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Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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1 Scope

. The present document establishes the minimum RF characteristics and minimum performance requirements for E-UTRA User Equipment (UE).

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] ITU-R Recommendation SM.329-10, "Unwanted emissions in the spurious domain"
- [3] ITU-R Recommendation M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".
- [4] 3GPP TS 36.211: "Physical Channels and Modulation".
- [5] 3GPP TS 36.212: "Multiplexing and channel coding".
- [6] 3GPP TS 36.213: "Physical layer procedures".
- [7] 3GPP TS 36.331: " Requirements for support of radio resource management ".
- [8] 3GPP TS 36.307: " Requirements on User Equipments (UEs) supporting a release-independent frequency band".
- [9] 3GPP TS 36.423: "X2 application protocol (X2AP) ".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply in the case of a single component carrier. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

Aggregated Channel Bandwidth: The RF bandwidth in which a UE transmits and receives multiple contiguously aggregated carriers.

Aggregated Transmission Bandwidth Configuration: The number of resource block allocated within the aggregated channel bandwidth.

Carrier aggregation: Aggregation of two or more component carriers in order to support wider transmission bandwidths.

Carrier aggregation band: A set of one or more operating bands across which multiple carriers are aggregated with a specific set of technical requirements.

Carrier aggregation bandwidth class: A class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE.

Carrier aggregation configuration: A combination of CA operating band(s) and CA bandwidth class(es) supported by a UE.

Channel edge: The lowest and highest frequency of the carrier, separated by the channel bandwidth.

Channel bandwidth: The RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell. The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

Contiguous carriers: A set of two or more carriers configured in a spectrum block where there are no RF requirements based on co-existence for un-coordinated operation within the spectrum block.

Contiguous resource allocation: A resource allocation of consecutive resource blocks within one carrier or across contiguously aggregated carriers. The gap between contiguously aggregated carriers due to the nominal channel spacing is allowed.

Contiguous spectrum: Spectrum consisting of a contiguous block of spectrum with no sub-block gaps.

Enhanced performance requirements type A: This defines performance requirements assuming as baseline receiver reference symbol based linear minimum mean square error interference rejection combining.

Inter-band carrier aggregation: Carrier aggregation of component carriers in different operating bands.

NOTE: Carriers aggregated in each band can be contiguous or non-contiguous.

Intra-band contiguous carrier aggregation: Contiguous carriers aggregated in the same operating band.

Intra-band non-contiguous carrier aggregation: Non-contiguous carriers aggregated in the same operating band.

Lower sub-block **edge:** The frequency at the lower edge of one sub-block. It is used as a frequency reference point for both transmitter and receiver requirements.

Non-contiguous spectrum: Spectrum consisting of two or more sub-blocks separated by sub-block gap(s).

Sub-block: This is one contiguous allocated block of spectrum for transmission and reception by the same UE. There may be multiple instances of sub-blocks within an RF bandwidth.

Sub-block bandwidth: The bandwidth of one sub-block.

Sub-block gap: A frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation.

Synchronized operation: Operation of TDD in two different systems, where no simultaneous uplink and downlink occur.

Unsynchronized operation: Operation of TDD in two different systems, where the conditions for synchronized operation are not met.

Upper sub-block edge: The frequency at the upper edge of one sub-block. It is used as a frequency reference point for both transmitter and receiver requirements.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

BW _{Channel}	Channel bandwidth
BW _{Channel,block}	Sub-block bandwidth, expressed in MHz. BW _{Channel,block} = F _{edge,block,high} - F _{edge,block,low} .
$BW_{Channel_CA}$	Aggregated channel bandwidth, expressed in MHz.
BW_{GB}	Virtual guard band to facilitate transmitter (receiver) filtering above / below edge CCs.

F	
E_{RS}	Transmitted energy per RE for reference symbols during the useful part of the symbol, i.e.
	excluding the cyclic prefix, (average power normalized to the subcarrier spacing) at the eNode B transmit antenna connector
\hat{E}_s	The averaged received energy per RE of the wanted signal during the useful part of the symbol,
	i.e. excluding the cyclic prefix, at the UE antenna connector; average power is computed within a set of REs used for the transmission of physical channels (including user specific RSs when present), divided by the number of REs within the set, and normalized to the subcarrier spacing
$F_{F_{Interferer}}(offset)$	Frequency Frequency offset of the interferer
F _{Interferer}	Frequency of the interferer
F _C F _{C,block, high}	Frequency of the carrier centre frequency Center frequency of the highest transmitted/received carrier in a sub-block.
$F_{C,block, low}$	Center frequency of the lowest transmitted/received carrier in a sub-block.
F _{CA_low}	The centre frequency of the <i>lowest carrier</i> , expressed in MHz.
F _{CA_high}	The centre frequency of the highest carrier, expressed in MHz.
$F_{DL_{low}}$	The lowest frequency of the downlink operating band
F _{DL_high}	The highest frequency of the downlink operating band
$\mathrm{F}_{\mathrm{UL_low}}$	The lowest frequency of the uplink operating band
F _{UL_high} F _{edge,block,low}	The highest frequency of the uplink operating band The lower sub-block edge, where $F_{edge,block,low} = F_{C,block,low} - F_{offset.}$
$F_{edge,block,high}$	The upper sub-block edge, where $F_{edge,block,low} = F_{C,block,low} + F_{offset}$.
F_{edge_low}	The <i>lower edge</i> of aggregated channel bandwidth, expressed in MHz.
F_{edge_high}	The higher edge of aggregated channel bandwidth, expressed in MHz.
F _{offset}	Frequency offset from $F_{C_{high}}$ to the <i>higher edge</i> or $F_{C_{low}}$ to the <i>lower edge</i> .
$F_{\rm offset, block, low}$	Separation between lower edge of a sub-block and the center of the lowest component carrier
$F_{\text{offset,block,high}}$	within the sub-block Separation between higher edge of a sub-block and the center of the highest component carrier within the sub-block
F _{OOB}	The boundary between the E-UTRA out of band emission and spurious emission domains.
I_o	The power spectral density of the total input signal (power averaged over the useful part of the
0	symbols within the transmission bandwidth configuration, divided by the total number of RE for
	this configuration and normalised to the subcarrier spacing) at the UE antenna connector, including the own-cell downlink signal
I _{or}	The total transmitted power spectral density of the own-cell downlink signal (power averaged over
	the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the eNode B transmit antenna connector
\hat{I}_{or}	The total received power spectral density of the own-cell downlink signal (power averaged over
	the useful part of the symbols within the transmission bandwidth configuration, divided by the total number of RE for this configuration and normalised to the subcarrier spacing) at the UE antenna connector
I_{ot}	The received power spectral density of the total noise and interference for a certain RE (average
	power obtained within the RE and normalized to the subcarrier spacing) as measured at the UE
x	antenna connector
L _{CRB}	Transmission bandwidth which represents the length of a contiguous resource block allocation
N _{cp}	expressed in units of resources blocks Cyclic prefix length
N _{DL}	Downlink EARFCN
N_{oc}	The power spectral density of a white noise source (average power per RE normalised to the
oc	subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as
N _{oc1}	measured at the UE antenna connector The power spectral density of a white noise source (average power per RE normalized to the
0.1	subcarrier spacing), simulating interference in non-CRS symbols in ABS subframe from cells that
	are not defined in a test procedure, as measured at the UE antenna connector.
N_{oc2}	The power spectral density of a white noise source (average power per RE normalized to the
	subcarrier spacing), simulating interference in CRS symbols in ABS subframe from all cells that are not defined in a test procedure, as measured at the UE antenna connector.

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N_{oc3}	The power spectral density of a white noise source (average power per RE normalised to the
005	subcarrier spacing), simulating interference in non-ABS subframe from cells that are not defined
	in a test procedure, as measured at the UE antenna connector
N_{oc}	The power spectral density (average power per RE normalised to the subcarrier spacing) of the
N _{Offs-DL}	summation of the received power spectral densities of the strongest interfering cells explicitly defined in a test procedure plus, as measured at the UE antenna connector. The respective power spectral density of each interfering cell relative to is defined by its associated DIP value. Offset used for calculating downlink EARFCN
N _{Offs-UL}	Offset used for calculating uplink EARFCN
N_{otx}	The power spectral density of a white noise source (average power per RE normalised to the
	subcarrier spacing) simulating eNode B transmitter impairments as measured at the eNode B transmit antenna connector
N _{RB}	Transmission bandwidth configuration, expressed in units of resource blocks
N_{RB_agg}	Aggregated Transmission Bandwidth Configuration The number of the aggregated RBs within the fully allocated Aggregated Channel bandwidth.
N_{RB_alloc}	Total number of simultaneously transmitted resource blocks in Channel bandwidth or Aggregated Channel Bandwidth.
N _{UL}	Uplink EARFCN.
Rav	Minimum average throughput per RB.
P _{CMAX}	The configured maximum UE output power.
P_{CMAX} , c	The configured maximum UE output power for serving cell c.
P _{EMAX}	Maximum allowed UE output power signalled by higher layers. Same as IE <i>P-Max</i> , defined in [7].
P _{EMAX, c}	Maximum allowed UE output power signalled by higher layers for serving cell <i>c</i> . Same as IE <i>P-Max</i> , defined in [7].
PInterferer	Modulated mean power of the interferer
P _{PowerClass}	P _{PowerClass} is the nominal UE power (i.e., no tolerance).
P _{UMAX}	The measured configured maximum UE output power.
Puw	Power of an unwanted DL signal
Pw	Power of a wanted DL signal
RB _{start}	Indicates the lowest RB index of transmitted resource blocks.
RB _{end}	Indicates the highest RB index of transmitted resource blocks.
Δf_{OOB}	Δ Frequency of Out Of Band emission.
$\Delta R_{IB,c}$	Allowed reference sensitivity relaxation due to support for inter-band CA operation, for serving cell <i>c</i> .
$\Delta T_{IB,c}$	Allowed maximum configured output power relaxation due to support for inter-band CA operation, for serving cell c.
ΔT_{C}	Allowed operating band edge transmission power relaxation.
$\Delta T_{C,c}$	Allowed operating band edge transmission power relaxation for serving cell c.
σ	Test specific auxiliary variable used for the purpose of downlink power allocation, defined in
	Annex C.3.2.
\mathbf{W}_{gap}	Sub-block gap size

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

ABS	Almost Blank Subframe
ACLR	Adjacent Channel Leakage Ratio
ACS	Adjacent Channel Selectivity
A-MPR	Additional Maximum Power Reduction
AWGN	Additive White Gaussian Noise
BS	Base Station
CA	Carrier Aggregation
CA_X	CA for band X where X is the applicable E-UTRA operating band
CA_X-X	Non-contiguous intra band CA for band X where X is the applicable E-UTRA operating band
CA_X-Y	CA for band X and Band Y where X and Y are the applicable E-UTRA operating band
CC	Component Carriers

CPE	Customer Premise Equipment
CPE X	Customer Premise Equipment for E-UTRA operating band X
CW	Continuous Wave
DL	Downlink
DIP	Dominant Interferer Proportion
eDL-MIMO	Down Link Multiple Antenna transmission
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
EPRE	Energy Per Resource Element
E-UTRA	Evolved UMTS Terrestrial Radio Access
EUTRAN	Evolved UMTS Terrestrial Radio Access Network
EVM	Error Vector Magnitude
FDD	Frequency Division Duplex
FRC	Fixed Reference Channel
HD-FDD	Half- Duplex FDD
MCS	Modulation and Coding Scheme
MOP	Maximum Output Power
MPR	Maximum Power Reduction
MSD	Maximum Sensitivity Degradation
OCNG	OFDMA Channel Noise Generator
OFDMA	Orthogonal Frequency Division Multiple Access
OOB	Out-of-band
PA	Power Amplifier
PCC	Primary Component Carrier
P-MPR	Power Management Maximum Power Reduction
PSS	Primary Synchronization Signal
PSS_RA	PSS-to-RS EPRE ratio for the channel PSS
RE	Resource Element
REFSENS	Reference Sensitivity power level
r.m.s	Root Mean Square
SCC	Secondary Component Carrier
SINR	Signal-to-Interference-and-Noise Ratio
SNR	Signal-to-Noise Ratio
SSS	Secondary Synchronization Signal
SSS_RA	SSS-to-RS EPRE ratio for the channel SSS
TDD	Time Division Duplex
UE	User Equipment
UL	Uplink
UL-MIMO	Up Link Multiple Antenna transmission
UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network
xCH_RA	xCH-to-RS EPRE ratio for the channel xCH in all transmitted OFDM symbols not containing RS
xCH_RB	xCH-to-RS EPRE ratio for the channel xCH in all transmitted OFDM symbols containing RS

4 General

4.1 Relationship between minimum requirements and test requirements

The Minimum Requirements given in this specification make no allowance for measurement uncertainty. The test specification TS 36.521-1 Annex F defines Test Tolerances. These Test Tolerances are individually calculated for each test. The Test Tolerances are used to relax the Minimum Requirements in this specification to create Test Requirements.

The measurement results returned by the Test System are compared - without any modification - against the Test Requirements as defined by the shared risk principle.

The Shared Risk principle is defined in ITU-R M.1545 [3].

4.2 Applicability of minimum requirements

- a) In this specification the Minimum Requirements are specified as general requirements and additional requirements. Where the Requirement is specified as a general requirement, the requirement is mandated to be met in all scenarios
- b) For specific scenarios for which an additional requirement is specified, in addition to meeting the general requirement, the UE is mandated to meet the additional requirements.
- c) The reference sensitivity power levels defined in subclause 7.3 are valid for the specified reference measurement channels.
- d) Note: Receiver sensitivity degradation may occur when:
 - 1) The UE simultaneously transmits and receives with bandwidth allocations less than the transmission bandwidth configuration (see Figure 5.6-1), and
 - 2) Any part of the downlink transmission bandwidth is within an uplink transmission bandwidth from the downlink center subcarrier.
- e) The spurious emissions power requirements are for the long term average of the power. For the purpose of reducing measurement uncertainty it is acceptable to average the measured power over a period of time sufficient to reduce the uncertainty due to the statistical nature of the signal.

4.3 Void

4.3A Applicability of minimum requirements (CA, UL-MIMO, eDL-MIMO)

The requirements in clauses 5, 6 and 7 which are specific to CA, UL-MIMO, and eDL-MIMO are specified as suffix A, B, C, D where;

- a) Suffix A additional requirements need to support CA
- b) Suffix B additional requirements need to support UL-MIMO
- c) Suffix C additional requirements need to support TBD
- d) Suffix D additional requirements need to support eDL-MIMO

A terminal which supports the above features needs to meet both the general requirements and the additional requirement applicable to the additional subclause (suffix A, B, C and D) in clauses 5, 6 and 7. Where there is a difference in requirement between the general requirements and the additional subclause requirements (suffix A, B, C and D) in clauses 5, 6 and 7, the tighter requirements are applicable unless stated otherwise in the additional subclause.

A terminal which supports more than one feature (CA, UL-MIMO, and eDL-MIMO) in clauses 5, 6 and 7 shall meet all of the separate corresponding requirements.

For a terminal supporting CA, compliance with minimum requirements for non-contiguous intra-band carrier aggregation in any given operating band does not imply compliance with minimum requirements for contiguous intraband carrier aggregation in the same operating band.

For a terminal supporting CA, compliance with minimum requirements for contiguous intra-band carrier aggregation in any given operating band does not imply compliance with minimum requirements for non- contiguous intra-band carrier aggregation in the same operating band.

4.4 RF requirements in later releases

The standardisation of new frequency bands may be independent of a release. However, in order to implement a UE that conforms to a particular release but supports a band of operation that is specified in a later release, it is necessary to

specify some extra requirements. TS 36.307 [8] specifies requirements on UEs supporting a frequency band that is independent of release.

NOTE: For terminals conforming to the 3GPP release of the present document, some RF requirements in later releases may be mandatory independent of whether the UE supports the bands specified in later releases or not. The set of requirements from later releases that is also mandatory for UEs conforming to the 3GPP release of the present document is determined by regional regulation.

5 Operating bands and channel arrangement

5.1 General

The channel arrangements presented in this clause are based on the operating bands and channel bandwidths defined in the present release of specifications.

- NOTE: Other operating bands and channel bandwidths may be considered in future releases.
- 5.2 Void
- 5.3 Void
- 5.4 Void

5.5 Operating bands

E-UTRA is designed to operate in the operating bands defined in Table 5.5-1.

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit FuL_low – FuL_high	Downlink (DL) operating band BS transmit UE receive F _{DL_low} – F _{DL_high}	Duplex Mode
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	869 MHz – 894MHz	FDD
6 ¹	830 MHz – 840 MHz	875 MHz – 885 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	FDD
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	FDD
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	FDD
12	699 MHz – 716 MHz	729 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	746 MHz – 756 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
15	Reserved	Reserved	FDD
16	Reserved	Reserved	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	FDD
22	3410 MHz – 3490 MHz	3510 MHz – 3590 MHz	FDD
23	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	FDD
24	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	FDD
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	FDD
26	814 MHz – 849 MHz	859 MHz – 894 MHz	FDD
27	807 MHz – 824 MHz	852 MHz – 869 MHz	FDD
28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
29	N/A	717 MHz – 728 MHz	FDD ²
-			100
33	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	TDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
35	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	TDD
36	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	TDD
37	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz 2690 MHz	2496 MHz 2690 MHz	TDD
42	3400 MHz – 3600 MHz	3400 MHz – 3600 MHz	TDD
43	3600 MHz – 3800 MHz	3600 MHz – 3800 MHz	TDD
44	703 MHz – 803 MHz	703 MHz – 803 MHz	TDD
	Band 6 is not applicable		100
NOTE 2:	Restricted to E-UTRA operation whe downlink operating band is paired wi carrier aggregation configuration that	th the uplink operating band (externation	

Table 5.5-1 E-UTRA operating bands

5.5A Operating bands for CA

E-UTRA carrier aggregation is designed to operate in the operating bands defined in Tables 5.5A-1 and 5.5A-2.

E-UTRA	E-UTRA	RA Uplink (UL) operating band			Downlink (D	Duplex		
CA Band	Band	BS receive / UE transmit			BS transi	nit /	UE receive	Mode
		$F_{UL_{low}} - F_{UL_{high}}$			F _{DL_lo}	w -	F_{DL_high}	
CA_1	1	1920 MHz	Ι	1980 MHz	2110 MHz	Ι	2170 MHz	FDD
CA_7	7	2500 MHz	Ι	2570 MHz	2620 MHz	Ι	2690 MHz	FDD
CA_38	38	2570 MHz	Ι	2620 MHz	2570 MHz	Ι	2620 MHz	TDD
CA_40	40	2300 MHz	Ι	2400 MHz	2300 MHz	Ι	2400 MHz	TDD
CA_41	41	2496 MHz		2690 MHz	2496 MHz		2690 MHz	TDD

Table 5.5A-1: Intra-band of	contiguous CA c	perating bands
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Table 5.5A-2: Inter-band CA operating bands

E-UTRA	E-UTRA	Uplink (UL) operating band			Downlink (D	L) c	perating band	Duplex	
CA Band	Band	BS receive / UE transmit			BS transi	Mode			
		F _{UL_low} – F _{UL_high}			F _{DL_lo}				
CA_1-5	1	1920 MHz	-	1980 MHz	2110 MHz	—	2170 MHz	FDD	
CA_1-5	5	824 MHz		849 MHz	869 MHz	Ι	894 MHz	FDD	
CA_1-18	1	1920 MHz	-	1980 MHz	2110 MHz	I	2170 MHz	FDD	
CA_1-10	18	815 MHz	-	830 MHz	860 MHz	-	875 MHz	TDD	
CA_1-19	1	1920 MHz	—	1980 MHz	2110 MHz	-	2170 MHz	FDD	
CA_1-19	19	830 MHz	—	845 MHz	875 MHz	-	890 MHz	FDD	
CA_1-21	1	1920 MHz	-	1980 MHz	2110 MHz	-	2170 MHz	FDD	
07_1-21	21	1447.9 MHz	-	1462.9 MHz	1495.9 MHz	-	1510.9 MHz	TOD	
CA_2-17	2	1850 MHz	—	1910 MHz	1930 MHz	-	1990 MHz	FDD	
0A_2-17	17	704 MHz	-	716 MHz	734 MHz	-	746 MHz	TDD	
CA_2-29	2	1850 MHz	-	1910 MHz	1930 MHz	-	1990 MHz	FDD	
CA_2-29	29		N/A		717 MHz	-	728 MHz	FDD	
CA_3-5	3	1710 MHz	—	1785 MHz	1805 MHz	-	1880 MHz	FDD	
CA_3-3	5	824 MHz	-	849 MHz	869 MHz	—	894 MHz	TDD	
CA_3-7	3	1710 MHz	-	1785 MHz	1805 MHz	05 MHz – 1880 MHz		FDD	
CA_3-7	7	2500 MHz	—	2570 MHz	2620 MHz	-	2690 MHz	FDD	
CA_3-8	3	1710 MHz		1785 MHz	1805 MHz		1880 MHz	FDD	
CA_3-0	8	880 MHz		915 MHz	925 MHz		960 MHz	FDD	
CA_3-20	3	1710 MHz	-	1785 MHz	1805 MHz	Ι	1880 MHz	FDD	
CA_3-20	20	832 MHz	-	862 MHz	791 MHz	—	821 MHz		
CA_4-5	4	1710 MHz	-	1755 MHz	2110 MHz	-	2155 MHz	FDD	
CA_4-5	5	824 MHz	-	849 MHz	869 MHz	Ι	894 MHz	FDD	
CA_4-7	4	1710 MHz		1755 MHz	2110 MHz		2155 MHz	FDD	
CA_4-7	7	2500 MHz		2570 MHz	2620 MHz		2690 MHz	FDD	
CA_4-12	4	1710 MHz	-	1755 MHz	2110 MHz	Ι	2155 MHz	FDD	
UA_4-12	12	699 MHz	Ι	716 MHz	729 MHz	-	746 MHz	FDD	
CA_4-13	4	1710 MHz	-	1755 MHz	2110 MHz	—	2155 MHz	FDD	
CA_4-13	13	777 MHz	Ι	787 MHz	746 MHz	-	756 MHz	FDD	
CA_4-17	4	1710 MHz	Ι	1755 MHz	2110 MHz	-	2155 MHz	FDD	
CA_4-17	17	704 MHz	-	716 MHz	734 MHz	Ι	746 MHz	FDD	
CA_4-29	4	1710 MHz	Ι	1755 MHz	2110 MHz	-	2155 MHz	FDD	
CA_4-29	29		N/A		717 MHz	Ι	728 MHz	FDD	
CA_5-12	5	824 MHz	-	849 MHz	869 MHz	Ι	894 MHz	FDD	
CA_5-12	12	699 MHz	Ι	716 MHz	729 MHz	-	746 MHz	FDD	
CA_5-17	5	824 MHz	-	849 MHz	869 MHz	-	894 MHz	FDD	
CA_0-17	17	704 MHz	-	716 MHz	734 MHz	-	746 MHz		
CA_7-20	7	2500 MHz	-	2570 MHz	2620 MHz	-	2690 MHz	FDD	
07_1-20	20 832 MHZ - 6		862 MHz	791 MHz	-	821 MHz	עטיז ן		
CA_8-20	8	880 MHz	-	915 MHz	925 MHz	-	960 MHz	FDD	
07_0-20	20	832 MHz	-	862 MHz	791 MHz	-	821 MHz	FUU	
CA_11-18	11	1427.9 MHz	-	1447.9 MHz	1475.9 MHz	-	1495.9 MHz	FDD	
07_11-10	18	815 MHz	-	830 MHz	860 MHz	_	875 MHz		

E-UTRA	E-UTRA	Uplink (UL) operating band			Downlink (DL) operating band			Duplex
CA Band	Band	BS receive / UE transmit			BS transi	nit /	UE receive	Mode
		F _{UL_low}	F _{UL_high}	F _{DL_lo}	w -	F_{DL_high}		
CA_25-25	25	1850 MHz	-	1915 MHz	1930 MHz	Ι	1995 MHz	FDD
CA_41-41	41	2496 MHz	-	2690 MHz	2496 MHz	I	2690 MHz	TDD

5.5B Operating bands for UL-MIMO

E-UTRA UL-MIMO is designed to operate in the operating bands defined in Table 5.5-1.

Table 5.5B-1: Void

5.6 Channel bandwidth

Requirements in present document are specified for the channel bandwidths listed in Table 5.6-1.

Table 5.6-1: Transmission bandwidth configuration N_{RB} in E-UTRA channel bandwidths

Channel bandwidth BW _{Channel} [MHz]	1.4	3	5	10	15	20
Transmission bandwidth configuration N _{RB}	6	15	25	50	75	100

Figure 5.6-1 shows the relation between the Channel bandwidth (BW_{Channel}) and the Transmission bandwidth configuration (N_{RB}). The channel edges are defined as the lowest and highest frequencies of the carrier separated by the channel bandwidth, i.e. at F_C +/- BW_{Channel}/2.

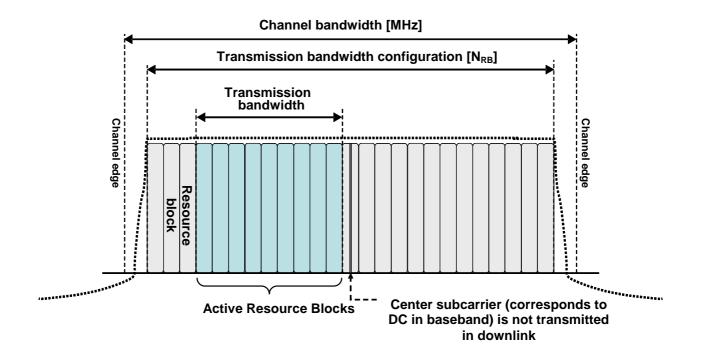


Figure 5.6-1: Definition of channel bandwidth and transmission bandwidth configuration for one E-UTRA carrier

5.6.1 Channel bandwidths per operating band

a) The requirements in this specification apply to the combination of channel bandwidths and operating bands shown in Table 5.6.1-1. The transmission bandwidth configuration in Table 5.6.1-1 shall be supported for each of the specified channel bandwidths. The same (symmetrical) channel bandwidth is specified for both the TX and RX path.

	E-UTRA band / Channel bandwidth							
E-UTRA Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
1			Yes	Yes	Yes	Yes		
2	Yes	Yes	Yes	Yes	Yes ¹	Yes ¹		
3	Yes	Yes	Yes	Yes	Yes ¹	Yes ¹		
4	Yes	Yes	Yes	Yes	Yes	Yes		
5	Yes	Yes	Yes	Yes ¹				
6			Yes	Yes ¹				
7			Yes	Yes	Yes ³	Yes ^{1, 3}		
8	Yes	Yes	Yes	Yes ¹				
9			Yes	Yes	Yes ¹	Yes ¹		
10			Yes	Yes	Yes	Yes		
11			Yes	Yes ¹				
12	Yes	Yes	Yes ¹	Yes ¹				
13			Yes ¹	Yes ¹				
14			Yes ¹	Yes ¹				
 17			Yes ¹	Yes ¹				
18			Yes	Yes ¹	Yes ¹			
19			Yes	Yes ¹	Yes ¹			
20			Yes	Yes ¹	Yes ¹	Yes ¹		
21			Yes	Yes ¹	Yes ¹			
22			Yes	Yes	Yes ¹	Yes ¹		
23	Yes	Yes	Yes	Yes	Yes ¹	Yes ¹		
24	100	100	Yes	Yes	100	100		
25	Yes	Yes	Yes	Yes	Yes ¹	Yes ¹		
26	Yes	Yes	Yes	Yes ¹	Yes ¹			
27	Yes	Yes	Yes	Yes ¹				
28		Yes	Yes	Yes ¹	Yes ¹	Yes ^{1, 2}		
33			Yes	Yes	Yes	Yes		
34			Yes	Yes	Yes			
35	Yes	Yes	Yes	Yes	Yes	Yes		
36	Yes	Yes	Yes	Yes	Yes	Yes		
37			Yes	Yes	Yes	Yes		
38			Yes	Yes	Yes ³	Yes ³		
39			Yes	Yes	Yes	Yes		
40			Yes	Yes	Yes	Yes		
41			Yes	Yes	Yes	Yes		
42			Yes	Yes	Yes	Yes		
43			Yes	Yes	Yes	Yes		
44		Yes	Yes	Yes	Yes	Yes		
NOTE 2: 2 NOTE 3: 3	sensitivity rec For the 20 M E-UTRA UL c 738 MHz refers to the pe restricted	uirement (su AHz bandwid carrier freque bandwidth f by the netwo	ubclause 7.3 ofth, the minine encies confine or which the ork for some	elaxation of th) is allowed. num requiren ed to either 7 uplink transm channel assig et unwanted 6	nents are spo 13-723 MHz nission bando gnments in F	ecified for or 728- width can DD/TDD		
(Clause 6.6.3	.2).						

Table 5.6.1-1: E-UTRA channel bandwidth

b) The use of different (asymmetrical) channel bandwidth for the TX and RX is not precluded and is intended to form part of a later release.

5.6A Channel bandwidth for CA

For intra-band contiguous carrier aggregation *Aggregated Channel Bandwidth*, *Aggregated Transmission Bandwidth Configuration* and *Guard Bands* are defined as follows, see Figure 5.6A-1.

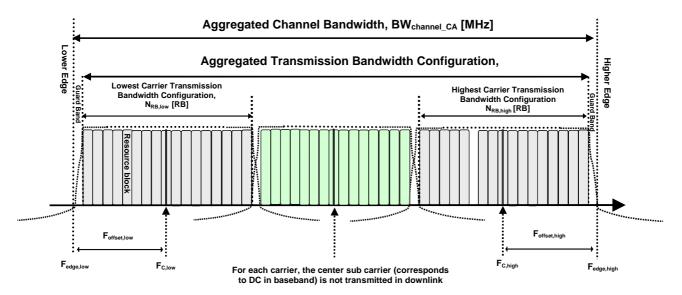


Figure 5.6A-1. Definition of Aggregated channel bandwidth and aggregated channel bandwidth edges

The aggregated channel bandwidth, BW_{Channel_CA}, is defined as

$$BW_{Channel_{CA}} = F_{edge,high} - F_{edge,low}$$
 [MHz]

The lower bandwidth edge $F_{edge,low}$ and the upper bandwidth edge $F_{edge,high}$ of the aggregated channel bandwidth are used as frequency reference points for transmitter and receiver requirements and are defined by

 $F_{edge,low} = F_{C,low} - F_{offset,low}$ $F_{edge,high} = F_{C,high} + F_{offset,high}$

The lower and upper frequency offsets depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carrier and are defined as

$$\begin{split} F_{offset,low} &= (0.18 N_{RB,low} + \Delta f_1)/2 + BW_{GB} \, [MHz] \\ F_{offset,high} &= (0.18 N_{RB,high} + \Delta f_1)/2 + BW_{GB} \, [MHz] \end{split}$$

where $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing and $\Delta f_1 = 0$ for the uplink, while N_{RB,low} and N_{RB,high} are the transmission bandwidth configurations according to Table 5.6-1 for the lowest and highest assigned component carrier, respectively. BW_{GB} denotes the *Nominal Guard Band* and is defined in Table 5.6A-1, and the factor 0.18 is the PRB bandwidth in MHz.

NOTE: The values of BW_{Channel_CA} for UE and BS are the same if the lowest and the highest component carriers are identical.

Aggregated Transmission Bandwidth Configuration is the number of the aggregated RBs within the fully allocated Aggregated Channel bandwidth and is defined per CA Bandwidth Class (Table 5.6A-1).

For intra-band non-contiguous carrier aggregation *Sub-block Bandwidth* and *Sub-block edges* are defined as follows, see Figure 5.6A-2.

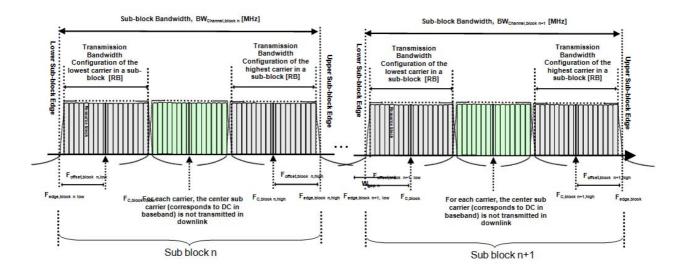


Figure 5.6A-2. Non-contiguous intraband CA terms and definitions

The lower sub-block edge of the Sub-block Bandwidth (BW_{Channel,block}) is defined as

 $F_{edge,block, low} = F_{C,block,low} - F_{offset,block, low}$

The upper sub-block edge of the Sub-block Bandwidth is defined as

 $F_{edge,block,high} = F_{C,block,high} + F_{offset,block,high}$.

The Sub-block Bandwidth, BW_{Channel.block}, is defined as follows:

BWChannel,block = Fedge,block,high - Fedge,block,low [MHz]

The lower and upper frequency offsets F_{offset,block,low} and F_{offset,block,high} depend on the transmission bandwidth configurations of the lowest and highest assigned edge component carriers within a sub-block and are defined as

$$\begin{split} F_{offset,block,low} &= (0.18 N_{RB,low} + \Delta f_1)/2 + BW_{GB} \, [MHz] \\ F_{offset,block,high} &= (0.18 N_{RB,high} + \Delta f_1)/2 + BW_{GB} \, [MHz] \end{split}$$

where $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing and $\Delta f_1 = 0$ for the uplink, while N_{RB,low} and N_{RB,high} are the transmission bandwidth configurations according to Table 5.6-1 for the lowest and highest assigned component carrier within a sub-block, respectively. BW_{GB} denotes the *Nominal Guard Band* and is defined in Table 5.6A-1, and the factor 0.18 is the PRB bandwidth in MHz.

The sub-block gap size between two consecutive sub-blocks W_{gap} is defined as

 $W_{gap} = F_{edge,block n+1,low -} F_{edge,block n,high [MHz]}$

CA Bandwidth Class Bandwidth Configuration		Maximum number of CC	Nominal Guard Band BW _{GB}				
A	N _{RB,agg} ≤ 100	1	a₁BW _{Channel(1)} - 0.5∆f₁ (NOTE 2)				
В	N _{RB,agg} ≤ 100	2	FFS				
С	100 < N _{RB,agg} ≤ 200	2	0.05 $max(BW_{Channel(1)}, BW_{Channel(2)}) - 0.5\Delta f_1$				
D	200 < N _{RB,agg} ≤ [300]	FFS	FFS				
E	[300] < N _{RB,agg} ≤ [400]	FFS	FFS				
F	F [400] < N _{RB,agg} ≤ [500]		FFS				
NOTE 1: BW _{Cha}	nnel(1) and BW _{Channel(2)} are c	hannel bandwidth	s of two E-UTRA component carriers				
according to Table 5.6-1 and $\Delta f_1 = \Delta f$ for the downlink with Δf the subcarrier spacing while $\Delta f_1 =$							
0 for th	0 for the uplink.						
NOTE 2: a ₁ = 0.	NOTE 2: $a_1 = 0.16/1.4$ for BW _{Channel(1)} = 1.4 MHz whereas $a_1 = 0.05$ for all other channel bandwidths.						

Table 5.6A-1: CA bandwidth classes and corresponding nominal guard bands

The channel spacing between centre frequencies of contiguously aggregated component carriers is defined in subclause 5.7.1A.

5.6A.1 Channel bandwidths per operating band for CA

The requirements for carrier aggregation in this specification are defined for carrier aggregation configurations with associated bandwidth combination sets. For inter-band carrier aggregation, a *carrier aggregation configuration* is a combination of operating bands, each supporting a carrier aggregation bandwidth class. For intra-band contiguous carrier aggregation, a carrier aggregation configuration is a single operating band supporting a carrier aggregation bandwidth class.

For each carrier aggregation configuration, requirements are specified for all bandwidth combinations contained in a *bandwidth combination set*, which is indicated per supported band combination in the UE radio access capability. A UE can indicate support of several bandwidth combination sets per band combination. Furthermore, if the UE indicates support of a bandwidth combination set that is a superset of another applicable bandwidth combination set, the latter is supported by the UE even if not indicated.

Requirements for intra-band contiguous carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 5.6A.1-1. Requirements for inter-band carrier aggregation are defined for the carrier aggregation configurations and bandwidth combination sets specified in Table 5.6A.1-2.

The DL component carrier combinations for a given CA configuration shall be symmetrical in relation to channel centre unless stated otherwise in Table 5.6A.1-1 or 5.6A.1-2.

E-UTRA CA configuration / Bandwidth combination set						
E-UTRA CA configuration	Component carriers in c freq	Maximum				
	Allowed channel bandwidths for carrier [MHz]	Allowed channel bandwidths for carrier [MHz]	aggregated bandwidth [MHz]	Bandwidth combination set		
CA 1C	15	15	40	0		
CA_1C	20	20	40			
CA 70	15	15	40	0		
CA_7C	20	20	- 40			
CA 28C	15	15	40	0		
CA_38C	20	20	- 40			
	10	20		0		
CA_40C	15	15	40			
	20	10, 20				
	10	20		0		
CA_41C	15	15, 20	40			
	20	10, 15, 20				
5.6A supp	-1 (the indexing letter). Absend ort of all classes. he supported CC bandwidth co	pperating band and a CA bandw ce of a CA bandwidth class for ombinations, the CC downlink a	an operating ba	nd implies		

Table 5.6A.1-1: E-UTRA CA configurations and bandwidth combination sets defined for intra-band contiguous CA

E-UTRA CA Configuration	E- UTRA Bands	E-UTRA C 1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_1A-5A	1				Yes			20	0
	5			Yes	Yes Yes	Yes	Yes		
CA_1A-18A	18			Yes	Yes	Yes	res	- 35	0
	10			Yes	Yes	Yes	Yes		
CA_1A-19A	19			Yes	Yes	Yes	105	35	0
	1			Yes	Yes	Yes	Yes		
CA_1A-21A	21			Yes	Yes	Yes		35	0
01 01 171	2			Yes	Yes				<u>^</u>
CA_2A-17A	17			Yes	Yes			20	0
	2			Yes	Yes			20	0
CA_2A-29A	29		Yes	Yes	Yes			20	0
	3				Yes	Yes	Yes	- 30	0
CA_3A-5A	5			Yes	Yes				U
	3				Yes			20	1
	5			Yes	Yes			20	•
CA_3A-7A	3			Yes	Yes	Yes	Yes	40	0
•	7			-	Yes	Yes	Yes		<u> </u>
	3				Yes	Yes	Yes	- 30 - 20	0
CA_3A-8A	8			Yes	Yes				
	3			Vee	Yes				1
	8			Yes Yes	Yes Yes	Yes	Yes	- 30	0
CA_3A-20A	20			Yes	Yes	Tes	165		
	4			Yes	Yes				0
CA_4A-5A	5			Yes	Yes			20	
	4			Yes	Yes				
CA_4A-7A	7			Yes	Yes	Yes	Yes	30	0
0.0.4.0.0	4	Yes	Yes	Yes	Yes				2
CA_4A-12A	12			Yes	Yes			20	0
	4			Yes	Yes	Yes	Yes	- 30	0
CA_4A-13A	13				Yes				0
CA_4A-13A	4			Yes	Yes			20	1
	13				Yes			20	1
CA_4A-17A	4			Yes	Yes			20	0
<u></u>	17			Yes	Yes				
CA_4A-29A	4			Yes	Yes			20	0
	29		Yes	Yes	Yes			-	-
CA_5A -12A	5			Yes	Yes			20	0
	12 5			Yes	Yes				
CA_5A-17A	5 17			Yes Yes	Yes Yes			20	0
	7			162	Yes	Yes	Yes		
CA_7A-20A	20			Yes	Yes	163	169	- 30	0
	8			Yes	Yes				
CA_8A-20A	20			Yes	Yes			20	0
	11			Yes	Yes				_
CA_11A-18A	18			Yes	Yes	Yes		25	0
NOTE 1: The CA Table 5.0 all classe NOTE 2: For each NOTE 3: For the s	Configuratio 6A-1 (the inc es. h band comb	lexing lette	er). Absen combinat	ation of ar ce of a CA ions of inc	operating bandwid	band and th class fo	r an opera	ting band implie	es support of

Table 5.6A.1-2: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA

Table 5.6A.1-3: E-UTRA CA configurations and bandwidth combination sets defined for noncontiguous intra-band CA

		ration / Bandwidth combinat	ion set	
	Component carriers in o frequ			
E-UTRA CA configuration	Allowed channel Allowed channel bandwidths for carrier [MHz] [MHz]		Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_25A-25A	5, 10	5, 10	20	0
CA_41A-41A	10, 15, 20	10, 15, 20	40	0

5.6B Channel bandwidth for UL-MIMO

The requirements specified in subclause 5.6 are applicable to UE supporting UL-MIMO.

5.6B.1 Void

5.7 Channel arrangement

5.7.1 Channel spacing

The spacing between carriers will depend on the deployment scenario, the size of the frequency block available and the channel bandwidths. The nominal channel spacing between two adjacent E-UTRA carriers is defined as following:

Nominal Channel spacing =
$$(BW_{Channel(1)} + BW_{Channel(2)})/2$$

where $BW_{Channel(1)}$ and $BW_{Channel(2)}$ are the channel bandwidths of the two respective E-UTRA carriers. The channel spacing can be adjusted to optimize performance in a particular deployment scenario.

5.7.1A Channel spacing for CA

For intra-band contiguous carrier aggregation bandwidth class C, the nominal channel spacing between two adjacent E-UTRA component carriers is defined as the following:

Nominal channel spacing =
$$\frac{BW_{Channel(1)} + BW_{Channel(2)} - 0.1 |BW_{Channel(1)} - BW_{Channel(2)}|}{0.6} = 0.3 \text{ [MHz]}$$

where $BW_{Channel(1)}$ and $BW_{Channel(2)}$ are the channel bandwidths of the two respective E-UTRA component carriers according to Table 5.6-1 with values in MHz. The channel spacing for intra-band contiguous carrier aggregation can be adjusted to any multiple of 300 kHz less than the nominal channel spacing to optimize performance in a particular deployment scenario.

For intra-band non-contiguous carrier aggregation the channel spacing between two E-UTRA component carriers in different sub-blocks shall be larger than the nominal channel spacing defined in this subclause.

5.7.2 Channel raster

The channel raster is 100 kHz for all bands, which means that the carrier centre frequency must be an integer multiple of 100 kHz.

5.7.2A Channel raster for CA

For carrier aggregation the channel raster is 100 kHz for all bands, which means that the carrier centre frequency must be an integer multiple of 100 kHz.

5.7.3 Carrier frequency and EARFCN

The carrier frequency in the uplink and downlink is designated by the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) in the range 0 - 65535. The relation between EARFCN and the carrier frequency in MHz for the downlink is given by the following equation, where $F_{DL_{low}}$ and $N_{Offs-DL}$ are given in Table 5.7.3-1 and N_{DL} is the downlink EARFCN.

 $F_{DL} = F_{DL \text{ low}} + 0.1(N_{DL} - N_{Offs-DL})$

The relation between EARFCN and the carrier frequency in MHz for the uplink is given by the following equation where F_{UL_low} and $N_{Offs-UL}$ are given in Table 5.7.3-1 and N_{UL} is the uplink EARFCN.

 $F_{UL} = F_{UL_low} + 0.1(N_{UL} - N_{Offs\text{-}UL})$

E-UTRA		Downlink		Uplink			
Operating Band	F _{DL_low} (MHz)	$N_{Offs-DL}$	Range of N _{DL}	F _{UL_low} (MHz)	N _{Offs-UL}	Range of NUL	
1	2110	0	0 - 599	1920	18000	18000 - 1859	
2	1930	600	600 – 1199	1850	18600	18600 - 1919	
3	1805	1200	1200 - 1949	1710	19200	19200 - 1994	
4	2110	1950	1950 - 2399	1710	19950	19950 - 2039	
5	869	2400	2400 - 2649	824	20400	20400 - 2064	
6	875	2650	2650 - 2749	830	20650	20650 - 2074	
7	2620	2750	2750 - 3449	2500	20750	20750 - 2144	
8	925	3450	3450 - 3799	880	21450	21450 - 2179	
9	1844.9	3800	3800 - 4149	1749.9	21800	21800 - 2214	
10	2110	4150	4150 - 4749	1710	22150	22150 - 2274	
11	1475.9	4750	4750 - 4949	1427.9	22750	22750 - 2294	
12	729	5010	5010 - 5179	699	23010	23010 - 23179	
13	746	5180	5180 - 5279	777	23180	23180 - 2327	
14	758	5280	5280 - 5379	788	23280	23280 - 2337	
17	734	5730	5730 - 5849	704	23730	23730 - 2384	
18	860	5850	5850 - 5999	815	23850	23850 - 2399	
19	875	6000	6000 - 6149	830	24000	24000 - 2414	
20	791	6150	6150 - 6449	832	24150	24150 - 2444	
21	1495.9	6450	6450 - 6599	1447.9	24450	24450 - 2459	
22	3510	6600	6600 - 7399	3410	24600	24600 - 2539	
23	2180	7500	7500 - 7699	2000	25500	25500 - 2569	
24	1525	7700	7700 - 8039	1626.5	25700	25700 - 2603	
25	1930	8040	8040 - 8689	1850	26040	26040 - 2668	
26	859	8690	8690 - 9039	814	26690	26690 - 2703	
27	852	9040	9040 - 9209	807	27040	27040 - 2720	
28	758	9210	9210 - 9659	703	27210	27210 - 2765	
29 ²	717	9660	9660 - 9769		N/A	1	
33	1900	36000	36000 - 36199	1900	36000	36000 - 3619	
34	2010	36200	36200 - 36349	2010	36200	36200 - 3634	
35	1850	36350	36350 - 36949	1850	36350	36350 - 3694	
36	1930	36950	36950 - 37549	1930	36950	36950 - 3754	
37	1910	37550	37550 - 37749	1910	37550	37550 - 3774	
38	2570	37750	37750 – 38249	2570	37750	37750 - 3824	
39	1880	38250	38250 - 38649	1880	38250	38250 - 3864	
40	2300	38650	38650 - 39649	2300	38650	38650 - 3964	
41	2496	39650	39650 - 41589	2496	39650	39650 - 4158	
42	3400	41590	41590 - 43589	3400	41590	41590 - 4358	
43	3600	43590	43590 - 45589	3600	43590	43590 - 4558	
44	703	45590	45590 - 46589	703	45590	45590 - 4658	
с 7 с	arrier extends bey 5 and 100 channe	ond the opera I numbers at t t the upper op	nate carrier frequenci ting band edge shall he lower operating ba erating band edge sh	not be used. This in and edge and the la	plies that the fi st 6, 14, 24, 49	rst 7, 15, 25, 50, 74 and 99	

Table 5.7.3-1: E-UTRA channel numbers

5.7.4

TX-RX frequency separation

a) The default E-UTRA TX channel (carrier centre frequency) to RX channel (carrier centre frequency) separation is specified in Table 5.7.4-1 for the TX and RX channel bandwidths defined in Table 5.6.1-1

E-UTRA Operating Band	TX - RX
	carrier centre frequency
	separation
1	190 MHz
2	80 MHz.
3	95 MHz.
4	400 MHz
5	45 MHz
6	45 MHz
7	120 MHz
8	45 MHz
9	95 MHz
10	400 MHz
11	48 MHz
12	30 MHz
13	-31 MHz
14	-30 MHz
17	30 MHz
18	45 MHz
19	45 MHz
20	-41 MHz
21	48 MHz
22	100 MHz
23	180 MHz
24	-101.5 MHz
25	80 MHz
26	45 MHz
27	45 MHz
28	55 MHz

Table 5.7.4-1: Default UE TX-RX frequency separation	Table 5.7.4-1	: Default UE	TX-RX free	quency se	paration
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b) The use of other TX channel to RX channel carrier centre frequency separation is not precluded and is intended to form part of a later release.

5.7.4A TX-RX frequency separation for CA

For intra-band contiguous carrier aggregation, the same TX-RX frequency separation as specified in Table 5.7.4-1 is applied to PCC and SCC, respectively.

6 Transmitter characteristics

6.1 General

Unless otherwise stated, the transmitter characteristics are specified at the antenna connector of the UE with a single or multiple transmit antenna(s). For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

- 6.2 Transmit power
- 6.2.1 Void

6.2.2 UE maximum output power

The following UE Power Classes define the maximum output power for any transmission bandwidth within the channel bandwidth for non CA configuration and UL-MIMO unless otherwise stated. The period of measurement shall be at least one sub frame (1ms).

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	±2		
2					23	$\pm 2^2$		
3					23	$\pm 2^2$		
4					23	<u>+2</u>		
5					23	±2		
6					23			
7					23	$\frac{\pm 2}{\pm 2^2}$		
8					23	$\pm 2^2$		
9					23	±2		
10					23	±2 ±2		
					23			
11						$\frac{\pm 2}{\pm 2^2}$		
12				-	23		-	-
13					23	±2		
14	31	+2/-3			23	<u>+2</u>		
17					23	<u>+2</u>		
18					23	±2 ⁵		
19					23	±2		
20					23	$\pm 2^2$		
21					23	<u></u> ±2		
22					23	$+2/-3.5^{2}$		
23					23°	±2°		
23					23	<u>+2</u>		
24					23	$\pm 2^{2}$		
26					23	$\pm 2^{2}$		
20						±2 ±2		
					23 23			
28 					23	+2/-2.5		
33					23	±2		
34					23	±2		
35					23	±2		
36					23	±2		
37					23	<u>+2</u>		
38					23	<u>+2</u>		
39					23	 ±2		
40					23	±2		
41	1			1	23	$\pm 2^2$	1	1
42					23	+2/-3		
42					23	+2/-3		
43					23	+2/[-3]		
NOTE 1:	Void	<u> </u>		1	23	T2/["J]	<u>I</u>	1
NOTE 2: NOTE 3: NOTE 4:	2 refers to th $F_{UL_high} - 4$ tolerance lin For the UE $P_{PowerClass}$ is	MHz and F _{UL_h} nit by 1.5 dB which supports the maximum	_{igh} , the max s both Band ⊨UE power s	imum output p 11 and Band specified witho	ower require 21 operating out taking int	within F _{UL_low} ar ement is relaxe g frequencies, t to account the t	d by reducing he tolerance olerance	g the lower is FFS.
	reducing the 818 MHz.	e lower toleran	ce limit by 1	.5 dB for trans	smission bai	m output power ndwidths confin	ed within 815	5 MHz and
NOTE 6:	vvnen NS_2	20 is signalled,	the total ou	itput power wit	nin 2000-20	05 MHz shall b	e limited to /	abm.

Table 6.2.2-1: UE Power Class

6.2.2A UE maximum output power for CA

The following UE Power Classes define the maximum output power for any transmission bandwidth within the aggregated channel bandwidth.

The maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms).

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the requirements in subclause 6.2.2 apply.

For intra-band contiguous carrier aggregation the maximum output power is specified in Table 6.2.2A-1.

E-UTRA CA Configuration	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)	
CA_1C					23	+2/-2			
CA_7C					23	$+2/-2^{2}$			
CA_38C					23	+2/-2			
CA_40C					23	+2/-2			
CA_41C	23 +2/-2 ²								
NOTE 1: Void	NOTE 1: Void								
NOTE 2: For tr									
F _{UL_hi}	_{gh} , the maxin	num output po	wer require	ment is relaxe	d by reducii	ng the lower tole	erance limit l	oy 1.5 dB	
NOTE 3: PPowerClass is the maximum UE power specified without taking into account the tolerance									
	NOTE 4: For intra-band contiguous carrier aggregation the maximum power requirement should apply to the total								
transr	mitted power	over all comp	onent carrie	ers (per UE).					

Table 6.2.2A-1: CA UE Power Class

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the requirements in subclause 6.2.2 apply.

6.2.2B UE maximum output power for UL-MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the maximum output power for any transmission bandwidth within the channel bandwidth is specified in Table 6.2.2B-1. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UE supporting UL-MIMO, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector. The period of measurement shall be at least one sub frame (1ms).

EUTRA band	Class 1 (dBm)	Tolerance (dB)	Class 2 (dBm)	Tolerance (dB)	Class 3 (dBm)	Tolerance (dB)	Class 4 (dBm)	Tolerance (dB)
1					23	+2/-3		
2					23	+2/-3 ²		
3					23	+2/-32		
4					23	+2/-3		
5					23	+2/-3		
6					23	+2/-3		
7					23	+2/-3 ²		
8					23	+2/-3 ²		
9					23	+2/-3		
10					23	+2/-3		
11					23	+2/-3		
12					23	+2/-3 ²		
13					23	+2/-3		
14					23	+2/-3		
17					20	12/0		
17					23	+2/-3		
18					23	+2/-3		
10					23	+2/-3		
20					23	+2/-3 ²		
20					23	+2/-3		
21					23	+2/-3 +2/-4.5 ²		
22						+2/-4.3		
						.0/0		
23					23	+2/-3		
24					23	+2/-3		
25					23	$+2/-3^{2}$		
26					23	+2/-3 ²		
27					23	+2/-3		
28					23	+2/[-3]		
33					23	+2/-3		
34					23	+2/-3		
35					23	+2/-3		
36					23	+2/-3		
37					23	+2/-3		
38					23	+2/-3		
39					23	+2/-3		
40					23	+2/-3		
41					23	+2/-3 ²		
42					23	+2/-4		
43					23	+2/-4		
44					23	+2/[-3]		
	2 refers to th F _{UL_high} – 4 I tolerance lin	MHz and F _{∪L_t} nit by 1.5 dB	_{high} , the maxi	mum output p	ower require	within F _{UL_low} ar ement is relaxed	d by reducing	the lower
						to account the t		

Table 6.2.2B-1: UE Power Class for UL-MIMO in closed loop spatial multiplexing scheme

Table 6.2.2B-2: UL-MIMO configuration in closed-loop spatial multiplexing scheme

Transmission mode	DCI format	Codebook Index		
Mode 2	DCI format 4	Codebook index 0		

For single-antenna port scheme, the requirements in subclause 6.2.2 apply.

6.2.3 UE maximum output power for modulation / channel bandwidth

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

Modulation	Cha	MPR (dB)					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

For PRACH, PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For transmissions with non-contiguous resource allocation in single component carrier, the allowed Maximum Power Reduction (MPR) for the maximum output power in table 6.2.2-1, is specified as follows

$$MPR = CEIL \{M_A, 0.5\}$$

Where M_A is defined as follows

$M_A =$	[8.0]-[10.12]A	; $0 < A \le [0.33]$
	[5.67] - [3.07]A	; $[0.33] < A \leq [0.77]$
	[3.31]	; [0.77]< A ≤[1.0]

Where

 $A = N_{RB_alloc} \ / \ N_{RB}$

CEIL{M_A, 0.5} means rounding upwards to closest 0.5dB, i.e. MPR \in [3.0, 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0]

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5 apply.

6.2.3A UE Maximum Output power for modulation / channel bandwidth for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band (Table 5.6A-1), the requirements in subclause 6.2.3 apply.

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A-1due to higher order modulation and contiguously aggregated transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3A-1. In case the modulation format is different on different component carriers then the MPR is determined by the rules applied to higher order of those modulations.

Modulation		MPR			
	50 RB + 100 RB	75 RB + 75 RB	75 RB+100 RB	100 RB + 100 RB	(dB)
QPSK	> 12 and ≤ 50	> 16 and ≤ 75	> 16 and ≤ 75	> 18 and ≤ 100	≤ 1
QPSK	> 50	> 75	> 75	> 100	≤2
16 QAM	≤ 12	≤ 16	≤ 16	≤ 18	≤1
16 QAM	> 12 and ≤ 50	> 16 and ≤ 75	> 16 and ≤ 75	> 18 and ≤ 100	≤2
16 QAM	> 50	> 75	> 75	> 100	≤ 3

Table 6.2.3A-1: Maximum Power Reduction (MPR) for Power Class 3

For PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A-1 is specified as follows

$$MPR = CEIL \{M_A, 0.5\}$$

Where MA is defined as follows

$M_A =$	8.2	; $0 \le A < 0.025$
	9.2 - 40A	; $0.025\!\le\!A\!<\!0.05$
	8 – 16A	; 0.05 $\leq A < 0.25$
	4.83 - 3.33A	; $0.25 \le A \le 0.4$,
	3.83 - 0.83A	; 0.4 \leq A \leq 1,

Where

 $A = N_{RB_alloc} / N_{RB_agg.}$

CEIL{ $M_{A, 0.5}$ } means rounding upwards to closest 0.5dB, i.e. MPR \in [3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5]

For intra-band carrier aggregation, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5A apply.

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the requirements in subclause 6.2.3 apply.

6.2.3B UE maximum output power for modulation / channel bandwidth for UL-MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2B-1 is specified in Table 6.2.3-1. The requirements shall be met with UL-MIMO configurations defined in Table 6.2.2B-2. For UE supporting UL-MIMO, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5B apply.

For single-antenna port scheme, the requirements in subclause 6.2.3 apply.

6.2.4 UE maximum output power with additional requirements

Additional ACLR and spectrum emission requirements can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the output power as specified in Table 6.2.2-1. Unless stated otherwise, an A-MPR of 0 dB shall be used.

For UE Power Class 1 and 3 the specific requirements and identified subclauses are specified in Table 6.2.4-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4-1 to 6.2.4-15 are in addition to the allowed MPR requirements specified in subclause 6.2.3.

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (<i>N</i> _{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
			3	>5	≤ 1
		2 4 40 22 25	5	>6	≤1
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	10	>6	≤ 1
		35, 50	15	>8	≤1
			20	>10	≤1
	6.6.2.2.2	41	5	>6	≤ 1
NS_04	0.0.2.2.2	41	10, 15, 20	Table	6.2.4-4
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40 > 55	≤1 ≤2
NS 10		20	15, 20		6.2.4-3
NS_11	6.6.2.2.1 6.6.3.3.13	23	1.4, 3, 5, 10, 15, 20		6.2.4-5
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table	6.2.4-6
NS_13	6.6.3.3.6	26	5	Table	6.2.4-7
NS_14	6.6.3.3.7	26	10, 15	Table	6.2.4-8
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15		6.2.4-9 6.2.4-10
NS_16	6.6.3.3.9	27	3, 5, 10		, Table 6.2.4-12, 6.2.4-13
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.12	44	10, 15, 20	Table	6.2.4-14
NS_20	6.2.2 6.6.2.2.1 6.6.3.3.14	23	5, 10, 15, 20	Table	6.2.4-15
NS_22	6.6.3.3.15	42	5, 10, 15, 20	Table 5.6-1	[0]
NS_23	6.6.3.3.16	43	5, 10, 15, 20	Table 5.6-1	[0]
 NS_32	-	-	-	-	-

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Parameters	R	egion A	Regi	Region C			
RB _{start}		0 - 12	13 – 18	19 – 42	43 – 49		
L _{CRB} [RBs]	6-8	1 to 5 and 9-50	≥8	≥18	≤2		
A-MPR [dB]	≤ 8	≤ 12	≤ 12	≤ 6	≤ 3		
NOTE 1; RB _{start} indicates the lowest RB index of transmitted resource blocks NOTE 2; L _{CRB} is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping between two regions, notes 1 and 2 apply on a per slot basis.							
NOTE 4; For intra- the two re			ng between two re both slots in the s	•	A-MPR value of		

Table 6.2.4-2: A-MPR for "NS_07"

Table 6.2.4-3: A-MPR for "NS_10"

Channel bandwidth [MHz]	Parameters	Region A				
	RB _{start}	0 – 10				
15	L _{CRB} [RBs]	1 -20				
	A-MPR [dB]	≤2				
	RB _{start}	0 – 15				
20	L _{CRB} [RBs]	1 -20				
	A-MPR [dB]	≤ 5				
NOTE 1: RB _{start} inc	licates the lowest RB index	of transmitted resource blocks				
NOTE 2: LCRB is th	e length of a contiguous re	source block allocation				
NOTE 3: For intra-	subframe frequency hoppir	ng which intersects Region A, notes 1 and 2 apply				
on a per	on a per slot basis					
NOTE 4: For intra-subframe frequency hopping which intersect Region A, the larger A-MPR value may be applied for both slots in the subframe						

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C		
10	RB _{start}	0 – 12	13 – 36	37 – 49		
	RB _{start} + L _{CRB} [RBs]	N/A	>37	N/A ³		
	A-MPR [dB]	≤3dB	≤2dB	≤3dB		
15	RB _{start}	0 – 18	19 – 55	56 – 74		
	RB _{start} + L _{CRB} [RBs]	N/A	>56	N/A ³		
	A-MPR [dB]	≤3dB	≤2dB	≤3dB		
20	RB _{start}	0 – 24	25 – 74	75 – 99		
	RB _{start} + L _{CRB} [RBs]	N/A ³	>75	N/A ³		
	A-MPR [dB]	≤3dB	≤2dB	≤3dB		
 NOTE 1: RB_{start} indicates the lowest RB index of transmitted resource blocks NOTE 2: L_{CRB} is the length of a contiguous resource block allocation NOTE 3: ³ refers to any RB allocation that starts in Region A or C is allowed the specified A-MPR NOTE 4: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 5: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe 						

Channel Bandwidth [MHz]	Parameters									
	Fc [MHz]	<20	04			≥2004				
3	L _{CRB} [RBs]	1-1	5	>5						
	A-MPR [dB]	≤5 ≤ 1								
	Fc [MHz]	<2004 2004 ≤ Fc <)4 ≤ Fc <	2007		≥20	007		
5	L _{CRB} [RBs]	1-2	25			6 & -25	8-12		>	6
	A-MPR [dB]	≤]	7		<	4	0		<	1
	Fc [MHz]	200)5 ≤	Fc <2	015	5		2015	5	
	RB _{start}		0.	-49				0-49	9	
10	L _{CRB} [RBs]		1.	-50				1-50		
	A-MPR [dB]	≤ 12				0				
	Fc [MHz]					<2012	2.5			
	RB _{start}	0-4	5-21		I	22	-56		57-74	
	L _{CRB} [RBs]	≥1	7-50		0-6 & ≥50		≤25	>2	5	>0
	A-MPR [dB]	≤15	≤7		≤10		0	≤6	;	≤15
15	Fc [MHz]					2012	.5			
	RB _{start}	0-12		13-39		-39	40-65			66-74
	L _{CRB} [RBs]	≥1		≥3	≥30 <30		≥ (69 – RB _{start})			≥1
	A-MPR [dB]	≤10 ≤6 0		0	≤2	2 ≤6.5		≤6.5		
	Fc [MHz]					2010)			
	RB _{start}	0-12		1:	3-29	9	30-68			69-99
20	L _{CRB} [RBs]	≥1	10	-60		1-9 & >60	1-24	≥25	5	≥1
	A-MPR [dB]	≤15	~	≦7		≤10	0	≤7	,	≤15

Table 6.2.4-5: A-MPR for "NS_11"

Channel bandwidth [MHz]	Parameters	Regic	Region B	
	RB _{start}	0	1-2	
1.4	L _{CRB} [RBs]	≤3 ≥4		≥4
	A-MPR [dB]	≤3 ≤6		≤3
	RB _{start}	0-3		4-5
3	L _{CRB} [RBs]	4-9	1-3 and 10-15	≥9
	A-MPR [dB]	≤4 ≤3		≤3
	RB _{start}	0-6		7-9
5	L _{CRB} [RBs]	≤8	≥9	≥15
	A-MPR [dB]	≤5	≤3	≤3

Table 6.2.4-6: A-MPR for "NS_12"

Table 6.2.4-7: A-MPR for "NS_13"

Channel bandwidth [MHz]	Parameters	Region A		
	RB _{start}	0-2		
5	L _{CRB} [RBs]	≤5	≥18	
	A-MPR [dB]	≤3	≤2	

Table 6.2.4-8: A-MPR for "NS_14"

Channel bandwidth [MHz]	Parameters	Region A	
	RB _{star} t	0	
10	L _{CRB} [RBs]	≤5	≥50
	A-MPR [dB]	≤3	≤1
	RB _{start}	3≥	3
15	L _{CRB} [RBs]	≤16	≥50
	A-MPR [dB]	≤3	≤1

Table 6.2.4-9: A-MPR for "NS_15" for E-UTRA highest channel edge > 845 MHz and ≤ 849 MHz

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C
1.4	RB _{end} [RB]			4-5
1.4	A-MPR [dB]			≤3
	RB _{end} [RB]	0-1	8-12	13-14
3	L _{CRB} [RB]	≤2	≥8	>0
	A-MPR [dB]	≤4	≤4	≤9
	RB _{end} [RB]	0-4	12-19	20-24
5	L _{CRB} [RB]	≤2	≥8	>0
	A-MPR [dB]	≤4	≤5	≤9
	RB _{end} [RB]	0-12	23-36	37-49
10	L _{CRB} [RB]	≤2	≥15	>0
	A-MPR [dB]	≤4	≤6	≤9
	RB _{end} [RB]	0-20	26-53	54-74
15	L _{CRB} [RB]	≤2	≥20	>0
	A-MPR [dB]	≤4	≤5	≤9

Channel bandwidth [MHz]	Parameters	Region A	Region B	Region C
	RB _{end} [RB]			19-24
5	L _{CRB} [RB]			≥18
	A-MPR [dB]			≤2
	RB _{end} [RB]	0-4	29-44	45-49
10	L _{CRB} [RB]	≤2	≥24	>0
	A-MPR [dB]	≤4	≤4	≤9
	RB _{end} [RB]	0-12	44-61	62-74
15	L _{CRB} [RB]	≤2	≥20	>0
	A-MPR [dB]	≤4	≤5	≤9

Table 6.2.4-10: A-MPR for "NS_15" for E-UTRA highest channel edge ≤ 845 MHz

Table 6.2.4-11: A-MPR for "NS_16" with channel lower edge at ≥807 MHz and <808.5 MHz

Channel bandwidth [MHz]	Parameter	Region A	Region B	Region C	Region D	Region E
	RB _{start}	0	1-2			
3 MHz	L _{CRB} [RBs]	≥12	12			
	A-MPR [dB]	≤2	≤1			
	RB _{start}	0-1	2	2-9	2-5	
5 MHz	L _{CRB} [RBs]	1 - 25	12	15-18	20	
	A-MPR [dB]	≤5	≤1	≤2	≤3	
	RB _{start}	0 - 8	0-	14	15-20	15-24
10 MHz	L _{CRB} [RBs]	1 - 12	15-20	≥24	≥30	24-27
	A-MPR [dB]	≤5	≤3	≤7	≤3	≤1

Table 6.2.4-12: A-MPR for "NS	_16" with channel lower edge at ≥808.5 MHz and <812 MHz

Channel bandwidth [MHz]	Parameter	Region A	Region B	Region C	Region D	Region E
	RB _{start}	0	0-1	1-5		
5 MHz	L _{CRB} [RBs]	16-20	≥24	16-20		
	A-MPR [dB]	≤2	≤3	≤1		
	RB _{start}	0.	-6	0-10	0-14	11-20
10 MHz	L _{CRB} [RBs]	1-12	15-20	24-32	≥36	24-32
	A-MPR [dB]	≤5	≤2	≤4	≤5	≤1

Table 6.2.4-13: A-MPR for "N	NS_16"	with channel	lower edge at ≥812 MHz
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Channel bandwidth [MHz]	Parameter	Region A	Region B	Region C	Region D
	RB _{start}	0 - 9	0	1-14	0-5
10 MHz	L _{CRB} [RBs]	27-32	36-40	36-40	≥45
	A-MPR [dB]	≤1	≤2	≤1	≤3

Channel bandwidth [MHz]	Parameters	Regi	on A	Region B
	RB _{start}			0-6
10	L _{CRB} [RBs]			≥40
	A-MPR [dB]			≤1
	RB _{start}	0.	-6	7-20
15	L _{CRB} [RBs]	≤18	≥36	≥42
	A-MPR [dB]	≤2	≤3	≤2
	RB _{start}	0-	14	15-30
20	L _{CRB} [RBs]	≤40	≥45	≥50
	A-MPR [dB]	≤2	≤3	≤2

Table 6.2.4-14: A-MPR for "NS_19"

Table 6.2.4-15: A-MPR for "NS_20"

Channel Bandwidth [MHz]	Parameters									
	Fc [MHz]	< 20	07.5		200	7.5 ≤ F	c < 201	2.5	2012.5 ≤ F	c ≤ 2017.5
5	RB _{start}	≤2	24		0	-3		4-6	≤;	24
5	L _{CRB} [RBs]	>	·0	1:	5-19	≥20		≥18	1-	25
	A-MPR [dB]	Ň	17		≤1	≤4		≤2	≤	0
	Fc [MHz]					20	005			
	RB _{start}		0-25			2	6-34		35	-49
	L _{CRB} [RBs]		>0		8	3-15	>	>15	>	0
10	A-MPR [dB]		≤16			≤2		≤5	≤	6
10	Fc [MHz]	2015								
	RB _{start}		0	-5			6-10			
	L _{CRB} [RBs]		≥;	32			≥40			
	A-MPR [dB]		1	<u>4</u>			≤2			
	Fc [MHz]					20	12.5			
15	RB _{start}		0-14				15-24		25-39	61-74
15	L _{CRB} [RBs]	1-9 & 4	0-75	10-3	39	24-29	9	≥30	≥36	≤6
	A-MPR [dB]	≤11		≤6		≤1		≤7	≤5	≤6
	Fc [MHz]					20	010			
20	RB _{start}	0-21	0-21 22-31 32-38 39-49		50-69	70-99				
20	L _{CRB} [RBs]	>0 1-9 & 31-75		10-3	30	≥15	≥24	≥25	>0	
	A-MPR [dB]	≤17 ≤12 ≤6 ≤9 ≤7 ≤5 ≤16								
NOTE 1: When NS_20 is signaled the minimum requirements for the 10 MHz bandwidth are specified for E-UTRA										
UL carrier center frequencies of 2005 MHz or 2015 MHz.										
	n NS_20 is signaled th				for the	9 15 M⊢	lz chanı	hel band	width are sp	ecified for
E-01	E-UTRA UL carrier center frequency of 2012.5 MHz.									

For PRACH, PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For each subframe, the A-MPR is evaluated per slot and given by the maximum value taken over the transmission(s) within the slot; the maximum A-MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by A-MPR, the power limits specified in subclause 6.2.5 apply.

6.2.4A UE maximum output power with additional requirements for CA

Additional ACLR, spectrum emission and spurious emission requirements for carrier aggregation can be signalled by the network to indicate that the UE shall also meet additional requirements in a specific deployment scenario. To meet these additional requirements, Additional Maximum Power Reduction (A-MPR) is allowed for the CA Power Class as specified in Table 6.2.2A-1.

If for intra-band carrier aggregation the UE is configured for transmissions within an E-UTRA channel bandwidth, then subclauses 6.2.3 and 6.2.4 apply with the Network Signaling value indicated by the IE *additionalSpectrumEmission* of the PCC.

For intra-band contiguous aggregation with the UE configured for transmissions within the aggregated channel bandwidth, the maximum output power reductions specified in Table 6.2.4A-1 is allowed when the applicable CA network signalling value is indicated by the IE *additionalSpectrumEmissionSCell-r10*. Then clause 6.2.3A does not apply, i.e. carrier aggregation MPR = 0 dB.

CA Network Signalling value	Requirements (subclause)	Uplink CA Configuration	A-MPR [dB] (subclause)
CA_NS_01	6.6.3.3A.1	CA_1C	6.2.4A.1
CA_NS_02	6.6.3.3A.2	CA_1C	6.2.4A.2
CA_NS_03	6.6.3.3A.3	CA_1C	6.2.4A.3
CA_NS_04	6.6.2.2A.1	CA_41C	6.2.4A.4
CA_NS_05	6.6.3.3A.4	CA_38C	6.2.4A.5
CA_NS_06	6.6.3.3A.5	CA_7C	6.2.4A.6

Table 6.2.4A-1: Additional Maximum Power Reduction (A-MPR) for CA

For PUCCH and SRS transmissions, the allowed A-MPR is according to that specified for PUSCH QPSK modulation for the corresponding transmission bandwidth.

For intra-band carrier aggregation, the A-MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum A-MPR over the two slots is then applied for the entire subframe.

For the UE maximum output power modified by A-MPR specified in table 6.2.4A-1, the power limits specified in subclause 6.2.5A apply.

6.2.4A.1 A-MPR for CA_NS_01 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCC and the SCC for contiguously aggregated signals is specified in table 6.2.4A.1-1.

CA_1C: CA_NS_01	RB _{start}	L _{CRB} [RBs]	RB _{start} + L _{CRB} [RBs]	A-MPR for QPSK and 16- QAM [dB]	
	0 – 23 and 176 – 199	> 0	N/A	≤ 12.0	
100 RB / 100 RB	24 – 105	> 64	N/A	≤ 6.0	
	106 – 175		> 175	≤ 5.0	
	0 – 6 and 143	0 < L _{CRB} ≤ 10	N/A	≤ 11.0	
	- 149	> 10	N/A	≤ 6.0	
75 RB / 75 RB	7 – 90	> 44	N/A	≤ 5.0	
	91 – 142	N/A	> 142	≤ 2.0	
 NOTE 1: RB_start indicates the lowest RB index of transmitted resource blocks NOTE 2: L_CRB is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A-MPR value may be applied for both slots in the subframe 					

Table 6.2.4A.1-1: Contiguous allocation A-MPR for CA_NS_01

If the UE is configured to CA_1C and it receives IE CA_NS_01 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

A-MPR = CEIL
$$\{M_{A}, 0.5\}$$

Where M_A is defined as follows

$$\begin{split} \mathbf{M}_{A} = & -22.5 \ \mathbf{A} + 17 & ; \ 0 \leq \mathbf{A} < 0.20 \\ & -11.0 \ \mathbf{A} + 14.7 & ; \ 0.20 \leq \mathbf{A} < 0.70 \\ & -1.7 \ \mathbf{A} + 8.2 & ; \ 0.70 \leq \mathbf{A} \leq 1 \end{split}$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.2 A-MPR for CA_NS_02 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_02 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.2-1.

CA_1C: CA_NS_02	RB _{end}	L _{CRB} [RBs]	A-MPR for QPSK and 16 –QAM [dB]
	0 –20	> 0	≤ 4 dB
	21 – 46	> 0	≤ 3 dB
100 RB / 100 RB	47 – 99	> RB _{end} - 20	≤ 3 dB
	100 – 184	> 75	≤ 6 dB
	185 – 199	> 0	≤ 10 dB
	0 - 48	> 0	≤ 2 dB
	49 - 80	> RB _{end} - 20	≤ 3 dB
75 RB / 75 RB	81 – 129	> 60	≤ 5 dB
	130 – 149	> 84	≤ 6 dB
	130 – 149	1 – 84	≤ 2 dB

Table 6.2.4A.2-1: Contiguous allocation A-MPR for CA_NS_02

If the UE is configured to CA_1C and it receives IE CA_NS_02 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

A-MPR = CEIL
$$\{M_{A}, 0.5\}$$

Where MA is defined as follows

$$\begin{split} [M_A = & -22.5 \ A + 17 & ; \ 0 \leq A < 0.20 \\ & -11.0 \ A + 14.7 & ; \ 0.20 \leq A < 0.70 \\ & -1.7 \ A + 8.2 & ; \ 0.70 \leq A \leq 1] \end{split}$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.3 A-MPR for CA_NS_03 for CA_1C

If the UE is configured to CA_1C and it receives IE CA_NS_03 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.3-1.

CA_1C: CA_NS_03	RB _{end}	L _{CRB} [RBs]	A-MPR for QPSK and 16-QAM [dB]
	0 – 26	> 0	≤ 10 dB
	27 – 63	≥ RB _{end} - 27	≤ 6 dB
100 RB / 100 RB	27 – 63	< RB _{end} - 27	≤ 1 dB
	64 – 100	> RB _{end} - 20	≤ 4 dB
	101 – 171	> 68	≤ 7 dB
	172 – 199	> 0	≤ 10 dB
	0 – 20	> 0	≤ 10 dB
	21 – 45	> 0	≤ 4 dB
75 RB / 75 RB	46 – 75	> RB _{end} – 13	≤ 2 dB
13 KD / 13 KD	76 – 95	> 45	≤ 5 dB
	96 – 149	> 43	≤ 8 dB
	120 – 149	1 - 43	≤ 6 dB

Table 6.2.4A.3-1: Contiguous allocation A-MPR for CA_NS_03

If the UE is configured to CA_1C and it receives IE CA_NS_03 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

A-MPR = CEIL
$$\{M_{A}, 0.5\}$$

Where M_A is defined as follows

$$\label{eq:main_state} \begin{split} [M_A = -23.33A + 17.5 & ; \ 0 \leq A < 0.15 \\ & -7.65A + 15.15 & ; \ 0.15 \leq A \leq 1] \end{split}$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.4 A-MPR for CA_NS_04

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.4-1.

CA Bandwidth Class C	RB _{Start}	L _{CRB} [RBs]	RB _{start} + L _{CRB} [RBs]	A-MPR for QPSK [dB]	A-MPR for 16QAM [dB]
50RB / 100 RB	0 – 44 and 105 – 149	>0	N/A	≤4dB	≤4dB
	45 – 104	N/A	>105	≤3dB	≤4dB
75 RB / 75 RB	0 – 44 and 105 – 149	>0	N/A	≤4dB	≤4dB
	45 – 104	N/A	>105	≤4dB	≤4dB
100 RB / 75 RB	0 – 49 and 125 – 174	>0	N/A	≤4dB	≤4dB
	50 - 124	N/A	>125	≤3dB	≤4dB
100 RB / 100 RB	0 – 59 and 140 – 199	>0	N/A	≤3dB	≤4dB
	60– 139	N/A	>140	≤3dB	≤4dB
NOTE 2: L _{CRB} is th NOTE 3: For intra- NOTE 4: For intra-	icates the lowest RB index of tran e length of a contiguous resource subframe frequency hopping whic subframe frequency hopping whic lots in the subframe	block alloc	ation regions, notes 1 a		

Table 6.2.4A.4-1: Contigous Allocation A-MPR for CA_NS_04

If the UE is configured to CA_41C and it receives IE CA_NS_04 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

A-MPR = CEIL
$$\{M_{A}, 0.5\}$$

Where M_A is defined as follows

$$\begin{split} M_A &= 10.5, & 0 \leq A < 0.05 \\ &= -50.0A + 13.00, & 0.05 \leq A < 0.15 \\ &= -4.0A + 6.10, & 0.15 \leq A < 0.40 \\ &= -0.83A + 4.83, & 0.40 \leq A \leq 1 \end{split}$$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4A.5 A-MPR for CA_NS_05 for CA_38C

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.5-1.

CA_38C	RB_{end}	L _{CRB} [RBs]	A-MPR for QPSK and 16-QAM [dB]	
	0 – 12	>0	≤ 5 dB	
40000/40000	13 – 79	> RB _{end} – 13	≤ 2 dB	
100RB/100RB	80 - 180	>60	≤ 6 dB	
181 – 199		> 0	≤ 11 dB	
	0 - 70	> max (0, RB _{end} -10)	≤ 2 dB	
71- 108		> 60	≤ 5 dB	
75RB/75RB	109 – 140	>0	≤ 5 dB	
	140 – 149	≤ 70	≤ 2 dB	
	140 – 149	>70	≤ 6 dB	
 NOTE 1: RB_{end} indicates the highest RB index of transmitted resource blocks NOTE 2: L_{CRB} is the length of a contiguous resource block allocation NOTE 3: For intra-subframe frequency hopping which intersects regions, notes 1 and 2 apply on a per slot basis NOTE 4: For intra-subframe frequency hopping which intersects regions, the larger A- 				

Table 6.2.4A.5-1: Contigous Allocation A-MPR for CA_NS_05

If the UE is configured to CA_38C and it receives IE CA_NS_05 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows

$$A-MPR = CEIL \{M_{A, 0.5}\}$$

Where MA is defined as follows

$$\begin{split} M_A &= -14.17 \; A + 16.50 \qquad ; \; 0 \leq A < 0.60 \\ &- 2.50 \; A + 9.50 \qquad ; \; 0.60 \leq A \leq 1 \end{split}$$

Where $A = N_{RB_alloc} / N_{RB_agg}$

6.2.4A.6 A-MPR for CA_NS_06

If the UE is configured to CA_7C and it receives IE CA_NS_06 the allowed maximum output power reduction applied to transmission on the PCC and the SCC for contiguously aggregated signals is specified in Table 6.2.4A.6-1.

CA Bandwidth Class C	RB_{end}	L _{CRB} [RBs]	A-MPR for QPSK and 16-QAM [dB]
	0 –22	>0	≤[4 dB
	23 – 105	> RB _{end} – 10	≤ 2 dB
100RB/100RB	106 – 142	> 75	≤ 3 dB
	143 – 177	>70	≤ 5 dB
	178 – 199	> 0	≤ 10 dB
	0 – 7	>0	≤ 5 dB
	20- 74	> RB _{end} – 10	≤ 2 dB
75RB/75RB	75 – 109	>64	≤ 2 dB
	110 – 144	>35	≤ 6 dB
	145 – 149	>0	≤ 10 dB

Table 6.2.4A.6-1: Contiguous Allocation A-MPR for CA_NS_06

If the UE is configured to CA_7C and it receives IE CA_NS_06 the allowed maximum output power reduction applied to transmissions on the PCell and the SCell with non-contiguous resource allocation is defined as follows:

A-MPR = CEIL $\{M_{A}, 0.5\}$

Where MA is defined as follows

 $\begin{array}{rl} M_A = & -23.33A + 17.5 & ; \ 0 \leq A < 0.15 \\ & -7.65A + 15.15 & ; \ 0.15 \leq A \leq 1 \end{array}$

Where $A = N_{RB_alloc} / N_{RB_agg.}$

6.2.4B UE maximum output power with additional requirements for UL-MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the A-MPR values specified in subclause 6.2.4 shall apply to the maximum output power specified in Table 6.2.2B-1. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UE supporting UL-MIMO, the maximum output power is measured as the sum of the maximum output power at each UE antenna connector. Unless stated otherwise, an A-MPR of 0 dB shall be used.

For the UE maximum output power modified by A-MPR, the power limits specified in subclause 6.2.5B apply.

For single-antenna port scheme, the requirements in subclause 6.2.4 apply.

6.2.5 Configured transmitted power

The UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for serving cell *c*. The configured maximum output power $P_{CMAX,c}$ is set within the following bounds:

$$P_{CMAX_L,c} \leq P_{CMAX,c} \leq P_{CMAX_H,c}$$

with

$$P_{CMAX_L,c} = MIN \{P_{EMAX,c} - \Delta T_{C,c}, P_{PowerClass} - MAX(MPR_c + A-MPR_c + \Delta T_{IB,c} + \Delta T_{C,c}, P-MPR_c)\}$$

 $P_{CMAX_H,c} = MIN \{P_{EMAX,c}, P_{PowerClass}\}$

where

- P_{EMAX,c} is the value given by IE *P*-*Max* for serving cell *c*, defined in [7];

- P_{PowerClass} is the maximum UE power specified in Table 6.2.2-1 without taking into account the tolerance specified in the Table 6.2.2-1;
- MPR_c and A-MPR_c for serving cell c are specified in subclause 6.2.3 and subclause 6.2.4, respectively;
- $\Delta T_{IB,c}$ is the additional tolerance for serving cell c as specified in Table 6.2.5-2; $\Delta T_{IB,c} = 0$ dB otherwise;
- $\Delta T_{C,c} = 1.5$ dB when Note 2 in Table 6.2.2-1 applies;
- $\Delta T_{C,c} = 0$ dB when Note 2 in Table 6.2.2-1 does not apply.

P-MPR_c is the allowed maximum output power reduction for

- a) ensuring compliance with applicable electromagnetic energy absorption requirements and addressing unwanted emissions / self desense requirements in case of simultaneous transmissions on multiple RAT(s) for scenarios not in scope of 3GPP RAN specifications;
- b) ensuring compliance with applicable electromagnetic energy absorption requirements in case of proximity detection is used to address such requirements that require a lower maximum output power.

The UE shall apply P-MPR_c for serving cell c only for the above cases. For UE conducted conformance testing P-MPR shall be 0 dB

NOTE 1: P-MPR_c was introduced in the $P_{CMAX,c}$ equation such that the UE can report to the eNB the available maximum output transmit power. This information can be used by the eNB for scheduling decisions.

NOTE 2: P-MPR_c may impact the maximum uplink performance for the selected UL transmission path.

For each subframe, the $P_{CMAX_L,c}$ for serving cell *c* is evaluated per slot and given by the minimum value taken over the transmission(s) within the slot; the minimum $P_{CMAX_L,c}$ over the two slots is then applied for the entire subframe. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

The measured configured maximum output power P_{UMAX,c} shall be within the following bounds:

 $P_{CMAX_L,c} - MAX\{T_L, T(P_{CMAX_L,c})\} \leq P_{UMAX,c} \leq P_{CMAX_H,c} + T(P_{CMAX_H,c})$

where $T(P_{CMAX,c})$ is defined by the tolerance table below and applies to $P_{CMAX_L,c}$ and $P_{CMAX_L,c}$ separately, while T_L is the absolute value of the lower tolerance in Table 6.2.2-1 for the applicable operating band.

Р _{СМАХ,с} (dBm)	Tolerance T(P _{CMAX,c}) (dB)
$23 < P_{CMAX,c} \le 33$	2.0
$21 \le P_{CMAX,c} \le 23$	2.0
$20 \le P_{CMAX,c} < 21$	2.5
19 ≤ P _{CMAX,c} < 20	3.5
18 ≤ P _{CMAX,c} < 19	4.0
13 ≤ P _{CMAX,c} < 18	5.0
$8 \le P_{CMAX,c} < 13$	6.0
$-40 \le P_{CMAX,c} < 8$	7.0

Table 6.2.5-1: PCMAX.c tolerance

For the UE which supports inter-band carrier aggregation configurations with uplink assigned to one E-UTRA band the $\Delta T_{IB,c}$ is defined for applicable bands in Table 6.2.5-2.

Inter-band CA	E-UTRA Band	ΔT _{IB,c} [dB]					
Configuration							
CA_1A-5A	1	0.3					
	5	0.3					
CA_1A-18A	1	0.3					
	18	0.3					
CA_1A-19A	1	0.3					
	19	0.3					
CA_1A-21A							
	<u>21</u> <u>0.3</u> 2 <u>0.3</u>						
CA_2A-17A	17	0.8					
CA_2A-29A	2	0.3					
	3	0.3					
CA_3A-5A	5	0.3					
CA_3A-7A	3	0.5					
CA_3A-7A	7	0.5					
CA_3A-8A	3	0.3					
	8	0.3					
CA_3A-20A	3	0.3					
	20	0.3					
CA_4A-5A	4	0.3					
	5	0.3					
CA_4A-7A	4	0.5					
	7	0.5					
CA_4A-12A	4	0.3					
_	12	0.8					
CA_4A-13A	4	0.3					
	13	0.3					
CA_4A-17A	4	0.3 0.8					
CA_4A-29A	4	0.3					
	5	0.8					
CA_5A-12A	12	0.4					
	5	0.8					
CA_5A-17A	17	0.4					
04 74 004	7	0.3					
CA_7A-20A	20	0.3					
	8	0.4					
CA_8A-20A	20	0.4					
CA_11A-18A	11	0.3					
	18	0.3					
bands	bove additional tolerances are only ap that belong to the supported inter-ban						
	urations	n non aggragated exerction for the					
	ove additional tolerances also apply in ted E-LITRA operating bands that believed						
	supported E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations						
	e the UE supports more than one of the	e above inter-band carrier					
	ation configurations and a E-UTRA of						
	er-band carrier aggregation configura						
	en the E-UTRA operating band freque						
	licable additional tolerance shall be th						
	cated to one decimal place for that op						
	configurations. In case there is a harn						
	and high band DL, then the maximum						
	ported carrier aggregation configuration						
appl		6					
	en the E-UTRA operating band freque	ency range is >1 GHz. the					
	licable additional tolerance shall be th						
	lies for that operating band among the						
սթբ	and for the operating build unlong the	supported on comparations					

Table 6.2.5-2: ΔT_{IB,c}

- NOTE: The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and another band is >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.
- NOTE: To meet the $\Delta T_{IB,c}$ requirements for CA_3A-7A with state-of-the-art technology, an increase in power consumption of the UE may be required. It is also expected that as the state-of-the-art technology evolves in the future, this possible power consumption increase can be reduced or eliminated.

6.2.5A Configured transmitted power for CA

For uplink carrier aggregation the UE is allowed to set its configured maximum output power $P_{CMAX,c}$ for serving cell *c* and its total configured maximum output power P_{CMAX} .

The configured maximum output power $P_{CMAX,c}$ on serving cell c shall be set as specified in subclause 6.2.5.

For uplink inter-band carrier aggregation, MPR_c and $A-MPR_c$ apply per serving cell c and are specified in subclause 6.2.3 and subclause 6.2.4, respectively. P-MPR_c accounts for power management for serving cell c. $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased independently on all component carriers.

For uplink intra-band contiguous carrier aggregation, $MPR_c = MPR$ and $A-MPR_c = A-MPR$ with MPR and A-MPR specified in subclause 6.2.3A and subclause 6.2.4A respectively. There is one power management term for the UE, denoted P-MPR, and P-MPR $_c = P-MPR$. $P_{CMAX,c}$ is calculated under the assumption that the transmit power is increased by the same amount in dB on all component carriers.

Table 6.2.5A-1:Void

The total configured maximum output power PCMAX shall be set within the following bounds:

$$P_{CMAX_L} \le P_{CMAX} \le P_{CMAX_H}$$

For uplink inter-band carrier aggregation with one serving cell c per operating band,

 $P_{CMAX_L} = MIN \{ 10log_{10} \sum MIN [p_{EMAX,c'} (\Delta t_{C,c}), p_{PowerClass} / (mpr_c \cdot a - mpr_c \cdot \Delta t_{C,c} \cdot \Delta t_{IB,c}), p_{PowerClass} / pmpr_c], P_{PowerClass} \}$

 $P_{CMAX_H} = MIN\{10 \ log_{10} \sum p_{EMAX,c}, P_{PowerClass}\}$

where

- $p_{EMAX,c}$ is the linear value of $P_{EMAX,c}$ which is given by IE *P*-Max for serving cell *c* in [7];
- P_{PowerClass} is the maximum UE power specified in Table 6.2.2A-1 without taking into account the tolerance specified in the Table 6.2.2A-1; p_{PowerClass} is the linear value of P_{PowerClass};
- mpr_c and a-mpr_c are the linear values of MPR_c and A-MPR_c as specified in subclause 6.2.3 and subclause 6.2.4, respectively;
- pmpr_c is the linear value of P-MPR_c;
- $\Delta t_{C,c}$ is the linear value of $\Delta T_{C,c}$. $\Delta t_{C,c} = 1.41$ when Note 2 in Table 6.2.2-1 applies for a serving cell *c*, otherwise $\Delta t_{C,c} = 1$;

- $\Delta t_{IB,c}$ is the linear value of the inter-band relaxation term $\Delta T_{IB,c}$ of the serving cell *c* as specified in Table 6.2.5-2; otherwise $\Delta t_{IB,c} = 1$.

For uplink intra-band contiguous carrier aggregation,

$$P_{CMAX_L} = MIN\{10 \ log_{10} \sum p_{EMAX,c} - \Delta T_C, P_{PowerClass} - MAX(MPR + A - MPR + \Delta T_{IB,c} + \Delta T_C, P - MPR)\}$$

 $P_{CMAX_H} = MIN\{10 \log_{10} \sum p_{EMAX,c}, P_{PowerClass}\}$

where

- p_{EMAX,c} is the linear value of P_{EMAX,c} which is given by IE *P-Max* for serving cell c in [7];
- P_{PowerClass} is the maximum UE power specified in Table 6.2.2A-1 without taking into account the tolerance specified in the Table 6.2.2A-1;
- MPR and A-MPR are specified in subclause 6.2.3A and subclause 6.2.4A respectively;
- $\Delta T_{\text{IB},c}$ is the additional tolerance for serving cell c as specified in Table 6.2.5-2;
- P-MPR is the power management term for the UE;
- ΔT_{C} is the highest value $\Delta T_{C,c}$ among all serving cells *c* in the subframe over both timeslots. $\Delta T_{C,c} = 1.5$ dB when Note 2 in Table 6.2.2A-1 applies to the serving cell *c*, otherwise $\Delta T_{C,c} = 0$ dB.

For each subframe, the P_{CMAX_L} is evaluated per slot and given by the minimum value taken over the transmission(s) within the slot; the minimum P_{CMAX_L} over the two slots is then applied for the entire subframe. $P_{PowerClass}$ shall not be exceeded by the UE during any period of time.

The measured maximum output power P_{UMAX} over all serving cells shall be within the following range:

 $P_{CMAX_L} - T(P_{CMAX_L}) \leq P_{UMAX} \leq P_{CMAX_H} + T(P_{CMAX_H})$

 $P_{UMAX} = 10 \log_{10} \sum p_{UMAX,c}$

where $p_{UMAX,c}$ denotes the measured maximum output power for serving cell *c* expressed in linear scale. The tolerance $T(P_{CMAX})$ is defined by the table below and applies to P_{CMAX_L} and P_{CMAX_H} separately.

Р _{смах} (dBm)	Tolerance T(P _{CMAX}) Intra-band with two active UL serving cells (dB)	Tolerance T(P _{CMAX}) Inter-band with two active UL serving cells (dB)
$21 \le P_{CMAX} \le 23$	2.0	2.0
$20 \le P_{CMAX} < 21$	[2.5]	TBD
19 ≤ P _{CMAX} < 20	[3.5]	TBD
18 ≤ P _{CMAX} < 19	[4.0]	TBD
13 ≤ P _{CMAX} < 18	[5.0]	TBD
$8 \le P_{CMAX} < 13$	[6.0]	TBD
-40 ≤ P _{CMAX} < 8	[7.0]	TBD

Table 6.2.5A-2: P_{CMAX} tolerance

Table 6.2.5A-3: Void

6.2.5B Configured transmitted power for UL-MIMO

For UE supporting UL-MIMO, the transmitted power is configured per each UE.

The definitions of configured maximum output power $P_{CMAX,c}$, the lower bound $P_{CMAX_L,c}$, and the higher bound $P_{CMAX_L,c}$ specified in subclause 6.2.5 shall apply to UE supporting UL-MIMO, where

- $P_{PowerClass}$ and $\Delta T_{C,c}$ are specified in subclause 6.2.2B;
- MPR_c is specified in subclause 6.2.3B;
- A-MPR_c is specified in subclause 6.2.4B.

The measured configured maximum output power $P_{\text{UMAX},c}$ for serving cell c shall be within the following bounds:

 $P_{CMAX_L,c} - MAX\{T_L, T_{LOW}(P_{CMAX_L,c})\} \le P_{UMAX,c} \le P_{CMAX_H,c} + T_{HIGH}(P_{CMAX_H,c})$

where $T_{LOW}(P_{CMAX_L,c})$ and $T_{HIGH}(P_{CMAX_H,c})$ are defined as the tolerance and applies to $P_{CMAX_L,c}$ and $P_{CMAX_H,c}$ separately, while T_L is the absolute value of the lower tolerance in Table 6.2.2B-1 for the applicable operating band.

For UE with two transmit antenna connectors in closed-loop spatial amultiplexing scheme, the tolerance is specified in Table 6.2.5B-1. The requirements shall be met with UL-MIMO configurations specified in Table 6.2.2B-2.

Tolerance Tolerance TLow(PCMAX_L,c) (dB) THIGH(PCMAX_H,c) (dl			
3.0	2.0		
[5.0]	[2.0]		
[5.0]	[3.0]		
[6.0]	[4.0]		
[5.0]			
[6.0]			
[7.0]			
	T _{LOW} (P _{CMAX_L,c}) (dB) 3.0 [5.0] [5.0] [6.0] [5 [6 [6		

Table 6.2.5B-1: PCMAX,c tolerance in closed-loop spatial multiplexing scheme

For single-antenna port scheme, the requirements in subclause 6.2.5 apply.

6.3 Output power dynamics

6.3.1 (Void)

6.3.2 Minimum output power

The minimum controlled output power of the UE is defined as the broadband transmit power of the UE, i.e. the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks), when the power is set to a minimum value.

6.3.2.1 Minimum requirement

The minimum output power is defined as the mean power in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2.1-1.

	Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 3.0 5 10 15 20 MHz MHz MHz MHz MHz MHz					
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

Table 6.3.2.1-1: Minimum output power

6.3.2A UE Minimum output power for CA

For intra-band contiguous carrier aggregation, the minimum controlled output power of the UE is defined as the transmit power of the UE per component carrier, i.e., the power in the channel bandwidth of each component carrier for all transmit bandwidth configurations (resource blocks), when the power on both component carriers are set to a minimum value.

6.3.2A.1 Minimum requirement for CA

For intra-band contiguous carrier aggregation the minimum output power is defined as the mean power in one subframe (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2A.1-1.

	CC Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 3.0 5 10 15 20 MHz MHz MHz MHz MHz MHz					20 MHz
Minimum output power			-40 c	lBm		
Measurement bandwidth				9.0 MHz	13.5 MHz	18 MHz

Table 6.3.2A.1-1: Minimum output power for intra-band contiguous CA UE

6.3.2B UE Minimum output power for UL-MIMO

For UE supporting UL-MIMO, the minimum controlled output power is defined as the broadband transmit power of the UE, i.e. the sum of the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks) at each transmit antenna connector, when the UE power is set to a minimum value.

6.3.2B.1 Minimum requirement

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the minimum output power is defined as the sum of the mean power at each transmit connector in one sub-frame (1ms). The minimum output power shall not exceed the values specified in Table 6.3.2B.1-1.

Table 6.3.2B.1-1: Minimum output power

	Channel bandwidth / Minimum output power / Measurement bandwidth					
	1.4 3.0 5 10 15 20 MHz MHz MHz MHz MHz MHz					
Minimum output power	-40 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

For single-antenna port scheme, the requirements in subclause 6.3.2 apply.

6.3.3 Transmit OFF power

Transmit OFF power is defined as the mean power when the transmitter is OFF. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During DTX and measurements gaps, the UE is not considered to be OFF.

6.3.3.1. Minimum requirement

The transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power shall not exceed the values specified in Table 6.3.3.1-1.

	Channel bandwidth / Transmit OFF power / Measurement bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Transmit OFF power	-50 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

Table 6.3.3.1-1: Transmit OFF power

6.3.3A UE Transmit OFF power for CA

For intra-band contiguous carrier aggregation, transmit OFF power is defined as the mean power per component carrier when the transmitter is OFF on both component carriers. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During measurements gaps, the UE is not considered to be OFF.

6.3.3A.1 Minimum requirement for CA

For intra-band contiguous carrier aggregation the transmit OFF power is defined as the mean power in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power shall not exceed the values specified in Table 6.3.3A.1-1.

	Channel bandwidth / Transmit OFF power / Measurement bandwidth					
	1.4 3.0 5 10 15 20 MHz MHz MHz MHz MHz MHz					
Transmit OFF power			-50 c	lBm		
Measurement bandwidth				9.0 MHz	13.5 MHz	18 MHz

Table 6.3.3A.1-1: Transmit OFF power for intra-band contiguous CA UE

6.3.3B UE Transmit OFF power for UL-MIMO

For UE supporting UL-MIMO, the transmit OFF power is defined as the mean power at each transmit antenna connector when the transmitter is OFF at all transmit antenna connectors. The transmitter is considered to be OFF when the UE is not allowed to transmit or during periods when the UE is not transmitting a sub-frame. During DTX and measurements gaps, the UE is not considered to be OFF.

6.3.3B.1 Minimum requirement

The transmit OFF power is defined as the mean power at each transmit antenna connector in a duration of at least one sub-frame (1ms) excluding any transient periods. The transmit OFF power at each transmit antenna connector shall not exceed the values specified in Table 6.3.3B.1-1.

	Channel bandwidth / Transmit OFF power/ Measurement bandwidth					
	1.4 3.0 5 10 15 20 MHz MHz MHz MHz MHz MHz					
Transmit OFF power	-50 dBm					
Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz

Table 6.3.3B.1-1: Transmit OFF power per antenna port

6.3.4 ON/OFF time mask

6.3.4.1 General ON/OFF time mask

The General ON/OFF time mask defines the observation period between Transmit OFF and ON power and between Transmit ON and OFF power. ON/OFF scenarios include; the beginning or end of DTX, measurement gap, contiguous, and non contiguous transmission

The OFF power measurement period is defined in a duration of at least one sub-frame excluding any transient periods. The ON power is defined as the mean power over one sub-frame excluding any transient period.

There are no additional requirements on UE transmit power beyond that which is required in subclause 6.2.2 and subclause 6.6.2.3

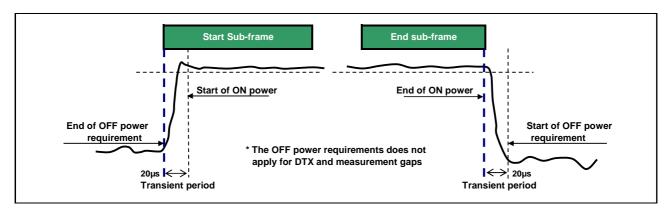


Figure 6.3.4.1-1: General ON/OFF time mask

6.3.4.2 PRACH and SRS time mask

6.3.4.2.1 PRACH time mask

The PRACH ON power is specified as the mean power over the PRACH measurement period excluding any transient periods as shown in Figure 6.3.4.2-1. The measurement period for different PRACH preamble format is specified in Table 6.3.4.2-1.

There are no additional requirements on UE transmit power beyond that which is required in subclause 6.2.2 and subclause 6.6.2.3

PRACH preamble format	Measurement period (ms)
0	0.9031
1	1.4844
2	1.8031
3	2.2844
4	0.1479

Table 6.3.4.2-1: PRACH ON power measurement period

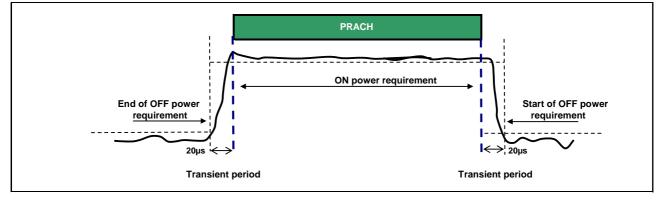


Figure 6.3.4.2-1: PRACH ON/OFF time mask

6.3.4.2.2 SRS time mask

In the case a single SRS transmission, the ON power is defined as the mean power over the symbol duration excluding any transient period. Figure 6.3.4.2.2-1

In the case a dual SRS transmission, the ON power is defined as the mean power for each symbol duration excluding any transient period. Figure 6.3.4.2.2-2

There are no additional requirements on UE transmit power beyond that which is required in subclause 6.2.2 and subclause 6.6.2.3

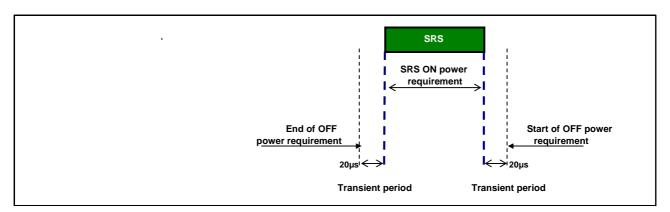


Figure 6.3.4.2.2-1: Single SRS time mask

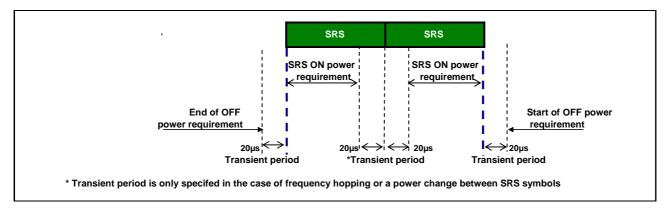
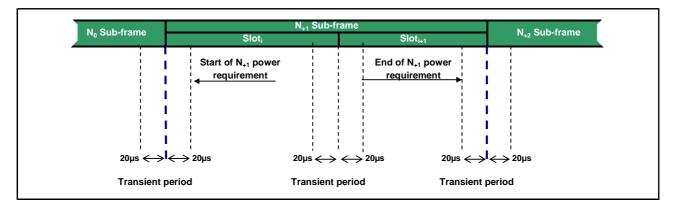


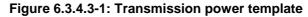
Figure 6.3.4.2.2-2: Dual SRS time mask for the case of UpPTS transmissions

6.3.4.3 Slot / Sub frame boundary time mask

The sub frame boundary time mask defines the observation period between the previous/subsequent sub–frame and the (reference) sub-frame. A transient period at a slot boundary within a sub-frame is only allowed in the case of Intra-sub frame frequency hopping. For the cases when the subframe contains SRS the time masks in subclause 6.3.4.4 apply.

There are no additional requirements on UE transmit power beyond that which is required in subclause 6.2.2 and subclause 6.6.2.3





6.3.4.4 PUCCH / PUSCH / SRS time mask

The PUCCH/PUSCH/SRS time mask defines the observation period between sounding reference symbol (SRS) and an adjacent PUSCH/PUCCH symbol and subsequent sub-frame.

There are no additional requirements on UE transmit power beyond that which is required in subclause 6.2.2 and subclause 6.6.2.3

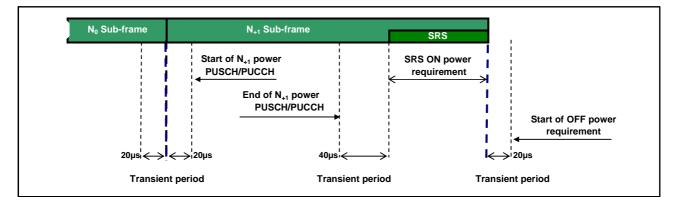


Figure 6.3.4.4-1: PUCCH/PUSCH/SRS time mask when there is a transmission before SRS but not after

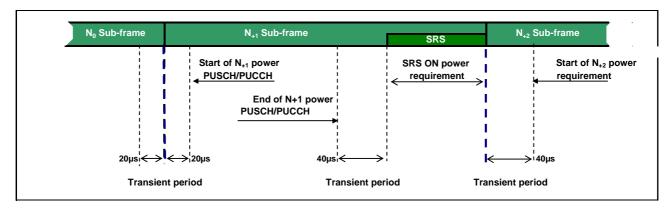


Figure 6.3.4.4-2: PUCCH/PUSCH/SRS time mask when there is transmission before and after SRS

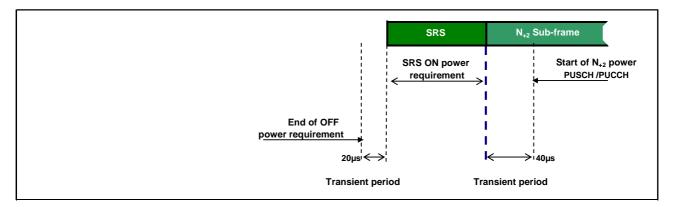


Figure 6.3.4.4-3: PUCCH/PUSCH/SRS time mask when there is a transmission after SRS but not before

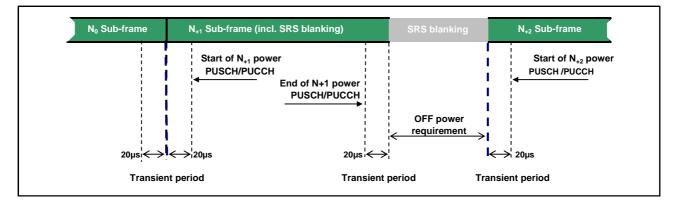


Figure 6.3.4.4-4: SRS time mask when there is FDD SRS blanking

6.3.4A ON/OFF time mask for CA

For intra-band contiguous carrier aggregation, the general output power ON/OFF time mask specified in subclause 6.3.4.1 is applicable for each component carrier during the ON power period and the transient periods. The OFF period as specified in subclause 6.3.4.1 shall only be applicable for each component carrier when all the component carriers are OFF.

6.3.4B ON/OFF time mask for UL-MIMO

For UE supporting UL-MIMO, the ON/OFF time mask requirements in subclause 6.3.4 apply at each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the general ON/OFF time mask requirements specified in subclause 6.3.4.1 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

For single-antenna port scheme, the requirements in subclause 6.3.4 apply.

6.3.5 Power Control

6.3.5.1 Absolute power tolerance

Absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap larger than 20ms. This tolerance includes the channel estimation error (the absolute RSRP accuracy requirement specified in subclause 9.1 of TS 36.133)

In the case of a PRACH transmission, the absolute tolerance is specified for the first preamble. The absolute power tolerance includes the channel estimation error (the absolute RSRP accuracy requirement specified in subclause 9.1 of TS 36.133).

6.3.5.1.1 Minimum requirements

The minimum requirement for absolute power tolerance is given in Table 6.3.5.1.1-1 over the power range bounded by the Maximum output power as defined in subclause 6.2.2 and the Minimum output power as defined in subclause 6.3.2.

For operating bands under Note 2 in Table 6.2.2-1, the absolute power tolerance as specified in Table 6.3.5.1.1-1 is relaxed by reducing the lower limit by 1.5 dB when the transmission bandwidth is confined within F_{UL_low} and $F_{UL_low} + 4$ MHz or $F_{UL_high} - 4$ MHz and F_{UL_high} .

Table 6.3.5.1.1-1:	Absolute	power	tolerance
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Conditions	Tolerance
Normal	± 9.0 dB
Extreme	± 12.0 dB

6.3.5.2 Relative Power tolerance

The relative power tolerance is the ability of the UE transmitter to set its output power in a target sub-frame relatively to the power of the most recently transmitted reference sub-frame if the transmission gap between these sub-frames is ≤ 20 ms.

For PRACH transmission, the relative tolerance is the ability of the UE transmitter to set its output power relatively to the power of the most recently transmitted preamble. The measurement period for the PRACH preamble is specified in Table 6.3.4.2-1.

6.3.5.2.1 Minimum requirements

The requirements specified in Table 6.3.5.2.1-1 apply when the power of the target and reference sub-frames are within the power range bounded by the Minimum output power as defined in subclause 6.3.2 and the measured PUMAX as defined in subclause 6.2.5 (i.e, the actual power as would be measured assuming no measurement error). This power shall be within the power limits specified in subclause 6.2.5.

To account for RF Power amplifier mode changes 2 exceptions are allowed for each of two test patterns. The test patterns are a monotonically increasing power sweep and a monotonically decreasing power sweep over a range bounded by the requirements of minimum power and maximum power specified in subclauses 6.3.2 and 6.2.2. For these exceptions the power tolerance limit is a maximum of ± 6.0 dB in Table 6.3.5.2.1-1

Power step ∆P (Up or down) [dB]		All combinations of PUSCH and PUCCH transitions [dB]	All combinations of PUSCH/PUCCH and SRS transitions between sub- frames [dB]	PRACH [dB]
ΔP <	< 2	±2.5 (Note 3)	±3.0	±2.5
2 ≤ ∆F	' < 3	±3.0	±4.0	±3.0
3 ≤ ∆F	' < 4	±3.5	±5.0	±3.5
4 ≤ ∆P	≤ 10	±4.0	±6.0	±4.0
10 ≤ ∆F	' < 15	±5.0	±8.0	±5.0
15 ≤	ΔP	±6.0	±6.0 ±9.0	
NOTE 1: For extreme conditions an additional ± 2.0 dB relaxation is allowed NOTE 2: For operating bands under Note 2 in Table 6.2.2-1, the relative power tolerance is relaxed by increasing the upper limit by 1.5 dB if the transmission bandwidth of the reference sub-frames is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the target sub-frame is not confined within any one of these frequency ranges; if the transmission bandwidth of the target sub-frame is confined within F_{UL_low} and F_{UL_low} + 4 MHz or F_{UL_high} – 4 MHz and F_{UL_high} and the reference sub-frame is not confined within any one of these frequency ranges, then the tolerance is relaxed by reducing the lower limit by 1.5 dB.				
NOTE 3:	E 3: For PUSCH to PUSCH transitions with the allocated resource blocks fixed in frequency and no transmission gaps other than those generated by downlink subframes, DwPTS fields or Guard Periods for TDD: for a power step ΔP ≤ 1 dB, the relative power tolerance for transmission is ±1.0 dB.			

Table 6.3.5.2.1-1 Relative power tolerance for transmission (norma	I conditions)
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The power step (ΔP) is defined as the difference in the calculated setting of the UE Transmit power between the target and reference sub-frames with the power setting according to subclause 5.1 of [TS 36.213]. The error is the difference between ΔP and the power change measured at the UE antenna port with the power of the cell-specific reference signals kept constant. The error shall be less than the relative power tolerance specified in Table 6.3.5.2.1-1.

For sub-frames not containing an SRS symbol, the power change is defined as the relative power difference between the mean power of the original reference sub-frame and the mean power of the target subframe not including transient durations. The mean power of successive sub-frames shall be calculated according to Figure 6.3.4.3-1 and Figure 6.3.4.1-1 if there is a transmission gap between the reference and target sub-frames.

If at least one of the sub-frames contains an SRS symbol, the power change is defined as the relative power difference between the mean power of the last transmission within the reference sub-frame and the mean power of the first transmission within the target sub-frame not including transient durations. A transmission is defined as PUSCH, PUCCH or an SRS symbol. The mean power of the reference and target sub-frames shall be calculated according to Figures 6.3.4.1-1, 6.3.4.2-1, 6.3.4.4-1, 6.3.4.4-2 and 6.3.4.4-3 for these cases.

6.3.5.3 Aggregate power control tolerance

Aggregate power control tolerance is the ability of a UE to maintain its power in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in TS 36.213 are constant.

6.3.5.3.1 Minimum requirement

The UE shall meet the requirements specified in Table 6.3.5.3.1-1 for aggregate power control over the power range bounded by the minimum output power as defined in subclause 6.3.2 and the maximum output power as defined in subclause 6.2.2.

TPC command	UL channel	Aggregate power tolerance within 21 ms
0 dB	PUCCH	±2.5 dB
0 dB	PUSCH	±3.5 dB
NOTE: The UE transmission gap is 4 ms. TPC command is transmitted via PDCCH 4 subframes preceding each PUCCH/PUSCH transmission.		

Table 6.3.5.3.1-1: Aggregate power control tolerance

6.3.5A Power control for CA

The requirements apply for one single PUCCH, PUSCH or SRS transmission of contiguous PRB allocation per component carrier with power setting in accordance with Clause 5.1 of [6].

6.3.5A.1 Absolute power tolerance

The absolute power tolerance is the ability of the UE transmitter to set its initial output power to a specific value for the first sub-frame at the start of a contiguous transmission or non-contiguous transmission with a transmission gap on each active component carriers larger than 20ms. The requirement can be tested by time aligning any transmission gaps on the component carriers.

6.3.5A.1.1 Minimum requirements

For intra-band contiguous carrier aggregation bandwidth classes B and C the absolute power control tolerance per component carrier is given in Table 6.3.5.1.1-1.

6.3.5A.2 Relative power tolerance

6.3.5A.2.1 Minimum requirements

The requirements apply when the power of the target and reference sub-frames on each component carrier exceed -20 dBm and the total power is limited by P_{UMAX} as defined in subclause 6.2.5A. For the purpose of these requirements, the power in each component carrier is specified over only the transmitted resource blocks.

For intra-band contiguous carrier aggregation bandwidth classes B and C, the UE shall meet the following requirements for transmission on both assigned component carriers when the average transmit power per PRB is aligned across both assigned carriers in the reference sub-frame:

a) for all possible combinations of PUSCH and PUCCH transitions per component carrier, the corresponding requirements given in Table 6.3.5.2.1-1:

b) for SRS transitions on each component carrier, the requirements for combinations of PUSCH/PUCCH and SRS transitions given in Table 6.3.5.2.1-1 with simultaneous SRS of constant SRS bandwidth allocated in the target and reference subrames:

c) for RACH on the primary component carrier, the requirements given in Table 6.3.5.2.1-1 for PRACH

For a) and b) above, the power step ΔP between the reference and target subframes shall be set by a TPC command and/or an uplink scheduling grant transmitted by means of an appropriate DCI Format.

For a), b) and c) above, two exceptions are allowed for each component carrier for a power per carrier ranging from -20 dBm to $P_{UMAX,c}$ as defined in subclause 6.2.5. For these exceptions the power tolerance limit is ± 6.0 dB in Table 6.3.5.2.1-1..

6.3.5A.3 Aggregate power control tolerance

Aggregate power control tolerance is the ability of a UE to maintain its power in non-contiguous transmission within 21 ms in response to 0 dB TPC commands with respect to the first UE transmission, when the power control parameters specified in [6] are constant on all active component carriers.

6.3.5A.3.1 Minimum requirements

For intra-band contiguous carrier aggregation bandwidth classes B and C, the aggregate power tolerance per component carrier is given in Table 6.3.5.3.1-1 with either simultaneous PUSCH or simultaneous PUCCH-PUSCH (if supported by the UE) configured. The average power per PRB shall be aligned across both assigned carriers before the start of the test. The requirement can be tested with the transmission gaps time aligned between component carriers.

6.3.5B Power control for UL-MIMO

For UE supporting UL-MIMO, the power control tolerance applies to the sum of output power at each transmit antenna connector.

The power control requirements specified in subclause 6.3.5 apply to UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme. The requirements shall be met with UL-MIMO configurations specified in Table 6.2.2B-2, wherein

- The Maximum output power requirements for UL-MIMO are specified in subclause 6.2.2B
- The Minimum output power requirements for UL-MIMO are specified in subclause 6.3.2B
- The requirements for configured transmitted power for UL-MIMO are specified in subclause 6.2.5B.

For single-antenna port scheme, the requirements in subclause 6.3.5 apply.

6.4 Void

6.5 Transmit signal quality

6.5.1 Frequency error

The UE modulated carrier frequency shall be accurate to within ± 0.1 PPM observed over a period of one time slot (0.5 ms) compared to the carrier frequency received from the E-UTRA Node B

6.5.1A Frequency error for CA

For intra-band contiguous carrier aggregation the UE modulated carrier frequencies per band shall be accurate to within ± 0.1 PPM observed over a period of one timeslot compared to the carrier frequency of primary component carrier received from the E-UTRA in the corresponding band.

6.5.1B Frequency error for UL-MIMO

For UE(s) supporting UL-MIMO, the UE modulated carrier frequency at each transmit antenna connector shall be accurate to within ± 0.1 PPM observed over a period of one time slot (0.5 ms) compared to the carrier frequency received from the E-UTRA Node B.

6.5.2 Transmit modulation quality

Transmit modulation quality defines the modulation quality for expected in-channel RF transmissions from the UE. The transmit modulation quality is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resource blocks (RBs)
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process
- Carrier leakage (caused by IQ offset)
- In-band emissions for the non-allocated RB

All the parameters defined in subclause 6.5.2 are defined using the measurement methodology specified in Annex F.

6.5.2.1 Error Vector Magnitude

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Before calculating the EVM the measured waveform is corrected by the sample timing offset and RF frequency offset. Then the IQ origin offset shall be removed from the measured waveform before calculating the EVM.

The measured waveform is further modified by selecting the absolute phase and absolute amplitude of the Tx chain. The EVM result is defined after the front-end IDFT as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %.

The basic EVM measurement interval in the time domain is one preamble sequence for the PRACH and is one slot for the PUCCH and PUSCH in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the EVM measurement interval is reduced by one symbol, accordingly. The PUSCH or PUCCH EVM measurement interval is also reduced when the mean power, modulation or allocation between slots is expected to change. In the case of PUSCH transmission, the measurement interval is reduced by a time interval equal to the sum of 5 μ s and the applicable exclusion period defined in subclause 6.3.4, adjacent to the boundary where the power change is expected to occur. The PUSCH exclusion period is applied to the signal obtained after the front-end IDFT. In the case of PUCCH transmission with power change, the PUCCH EVM measurement interval is reduced by one symbol adjacent to the boundary where the power change is expected to occur.

6.5.2.1.1 Minimum requirement

The RMS average of the basic EVM measurements for 10 sub-frames excluding any transient period for the average EVM case, and 60 sub-frames excluding any transient period for the reference signal EVM case, for the different modulations schemes shall not exceed the values specified in Table 6.5.2.1.1-1 for the parameters defined in Table 6.5.2.1.1-2. For EVM evaluation purposes, [all PRACH preamble formats 0-4 and] all PUCCH formats 1, 1a, 1b, 2, 2a and 2b are considered to have the same EVM requirement as QPSK modulated.

Parameter	Unit	Average EVM Level	Reference Signal EVM Level
QPSK or BPSK	%	17.5	17.5
16QAM	%	12.5	12.5

Parameter	Unit	Level
UE Output Power	dBm	≥ -40
Operating conditions		Normal conditions

6.5.2.2 Carrier leakage

Carrier leakage (The IQ origin offset) is an additive sinusoid waveform that has the same frequency as the modulated waveform carrier frequency. The measurement interval is one slot in the time domain.

6.5.2.2.1 Minimum requirements

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.5.2.2.1-1.

Parameters	Relative limit (dBc)	Applicable frequencies
Output power >10 dBm	-28	Carrier center frequency < 1 GHz
	-25	Carrier center frequency ≥ 1 GHz
0 dBm ≤ Output power ≤10 dBm	-25	
-30 dBm ≤ Output power ≤0 dBm	-20	
-40 dBm ≤ Output power < -30 dBm	-10	

 Table 6.5.2.2.1-1: Minimum requirements for relative carrier leakage power

6.5.2.3 In-band emissions

The in-band emission is defined as the average across 12 sub-carrier and as a function of the RB offset from the edge of the allocated UL transmission bandwidth. The in-band emission is measured as the ratio of the UE output power in a non–allocated RB to the UE output power in an allocated RB.

The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one SC-FDMA symbol, accordingly.

6.5.2.3.1 Minimum requirements

The relative in-band emission shall not exceed the values specified in Table 6.5.2.3.1-1.

Parameter description	Unit	Limit (Note 1)		Applicable Frequencies
General	dB	$\max \left\{ \begin{array}{l} -25 - 10 \cdot \log_{10} \left(N_{RB} / L_{CRB} \right), \\ 20 \cdot \log_{10} EVM - 3 - 5 \cdot \left(\left \Delta_{RB} \right - 1 \right) / L_{CRB}, \\ -57 \ dBm \ / \ 180 \ kHz - P_{RB} \right\} \end{array}$		Any non-allocated (Note 2)
	dB	-28	Image frequencies when carrier center frequency < 1 GHz and Output power > 10 dBm	Imaga
IQ Image		-25	Image frequencies when carrier center frequency < 1 GHz and Output power ≤ 10 dBm	Image frequencies
		-25	Image frequencies when carrier center frequency ≥ 1 GHz	(Notes 2, 3)
		-28	Output power > 10 dBm and carrier center frequency < 1 GHz	
Carrier leakage	dBc	-25	Output power > 10 dBm and carrier center frequency ≥ 1 GHz	Carrier frequency
		-25	0 dBm ≤ Output power ≤10 dBm	(Notes 4, 5)
		-20	-30 dBm ≤ Output power ≤ 0 dBm	
		-10	-40 dBm ≤ Output power < -30 dBm	

Table 6.5.2.3.1-1: Minimum requirements for in-band emissions

NOTE 1:	An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values
NOTE 2:	(General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 10. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-
NOTE 2.	allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs.
NOTE 3:	
	bandwidth, based on symmetry with respect to the centre carrier frequency, but excluding any allocated RBs.
NOTE 4:	The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-
	allocated RB to the measured total power in all allocated RBs.
NOTE 5:	The applicable frequencies for this limit are those that are enclosed in the RBs containing the DC
	frequency if N_{RB} is odd, or in the two RBs immediately adjacent to the DC frequency if N_{RB} is even, but excluding any allocated RB.
NOTE 6:	L_{CRR} is the Transmission Bandwidth (see Figure 5.6-1).
NOTE 0.	<i>L_{CRB}</i> is the manshission bandwidth (see Figure 5.0-1).
NOTE 7:	$N_{\scriptscriptstyle RB}$ is the Transmission Bandwidth Configuration (see Figure 5.6-1).
NOTE 8:	EVM is the limit specified in Table 6.5.2.1.1-1 for the modulation format used in the allocated RBs.
NOTE 9:	Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g.
	$\Delta_{_{RB}}=1$ or $\Delta_{_{RB}}=-1$ for the first adjacent RB outside of the allocated bandwidth.
NOTE 10	: $P_{\scriptscriptstyle RB}$ is the transmitted power per 180 kHz in allocated RBs, measured in dBm.

6.5.2.4 EVM equalizer spectrum flatness

The zero-forcing equalizer correction applied in the EVM measurement process (as described in Annex F) must meet a spectral flatness requirement for the EVM measurement to be valid. The EVM equalizer spectrum flatness is defined in terms of the maximum peak-to-peak ripple of the equalizer coefficients (dB) across the allocated uplink block. The basic measurement interval is the same as for EVM.

6.5.2.4.1 Minimum requirements

The peak-to-peak variation of the EVM equalizer coefficients contained within the frequency range of the uplink allocation shall not exceed the maximum ripple specified in Table 6.5.2.4.1-1 for normal conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 5 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 7 dB (see Figure 6.5.2.4.1-1).

The EVM equalizer spectral flatness shall not exceed the values specified in Table 6.5.2.4.1-2 for extreme conditions. For uplink allocations contained within both Range 1 and Range 2, the coefficients evaluated within each of these frequency ranges shall meet the corresponding ripple requirement and the following additional requirement: the relative difference between the maximum coefficient in Range 1 and the minimum coefficient in Range 2 must not be larger than 6 dB, and the relative difference between the maximum coefficient in Range 2 and the minimum coefficient in Range 1 must not be larger than 10 dB (see Figure 6.5.2.4.1-1).

Table 6.5.2.4.1-1: Minimum requirements for EVM equ	ualizer spectrum flatness (normal conditions)
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	Frequency range	Maximum ripple [dB]
F _{UL_Mea}	s – $F_{UL_{Low}} \ge 3 \text{ MHz}$ and $F_{UL_{High}} - F_{UL_{Meas}} \ge 3 \text{ MHz}$	4 (p-p)
	(Range 1)	
F _{UL_Mea}	as – F _{UL_Low} < 3 MHz or F _{UL_High} – F _{UL_Meas} < 3 MHz	8 (p-p)
	(Range 2)	
NOTE 1:	F _{UL_Meas} refers to the sub-carrier frequency for which evaluated	the equalizer coefficient is
NOTE 2:	F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency 5.5-1	band specified in Table

Table 6.5.2.4.1-2: Minimum requirements for EVM equalizer spectrum flatness (extreme conditions)

Frequency range		Maximum Ripple [dB]		
F _{UL_Meas}	s – $F_{UL_{Low}} \ge 5 \text{ MHz}$ and $F_{UL_{High}} - F_{UL_{Meas}} \ge 5 \text{ MHz}$	4 (p-p)		
	(Range 1)			
F _{UL_Meas} – F _{UL_Low} < 5 MHz or F _{UL_High} – F _{UL_Meas} < 5 MHz		12 (p-p)		
	(Range 2)			
NOTE 1: FUL_Meas refers to the sub-carrier frequency for which the equalizer coefficient is evaluated				
NOTE 2:	F_{UL_Low} and F_{UL_High} refer to each E-UTRA frequency 5.5-1	band specified in Table		

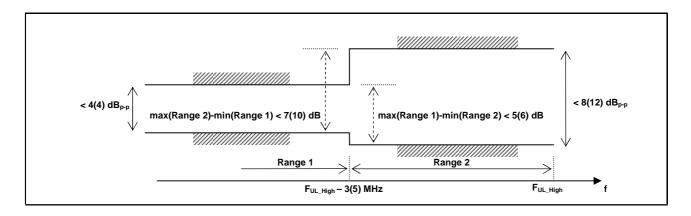


Figure 6.5.2.4.1-1: The limits for EVM equalizer spectral flatness with the maximum allowed variation of the coefficients indicated (the ETC minimum requirement within brackets).

6.5.2A Transmit modulation quality for CA

The requirements in this clause apply with PCC and SCC in the UL configured and activated: PCC with PRB allocation and SCC without PRB allocation and without CSI reporting and SRS configured.

6.5.2A.1 Error Vector Magnitude

For the intra-band contiguous carrier aggregation, the Error Vector Magnitude requirement should be defined for each component carrier. Requirements only apply with PRB allocation in one of the component carriers.

When a single component carrier is configured Table 6.5.2.1.1-1 apply.

The EVM requirements are according to Table 6.5.2A.1-1 if CA is configured in uplink.

Table 6.5.2A.1-1: Minimum requirements for Error Vector Magnit	tude
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Parameter	Unit	Average EVM Level per CC	Reference Signal EVM Level
QPSK or BPSK	%	17.5	17.5
16QAM	%	12.5	12.5

6.5.2A.2 Carrier leakage for CA

Carrier leakage (The IQ origin offset) is an additive sinusoid waveform that has the same frequency as the modulated waveform carrier frequency. Carrier leakage is defined for each component carrier and is measured on the carrier with PRBs allocated. The measurement interval is one slot in the time domain.

6.5.2A.2.1 Minimum requirements

The relative carrier leakage power is a power ratio of the additive sinusoid waveform and the modulated waveform. The relative carrier leakage power shall not exceed the values specified in Table 6.5.2A.2.1-1.

Table 6.5.2A.2.1-1: Minimum requirements for Relative Carrier Leakage Power

Parameters	Relative Limit (dBc)
Output power >0 dBm	-25
-30 dBm ≤ Output power ≤0 dBm	-20
-40 dBm ≤ Output power < -30 dBm	-10

6.5.2A.3 In-band emissions

6.5.2A.3.1 Minimum requirement for CA

For intra-band contiguous carrier aggregation bandwidth class C, the requirements in Table 6.5.2A.3.1-1 and 6.5.2A.3.1-2 apply within the aggregated transmission bandwidth configuration with both component carrier (s) active and one single contiguous PRB allocation of bandwidth L_{CRB} at the edge of the aggregated transmission bandwidth configuration.

The inband emission is defined as the interference falling into the non allocated resource blocks for all component carriers. The measurement method for the inband emissions in the component carrier with PRB allocation is specified in annex F. For a non allocated component carrier a spectral measurement is specified.

General		····· [/						
General		$\max\{-1\}$	$25 - 10 \cdot \log_{10} (N_{RB} / L_{CRB}),$					
	dB	$20 \cdot \log_{10}$	$EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB}$,	Any non-allocated (Note 1)				
		– 57 dBm	$/180 kHz - P_{RB}$					
IQ Image	dB		-25	Exception for IQ image (Note 2)				
Carrier		-25	Output power > 0 dBm	Exception for Carrier frequency				
leakage	dBc	-20 -10	-30 dBm ≤ Output power ≤ 0 dBm -40 dBm ≤ Output power < -30 dBm	(Note 3)				
NOTE 1: An in-band emissions combined limit is evaluated in each non-allocated RB. For each such RB, the minimum requirement is calculated as the higher of P_{RB} - 30 dB and the power sum of all limit values (General, IQ Image or Carrier leakage) that apply. P_{RB} is defined in Note 8. The limit is evaluated in each non-allocated RB. The measurement bandwidth is 1 RB and the limit is expressed as a ratio of measured power in one non-allocated RB to the measured average power per allocated RB, where the averaging is done across all allocated RBs								
NOTE 2: Exc	eptions to the g	eneral limit are	e allowed for up to $L_{{\it CRBs}}$ RBs within a $$	contiguous width of $L_{\scriptscriptstyle CRBs}$ non-				
NOTE 3: Exc ban	allocated RBs. The measurement bandwidth is 1 RB.							
NOTE 4: L_{CL}	_{RB} is the Transr	nission Bandw	vidth (see Figure 5.6-1) not exceeding	$N_{RB}/2-1$				
-								
NOTE 6: EV	M is the limits	specified in Ta	ble 6.5.2.1.1-1 for the modulation forma	t used in the allocated RBs.				
NOTE 7: Δ_{RI}	$_{B}$ is the starting	frequency offs	set between the allocated RB and the m	easured non-allocated RB (e.g.				
Δ_R	$_{\scriptscriptstyle RB}=1$ or $\Delta_{\scriptscriptstyle RB}=$	$\Delta_{RB}=-1$ or $\Delta_{RB}=-1$ for the first adjacent RB outside of the allocated bandwidth.						
NOTE 8: P_{RE}	_B is the transmit	ted power per	180 kHz in allocated RBs, measured in	dBm.				

Table 6.5.2A.3.1-1: Minimum requirements for in-band emissions (allocated component carrier)

Para- meter	Unit	Meas BW Note 1		Limit	remark	Applicable Frequencies
General	dB	BW of 1 RB (180KHz rectangular)	$20 \cdot \log_{10}$	$25 - 10 \cdot \log_{10} (N_{RB} / L_{CRB}),$ $EVM - 3 - 5 \cdot (\Delta_{RB} - 1) / L_{CRB},$ $n / 180 kHz - P_{RB} \}$	The reference value is the average power per allocated RB in the allocated component carrier	Any RB in the non allocated component carrier. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
IQ Image	dB	BW of 1 RB (180KHz rectangular)		-25 Note 2	The reference value is the average power per allocated RB in the allocated component carrier	The frequencies of the L_{CRB} contiguous non-allocated RBs are unknown. The frequency raster of the RBs is derived when this component carrier is allocated with RBs
		BW of 1 RB (180KHz		Note 3	The reference	The frequencies of
		rectangular)	-25	Output power > 0 dBm	value is the total power	the up to 2 non-allocated
Carrier leakage	ORC I	dBc -2	-20	-30 dBm ≤ Output power ≤ 0 dBm	of the allocated RBs in the allocated component carrier	RBs are unknown. The frequency raster of the RBs is derived when this
			-10	-40 dBm ≤ Output power < -30 dBm	Gamor	component carrier is allocated with RBs
	Resolution bandwidth		han the me	asurement BW may be integrated	to achieve the r	neasurement
			limit is are	allowed for up to $L_{\it CRB}$ RBs within	n a contiguous v	width of $L_{\!{\scriptscriptstyle CRB}}^{}$
NOTE 3:	Two Exce			are allowed for up to two contiguous		RBs

Table 6.5.2A.3.1-2: Minimum requirements for in	-band emissions (not allocated comp	ponent carrier)

6.5.2B Transmit modulation quality for UL-MIMO

NOTE 4: Note 4 to note 8 from Table 6.5.2A.3.1-1 apply for Table 6.5.2A.3.1-2 as well.

For UE supporting UL-MIMO, the transmit modulation quality requirements are specified at each transmit antenna connector.

For single-antenna port scheme, the requirements in subclause 6.5.2 apply.

The transmit modulation quality is specified in terms of:

- Error Vector Magnitude (EVM) for the allocated resource blocks (RBs)
- EVM equalizer spectrum flatness derived from the equalizer coefficients generated by the EVM measurement process

- Carrier leakage (caused by IQ offset)
- In-band emissions for the non-allocated RB

6.5.2B.1 Error Vector Magnitude

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Error Vector Magnitude requirements specified in Table 6.5.2.1.1-1 which is defined in subclause 6.5.2.1 apply at each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

6.5.2B.2 Carrier leakage

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the Relative Carrier Leakage Power requirements specified in Table 6.5.2.2.1-1 which is defined in subclause 6.5.2.2 apply at each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

6.5.2B.3 In-band emissions

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the In-band Emission requirements specified in Table 6.5.2.3.1-1 which is defined in subclause 6.5.2.3 apply at each transmit antenna connector. The requirements shall be met with the uplink MIMO configurations specified in Table 6.2.2B-2.

6.5.2B.4 EVM equalizer spectrum flatness for UL-MIMO

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the EVM Equalizer Spectrum Flatness requirements specified in Table 6.5.2.4.1-1 and Table 6.5.2.4.1-2 which are defined in subclause 6.5.2.4 apply at each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

6.6 Output RF spectrum emissions

The output UE transmitter spectrum consists of the three components; the emission within the occupied bandwidth (channel bandwidth), the Out Of Band (OOB) emissions and the far out spurious emission domain.

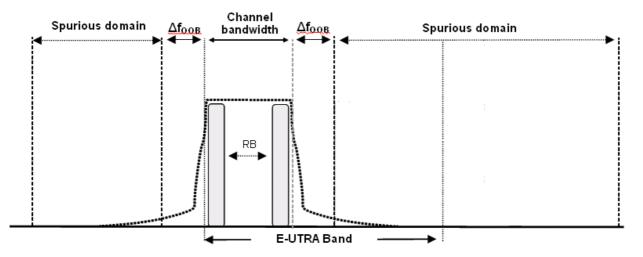


Figure 6.6-1: Transmitter RF spectrum

6.6.1 Occupied bandwidth

Occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel. The occupied bandwidth for all transmission bandwidth configurations (Resources Blocks) shall be less than the channel bandwidth specified in Table 6.6.1-1

	Occupied channel bandwidth / Channel bandwidth					
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Channel bandwidth (MHz)	1.4	3	5	10	15	20

Table 6.6.1-1: Occupied channel bandwidth

6.6.1A Occupied bandwidth for CA

For intra-band contiguous carrier aggregation the occupied bandwidth is a measure of the bandwidth containing 99 % of the total integrated power of the transmitted spectrum. The OBW shall be less than the aggregated channel bandwidth defined in subclause 5.6A.

6.6.1B Occupied bandwidth for UL-MIMO

For UE supporting UL-MIMO, the requirements for occupied bandwidth is specified at each transmit antenna connector. The occupied bandwidth is defined as the bandwidth containing 99 % of the total integrated mean power of the transmitted spectrum on the assigned channel at each transmit antenna connector.

For UE with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the occupied bandwidth at each transmitter antenna shall be less than the channel bandwidth specified in Table 6.6.1B-1. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

Table 6.6.1B-1: Occupied channel bandwidth

	Occupied c	Occupied channel bandwidth / Channel bandwidth				
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Channel bandwidth (MHz)	1.4	3	5	10	15	20

For single-antenna port scheme, the requirements in subclause 6.6.1 apply.

6.6.2 Out of band emission

The Out of band emissions are unwanted emissions immediately outside the assigned channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and an Adjacent Channel Leakage power Ratio.

6.6.2.1 Spectrum emission mask

The spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the ± edge of the assigned E-UTRA channel bandwidth. For frequencies greater than (Δf_{OOB}) as specified in Table 6.6.2.1.1-1 the spurious requirements in subclause 6.6.3 are applicable.

6.6.2.1.1 Minimum requirement

The power of any UE emission shall not exceed the levels specified in Table 6.6.2.1.1-1 for the specified channel bandwidth.

	Spectrum emission limit (dBm)/ Channel bandwidth								
Δf _{оов} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth		
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz		
± 1-2.5	-10	-10	-10	-10	-10	-10	1 MHz		
± 2.5-2.8	-25	-10	-10	-10	-10	-10	1 MHz		
± 2.8-5		-10	-10	-10	-10	-10	1 MHz		
± 5-6		-25	-13	-13	-13	-13	1 MHz		
± 6-10			-25	-13	-13	-13	1 MHz		
± 10-15				-25	-13	-13	1 MHz		
± 15-20					-25	-13	1 MHz		
± 20-25						-25	1 MHz		

Table 6.6.2.1.1-1: General E-UTRA spectrum emission mask

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.1A Spectrum emission mask for CA

For intra-band contiguous carrier aggregation the spectrum emission mask of the UE applies to frequencies (Δf_{OOB}) starting from the ± edge of the aggregated channel bandwidth (Table 5.6A-1) For intra-band contiguous carrier aggregation the bandwidth class C, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.1A-1 for the specified channel bandwidth.

Spectrum emission limit [dBm]/BW _{Channel_CA}								
Δf _{OOB}	25RB+100RB	50RB+100RB	75RB+75RB	75RB+100RB	100RB+100RB	Measurement		
(MHz)	(24.95 MHz)	(29.9 MHz)	(30 MHz)	(34.85 MHz)	(39.8 MHz)	bandwidth		
± 0-1	-22	-22.5	-22.5	-23.5	-24	30 kHz		
± 1-5	-10	-10	-10	-10	-10	1 MHz		
± 5-24.95	-13	-13	-13	-13	-13	1 MHz		
± 24.95-29.9	-25	-13	-13	-13	-13	1 MHz		
± 29.9-29.95	-25	-25	-13	-13	-13	1 MHz		
± 29.95-30		-25	-13	-13	-13	1 MHz		
± 30-34.85		-25	-25	-13	-13	1 MHz		
± 34.85-34.9		-25	-25	-25	-13	1 MHz		
± 34.9-35			-25	-25	-13	1 MHz		
± 35-39.8				-25	-13	1 MHz		
$\pm 39.8-39.85$				-25	-25	1 MHz		
± 39.85-44.8					-25	1 MHz		

Table 6.6.2.1A-1: General E-UTRA CA spectrum emission mask for Bandwidth Class C

6.6.2.2 Additional spectrum emission mask

This requirement is specified in terms of an "additional spectrum emission" requirement.

6.6.2.2.1 Minimum requirement (network signalled value "NS_03", "NS_11", and "NS_20")

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS_03", "NS_11" or "NS_20" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.1-1.

	Spectrum emission limit (dBm)/ Channel bandwidth								
Δf _{оов} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth		
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz		
± 1-2.5	-13	-13	-13	-13	-13	-13	1 MHz		
± 2.5-2.8	-25	-13	-13	-13	-13	-13	1 MHz		
± 2.8-5		-13	-13	-13	-13	-13	1 MHz		
± 5-6		-25	-13	-13	-13	-13	1 MHz		
± 6-10			-25	-13	-13	-13	1 MHz		
± 10-15				-25	-13	-13	1 MHz		
± 15-20					-25	-13	1 MHz		
± 20-25						-25	1 MHz		

Table	6.6.2.2	.1-1:	Additional	requirements
IUDIC	0.0.2.2		Additional	requirements

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2.2 Minimum requirement (network signalled value "NS_04")

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.2-1.

	Spectrum emission limit (dBm)/ Channel bandwidth								
Δf _{OOB} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Measurement bandwidth		
± 0-1	-10	-13	-15	-18	-20	-21	30 kHz		
± 1-2.5	-13	-13	-13	-13	-13	-13	1 MHz		
± 2.5-2.8	-25	-13	-13	-13	-13	-13	1 MHz		
± 2.8-5.5		-13	-13	-13	-13	-13	1 MHz		
± 5.5-6		-25	-25	-25	-25	-25	1 MHz		
± 6-10			-25	-25	-25	-25	1 MHz		
± 10-15				-25	-25	-25	1 MHz		
± 15-20					-25	-25	1 MHz		
± 20-25						-25	1 MHz		

Table 6.6.2.2.2-1:	Additional re	quirements
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Note: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2.3 Minimum requirement (network signalled value "NS_06" or "NS_07")

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "NS_06" or "NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2.3-1.

	Spectrum emission limit (dBm)/ Channel bandwidth						
Δf _{оов} (MHz)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	Measurement bandwidth		
± 0-0.1	-13	-13	-15	-18	30 kHz		
± 0.1-1	-13	-13	-13	-13	100 kHz		
± 1-2.5	-13	-13	-13	-13	1 MHz		
± 2.5-2.8	-25	-13	-13	-13	1 MHz		
± 2.8-5		-13	-13	-13	1 MHz		
± 5-6		-25	-13	-13	1 MHz		
± 6-10			-25	-13	1 MHz		
± 10-15				-25	1 MHz		

Table 6.6.2.2.3-1: Additional requirements

NOTE: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2A Additional Spectrum Emission Mask for CA

This requirement is specified in terms of an "additional spectrum emission" requirement.

6.6.2.2A.1 Minimum requirement (network signalled value "CA_NS_04")

Additional spectrum emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

When "CA_NS_04" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.2.2A-1.

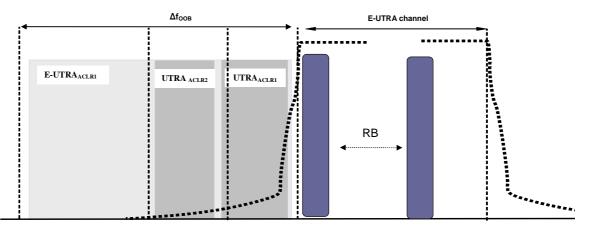
	Spectrum emission limit [dBm]/BW _{Channel_CA}							
	Δf _{oob} (MHz)	50+100RB (29.9 MHz)	75+75B (30 MHz)	75+100RB (34.85 MHz)	100+100RB (39.8 MHz)	Measurement bandwidth		
Γ	± 0-1	-22.5	-22.5	-23.5	-24	30 kHz		
	± 1-5.5	-13	-13	-13	-13	1 MHz		
	$\pm 5.5-34.9$	-25	-25	-25	-25	1 MHz		
	\pm 34.9-35		-25	-25	-25	1 MHz		
	$\pm 35 - 39.85$			-25	-25	1 MHz		
	± 39.85-44.8				-25	1 MHz		

Table 6.6.2.2A-1: Additional requirements

Note: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.3 Adjacent Channel Leakage Ratio

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency. ACLR requirements for one E-UTRA carrier are specified for two scenarios for an adjacent E-UTRA and /or UTRA channel as shown in Figure 6.6.2.3-1.





6.6.2.3.1 Minimum requirement E-UTRA

E-UTRA Adjacent Channel Leakage power Ratio (E-UTRA_{ACLR}) is the ratio of the filtered mean power centred on the assigned channel frequency to the filtered mean power centred on an adjacent channel frequency at nominal channel spacing. The assigned E-UTRA channel power and adjacent E-UTRA channel power are measured with rectangular filters with measurement bandwidths specified in Table 6.6.2.3.1-1 and Table 6.6.2.3.1-2. If the measured adjacent channel power is greater than -50dBm then the E-UTRA_{ACLR} shall be higher than the value specified in Table 6.6.2.3.1-1 and Table 6.6.2.3.1-2.

	Channel bandwidth / E-UTRA _{ACLR1} / Measurement bandwidth								
	1.4 MHz								
E-UTRA _{ACLR1}	30 dB	30 dB	30 dB	30 dB	30 dB	30 dB			
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz			
Adjacent channel	+1.4	+3.0	+5	+10	+15	+20			
centre frequency	/	/	/	/	/	/			
offset [MHz]	-1.4	-3.0	-5	-10	-15	-20			

Table 6.6.2.3.1-1: General requirements for E-UTRA_{ACLR}

	Channel bandwidth / E-UTRA _{ACLR1} / Measurement bandwidth							
	1.4	1.4 3.0 5 10				20		
	MHz	MHz	MHz	MHz	MHz	MHz		
E-UTRA _{ACLR1}			37 dB	37 dB				
E-UTRA channel								
Measurement			4.5 MHz	9.0 MHz				
bandwidth								
Adjacent channel			+5	+10				
centre frequency			/	/				
offset [MHz]			-5	-10				
NOTE 1: E-UTRAAC	NOTE 1: E-UTRA _{ACLR1} shall be applicable for >23dBm							

6.6.2.3.1A Void

6.6.2.3.2 Minimum requirements UTRA

UTRA Adjacent Channel Leakage power Ratio (UTRA_{ACLR}) is the ratio of the filtered mean power centred on the assigned E-UTRA channel frequency to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

UTRA Adjacent Channel Leakage power Ratio is specified for both the first UTRA adjacent channel (UTRA_{ACLR1}) and the 2nd UTRA adjacent channel (UTRA_{ACLR2}). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor α =0.22. The assigned E-UTRA channel power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3.2-1. If the measured UTRA channel power is greater than –50dBm then the UTRA_{ACLR} shall be higher than the value specified in Table 6.6.2.3.2-1.

	Channel bandwidth / UTRA _{ACLR1/2} / Measurement bandwidth						
	1.4	3.0	5	10	15	20	
	MHz	MHz	MHz	MHz	MHz	MHz	
UTRA _{ACLR1}	33 dB	33 dB	33 dB	33 dB	33 dB	33 dB	
Adjacent channel centre	0.7+BW _{UTRA} /2 /	1.5+BW _{UTRA} /2 /	+2.5+BW _{UTRA} /2	+5+BW _{UTRA} /2	+7.5+BW _{UTRA} /2	+10+BW _{UTRA} /2	
frequency offset [MHz]	-0.7- BW _{UTRA} /2	-1.5- BW _{UTRA} /2	-2.5-BW _{UTRA} /2	-5-BW _{UTRA} /2	-7.5-BW _{UTRA} /2	, -10-BW _{UTRA} /2	
UTRA _{ACLR2}	-	-	36 dB	36 dB	36 dB	36 dB	
Adjacent channel centre frequency offset [MHz]	-	-	+2.5+3*BW _{UTRA} /2 / -2.5-3*BW _{UTRA} /2	+5+3*BW _{UTRA} /2 / -5-3*BW _{UTRA} /2	+7.5+3*BW _{UTRA} /2 / -7.5-3*BW _{UTRA} /2	+10+3*BW _{UTRA} /2 / -10-3*BW _{UTRA} /2	
E-UTRA channel Measurement bandwidth	1.08 MHz	2.7 MHz	4.5 MHz	9.0 MHz	13.5 MHz	18 MHz	
UTRA 5MHz channel Measurement bandwidth (Note 1)	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	3.84 MHz	
UTRA 1.6MHz channel measurement bandwidth (Note 2)	1.28 MHz	1.28 MHz	1.28 MHz	1.28MHz	1.28MHz	1.28MHz	

Table 6.6.2.3.2-1: Requirements for	UTRA _{ACLR1/2}
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6.6.2.3.2A Minimum requirement UTRA for CA

For intra-band contiguous carrier aggregation the UTRA Adjacent Channel Leakage power Ratio (UTRA_{ACLR}) is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent(s) UTRA channel frequency.

UTRA Adjacent Channel Leakage power Ratio is specified for both the first UTRA adjacent channel (UTRA_{ACLR1}) and the 2nd UTRA adjacent channel (UTRA_{ACLR2}). The UTRA channel power is measured with a RRC bandwidth filter with roll-off factor α =0.22. The assigned aggregated channel bandwidth power is measured with a rectangular filter with measurement bandwidth specified in Table 6.6.2.3.2A-1. If the measured UTRA channel power is greater than –50dBm then the UTRA_{ACLR} shall be higher than the value specified in Table 6.6.2.3.2A-1.

	CA bandwidth class / UTRA _{ACLR1/2} / measurement bandwidth
	CA bandwidth class C
UTRA _{ACLR1}	33 dB
Adjacent channel centre frequency offset (in MHz)	+ BW _{Channel_CA} /2 + BW _{UTRA} /2 / - BW _{Channel_CA} / 2 - BW _{UTRA} /2
UTRA _{ACLR2}	36 dB
Adjacent channel centre frequency offset (in MHz)	+ BW _{Channel_CA} /2 + 3*BW _{UTRA} /2 / - BW _{Channel_CA} /2 - 3*BW _{UTRA} /2
CA E-UTRA channel Measurement bandwidth	BW _{Channel_CA} - 2* BW _{GB}
UTRA 5MHz channel Measurement bandwidth (Note 1)	3.84 MHz
UTRA 1.6MHz channel measurement bandwidth (Note 2)	1.28 MHz
	DD co-existence with UTRA FDD in paired spectrum. DD co-existence with UTRA TDD in unpaired spectrum.

Table 6.6.2.3.2A-1: Requirements for UTRA_{ACLR1/2}

6.6.2.3.3A Minimum requirements for CA E-UTRA

For intra-band contiguous carrier aggregation the carrier aggregation E-UTRA Adjacent Channel Leakage power Ratio (CA E-UTRA_{ACLR}) is the ratio of the filtered mean power centred on the aggregated channel bandwidth to the filtered mean power centred on an adjacent aggregated channel bandwidth at nominal channel spacing. The assigned aggregated channel bandwidth power are measured with rectangular filters with measurement bandwidths specified in Table 6.6.2.3.3A-1. If the measured adjacent channel power is greater than – 50dBm then the E-UTRA_{ACLR} shall be higher than the value specified in Table 6.6.2.3.3A-1.

	CA bandwidth class / CA E-UTRA _{ACLR} / Measurement bandwidth CA bandwidth class C
CA E-UTRA _{ACLR}	30 dB
CA E-UTRA channel Measurement bandwidth	BW _{Channel_CA} - 2* BW _{GB}
Adjacent channel centre frequency offset (in MHz)	+ BW _{Channel_CA} / - BW _{Channel_CA}

6.6.2.4 Void

6.6.2.4.1 Void

6.6.2A Void

<reserved for future use>

6.6.2B Out of band emission for UL-MIMO

For UE supporting UL-MIMO, the requirements for Out of band emissions resulting from the modulation process and non-linearity in the transmitters are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in subclause 6.6.2 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

For single-antenna port scheme, the requirements in subclause 6.6.3 apply.

6.6.3 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products, but exclude out of band emissions unless otherwise stated. The spurious emission limits are specified in terms of general requirements inline with SM.329 [2] and E-UTRA operating band requirement to address UE co-existence.

To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.3.1 Minimum requirements

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth. The spurious emission limits in Table 6.6.3.1-2 apply for all transmitter band configurations (NRB) and channel bandwidths.

Table 6.6.3.1-1: Boundary between E-UTRA out of band and spurious emission domain

Channel bandwidth	1.4	3.0	5	10	15	20
	MHz	MHz	MHz	MHz	MHz	MHz
ООВ boundary F _{ООВ} (MHz)	2.8	6	10	15	20	25

NOTE: In order that the measurement of spurious emissions falls within the frequency ranges that are more than F_{OOB} (MHz) from the edge of the channel bandwidth, the minimum offset of the measurement frequency from each edge of the channel should be $F_{OOB} + MBW/2$. MBW denotes the measurement bandwidth defined in Table 6.6.3.1-2.

Frequency Range	Maximum Level	Measurement bandwidth	Note				
9 kHz ≤ f < 150 kHz	-36 dBm	1 kHz					
150 kHz ≤ f < 30 MHz	-36 dBm	10 kHz					
30 MHz ≤ f < 1000 MHz	-36 dBm	100 kHz					
1 GHz ≤ f < 12.75 GHz	-30 dBm	1 MHz					
12.75 GHz ≤ f < 5 th harmonic of the upper frequency edge of the UL operating band in GHz	-30 dBm	1 MHz	1				
NOTE 1: Applies for Bar	NOTE 1: Applies for Band 22, Band 42 and Band 43						

Table 6.6.3.1-2: Spurious emissions limits

6.6.3.1A Minimum requirements for CA

For intra-band contiguous carrier aggregation the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth (Table 5.6A-1). For frequencies Δ fOOB greater than FOOB as specified in Table 6.6.3.1A-1 the spurious emission requirements in Table 6.6.3.1-2 are applicable.

Table 6.6.3.1A-1: Boundary between E-UTRA out of band and spurious emission domain for intraband contiguous carrier aggregation

CA Bandwidth Class	ООВ boundary F _{оов} (MHz)
A	Table 6.6.3.1-1
В	FFS
C	BW _{Channel_CA} + 5

NOTE: In order that the measurement of spurious emissions falls within the frequency ranges that are more than F_{OOB} (MHz) from the edge of the channel bandwidth, the minimum offset of the measurement frequency from each edge of the aggregated channel should be $F_{OOB} + MBW/2$. MBW denotes the measurement bandwidth defined in Table 6.6.3.1-2.

6.6.3.2 Spurious emission band UE co-existence

This clause specifies the requirements for the specified E-UTRA band, for coexistence with protected bands

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

	Spurious emission							
E-UTRA Band	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note	
1	E-UTRA Band 1, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 38, 40, 41, 42, 43, 44	F _{DL low}	_	F_{DL_high}	-50	1		
	E-UTRA Band 3, 34	F _{DL low}	-	FDL_high	-50	1	15	
	Frequency range	1880		1895	-40	1	15,27	
	Frequency range	1895		1915	-15.5	5	15, 26, 27	
	Frequency range	1915		1920	+1.6	5	15, 26, 27	
	Frequency range	1839.9	-	1879.9	-50	1	15	
2	E-UTRA Band 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 26, 27, 28, 29, 41, 42	F_{DL_low}	-	$F_{DL_{high}}$	-50	1		
	E-UTRA Band 2, 25	F _{DL_low}	-	F_{DL_high}	-50	1	15	
	E-UTRA Band 43	F _{DL_low}	-	F_{DL_high}	-50	1	2	
3	E-UTRA Band 1, 7, 8, 20, 26, 27, 28, 33, 34, 38, 41, 43, 44	F_{DL_low}	-	F_{DL_high}	-50	1		
	E-UTRA Band 3	F _{DL_low}	-	F_{DL_high}	-50	1	15	
	E-UTRA Band 11, 18, 19, 21	F _{DL_low}	-	F_{DL_high}	-50	1	13	
	E-UTRA Band 22, 42	F _{DL_low}	-	F_{DL_high}	-50	1	2	
	Frequency range	1884.5	-	1915.7	-41	0.3	13	
4	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 26, 27, 28, 29, 41, 43	F _{DL_low}	-	F_{DL_high}	-50	1		
	E-UTRA Band 42	F _{DL_low}	-	F_{DL_high}	-50	1	2	
5	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 22, 23, 24, 25, 28, 29,42, 43	$F_{DL_{low}}$	-	F_{DL_high}	-50	1		
	E-UTRA Band 41	F _{DL_low}	-	F_{DL_high}	-50	1	2	
0	E-UTRA Band 26	859	-	869	-27	1		
6	E-UTRA Band 1, 9, 11, 34	F _{DL_low}	-	F _{DL_high}	-50	1		
	Frequency range	860	-	875	-37	1		
	Frequency range	875	-	895	-50	1		
		1884.5	-	1919.6	-41	0.3	7	
	Frequency range	1884.5	-	1915.7			8	
7	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	F_{DL_low}	-	$F_{DL_{high}}$	-50	1		
	Frequency range	2570	-	2575	+1.6	5	15, 21, 26	
	Frequency range	2575	-	2595	-15.5	5	15, 21, 26	
	Frequency range	2595	-	2620	-40	1	15, 21	
8	E-UTRA Band 1, 20, 28, 33, 34, 38, 39, 40	F _{DL_low}	-	F_{DL_high}	-50	1		
	E-UTRA band 3	F _{DL_low}	-	F_{DL_high}	-50	1	2	
	E-UTRA band 7	F _{DL_low}	-	F_{DL_high}	-50	1	2	
	E-UTRA Band 8	F _{DL_low}	-	F _{DL_high}	-50	1	15	
	E-UTRA Band 22, 41, 42, 43	F _{DL_low}	-	F _{DL_high}	-50	1	2	
	E-UTRA Band 11, 21	F _{DL_low}	-	F _{DL_high}	-50	1	23	
	Frequency range	860	-	890	-40	1	15, 23	
9	Frequency range E-UTRA Band 1, 11, 18, 19, 21, 26, 28,	1884.5	-	1915.7	-41	0.3	8, 23	
5	34	F _{DL_low}	-	F_{DL_high}	-50	1		
	Frequency range	1884.5	-	1915.7	-41	0.3	8	
	Frequency range	945	-	960	-50	1		
	Frequency range	1839.9	-	1879.9	-50	1		
	Frequency range	2545	-	2575	-50	1		
10	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 41, 43	F _{DL_low}	-	F_{DL_high}	-50	1		
	E-UTRA Band 22, 42	F _{DL_low}	_	F_{DL_high}	-50	1	2	
4.4	E-UTRA Band 1, 11, 18, 19, 21, 28, 34	F _{DL_low}	-	F _{DL_high}	-50	1		
11								
11	Frequency range Frequency range	1884.5 945	-	1915.7 960	-41 -50	0.3	8	

Table 6.6.3.2-1: Requirements

	Eroquonov rango	2545	-	2575	-50	1	1
12	E-UTRA Band 2, 5, 13, 14, 17, 23, 24,	2040	-	2070			
12	25, 26, 27, 41	F _{DL low}	-	F_{DL_high}	-50	1	
	E-UTRA Band 4, 10	F _{DL_low}	-	F _{DL_high}	-50	1	2
	E-UTRA Band 12	F _{DL_low}	-	F _{DL_high}	-50	1	15
13	E-UTRA Band 2, 4, 5, 10, 12, 13, 17, 23,	- DL_10W		· DC_nign	-50	1	
	25, 26, 27, 29, 41	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	
	Frequency range	769	-	775	-35	0.00625	15
	Frequency range	799	-	805	-35	0.00625	11, 15
	E-UTRA Band 14	F_{DL_low}	-	F_{DL_high}	-50	1	15
	E-UTRA Band 24	F_{DL_low}	-	F_{DL_high}	-50	1	2
14	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17,	_		_	-50	1	
	23, 24, 25, 26, 27, 29, 41	F _{DL_low}	-	F _{DL_high}			40.45
	Frequency range	769	-	775	-35	0.00625	12, 15
47	Frequency range	799	-	805	-35	0.00625	11, 12, 15
17	E-UTRA Band 2, 5, 13, 14, 17, 23, 24, 25, 26, 27, 41	F _{DL low}	_	F _{DL high}	-50	1	
	E-UTRA Band 4, 10	F _{DL low}	_	F _{DL_high}	-50	1	2
	E-UTRA Band 12	F _{DL_low}	_		-50	1	15
18	E-UTRA Band 1, 11, 21, 34		-	F _{DL_high}	-50	1	10
10		F _{DL_low}	-	F _{DL_high}	-30	1	
	Frequency range Frequency range	860 1994 5	-	890 1915.7	-40 -41	0.3	8
		1884.5	-		-41	0.3	0
	Frequency range	758	-	799	1	1	45
	Frequency range	799	-	803	-40		15
	Frequency range	945	-	960	-50	1	
	Frequency range	1839.9	-	1879.9	-50	1	
4.0	Frequency range	2545	-	2575	-50	1	
19	E-UTRA Band 1, 11, 21, 28, 34	F _{DL_low}	-	F _{DL_high}	-50	1	
	Frequency range Frequency range	1884.5 945	-	1915.7 960	-41 -50	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	
	Frequency range	2545	-	2575	-50	1	
20	E-UTRA Band 1, 3, 7, 8, 20, 22, 33, 34,	_		_	-50	1	
	40, 43	F _{DL_low}	-	F _{DL_high}			45
	E-UTRA Band 20	F _{DL_low}	-	F _{DL_high}	-50	1	15
04	E-UTRA Band 38, 42	F _{DL_low}	-	F _{DL_high}	-50	1	2
21	E-UTRA Band 1, 18, 19, 28, 34	F _{DL_low}	-	F _{DL_high}	-50	1	
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range Frequency range	945 1839.9	-	960 1879.9	-50 -50	1	
	Frequency range	2545	-	2575	-50	1	
22	E-UTRA Band 1, 3, 7, 8, 20, 26, 27, 28,	2010		20.0			
	33, 34, 38, 39, 40, 43	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	
	Frequency range	3510	-	3525	-40	1	15
	Frequency range	3525	-	3590	-50	1	
23	E-UTRA Band 4, 5, 10, 12, 13, 14, 17,	-		-			
24	23, 24, 26, 27, 29, 41	F _{DL_low}	-	F _{DL_high}	-50	1	
24	E-UTRA Band 2, 4, 5, 10, 12, 13, 14, 17, 23, 24, 25, 26, 29, 41	F _{DL low}	-	F_{DL_high}	-50	1	
25	E-UTRA Band 4, 5, 10,12, 13, 14, 17, 22,	• DL_IOW		• DL_nign	50	4	
	23, 24, 26, 27, 28, 29, 41, 42	F _{DL_low}	-	F _{DL_high}	-50	1	
	E-UTRA Band 2	F _{DL_low}	L -	F _{DL_high}	-50	1	15
	E-UTRA Band 25	F _{DL_low}	-	F _{DL_high}	-50	1	15
	E-UTRA Band 43	F _{DL_low}	-	F _{DL_high}	-50	1	2
26	E-UTRA Band 1, 2, 3, 4, 5, 10, 11, 12,			- 2			
	13, 14, 17, 18,19, 21, 22, 23, 24, 25, 26,	_			-50	1	
	29, 34, 40, 42, 43		-	F _{DL_high}	50	4	2
	E-UTRA Band 41	F _{DL_low}	-	F _{DL_high}	-50	1 0.3	2
	Frequency range	1884.5		1915.7	-41 -50	0.3	8
	Frequency range	703	-	799	-		4 5
	-	799	-	803	-40	1	15
	Frequency range	945	-	960	-50	1	
07	Frequency range	1839.9	-	1879.9	-50	1	
27	E-UTRA Band 1, 2, 3, 4, 5, 7, 10, 12, 13, 14, 17, 22, 23, 25, 26, 27, 29, 38, 41, 42,				-50	1	
	43	F _{DL_low}	-	F_{DL_high}	-00		
	•		•	9	•		

	Frequency range	799	-	805	-35	0.00625	
	E-UTRA Band 28	$F_{DL_{low}}$	-	790	-50	1	
28	E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 25, 26, 27, 34, 38, 41	F _{DL_low}	-	F _{DL_high}	-50	1	
	E-UTRA Band 1, 4, 10, 22, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	2
	E-UTRA Band 11, 21	F_{DL_low}	-	F_{DL_high}	-50	1	19, 24
	E-UTRA Band 1	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	19, 25
	Frequency range	470	-	710	-26.2	6	31
	Frequency range	758	-	773	-32	1	15
	Frequency range	773	-	803	-50	1	
	Frequency range	662	-	694	-26.2	6	15
	Frequency range	1884.5	-	1915.7	-41	0.3	8, 19
	Frequency range	1839.9	-	1879.9	-50	1	
33	E-UTRA Band 1, 7, 8, 20, 22, 34, 38, 39, 40, 42, 43	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	5
	E-UTRA Band 3	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	15
34	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 33, 38,39, 40, 41, 42, 43, 44	F _{DL_low}	_	F _{DL_high}	-50	1	5
	Frequency range	1884.5	-	1915.7	-41	0.3	8
	Frequency range	1839.9	-	1879.9	-50	1	5
35							
36							
37			-				
38	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	
	Frequency range	2620	-	2645	-15.5	5	15, 22, 26
	Frequency range	2645	-	2690	-40	1	15, 22
39	E-UTRA Band 22, 34, 40, 41, 42, 44	$F_{DL_{low}}$	-	F_{DL_high}	-50	1	
40	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 33, 34, 38, 39, 41, 42, 43, 44	F _{DL_low}	-	F_{DL_high}	-50	1	
41	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13, 14, 17, 23, 24, 25, 26, 27, 28, 29, 34, 39, 40, 42, 44	F_{DL_low}	-	$F_{DL_{high}}$	-50	1	
	E-UTRA Band 9, 11, 18, 19, 21	F_{DL_low}	-	F_{DL_high}	-50	1	30
	Frequency range	1839.9		1879.9	-50	1	30
	Frequency range	1884.5		1915.7	-41	0.3	8, 30
42	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 33, 34, 38, 40, 41, 44	F _{DL low}	-	F_{DL_high}	-50	1	
43	E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 10, 20, 25, 26, 27, 28, 33, 34, 38, 40	F _{DL_low}	-	F _{DL_high}	-50	1	
	E-UTRA Band 22	$F_{DL_{low}}$	-	F_{DL_high}	[-50]	[1]	3
44	E-UTRA Band 3, 5, 8, 34, 39, 41	F _{DL_low}	-	F _{DL_high}	-50	1	
	E-UTRA Band 1, 40, 42	$F_{DL_{low}}$	-	F_{DL_high}		-50	2

NOTE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.5-1 NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd, 3rd, 4th [or 5th] harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd, 3rd or 4th harmonic totally or partially overlaps the measurement bandwidth (MBW). NOTE 3: To meet these requirements some restriction will be needed for either the operating band or protected band NOTE 4: N/A NOTE 5: For non synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band NOTE 6: N/A. NOTE 7: Applicable when co-existence with PHS system operating in 1884.5-1919.6MHz. NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7MHz. NOTE 9: N/A. NOTE 10: N/A. NOTE 11: Whether the applicable frequency range should be 793-805MHz instead of 799-805MHz is TBD NOTE 12: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dBNOTE 13: This requirement applies for 5, 10, 15 and 20 MHz E-UTRA channel bandwidth allocated within 1744.9MHz and 1784.9MHz. NOTE 14: N/A. NOTE 15: These requirements also apply for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth. NOTE 16: N/A. NOTE 17: N/A NOTE 18: N/A NOTE 19: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz. NOTE 20: N/A. NOTE 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. NOTE 22: This requirement is applicable for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. For carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE P-Max. NOTE 23 This requirement is applicable only for the following cases: - for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 902.5 MHz \leq F_c < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB - for carriers of 5 MHz channel bandwidth when carrier centre frequency (F_c) is within the range 907.5 MHz \leq F_c \leq 912.5 MHz without any restriction on uplink transmission bandwidth. - for carriers of 10 MHz channel bandwidth when carrier centre frequency (F_c) is $F_c = 910$ MHz with an uplink transmission bandwidth less than or equal to 32 RB with $RB_{start} > 3$. NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW). NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned E-UTRA carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.6-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW). NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band. NOTE 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. NOTE 28: N/A. NOTE 29: N/A.

NOTE 3		This requirement applies when the E-UTRA carrier is confined within 2545-2575 MHz and the channel bandwidth is 10 or 20 MHz.
NOTE 3	31:	This requirement is applicable for 5 and 10 MHz E-UTRA channel bandwidth allocated within 718-728MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to [30] RB with [RBstart > 1] and RBstart<48.

6.6.3.2A Spurious emission band UE co-existence for CA

This clause specifies the requirements for the specified carrier aggregation configurations for coexistence with protected bands

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth defined for the protected band.

E- Spurious emission							
UTRA CA Config uration	Protected band		ency MH2	y range z)	Maximum Level (dBm)	MBW (MHz)	Note
CA_1C	E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 38, 40, 41, 42, 43, 44	$F_{DL_{low}}$	-	$F_{DL_{high}}$	-50	1	
	E-UTRA band 34	F _{DL_low}	-	F _{DL_high}	-50	1	4, 6, 7
	Frequency range	1880	-	1895	-40	1	7, 10
	Frequency range	1895	-	1915	-15.5	5	7, 10, 12
	Frequency range	1900	-	1915	-15.5	5	6, 7, 10, 12
	Frequency range	1915	-	1920	+1.6	5	6, 7, 10, 12
	Frequency range	1884.5	-	1915.7	-41	0.3	4, 5
	Frequency range	1839.9	-	1879.9	-50	1	
CA_7C	E-UTRA Band 1, 3, 7, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	F_{DL_low}	-	F_{DL_high}	-50	1	
	Frequency range	2570	-	2575	+1.6	5	8, 12
	Frequency range	2575 2595	-	2595 2620	-15.5 -40	5	8, 12 8
CA_38C	E-UTRA Band 1,3, 8, 20, 22, 27, 28, 29, 33, 34, 40, 42, 43	F _{DL_low}	_	F _{DL_high}	-40	1	0
	Frequency range	2620	_	2645	-15.5	5	9, 10, 11, 12
	Frequency range	2645	-	2690	-40	1	9, 10, 11
CA_40C	E-UTRA Band 1, 3, 7, 8, 20, 22, 26, 27, 33, 34, 38, 39, 41, 42, 43, 44	F _{DL_low}	-	F_{DL_high}	-50	1	
CA_41C	E-UTRA Band 1, 2, 3, 4, 5, 8, 10, 12, 13 , 14, 17, 23, 24, 25, 26, 27, 28, 29, 34, 39,	F _{DL low}	-	F _{DL bigh}	-50	1	
NOTE 5: NOTE 6: NOTE 7: NOTE 8: NOTE 9: NOTE 10 NOTE 11	14, 17, 23, 24, 25, 26, 27, 28, 29, 34, 39, 40, 42, 44 - - FDL_high -50 1 TE 1: FDL_low and FDL_high refer to each E-UTRA frequency band specified in Table 5.5-1 TE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 are permitted for each assigned E-UTRA carrier used in the measurement due to 2nd or 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RE within the transmission bandwidth (see Figure 5.6-1) for which the 2nd or 3rd harmonic, i.e. the frequency equal to two or three times the frequency of that RE, is within the measurement bandwidth (MBW). TE 3: To meet these requirements some restriction will be needed for either the operating band or protected band TE 4: Applicable when CA_NS_01 in subclause 6.6.3.3A.1 is signalled by the network. TE 5: Applicable when CA_NS_02 in subclause 6.6.3.3A.2 is signalled by the network.						

Table 6.6.3.2A-1: Requirements

6.6.3.3 Additional spurious emissions

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell handover/broadcast message.

6.6.3.3.1 Minimum requirement (network signalled value "NS_05")

When "NS_05" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.1-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)		el bandw mission l			Measurement bandwidth	Note
	5 MHz	10 MHz	15 MHz	20 MHz		
1884.5 ≤ f ≤1915.7	-41	-41	-41	-41	300 KHz	1
NOTE 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. Additional restrictions apply for operations below this point.						

 Table 6.6.3.3.1-1: Additional requirements (PHS)

The requirements in Table 6.6.3.3.1-1 apply with the additional restrictions specified in Table 6.6.3.3.1-2 when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is less than the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned.

Table 6.6.3.3.1-2: RB restriction	s for additional requ	uirement (PHS).
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15 MHz channel bandwidth with $f_c = 1932.5$ MHz						
RB _{start} 0-7 8-66 67-74						
L _{CRB}	N/A	≤ MIN(30, 67 – RB _{start})	N/A			
	20 MHz channel ba	andwidth with f _c = 1930 MHz	Z			
RB _{start}	0-23	24-75	76-99			
L _{CRB}	N/A	≤ MIN(24, 76 – RB _{start})	N/A			

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (300 kHz).

6.6.3.3.2 Minimum requirement (network signalled value "NS_07")

When "NS_07" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.2-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band	Channel bandwidth / Spectrum	Measurement			
(MHz)	emission limit (dBm)	bandwidth			
	10 MHz				
769 ≤ f ≤ 775	-57	6.25 kHz			
NOTE: The emissions measurement shall be sufficiently power averaged to ensure standard standard deviation < 0.5 dB.					

Table 6.6.3.3.2-1:	Additional	requirements
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NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (6.25 kHz).

6.6.3.3.3 Minimum requirement (network signalled value "NS_08")

When "NS 08" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.3-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band	Channel ban	dwidth / Spectrum (dBm)	Measurement bandwidth	
(MHz)				
860 ≤ f ≤ 890	-40	-40	-40	1 MHz

Table 6.6.3.3.3-1: Additional requirement

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (1 MHz).

6.6.3.3.4 Minimum requirement (network signalled value "NS_09")

When "NS 09" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.4-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)			Measurement bandwidth
	5MHz	10MHz	15MHz	
1475.9 ≤ f ≤ 1510.9	-35	-35	-35	1 MHz

- NOTE 1: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (1 MHz).
- NOTE 2: To improve measurement accuracy, A-MPR values for NS_09 specified in Table 6.2.4-1 in subclause 6.2.4 are derived based on both the above NOTE 1 and 100 kHz RBW.

6.6.3.3.5 Minimum requirement (network signalled value "NS_12")

When "NS 12" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.5-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	1.4 MHz, 3 MHz, 5 MHz	
806 ≤ f ≤ 813.5	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 814.2 MHz.		
NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3.3.6 Minimum requirement (network signalled value "NS_13")

When "NS 13" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.6-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 5 MHz	Measurement bandwidth
806 ≤ f ≤ 816	-42	6.25 kHz
NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 819 MHz.		
NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

Table 6.6.3.3.6-1: Additional requirements

6.6.3.3.7 Minimum requirement (network signalled value "NS_14")

When "NS 14" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.7-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm)	Measurement bandwidth
	10 MHz, 15 MHz	
806 ≤ f ≤ 816	-42	6.25 kHz
 NOTE 1: The requirement applies for E-UTRA carriers with lower channel edge at or above 824 MHz. NOTE 2: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB. 		

Table 6.6.3.3.7-1: Additional requirements

6.6.3.3.8 Minimum requirement (network signalled value "NS_15")

When "NS 15" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.8-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Table	6.6.3.3.8-	1: Additio	onal requir	ements
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Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz	Measurement bandwidth
851 ≤ f ≤ 859	-53	6.25 kHz
NOTE 1: The emissions measurement shall be sufficiently power averaged to ensure a standard deviation < 0.5 dB.		

6.6.3.3.9 Minimum requirement (network signalled value "NS_16")

When "NS_16" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.9-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 1.4, 3, 5, 10 MHz	Measurement bandwidth	Note
790 ≤ f ≤ 803	-32	1 MHz	

Table 6.6.3.3.9-1: Additional requirements

6.6.3.3.10 Minimum requirement (network signalled value "NS_17")

When "NS_17" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.10-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 5, 10 MHz	Measurement bandwidth	Note
470 ≤ f ≤ 710	-26.2	6 MHz	1
NOTE 1: Applicable when the assigned E-UTRA carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.			

Table 6.6.3.3.10-1: Additional requirements

6.6.3.3.11 Minimum requirement (network signalled value "NS_18")

When "NS_18" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.11-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Table 6.6.3.3.11-1: Additional requirements

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 5, 10, 15, 20 MHz	Measurement bandwidth	Note
692-698	-26.2	6 MHz	

6.6.3.3.12 Minimum requirement (network signalled value "NS_19")

When "NS_19" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.12-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 3, 5, 10, 15, 20 MHz	Measurement bandwidth	Note
662 ≤ f ≤ 694	-25	8 MHz	

6.6.3.3.13 Minimum requirement (network signalled value "NS_11")

When "NS_11" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.13-1. These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 1.4, 3, 5, 10, 15, 20 MHz	Measurement bandwidth
E-UTRA Band 2	-50	1 MHz
1998 ≤ f ≤ 1999	-21	1 MHz
1997 ≤ f < 1998	-27	1 MHz
1996 ≤ f < 1997	-32	1 MHz
1995 ≤ f < 1996	-37	1 MHz
1990 ≤ f < 1995	-40	1 MHz

Table 6.6.3.3.13-1: Additional requirements

6.6.3.3.14 Minimum requirement (network signalled value " NS_20")

When "NS_20" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.14-1. These requirements also apply for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 and Table 6.6.3.1A-1 from the edge of the channel bandwidth.

Frequency band (MHz)	Channel bandwidth / Spectrum emission limit (dBm) 5, 10, 15, 20 MHz	Measurement bandwidth				
1990 ≤ f < 1999	-40	1 MHz				
1999 ≤ f ≤ 2000	-40	Note 1				
Note 1: The measurement bandwidth is 1% of the applicable E-UTRA channel bandwidth.						

Table 6.6.3.3.14-1: Additional requirements

6.6.3.3.15 Minimum requirement (network signalled value " NS_22")

When "NS 22" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.15-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Protected band		Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	
43		$F_{DL_{low}}$	•	$F_{DL_{high}}$	[-50]	1	
NOTE:	E: The [-50] dBm/MHz in Table 6.6.3.3.13-1 is for unsynchronized operation. To meet these						
	requirements some restriction will be needed for either the operating band or protected						
	band.						

Table 6.6.3.3.15-1: Additional requirement

NOTE 1: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (1 MHz).

6.6.3.3.16 Minimum requirement (network signalled value " NS_23")

When "NS 23" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3.16-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1-1 from the edge of the channel bandwidth.

Protected band	Frequen	cy rar	nge (MHz)	Maximum Level (dBm)	MBW (MHz)		
42	F _{DL_low}	-	F _{DL_high}	[-50]	1		
	OTE: The [-50] dBm/MHz in Table 6.6.3.3.14-1 is for unsynchronized operation. To meet these requirements some restriction will be needed for either the operating band or protected						

 Table 6.6.3.3.16-1: Additional requirement

NOTE 1: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (1 MHz).

6.6.3.3A Additional spurious emissions for CA

These requirements are specified in terms of an additional spectrum emission requirement. Additional spurious emission requirements are signalled by the network to indicate that the UE shall meet an additional requirement for a specific deployment scenario as part of the cell reconfiguration message.

6.6.3.3A.1 Minimum requirement for CA_1C (network signalled value "CA_NS_01")

When "CA_NS_01" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.1-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)	Note			
E-UTRA band 34	FDL_low	-	FDL_high	-50	1				
Frequency range	1884.5	-	1915.7	-41	0.3	1			
NOTE 1: Applicable when the aggregated channel bandwidth is confined within frequency range 1940 – 1980 MHz									

Table 6.6.3.3A.1-1: Additional requirements (PHS)

NOTE: For measurement conditions at the edge of each frequency range, the lowest frequency of the measurement position in each frequency range should be set at the lowest boundary of the frequency range plus MBW/2. The highest frequency of the measurement position in each frequency range should be set at the highest boundary of the frequency range minus MBW/2. MBW denotes the measurement bandwidth (300 kHz).

6.6.3.3A.2 Minimum requirement for CA_1C (network signalled value "CA_NS_02")

When "CA_NS_02" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.2-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
E-UTRA band 34	$F_{DL_{low}}$	-	F_{DL_high}	-50	1
Frequency range	1900	-	1915	-15.5	5
Frequency range	1915	-	1920	+1.6	5

Table 6.6.3.3A.2-1: Additional requirements

6.6.3.3A.3 Minimum requirement for CA_1C (network signalled value "CA_NS_03")

When "CA_NS_03" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.3-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

Protected band	Frequency range (MHz)		nge (MHz)	Maximum Level (dBm)	MBW (MHz)
E-UTRA band 34	$F_{DL_{low}}$	-	F _{DL_high}	-50	1
Frequency range	1880	-	1895	-40	1
Frequency range	1895	-	1915	-15.5	5
Frequency range	1915	-	1920	+1.6	5

Table 6.6.3.3A.3-1: Additional requirements

6.6.3.3A.4 Minimum requirement for CA_38C (network signalled value "CA_NS_05")

When "CA_NS_05" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.4-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth. This requirement is applicable for carriers with aggregated channel bandwidths confined in 2570 - 2615 MHz.

Table 6.6.3.3A.4-1: Additional requirements

Ī	Protected band	Frequency range (MHz)			Maximum Level (dBm)	MBW (MHz)
	Frequency range	2620	-	2645	-15.5	5
	Frequency range	2645	-	2690	-40	1

6.6.3.3A.5 Minimum requirement for CA_7C (network signalled value "CA_NS_06")

When "CA_NS_06" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.6.3.3A.5-1. This requirement also applies for the frequency ranges that are less than F_{OOB} (MHz) in Table 6.6.3.1A-1 from the edge of the aggregated channel bandwidth.

Protected band	Frequenc	y rar	nge (MHz)	Maximum Level (dBm)	MBW (MHz)
Frequency range	2570	1	2575	+1.6	5
Frequency range	2575	-	2595	-15.5	5
Frequency range	2595	-	2620	-40	1

Table 6.6.3.3A.5-1: Additional requirements

6.6.3A Void

<reserved for future use>

6.6.3B Spurious emission for UL-MIMO

For UE supporting UL-MIMO, the requirements for Spurious emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emissions, intermodulation products and frequency conversion products are specified at each transmit antenna connector.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in subclause 6.6.3 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-1.

For single-antenna port scheme, the general requirements in subclause 6.6.3 apply.

6.6A Void

6.6B Void

6.7 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

6.7.1 Minimum requirement

User Equipment(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or eNode B receive band as an unwanted interfering signal. The UE intermodulation attenuation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal at each of the transmitter antenna port with the other antenna port(s) if any is terminated. Both the wanted signal power and the intermodulation product power are measured through E-UTRA rectangular filter with measurement bandwidth shown in Table 6.7.1-1.

The requirement of transmitting intermodulation is prescribed in Table 6.7.1-1.

BW Channel (UL)	5MHz		10MHz		15MHz		20MHz	
Interference Signal Frequency Offset	5MHz	10MHz	10MHz	20MHz	15MHz	30MHz	20MHz	40MHz
Interference CW Signal Level	nal -40dBc							
Intermodulation Product	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc	-29dBc	-35dBc
Measurement bandwidth	4.5MHz	4.5MHz	9.0MHz	9.0MHz	13.5MHz	13.5MHz	18MHz	18MHz

Table 6.7.1-1: Transmit Intermodulation

6.7.1A Minimum requirement for CA

User Equipment(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or eNode B receive band as an unwanted interfering signal. The UE intermodulation attenuation is defined by the ratio of the mean power of the wanted signal to the mean power of the intermodulation product on both component carriers when an interfering CW signal is added at a level below the wanted signal at each of the transmitter antenna port with the other antenna port(s) if any is terminated. Both the wanted signal power and the intermodulation product power are measured through rectangular filter with measurement bandwidth shown in Table 6.7.1A-1.

For intra-band contiguous carrier aggregation the requirement of transmitting intermodulation is specified in Table 6.7.1A-1.

CA bandwidth class(UL)	С		
Interference Signal Frequency Offset	BWChannel_CA 2*BWChannel_0		
Interference CW Signal Level	-40dBc		
Intermodulation Product	-29dBc	-35dBc	
Measurement bandwidth	BW _{Channel_CA} - 2* BW _{GB}		

6.7.1B Minimum requirement for UL-MIMO

For UE supporting UL-MIMO, the transmit intermodulation requirements are specified at each transmit antenna connector and the wanted signal is defined as the sum of output power at each transmit antenna connector.

For UEs with two transmit antenna connectors in closed-loop spatial multiplexing scheme, the requirements in subclause 6.7.1 apply to each transmit antenna connector. The requirements shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2.

For single-antenna port scheme, the requirements in subclause 6.7.1 apply.

- 6.8.1 Void
- 6.8A Void

6.8B Time alignment error for UL-MIMO

For UE(s) with multiple transmit antenna connectors supporting UL-MIMO, this requirement applies to frame timing differences between transmissions on multiple transmit antenna connectors in the closed-loop spatial multiplexing scheme.

The time alignment error (TAE) is defined as the average frame timing difference between any two transmissions on different transmit antenna connectors.

6.8B.1 Minimum Requirements

For UE(s) with multiple transmit antenna connectors, the Time Alignment Error (TAE) shall not exceed 130 ns.

7 Receiver characteristics

7.1 General

Unless otherwise stated the receiver characteristics are specified at the antenna connector(s) of the UE. For UE(s) with an integral antenna only, a reference antenna(s) with a gain of 0 dBi is assumed for each antenna port(s). UE with an integral antenna(s) may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna. For UEs with more than one receiver antenna connector, identical interfering signals shall be applied to each receiver antenna port if more than one of these is used (diversity).

The levels of the test signal applied to each of the antenna connectors shall be as defined in the respective sections below.

With the exception of subclause 7.3, the requirements shall be verified with the network signalling value NS_01 configured (Table 6.2.4-1).

All the parameters in clause 7 are defined using the UL reference measurement channels specified in Annexes A.2.2 and A.2.3, the DL reference measurement channels specified in Annex A.3.2 and using the set-up specified in Annex C.3.1.

For the additional requirements for intra-band non-contiguous carrier aggregation, in-gap test refers to the case when the interfering signal(s) is (are) located at a negative offset with respect to the the assigned channel frequency of the highest carrier frequency; or located at a positive offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous carrier aggregation, out-of-gap test refers to the case when the interfering signal(s) is (are) located at a positive offset with respect to the assigned channel frequency of the

highest carrier frequency, or located at a negative offset with respect to the assigned channel frequency of the lowest carrier frequency.

For the additional requirements for intra-band non-contiguous carrier aggregation with channel bandwidth larger than or equal to 5 MHz, existing adjacent channel selectivity requirements, in-band blocking requirements and narrow band blocking requirements shall be supported for in-gap tests only if the sub-block gap size satisfies the following condition so that the interferer position does not change the nature of the core requirement tested:

 $Wgap \ge (Interferer frequency offset 1) + (Interferer frequency offset 2) -0.5*((Channel bandwidth 1) + (Channel bandwidth 2))$

where the interferer frequency offset represents the interferer frequency offset per carrier specified in subclause 7.5.1, subclause 7.6.1 and subclause 7.6.3.

7.2 Diversity characteristics

The requirements in Section 7 assume that the receiver is equipped with two Rx port as a baseline. These requirements apply to all UE categories unless stated otherwise. Requirements for 4 ports are FFS. With the exception of subclause 7.9 all requirements shall be verified by using both (all) antenna ports simultaneously.

7.3 Reference sensitivity power level

The reference sensitivity power level REFSENS is the minimum mean power applied to both the UE antenna ports at which the throughput shall meet or exceed the requirements for the specified reference measurement channel.

7.3.1 Minimum requirements (QPSK)

The throughput shall be $\ge 95\%$ of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.1-1 and Table 7.3.1-2

Channel bandwidth										
	E-UTRA 1.4 MHz 3 MHz 5 MHz 10 MHz 15 MHz 20 MHz Duplex									
Band	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	Mode			
1	402.7	00.7	-100	-97	-95.2	-94	FDD			
2	-102.7	-99.7	-98	-95	-93.2	-92	FDD			
3	-101.7	-98.7	-97	-94	-92.2	-91	FDD			
4	-104.7	-101.7	-100	-97	-95.2	-94	FDD			
5	-103.2	-100.2	-98	-95			FDD			
6 7			-100	-97	02.0	00	FDD			
	400.0	00.0	-98	-95	-93.2	-92	FDD			
8	-102.2	-99.2	-97	-94	04.0	00	FDD			
9			-99	-96	-94.2	-93	FDD			
10			-100	-97	-95.2	-94	FDD			
11	404.7	00.7	-100	-97			FDD			
12	-101.7	-98.7	-97	-94			FDD			
13			-97	-94			FDD			
14			-97	-94			FDD			
			07	0.4			500			
17			-97 -100 ⁷	-94 -97 ⁷	-95.2 ⁷		FDD			
18							FDD			
19			-100	-97	-95.2		FDD			
20			-97	-94	-91.2	-90	FDD			
21			-100	-97	-95.2	04	FDD			
22			-97	-94	-92.2	-91	FDD			
23	-104.7	-101.7	-100	-97	-95.2	-94	FDD			
24			-100	-97	04.7	00.5	FDD			
25	-101.2	-98.2	-96.5	-93.5	-91.7 -92.7 ⁶	-90.5	FDD			
26	-102.7	-99.7	-97.5 ⁶	-94.5 ⁶	-92.7		FDD			
27	-103.2	-100.2	-98	-95	00.7	01	FDD			
28		-100.2	-98.5	-95.5	-93.7	-91	FDD			
			400	07	-95.2	-94	TDD			
33			-100	-97	-95.2	-94	TDD			
34	100.0	402.2	-100	-97	-95.2	-94	TDD			
35	-106.2	-102.2	-100	-97	-95.2	-94 -94	TDD			
36 37	-106.2	-102.2	-100 -100	-97 -97	-95.2	-94	TDD TDD			
					-95.2	-94				
38 39			-100 -100	-97 -97	-95.2	-94 -94	TDD TDD			
<u>39</u>			-100	-97 -97	-95.2	-94	TDD			
40			-100	-97 -95	-93.2	-94	TDD			
41			-98 -99	-95 -96	-93.2	-92	TDD			
42			-99	-96 -96	-94.2	-93	TDD			
43		[_100.2]			[-93.2]	[-92]	TDD			
44 NOTE 1:	The transmitter	[-100.2] shall be set	[-98]	[-95] as defined			עטי			
NOTE 2:	Reference meas						NG			
	Pattern OP.1 FE	DD/TDD as	described	in Annex A						
NOTE 3:	The signal powe				d 0 the ref	010000 000	oitiv <i>it</i> iv			
NOTE 4:	For the UE which level is FFS.	n supports	both Band	a 3 and Bar	iu 9 the ref	erence sen	SILIVILY			
NOTE 5:	For the UE which level is FFS.	h supports	both Band	d 11 and Ba	and 21 the	reference s	ensitivity			
NOTE 6:	⁶ indicates that t									
frequency of the assigned E-UTRA channel bandwidth is within 865-894 MHz. NOTE 7: For a UE that support both Band 18 and Band 26, the reference sensitivity level for Band 26 applies for the applicable channel bandwidths.										

Table 7.3.1-1:	Reference	sensitivity	QPSK	PREFSENS

The reference receive sensitivity (REFSENS) requirement specified in Table 7.3.1-1 shall be met for an uplink transmission bandwidth less than or equal to that specified in Table 7.3.1-2.

NOTE: Table 7.3.1-2 is intended for conformance tests and does not necessarily reflect the operational conditions of the network, where the number of uplink and downlink allocated resource blocks will be practically constrained by other factors. Typical receiver sensitivity performance with HARQ retransmission enabled and using a residual BLER metric relevant for e.g. Speech Services is given in the Annex X (informative).

For the UE which supports inter-band carrier aggregation configuration in Table 7.3.1-1A with uplink in one E-UTRA band, the minimum requirement for reference sensitivity in Table 7.3.1-1 shall be increased by the amount given in $\Delta R_{IB,c}$ in Table7.3.1-1A for the applicable E-UTRA bands.

Inter-band CA Configuration		ΔR _{IB,c} [dB]						
CA_1A-5A	1	0						
07_17-37	5	0						
CA_1A-18A	1	0						
	18	0						
CA_1A-19A	1	0						
	19	0						
CA_1A-21A	21	0						
	2	0						
CA_2A-17A	17	0.5						
	3	0						
CA_3A-5A	5	0						
	3	0						
CA_3A-7A	7	0						
CA_3A-8A	3	0						
0/(_0/(0/(8	0						
CA_3A-20A	3	0						
	20	0						
CA_4A-5A	4	0						
	5	0						
CA_4A-7A	4 7	0.5						
	4	0.5						
CA_4A-12A	12	0.5						
	4	0						
CA_4A-13A	13	0						
	4	0						
CA_4A-17A	17	0.5						
CA_5A-12A	5	0.5						
04_34-124	12	0.3						
CA_5A-17A	5	0.5						
	17	0.3						
CA_7A-20A	7	0						
	20	0						
CA_8A-20A	8	0						
	20	0						
CA_11A-18A	18	0						
NOTE 1. The a	above additional tolerances are only ap	-						
band	s that belong to the supported inter-bar gurations	nd carrier aggregation						
NOTE 2: The a	above additional tolerances also apply i	n intra-band CA and non-						
aggre	egated operation for the supported E-U	TRA operating bands that belong to						
	upported inter-band carrier aggregation							
	se the UE supports more than one of th							
	egation configurations and a E-UTRA o							
	nter-band carrier aggregation configura							
	When the E-UTRA operating band freq							
	pplicable additional tolerance shall be Table 7.3.1-1A, truncated to one decimate the decimate the state of t							
		1 110						
	operating band among the supported CA							
harmonic relation between low band UL and high band DL, then the								
	naximum tolerance among the differen							
	configurations involving such band sha							
	When the E-UTRA operating band freq							
applicable additional tolerance shall be the maximum tolerance in Table								
7	3.1-1A that would apply for that oper	ating band among the supported						

Table 7.3.1-1	A: ΔR _{IB,c}
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CA configurations

NOTE : The above additional tolerances do not apply to supported UTRA operating bands with frequency range below 1 GHz that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations when such bands are belonging only to band combination(s) where one band is <1GHz and another band is >1.7GHz and there is no harmonic relationship between the low band UL and high band DL. Otherwise the above additional tolerances also apply to supported UTRA operating bands that correspond to the E-UTRA operating bands that belong to the supported inter-band carrier aggregation configurations.

E-UTRA Band / Channel bandwidth / N _{RB} / Duplex mode									
E-UTRA Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex Mode		
1			25	50	75	100	FDD		
2	6	15	25	50	50 ¹	50 ¹	FDD		
3	6	15	25	50	50 ¹	50 ¹	FDD		
4	6	15	25	50	75	100	FDD		
5	6	15	25	25 ¹	_		FDD		
6	-		25	25 ¹			FDD		
7			25	50	75	75 ¹	FDD		
8	6	15	25	25 ¹			FDD		
9	-		25	50	50 ¹	50 ¹	FDD		
10			25	50	75	100	FDD		
11			25	25 ¹			FDD		
12	6	15	20 ¹	20 ¹			FDD		
13	Ű	10	20 ¹	20 ¹			FDD		
10			15 ¹	15 ¹			FDD		
			10	10			100		
17			20 ¹	20 ¹			FDD		
18			25	25 ¹	25 ¹		FDD		
19			25	25 ¹	25 ¹		FDD		
20			25	20 ¹	20 ³	20 ³	FDD		
20			25	20 25 ¹	20 25 ¹	20	FDD		
22			25	50	50 ¹	50 ¹	FDD		
22	6	15	25	50	75	100	FDD		
23	0	15	25	50	75	100	FDD		
24	6	15	25	50	50 ¹	50 ¹	FDD		
26	6	15	25	25 ¹	25 ¹	50	FDD		
20	6	15	25	25 25 ¹	25		FDD		
28	0	15	25	25 ¹	25 ¹	25 ¹	FDD		
		15	20	20	20	20	FDD		
			25	50	75	100	TDD		
33			25	50	75	100			
34	0	45	25	50	75	100	TDD		
35	6	15	25	50	75	100	TDD		
36	6	15	25	50	75	100	TDD		
37			25	50	75	100	TDD		
38			25	50	75	100	TDD		
39			25	50	75	100	TDD		
40			25	50	75	100	TDD		
41			25	50	75	100	TDD		
42			25	50	75	100	TDD		
43		4.5	25	50	75	100	TDD		
44 NOTE 1:	roforo to th	15	25	50 ka aball ba	75	100	TDD		
 NOTE 1: ¹ refers to the UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.6-1). NOTE 2: For the UE which supports both Band 11 and Band 21 the uplink configuration for reference sensitivity is FFS. NOTE 3: ³ refers to Band 20; in the case of 15MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 11 and in the case of 20MHz channel bandwidth, the UL resource blocks shall be located at RB_{start} 16 									

 Table 7.3.1-2: Uplink configuration for reference sensitivity

Unless given by Table 7.3.1-3, the minimum requirements specified in Tables 7.3.1-1 and 7.3.1-2 shall be verified with the network signalling value NS_01 (Table 6.2.4-1) configured.

E-UTRA Band	Network Signalling value
2	NS_03
4	NS_03
10	NS_03
12	NS_06
13	NS_06
14	NS_06
17	NS_06
19	NS_08
21	NS_09
23	NS_03

7.3.1A Minimum requirements (QPSK) for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.1-1 and Table 7.3.1-2. The reference sensitivity is defined to be met with both downlink component carriers active and either of the uplink carriers active. The UE shall meet the requirements specified in subclause 7.3.1 with the following exceptions.

For the UE that supports any of the E-UTRA CA configurations given in Table 7.3.1A-0a, exceptions to the aforementioned requirements are allowed when the uplink active in the lower-frequency operating band is within a specified frequency range as noted in Table 7.3.1A-0a. For these exceptions, the UE shall meet the requirements specified in Table 7.3.1A-0a and Table 7.3.1A-0b.

Channel bandwidth									
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode	
CA_3A-8A ⁴	3				N/A	N/A	N/A	FDD	
CA_3A-0A	8			N/A	N/A				
CA_4A-12A ^{5,6}	4	[-89.2]	[-89.2]	[-90]	[-89.5]			FDD	
CA_4A-12A	12			-96.5	-93.5			FUU	
CA_4A-17A ^{5,6}	4			[-90]	[-89.5]			FDD	
0A_4A-17A	17			-96.5	-93.5			FDD	
NOTE 1: The transmitter shall be set to P_{UMAX} as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 NOTE 3: The signal power is specified per port NOTE 4: No requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 2nd transmitter harmonic is within the downlink transmission bandwidth of the high band. The reference sensitivity is only verified when this is not the case (the requirements specified in clause 7.3.1 apply). NOTE 5: These requirements apply when there is at least one individual RE within the uplink transmission bandwidth of the low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of the low band for which the 3rd transmitter harmonic is within the downlink transmission bandwidth of the high band. NOTE 6: The requirements should be verified for UL EARFCN of the low band (superscript LB) such that $f_{UL}^{LB} = \lfloor f_{DL}^{HB} / 0.3 \rfloor 0.1$ in MHz and $F_{UL_{Low}}^{LB} + BW_{Channel}^{LB} / 2 < f_{UL_{Lingh}}^{LB} - BW_{Channel}^{LB} / 2$ with f_{DL}^{HB} the carrier frequency of the high band in MHz and $BW_{Channel}^{LB}$ the channel bandwidth configured in the									

E-UTRA Band / Channel bandwidth of the high band / N_{RB} / Duplex mode									
EUTRA CA Configuration	UL band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex mode	
CA_4A-12A	12	2	5	8	16			FDD	
CA_4A-17A	17			8	16			FDD	
 NOTE 1: refers to the UL resource blocks, which shall be centred within the transmission bandwidth configuration for the channel bandwidth. NOTE 2: the UL configuration applies regardless of the channel bandwidth of the low band unless the UL resource blocks exceed that specified in Table 7.3.1-2 for the uplink bandwidth in which case the allocation according to Table 7.3.1-2 applies. 									

Table 7.3.1A-0b: Uplink configuration for the low band (exceptions)

For band combinations including operating bands without uplink band (as noted in Table 5.5-1), the requirements are specified in Table 7.3.1A-0d and Table 7.3.1A-0e.

Channel bandwidth									
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode	
CA_2A-29A	2			-98	-95			FDD	
	29		-98.7	-97	-94				
CA_4A-29A	4			-100	-97			FDD	
	29		-98.7	-97	-94				
NOTE 1: The transmitter shall be set to P _{UMAX} as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 NOTE 3: The signal power is specified per port									

Table 7.3.1A-0d: Reference sensitivity QPSK PREFSENS

Table 7.3.1A-0e: l	Jplink configuratio	on for reference sensitivity
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E-UTRA Band / Channel bandwidth / NRB / Duplex mode									
EUTRA CA Configuration	EUTRA band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex mode	
CA_2A-29A	2			25	50			FDD	
	29		N/A	N/A	N/A			FUU	
CA_4A-29A	4			25	50				
	29		N/A	N/A	N/A			FDD	

In all cases for single uplink inter-band CA, unless given by Table 7.3.1-3 for the band with the active uplink carrier, the applicable reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4-1) configured.

For intra-band contiguous carrier aggregation the throughput of each component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.3.1-1 and Table 7.3.1A-1. Table 7.3.1A-1 specifies the maximum number of allocated uplink resource blocks for which the intra-band contiguous carrier aggregation reference sensitivity requirement shall be met. The PCC and SCC allocations follow Table 7.3.1A-1 and form a contiguous allocation where TX–RX frequency separations are as defined in Table 5.7.4-1. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2 and the downlink PCC carrier center frequency shall be configured closer to uplink operating band than the downlink SCC center frequency. Unless given by Table 7.3.1-3, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4-1) configured.

CA configuration / CC combination / N _{RB_agg} / Duplex mode									
CA configuration	100RB+50RB		75RB+75RB		100RB+75RB		100RB+100RB		Dunlay
	PCC	SCC	PCC	SCC	PCC	SCC	PCC	SCC	Duplex Mode
CA_1C	N/A	N/A	75	54	N/A	N/A	100	30	FDD
CA_7C	N/A	N/A	75	0	N/A	N/A	75	0	FDD
CA_38C			75	75			100	100	TDD
CA_40C	100	50	75	75	N/A	N/A	100	100	TDD
CA_41C	100	50	75	75	100	75	100	100	TDD
NOTE 1: The carrier centre frequency of SCC in the UL operating band is configured closer to the DL operating band. NOTE 2: The transmitted power over both PCC and SCC shall be set to P _{UMAX} as defined in subclause 6.2.5A. NOTE 3: The UL resource blocks in both PCC and SCC shall be confined within the transmission bandwidth									

Table 7.3.1A-1: Intra-band CA uplink configuration for reference sensitivity

configuration for the channel bandwidth (Table 5.6-1). NOTE 4: The UL resource blocks in PCC shall be located as close as possible to the downlink operating band, while the UL resource blocks in SCC shall be located as far as possible from the downlink operating band.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the throughput of each downlink component carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with both downlink carriers active and parameters specified in Table 7.3.1-1 and Table 7.3.1A-3 with the power level in Table 7.3.1-1 increased by Δ_{IBNC} given in Table 7.3.1A-3 for the SCC. Unless given by Table 7.3.1-3, the reference sensitivity requirements shall be verified with the network signalling value NS_01 (Table 6.2.4-1) configured.

CA configuration	Aggregated channel bandwidth (PCC+SCC)	W _{gap} /[MHz]	UL PCC allocation	ΔR _{IBNC} (dB)	Duplex mode
	25RB+25RB	$30.0 < W_{gap} \le 55.0$	10 ¹	5.0	
	2010-2010	$0.0 < W_{gap} \le 30.0$	25 ¹	0.0	
	25RB+50RB	$25.0 < W_{gap} \le 50.0$	10 ¹	4.5	
	2368+3068	$0.0 < W_{gap} \le 25.0$	25 ¹	0.0	FDD
CA_25A-25A	50RB+25RB	15.0 < W _{gap} ≤ 50.0	10 ⁴	5.5	FUU
	JUKD+2JKD	0.0 < W _{gap} ≤ 15.0	32 ¹	0.0	
	50RB+50RB	10.0 < W _{gap} ≤ 45.0	10 ⁴	5.0	
	JUKD+JUKD	$0.0 < W_{gap} \le 10.0$	32 ¹	0.0	
CA_41A-41A	NOTE 6	NOTE 7	NOTE 8	0.0	TDD
NOTE 2: W _{gap} is NOTE 3: The ca operat NOTE 4: ⁴ refer NOTE 5: For the only in NOTE 6: All cor NOTE 7: All app	ting band but confi s the sub-block ga arrier center freque ting band. s to the UL resource TDD intra-band r synchronized ope nbinations of chan blicable sub-block CC allocation is sa	ce blocks shall be located as c ned within the transmission. b between the two sub-blocks. ency of PCC in the UL operation ce blocks shall be located at R non-contiguous CA configuration eration between all component nel bandwidths defined in Tab gap sizes. une as Transmission bandwidt	ng band is conf B _{start} =33. ons, the minim carriers. le 5.6A.1-3.	igured close	r to the DL ents apply

Table 7.3.1A-3:	: Intra-band non-cont	tiquous CA uplin	k configuration for	reference sensitivity

7.3.1B Minimum requirements (QPSK) for UL-MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.3.1 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{UMAX} is the total transmitter power over the two transmit antenna connectors.

7.3.2 Void

7.4 Maximum input level

This is defined as the maximum mean power received at the UE antenna port, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel.

7.4.1 Minimum requirements

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4.1-1

Rx Parameter	Units	Channel bandwidth						
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
Power in Transmission Bandwidth Configuration	dBm	-25						
Bandwidth Configuration Image: Configuration NOTE 1: The transmitter shall be set to 4dB below PCMAX_L at the minimum uplink configuration specified in Table 7.3.1-2 with PCMAX_L as defined in subclause 6.2.5. NOTE 2: Reference measurement channel is Annex A.3.2: 64QAM, R=3/4 variant with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.								

 Table 7.4.1-1: Maximum input level

7.4.1A Minimum requirements for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the maximum input level is defined with the uplink active on the band other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.4.1 for each component carrier while both downlink carriers are active.

For intra-band contiguous carrier aggregation maximum input level is defined as a mean power received at the UE antenna port over the aggregated channel bandwidth, at which the specified relative throughput shall meet or exceed the minimum requirements for the specified reference measurement channel over each component carrier.

The downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.4.1A-1 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2.

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels over each component carrier as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.4.1A-1.

For intra-band non-contiguous carrier aggregation with two downlink carriers the maximum input level requirement is – 22 dBm and is defined as a sum of mean carrier powers received at the UE antenna port while both carriers have equal power. The throughput shall be \geq 95% of the maximum throughput of the specified reference measurement channel as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1) over each carrier. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1A-3.

Rx Parameter	Units	CA Bandwidth Class					
		Α	В	С	D	E	F
Power in Transmission Aggregated Bandwidth Configuration	dBm			-22			
NOTE 1: The transmitter shal 6.2.5A.	l be set to	4dB below	PCMAX_L OR	PCMAX_L_CA	as defin	ed in sub	clause
NOTE 2: Reference measure dynamic OCNG Pat							e sided

Table 7.4.1A-1: Maximum input level for intra-band contiguous CA

7.4.1B Minimum requirements for UL-MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing, the minimum requirements in Clause 7.4.1 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

7.4A Void

7.4A.1 Void

Adjacent Channel Selectivity (ACS) 7.5

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a E-UTRA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

7.5.1 Minimum requirements

The UE shall fulfil the minimum requirement specified in Table 7.5.1-1 for all values of an adjacent channel interferer up to -25 dBm. However it is not possible to directly measure the ACS, instead the lower and upper range of test parameters are chosen in Table 7.5.1-2 and Table 7.5.1-3 where the throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

					,		
			C	Channel b	andwidth	1	
Rx Parameter	Units	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz

Table 7.5.1-1: Adjacent channel selectivity

			Channel bandwidth						
Rx Parameter	Units	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
ACS	dB	33.0	33.0	33.0	33.0	30	27		

Rx Parameter	Units		Channel bandwidth								
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz				
Power in	dBm										
Transmission											
Bandwidth				REFSENS	5 + 14 0B						
Configuration											
	dBm	REFSENS	REFSENS	REFSENS	REFSENS	REFSENS	REFSENS				
PInterferer		+45.5dB	+45.5dB	+45.5dB	+45.5dB	+42.5dB	+39.5dB				
BWInterferer	MHz	1.4	3	5	5	5	5				
FInterferer (offset)	MHz	1.4+0.0025	3+0.0075	5+0.0025	7.5+0.0075	10+0.0125	12.5+0.0025				
		/	/	/	/	/	/				
		-1.4-0.0025	-3-0.0075	-5-0.0025	-7.5-0.0075	-10-0.0125	-12.5-				
							0.0025				
NOTE 1: The tra	insmitter s	hall be set to 4d	B below PCMAX	⊥ at the minimum	uplink configura	ation specified i	n Table 7.3.1-				
		defined in subcl				-					
NOTE 2: The int	erferer co	nsists of the Ref	erence measur	ement channel sp	pecified in Anne	x A.3.2 with one	e sided				
				ribed in Annex A							
C.3.1							-				

Table 7.5.1-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter	Units		Channel bandwidth							
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz			
Power in Transmission Bandwidth Configuration	dBm	-56.5	-56.5	-56.5	-56.5	-53.5	-50.5			
PInterferer	dBm			-2	5					
BWInterferer	MHz	1.4	3	5	5	5	5			
F _{Interferer} (offset)	MHz	1.4+0.0025	3+0.0075 /	5+0.0025 /	7.5+0.0075	10+0.0125 /	12.5+0.0025			
		-1.4-0.0025	-3-0.0075	-5-0.0025	-7.5-0.0075	-10-0.0125	-12.5- 0.0025			
NOTE 1: The transmitter shall be set to 24dB below PCMAX_L at the minimum uplink configuration specified in Table 7.3.1-2 with PCMAX_L as defined in subclause 6.2.5.										
NOTE 2: The int	erferer co	nsists of the Ref	ference measur	ement channel sp Annex A.5.1.1/A.						

Table 7.5.1-3: Test parameters for Adjacent channel selectivity, Case 2

7.5.1A Minimum requirements for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band, the adjacent channel requirements are defined with the uplink active on the band other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.5.1 for each component carrier while both downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band (as noted in Table 5.5-1), the requirements for both downlinks shall be met with the uplink active in the band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3.1A-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the adjacent channel requirements of subclause 7.5.1A do not apply.

For intra-band contiguous carrier aggregation the downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.5.1A-2 and Table 7.5.1A-3 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2. The UE shall fulfil the minimum requirement specified in Table 7.5.1A-1 for an adjacent channel interferer on either side of the aggregated downlink signal at a specified frequency offset and for an interferer power up to -25 dBm. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.5.1A-2 and 7.5.1A-3.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, each larger than or equal to 5 MHz, the adjacent channel selectivity requirements are defined with the uplink configuration in accordance with Table 7.3.1A-3. For this uplink configuration, the UE shall meet the requirements specified in subclause 7.5.1 for each component carrier subject to in-gap and out-of-gap interferers while both downlink carriers are active. The interferer powerP_{interferer} for Case 1 in Table 7.5.1-2 shall be set to the maximum of the levels given by the two downlink carriers. For both Case 1 and Case 2 (Table 7.5.1-3), the wanted signal power level of each carrier shall be set in accordance with the ACS requirement (Clause 7.5.1) relative to the interferer power P_{interferer}.

			CA Bandwidth Class							
Rx Parameter	Units	В	С	D	E	F				
ACS	dB		24							

Rx Parameter	Units	CA Bandwidth Class					
		В	С	D	E	F	
Pw in Transmission Bandy	width		REFSENS +				
Configuration, per CC			14 dB				
	dBm		Aggregated				
			power + 22.5				
PInterferer			dB				
BWInterferer	MHz		5				
F _{Interferer} (offset)	MHz		2.5 + F _{offset}				
			/				
			-2.5 - F _{offset}				
NOTE 1: The transmitter	shall be set to 4dB	below P _{CM}	AX_L OF PCMAX_L_C	as defined in	subclause 6.2	2.5A.	
NOTE 2: The interferer c	onsists of the Refer	ence meas	urement channe	I specified in A	Annex A.3.2 wi	th one sided	
dynamic OCNG	Pattern OP.1 FDD	/TDD as de	scribed in Annex	x A.5.1.1/A.5.2	2.1 and set-up	according to	
Annex C.3.1							
NOTE 3: The Finterferer (of							
	I to $\left[\mathrm{F}_{\mathrm{interferer}} \left/ 0.015 \right. + \right.$						

Table 7.5.1A-2: Test parameters for Adjacent channel selectivity, Case 1

Rx Parameter Units CA Bandwidth Class				Class		
		В	С	D	E	F
Pw in Transmission Bandwidth Configuration, per CC	dBm		-50.5			
PInterferer	dBm			-25		
BWInterferer	MHz		5			
F _{Interferer} (offset)	F _{Interferer} (offset) MHz					
			/			
			-2.5- F _{offset}			
NOTE 1: The transmitter shall be	set to 24d	B below PCMA	X_L OF PCMAX_L_CA	as defined in	subclause 6.2	5A.
NOTE 2: The interferer consists of						
dynamic OCNG Pattern	OP.1 FDI	D/TDD as des	cribed in Annex /	A.5.1.1/A.5.2.	1 and set-up a	ccording to
Annex C.3.1						
NOTE 3: 5. The Finterferer (offset) is	s relative t	o the center fr	equency of the a	djacent CC b	eing tested and	d shall be
further adjusted to $\lfloor F_{inter}$	$_{\rm ferer}/0.015$	+ 0.5 0.015 +	0.0075 MHz to k	be offset from	the sub-carrie	r raster.

7.5.1B Minimum requirements for UL-MIMO

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.5.1 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

7.6 Blocking characteristics

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

7.6.1 In-band blocking

In-band blocking is defined for an unwanted interfering signal falling into the UE receive band or into the first 15 MHz below or above the UE receive band at which the relative throughput shall meet or exceed the minimum requirement for the specified measurement channels.

7.6.1.1 Minimum requirements

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.1.1-1 and 7.6.1.1-2.

Rx parameter	Units						
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Power in			REFSENS	+ channel band	width specific v	alue below	
Transmission	dBm						
Bandwidth	ubiii	6	6	6	6	7	9
Configuration							
BWInterferer	MHz	1.4	3	5	5	5	5
Floffset, case 1	MHz	2.1+0.0125	4.5+0.0075	7.5+0.0125	7.5+0.0025	7.5+0.0075	7.5+0.0125
Floffset, case 2	MHz	3.5+0.0075	7.5+0.0075	12.5+0.0075	12.5+0.012	12.5+0.002	12.5+0.007
					5	5	5
NOTE 1: The tra	nsmitter	shall be set to	4dB below Pcr	MAX_L at the minii	mum uplink co	nfiguration spe	cified in
Table 7	'.3.1-2 wi	th PCMAX_L as c	defined in subc	lause 6.2.5.			
NOTE 2: The inte	erferer co	onsists of the R	Reference mea	surement chanr	nel specified in	Annex A.3.2 w	ith one
sided d	ynamic C	OCNG Pattern	OP.1 FDD/TD	D as described i	in Annex A.5.1	.1/A.5.2.1 and	set-up
accordi	ng to An	nex C.3.1					-

E-UTRA	Parameter	Unit	Case 1	Case 2	Case 3	Case 4	Case 5
band	PInterferer	dBm	-56	-44			-38
	F _{Interferer} (offset)	MHz	=-BW/2 - F _{loffset,case 1} & =+BW/2 + F _{loffset,case 1}	≤-BW/2 - F _{loffset,case 2} & ≥+BW/2 + F _{loffset,case 2}			-BW/2 - 11
$\begin{array}{c} 1,2,3,4,5,\\ 6,7,8,9,\\ 10,11,12,\\ 13,14,17,\\ 18,19,20,\\ 21,22,23,\\ 25,26,27,\\ 28,31,33,\\ 34,35,36,\\ 37,38,39,\\ 40,41,42,\\ 43,44 \end{array}$	Finterferer	MHz	(Note 2)	F _{DL_low} − 15 to F _{DL_high} + 15	Void	Void	
30	F _{Interferer}	MHz	(Note 2)	F _{DL_low} – 15 to F _{DL_high} + 15			F _{DL_low} -11
the NOTE 2: Fo	e first 15 MHz b or each carrier f a. the carrier b. the carrier	pelow or requency frequenc frequenc	above the UE receive I / the requirement is va y -BW/2 - F _{loffset, case 1} a y +BW/2 + F _{loffset, case 1}	lid for two frequencies:			d, but within

Table 7.6.1.1-2: In-band blocking

For the UE which supports inter band CA configuration in Table 7.3.1-1A, $P_{Interferer}$ power defined in Table 7.6.1.1-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A.

7.6.1.1A Minimum requirements for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the in-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.1.1 for each component carrier while both downlink carriers are active. For the UE which supports inter band CA configuration in Table 7.3.1-1A, $P_{Interferer}$ power defined in Table 7.6.1.1-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A. For E-UTRA CA configurations including an operating

band without uplink band (as noted in Table 5.5-1), the requirements for both downlinks shall be met with the uplink in the band capable of UL operation.. The requirements for the component carrier configured in the operating band without uplink band are specified in Table 7.6.1.1-1 and Table 7.6.1.1A-0.

Table 7.6.1.1A-0:	In-band blocking for	additional operating bands f	or carrier aggregation

E-UTRA band	Parameter	Unit	Case 1	Case 2				
	PInterferer	dBm	-56	-44				
	F _{Interferer} (offset)	MHz	=-BW/2 - F _{loffset,case 1} & =+BW/2 + F _{loffset,case 1}	≤-BW/2 – F _{loffset,case 2} & ≥+BW/2 + F _{loffset,case 2}				
29	F _{Interferer} MHz (Note 2)		F _{DL_low} – 15 to F _{DL_high} + 15					
NOTE 1: For cer	rtain bands, the ur	nwanted mo	dulated interfering signal r	nay not fall inside the				
UE receive band, but within the first 15 MHz below or above the UE receive band NOTE 2: For each carrier frequency the requirement is valid for two frequencies: a. the carrier frequency -BW/2 - F _{loffset, case 1} and								
	•		 Floffset, case 1 modulated interfering signal 	al are interferer center				

For E-UTRA CA configurations listed in Table 7.3.1A-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the in-band blocking requirements of subclause 7.6.1.1A do not apply.

For intra-band contiguous carrier aggregation the downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.6.1.1A-1 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Tables 7.6.1.1A-1 and Tables 7.6.1.1A-2 being on either side of the aggregated signal. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.1.1A-2.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, each larger than or equal to 5 MHz, the in-band blocking requirements are defined with the uplink configuration in accordance with Table 7.3.1A-3. For this uplink configuration, the UE shall meet the requirements specified in subclause 7.6.1.1 for each component carrier subject to in-gap and out-of-gap interferers while both downlink carriers are active.

Rx Parameter	Units	CA Bandwidth Class					
		В	С	D	E	F	
Pw in Transmission	smission REFSENS + CA Bandwidth Class specific value below					ow.	
Bandwidth	dBm		12				
Configuration, per CC			12				
BWInterferer	MHz		5				
Floffset, case 1	MHz		7.5				
Floffset, case 2	MHz		12.5				
NOTE 1: The transmit	ter shall b	be set to 4dB bel	OW PCMAX_L OF PC	MAX_L_CA as defin	ed in subclause 6	6.2.5A	
NOTE 2: The interfere	er consiste	s of the Reference	e measurement	channel specifie	d in Annex A.3.2 v	with one sided	
dynamic OC	dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1 and set-up according to						
Annex C.3.1						-	

Table	7.6.1	.1A-1:	In band	blocking	parameters
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CA configuration	Parameter	Unit	Case 1	Case 2				
	PInterferer	dBm	-56	-44				
	FInterferer	MHz	=-F _{offset} - F _{loffset,case 1} & =+F _{offset} + F _{loffset,case 1}	≤-F _{offset} - F _{loffset,case 2} & ≥+F _{offset} + F _{loffset,case 2}				
CA_1C, CA_7C, CA_38C, CA_40C, CA_41C	F _{Interferer} (Range)	MHz	(Note 2)	F _{DL_low} – 15 to F _{DL_high} + 15				
(A A)(C (A A)(C (A A)))								

Table 7.6.1.1A-2: In-band blocking

7.6.2 Out-of-band blocking

Out-of-band band blocking is defined for an unwanted CW interfering signal falling more than 15 MHz below or above the UE receive band. For the first 15 MHz below or above the UE receive band the appropriate in-band blocking or adjacent channel selectivity in subclause 7.5.1 and subclause 7.6.1 shall be applied.

7.6.2.1 Minimum requirements

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2.1-1 and 7.6.2.1-2.

For Table 7.6.2.1-2 in frequency range 1, 2 and 3, up to $\max(24, 6 \cdot \lceil N_{RB} / 6 \rceil)$ exceptions are allowed for spurious

response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configuration (see Figure 5.6-1). For these exceptions the requirements of subclause 7.7 Spurious response are applicable.

For Table 7.6.2.1-2 in frequency range 4, up to $\max(8, \left[(N_{RB} + 2 \cdot L_{CRBs})/8 \right])$ exceptions are allowed for spurious

response frequencies in each assigned frequency channel when measured using a 1MHz step size, where N_{RB} is the number of resource blocks in the downlink transmission bandwidth configurations (see Figure 5.6-1) and L_{CRBs} is the number of resource blocks allocated in the uplink. For these exceptions the requirements of clause 7.7 spurious response are applicable.

Rx Parameter	Units	Channel bandwidth					
		1.4	3 MHz	5 MHz	10	15	20
		MHz			MHz	MHz	MHz
Power in		REFS	ENS + ch	annel ban	dwidth sp	ecific valu	e below
Transmission	dBm						
Bandwidth	ubiii	6	6	6	6	7	9
Configuration							
NOTE 1: The transmit	ter shall be	e set to 40	B below I	Рсмах_∟ at	the minim	num uplink	ζ.
configuration	specified i	in Table 7	7.3.1-2 wit	h Pcmax_L	as define	d in subcla	ause
6.2.5.	6.2.5.						
	eference measurement channel is specified in Annex A.3.2 with one sided						
dynamic OC	NG Pattern	OP.1 FE	D/TDD a	s describe	ed in Anne	x A.5.1.1/	A.5.2.

Table 7.6.2.1-1: Out-of-band blocking parameters

E-UTRA band	Parameter	Units	Frequency				
			Range 1	Range 2	Range 3	Range 4	
	PInterferer	dBm	-44	-30	-15	-15	
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,			F _{DL_low} -15 to F _{DL_low} -60	F _{DL_low} -60 to F _{DL_low} -85	F _{DL_low} -85 to 1 MHz	-	
12, 13, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44	F _{Interferer} (CW)	MHz	F _{DL_high} +15 to F _{DL_high} + 60	F _{DL_high} +60 to F _{DL_high} +85	F _{DL_high} +85 to +12750 MHz	-	
2, 5, 12, 17	FInterferer	MHz	_	_	-	FUL_low - FUL_hi	

Table 7.6.2.1-2: Out of band blocking

7.6.2.1A Minimum requirements for CA

For inter-band carrier aggregation with the uplink assigned to one E-UTRA band, the out-of-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested. The throughput in the downlink measured shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2.1-1 and 7.6.2.1A-0. The UE shall meet these requirements for each component carrier while both downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band (as noted in Table 5.5-1), the requirements for both downlinks shall be met with the uplink active in the band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3.1A-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the out-of-band blocking requirements of subclause 7.6.2.1A do not apply.

Paramete	er Unit	Range 1	Range 2	Range 3
Pw	dBm	Table 7.6.	carriers	
Pinterferer	dBm	-44 + ΔR _{IB,c}	-30 + ΔR _{IB,c}	-15 + ΔR _{IB,c}
Finterferer	MHz	$-60 < f - F_{DL_{Low(1)}} < -15$	$-85 < f - F_{DL_{Low(1)}} \le -60$	$1 \le f \le F_{DL_Low(1)} - 85$
(CW)		or	or	or
		$-60 < f - F_{DL_{Low(2)}} < -15$	$-85 < f - F_{DL_{Low(2)}} \le -60$	$F_{DL_{High(1)}} + 85 \le f$
		or	or	$\leq F_{DL_Low(2)} - 85$
		$15 < f - F_{DL_{High(1)}} < 60$	$60 \leq f - F_{DL_{High(1)}} < 85$	or
		or	or	$F_{DL_{High(2)}} + 85 \le f$
		$15 < f - F_{DL_{High(2)}} < 60$	$60 \leq f - F_{DL_{High(2)}} < 85$	≤ 12750
NOTE 1:		nd F _{DL_High(1)} denote the respec		
	operating b	and, $F_{DL_Low(2)}$ and $F_{DL_High(2)}$ the second seco	ne respective lower and up	per frequency limits of the
	upper oper	5		
NOTE 2:		$_{(2)} - F_{DL_High(1)} < 145 \text{ MHz and}$		
	in both Rar	nge 1 and Range 2. Then the l	ower of the P _{Interferer} applies	i.
NOTE 3:	For F _{DL_Low}	$_{(1)} - 15 \text{ MHz} \le f \le F_{\text{DL}-High}(1) + 1$	5 MHz and F _{DL_Low(2)} – 15 I	$MHz \le f \le F_{DL_{High(2)}} + 15$
	MHz the ap	propriate adjacent channel se	electivity and in-band blocki	ng in the respective
	subclauses	7.5.1A and 7.6.1.1A shall be	applied.	
NOTE 4:	$\Delta R_{IB,c}$ acco	rding to Table 7.3.1-1A applies	s when serving cell <i>c</i> is me	asured.

Table 7.6.2.1A-0: out-of-band blocking for inter-band carrier aggregation with one active uplink

For Table 7.6.2.1A-0 in frequency ranges 1, 2 and 3, up to $\max(24,6 \cdot \lceil N_{RB} \cdot /6 \rceil)$ exceptions per downlink are allowed for spurious response frequencies when measured using a step size of 1 MHz. For these exceptions the requirements in clause 7.7.1A apply.

For intra-band contiguous carrier aggreagations the downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.6.2.1A-1 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Tables 7.6.2.1A-1 and Tables 7.6.2.1A-2 being on either side of the aggregated signal. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.6.2.1A-1 and 7.6.2.1A-2.

For Table 7.6.2.1A-2 in frequency range 1, 2 and 3, up to $\max(24,6 \cdot \lceil N_{RB} \cdot /6 \rceil)$ exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7 Spurious response are applicable.

Table 7.6.2.1A-1: Out-of-band blocking parameters

Rx Parameter			Class			
		В	С	D	E	F
Pw in Transmission Bandwidth Configuration, per dBm		REFSENS + CA Bandwidth Class specific value below				
			9			
NOTE 1: The transmitter shall be set to 4dB below PCMAX_L or PCMAX_L_CA as defined in subclause 6.2.5A. NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.						

Table	7.6.2.1A	-2: Out	of band	blocking
IUNIO	1.0.2.17	 . out	or surre	a biooning

CA configuration	Parameter	Units	Frequency		
			Range 1	Range 2	Range 3
	PInterferer	dBm	-44	-30	-15
	E		F _{DL_low} -15 to F _{DL_low} -60	F _{DL_low} -60 to F _{DL_low} -85	F _{DL_low} -85 to 1 MHz
CA_1C, <u>CA_3C</u> , CA_7C , CA_38C, CA_40C, CA_41C	F _{Interferer} (CW)	MHz	$F_{DL_high} + 15$ to $F_{DL_high} + 60$	F _{DL_high} +60 to F _{DL_high} +85	F _{DL_high} +85 to +12750 MHz

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the out-of-band blocking requirements are defined with the uplink configuration in accordance with table 7.3.1A-3. For this uplink configuration, the UE shall meet the requirements specified in subclause 7.6.2.1 for each component carrier while both downlink carriers are active.

For Table 7.6.2.1-2 in frequency range 1, 2 and 3, up to $\max(24,6 \cdot \lceil N_{RB} \cdot /6 \rceil)$ exceptions per assigned E-UTRA channel per sub-block of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of subclause 7.7 spurious response are applicable.

For Table 7.6.2.1-2 in frequency range 4, up to $\max(8, \left[(N_{RB} + 2 \cdot L_{CRBs})/8 \right])$ exceptions per assigned E-UTRA channel

per sub-block of the E-UTRA CA configuration are allowed for spurious response frequencies when measured using a 1MHz step size. For these exceptions the requirements of clause 7.7 spurious response are applicable.

7.6.3 Narrow band blocking

This requirement is measure of a receiver's ability to receive a E-UTRA signal at its assigned channel frequency in the presence of an unwanted narrow band CW interferer at a frequency, which is less than the nominal channel spacing.

7.6.3.1 Minimum requirements

The relative throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3.1-1

Parameter	Unit						
Parameter	Unit	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
Pw	dDm	P _R	EFSENS + cha	nnel-bandwi	dth specific	value belo	w
Pw	dBm	22	18	16	13	14	16
P _{uw} (CW)	dBm	-55	-55	-55	-55	-55	-55
F_{uw} (offset for $\Delta f = 15 \text{ kHz}$)	MHz	0.9075	1.7025	2.7075	5.2125	7.7025	10.2075
F_{uw} (offset for $\Delta f = 7.5 \text{ kHz}$)	MHz						
NOTE 1: The transmitter shall be set a 4 dB below PCMAX_L at the minimum uplink configuration specified in Table 7.3.1-2 with PCMAX_L as defined in subclause 6.2.5.							
NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

For the UE which supports inter-band CA configuration in Table 7.3.1-1A, P_{UW} power defined in Table 7.6.3.1-1 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A.

7.6.3.1A Minimum requirements for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the narrow-band blocking requirements are defined with the uplink active on the band other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.6.3.1 for each component carrier while both downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band (as noted in Table 5.5-1), the requirements for both downlinks shall be met with the uplink active in the band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3.1A-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the narrow-band blocking requirements of subclause 7.6.3.1A do not apply.

For intra-band contiguous carrier aggregation the downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.6.3.1A-1 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.6.3.1A-1 being on either side of the aggregated signal. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.6.3.1A-1.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the narrow band blocking requirements are defined with the uplink configuration in accordance with Table 7.3.1A-3. For this uplink configuration, the UE shall meet the requirements specified in subclause 7.6.3.1 for each component carrier subject to in-gap and out-of-gap interferers while both downlink carriers are active.

Parameter	Unit	CA Bandwidth Class					
Falanielei	Unit	В	С	D	E	F	
Pw in Transmission Bandwidth	dBm	REF	SENS + CA Band	vidth Class	specific value	below	
Configuration, per CC	UDIII		16 ⁴				
P _{uw} (CW)	dBm		-55				
FIIM (offset for			- F _{offset} – 0.2				
$\Delta f = 15 \text{ kHz}$	MHz		/				
$\Delta I = 15 \text{ KHz})$			+ F _{offset} + 0.2				
F _{uw} (offset for	MHz						
⊿f = 7.5 kHz)							
NOTE 1: The transmitter shall be set to	4dB below F	CMAX_L OF PC	MAX_L_CA as define	d in subclau	se 6.2.5A.		
NOTE 2: Reference measurement char	nel is specifi	ied in Annex	A.3.2 with one sid	ed dynamic	OCNG Patter	rn OP.1	
FDD/TDD as described in Ann	FDD/TDD as described in Annex A.5.1.1/A.5.2.1.						
	NOTE 3: The Finterferer (offset) is relative to the center frequency of the adjacent CC being tested and shall be further						
adjusted to $[F_{\text{interferer}}/0.015 + 0.5]0.015 + 0.0075$ MHz to be offset from the sub-carrier raster.							
NOTE 4: The requirement is applied for	the band co	mbinations v	vhose component	carriers' BW	/≥5 MHz.		

Table	7.6.3.1A-1	: Narrow-band	blocking
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7.6A Void

<Reserved for future use>

7.6B Blocking characteristics for UL-MIMO

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in subclause 7.6 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

7.7 Spurious response

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the out of band blocking limit as specified in subclause 7.6.2 is not met.

7.7.1 Minimum requirements

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7.1-1 and 7.7.1-2.

Rx parameter	Units	Channel bandwidth						
		1.4 MHz	1.4 MHz 3 MHz 5 MHz 10 MHz 15 MHz 20 M					
Power in		REF	REFSENS + channel bandwidth specific value below					
Transmission Bandwidth Configuration	dBm	6	6	6	6	7	9	
 NOTE 1: The transmitter shall be set to 4dB below PCMAX_L at the minimum uplink configuration specified in Table 7.3.1-2. N OTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1. 								

Table 7.7.1-1:	Spurious	response	parameters
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Table 7.7.1-2: Spurious response

Parameter	Unit	Level		
P _{Interferer} (CW)	dBm	-44		
F _{Interferer}	MHz	Spurious response frequencies		

For the UE which supports inter-band CA configuration in Table 7.3.1-1A, $P_{interferer}$ power defined in Table 7.7.1-2 is increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A.

7.7.1A Minimum requirements for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the spurious response requirements are defined with the uplink active on the band other than the band whose downlink is being tested. The throughput measured in each downlink with $F_{interferer}$ in Table 7.6.2.1A-0 at spurious response frequencies shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7.1-1 and 7.7.1-2. The UE shall meet these requirements for each component carrier while both downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band (as noted in Table 5.5-1), the requirements for both downlinks shall be met with the uplink active in the band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3.1A-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the spurious response requirements of subclause 7.7.1A do not apply.

For intra-band contiguous carrier aggregation the downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.7.1A-1 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggregation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Tables 7.7.1A-1 and 7.7.1A-2.

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the spurious response requirements are defined with the uplink configuration in accordance with Table 7.3.1A-3. For this uplink configuration, the UE shall meet the requirements specified in clause 7.7.1 for each component carrier while both downlink carriers are active.

	•	•	•				
Rx Parameter	Units	CA Bandwidth Class					
		В	С	D	ш		
in Transmission Bandwidth	dBm	REFSENS + CA Bandwidth Class specific					
figuration por CC	UDIII		0				

Table 7.7.1A-1:	Spurious	response	parameters
-----------------	----------	----------	------------

		В	С	D	E	F	
Pw in Transmission Bandwidth	REFSENS + CA Bandwidth Class specific value below						
Configuration, per CC	dBm		9				
NOTE 1: The transmitter shall b	NOTE 1: The transmitter shall be set to 4dB below PCMAX_L or PCMAX_L_CA as defined in subclause 6.2.5A.						
NOTE 2: Reference measurem	NOTE 2: Reference measurement channel is specified in Annex A.3.2 with one sided dynamic OCNG Pattern						
OP.1 FDD/TDD as described in Annex A.5.1.1/A.5.2.1.							

Table 7.7.1A-2: Spurious response

Parameter	Unit	Level
P _{Interferer} (CW)	dBm	-44
FInterferer	MHz	Spurious response frequencies

Minimum requirements for UL-MIMO 7.7.1B

For UE with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in Clause 7.7.1 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{CMAX L} is defined as the total transmitter power over the two transmit antenna connectors.

7.8 Intermodulation characteristics

Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

7.8.1 Wide band intermodulation

The wide band intermodulation requirement is defined following the same principles using modulated E-UTRA carrier and CW signal as interferer.

7.8.1.1 Minimum requirements

The throughput shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.1.1 for the specified wanted signal mean power in the presence of two interfering signals

Rx Paramete	r Units	Channel bandwidth						
		1.4 MHz	1.4 MHz 3 MHz 5 MHz 10 MHz 15 MHz 20					20 MHz
Power in		RE	REFSENS + channel bandwidth specific value below					
Transmission Bandwidth Configuration	dBm	12		8	6	6	7	9
P _{Interferer 1} (CW)	dBm	-46						
P _{Interferer 2} (Modulated)	dBm	-46						
BW Interferer 2		1.4 3 5						
FInterferer 1	MHz	-BW/2 –2.1	-BW/	/2 –4.5		-BW	/2 – 7.5	
(Offset)		/		/			/	
		+BW/2+ 2.1	+BW/	2 + 4.5		+BW	/2 + 7.5	
F _{Interferer 2} (Offset)	MHz	2*FInterferer 1						
NOTE 1: The t	ransmitter sha	all be set to 4dB	below I	CMAX_L a	at the minim	um uplink c	onfiguration	specified in
Table	e 7.3.1-2 with	PCMAX_L as define	ed in su	ubclause	6.2.5.			
NOTE 2: Refe	rence measur	rement channel is specified in Annex A.3.2 with one sided dynamic OCNG						
Patte	rn OP.1 FDD/	D/TDD as described in Annex A.5.1.1/A.5.2.1.						
		terferer consists of the Reference measurement channel specified in Annex						
	A.3.2 with one sided dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex							
A.5.1	.1/A.5.2.1 witl	n set-up accordir	ng to Ar	nnex C.3	.1The interf	ering modu	lated signal	is 5MHz E-
UTR	A signal as de	scribed in Annex	k D for (channel l	bandwidth ≥	≥5MHz	-	

For the UE which supports inter band CA configuration in Table 7.3.1-1A, $P_{interferer1}$ and $P_{interferer2}$ powers defined in Table 7.8.1.1-1 are increased by the amount given by $\Delta R_{IB,c}$ in Table 7.3.1-1A.

7.8.1A Minimum requirements for CA

For inter-band carrier aggregation with uplink assigned to one E-UTRA band the wide band intermodulation requirements are defined with the uplink active on the band other than the band whose downlink is being tested. The UE shall meet the requirements specified in subclause 7.8.1.1 for each component carrier while both downlink carriers are active. For E-UTRA CA configurations including an operating band without uplink band (as noted in Table 5.5-1), the requirements for both downlinks shall be met with the uplink active in the band capable of UL operation. For E-UTRA CA configurations listed in Table 7.3.1A-0a under conditions for which reference sensitivity for the operating band being tested is N/A, the wideband intermodulation requirements of subclause 7.8.1A do not apply.

For intra-band contiguous carrier aggegation the downlink SCC shall be configured at nominal channel spacing to the PCC with the PCC configured closest to the uplink band. Downlink PCC and SCC are both activated. The uplink output power shall be set as specified in Table 7.8.1A-1 with the uplink configuration set according to Table 7.3.1A-1 for the applicable carrier aggreagation configuration. For UE(s) supporting one uplink carrier, the uplink configuration of the PCC shall be in accordance with Table 7.3.1-2. The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Table 7.8.1A-1 being on either side of the aggregated signal. The throughput of each carrier shall be \geq 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.2.3 and A.3.2 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table 7.8.1A-1

Rx parameter	Units		CA Bandwidth Class						
•		В	С	D	E	F			
Pw in		RE	FSENS + CA B	andwidth Class	specific value	below			
Transmission									
Bandwidth	dBm		12						
Configuration, per			12						
CC									
PInterferer 1	dBm			-46					
(CW)				40					
PInterferer 2	dBm			-46					
(Modulated)				10		1			
BW Interferer 2	MHz		5						
FInterferer 1	MHz		-F _{offset} -7.5						
(Offset)			_ /						
			+ F _{offset} +7.5						
FInterferer 2	MHz			2*FInterferer 1					
(Offset)									
NOTE 1: The trans									
			is specified in An		one sided dyna	amic OCNG			
			ed in Annex A.5.						
		erferer consists of the Reference measurement channel specified in Annex							
		d dynamic OCNG Pattern OP.1 FDD/TDD as described in Annex							
			ing to Annex C.3		ile a dia Arra arra				
	•	dulated signal is	5MHz E-UTRA	signal as desci	ibea in Annex L	J for channel			
bandwid	th ≥5MHz								

Table 7.8.1A-1: Wide band intermodulation

For intra-band non-contiguous carrier aggregation with one uplink carrier and two downlink carriers, the wide band intermodulation requirements are defined with the uplink configuration in accordance with Table 7.3.1A-3. For this uplink configuration, the UE shall meet the requirements specified in subclause 7.8.1.1 for each component carrier while both downlink carriers are active. The wide band intermodulation requirements shall be supported for out-of-gap test only.

7.8.1B Minimum requirements for UL-MIMO

For UE(s) with two transmitter antenna connectors in closed-loop spatial multiplexing scheme, the minimum requirements in subclause 7.8.1 shall be met with the UL-MIMO configurations specified in Table 6.2.2B-2. For UL-MIMO, the parameter P_{CMAX_L} is defined as the total transmitter power over the two transmit antenna connectors.

7.8.2 Void

7.9 Spurious emissions

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the UE antenna connector.

7.9.1 Minimum requirements

The power of any narrow band CW spurious emission shall not exceed the maximum level specified in Table 7.9.1-1

Table 7.9.1-1: General receiver spurious emission requirements

Frequency band	Measurement bandwidth	Maximum level	Note				
30MHz ≤ f < 1GHz	100 kHz	-57 dBm					
1 GHz \leq f \leq 12.75 GHz	1 MHz	-47 dBm					
12.75 GHz \leq f \leq 5 th harmonic of the upper frequency edge of the DL operating band in GHz	1 MHz	-47 dBm	1				
 NOTE 1: Applies only for Band 22, Band 42 and Band 43 NOTE 2: Unused PDCCH resources are padded with resource element groups with power level given by PDCCH_RA/RB as defined in Annex C.3.1. 							

7.10 Receiver image

7.10.1 Void

7.10.1A Minimum requirements for CA

Receiver image rejection is a measure of a receiver's ability to receive the E-UTRA signal on one component carrier while it is also configured to receive an adjacent aggregated carrier. Receiver image rejection ratio is the ratio of the wanted received power on a sub-carrier being measured to the unwanted image power received on the same sub-carrier when both sub-carriers are received with equal power at the UE antenna connector.

For intra-band contiguous carrier aggregation the UE shall fulfil the minimum requirement specified in Table 7.10.1A-1 for all values of aggregated input signal up to -22 dBm.

		CA bandwidth class					
Rx parameter	Units	Α	В	С	D	E	F
Receiver image rejection	dB			25			

Table 7.10.1A-1: Receiver image rejection

8 Performance requirement

This clause contains performance requirements for the physical channels specified in TS 36.211 [4]. The performance requirements for the UE in this clause are specified for the measurement channels specified in Annex A.3, the propagation conditions in Annex B and the downlink channels in Annex C.3.2.

Note: For the requirements in the following sections, similar Release 8 and 9 requirements apply for time domain measurements restriction under colliding CRS.

8.1 General

8.1.1 Dual-antenna receiver capability

The performance requirements are based on UE(s) that utilize a dual-antenna receiver.

For all test cases, the SNR is defined as

$$SNR = \frac{\hat{E}_{s}^{(1)} + \hat{E}_{s}^{(2)}}{N_{oc}^{(1)} + N_{oc}^{(2)}}$$

where the superscript indicates the receiver antenna connector. The above SNR definition assumes that the REs are not precoded. The SNR definition does not account for any gain which can be associated to the precoding operation. The relative power of physical channels transmitted is defined in Table C.3.2-1. The SNR requirement applies for the UE categories and CA capabilities given for each test.

For enhanced performance requirements type A, the SINR is defined as

$$SINR = \frac{\hat{E}_{s}^{(1)} + \hat{E}_{s}^{(2)}}{N_{oc}^{(1)'} + N_{oc}^{(2)'}}$$

where the superscript indicates the receiver antenna connector. The above SINR definition assumes that the REs are not precoded. The SINR definition does not account for any gain which can be associated to the precoding operation. The relative power of physical channels transmitted is defined in Table C.3.2-1. The SINR requirement applies for the UE categories given for each test.

The applicability of the requirements with respect to CA capabilities is given as in Table 8.1.1-1. In case the CA capability is omitted, the requirement is applicable to a UE regardless of its CA capability.

Table 8.1.1-1: Applicability of the requirement with respect to the CA capability

CA Capability	CA Capability Description					
CL_X	The requirement is applicable to a UE that indicates a CA bandwidth					
	class X on at least one E-UTRA band.					
CL_X-Y	The requirement is applicable to a UE that indicates CA bandwidth					
	classes X and Y on at least one E-UTRA band combination.					
Note: The	Note: The CA bandwidth classes are defined in Table 5.6A-1					

For test cases with more than one component carrier, "Fraction of Maximum Throughput" in the performance requirement refers to the ratio of the sum of throughput values of all component carriers to the sum of the nominal maximum throughput values of all component carriers, unless otherwise stated.

8.1.1.1 Simultaneous unicast and MBMS operations

8.1.1.2 Dual-antenna receiver capability in idle mode

8.2 Demodulation of PDSCH (Cell-Specific Reference Symbols)

8.2.1 FDD (Fixed Reference Channel)

The parameters specified in Table 8.2.1-1 are valid for all FDD tests unless otherwise stated.

Parameter	Unit	Value
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths
Cyclic Prefix		Normal
Cell_ID		0
Cross carrier scheduling		Not configured

Table 8.2.1-1: Common Test Parameters (FDD)

8.2.1.1 Single-antenna port performance

The single-antenna performance in a given multi-path fading environments is determined by the SNR for which a certain relative information bit throughput of the reference measurement channels in Annex A.3.3 is achieved. The purpose of these tests is to verify the single-antenna performance with different channel models and MCS. The QPSK and 64QAM cases are also used to verify the performance for all bandwidths specified in Table 5.6.1-1.

8.2.1.1.1 Minimum Requirement

For single carrier the requirements are specified in Table 8.2.1.1.1-2, with the addition of the parameters in Table 8.2.1.1.1-1 and the downlink physical channel setup according to Annex C.3.2. For CA the requirements are specified in Table 8.2.1.1.1-4, with the addition of the parameters in Table 8.2.1.1.1-3 and the downlink physical channel setup according to Annex C.3.2.

Parame	er	Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16- 18	Test 19
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	0	0	0	0	0
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)				
	σ	dB	0	0	0	0	0
N_{oc} at antenna port dBm/15kH		dBm/15kHz	-98	-98	-98	-98	-98
Symbols for unu	Symbols for unused PRBs		OCNG (Note 2)				
Modulati	Modulation		QPSK	16QAM	64QAM	16QAM	QPSK
PDSCH transmis	PDSCH transmission mode			1	1	1	1
Note 1: $P_B = 0$							
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.							
Note 3: Void.	Void.						
Note 4: Void.							

Table 8.2.1.1.1-1: Test Parameters

Test num. Band- width Reference channel OCNG pattern gation condi- tion matrix and antenna condi- tion Fraction of matrix and antenna condi- tion Fraction of maximum UE cate gavin 1 10 MHz R.2 FDD OP.1 FDD EVA5 1x2 Low 70 -1.0 ≥1 3 10 MHz R.2 FDD OP.1 FDD ETU300 1x2 Low 70 -0.4 ≥1 4 10 MHz R.2 FDD OP.1 FDD ETU300 1x2 Low 70 -0.0 ≥1 5 1.4 MHz R.3 FDD OP.1 FDD EVA5 1x2 Low 70 0.0 ≥1 6 10 MHz R.3 FDD OP.1 FDD EVA5 1x2 Low 70 0.0 ≥1 7 10 MHz R.3 FDD OP.1 FDD ETU70 1x2 Low 70 1.4 >2 5 MHz R.3 FDD OP.1 FDD ETU300 1x2 High 70 9.4 >2 7 3 MHz R.5 FDD OP.1 FDD EVA5 1x2 Low					Propa-	Correlation	Reference	value	
2 10 MHz R.2 FDD OP.1 FDD ETU70 1x2 Low 70 -0.4 ≥1 3 10 MHz R.2 FDD OP.1 FDD ETU300 1x2 Low 70 0.0 ≥1 4 10 MHz R.2 FDD OP.1 FDD HST 1x2 Low 70 -2.4 ≥1 5 1.4 MHz R.3 FDD OP.1 FDD EVA5 1x2 Low 70 6.7 ≥2 6 10 MHz R.3 FDD OP.1 FDD EVA5 1x2 Low 70 6.7 1 7 5 MHz R.3 FDD OP.1 FDD ETU70 1x2 Low 30 1.4 ≥2 5 MHz R.3 FDD OP.1 FDD ETU70 1x2 Low 30 1.4 1 10 MHz R.3 FDD OP.1 FDD ETU300 1x2 Low 30 1.4 1 8 5 MHz R.3 FDD OP.1 FDD ETU300 1x2 Low 70 17.6 21 10 MHz R.6 FDD <t< th=""><th></th><th></th><th></th><th></th><th>gation condi-</th><th>matrix and antenna</th><th>maximum throughput</th><th>-</th><th>cate</th></t<>					gation condi-	matrix and antenna	maximum throughput	-	cate
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	10 MHz	R.2 FDD	OP.1 FDD	EVA5	1x2 Low	70	-1.0	≥1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2	10 MHz	R.2 FDD	OP.1 FDD	ETU70	1x2 Low	70	-0.4	≥1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	3	10 MHz	R.2 FDD	OP.1 FDD	ETU300	1x2 Low	70	0.0	≥1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		10 MHz	R.2 FDD		HST	1x2	70	-2.4	≥1
6 5 MHz R.3-1 FDD OP.1 FDD EVA5 1x2 Low 70 6.7 1 7 10 MHz R.3 FDD OP.1 FDD ETU70 1x2 Low 30 1.4 ≥2 5 MHz R.3-1 FDD OP.1 FDD ETU70 1x2 Low 30 1.4 1 8 10 MHz R.3-1 FDD OP.1 FDD ETU300 1x2 High 70 9.4 ≥2 5 MHz R.3-1 FDD OP.1 FDD ETU300 1x2 High 70 9.4 1 9 3 MHz R.5 FDD OP.1 FDD EVA5 1x2 Low 70 17.6 ≥1 10 5 MHz R.6 FDD OP.1 FDD EVA5 1x2 Low 70 17.7 ≥2 5 MHz R.7 FDD OP.1 FDD EVA5 1x2 Low 70 17.7 ≥2 10 MHz R.7 FDD OP.1 FDD EVA5 1x2 Low 70 16.7 1 12 10 MHz R.7 FDD OP.1 FDD EVA5	5	1.4 MHz	R.4 FDD	OP.1 FDD	EVA5	1x2 Low		0.0	≥1
S MHZ R.3-1 FDD OP.1 FDD EVAS 1 X2 Low 30 1.4 ≥2 5 MHZ R.3 FDD OP.1 FDD ETU70 1 X2 Low 30 1.4 1 8 10 MHz R.3 FDD OP.1 FDD ETU70 1 X2 Low 30 1.4 1 9 3 MHz R.3 FDD OP.1 FDD ETU300 1 X2 High 70 9.4 22 10 MHz R.3 FDD OP.1 FDD EVU300 1 X2 High 70 9.4 1 9 3 MHz R.5 FDD OP.1 FDD EVA5 1 X2 Low 70 17.6 ≥1 10 5 MHz R.6 FDD OP.1 FDD EVA5 1 X2 Low 70 17.7 ≥2 10 MHz R.7 FDD OP.1 FDD EVA5 1 X2 Low 70 16.7 1 11 10 MHz R.7 FDD OP.1 FDD ETU70 1 X2 Low 70 16.7 1 12 10 MHz R.7 FDD	6	10 MHz	R.3 FDD	OP.1 FDD	EVA5	1x2 Low		6.7	≥2
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	0	5 MHz	R.3-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	6.7	1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	7	10 MHz	R.3 FDD	OP.1 FDD	ETU70	1x2 Low		1.4	≥2
8 5 MHz R.3-1 FDD OP.1 FDD ETU300 1x2 High 70 9.4 1 9 3 MHz R.5 FDD OP.1 FDD EVA5 1x2 Low 70 17.6 ≥1 10 5 MHz R.6 FDD OP.1 FDD EVA5 1x2 Low 70 17.4 ≥2 10 5 MHz R.6-1 FDD OP.1 FDD EVA5 1x2 Low 70 17.4 ≥2 11 10 MHz R.7 FDD OP.1 FDD EVA5 1x2 Low 70 17.7 ≥2 10 MHz R.7-1 FDD OP.1 FDD EVA5 1x2 Low 70 16.7 1 12 10 MHz R.7-1 FDD OP.1 FDD ETU70 1x2 Low 70 18.1 1 13 10 MHz R.7-1 FDD OP.1 FDD EVA5 1x2 High 70 17.8 1 14 15 MHz R.8 FDD OP.1 FDD EVA5 1x2 Low 70 17.6 ≥3 15 20 MHz	'	5 MHz	R.3-1 FDD	OP.1 FDD	ETU70	1x2 Low		1.4	1
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	0	10 MHz	R.3 FDD	OP.1 FDD	ETU300	1x2 High		9.4	≥2
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		5 MHz	R.3-1 FDD	OP.1 FDD	ETU300	1x2 High		9.4	1
105 MHzR.6-1 FDDOP.1 FDDEVA51x2 Low7017.511110 MHzR.7 FDDOP.1 FDDEVA51x2 Low7017.7≥210 MHzR.7.1 FDDOP.1 FDDEVA51x2 Low7016.711210 MHzR.7.1 FDDOP.1 FDDETU701x2 Low7018.111310 MHzR.7.1 FDDOP.1 FDDETU701x2 Low7018.111310 MHzR.7.1 FDDOP.1 FDDEVA51x2 High7019.1≥210 MHzR.7.1 FDDOP.1 FDDEVA51x2 Low7017.811415 MHzR.8 FDDOP.1 FDDEVA51x2 Low7017.7≥215MHzR.8-1 FDDOP.1 FDDEVA51x2 Low7017.6≥31520 MHzR.9-1 FDDOP.1 FDDEVA51x2 Low7017.3220 MHzR.9-1 FDDOP.1 FDDEVA51x2 Low7016.71163 MHzR.0 FDDOP.1 FDDETU701x2 Low301.9≥11710 MHzR.1 FDDOP.1 FDDETU701x2 Low301.9≥11820 MHzR.1 FDDOP.1 FDDETU701x2 Low301.9≥11910 MHzR.1 FDDOP.1 FDDETU701x2 Low301.9≥11910 MHzR.1 FDDOP.1 FDDETU70 <td< td=""><td>9</td><td>3 MHz</td><td>R.5 FDD</td><td></td><td>EVA5</td><td>1x2 Low</td><td></td><td>17.6</td><td>≥1</td></td<>	9	3 MHz	R.5 FDD		EVA5	1x2 Low		17.6	≥1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10	5 MHz	R.6 FDD		EVA5	1x2 Low		17.4	≥2
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10	5 MHz	R.6-1 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.5	1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	11					1x2 Low			≥2
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	11	10 MHz	R.7-1 FDD			1x2 Low	70	16.7	1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12	10 MHz	R.7 FDD		ETU70	1x2 Low	70	19.0	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12	10 MHz	R.7-1 FDD		ETU70	1x2 Low	70	18.1	1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	12	10 MHz	R.7 FDD		EVA5	1x2 High			≥2
14 15 MHz R.8-1 FDD OP.1 FDD EVA5 1x2 Low 70 16.8 1 15 20 MHz R.9 FDD OP.1 FDD EVA5 1x2 Low 70 17.6 ≥3 15 20 MHz R.9-2 FDD OP.1 FDD EVA5 1x2 Low 70 17.3 2 20 MHz R.9-2 FDD OP.1 FDD EVA5 1x2 Low 70 16.7 1 16 3 MHz R.0 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 17 10 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 18 20 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 19 10 MHz R.41 FDD OP.1 FDD EVA5 1x2 Low 70 -5.4 ≥1 Note 1: Void. Void. Void. Void. Void. Void. Void.	15		R.7-1 FDD			1x2 High	70	17.8	1
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	14	15 MHz				1x2 Low	70		≥2
15 20 MHz R.9-2 FDD OP.1 FDD EVA5 1x2 Low 70 17.3 2 20 MHz R.9-1 FDD OP.1 FDD EVA5 1x2 Low 70 16.7 1 16 3 MHz R.0 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 17 10 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 18 20 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 19 10 MHz R.41 FDD OP.1 FDD EVA5 1x2 Low 70 -5.4 ≥1 Note 1: Void. Void. Void. Void. Void. Void.	14	15 MHz	R.8-1 FDD	OP.1 FDD	EVA5	1x2 Low		16.8	1
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		20 MHz	R.9 FDD	OP.1 FDD	EVA5	1x2 Low	70	17.6	≥3
16 3 MHz R.0 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 17 10 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 18 20 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 19 10 MHz R.41 FDD OP.1 FDD EVA5 1x2 Low 70 -5.4 ≥1 Note 1: Void. Void. Void. Void. Void. Void.	15		R.9-2 FDD			1x2 Low		17.3	
17 10 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 18 20 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 19 10 MHz R.41 FDD OP.1 FDD EVA5 1x2 Low 70 -5.4 ≥1 Note 1: Void. Void. Void. Void. Void. Void. Void.			R.9-1 FDD		EVA5	1x2 Low		16.7	1
18 20 MHz R.1 FDD OP.1 FDD ETU70 1x2 Low 30 1.9 ≥1 19 10 MHz R.41 FDD OP.1 FDD EVA5 1x2 Low 70 -5.4 ≥1 Note 1: Void. Note 2: Void.									
19 10 MHz R.41 FDD OP.1 FDD EVA5 1x2 Low 70 -5.4 ≥1 Note 1: Void. Note 2: Void.									
Note 1: Void. Note 2: Void.								-	
Note 2: Void.			R.41 FDD	OP.1 FDD	EVA5	1x2 Low	70	-5.4	≥1
Note 3: Test 1 may not be executed for UE-s for which Test 1 in Table 8.2A.1.1.1-2 is applicable.					· · · · -		0		
	Note 3	: lest 1 m	ay not be exe	cuted for UE-	s for which	lest 1 in Table 8	.2A.1.1.1-2 is a	pplicable	

Table 8.2.1.1.1-2: Minimum performance (FRC)

Table 8.2.1.1.1-3: Test Parameters for CA

Pa	Parameter		Test 1-2
Downlink power	ρ_{A}	dB	0
allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)

	σ	dB	0						
$N_{\it oc}$ at antenna port		dBm/15kHz	-98						
Symbols 1	for unused PRBs		OCNG (Note 2)						
Μ	odulation		QPSK						
PDSCH tra	ansmission mode		1						
Note 1: $P_B =$	$P_{\rm R}=0$.								
with		UE; the data trans	to an arbitrary number of virtual UEs smitted over the OCNG PDSCHs shall s QPSK modulated.						
Note 3: PUC	CCH format 1b with chai	nnel selection is us	sed to feedback ACK/NACK.						
Note 4: The	same PDSCH transmis	sion mode is appli	ed to each component carrier.						

Table 8.2.1.1.1-4: Minimum performance (FRC) for CA

				Dropo	Correlation	Reference	value		
Test num.	Band- width	Reference channel	OCNG pattern	Propa- gation condi- tion	matrix and antenna config.	Fraction of maximum throughput (%)	SNR (dB)	UE cate gory	CA capa- bility
1	2x10 MHz	R.2 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-1.1	≥3	CL_A-A (Note 2)
2	2x20 MHz	R.42 FDD	OP.1 FDD (Note 1)	EVA5	1x2 Low	70	-1.3	≥5	CL_C
Note 1	: The OCN	IG pattern app	olies for each	CC.					
Note 2	: 30usec ti	ming differend	ce between tw	vo CCs is ap	oplied in inter-bai	nd CA case.			

- 8.2.1.1.2 Void
- 8.2.1.1.3 Void

8.2.1.1.4 Minimum Requirement 1 PRB allocation in presence of MBSFN

The requirements are specified in Table 8.2.1.1.4-2, with the addition of the parameters in Table 8.2.1.1.4-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the single-antenna performance with a single PRB allocated at the lower band edge in presence of MBSFN.

Parameter		Unit	Test 1
	$ ho_{\scriptscriptstyle A}$	dB	0
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)
	σ	dB	0
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98
Symbols for MBSFN MBSFN subframes	•		OCNG (Note 3)
PDSCH transmission	on mode		1
Note 1: $P_{B} = 0$			
		an MBSFN subfrar e except the first tv	
QPSK mod not inserted	ulated data. I in the MBS	the MBSFN subfra Cell-specific refere FN portion of the M FN data is used ins	ence signals are /IBSFN subframes,

Table 8.2.1.1.4-1: Test Parameters for Testing 1 PRB allocation

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference	value	UE
number		Channel	Pattern	Condition	Matrix and Antenna	Fraction of Maximum	SNR (dB)	Category
					Configuration	Throughput	(ub)	
						(%)		
1	10 MHz	R.29 FDD	OP.3 FDD	ETU70	1x2 Low	30	2.0	≥1

Table 8.2.1.1.4-2: Minimum performance 1PRB (FRC)

8.2.1.2 Transmit diversity performance

8.2.1.2.1 Minimum Requirement 2 Tx Antenna Port

The requirements are specified in Table 8.2.1.2.1-2, with the addition of the parameters in Table 8.2.1.2.1-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmitter antennas.

Table 8.2.1.2.1-1: Test Parameters for Transmit diversity	Performance	
	y renomance ((FNC)

Parameter		Unit	Test 1-2
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	-3
	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0
$N_{\it oc}$ at antenna	ı port	dBm/15kHz	-98
PDSCH transmissi	on mode		2
Note 1: $P_B = 1$.			

Table 8.2.1.2.1-2: Minimum performance Transmit Diversity (FRC)

Test	Band-	Reference	Reference OCNG		Correlation	Reference	UE	
number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughp ut (%)	SNR (dB)	Category
1	10 MHz	R.11 FDD	OP.1 FDD	EVA5	2x2 Medium	70	6.8	≥2
	5 MHz	R.11-2 FDD	OP.1 FDD	EVA5	2x2 Medium	70	5.9	1
2	10 MHz	R.10 FDD	OP.1 FDD	HST	2x2	70	-2.3	≥1

8.2.1.2.2 Minimum Requirement 4 Tx Antenna Port

The requirements are specified in Table 8.2.1.2.2-2, with the addition of the parameters in Table 8.2.1.2.2-1 and the downlink physical channel setup according Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC-FSTD) with 4 transmitter antennas.

Parameter		Unit	Test 1-2
	$ ho_{\scriptscriptstyle A}$	dB	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0
$N_{\it oc}$ at antenna	port	dBm/15kHz	-98
PDSCH transmission	on mode		2
Note 1: $P_B = 1$.			

 Table 8.2.1.2.2-1: Test Parameters for Transmit diversity Performance (FRC)

Test	Band-	Reference	Reference OCNG Pro		Correlation	Reference v	UE	
number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	1.4 MHz	R.12 FDD	OP.1 FDD	EPA5	4x2 Medium	70	0.6	≥1
2	10 MHz	R.13 FDD	OP.1 FDD	ETU70	4x2 Low	70	-0.9	≥1

8.2.1.2.3 Minimum Requirement 2 Tx Antenna Ports (demodulation subframe overlaps with aggressor cell ABS)

The requirements are specified in Table 8.2.1.2.3-2, with the addition of parameters in Table 8.2.1.2.3-1 and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell. In Table 8.2.1.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Parameter		Unit	Cell 1	Cell 2
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
	N _{oc1}	dBm/15kHz	-102 (Note 2)	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N _{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.2.1.2.3-2	6
BW _{Channel}		MHz	10	10
Subframe Configura	ition		Non-MBSFN	Non-MBSFN
Time Offset between	Cells	μs	2.5 (synchror	nous cells)
Cell Id			0	1
ABS pattern (Note	5)		N/A	11000100 11000000 11000000 11000000 11000000
RLM/RRM Measurement Pattern (Note 6)			1000000 1000000 1000000 1000000 1000000	N/A
	C _{CSI,0}		11000100 11000000 11000000 11000000 11000000	N/A
CSI Subframe Sets (Note7)	C _{CSI,1}		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFDM	symbols		2	
PDSCH transmission	mode		2	N/A
Cyclic prefix			Normal	Normal
overlapping with thNote 3:This noise is appliaABS.ABS.Note 4:This noise is appliaNote 5:ABS pattern as deNote 6:Time-domain meaNote 7:As configured acc	ne aggressor Å ed in OFDM sy ed in all OFDM fined in [9]. surement resc ording to the ti	ymbols #1, #2, #3, #5, #6, a ABS. ymbols #0, #4, #7, #11 of a A symbols of a subframe ov purce restriction pattern for ime-domain measurement	a subframe overlapping verlapping with aggress PCell measurements a	with the aggressor or non-ABS s defined in [7]
Mote 8: Cell 1 is the servin is the same.		s the aggressor cell. The n	umber of the CRS ports	in Cell1 and Cell2

 Table 8.2.1.2.3-1: Test Parameters for Transmit diversity Performance (FRC)

is the same. Note 9: SIB-1 will not be transmitted in Cell2 in this test.

Test Number	Reference Channel		DCNG Propagation attern Conditions (Note 1)		Correlation Matrix and Antenna	trix and				
		Cell 1	Cell 2	Cell 1	Cell 2	Configurati on	Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 2)		
1	R.11-4 FDD (Note 4)	OP.1 FDD	OP.1 FDD	EVA5	EVA 5	2x2 Medium	70	3.4	≥2	
Note 1:					Cell2 are	statistically indep	bendent.			
Note 2:	SNR correspo	nds to \widehat{E}	s/N_{oc2}	of cell 1.						
Note 3: Note 4:	Note 3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									
Note 5:	The maximum	Through	put is cal	culated fi	rom the tota	al Payload in 9 s	ubframes, avera	aged ove	r 40ms.	

Table 8.2.1.2.3-2: Minimum Performance Transmit Diversity (FRC)

8.2.1.2.3A Minimum Requirement 2 Tx Antenna Ports (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements are specified in Table 8.2.1.2.3A-2, with the addition of parameters in Table 8.2.1.2.3A-1. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cells with CRS assistance information. In Table 8.2.1.2.3A-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

Parameter		Unit	Cell 1	Cell 2	Cell 3
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
	N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N _{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
\hat{E}_s/N_{oc2}		dB	Reference Value in Table8.2.1.2.3A- 2	12	10
BW _{Channel}		MHz	10	10	10
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	een Cells	Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (No	ABS pattern (Note 5)		N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measur Subframe Pattern (10000000 10000000 10000000 10000000 1000000	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		11000000 11000000 11000000 11000000 11000000	N/A	N/A
(Note7)	C _{CSI,1}		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control symbols	OFDM		2	Note 8	Note 8
PDSCH transmissio	n mode		2	Note 9	Note 9
Cyclic prefix		1	Normal	Normal	Normal

 Table 8.2.1.2.3A-1: Test Parameters for Transmit diversity Performance (FRC)

Note 1:	$P_B = 1.$
Note 2:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is
	overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6:	Time-domain measurement resource restriction pattern for PCell measurements as defined in
	[7]
Note 7:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe
	indicated by "0" of ABS pattern.
Note 9:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying
	OCNG pattern as defined in Annex A.5.
Note 10:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 11:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.2.3A-2: Minimum Performance Transmit Diversity (FRC)

Test Number	Reference Channel	OC	NG Patte	ern	Propagation Conditions (Note1)		Correlation Matrix and	Reference Value		UE Cate		
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	gory	
1	R.11-4 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Medium	70	3.4	≥2	
Note 1: Note 2: Note 3:	The correlation	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to of cell 1.										

8.2.1.2.4 Enhanced Performance Requirement Type A - 2 Tx Antenna Ports with TM3 interference model

The requirements are specified in Table 8.2.1.2.4-2, with the addition of parameters in Table 8.2.1.2.4-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 3 interference model defined in clause B.5.2. In Table 8.2.1.2.4-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Parameter		Unit	Cell 1	Cell 2	Cell 3		
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3		
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3	-3		
	σ	dB	0	0	0		
Cell-specific reference	signals		Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1		
N_{oc} at antenna po	ort	dBm/15kHz	-98	N/A	N/A		
DIP (Note 2)		dB	N/A	-2.23	-8.06		
BW _{Channel}	MHz	10	10	10			
Cyclic Prefix		Normal	Normal	Normal			
Cell Id			0	1	2		
Number of control OFDM	l symbols		2	2	2		
PDSCH transmission			2	N/A	N/A		
Interference mod	el		N/A	As specified in clause B.5.2	As specified in clause B.5.2		
Probability of occurrence of	Rank 1	%	N/A	80	80		
transmission rank in interfering cells	Rank 2	%	N/A	20	20		
Reporting interva	al	ms	5	N/A	N/A		
Reporting mode			PUCCH 1-0	N/A	N/A		
Note 1: $P_B = 1$							
Note 2: The respective received power spectral density of each interfering cell relative to N_{oc} is defined by							
 its associated DIP value as specified in clause B.5.1. Note 3: Cell 1 is the serving cell. Cell 2, 3 are the interfering cells. Note 4: Cell 2 transmission is delayed with respect to Cell 1 by 0.33 ms and Cell 3 transmission is delayed with respect to Cell 1 by 0.67 ms. 							

Table 8.2.1.2.4-1: Test Parameters for Transmit diversity Performance (FRC) with TM3 interference model

Table 8.2.1.2.4-2: Enhanced Performance Requirement Type A, Transmit Diversity (FRC) with TM3 interference model

Test Number	Reference Channel	OCI	NG Pat	tern	Propagation Conditions		Correlation Reference Matrix and		Value	UE Cate	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 3)	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	gory
1	R.46 FDD	OP.	N/A	N/A	EV	EV	EV	2x2 Low	70	-1.1	≥1
		1			A70	A70	A70				
		FD									
		D									
Note 1:											
Note 2:	Note 2: SINR corresponds to \hat{E}_s / N_{oc} of Cell 1 as defined in clause 8.1.1.										
Note 3:	Correlation ma	trix and	anten	na conf	iguratic	on para	meters	apply for each o	f Cell 1, Cell 2 a	nd Cell 3.	

8.2.1.3 Open-loop spatial multiplexing performance

8.2.1.3.1 Minimum Requirement 2 Tx Antenna Port

For single carrier the requirements are specified in Table 8.2.1.3.1-2, with the addition of the parameters in Table 8.2.1.3.1-1 and the downlink physical channel setup according to Annex C.3.2. For CA the requirements are specified in Table 8.2.1.3.1-4, with the addition of the parameters in Table 8.2.1.3.1-3 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas.

Parameter		Unit	Test 1-2
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98
PDSCH transmission	on mode		3
Note 1: $P_B = 1$.			
Note 2: Void			
Note 3: Void			

Table 8.2.1.3.1-1: Test Parameters for Large Delay CDD (FRC)

				Brono	Correlation	Reference				
Test num	Bandwidth	Reference channel	OCNG pattern	OCNG gation ma pattern condi- a tion c		Fraction of maximum Throughput (%)	SNR (dB)	UE category		
1	10 MHz	R.11 FDD	OP.1 FDD	EVA70	2x2 Low	70	13.0	≥2		
2	10 MHz	R.35 FDD	OP.1 FDD	EVA200	2x2 Low	70	20.2	≥2		
Note 1:	Void.									
Note 2:	Test 1 may no	ot be executed	d for UE-s for	which Test 1	or 2 in Table 8.2/	A.1.3.1-2 is appl	cable.			

Table 8.2.1.3.1-3: Test Parameters for Large Delay CDD (FRC) for CA

	Parameter		Unit	Test 1-3			
Devertistenseense		$ ho_{\scriptscriptstyle A}$	dB	-3			
	Downlink power allocation		dB	-3 (Note 1)			
		σ	dB	0			
N_{oo}	, at antenna	port	dBm/15kHz	-98			
PDSCH	l transmissio	on mode		3			
Note 1:	$P_B = 1$.						
Note 2:	PUCCH format 1b with channel selection is used to feedback ACK/NACK.						
Note 3:		The same PDSCH transmission mode is applied to each component carrier.					

				Propa-	Correlation	Reference	value			
Test num	Bandwidth	Reference channel	OCNG pattern	gation condi- tion	matrix and antenna config.	Fraction of maximum Throughput (%)	SNR (dB)	UE category	CA capa- bility	
1	2x10 MHz	R.11 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.7	≥3	CL_A-A	
2 (Note 2)	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2	≥5	CL_C	
Note 1: Note 2:	Note 1: The OCNG pattern applies for each CC.									

8.2.1.3.1A Soft buffer management test

For CA the requirements are specified in Table 8.2.1.3.1A-2, with the addition of the parameters in Table 8.2.1.3.1A-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the UE performance with proper instantaneous buffer implementation. The test points are applied to UE category and bandwidth combination with maximum aggregated bandwidth as specified inTable 8.2.1.3.1A-3.

Paramete	r	Unit	Test 1-7				
Downlink power	$ ho_{\scriptscriptstyle A}$	dB	-3				
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)				
	σ	dB	0				
N_{oc} at antenna	a port	dBm/15kHz	-98				
PDSCH transmissi	on mode		3				
Note 1: $P_B = 1$.							
	For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK.						
	For CA test cases, the same PDSCH transmission mode is applied to each component carrier.						

 Table 8.2.1.3.1A-1: Test Parameters for soft buffer management test (FRC) for CA

Table 8.2.1.3.1A-2: Minimum performance soft buffer management test (FRC) for CA

				Dropo		Reference	value	
Test num	Bandwi dth	Reference channel	OCNG pattern	Propa- gation condi- tion	gation Correlation condi- matrix and antenna config		SNR (dB)	CA capa- bility
1	2x20 MHz	R.30 FDD	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.2	CL_A-A CL_C
2	15MHz +	R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.1	
2	10MHz	R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)	EVAD	2X2 LOW	70	15.1	CL_A-A
3	20MHz +	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)	5)/470		70	13.5	CL_A-A
3	10MHz	R.11 FDD for 10MHz CC	OP.1 FDD (Note 1)	EVA70 2x2 Low	70	13.5		
	20MHz +	R.30 FDD for 20MHz CC	OP.1 FDD (Note 1)			70	13.5	CL_A-A
4	15MHz	R.30-1 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA70	2x2 Low	70	13.5	
5	2x20 MHz	R.35-1 FDD	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.8	CL_A-A CL_C
6	20MHz +	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)	EVA5		70	15.9	
6	10MHz	R.35-3 FDD for 10MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.9	CL_A-A
7	20MHz +	R.35-1 FDD for 20MHz CC	OP.1 FDD (Note 1)			70	15.9	
(7 15MHz	R.35-2 FDD for 15MHz CC	OP.1 FDD (Note 1)	EVA5	2x2 Low	70	15.9	CL_A-A
Note 1: For CA test cases, the OCNG pattern applies for each CC. Note 2: For Test 2, 3, 4, 6, 7 the Fraction of maximum Throughput applies to each CC.								

Table 8.2.1.3.1A-3: Test points for soft buffer management tests for CA

UE category	Bandwidth combination with maximum aggregated bandwidth (Note 1)							
OE calegoly	2x20MHz	15MHz+10MHz	20MHz+10MHz	20MHz+15MHz				
3	1	2	3	4				
4 5		N/A	6	7				
Note 1: Maximum over all supported CA configurations and bandwidth combination sets according to Table 5.6A.1-								
1and Table	1and Table 5.6A.1-2.							

8.2.1.3.2 Minimum Requirement 4 Tx Antenna Port

The requirements are specified in Table 8.2.1.3.2-2, with the addition of the parameters in Table 8.2.1.3.2-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 4 transmitter antennas.

Parameter		Unit	Test 1
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	-6
	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)
	σ	dB	3
$N_{\scriptscriptstyle oc}$ at antenna	port	dBm/15kHz	-98
PDSCH transmissi	on mode		3
Note 1: $P_B = 1$			

Γ	Test	Band-	Reference	OCNG	Propagation	Correlation	Reference v	alue	UE
	number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
	1	10 MHz	R.14 FDD	OP.1 FDD	EVA70	4x2 Low	70	14.3	≥2

8.2.1.3.3 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS)

The requirements for non-MBSFN ABS are specified in Table 8.2.1.3.3-2, with the addition of parameters in Table 8.2.1.3.3-1 and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

The requirements for MBSFN ABS are specified in Table 8.2.1.3.3-4, with the addition of parameters in Table 8.2.1.3.3-3 and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

The purpose is to verify the performance of large delay CDD with 2 transmitter antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell. In Tables 8.2.1.3.3-1 and 8.2.1.3.3-3, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Parameter		Unit	Cell 1	Cell 2
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
	N _{oc1}	dBm/15kHz	-102 (Note 2)	N/A
N_{oc} at antenna port	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N _{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.2.1.3.3-2	6
BW _{Channel}		MHz	10	10
Subframe Configur	ation		Non-MBSFN	Non-MBSFN
Cell Id			0	1
Time Offset betweer	Cells	μs	2.5 (synchro	nous cells)
ABS pattern (Note	9 5)		N/A	11000100, 11000000, 11000000, 11000000, 11000000, 11000000
RLM/RRM Measurement Pattern(Note 6			10000000 10000000 10000000 10000000 1000000	N/A
CSI Subframe Sets (Note	C _{CSI,0}		11000100 11000000 11000000 11000000 11000000	N/A
7)	C _{CSI,1}		00111011 00111111 00111111 00111111 00111111	N/A
Number of control OFD			2	
PDSCH transmission	mode		3 Normal	N/A
Cyclic prefixNote 1: $P_{\scriptscriptstyle R} = 1$.			Normal	Normal
Note 2:This noise is appl overlapping with tNote 3:This noise is appl aggressor ABS.Note 4:This noise is applNote 5:ABS pattern as de Time-domain meat Note 7:Note 7:As configured acc measurements de	he aggressor Å ied in OFDM sy ied in all OFDM efined in [9]. asurement reso cording to the ti efined in [7].	ymbols #0, #4, #7, #11 of I symbols of a subframe o purce restriction pattern fo me-domain measurement	a subframe overlapping overlapping with aggres r PCell measurements t resource restriction pa	g with the sor non-ABS as defined in [7]. ttern for CSI
Note 8: Cell 1 is the servi Cell2 is the same Note 9: SIB-1 will not be t		s the aggressor cell. The r Cell2 in this test.	number of the CRS port	s in Cell1 and

Table 8.2.1.3.3-1: Test Parameters for Large Delay CDD (FRC) – Non-MBSFN ABS

Test Number	Reference Channel			Propagation Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 2)	
1	R.11 FDD (Note 4)	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	13.3	≥2
Note 1:	The propagati	on condit	ons for C	ell 1 and	Cell2 are	statistically indepe	endent.	•	
Note 2:	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.								
Note 3: Note 4:	3: The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.								
Note 5:	The maximum Throughput is calculated from the total Payload in 9 subframes, averaged over 40ms.								

Table 8.2.1.3.3-2: Minimum Performance Large Delay CDD (FRC) – Non-MBSFN ABS

Parameter		Unit	Cell 1	Cell 2
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3
	σ	dB	0	N/A
	N _{oc1}	dBm/15kHz	-102 (Note 2)	N/A
N_{oc} at antenna port	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N _{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.2.1.3.3-4	6
BW _{Channel}		MHz	10	10
Subframe Configura	ation		Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset between	Cells	μs	2.5 (synchror	nous cells)
ABS pattern (Note	9 5)		N/A	0001000000 0100000010 0000001000 0000000
RLM/RRM Measurement Pattern (Note 6			0001000000 010000010 0000001000 00000000	N/A
C _{CSI,0} CSI Subframe Sets (Note			0001000000 010000010 0000001000 00000000	N/A
7)	C _{CSI,1}		1110111111 1011111101 1111110111 1111110111 111111	N/A
MBSFN Subframe Allocation	on (Note 10)		N/A	001000 100001 000100 000000
Number of control OFDN			2	
PDSCH transmission Cyclic prefix	mode		3 Normal	N/A Normal
subframe overlap Note 3: This noise is appl Note 4: This noise is appl Note 5: ABS pattern as de MBSFN ABS sub Note 6: Time-domain mea Note 7: As configured acc measurements de Note 8: Cell 1 is the servi Cell2 is the same Note 9: SIB-1 will not be t	ping with the ag ied in OFDM sp ied in all OFDM efined in [9]. Th frames. asurement resc cording to the ti efined in [7]. ng cell. Cell 2 is ransmitted in C	ymbol #0 of a subframe ov I symbols of a subframe ov le 4 th , 12 th , 19 th and 27 th s purce restriction pattern for me-domain measurement s the aggressor cell. The r	verlapping with the aggroup overlapping with aggress ubframes indicated by A r PCell measurements a t resource restriction pa number of the CRS port	ressor ABS. sor non-ABS. ABS pattern are as defined in [7]. ttern for CSI s in Cell1 and
	mber of uplink	HARQ transmission is lim ptected by MBSFN ABS ir		HICH channel

Table 8.2.1.3.3-3: Test Parameters for Large Delay CDD (FRC) – MBSFN ABS

Test Number	Reference Channel	OCNG Pattern		Propagation Conditions (Note 2)		Correlation Matrix and Antenna	Reference Value		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 2)	
1	R.11 FDD (Note 4)	OP.1 FDD	OP.1 FDD	EVA 5	EVA 5	2x2 Low	70	12.0	≥2
Note 1:					Cell2 are	statistically indepe	ndent.	•	
Note 2:	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.								
Note 3: Note 4:	The correlation matrix and antenna configuration apply for Cell 1 and Cell 2. Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.								
Note 5:	The maximum	Through	put is cald	culated fro	om the tota	al Payload in 4 su	bframes, averag	ed over 4	0ms.

Table 8.2.1.3.3-4: Minimum Performance Large Delay CDD (FRC) – MBSFN ABS

8.2.1.3.4 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements for non-MBSFN ABS are specified in Table 8.2.1.3.4-2, with the addition of parameters in Table 8.2.1.3.4-1. The purpose is to verify the performance of large delay CDD with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cells with CRS assistance information. In Table 8.2.1.3.4-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 ad Cell3.

Parameter		Unit	Cell 1	Cell 2	Cell 3
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
anoodion	σ	dB	0	N/A	N/A
	N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.2.1.3.4-2	Reference Value in Table 8.2.1.3.4-2	Reference Value in Table 8.2.1.3.4-2
BW _{Channel}		MHz	10	10	10
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	Frequency shift between Cells		N/A	300	-100
Cell Id	Cell Id		0	1	126
ABS pattern (No	ABS pattern (Note 5)		N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
	RLM/RRM Measurement Subframe Pattern (Note 6)		1000000 1000000 1000000 1000000 1000000 1000000	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		11000000 11000000 11000000 11000000 11000000	N/A	N/A
(Note7)	C _{CSI,1}		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control symbols	OFDM		2	Note 8	Note 8
PDSCH transmissio	n mode		3	Note 9	Note 9
Cyclic prefix			Normal	Normal	Normal

Table 8.2.1.3.4-1: Test Parameters for Large Delay CDD (FRC) – Non-MBSFN ABS

Note 1:	$P_B = 1$.
Note 2:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the
	definition of the reference channel.
Note 6:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 7:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10:	
	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.
Note 11:	SID-1 will not be transmitted in Ceil 2 and Ceil 3 in this test.

Table 8.2.1.3.4-2: Minimum Performance Large Delay CDD (FRC) – Non-MBSFN ABS

Test Numb er	Refer ence Chan nel	\widehat{E}_{s}/N_{oc2}		OCNG Pattern			Propagation Conditions (Note1)			Correlatio n Matrix	Reference Value		UE Cate	
		Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	and Antenna Configurat ion (Note 2)	Fraction of Maximu m Through put (%)	SNR (dB) (Note 3)	gory	
1	R.11 FDD	9	7	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	70	13.9	≥2	
2	R.35 FDD	9	1	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	70	22.6	≥2	
Note 1: Note 2: Note 3:	The co	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.												

8.2.1.4 Closed-loop spatial multiplexing performance

8.2.1.4.1 Minimum Requirement Single-Layer Spatial Multiplexing 2 Tx Antenna Port

The requirements are specified in Table 8.2.1.4.1-2, with the addition of the parameters in Table 8.2.1.4.1-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with wideband and frequency selective precoding.

Parameter		Unit	Test 1	Test 2			
Downlink nower	$ ho_{\scriptscriptstyle A}$	dB	-3	-3			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)			
	σ	dB	0	0			
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98	-98			
Precoding granul	arity	PRB	6	50			
PMI delay (Note	e 2)	ms	8	8			
Reporting inter	val	ms 1		1			
Reporting mod	le		PUSCH 1-2	PUSCH 3-1			
CodeBookSubsetR on bitmap	estricti		001111	001111			
PDSCH transmis	sion		4	4			
mode							
Note 1: $P_B = 1$.							
Note 2: If the UE	reports	in an available upl	ink reporting instan	ce at subrame			
SF#n based on PMI estimation at a downlink SF not later than							
SF#(n-4 before S		ported PMI cannot	be applied at the e	NB downlink			

Table 8.2.1.4.1-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Test	Band-	Reference	OCNG	Propagation	Correlation	Reference value		UE
number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.10 FDD	OP.1 FDD	EVA5	2x2 Low	70	-2.5	≥1
2	10 MHz	R.10 FDD	OP.1 FDD	EPA5	2x2 High	70	-2.3	≥1

8.2.1.4.1A Minimum Requirement Single-Layer Spatial Multiplexing 4 Tx Antenna Port

The requirements are specified in Table 8.2.1.4.1A-2, with the addition of the parameters in Table 8.2.1.4.1A-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with wideband and frequency selective precoding.

Parameter		Unit	Test 1				
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	-6				
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)				
	σ	dB	3				
$N_{_{oc}}$ at antenna p	ort	dBm/15kHz	-98				
Precoding granula	arity	PRB	6				
PMI delay (Note	2)	ms	8				
Reporting interv	al	ms	1				
Reporting mode	e		PUSCH 1-2				
CodeBookSubsetRe	estricti		000000000000000000000000000000000000000				
on bitmap			00000000000000000				
			00000000000000000				
			111111111111111111				
PDSCH transmiss mode	sion		4				
Note 1: $P_B = 1$.							
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).							

Table 8.2.1.4.1A-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Table 8.2.1.4.1A-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

ſ	Test	Band-	Reference	OCNG	Propagation	Correlation	Reference v	value	UE
	number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
	1	10 MHz	R.13 FDD	OP.1 FDD	EVA5	4x2 Low	70	-3.2	≥1

8.2.1.4.1B Enhanced Performance Requirement Type A - Single-Layer Spatial Multiplexing 2 Tx Antenna Port with TM4 interference model

The requirements are specified in Table 8.2.1.4.1B-2, with the addition of the parameters in Table 8.2.1.4.1B-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rankone performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 4 interference model defined in clause B.5.3. In Table 8.2.1.4.1B-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Parameter		Unit	Cell 1	Cell 2	Cell 3			
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3	-3			
	σ	dB	0	0	0			
Cell-specific reference	signals		Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1			
N_{oc} at antenna po	ort	dBm/15kHz	-98	N/A	N/A			
DIP (Note 2)		dB	N/A	-1.73	-8.66			
BW _{Channel}		MHz	10	10	10			
Cyclic Prefix			Normal	Normal	Normal			
Cell Id			0	1	2			
Number of control OFDN	symbols		2	2	2			
PDSCH transmission			6	N/A	N/A			
Interference mod	el		N/A	As specified in clause B.5.3	As specified in clause B.5.3			
Probability of occurrence of	Rank 1	%	N/A	80	80			
transmission rank in interfering cells	Rank 2	%	N/A	20	20			
Precoding granula	rity	PRB	50	6	6			
PMI delay (Note	4)	ms	8	N/A	N/A			
Reporting interva	al	ms	5	N/A	N/A			
Reporting mode			PUCCH 1-1	N/A	N/A			
CodeBookSubsetRestrict	on bitmap		001111	N/A	N/A			
Note 1: $P_B = 1$ Note 2:The respective received power spectral density of each interfering cell relative to N_{oc} ' is defined by its associated DIP value as specified in clause B.5.1.Note 3:Cell 1 is the serving cell. Cell 2, 3 are the interfering cells.Note 4:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 5:All cells are time-synchronous.								

Table 8.2.1.4.1B-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Table 8.2.1.4.1B-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Test Number	Reference Channel				Propagation Conditions			Correlation Matrix and	Reference Value		UE Cate
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 3)	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	gory
1	R.47 FDD	OP. 1 FD D	N/A	N/A	EV A5	EV A5	EV A5	2x2 Low	70	0.8	≥1
Note 1:								e statistically inc	dependent.		
Note 2:	SINR corresponds to \hat{E}_s/N_{oc} of Cell 1 as defined in clause 8.1.1.										
Note 3:	Correlation ma	trix and	anten	na conf	iguratic	on para	meters	apply for each o	f Cell 1, Cell 2 a	nd Cell 3.	

8.2.1.4.1C Minimum Requirement Single-Layer Spatial Multiplexing 2 Tx Antenna Ports (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements are specified in Table 8.2.1.4.1C-2, with the addition of parameters in Table 8.2.1.4.1C-1. The purpose is to verify the closed loop rank-one performance with wideband precoding if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell with CRS assistance information. In Table 8.2.1.4.1C-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

Parameter		Unit	Cell 1	Cell 2	Cell 3
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
anocation	σ	dB	0	N/A	N/A
	N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.2.1.4.1C-2	12	10
BW _{Channel}		MHz	10	10	10
Subframe Configur	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betweer	n Cells	μs	N/A	3	-1
Frequency shift betwe	en Cells	Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Not	e 5)		N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measure Subframe Pattern (N			10000000 10000000 10000000 10000000 1000000	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		11000000 11000000 11000000 11000000 11000000	N/A	N/A
(Note7)	C _{CSI,1}		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control C symbols	DFDM		2	Note 8	Note 8
PDSCH transmission mode			6	Note 9	Note 9
Precoding granularity		PRB	50	N/A	N/A
PMI delay (Note 10)		ms	8	N/A	N/A
	Reporting interval		1	N/A	N/A
Peporting mod		ms	PUSCH 3-1	N/A	N/A
CodeBookSubsetRes bitmap			1111	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Table 8.2.1.4.1C-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) – Non-MBSFN ABS

Note 1:	$P_B = 1$.
Note 2:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4: Note 5:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 7:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10:	•
Note 11:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 12:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.1.4.1C-2: Minimum Performance Single-Layer Spatial Multiplexing (FRC)– Non-MBSFN ABS

Test Number	Reference Channel	00	NG Patte	ern		ropagations (N		Correlation Matrix and	Reference	Value	UE Cate
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	gory
1	R.11 FDD	OP.1	OP.1	OP.1	EPA5	EPA5	EPA5	2x2 High	70	6.1	≥2
		FDD	FDD	FDD							
Note 1:	The propagat	ion condi	tions for	Cell 1, Co	ell 2 and	Cell 3 are	e statistic	ally independen	t.		
Note 2:	The correlation	on matrix	and ante	nna conf	iguration	apply for	Cell 1, C	ell 2 and Cell 3.			
Note 3:	SNR correspo	onds to \hat{E}	\hat{E}_s / N_{oc2} of	of cell 1.							

8.2.1.4.2 Minimum Requirement Multi-Layer Spatial Multiplexing 2 Tx Antenna Port

The requirements are specified in Table 8.2.1.4.2-2, with the addition of the parameters in Table 8.2.1.4.2-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

Parameter		Unit	Test 1-2					
Downlink nower	$ ho_{\scriptscriptstyle A}$	dB	-3					
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)					
	σ	dB	0					
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98					
Precoding granu	Ilarity	PRB	50					
PMI delay (Not	e 2)	ms	8					
Reporting inte	rval	ms	1					
Reporting mo	de		PUSCH 3-1					
CodeBookSubsetR	estriction		110000					
bitmap								
PDSCH transmission	on mode		4					
Note 1: $P_B = 1$.								
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).								

Table 8.2.1.4.2-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC)

Test	Band-	Reference	OCNG	Propagation	Correlation	Reference v	UE	
number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.35 FDD	OP.1 FDD	EPA5	2x2 Low	70	18.9	≥2
2	10 MHz	R.11 FDD	OP.1 FDD	ETU70	2x2 Low	70	14.3	≥2

8.2.1.4.3 Minimum Requirement Multi-Layer Spatial Multiplexing 4 Tx Antenna Port

For single carrier the requirements are specified in Table 8.2.1.4.3-2, with the addition of the parameters in Table 8.2.1.4.3-1 and the downlink physical channel setup according to Annex C.3.2. For CA the requirements are specified in Table 8.2.1.4.3-4, with the addition of the parameters in Table 8.2.1.4.3-3 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

Table 8.2.1.4.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC)

Paramete	r	Unit	Test 1
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	-6
	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)
	σ	dB	3

$N_{\scriptscriptstyle oc}$ at antenna port	dBm/15kHz	-98					
Precoding granularity	PRB	6					
PMI delay (Note 2)	ms	8					
Reporting interval	ms	1					
Reporting mode		PUSCH 1-2					
CodeBookSubsetRestrictio		000000000000000000000000000000000000000					
n bitmap		0000000111111111111111100					
		0000000000000					
PDSCH transmission mode		4					
Note 1: $P_B = 1$.							
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).							
Note 3: Void.							
Note 4: Void.							
Note 5: Void.							

				Propa-	Correlation	Reference v		
Test num.	Band- width	Referencechannel	OCNG pattern	OCNG gation		Fraction of maximum SNR throughput (dB) (%)		UE cate- gory
1	10 MHz	R.36 FDD	OP.1 FDD	EPA5	4x2 Low	70	14.7	≥2
Note 1	: Void							

Table 8.2.1.4.3-3: Test Parameters for Multi-Layer Spatial Multiplexing (FRC) for CA

Parameter		Unit	Test 1	Test 2					
Deverliek zewer	$ ho_{\scriptscriptstyle A}$	dB	-6	-6					
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)	-6 (Note 1)					
	σ	dB	3	3					
$N_{\scriptscriptstyle oc}$ at antenna	port	dBm/15kHz	-98	-98					
Precoding granu	Ilarity	PRB	6	8					
PMI delay (Not	e 2)	ms	8	8					
Reporting inter	rval	ms	1	1					
Reporting mo	de		PUSCH 1-2	PUSCH 1-2					
CodeBookSubsetRe	estriction		0000000000000	000000000000000000					
bitmap			0000000000000000000	0000000000000000000					
			0000001111111	0000001111111					
			1111111110000	1111111110000					
			000000000000	000000000000					
CSI request field (Note 3)		'10'						
PDSCH transmission	on mode		4						
Note 1: $P_B = 1$.									
based on I reported P	5								
Note 3: Multiple Collayers.	3: Multiple CC-s under test are configured as the 1 st set of serving cells by higher								
Note 4: ACK/NAC									
			applied to each con	nponent carrier.					

				Propa-	Correlation	Reference value				
Test num.	Band- width	Referencechannel	OCNG pattern	gation condi- tion	matrix and antenna config.	Fraction of maximum throughput (%)	SNR (dB)	UE cate- Gory	CA capa- bility	
1	2x10 MHz	R.14 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.8	≥3	CL_A- A	
2	2x20 MHz	R.14-3 FDD	OP.1 FDD (Note 1)	EVA5	4x2 Low	70	10.9	≥5	CL_C	
Note 1	Note 1: The OCNG pattern applies for each CC.									

Table 8.2.1.4.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC) for CA

8.2.1.5 MU-MIMO

8.2.1.6 [Control channel performance: D-BCH and PCH]

8.2.1.7 Carrier aggregation with power imbalance

The requirements in this section verify the ability of an intraband adjancent carrier aggregation UE to demodulate the signal transmitted by the PCell in the presence of a stronger SCell signal on an adjacent frequency. Throughput is measured on the PCell only.

8.2.1.7.1 Minimum Requirement

For CA the requirements are specified in Table 8.2.1.7.1-2, with the addition of the parameters in Table 8.2.1.7.1-1 and the downlink physical channel setup according to Annex C.3.2.

Paramete	r	Unit	Test 1			
	$ ho_{\scriptscriptstyle A}$	dB	0			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)			
	σ	dB	0			
\hat{E}_{s} – PCell at anten PCell	na port of	dBm/15kHz	-85			
\hat{E}_{s} _ $SCell$ at anten Scell	na port of	dBm/15kHz	-79			
N_{oc} at antenn	a port	dBm/15kHz	Off (Note 2)			
Symbols for unus	ed PRBs		OCNG (Note 3,4)			
Modulatio	n		64 QAM			
Maximum number transmissio			1			
Redundancy version	-		{0}			
PDSCH transmiss of PCell			1			
PDSCH tramsmiss of SCell	sion mode		3			
Note 1: $P_B = 0$.						
Note 3: These p an arbitr PDSCH the OCN pseudo	 These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated. pseudo random data, which is QPSK modulated. 					
	and PDSCI					

Table 8.2.1.7.1-2: Minimum performance (FRC) for CA

Test Number	Band- width		rence nnel	OCNG F	Pattern	Propa Cond		Correlation Matrix and Antenna		Reference value Fraction of Maximum	UE Category	CA capabi lity
		PCell	SCell	PCell	SCell	PCell	SCell	PCell	SCell	Throughput (%)		
1	2x20M Hz	R.49 FDD	R.49-1 FDD	OP.1 FDD	OP.5 FDD	AWGN	Clause B.1	1x2	2x2	85%	5-8	CL-C

8.2.2 TDD (Fixed Reference Channel)

The parameters specified in Table 8.2.2-1 are valid for all TDD tests unless otherwise stated.

Parameter	Unit	Value				
Uplink downlink configuration (Note 1)		1				
Special subframe configuration (Note 2)		4				
Cyclic prefix		Normal				
Cell ID		0				
Inter-TTI Distance		1				
Number of HARQ processes per component carrier	Processes	7				
Maximum number of HARQ transmission		4				
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM				
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	4 for 1.4 MHz bandwidth, 3 for 3 MHz and 5 MHz bandwidths, 2 for 10 MHz, 15 MHz and 20 MHz bandwidths				
Cross carrier scheduling		Not configured				
Note 1:as specified in Table 4.2-2 in TS 36.211 [4].Note 2:as specified in Table 4.2-1 in TS 36.211 [4].						

Table 8.2.2-1: Common Test Parameters (TDD)

8.2.2.1 Single-antenna port performance

The single-antenna performance in a given multi-path fading environments is determined by the SNR for which a certain relative information bit throughput of the reference measurement channels in Annex A.3.4 is achieved. The purpose of these tests is to verify the single-antenna performance with different channel models and MCS. The QPSK and 64QAM cases are also used to verify the performance for all bandwidths specified in Table 5.6.1-1.

8.2.2.1.1 Minimum Requirement

For single carrier the requirements are specified in Table 8.2.2.1.1-2, with the addition of the parameters in Table 8.2.2.1.1-1 and the downlink physical channel setup according to Annex C.3.2. For CA the requirements are specified in Table 8.2.2.1.1-4, with the addition of the parameters in Table 8.2.2.1.1-3 and the downlink physical channel setup according to Annex C.3.2.

Paramete	r	Unit	Test 1- 5	Test 6- 8	Test 9- 15	Test 16- 18	Test 19
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0	0	0	0	0
power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)

Table 8.2.2.1.1-1: Test Parameters

	σ	dB	0	0	0	0	0	
N_{oc} at ante	enna	dBm/15kHz	-98	-98	-98	-98	-98	
port	,		0010	0010	0010	00110	00110	
Symbols			OCNG	OCNG	OCNG	OCNG	OCNG	
unused Pl	RBs		(Note 2)	(Note 2)	(Note 2)	(Note 2)	(Note 2)	
Modulati	on		QPSK	16QAM	64QAM	16QAM	QPSK	
ACK/NAG	CK		Multiplexing	Multiplexing	Multiplexing	Multiplexing	Multiplexing	
feedback n	node				-	_		
PDSCH	1		1	1	1	1	1	
transmission	mode							
Note 1: P ₁	=0							
Note 2: Th	ese phy	sical resource	blocks are ass	igned to an arl	oitrary number	of virtual UEs v	with one	
P	SCH p	er virtual UE; tl	ne data transm	itted over the C	CNG PDSCH	s shall be unco	rrelated	
PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.								
	Void.							
Note 4: Vo	oid.							

Table 8.2.2.1.1-2:	Minimum	performance	(FRC)

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference v	alue	UE
number		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.2 TDD	OP.1 TDD	EVA5	1x2 Low	70	-1.2	≥1
2	10 MHz	R.2 TDD	OP.1 TDD	ETU70	1x2 Low	70	-0.6	≥1
3	10 MHz	R.2 TDD	OP.1 TDD	ETU300	1x2 Low	70	-0.2	≥1
4	10 MHz	R.2 TDD	OP.1 TDD	HST	1x2	70	-2.6	≥1
5	1.4 MHz	R.4 TDD	OP.1 TDD	EVA5	1x2 Low	70	0.0	≥1
6	10 MHz	R.3 TDD	OP.1 TDD	EVA5	1x2 Low	70	6.7	≥2
	5 MHz	R.3-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	6.7	1
7	10 MHz	R.3 TDD	OP.1 TDD	ETU70	1x2 Low	30	1.4	≥2
	5 MHz	R.3-1 TDD	OP.1 TDD	ETU70	1x2 Low	30	1.4	1
8	10 MHz	R.3 TDD	OP.1 TDD	ETU300	1x2 High	70	9.3	≥2
	5 MHz	R.3-1 TDD	OP.1 TDD	ETU300	1x2 High	70	9.3	1
9	3 MHz	R.5 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	≥1
10	5 MHz	R.6 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	≥2
	5 MHz	R.6-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1
11	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	≥2
	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.6	1
12	10 MHz	R.7 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.1	≥2
	10 MHz	R.7-1 TDD	OP.1 TDD	ETU70	1x2 Low	70	19.1	1
13	10 MHz	R.7 TDD	OP.1 TDD	EVA5	1x2 High	70	19.1	≥2
	10 MHz	R.7-1 TDD	OP.1 TDD	EVA5	1x2 High	70	19.1	1

14	15 MHz	R.8 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.8	≥2
	15 MHz	R.8-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.8	1
15	20 MHz	R.9 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	≥3
	20 MHz	R.9-2 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	2
	20 MHz	R.9-1 TDD	OP.1 TDD	EVA5	1x2 Low	70	17.7	1
16	3 MHz	R.0 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.1	≥1
17	10 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.0	≥1
18	20 MHz	R.1 TDD	OP.1 TDD	ETU70	1x2 Low	30	2.1	≥1
19	10 MHz	R.41 TDD	OP.1 TDD	EVA5	1x2 Low	70	-5.3	≥1
Note 1:	Void							

Table 8.2.2.1.1-3: Test Parameters for CA

	Parameter	Unit	Test 1
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0
power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)
	σ	dB	0
N_{i}	$_{pc}$ at antenna port	dBm/15kHz	-98
Symb	ols for unused PRBs		OCNG (Note 2)
	Modulation		QPSK
ACK/N	ACK feedback mode		PUCCH format 1b with channel selection
PDSC	H transmission mode		1
Note 1:	$P_B = 0$		
Note 2:	These physical resource blo	ocks are assigne	ed to an arbitrary number of virtual UEs with one
F	PDSCH per virtual UE; the	data transmitted	over the OCNG PDSCHs shall be uncorrelated
F	oseudo random data, which	n is QPSK modu	lated.
Note 3:	The same PDSCH transmis	ssion mode is ap	pplied to each component carrier.

Table 8.2.2.1.1-4: Minimum performance (FRC) for CA

Test	Bandwidth	ndwidth Reference	Reference OCNG Propagation		Reference value		UE	CA	
number		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category	capability
1	2x20MHz	R.42 TDD	OP.1 TDD (Note 1)	EVA5	1x2 Low	70	-1.2	≥5	CL_C, CL_A-A
Note 1:	The OCNG p	attern applies	for each C	C.		•			

8.2.2.1.2 Void

8.2.2.1.3 Void

8.2.2.1.4 Minimum Requirement 1 PRB allocation in presence of MBSFN

The requirements are specified in Table 8.2.2.1.4-2, with the addition of the parameters in Table 8.2.2.1.1.4-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the single-antenna performance with a single PRB allocated at the lower band edge in presence of MBSFN.

Parameter		Unit	Test 1		
	$ ho_{\scriptscriptstyle A}$	dB	0		
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)		
	σ	dB	0		
$N_{\scriptscriptstyle oc}$ at antenna	N _{oc} at antenna port dBm/15kHz -98				
Symbols for MBSFN MBSFN subframes			OCNG (Note 3)		
ACK/NACK feedba	ck mode		Multiplexing		
PDSCH transmission	on mode		1		
whole MBS first slot. Note 3: The MBSFI QPSK mod not inserted	FN subfram N portion of t ulated data. I in the MBS	an MBSFN subfran e except the first tw the MBSFN subfran Cell-specific refere FN portion of the M ulated MBSFN data	vo symbols in the mes shall contain ence signals are IBSFN		

 Table 8.2.2.1.4-1: Test Parameters for Testing 1 PRB allocation

Table 8.2.2.1.4-2: Minimum performance 1PRB (FRC	;)
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Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference	value	UE
number		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.29 TDD	OP.3 TDD	ETU70	1x2 Low	30	2.0	≥1

8.2.2.2 Transmit diversity performance

8.2.2.2.1 Minimum Requirement 2 Tx Antenna Port

The requirements are specified in Table 8.2.2.2.1-2, with the addition of the parameters in Table 8.2.2.2.1-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmitter antennas.

Table 8.2.2.2.1-1: Test Parameters for T	ransmit diversity Performance (FRC)

Parameter		Unit	Test 1-2
	$ ho_{\scriptscriptstyle A}$	dB	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0
$N_{\it oc}$ at antenna	port	dBm/15kHz	-98
ACK/NACK feedba	ck mode		Multiplexing
PDSCH transmission	on mode		2
Note 1: $P_B = 1$			

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Test Bandw		Bandw Reference		Reference OCNG Pro	Propagation	Correlation	Reference	UE
number	idth	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.11 TDD	OP.1 TDD	EVA5	2x2 Medium	70	6.8	≥2
I	5 MHz	R.11-2 TDD	OP.1 TDD	EVA5	2x2 Medium	70	6.8	1
2	10 MHz	R.10 TDD	OP.1 TDD	HST	2x2	70	-2.3	≥1

Table 8.2.2.2.1-2: Minimum performance Transmit Diversity (FRC)

8.2.2.2.2 Minimum Requirement 4 Tx Antenna Port

The requirements are specified in Table 8.2.2.2.2.2, with the addition of the parameters in Table 8.2.2.2.2.1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC-FSTD) with 4 transmitter antennas.

Table 8.2.2.2.2-1: Test Parameters for Transmit diversity Performance (FR	(C)
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Parameter		Unit	Test 1-2
	$ ho_{\scriptscriptstyle A}$	dB	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0
$N_{\it oc}$ at antenna	port	dBm/15kHz	-98
ACK/NACK feedba	ck mode		Multiplexing
PDSCH transmissio	on mode		2
Note 1: $P_B = 1$		-	

Table 8.2.2.2.2-2: Minimum performance	Transmit Diversity (FRC)
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Test	Band-	Reference	OCNG	Propagation	Correlation	Reference value		UE
number	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	1.4 MHz	R.12 TDD	OP.1 TDD	EPA5	4x2 Medium	70	0.2	≥1
2	10 MHz	R.13 TDD	OP.1 TDD	ETU70	4x2 Low	70	-0.5	≥1

8.2.2.2.3 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS)

The requirements are specified in Table 8.2.2.3-2, with the addition of parameters in Table 8.2.2.3-1 and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell. In Table 8.2.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

	Parameter		Unit	Cell 1	Cell 2		
Uplin	k downlink confi	guration		1	1		
	al subframe con			4	4		
		$ ho_{\scriptscriptstyle A}$	dB	-3	-3		
	Downlink power allocation		dB	-3 (Note 1)	-3 (Note 1)		
	anoodiion	σ	dB	0	N/A		
		N _{oc1}	dBm/15kHz	-102 (Note 2)	N/A		
N _{oc} at a	antenna port	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A		
		N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A		
	\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.2.2.3-2	6		
	BW _{Channel}		MHz	10	10		
Su	bframe Configu	ration		Non-MBSFN	Non-MBSFN		
Time	e Offset betwee	n Cells	μs	2.5 (synch	ronous cells)		
	Cell Id			0	1		
А	BS pattern (Not	te 5)		N/A	0000010001 0000000001		
RLM/RR	M Measuremen Pattern (Note			0000000001 0000000001	N/A		
CSI Sul	CSI Subframe Sets			0000010001 0000000001	N/A		
(N	lote 7)	C _{CSI,1}		1100101000 1100111000	N/A		
Number	r of control OFD	M symbols		2			
ACK	/NACK feedbac	k mode		Multiplexing			
PDS	CH transmissio	n mode		2	N/A		
	Cyclic prefix			Normal	Normal		
Note 1: $P_B = 1$ Note 2:This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.Note 3:This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with							
Note 4:	the aggressor ABS. This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.						
Note 5:	ABS pattern as	defined in [9]					
Note 6:							
Note 7:			ne time-domain measuren	nent resource re	striction pattern		
Note 8:	for CSI measur Cell 1 is the se Cell1 and Cell2	rving cell. Cell	ed in [7]. 2 is the aggressor cell. T	he number of the	e CRS ports in		
Note 9:			in Cell2 in this test.				

Table 8.2.2.2.3-1: Test	Parameters for Transr	mit diversity Perfor	mance (FRC)

Test Number	Reference Channel	OCNG Pattern		n Propagation Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value		Matrix and		UE Category
		Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 2)			
1	R.11-4 TDD (Note 4)	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Medium	70	3.8	≥2		
Note 1:	The propagat	ion condit	ions for C	ell 1 and 0	Cell2 are	statistically indepe	endent.		•		
Note 2:	SNR corresponds to \hat{E}_s/N_{ac2} of cell 1.										
Note 3: Note 4:	The correlation matrix and antenna configuration apply for Cell 1 and Cell 2. Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.										
Note 5:	The maximur	n Through	put is cale	The maximum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.							

Table 8.2.2.3-2: Minimum Performance Transmit Diversity (FRC)

8.2.2.2.3A Minimum Requirement 2 Tx Antenna Ports (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements are specified in Table 8.2.2.2.3A-2, with the addition of parameters in Table 8.2.2.2.3A-1. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell with CRS assistance information. In Table 8.2.2.2.3A-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

	Parameter		Unit	Cell 1	Cell 2	Cell 3	
Uplink d	ownlink confi	auration	Onic	1	1	1	
	ubframe con	0		4	4	4	
		ρ_A	dB	-3	-3	-3	
	Downlink power allocation $\rho_B \sigma$		dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)	
			dB	0	N/A	N/A	
		N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A	
N_{oc} at an	itenna port	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A	
		N _{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A	
	\hat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.2.2.2.3A-2	12	10	
	BW _{Channel}		MHz	10	10	10	
Subfra	ame Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN	
Time C)ffset betwee	n Cells	μs	N/A	3	-1	
Frequence	cy shift betwe	en Cells	Hz	N/A	300	-100	
	Cell Id			0	126	1	
ABS	ABS pattern (Note 5)			N/A	0000000001 0000000001	0000000001 0000000001	
	RRM Measur me Pattern (I			0000000001 0000000001	N/A	N/A	
CSI Subf	rame Sets	C _{CSI,0}		0000000001 0000000001	N/A	N/A	
(No	ote7)	C _{CSI,1}		1100111000 1100111000	N/A	N/A	
Numbe	er of control (symbols	OFDM		2	Note 8	Note 8	
ACK/N/	ACK feedbac	k mode		Multiplexing	N/A	N/A	
	l transmissio	n mode		2	Note 9	Note 9	
	Cyclic prefix			Normal	Normal	Normal	
Note 1: Note 2: Note 3: Note 4: Note 5:	subframe ov This noise is aggressor A This noise is ABS pattern PDCCH/PCI overlapped	erlapping v applied in BS. applied in as defined FICH are tra with the AB	vith the aggresso OFDM symbols all OFDM symbo in [9]. PDSCH o ansmitted in the S subframe of ag	#1, #2, #3, #5, #6, # or ABS. #0, #4, #7, #11 of a ols of a subframe ov ther than SIB1/pagi serving cell subfram ggressor cell and th	subframe overlap rerlapping with ago ng and its associa ne when the subfra	ping with the gressor non-ABS ited ame is	
Note 6: Note 7:	definition of the reference channel. Time-domain measurement resource restriction pattern for PCell measurements as defined in [7] As configured according to the time-domain measurement resource restriction pattern for CSI						
Note 8:	measureme The number	nts defined of control (in [7]. DFDM symbols is	s not available for A			
Note 11:	SIB-1 will no	ot be transm	ntted in Cell 2 ar	nd Cell 3 in this test.			

 Table 8.2.2.2.3A-1: Test Parameters for Transmit diversity Performance (FRC)

Test Number	Reference Channel	00	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and	Reference Value		UE Cate			
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configuration (Note 2)	Maximum (dB)		Configuration Maximum (dB (Note 2) Throughput (Not	(Note	gory
1	R.11-4 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Medium	70	3.5	≥2		
	Note 1: Note 2:		orrelation	matrix a	nd anten	na config	uration a	ell 3 are statistical pply for Cell 1, Ce $_{c2}$ of cell 1.					

8.2.2.2.4 Enhanced Performance Requirement Type A – 2 Tx Antenna Ports with TM3 interference model

The requirements are specified in Table 8.2.2.2.4-2, with the addition of parameters in Table 8.2.2.2.4-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of transmit diversity (SFBC) with 2 transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 3 interference model defined in clause B.5.2. In Table 8.2.2.2.4-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Parameter		Unit	Cell 1	Cell 2	Cell 3
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference	signals		Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna po	ort	dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.73	-8.66
BW _{Channel}	BW _{Channel}			10	10
Cyclic Prefix	Cyclic Prefix			Normal	Normal
Cell Id			0	1	2
Number of control OFDM	symbols		2	2	2
PDSCH transmission			2	N/A	N/A
Interference mod	əl		N/A	As specified in clause B.5.2	As specified in clause B.5.2
Probability of occurrence of	Rank 1	%	N/A	80	80
transmission rank in interfering cells	Rank 2	%	N/A	20	20
Reporting interva	Reporting interval		5	N/A	N/A
Reporting mode	Reporting mode		PUCCH 1-0	N/A	N/A
ACK/NACK feedback		Multiplexing	N/A	N/A	
Note 1: $P_B = 1$ Note 2:The respective requires associated DIPNote 3:Cell 1 is the servinNote 4:All cells are time-s	value as spec g cell. Cell 2,	ified in clause B	.5.1.	cell relative to $N_{_{\scriptscriptstyle O}}$	c^{\prime} is defined by

Table 8.2.2.2.4-1: Test Parameters for Transmit diversity Performance (FRC) with TM3 interference model

Table 8.2.2.2.4-2: Enhanced Performance Requirement Type A, Transmit Diversity (FRC) with TM3
interference model

Test Number	Reference Channel	OCI	NG Pat	tern	Propagation Conditions		Correlation Matrix and				
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 3)	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	gory
1	R.46 TDD	OP.	N/A	N/A	EV	EV	EV	2x2 Low	70	-1.4	≥1
		1			A70	A70	A70				
		TD									
		D									
Note 1:											
Note 2:	e 2: SINR corresponds to \widehat{E}_s/N_{oc} of Cell 1 as defined in clause 8.1.1.										
Note 3:									f Cell 1, Cell 2 a	nd Cell 3.	

8.2.2.3 Open-loop spatial multiplexing performance

8.2.2.3.1 Minimum Requirement 2 Tx Antenna Port

For single carrier the requirements are specified in Table 8.2.2.3.1-2, with the addition of the parameters in Table 8.2.2.3.1-1 and the downlink physical channel setup according to Annex C.3.2. For CA the requirements are specified in Table 8.2.2.3.1-4, with the addition of the parameters in Table 8.2.2.3.1-3 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas.

Parameter		Unit	Test 1-2
Davasliala	$ ho_{\scriptscriptstyle A}$	dB	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0
$N_{_{oc}}$ at antenna	a port	dBm/15kHz	-98
ACK/NACK feedba	ck mode		Bundling
PDSCH transmissi	on mode		3
Note 1: $P_B = 1$			
Note 2: Void. Note 3: Void.			

Test	Bandwidth	Reference	ence OCNG Propagation Correlatio		Correlation	Reference v	/alue	UE	
num ber		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Cate gory	
1	10 MHz	R.11-1 TDD	OP.1 TDD	EVA70	2x2 Low	70	13.1	≥2	
2	10 MHz	R.35 TDD	OP.1 TDD	EVA200	2x2 Low	70	20.3	≥2	
Note 1	: Void								

Parameter	•	Unit	Test 1
Davadialana	$ ho_{\scriptscriptstyle A}$	dB	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)
	σ	dB	0

N_{oc} at antenna port	dBm/15kHz	-98					
ACK/NACK feedback mode		PUCCH format 1b with channel selection					
PDSCH transmission mode		3					
Note 1: $P_B = 1$							
Note 2: The same PDSCH transmission mode is applied to each component carrier.							

Table 8.2.2.3.1-4: Minimum performance Large Delay CDD (FRC) for CA

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference v	/alue	UE	CA
num ber		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Cate gory	capabil ity
1	2x20 MHz	R.30-1 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.7	≥5	CL_C

8.2.2.3.1A Soft buffer management test

For CA the requirements are specified in Table 8.2.2.3.1A-2, with the addition of the parameters in Table 8.2.2.3.1A-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify UE performance with proper instantaneous buffer implementation.

Table 8.2.2.3.1A-1: Test Parameters for soft buffer management test (FRC) for CA

Parameter		Unit	Test 1-2				
Downlink nower	$ ho_{\scriptscriptstyle A}$	dB	-3				
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)				
	σ	dB	0				
$N_{\scriptscriptstyle oc}$ at antenna	port	dBm/15kHz	-98				
ACK/NACK feedba	ck mode		- (Note 2)				
PDSCH transmissi	on mode		3				
Note 1: $P_{B} = 1$	Note 1: $P_{R} = 1$						
Note 3: For CA tes	2: PUCCH format 1b with channel selection is used to feedback ACK/NACK.						

Table 8.2.2.3.1A-2: Minimum performance soft buffer management test (FRC) for CA

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference	value	UE	CA
num ber		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Cate gory	capabil ity
1	2x20 MHz	R.30-2 TDD	OP.1 TDD (Note 1)	EVA70	2x2 Low	70	13.2	3	CL_C, CL_A-A
2	2x20 MHz	R.35-1 TDD	OP.1 TDD (Note 1)	EVA5	2x2 Low	70	15.7	4	CL_C, CL_A-A
Note 1	: For CA test	cases, the OC	NG pattern a	applies for each	CC.	•		•	

8.2.2.3.2 Minimum Requirement 4 Tx Antenna Port

The requirements are specified in Table 8.2.2.3.2-2, with the addition of the parameters in Table 8.2.2.3.2-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the performance of large delay CDD with 4 transmitter antennas.

Parameter		Unit	Test 1				
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	-6				
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)				
	σ	dB	3				
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98				
ACK/NACK feedba	ck mode		Bundling				
PDSCH transmission	on mode		3				
Note 1: $P_B = 1$.							

Table 8.2.2.3.2-1: Test Parameters for Large Delay CDD (FRC)

ſ	Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference	/alue	UE
	number		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
	1	10 MHz	R.14 TDD	OP.1 TDD	EVA70	4x2 Low	70	14.2	≥2

8.2.2.3.3 Minimum Requirement 2Tx antenna port (demodulation subframe overlaps with aggressor cell ABS)

The requirements for non-MBSFN ABS are specified in Table 8.2.2.3.3-2, with the addition of parameters in Table 8.2.2.3.3-1 and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

The requirements for MBSFN ABS are specified in Table 8.2.2.3.3-4, with the addition of parameters in Table 8.2.2.3.3-3 and the downlink physical channel setup according to Annex C.3.2 and Annex C.3.3.

The purpose is to verify the performance of large delay CDD with 2 transmitter antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell. In Tables 8.2.2.3.3-1 and 8.2.2.3.3-3, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Parameter		Unit	Cell 1	Cell 2			
Uplink downlink confi	guration		1	1			
Special subframe cont	iguration		4	4			
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)			
	σ	dB	0	N/A			
	N _{oc1}	dBm/15kHz	-102 (Note 2)	N/A			
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A			
	N_{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A			
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.2.2.3.3-2	6			
BW _{Channel}		MHz	10	10			
Subframe Configu	ration		Non-MBSFN	Non-MBSFN			
Cell Id			0	1			
Time Offset betwee	n Cells	μs	2.5 (synchroi	nous cells)			
ABS pattern (Not	e 5)		N/A	0000010001, 0000000001			
RLM/RRM Measuremen Pattern (Note 6			0000000001, 0000000001	N/A			
CSI Subframe Sets	C _{CSI,0}		0000010001, 0000000001	N/A			
(Note 7)	C _{CSI,1}		1100101000 1100111000	N/A			
Number of control OFD	V symbols		2				
ACK/NACK feedbac			Multiplexing				
PDSCH transmission	n mode		3	N/A			
Cyclic prefix			Normal	Normal			
 Note 1: P_B = 1. Note 2: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS. Note 3: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 4: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 5: ABS pattern as defined in [9]. Note 6: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]. Note 7: As configured according to the time-domain measurement resource restriction pattern for 							
and Cell2 is the	ving cell. Cell same.		cell. The number of the	CRS ports in Cell1			

Test Number	Reference Channel			Propagation Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value		UE Category		
		Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Fraction of Maximum Throughput (%) (Note 5)	SNR (dB) (Note 2)			
1	R.11 TDD (Note 4)	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	14.0	≥2		
Note 1:	The propagat	tion condit	ions for C	ell 1 and 0	Cell2 are s	statistically indepe	ndent.				
Note 2:	SNR corresp	onds to \widetilde{E}	\hat{Z}_s/N_{oc2} of	of cell 1.							
Note 3: Note 4:	Cell 1 Refere PDCCH/PCF	The correlation matrix and antenna configuration apply for Cell 1 and Cell 2. Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5:	The maximur	n Through	put is cal	culated fro	om the tota	al Payload in 2 sul	bframes, averag	ged over	20ms.		

Table 8.2.2.3.3-2: Minimum Performance Large Delay CDD (FRC) – Non-MBSFN ABS

Parameter	,	Unit	Cell 1	Cell 2
Uplink downlink con			1	1
Special subframe co	nfiguration		4	4
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A
	N _{oc1}	dBm/15kHz	-102 (Note 2)	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A
	N _{oc3}	dBm/15kHz	-94.8 (Note 4)	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.2.2.3.3-4	6
BW _{Channel}		MHz	10	10
Subframe Config	uration		Non-MBSFN	MBSFN
Cell Id			0	126
Time Offset betwe	en Cells	μs	2.5 (synchro	nous cells)
ABS pattern (No	ote 5)		N/A	0000000001 0000000001
RLM/RRM Measureme Pattern (Note			0000000001 0000000001	N/A
CSI Subframe Sets	C _{CSI,0}		0000000001 0000000001	N/A
(Note 7)	C _{CSI,1}		1100111000 1100111000	N/A
MBSFN Subframe Allo 10)	cation (Note		N/A	000010
Number of control OFI	DM symbols		2	
ACK/NACK feedba	ck mode		Multiplexing	
PDSCH transmissi			3	N/A
Cyclic prefi	x		Normal	Normal
Note 1: $P_B = 1$.				
#13 of a subfr	ame overlappir	ng with the aggresso	3, #4, #5, #6, #7, #8, #9 or ABS. bframe overlapping with	
ABS.		-	ubframe overlapping wit	
		. The 10^{th} and 20^{th} s	subframes indicated by	ABS pattern are
MBSFN ABS Note 6: Time-domain		esource restriction	pattern for PCell measu	rements as defined
			surement resource rest	riction pattern for
Note 8: Cell 1 is the se	•		cell. The number of the	CRS ports in Cell1
and Cell2 is th		in CallO in this tast		
Note 9: SIB-1 will not Note 10: MBSFN Subfr subframe allo	ame Allocation	in Cell2 in this test. as defined in [7], or	ne frame with 6 bits is cl	nosen for MBSFN

Test Number	Reference Channel			Propagation Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value		UE Category		
		Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Fraction of Maximum Throughput (%) Note 5)	SNR (dB) (Note 2)			
1	R.11 TDD (Note 4)	OP.1 TDD	OP.1 TDD	EVA 5	EVA 5	2x2 Low	70	12.2	≥2		
Note 1:					Cell2 are s	statistically indepe	ndent.				
Note 2:	SNR correspo	onds to \widehat{E}	\hat{Z}_s / N_{oc2} of	of cell 1.							
Note 3: Note 4:	Cell 1 Refere PDCCH/PCF	The correlation matrix and antenna configuration apply for Cell 1 and Cell 2. Cell 1 Reference channel is modified: PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.									
Note 5:			imum Throughput is calculated from the total Payload in 2 subframes, averaged over 20ms.								

Table 8.2.2.3.3-4: Minimum Performance Large Delay CDD (FRC) – MBSFN ABS

8.2.2.3.4 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements for non-MBSFN ABS are specified in Table 8.2.2.3.4-2, with the addition of parameters in Table 8.2.2.3.4-1. The purpose is to verify the performance of large delay CDD with 2 transmitter antennas if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell with CRS assistance information. In Table 8.2.2.3.4-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

Pa	rameter		Unit	Cell 1	Cell 2	Cell 3
Uplink dow				1	1	1
Special subf	rame con	figuration		4	4	4
		$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation		$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
		σ	dB	0	N/A	N/A
		N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{oc} at anter	ina port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
		N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
Ê	\hat{Z}_s/N_{oc2}		dB	Reference Value in Table 8.2.2.3.4-2	Reference Value in Table 8.2.2.3.4-2	Reference Value in Table 8.2.2.3.4-2
В	W _{Channel}		MHz	10	10	10
Subfram	e Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offs	et betwee	n Cells	μs	N/A	3	-1
Frequency s	shift betwe	een Cells	Hz	N/A	300	-100
	Cell Id			0	1	126
ABS pa	attern (Not	te 5)		N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Subframe				0000000001 0000000001	N/A	N/A
CSI Subfran	ne Sets	C _{CSI,0}	000000001 N/A		N/A	
(Note7	7)	C _{CSI,1}		1100111000 1100111000	N/A	N/A
Number o	of control (ymbols	OFDM		2	Note 8	Note 8
ACK/NAC		k mode		Multiplexing	N/A	N/A
PDSCH tra	ansmissio	n mode		3	Note 9	Note 9
	clic prefix			Normal	Normal	Normal
Note 1: P_B	=1.					
OV	erlapping	with the age	gressor ABS.	#1, #2, #3, #5, #6, #8 #0, #4, #7, #11 of a s		
	gressor A			#0, # 4 , #7, #11 01 a 3		ing with the
			all OFDM symbo	ols of a subframe ove	rlapping with ago	ressor non-ABS
Note 5: AE	S pattern	as defined	in [9]. PDSCH o	ther than SIB1/pagin	g and its associat	ed
				serving cell subframe ggressor cell and the		
			ce channel.			-
Note 6: Tir [7]		n measurer	nent resource re	striction pattern for P	Cell measuremen	ts as defined in
Note 7: As	configure	ed according		nain measurement re	source restriction	pattern for CSI
Note 8: Th	e number	of control C	OFDM symbols is	s not available for AE	S and is 2 for the	subframe
Note 9: Do	wnlink ph			2 and Cell 3 in acco	rdance with Annex	c C.3.3 applying
Note 10: Th	e number	of the CRS	ports in Cell1, 0	Cell2 and Cell 3 is the d Cell 3 is the	e same.	
0						

Table 8.2.2.3.4-1: Test Parameters for Large Delay CDD (FRC) – Non-MBSFN ABS

Test Num	Refer ence	$\widehat{E}_{s}/2$	N _{oc2}	OCNG Pattern Propagation Conditions (Note1)					Correlation Matrix and	Reference Value		UE Cate	
ber	Chan nel	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 2)	Fraction of Maximum Throughp ut (%)	SNR (dB) (Note 3)	gory
1	R.11 TDD	9	7	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	70	14.2	≥2
2	R.35 TDD	9	1	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	70	22.7	≥2
	Note 1: The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.												
Note 2:						•	n apply fo	r Cell 1,	Cell 2 and	d Cell 3.			
Note 3:	SNR	correspo	onds to	\widehat{E}_{s}/N_{oc2}	of cell 1.								

Table 8.2.2.3.4-2: Minimum Performance Large Delay CDD (FRC) – Non-MBSFN ABS

8.2.2.4 Closed-loop spatial multiplexing performance

8.2.2.4.1 Minimum Requirement Single-Layer Spatial Multiplexing 2 Tx Antenna Port

The requirements are specified in Table 8.2.2.4.1-2, with the addition of the parameters in Table 8.2.2.4.1-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with wideband and frequency selective precoding.

Parameter		Unit	Test 1	Test 2			
Deventinte norven	$ ho_{\scriptscriptstyle A}$	dB	-3	-3			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)			
	σ	dB	0	0			
$N_{\scriptscriptstyle oc}$ at antenna po	ort	dBm/15kHz	-98	-98			
Precoding granular	rity	PRB	6	50			
PMI delay (Note 2	2)	ms	10 or 11	10 or 11			
Reporting interva	ıl	ms 1 or 4 (Note 3)		1 or 4 (Note 3)			
Reporting mode			PUSCH 1-2	PUSCH 3-1			
CodeBookSubsetRest bitmap	riction		001111	001111			
ACK/NACK feedback	mode		Multiplexing	Multiplexing			
PDSCH transmission	mode		4	4			
Note 1: $P_B = 1$.							
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).							
Note 3: For Uplink - c and 4ms.	lownlink	configuration 1 the rep	orting interval will alte	ernate between 1ms			

Table 8.2.2.4.1-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Table 8.2.2.4.1-2: Minimum performance Single-Layer Spatial Multiplexing (FRC)

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference	UE	
number		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.10 TDD	OP.1 TDD	EVA5	2x2 Low	70	-3.1	≥1
2	10 MHz	R.10 TDD	OP.1 TDD	EPA5	2x2 High	70	-2.8	≥1

8.2.2.4.1A Minimum Requirement Single-Layer Spatial Multiplexing 4 Tx Antenna Port

The requirements are specified in Table 8.2.2.4.1A-2, with the addition of the parameters in Table 8.2.2.4.1A-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-one performance with wideband and frequency selective precoding.

Parameter		Unit	Test 1		
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	-6		
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)		
	σ	dB	3		
$N_{\scriptscriptstyle oc}$ at antenna	port	dBm/15kHz	-98		
Precoding granul	arity	PRB	6		
PMI delay (Note	e 2)	ms	10 or 11		
Reporting inter	val	ms	1 or 4 (Note 3)		
Reporting mod	le		PUSCH 1-2		
CodeBookSubsetR on bitmap	estricti		00000000000000000 00000000000000000 0000		
			1111111111111		
ACK/NACK feedl mode	back		Multiplexing		
PDSCH transmis mode	sion		4		
Note 1: $P_{R} = 1$.					
 Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: For Uplink - downlink configuration 1 the reporting interva will alternate between 1ms and 4ms. 					

Table 8.2.2.4.1A-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC)

Table 8.2.2.4.1A-2: Minimum performanc	e Single-Layer	Spatial Multiplexing (FRC))
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ſ	Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference value		UE	
	number		Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category	
	1	10 MHz	R.13 TDD	OP.1 TDD	EVA5	4x2 Low	70	-3.5	≥1	

8.2.2.4.1B Enhanced Performance Requirement Type A – Single-Layer Spatial Multiplexing 2 Tx Antenna Port with TM4 interference model

The requirements are specified in Table 8.2.2.4.1B-2, with the addition of the parameters in Table 8.2.2.4.1B-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rankone performance with wideband precoding with two transmit antennas when the PDSCH transmission in the serving cell is interfered by PDSCH of two dominant interfering cells applying transmission mode 4 interference model defined in clause B.5.3. In Table 8.2.2.4.1B-1, Cell 1 is the serving cell, and Cell 2, 3 are interfering cells. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1, Cell 2 and Cell 3, respectively.

Parameter		Unit	Cell 1	Cell 2	Cell 3
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3	-3
	σ	dB	0	0	0
Cell-specific reference	signals		Antenna ports 0,1	Antenna ports 0,1	Antenna ports 0,1
N_{oc} at antenna po	ort	dBm/15kHz	-98	N/A	N/A
DIP (Note 2)		dB	N/A	-1.73	-8.66
BW _{Channel}		MHz	10	10	10
Cyclic Prefix			Normal	Normal	Normal
Cell Id			0	1	2
Number of control OFDM	symbols		2	2	2
PDSCH transmission	mode		6	N/A	N/A
Interference mode	əl		N/A	As specified in clause B.5.3	As specified in clause B.5.3
Probability of occurrence of	Rank 1	%	N/A	80	80
transmission rank in interfering cells	Rank 2	%	N/A	20	20
Precoding granula	rity	PRB	50	6	6
PMI delay (Note 4	1)	ms	10 or 11	N/A	N/A
Reporting interva	l	ms	5	N/A	N/A
Reporting mode			PUCCH 1-1	N/A	N/A
CodeBookSubsetRestricti	on bitmap		001111	N/A	N/A
ACK/NACK feedback	mode		Multiplexing	N/A	N/A
Note 1: $P_B = 1$ Note 2:The respective recits associated DIPNote 3:Cell 1 is the servinNote 4:If the UE reports inat a downlink SF nbefore SF#(n+4).	value as speo g cell. Cell 2, an available	cified in clause B 3 are the interfer uplink reporting	.5.1. ring cells. instance at subrar	ne SF#n based or	PMI estimation
Note 5: All cells are time-s	ynchronous.				

Table 8.2.2.4.1B-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Table 8.2.2.4.1B-2: Enhanced Performance Requirement Type A, Single-Layer Spatial Multiplexing (FRC) with TM4 interference model

Test Number	Reference Channel	OCI	NG Pat	tern				Correlation Matrix and	Matrix and		
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 3)	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	gory
1	R.47 TDD	OP. 1 TD D	N/A	N/A	EV A5	EV A5	EV A5	2x2 Low	70	1.1	≥1
Note 1:								e statistically inc	dependent.		
Note 2:	Note 2: SINR corresponds to \hat{E}_s / N_{oc} of Cell 1 as defined in clause 8.1.1.										
									f Cell 1, Cell 2 a	nd Cell 3.	

8.2.2.4.1C Minimum Requirement Single-Layer Spatial Multiplexing 2 Tx Antenna Ports (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements are specified in Table 8.2.2.4.1C-2, with the addition of parameters in Table 8.2.2.4.1C-1. The purpose is to verify the closed loop rank-one performance with wideband precoding if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell with CRS assistance information. In Table 8.2.2.4.1C-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink confi	Uplink downlink configuration		1	1	1
Special subframe con	figuration		4	4	4
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)	-3 (Note 1)	-3 (Note 1)
	σ	dB	0	N/A	N/A
	N_{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{oc} at antenna port	N_{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.2.2.4.1C-2	12	10
BW _{Channel}		MHz	10	10	10
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	en Cells	Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (Not	e 5)		N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measur Subframe Pattern (I			0000000001 0000000001	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		000000001 0000000001	N/A	N/A
(Note7)	C _{CSI,1}		1100111000 1100111000	N/A	N/A
Number of control symbols	OFDM		2	Note 8	Note 8
ACK/NACK feeback	(mode		Multiplexing	N/A	N/A
PDSCH transmission mode			6	Note 9	Note 9
Precoding granularity		PRB	50	N/A	N/A
PMI delay (Note 10)		ms	10 or 11	N/A	N/A
Reporting interv	val	ms	1 or 4 (Note 11)	N/A	N/A
Peporting mod			PUSCH 3-1	N/A	N/A
CodeBookSubsetRe bitmap	striction		1111	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Table 8.2.2.4.1C-1: Test Parameters for Single-Layer Spatial Multiplexing (FRC) – Non-MBSFN ABS

Note 1:	$P_B = 1$.
Note 2:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 4:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 5:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 7:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.
Note 10:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).
Note 11:	For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.
Note 12:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 13:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.2.2.4.1C-2: Minimum Performance Single-Layer Spatial Multiplexing (FRC)- Non-MBSFN ABS

Test Number	Reference Channel	00	NG Patt	ern		Propagation conditions (Note1)		Correlation Matrix and	Matrix and		UE Cate
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	gory
1	R.11 TDD	OP.1 TDD	OP.1 FDD	OP.1 TDD	EPA5	EPA5	EPA5	2x2 High	70	6.4	≥2
Note 2:	Note 1:The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.Note 2:The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.										

8.2.2.4.2 Minimum Requirement Multi-Layer Spatial Multiplexing 2 Tx Antenna Port

The requirements are specified in Table 8.2.2.4.2-2, with the addition of the parameters in Table 8.2.2.4.2-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

Parameter		Unit	Test 1-2			
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	-3			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3 (Note 1)			
	σ	dB	0			
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98			
Precoding granu	Ilarity	PRB	50			
PMI delay (Not	e 2)	ms	10 or 11			
Reporting inte	rval	ms	1 or 4 (Note 3)			
Reporting mo	de		PUSCH 3-1			
ACK/NACK feedba	ck mode		Bundling			
CodeBookSubsetR	estriction		110000			
bitmap						
PDSCH transmission	on mode		4			
Note 1: $P_B = 1$.						
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).						
		configuration 1 the 1ms and 4ms.	reporting interval			

Table 8.2.2.4.2-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC)

T	est	Band-	Reference	OCNG	Propagation	Correlation	Reference	/alue	UE
nur	nber	width	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
	1	10 MHz	R.35 TDD	OP.1 TDD	EPA5	2x2 Low	70	19.5	≥2
	2	10 MHz	R.11-1 TDD	OP.1 TDD	ETU70	2x2 Low	70	13.9	≥2

8.2.2.4.3 Minimum Requirement Multi-Layer Spatial Multiplexing 4 Tx Antenna Port

For single carrier the requirements are specified in Table 8.2.2.4.3-2, with the addition of the parameters in Table 8.2.2.4.3-1 and the downlink physical channel setup according to Annex C.3.2. For CA the requirements are specified in Table 8.2.2.4.3-4, with the addition of the parameters in Table 8.2.2.4.3-3 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the closed loop rank-two performance with wideband and frequency selective precoding.

Table 8.2.2.4.3-1: Test Parameters for Multi-Layer Spatial Multiplexing (FRC)

Parameter	•	Unit	Test 1
Deverlight newser	$ ho_{\scriptscriptstyle A}$	dB	-6
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-6 (Note 1)
	σ	dB	3

N _{oc}	at antenna port	dBm/15kHz	-98		
Precoding granularity		PRB	6		
PMI delay (Note 2)		ms	10 or 11		
Re	porting interval	ms	1 or 4 (Note 3)		
Re	eporting mode		PUSCH 1-2		
	CK feedback mode		Bundling		
CodeBo	okSubsetRestriction		000000000000000000000000000000000000000		
	bitmap		000001111111111111111000000		
			000000000		
PDSCH	transmission mode		4		
Note 1:	$P_B = 1$.				
Note 2:	Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)				
Note 3:	For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and 4ms.				
Note 4:	Void.				
Note 5:	Void.				
Note 6:	Void.				

Table 8.2.2.4.3-2: Minimum	performance Multi-Lave	r Spatial Multiplexing (FRC)
	por lor mando mana Eugo	

Test	Band-	Reference	OCNG	Propagatio	Correlation	Reference value		UE
number	width	Channel	Pattern	n Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz	R.36 TDD	OP.1 TDD	EPA5	4x2 Low	70	15.7	≥2
Note 1:	Void							

Table 8.2.2.4.3-3: Test Parameters	for Multi-Laver Spatia	l Multiplexing (FRC) for CA
	, ioi main Eayer opana	

Parameter		Unit	Test 1			
Deverliek zewer	$ ho_{\scriptscriptstyle A}$	dB	-6			
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB -6 (Note 1)				
	σ	dB	3			
$N_{_{oc}}$ at antenna	port	dBm/15kHz	-98			
Precoding granu	Ilarity	PRB	8			
PMI delay (Not	e 2)	ms	10 or 11			
Reporting inte	rval	ms	1 or 4 (Note 3)			
Reporting mo	de		PUSCH 1-2			
ACK/NACK feedba	ck mode		PUCCH format 1b with channel selection			
CodeBookSubsetRestriction			000000000000000000000000000000000000000			
bitmap			0000111111111111111100000000			
			0000000			
CSI request field ('10'			
PDSCH transmission	on mode		4			
Note 1: $P_B = 1$.						
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4)						
Note 3: For Uplink - downlink configuration 1 the reporting interval will alternate						
between 1ms and 4ms.						
Note 4: Multiple CC-s under test are configured as the 1 st set of serving cells by high layers.						
Note 5: The same PDSCH transmission mode is applied to each component carrier.						

Test	Band-	Reference	OCNG	Propagatio	Correlation	Reference value		UE	
number	width	Channel	Pattern	n Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category	caŗ
1	2x20	R.43 TDD	OP.1 TDD	EVA5	4x2 Low	70	11.1	≥5	С
	MHz		(Note 1)						CL
Note 1:	Note 1: The OCNG pattern applies for each CC.								

Table 8.2.2.4.3-4: Minimum performance Multi-Layer Spatial Multiplexing (FRC) for CA

8.2.2.5 MU-MIMO

8.2.2.6 [Control channel performance: D-BCH and PCH]

8.2.2.7 Carrier aggregation with power imbalance

The requirements in this section verify the ability of an intraband adjancent carrier aggregation UE to demodulate the signal transmitted by the PCell in the presence of a stronger SCell signal on an adjacent frequency. Throughput is measured on the PCell only.

8.2.2.7.1 Minimum Requirement

For CA the requirements are specified in Table 8.2.2.7.1-2, with the addition of the parameters in Table 8.2.2.7.1-1 and the downlink physical channel setup according to Annex C.3.2.

Paramete	r	Unit	Test 1	
Devertials a surray	$ ho_{\scriptscriptstyle A}$	dB	0	
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	
	σ	dB	0	
\hat{E}_{s} – PCell at anten PCell	na port of	dBm/15kHz	-85	
\hat{E}_{s} _ $SCell$ at anten Scell	na port of	dBm/15kHz	-79	
$N_{\scriptscriptstyle oc}$ at antenn	a port	dBm/15kHz	Off (Note 2)	
Symbols for unus	ed PRBs		OCNG (Note 3,4)	
Modulatio	n		64 QAM	
Maximum number transmissio			1	
Redundancy versions sequence	•		{0}	
PDSCH transmiss of PCell			1	
PDSCH transmiss of SCell	ion mode		3	
Note 1: $P_{\scriptscriptstyle B} = 0$.Note 2:No external noise sources are applied.Note 3:These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data.				
	and PDSCI		e Scell control	

Table 8.2.2.7.1-2: Minimum performance (FRC) for CA

Test Number	Band- width		rence nnel	OCNG F	Pattern		gation itions	Correlation Matrix and Antenna		Matrix and		Matrix and		Matrix and Antenna		Matrix and Fraction of Antenna Maximum		UE Category	CA capabi lity
		PCell	SCell	PCell	SCell	PCell	SCell	PCell	SCell	Throughput (%)									
1	2x20M Hz	R.49 TDD	R.49-1 TDD	OP.1 TDD	OP.5 TDD	AWGN	Clause B.1	1x2	2x2	85%	5-8	CL-C							

8.3 Demodulation of PDSCH (User-Specific Reference Symbols)

8.3.1 FDD

The parameters specified in Table 8.3.1-1 are valid for FDD unless otherwise stated.

Parameter	Unit	Value			
Cyclic prefix		Normal			
Cell ID		0			
Inter-TTI Distance		1			
Number of HARQ processes	Processes	8			
Maximum number of HARQ transmission		4			
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM			
Number of OFDM symbols for PDCCH	OFDM symbols	2			
Precoder update granularity		Frequency domain: 1 PRG for Transmission mode 9 and 10 Time domain: 1 ms			
Note 1: as specified in Table 4.2-2 in TS 36.211 [4]. Note 2: as specified in Table 4.2-1 in TS 36.211 [4].					

Table 8.3.1-1: Common Test Parameters for User-specific Reference Symbols

8.3.1.1 Single-layer Spatial Multiplexing

For single-layer transmission on antenna ports 7 or 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.3.1.1-1 and 8.3.1.1-2, with the addition of the parameters in Table 8.3.1.1-3 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify rank-1 performance on one of the antenna ports 7 or 8 with and without a simultaneous transmission on the other antenna port, and to verify rate matching with multiple CSI reference symbol configurations with non-zero and zero transmission power.

parameter		Unit	Test 1	Test 2					
	$ ho_{\scriptscriptstyle A}$	dB	0	0					
Downlink power allocation			0 (Note 1)	0 (Note 1)					
	σ	dB	-3	-3					
Beamforming me	odel		Annex B.4.1	Annex B.4.1					
Cell-specific refer signals	ence		Antenna	ports 0,1					
CSI reference sig	inals		Antenna ports 15,,18	Antenna ports 15,,18					
CSI-RS periodicity subframe offs $T_{CSI-RS} / \Delta_{CSI-R}$	et s	Subframes	5/2	5/2					
CSI reference si configuration			0	3					
Zero-power CSI-RS configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap		Subframes / bitmap	3 / 00010000000000000000	3 / 0001000000000000					
$N_{\scriptscriptstyle oc}$ at antenna	port	dBm/15kHz	-98	-98					
Symbols for unu PRBs	sed		OCNG (Note 4)	OCNG (Note 4)					
Number of alloca resource blocks (N		PRB	50	50					
Simultaneous transmission			No	Yes (Note 3, 5)					
PDSCH transmis mode	sion		9	9					
ModeNote 1: $P_B = 1$.Note 2:The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.Note 3:Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test.Note 4:These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.									
			ties $n_{ m SCID}$ are set to 0						
DM RS \	vitn inte	riering simultai	DM RS with interfering simultaneous transmission test cases.						

Table 8.3.1.1-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Table 8.3.1.1-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test	est Bandwidt Reference		OCNG	Propagation	Correlation	Reference	UE	
number	h and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughpu t (%)	SNR (dB)	Category
1	10 MHz QPSK 1/3	R.43 FDD	OP.1 FDD	EVA5	2x2 Low	70	-1	≥1

nd MCS	Channel				Reference v	arao	UE
	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
10 MHz QAM 1/2	R.50 FDD	OP.1 FDD	EPA5	2x2 Low	70	21.9	≥2
(QAM 1/2	QAM 1/2	QAM 1/2	QAM 1/2	0 MHz R.50 FDD OP.1 FDD EPA5 2x2 Low	0 MHz R.50 FDD OP.1 FDD EPA5 2x2 Low 70	0 MHz R.50 FDD OP.1 FDD EPA5 2x2 Low 70 21.9

Table 8.3.1.1-3: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

8.3.1.1A Enhanced Performance Requirement Type A – Single-layer Spatial Multiplexing with TM9 interference model

The requirements are specified in Table 8.3.1.1A-2, with the addition of the parameters in Table 8.3.1.1A-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify closed loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4. In 8.3.1.1A-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

	r	Unit	Cell 1	Cell 2
Downlink news	$ ho_{\scriptscriptstyle A}$	dB	0	0
Downlink power allocation			0 (Note 1)	0
σ		dB	-3	-3
Cell-specific referen	ce signals		Antenna ports 0,1	Antenna ports 0,1
CSI reference s	ignals		Antenna ports 15,,18	N/A
CSI-RS periodic subframe offset T _{CSI} .	ity and	Subframes	5/2	N/A
CSI reference s configuratio	signal		0	N/A
N_{oc} at antenna	a port	dBm/15kH z	-98	N/A
DIP (Note 2	2)	dB	N/A	-1.73
BW _{Channel}		MHz	10	10
Cyclic Prefi	ix		Normal	Normal
Cell Id			0	126
Number of contro symbols	IOFDM		2	2
PDSCH transmissi	on mode		9	N/A
Beamforming model			As specified in clause B.4.3 (Note 4, 5)	N/A
Interference model			N/A	As specified in clause B.5.4
Probability of occurrence of	Rank 1		N/A	70
transmission rank in interfering cells	Rank 2		N/A	30
Precoder update g	ranularity	PRB	50	6
PMI delay (No	te 5)	Ms	8	N/A
Reporting inte	erval	Ms	5	N/A
Reporting mo	ode		PUCCH 1-1	N/A
CodeBookSubsetRestriction bitmap			0000000000000000 0000000000000000 000000	N/A
Symbols for unuse	ed PRBs		OCNG (Note 6)	N/A
	smission		No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal	N/A

Table 8.3.1.1A-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

ote 5: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI

	cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs
	with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs
	shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.3.1.1A-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Referenc e		NG Propagation		•	Correlatio n Matrix	Reference Value		UE Categor
	Channel	Cell 1	Cell 2	Cell 1	Cell 2	and Antenna Configurat ion (Note 3)	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	У
1	R.48 FDD	OP.1 FDD	N/A	EVA5	EVA5	4x2 Low	70	-1.1	≥1
Note 1:	The propagation conditions for Cell 1 and Cell 2 are statistically independent.								
Note 2:	SINR corresponds to \hat{E}_s/N_{oc} of Cell 1 as defined in clause 8.1.1.								
Note 3:	Correlation	matrix ar	nd antenr	na configu	uration pa	arameters appl	y for each of Cell 1	and Cell 2.	

8.3.1.1B Single-layer Spatial Multiplexing (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements are specified in Table 8.3.1.1B -2, with the addition of parameters in Table 8.3.1.1B -1. The purpose is to verify the performance of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell with CRS assistance information. In Table 8.3.1.1B -1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

Parameter		Unit	Cell 1	Cell 2	Cell 3
	$ ho_{\scriptscriptstyle A}$	dB	0	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	-3 (Note 1)	-3 (Note 1)
σ		dB	-3	N/A	N/A
	N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N_{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 2	12	10
BW _{Channel}		MHz	10	10	10
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	en Cells	Hz	N/A	300	-100
Cell Id			0	1	126
Cell-specific referenc	e signals		A	ntenna ports 0,1	
CSI reference sig	Inals		Antenna ports 15,16	N/A	N/A
CSI-RS periodicity subframe offs $T_{CSI-RS} / \Delta_{CSI-R}$	et	Subframes	5/2	N/A	N/A
CSI reference si configuration			8	N/A	N/A
Zero-power CSI-RS configuration ICSI-RS / ZeroPowerCSI-RS		Subframes / bitmap	[3 / 0010000000000 00]	N/A	N/A
bitmap ABS pattern (Nor	te 5)		N/A	11000000 11000000 11000000 11000000 11000000	11000000 11000000 11000000 11000000 11000000
RLM/RRM Measur Subframe Pattern (I			10000000 10000000 10000000 10000000 1000000	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		11000000 11000000 11000000 11000000 11000000	N/A	N/A
(Note7)	C _{CSI,1}		00111111 00111111 00111111 00111111 00111111	N/A	N/A
Number of control OFDM symbols			2	Note 8	Note 8
PDSCH transmissio	n mode		TM9-1layer	Note 9	Note 9
Precoding granul	arity		Frequency domain: 1 PRG Time domain: 1 ms	N/A	N/A
Beamforming mo			Annex B.4.1	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Table 8.3.1.1B-1: Test parameters of TM9-Single-Layer (2 CSI-RS ports) – Non-MBSFN ABS

Note 1:	$P_B = 1$.
Note 2:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a
	subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the
	aggressor ABS.
Note 4:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-
	ABS.
Note 5:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is
	overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6:	Time-domain measurement resource restriction pattern for PCell measurements as defined
Note 0.	in [7].
Note 7:	As configured according to the time-domain measurement resource restriction pattern for
	CSI measurements defined in [7].
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe
	indicated by "0" of ABS pattern.
Note 9:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3
	applying OCNG pattern as defined in Annex A.5.
Note 10:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI
	estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at
	the eNB downlink before SF#(n+4).
Note 11:	, , , , , , , , , , , , , , , , , , ,
Note 12:	
Note 13:	The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Table 8.3.1.1B-2: Minimum Performance of TM9-Single-Layer (2 CSI-RS ports) – Non-MBSFN ABS

Test Number	Reference Channel	00	NG Patt	ern	Propagation Conditions (Note1)		Correlation Reference Value Matrix and		UE Cate		
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	Antenna Configurati on (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	gory
1	R.51 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD		EVA5		2x2 Low	70	[TBD]	≥2
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.										

8.3.1.2 Dual-Layer Spatial Multiplexing

For dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.3.1.2-2, with the addition of the parameters in Table 8.3.1.2-1 where Cell 1 is the serving cell and Cell 2 is the interfering cell. The downlink physical channel setup is set according to Annex C.3.2. The purpose of these tests is to verify the rank-2 performance for full RB allocation, to verify rate matching with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

Table 8.3.1.2-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Tes	st 1
		Unit	Cell 1	Cell 2
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	4	0
	$ ho_{\scriptscriptstyle B}$	dB	4 (Note 1)	0
	σ	dB	-3	-3

Cell-specific reference signals		Antenna ports 0 and	Antenna ports 0 and					
Cell ID		0	126					
CSI reference signals		Antenna ports 15,16	NA					
Beamforming model		Annex B.4.2	NA					
CSI-RS periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$	Subframes	5/2	NA					
CSI reference signal configuration		8	NA					
Zero-power CSI-RS configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap	Subframes / bitmap	3 / 001000000000000000	NA					
$N_{\it oc}$ at antenna port	dBm/15kHz	-98	-98					
\widehat{E}_s/N_{oc}		Reference Value in Table 8.3.1.2-2	7.25dB					
Symbols for unused PRBs		OCNG (Note 2)	NA					
Number of allocated resource blocks (Note 2)	PRB	50	NA					
Simultaneous transmission		No	NA					
PDSCH transmission mode		9	Blanked					
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.								

Table 8.3.1.2-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS			-		gation dition	Correlation Matrix and	Reference value		UE Categ
			Cell1	Cell 2	Cell 1	Cell 2	Antenna Configurati on	Fraction of Maximum Throughput (%)	SNR (dB)	ory
1	10 MHz 16QAM 1/2	R.51 FDD	OP.1 FDD	N/A	ETU5	ETU5	2x2 Low	70	[14.2]	2-8
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1 and Cell 2 are statistically independent. Correlation matrix and antenna configuration parameters apply for each of Cell 1 and Cell 2. SNR corresponds to \hat{E}_s/N_{oc} of Cell 1.									

8.3.1.3 Performance requirements for DCI format 2D and non Quasi Co-located Antenna Ports

8.3.1.3.1 Minimum requirement with Same Cell ID (with single NZP CSI-RS resource)

The requirements are specified in Table 8.3.1.3.1-3, with the additional parameters in Table 8.3.1.3.1-1 and Table 8.3.1.3.1-2. The purpose of this test is to verify the UE capability of supporting non quasi-colocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission point share the same Cell ID. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling defined in [6], configured according to Table 8.3.1.3.1-2. In Table 8.3.1.3.1-1 and 8.3.1.3.1-2, transmission point 1 (TP 1) is the serving cell and transmission point 2

(TP 2) transmits PDSCH. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Paramete	r	Unit	TP 1	TP 2					
Downlink power	$ ho_{\scriptscriptstyle A}$	dB	0	0					
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0					
σ		dB	-3	-3					
Cell-specific referer	ice signals		Antenna ports 0,1	(Note 2)					
CSI-RS 0 antenr	na ports		NA	Port {15,16}					
qcl-CSI-RS-Configl CSI-RS 0 period subframe offset T _{CSI}	icity and _{-RS} / ∆ _{CSI-RS}	Subframes	NA	5/2					
qcl-CSI-RS-Configl CSI-RS 0 config			NA	8					
csi-RS-ConfigZPId power CSI-RS 0 co I _{CSI-RS} / ZeroPower CSI-R	nfiguration		NA	2/ 000001000000000					
$N_{\scriptscriptstyle oc}$ at antenn	a port	dBm/15kH z	-98	-98					
SNR		dB	Reference point in Table 8.3.1.3.1-3	Reference point in Table 8.3.1. 1-3					
BW _{Channe}		MHz	10	10					
Cyclic Pref	ix		Normal	Normal					
Cell Id			0	0					
Number of contro symbols	I OFDM		2	2					
PDSCH transmiss	ion mode		Blanked	10					
Number of alloca	ted PRB	PRB	NA	50					
<i>qcl-Operation, '</i> PE Mapping and Qu Location Indic	asi-Co-		Туре	B, '00'					
Time offset betwe	een TPs	μs	NA	Reference point in Table 8.3.1.3.1-3					
Frequency error be	tween TPs	Hz	NA	0					
Beamforming I	model		NA	As specified in clause B.4.1					
Symbols for unus	ed PRBs		NA	OCNG (Note 3)					
Note 1: $P_B = 1$									
Note 3: These ph with one	Noet 2: REs for antenna ports 0 and 1 have zero transmission power.								

Table 8.3.1.3.1-1: Test Parameters for quasi co-location type B: same Cell ID

Table 8.3.1.3.1-2 Configurations of PQI and DL transmission hypothesis for each PQI set

PQI set index	Parameter	s in each PQI set	DL transm hypothesis PQI S	
	NZP CSI-RS Index (For quasi co-location)	ZP CSI-RS configuration	TP 1	TP 2
PQI set 0	CSI-RS 0	ZP CSI-RS 0	Blanked	PDSCH

Test Number			Time offset between	Propagation Conditions (Note1)		Correlation Matrix and Antenna	Reference Value		UE Category	
		TP 1	TP 2	TPs (μs)	TP 1	TP 2	Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.52 FDD	NA	OP.1 FDD	2	EPA	EPA	2x2 Low	70	12.1	≥2
2	R.52 FDD	NA	OP.1 FDD	-0.5	EPA	EPA	2x2 Low	70	12.6	≥2
FDD FDD Note 1: The propagation conditions for TP 1 and TP 2 are statistically independent. Note 2: The correlation matrix and antenna configuration apply for TP 1 and TP 2. Note 3: SNR corresponds to \hat{E}_s / N_{oc} of TP 2.										

Table 8.3.1.3.1-3: Minimum performance for quasi co-location type B: same Cell ID

8.3.1.3.2 Minimum requirements with Same Cell ID (with multiple NZP CSI-RS resources)

The requirements are specified in Table 8.3.1.3.2-3, with the additional parameters in Table 8.3.1.3.2-1 and 8.3.1.3.2-2. The purpose of this test is to verify the UE capability of supporting non quasi-colocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission point share the same Cell ID. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling defined in [6]. In 8.3.1.3.2-1 and 8.3.1.3.2-2, transmission point 1 (TP 1) is the serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) has same Cell ID as TP 1. Multiple NZP CSI-RS resources and ZP CSI-RS resources are configured. In each sub-frame, DL PDSCH transmission is dynamically switched between 2 TPs with multiple PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator and downlink transmission hypothesis are defined in Table 8.3.1.3.2-2. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

paramete	r	Unit	TP 1	TP 2
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	0	0
	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0
	σ	dB	-3	-3

Beamforming model		N/A	As specified in clause B.4.1
Cell-specific reference signals		Antenna ports 0,1	(Note 2)
CSI reference signals 0		Antenna ports {15,16}	N/A
CSI-RS 0 periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$	Subframes	5/2	N/A
CSI reference signal 0 configuration		0	N/A
CSI reference signals 1		N/A	Antenna ports {15,16}
CSI-RS 1 periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$	Subframes	N/A	5/2
CSI reference signal 1 configuration		N/A	8
Zero-power CSI-RS 0 configuration I _{CSI-RS} / ZeroPower CSI-RS bitmap	Subframes /bitmap	2/ 0010000000000000000000000000000000000	2/ 001000000000000000
Zero-power CSI-RS1 configuration I _{CSI-RS} / ZeroPower CSI-RS bitmap _S	Subframes /bitmap	2/ 0000010000000000	2/ 0000010000000000
${\widehat E}_{s}/N_{oc}$	dB	Reference Value in Table 8.3.1.3.2-3	Reference Value in Table 8.3.1.3.2-3
$N_{_{oc}}$ at antenna port	dBm/15kH z	-98	-98
BW _{Channel}	MHz	10	10
Cyclic Prefix		Normal	Normal
Cell Id		0	0
Number of control OFDM symbols		2	2
Timing offset between TPs		N/A	Reference Value in Table 8.3.1.3.2-3
Frequency offset between TPs	Hz	N/A	0
Number of allocated resource blocks	PRB	50	50
PDSCH transmission mode		10	10
Probability of occurrence of PDSCH transmission(Note 3)	%	30	70
Symbols for unused PRBs		OCNG (Note 4)	OCNG (Note 4)

Note 2: REs for antenna ports 0 and 1 have zero transmission power.

Note 3: PDSCH transmission from TPs shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TPs are specified. The probability of occurrence of PQI set in each TP is equal.

Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

PQI set index	Parameter	DL transmission hypothesis for each PQI Set		
	NZP CSI-RS Index (For quasi co-location)	ZP CSI-RS configuration	TP 1	TP 2
PQI set 0	CSI-RS 0	ZP CSI-RS 0	PDSCH	Blanked
PQI set 1	CSI-RS 0	ZP CSI-RS 1	PDSCH	Blanked
PQI set 2	CSI-RS 1	ZP CSI-RS 0	Blanked	PDSCH
PQI set 3	CSI-RS 1	ZP CSI-RS 1	Blanked	PDSCH

Table 8.3.1.3.2-2 Configurations of PQI and DL transmission hypothesis for each PQI set

Table 8.3.1.3.2-3 Performance Requirements for timing offset compensation with DPS transmission

Test Number	Timing offset(us)	Reference Channel		OCNG Propagation Pattern Conditions		Correlation Reference Value Matrix and		UE Category			
			TP 1	TP 2	TP 1	TP 2	Antenna Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)		
1	2	R.53 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	70	12.2	≥2	
2	-0.5	R.53 FDD	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	70	12.5	≥2	
Note 1: Note 2: Note 3:	Correlation	The propagation conditions for TP 1 and TP 2 are statistically independent. Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. SNR corresponds to \hat{E}_s/N_{oc} of both TP 1 and TP 2 as defined in clause 8.1.1.									

8.3.1.3.3 Minimum requirement with Different Cell ID and Colliding CRS (with single NZP CSI-RS resource)

The requirements are specified in Table 8.3.1.3.3-2, with the additional parameters in Table 8.3.1.3.3-1. The purpose of this test is to verify the UE capability of supporting non quasi-colocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points have different Cell ID and colliding CRS. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the frequency difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' signalling defined in [6]. In 8.3.1.3.3-1, transmission point 1 (TP 1) is serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) transmits PDSCH with different Cell ID. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Table 8.3.1.3.3-1 Test Parameters for quasi co-location type B with different Cell ID and Colliding CRS

parameter		Unit TP 1		TP 2	
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	0	0	
	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0	
	σ	dB	-3	-3	

Beamforming model		N/A	As specified in clause B.4.2					
Cell-specific reference signals		Antenna ports 0,1	Antenna ports 0,1					
CSI reference signals 0		N/A	Antenna ports {15,16}					
CSI-RS 0 periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$	Subframes	N/A	5 / 2					
CSI reference signal 0 configuration		N/A	0					
Zero-power CSI-RS 0 configuration I _{CSI-RS} / ZeroPower CSI-RS bitmap	Subframes /bitmap	N/A	2/ 00100000000000000					
\widehat{E}_{s}/N_{oc}	dB	Reference point in Table 8.3.1.3.3-2 + 4dB	Reference Value in Table 8.3.1.3.3-2					
$N_{_{oc}}$ at antenna port	dBm/15kH z	-98	-98					
BW _{Channel}	MHz	10	10					
Cyclic Prefix		Normal	Normal					
Cell Id		0	126					
Number of control OFDM symbols		1	2					
Timing offset between TPs	us	N/A	0					
Frequency offset between TPs	Hz	N/A	200					
<i>qcl-Operation, '</i> PDSCH RE Mapping and Quasi-Co- Location Indicator'		Туре	B, '00'					
PDSCH transmission mode		Blank	10					
Number of allocated resource block		N/A	50					
Symbols for unused PRBs		N/A	OCNG(Note2)					
Note 1: $P_B = 1$ Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.								

Table 8.3.1.3.3-2 Performance Requirements for quasi co-location type B with different Cell ID and Colliding CRS

Test Number	Reference Channel	OCNG Pattern				Correlation Matrix and Antenna	Reference	UE Category		
		TP 1	TP 2	TP 1	TP 2	Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)		
1	R.54 FDD	N/A	OP.1 FDD	EPA5	ETU5	2x2 Low	70	14.4	≥2	
Note 1: Note 2: Note 3:	Correlation m	The propagation conditions for TP 1 and TP 2 are statistically independent. Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. SNR corresponds to \hat{E}_s/N_{ac} of TP 2 as defined in clause 8.1.1.								

8.3.2 TDD

The parameters specified in Table 8.3.2-1 are valid for TDD unless otherwise stated.

Table 8.3.2-1: Common Test Parameters for User-specific Reference Symbols

Parameter	Unit	Value
Uplink downlink configuration (Note 1)		1
Special subframe configuration (Note 2)		4
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes	Processes	7
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,1,2,3} for QPSK and 16QAM {0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH	OFDM symbols	2
Precoder update granularity		Frequency domain: 1 PRB for Transmission mode 8, 1 PRG for Transmission mode 9 and 10Time domain: 1 ms
ACK/NACK feedback mode		Multiplexing
	Table 4.2-2 in TS 36. Table 4.2-1 in TS 36.	

8.3.2.1 Single-layer Spatial Multiplexing

For single-layer transmission on antenna port 5, the requirements are specified in Table 8.3.2.1-2, with the addition of the parameters in Table 8.3.2.1-1 and the downlink physical channel setup according to Annex C.3.2. The purpose is to verify the demodulation performance using user-specific reference signals with full RB or single RB allocation.

Parameter		Unit	Test 1	Test 2	Test 3	Test 4		
Downlink power	$ ho_{\scriptscriptstyle A}$	dB	0	0	0	0		
allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)		
	σ	dB	0	0	0	0		
Cell-specific refere signals	ence			Antenna port 0				
Beamforming mo	del		Annex B.4.1					
$N_{_{oc}}$ at antenna p	ort	dB/15kHz	-98	-98	-98	-98		
Symbols for unused	PRBs		OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)	OCNG (Note 2)		
PDSCH transmiss mode	sion		7	7	7	7		
Note 1: $P_{B} = 0$.								
Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.								

Table 8.3.2.1-1: Test Parameters for Testing DRS

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference	value	UE
number	and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
1	10 MHz QPSK 1/3	R.25 TDD	OP.1 TDD	EPA5	2x2 Low	70	-0.8	≥1
2	10 MHz 16QAM 1/2	R.26 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.0	≥2
	5MHz 16QAM 1/2	R.26-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	7.0	1
3	10 MHz 64QAM 3/4	R.27 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.0	≥2
	10 MHz 64QAM 3/4	R.27-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.0	1
4	10 MHz 16QAM 1/2	R.28 TDD	OP.1 TDD	EPA5	2x2 Low	30	1.7	≥1

Table 8.3.2.1-2: Minimum performance DRS (FRC)

For single-layer transmission on antenna ports 7 or 8 upon detection of a PDCCH with DCI format 2B, the requirements are specified in Table 8.3.2.1-4 and 8.3.2.1-5, with the addition of the parameters in Table 8.3.2.1-3 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify rank-1 performance on one of the antenna ports 7 or 8 with and without a simultaneous transmission on the other antenna port.

Parameter		Unit	Test 1	Test 2	Test 3	Test 4	Test 5	
Downlink power	$ ho_{\scriptscriptstyle A}$	dB	0	0	0	0	0	
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)	0 (Note 1)	
	σ	dB	-3	-3	-3	-3	-3	
Cell-specific reference signals	e			Antenna p	port 0 and ant	enna port 1		
Beamforming mode					Annex B.4.1			
N_{oc} at antenna port dBm/15kHz			-98	-98	-98	-98	-98	
Symbols for unused Pl	Symbols for unused PRBs			OCNG (Note 4)	OCNG (Note 4)	OCNG (Note 4)	OCNG (Note 4)	
Simultaneous transmis	sion		No	No	No	Yes (Note 3, 5)	Yes (Note 3, 5)	
PDSCH transmission m	ode		8	8	8	8	8	
	mbols	bols of the sigr of an interferei st.					t used for the	
per virtual UE	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.							
Note 5: The two UEs'	scram	bling identities	$n_{\rm SCID}$ are se	t to 0 for CDN	/I-multiplexed	DM RS with in	nterfering	
simultaneous	transm	nission test cas	es.					

 Table 8.3.2.1-3: Test Parameters for Testing CDM-multiplexed DM RS (single layer)

Test	Bandwidt	Reference	OCNG	Propagation	Correlation	Reference	value	UE
number	h and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughpu t (%)	SNR (dB)	Category
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	-1.0	≥1
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	7.7	≥2
	5MHz 16QAM 1/2	R.32-1 TDD	OP.1 TDD	EPA5	2x2 Medium	70	7.7	1
3	10 MHz 64QAM 3/4	R.33 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.7	≥2
	10 MHz 64QAM 3/4	R.33-1 TDD	OP.1 TDD	EPA5	2x2 Low	70	17.7	1

Table 8.3.2.1-4: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC)

Table 8.3.2.1-5: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC)

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Reference v	/alue	UE
number	and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category
4	10 MHz	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	21.9	≥2
	16QAM 1/2	(Note 1)						
5	10 MHz	R.34 TDD	OP.1 TDD	EPA5	2x2 Low	70	22.0	≥2
	64QAM 1/2	(Note 1)						
Note 1:	The reference of	channel applie	s to both the i	input signal unde	er test and the inte	rfering signal.		

8.3.2.1A Single-layer Spatial Multiplexing (with multiple CSI-RS configurations)

For single-layer transmission on antenna ports 7 or 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.3.2.1A-2 and 8.3.2.1A-3, with the addition of the parameters in Table 8.3.2.1A-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify rank-1 performance on one of the antenna ports 7 or 8 with and without a simultaneous transmission on the other antenna port, and to verify rate matching with multiple CSI reference symbol configurations with non-zero and zero transmission power.

Parameter		Unit	Test 1	Test 2				
Davadiala	$ ho_{\scriptscriptstyle A}$	dB	0	0				
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0 (Note 1)				
	σ	dB	-3	-3				
Cell-specific refere signals	nce			ports 0,1				
CSI reference sigr	nals		Antenna ports 15,,22	Antenna ports 15,,18				
Beamforming mo	del		Annex B.4.1	Annex B.4.1				
CSI-RS periodicity subframe offse $T_{CSI-RS} / \Delta_{CSI-RS}$	t	Subframes	5 / 4	5 / 4				
CSI reference sig configuration			1	3				
Zero-power CSI-I configuration <i>I</i> _{CSI-RS} / <i>ZeroPowerCSI-F</i> bitmap		Subframes / bitmap	4 / 0010000100000000	4 / 00100000000000000				
$N_{\scriptscriptstyle oc}$ at antenna p		dBm/15kHz	-98	-98				
Symbols for unus PRBs	ed		OCNG (Note 4)	OCNG (Note 4)				
Number of allocat resource blocks (No		PRB	50	50				
Simultaneous transmission			No	Yes (Note 3, 5)				
PDSCH transmiss mode	ion		9	9				
port 7 or 8 Note 3: Modulatio port (7 or Note 4: These ph virtual UE OCNG PI	 P_B = 1. The modulation symbols of the signal under test are mapped onto antenna port 7 or 8. Modulation symbols of an interference signal is mapped onto the antenna port (7 or 8) not used for the input signal under test. 							
			ties $n_{ m SCID}$ are set to 0 neous transmission test					

Table 8.3.2.1A-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with multiple CSI-RS configurations

Table 8.3.2.1A-2: Minimum performance for CDM-multiplexed DM RS without simultaneous transmission (FRC) with multiple CSI-RS configurations

Test	Bandwidt	Reference	OCNG	Propagation	Correlation	Reference value		UE
number	h and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughpu t (%)	SNR (dB)	Category
1	10 MHz QPSK 1/3	R.50 TDD	OP.1 TDD	EVA5	2x2 Low	70	-0.6	≥1

Test			Propagation	Correlation	Reference v	UE			
number	and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category	
2	10 MHz 64QAM 1/2	R.44 TDD	OP.1 TDD	EPA5	2x2 Low	70	22.1	≥2	
Note 1:									

Table 8.3.2.1A-3: Minimum performance for CDM-multiplexed DM RS with interfering simultaneous transmission (FRC) with multiple CSI-RS configurations

8.3.2.1B Enhanced Performance Requirement Type A – Single-layer Spatial Multiplexing with TM9 interference model

The requirements are specified in Table 8.3.2.1B-2, with the addition of the parameters in Table 8.3.2.1B-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify closed-loop rank one performance on one of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell when the PDSCH transmission in the serving cell is interfered by PDSCH of one dominant interfering cell applying transmission mode 9 interference model defined in clause B.5.4. In 8.3.2.1B-1, Cell 1 is the serving cell, and Cell 2 is the interfering cell. The downlink physical channel setup is according to Annex C.3.2 for each of Cell 1 and Cell 2, respectively.

paramete	r	Unit	Cell 1	Cell 2
Downlink newer	$ ho_{\scriptscriptstyle A}$	dB	0	0
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0
	σ	dB	-3	-3
Cell-specific referen	nce signals		Antenna ports 0,1	Antenna ports 0,1
CSI reference	-		Antenna ports 15,,18	N/A
CSI-RS periodic subframe offset T _{CSI}	-rs / Δ_{csi-rs}	Subframes	5 / 4	N/A
CSI reference configuration			0	N/A
$N_{\scriptscriptstyle oc}$ at antenn	a port	dBm/15kH z	-98	N/A
DIP (Note	2)	dB	N/A	-1.73
BW _{Channe}	I	MHz	10	10
Cyclic Pref	ïx		Normal	Normal
Cell Id			0	126
Number of contro symbols	OFDM		2	2
PDSCH transmiss	ion mode		9	0 0 -3 Antenna ports 0,1 N/A N/A N/A -1.73 10 Normal 126 2 N/A 126 2 N/A N/A N/A N/A As specified in clause B.5.4 70 30 6 N/A N/A N/A N/A N/A N/A
Beamforming I	nodel		As specified in clause B.4.3 (Note 4, 5)	N/A
Interference n	nodel		N/A	
Probability of occurrence of	Rank 1		N/A	70
transmission rank in interfering cells	Rank 2		N/A	30
Precoder update g	ranularity	PRB	50	6
PMI delay (No	ote 5)	ms	10 or 11	N/A
Reporting inte	erval	ms	5	N/A
Reporting m	ode		PUCCH 1-1	N/A
CodeBookSubsetF bitmap	Restriction		0000000000000000 0000000000000000 000000	N/A
Symbols for unus	ed PRBs		OCNG (Note 6)	N/A
Simultaneous trar	osmission		No simultaneous transmission on the other antenna port in (7 or 8) not used for the input signal under test	N/A
Note 1: $P_B = 1$				
Note 2: The resp			tral density of each inter P value as specified in c	-
Note 3: The mode			al under test in Cell 1 are	
Note 4: The prece Note 5: If the UE	oder in claus reports in ar	n available upli	s UE recommended PMI nk reporting instance at a	subrame SF#n based

Table 8.3.2.1B-1: Test Parameters for Testing CDM-multiplexed DM RS (single layer) with TM9 interference model

Note 5: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI

	cannot be applied at the eNB downlink before SF#(n+4).
Note 6:	These physical resource blocks are assigned to an arbitrary number of virtual UEs
	with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs
	shall be uncorrelated pseudo random data, which is QPSK modulated.
Note 7:	All cells are time-synchronous.

Table 8.3.2.1B-2: Enhanced Performance Requirement Type A, CDM-multiplexed DM RS with TM9 interference model

Test Number	Referenc e		Pattern Conditions n Matrix		Correlatio n Matrix	Reference V	alue	UE Categor	
	Channel	Cell 1	Cell 2	Cell 1	Cell 2	and Antenna Configurat ion (Note 3)	Fraction of Maximum Throughput (%)	SINR (dB) (Note 2)	У
1	R.48 TDD	OP.1 TDD	N/A	EVA5	EVA5	4x2 Low	70	-1.0	≥1
Note 1:							ly independent.		
Note 2:	SINR corres	sponds to	\hat{E}_s/N_a	$_{oc}$ of Ce	ll 1 as de	fined in clause	8.1.1.		
Note 3:	Correlation	matrix ar	nd antenr	a configu	uration pa	arameters appl	y for each of Cell 1	and Cell 2	

8.3.2.1C Single-layer Spatial Multiplexing (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

The requirements are specified in Table 8.3.2.1.C -2, with the addition of parameters in Table 8.3.2.1.C -1. The purpose is to verify the performance of the antenna ports 7 or 8 without a simultaneous transmission on the other antenna port in the serving cell if the PDSCH transmission in the serving cell takes place in subframes that overlap with ABS [9] of the aggressor cell with CRS assistance information. In Table 8.3.2.1.C -1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] includes Cell 2 and Cell 3.

Parameter		Unit	Cell 1	Cell 2	Cell 3
Uplink downlink Conf	iguration		1	1	1
Special subframe con	figuration		4	4	4
	$ ho_{\scriptscriptstyle A}$	dB	0	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	-3 (Note 1)	-3 (Note 1)
anocation	σ	dB	-3	N/A	N/A
	N _{oc1}	dBm/15kHz	-98 (Note 2)	N/A	N/A
N_{ac} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 3)	N/A	N/A
	N _{oc3}	dBm/15kHz	-93 (Note 4)	N/A	N/A
\hat{E}_s/N_{oc2}		dB	Reference Value in Table 2	12	10
BW _{Channel}		MHz	10	10	10
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	een Cells	Hz	N/A	300	-100
Cell Id			0	1	126
Cell-specific reference	e signals		A	ntenna ports 0,1	
CSI reference sig	gnals		Antenna ports 15,16	N/A	N/A
CSI-RS periodicit subframe offs $T_{CSI-RS} / \Delta_{CSI-R}$	et	Subframes	5/4	N/A	N/A
CSI reference si configuratior	gnal		8	N/A	N/A
Zero-power CSI configuratior I _{CSI-RS} / ZeroPowe bitmap	-RS	Subframes / bitmap	[4 / 0010000000000 00]	N/A	N/A
ABS pattern (No	te 5)		N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measur Subframe Pattern (0000000001 0000000001	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		0000000001 00000000001	N/A	N/A
(Note7)	C _{CSI,1}		1100111000 1100111000	N/A	N/A
Number of control symbols	OFDM		2	Note 8	Note 8
PDSCH transmissio	n mode		TM9-1layer	Note 9	Note 9
Precoding granu	coding granularity		Frequency domain: 1 PRG Time domain: 1 ms	N/A	N/A
Beamforming m			Annex B.4.1	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Table 8.3.2.1.C-1: Test parameters of TM9-Single-Layer (2 CSI-RS ports) – Non-MBSFN ABS

Note 1:	$P_B = 1$.
Note 2:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a
	subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the
	aggressor ABS.
Note 4:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non- ABS.
Note 5:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is
	overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 6:	Time-domain measurement resource restriction pattern for PCell measurements as defined
	in [7].
Note 7:	As configured according to the time-domain measurement resource restriction pattern for
	CSI measurements defined in [7].
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe
	indicated by "0" of ABS pattern.
Note 9:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3
	applying OCNG pattern as defined in Annex A.5.
Note 10:	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI
	estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at
	the eNB downlink before SF#(n+4).
Note 11:	For Uplink - downlink configuration 1 the reporting interval will alternate between 1ms and
	4ms.
Note 12:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.
Note 14:	The modulation symbols of the signal under test are mapped onto antenna port 7 or 8.

Table 8.3.2.1.C-2: Minimum Performance of TM9-Single-Layer (2 CSI-RS ports) – Non-MBSFN ABS

Test Number	Reference Channel	00	NG Patt	ern	Propagation Conditions (Note1)		Correlation Matrix and	Reference	eference Value		
		Cell 1	Cell 2	Cell 3	Cell 1			Antenna Configurati on (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	gory
1	R.51 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD		EVA5		2x2 Low	70	[TBD]	≥2
Note 1: Note 2: Note 3:	The correlation	on matrix	TDD TDD TDD Image: conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. Image: configuration apply for Cell 1, Cell 2 and Cell 3. ds to \hat{E}_s / N_{oc2} of cell 1. Image: configuration apply for Cell 1, Cell 2 and Cell 3.								

8.3.2.2 Dual-Layer Spatial Multiplexing

For dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2B, the requirements are specified in Table 8.3.2.2-2, with the addition of the parameters in Table 8.3.2.2-1 and the downlink physical channel setup according to Annex C.3.2. The purpose of these tests is to verify the rank-2 performance for full RB allocation.

Parame	ter	Unit	Test 1	Test 2
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0	0
power	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0 (Note 1)
allocation	σ	dB	-3	-3
Cell-spec referenc symbol	ce		Antenna port 0 ar 1	nd antenna port
Beamforn model			Annex	B.4.2
$N_{_{oc}}$ at ant port	enna	dBm/15kHz	-98	-98
Symbols unused P			OCNG (Note 2)	OCNG (Note 2)
Number allocate resource b	ed	PRB	50	50
PDSCI transmiss mode	sion		8	8
Note 1:	$P_{R} = 1$			
Note 2:	These numbe transm	physical resource blocks or of virtual UEs with one hitted over the OCNG PD n data, which is QPSK m	PDSCH per virtual SCHs shall be unco	UE; the data

Table 8.3.2.2-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer)

Table 8.3.2.2-2: Minimum performance for CDM-multiplexed DM RS (FRC)

Test	Bandwidth	Reference	OCNG	Propagation		Reference value		UE	
number	and MCS	Channel	Pattern	Condition	Matrix and Antenna Configuration	Fraction of Maximum Throughput (%)	SNR (dB)	Category	
1	10 MHz QPSK 1/3	R.31 TDD	OP.1 TDD	EVA5	2x2 Low	70	4.5	≥2	
2	10 MHz 16QAM 1/2	R.32 TDD	OP.1 TDD	EPA5	2x2 Medium	70	21.7	≥2	

8.3.2.3 Dual-Layer Spatial Multiplexing (with multiple CSI-RS configurations)

For dual-layer transmission on antenna ports 7 and 8 upon detection of a PDCCH with DCI format 2C, the requirements are specified in Table 8.3.2.3-2, with the addition of the parameters in Table 8.3.2.3-1 where Cell 1 is the serving cell and Cell 2 is the interfering cell. The downlink physical channel setup is set according to Annex C.3.2. The purpose of these tests is to verify the rank-2 performance for full RB allocation, to verify rate matching with multiple CSI reference symbol configurations with non-zero and zero transmission power, and to verify that the UE correctly estimate SNR.

Table 8.3.2.3-1: Test Parameters for Testing CDM-multiplexed DM RS (dual layer) with multiple CSI-RS configurations

parameter		Unit	Test 1			
		Unit	Cell 1	Cell 2		
Downlink nower	$ ho_{\scriptscriptstyle A}$	dB	4	0		
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	4 (Note 1)	0		
anocation	σ	dB	-3	-3		

Cell-specific reference signals		Antenna ports 0 and 1	Antenna ports 0 and 1					
Cell ID		0	126					
CSI reference signals		Antenna ports 15,16	NA					
Beamforming model		Annex B.4.2	NA					
CSI-RS periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$	Subframes	5 / 4	NA					
CSI reference signal configuration		8	NA					
Zero-power CSI-RS configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap	Subframes / bitmap	4 / 0010000000000000000000000000000000000	NA					
$N_{_{oc}}$ at antenna port	dBm/15kHz	-98	-98					
\widehat{E}_s/N_{oc}		Reference Value in Table 8.3.2.3-2	Test specific, 7.25dB					
Symbols for unused PRBs		OCNG (Note 2)	NA					
Number of allocated resource blocks (Note 2)	PRB	50	NA					
Simultaneous transmission		No	NA					
PDSCH transmission mode		9	Blanked					
Note 1: $P_B = 1$								
virtual UEs with	Note 2: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK							

Table 8.3.2.3-2: Minimum performance for CDM-multiplexed DM RS (FRC) with multiple CSI-RS configurations

Test number	Bandwidth and MCS	Reference Channel		NG tern		opagationCorrelationConditionMatrix and				UE Cate
			Cell 1	Cell 2	Cell 1	Cell 2	Antenna Configurati on	Fraction of Maximum Throughput (%)	SNR (dB)	gory
1	10 MHz 16QAM 1/2	R.51 TDD	OP.1 TDD	N/A	ETU5	ETU5	2x2 Low	70	[14.8]	2-8
	The propagation Correlation matr SNR correspond	ix and antenna	a configui	ration par				nd Cell 2.		

8.3.2.4 Performance requirements for DCI format 2D and non Quasi Co-located Antenna Ports

8.3.2.4.1 Minimum requirement with Same Cell ID (with single NZP CSI-RS resource)

The requirements are specified in Table 8.3.2.4.1-3, with the additional parameters in Table 8.3.2.4.1-1 and Table 8.3.2.4.1-2. The purpose of this test is to verify the UE capability of supporting non quasi-colocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission point share the same Cell ID. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching according to the

'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling defined in [6], configured according to Table 8.3.2.4.1-2. In Table 8.3.2.4.1-1 and 8.3.2.4.1-2, transmission point 1 (TP 1) is the serving cell and transmission point 2 (TP 2) transmits PDSCH. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

Paramete	r	Unit	TP 1	TP 2
Deurslieleneuren	$ ho_{\scriptscriptstyle A}$	dB	0	0
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0
anooanon	σ	dB	-3	-3
Cell-specific referer	nce signals		Antenna ports 0,1	(Note 2)
CSI-RS 0 antenr	na ports		NA	Port {15,16}
<i>qcl-CSI-RS-Configl</i> CSI-RS 0 period subframe offset <i>T</i> _{CSI}	icity and	Subframes	NA	5/4
qcl-CSI-RS-Configl CSI-RS 0 config	<i>VZPId-r11,</i> uration		NA	8
csi-RS-ConfigZPId power CSI-RS 0 co I _{CSI-RS} / ZeroPower CSI-R	nfiguration		NA	4/ 0000010000000000
$N_{\scriptscriptstyle oc}$ at antenn		dBm/15kH z	-98	-98
SNR		dB	Reference point in Table 8.3.2.4.1-3	Reference point in Table 8.3.2.4.1-3
BW _{Channe}	l	MHz	10	10
Cyclic Pref	ïx		Normal	Normal
Cell Id			0	0
Number of contro symbols	I OFDM		2	2
PDSCH transmiss	ion mode		Blanked	10
Number of alloca	ted PRB	PRB	NA	50
<i>qcl-Operation, '</i> PD Mapping and Qu Location Indic	asi-Co-		Туре	B, '00'
Time offset betwe	een TPs	μs	NA	Reference point in Table 8.3.2.4-3
Frequency error be	tween TPs	Hz	NA	0
Beamforming model			NA	As specified in clause B.4.1
Symbols for unused PRBs			NA	OCNG (Note 3)
Note 3: These ph	ysical resou	rce blocks are	zero transmission powe assigned to an arbitrary data transmitted over th	number of virtual UEs

Table 8.3.2.4.1-1: Test Parameters for quasi co-location type B: same Cell ID

shall be uncorrelated pseudo random data, which is QPSK modulated.

PQI set index	Parameter	Parameters in each PQI set				
	NZP CSI-RS Index (For quasi co-location)	ZP CSI-RS configuration	TP 1	TP 2		
PQI set 0	CSI-RS 0	ZP CSI-RS 0	Blanked	PDSCH		

Table 8.3.2.4.1-2 Configurations of PQI and DL transmission hypothesis for each PQI set

Table 8.3.2.4.1-3: Minimum performance for quasi co-location type B: same Cell ID

Test Number	Reference Channel		iCN tern	Time offset between	Propag Condi (Not	tions	Correlation Matrix and Antenna	Reference Value		UE Category
		TP 1	TP 2	TPs (μs)	TP 1	TP 2	Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.52 TDD	NA	OP.1 TDD	2	EPA	EPA	2x2 Low	70	12	≥2
2	R.52 TDD	NA	OP.1 TDD	-0.5	EPA	EPA	2x2 Low	70	12.4	≥2
Note 1:	The propagation	on condi	tions for	TP 1 and TP	2 are sta	tistically	independent.			
Note 2:						•	•			
Note 3:	The correlation matrix and antenna configuration apply for TP 1 and TP 2. SNR corresponds to \hat{E}_s / N_{oc} of TP 2.									

8.3.2.4.2 Minimum requirements with Same Cell ID (with multiple NZP CSI-RS resources)

The requirements are specified in Table 8.3.2.4.2-3, with the additional parameters in Table 8.3.2.4.2-1 and 8.3.2.4.2-2. The purpose of this test is to verify the UE capability of supporting non quasi-colocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission point share the same Cell ID. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the timing difference between two transmission points, channel parameters estimation and rate matching according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' (PQI) signalling defined in [6]. In8.3.2.4.2-1 and 8.3.2.4.2-2, transmission point 1 (TP 1) is the serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) has same Cell ID as TP 1. Multiple NZP CSI-RS resources and ZP CSI-RS resources are configured. In each sub-frame, DL PDSCH transmission is dynamically switched between 2 TPs with multiple PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator configuration (PQI). Configurations of PDSCH RE Mapping and Quasi-Co-Location Indicator and downlink transmission hypothesis are defined in Table 8.3.2.4.2-2. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

parameter		Unit	TP 1	TP 2
Downlink power	$ ho_{\scriptscriptstyle A}$	dB	0	0
allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0
	σ		-3	-3
Beamforming mode	9		N/A	As specified in clause B.4.1
Cell-specific referer	nce signals		Antenna ports 0,1	(Note 2)
CSI reference signa			Antenna ports {15,16}	N/A
CSI-RS 0 periodicit subframe offset T _{CS}	$\Delta_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$	Subframes	5 / 4	N/A
CSI reference signa configuration	al O		0	N/A
CSI reference signa			N/A	Antenna ports {15,16}
CSI-RS 1 periodicit subframe offset T _{CS}	$_{\rm SI-RS}$ / $\Delta_{\rm CSI-RS}$	Subframes	N/A	5 / 4
CSI reference signa configuration			N/A	8
Zero-power CSI-RS configuration I _{CSI-RS} / ZeroPower CSI-RS	bitmap	Subframes /bitmap	4/ 0010000000000000000000000000000000000	4/ 001000000000000000
configuration I _{CSI-RS} /			4/ 0000010000000000	4/ 0000010000000000
\widehat{E}_{s}/N_{oc}		dB	Reference Value in Table 8.3.2.4.2-3	Reference Value in Table 8.3.2.4.2-3
$N_{\scriptscriptstyle oc}$ at antenna por	t	dBm/15kH z	-98	-98
BW _{Channel}		MHz	10	10
Cyclic Prefix			Normal	Normal
Cell Id			0	0
Number of control C symbols	OFDM		2	2
Timing offset betwe	en TPs		N/A	Reference Value in Table 8.3.2.4.2-3
Frequency offset be		Hz	N/A	0
Number of allocated resource blocks		PRB	50	50
PDSCH transmission mode			10	10
Probability of occurrence of PDSCH transmission(Note 3)		%	30	70
Symbols for unused	PRBs		OCNG (Note 4)	OCNG (Note 4)
			zero transmission powe I be randomly determine	

Table 8.3.2.4.2-1 Test Parameters for timing offset compensation with DPS transmission

Note 3: PDSCH transmission from TPs shall be randomly determined independently for each subframe. Probabilities of occurrence of PDSCH transmission from TPs are specified. The probability of occurrence of PQI set in each TP is equal.
 Note 4: These physical resource blocks are assigned to an arbitrary number of virtual UEs

with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.

PQI set index	Parameter	DL transmission hypothesis for each PQI Set		
	NZP CSI-RS Index (For quasi co-location)	TP 1	TP 2	
PQI set 0	CSI-RS 0	ZP CSI-RS 0	PDSCH	Blanked
PQI set 1	CSI-RS 0	ZP CSI-RS 1	PDSCH	Blanked
PQI set 2	CSI-RS 1	ZP CSI-RS 0	Blanked	PDSCH
PQI set 3	CSI-RS 1	Blanked	PDSCH	

Table 8.3.2.4.2-2 Configurations of PQI and DL transmission hypothesis for each PQI set

Table 8.3.2.4.2-3 Performance Requirements for timing offset compensation with DPS transmission

Test Number	Timing offset(us)	Reference Channel		NG tern	-	gation itions	Correlation Matrix and	Reference Value		UE Category
			TP 1	TP 2	TP 1	TP 2	Antenna Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	2	R.53 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	70	12.3	≥2
2	-0.5	R.53 TDD	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	70	12.5	≥2
Note 1: Note 2:	The propagation conditions for TP 1 and TP 2 are statistically independent. Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2.									
Note 3:	SNR corresp	bonds to $ \widehat{E}_{s} ig/ $	N_{oc} of	both TI	P 1 and 7	FP 2 as o	defined in clause 8	3.1.1.		

8.3.2.4.3 Minimum requirement with Different Cell ID and Colliding CRS (with single NZP CSI-RS resource)

The requirements are specified in Table 8.3.2.4.3-2, with the additional parameters in Table 8.3.2.4.3-1. The purpose of this test is to verify the UE capability of supporting non quasi-colocated antenna ports when the UE receives DCI format 2D in a scenario where the two transmission points have different Cell ID and colliding CRS. In particular the test verifies that the UE, configured with quasi co-location type B, performs correct tracking and compensation of the frequency difference between two transmission points, channel parameters estimation and rate matching behaviour according to the 'PDSCH RE Mapping and Quasi-Co-Location Indicator' signalling defined in [6]. In 8.3.2.4.3-1, transmission point 1 (TP 1) is serving cell transmitting PDCCH, synchronization signals and PBCH, and transmission point 2 (TP 2) transmits PDSCH with different Cell ID. The downlink physical channel setup for TP 1 is according to Table C.3.4-1 and for TP 2 according to Table C.3.4-2.

parameter		Unit	TP 1	TP 2
Downlink nowor	$ ho_{\scriptscriptstyle A}$	dB	0	0
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)	0
	σ	dB	-3	-3

Beamforming model		N/A	As specified in clause B.4.2			
Cell-specific reference signals		Antenna ports 0,1	Antenna ports 0,1			
CSI reference signals 0		N/A	Antenna ports {15,16}			
CSI-RS 0 periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$	Subframes	N/A	5 / 4			
CSI reference signal 0 configuration		N/A	0			
Zero-power CSI-RS 0 configuration I _{CSI-RS} / ZeroPower CSI-RS bitmap	Subframes /bitmap	N/A	4/ 001000000000000000			
\widehat{E}_s/N_{oc}	dB	Reference point in Table 8.3.2.4.3 + 4dB	Reference Value in Table 8.3.2.4.3-2			
$N_{_{oc}}$ at antenna port	dBm/15kH z	-98	-98			
BW _{Channel}	MHz	10	10			
Cyclic Prefix		Normal	Normal			
Cell Id		0	126			
Number of control OFDM symbols		1	2			
Timing offset between TPs	us	N/A	0			
Frequency offset between TPs	Hz	N/A	200			
<i>qcl-Operation, '</i> PDSCH RE Mapping and Quasi-Co- Location Indicator'		Туре	B, '00'			
PDSCH transmission mode		Blank	10			
Number of allocated resource block		N/A	50			
Symbols for unused PRBs		N/A	OCNG(Note2)			
Note 1: $P_B = 1$ Note 2:These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated.						

Table 8.3.2.4.3-2 Performance Requirements for quasi co-location type B with different Cell ID and Colliding CRS

Test Number	Reference Channel		NG tern	Cond	gation itions te1)	Correlation Matrix and Antenna	Reference	Reference Value	
		TP 1	TP 2	TP 1	TP 2	Configuration (Note 2)	Fraction of Maximum Throughput (%)	SNR (dB) (Note 3)	
1	R.54 TDD	N/A	OP.1 TDD	EPA5	ETU5	2x2 Low	70	14.7	≥2
Note 1: Note 2: Note 3:	The propagation conditions for TP 1 and TP 2 are statistically independent. Correlation matrix and antenna configuration parameters apply for each of TP 1 and TP 2. SNR corresponds to \hat{E}_s/N_{oc} of TP 2 as defined in clause 8.1.1.								

8.4 Demodulation of PDCCH/PCFICH

The receiver characteristics of the PDCCH/PCFICH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). PDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of PDCCH

8.4.1 FDD

The parameters specified in Table 8.4.1-1 are valid for all FDD tests unless otherwise stated.

Parameter		Unit	Single antenna port	Transmit diversity
Number of PDC	CH symbols	symbols	2	2
Number of PHICH	H groups (<i>N</i> g)		1	1
PHICH du	ration		Normal	Normal
Unused RE-s a	and PRB-s		OCNG	OCNG
Cell I	D		0	0
Downlink nower	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
Downlink power allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
$N_{_{oc}}$ at antenna port		dBm/15kHz	-98	-98
Cyclic p	refix		Normal	Normal

Table 8.4.1-1: Test Parameters for PDCCH/PCFICH

8.4.1.1 Single-antenna port performance

For the parameters specified in Table 8.4.1-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.4.1.1-1: Minimum performance PDCCH/PCFICH

Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Referen	ce value
number		level	Channel	Pattern	Condition	configuration	Pm-dsg (%)	SNR (dB)
						and		
						correlation		
						Matrix		
1	10 MHz	8 CCE	R.15 FDD	OP.1 FDD	ETU70	1x2 Low	1	-1.7

8.4.1.2 Transmit diversity performance

8.4.1.2.1 Minimum Requirement 2 Tx Antenna Port

For the parameters specified in Table 8.4.1-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Aggregation	Reference	Reference OCNG	Propagation	Antenna	Reference value	
numbe		level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16 FDD	OP.1 FDD	EVA70	2 x 2 Low	1	-0.6

Table 8.4.1.2.1-1: Minimum performance PDCCH/PCFICH

8.4.1.2.2 Minimum Requirement 4 Tx Antenna Port

For the parameters specified in Table 8.4.1-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Reference value	
number		level	Channel	Pattern	Condition	configuration and correlation	Pm-dsg (%)	SNR (dB)
						Matrix	(70)	(ub)
1	5 MHz	2 CCE	R.17 FDD	OP.1 FDD	EPA5	4 x 2 Medium	1	6.3

Table 8.4.1.2.2-1: Minimum performance PDCCH/PCFICH

8.4.1.2.3 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS)

For the parameters for non-MBSFN ABS specified in Table 8.4.1-1 and Table 8.4.1.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.4.1.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

For the parameters for MBSFN ABS specified in Table 8.4.1-1 and Table 8.4.1.2.3-3, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.3-4. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Paramete	r	Unit	Cell 1	Cell 2				
	PDCCH_RA	Unit						
Downlink power	PHICH_RA OCNG_RA	dB	-3	-3				
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3				
	N _{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A				
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A				
	N _{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A				
\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.4.1.2.3- 2	1.5				
BW _{Channel}		MHz	10	10				
Subframe Config	uration		Non-MBSFN	Non-MBSFN				
Time Offset betwe	en Cells	μs	2.5 (synchro	nous cells)				
Cell Id			0	1				
ABS pattern (N	ote 4)		N/A	00000100 00000100 00000100 01000100 00000100				
RLM/RRM Measureme Pattern (Note			00000100 00000100 00000100 00000100 00000100	N/A				
CSI Subframe Sets	C _{CSI,0}		00000100 00000100 00000100 01000100 00000100	N/A				
(Note 6)	C _{CSI,1}		11111011 11111011 11111011 10111011 10111011 11111011	N/A				
Number of control OF			3					
Number of PHICH g			1 Extended					
PHICH durat Unused RE-s and			Extended OCNG					
Cyclic prefi			Normal	Normal				
Note 1: This noise is a overlapping wit Note 2: This noise is a	oplied in OFDM s th the aggressor a oplied in OFDM s	ymbols #1, #2, #3, #5, ABS. ymbols #0, #4, #7, #11	#6, #8, #9, #10, #12,	#13 of a subframe				
Note 3: This noise is a Note 4: ABS pattern as are transmitted								
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7];								
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7];								
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.								
Note 8: SIB-1 will not be transmitted in Cell2 in the test.								

Table 8.4.1.2.3-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Test Numb er	Aggregati on Level	Referen ce Channel	OCNG Pattern		Propagation Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Pm- dsg (%)	SNR (dB) (Note 2)
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-3.9
Note 1:		The propagation conditions for Cell 1 and Cell 2 are statistically independent.							
Note 2:	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.								
Note 3:	The correlat	ion matrix ar	nd antenn	a configu	iration ap	ply for Ce	ell 1 and Cell 2.		

Table 8.4.1.2.3-2: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Paramet	er	Unit	Cell 1	Cell 2
Downlink power	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
	N _{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N _{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
\widehat{E}_{s}/N_{oo}	·	dB	Reference Value in Table 8.4.1.2.3- 4	1.5
BW _{Chanr}	nel	MHz	10	10
Subframe Conf	iguration		Non-MBSFN	MBSFN
Time Offset betw	veen Cells	μs	2.5 (synchro	nous cells)
Cell Id			0	126
ABS pattern (Note 4)		N/A	0001000000 0100000010 0000001000 0000000
RLM/RRM Measuren Pattern (No			000100000 010000010 000001000 000000000	N/A
CSI Subframe Sets	C _{CSI,0}		000100000 010000010 0000001000 00000000	N/A
(Note 6)	C _{CSI,1}		1110111111 1011111101 1111110111 1111110111 111111	N/A
MBSFN Subframe Allocation (Note 9)			N/A	001000 100001 000100 000000
Number of control O	FDM symbols		3	
Number of PHICH	groups (Ng)		1	
PHICH dur			extended	
Unused RE-s ar			OCNG	NI
Cyclic pre	XIIX		Normal	Normal

Table 8.4.1.2.3-3: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2:	This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [9]. The 4 th , 12 th , 19 th and 27 th subframes indicated by ABS pattern
	are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is
	overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in
	the definition of the reference channel.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in
	[7].
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 7:	Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1
	and Cell2 is the same.
Note 8:	SIB-1 will not be transmitted in Cell2 in this test.
Note 9:	MBSFN Subframe Allocation as defined in [7], four frames with 24 bits is chosen for MBSFN
	subframe allocation.
Note 10:	
1	channel transmission is in a subframe protected by MBSFN ABS in this test.

Table 8.4.1.2.3-4: Minimum performance PDCCH/PCHICH – MBSFN ABS

Test Numb er	Aggregati on Level	Reference Channel	OCNG Propagation Pattern Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value												
			Cell 1	Cell 2	Cell 1	Cell 2	Configurati on	Pm- dsg (%)	SNR (dB) (Note 2)									
1	8 CCE	R15-1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	2x2 Low	1	-4.2									
Note 1:		The propagation conditions for Cell 1 and Cell2 are statistically independent.																
Note 2:	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.																	
Note 3:	The correlat	ion matrix and	antenna	configura	tion appl	y for Cell	1 and Cell 2.		The correlation matrix and antenna configuration apply for Cell 1 and Cell 2.									

8.4.1.2.4 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

For the parameters for non-MBSFN ABS specified in Table 8.4.1-1 and Table 8.4.1.2.4-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.4-2.

For the parameters for MBSFN ABS specified in Table 8.4.1-1 and Table 8.4.1.2.4-3, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.1.2.4-4.

In Tables 8.4.1.2.4-1 and 8.4.1.2.4-3, Cell 1 is the serving cell, and Cell 2 and Cell3are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Paran	neter	Unit	Cell 1	Cell 2	Cell 3		
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3		
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3		
	N _{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A		
N_{oc} at antenna	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A		
port	N _{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A		
\widehat{E}_{s}/N	V _{oc2}	dB	Reference Value in Table 8.4.1.2.4-2	5	3		
BW _{Cr}	annel	MHz	10	10	10		
Subframe Co	onfiguration		Non-MBSFN	Non-MBSFN	Non-MBSFN		
Time Offset be	etween Cells	μs	N/A	3	-1		
Frequency shift	between Cells	Hz	N/A	300	-100		
Cell	ld		0	126	1		
ABS patter	ABS pattern (Note 4)		N/A	00000100 00000100 00000100 00000100 00000100	00000100 00000100 00000100 00000100 00000100		
RLM/RRM M Subframe Pat			00000100 00000100 00000100 00000100 00000100	N/A	N/A		
CSI Subframe	C _{CSI,0}		00000100 00000100 00000100 00000100 00000100	N/A	N/A		
Sets (Note 6)	C _{CSI,1}		11111011 11111011 11111011 11111011 11111011 11111011	N/A	N/A		
Number of control			2	Note 7	Note 7		
Number of PHIC			1 Normal	N/A	N/A		
PHICH c Unused RE-s			Normal OCNG	N/A OCNG	N/A OCNG		
				Normal	Normal		
Cyclic prefix Normal Normal Normal Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS. Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 3: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS Note 4: ABS pattern as defined in [9]. PDCCH/PCFICH other than that associated with SIB1/Paging are							
 In the patient as defined in [5]. I Deer in or for other than that associated with orb in aging the transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell. Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]; Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI 							
 measurements defined in [7]; Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern. Note 8: The number of the CRS ports in Cell1, Cell2 and Cell 3is the same. 							
Note 9: SIB-1 will not be transmitted in Cell2 and Cell 3 in the test.							

Test Number	Aggregati on Level	Reference Channel	00	NG Patt	ern	Propagation Conditions (Note 1)				Correlation Matrix and	Refere	nce Value
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3	Antenna Configuration (Note 2)	Pm- dsg (%)	SNR (dB) (Note 3)	
1	8 CCE	R.15-2 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	1	-2.2	
Note 1: Note 2:	Note 2: The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.											
Note 3:	SNR correspo	nds to \hat{E}_s / N_o	₂ of cell	1.								

Table 8.4.1.2.4-2: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Paran	neter	Unit	Cell 1	Cell 2	Cell 3
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
	N _{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
N _{oc} at antenna	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
port	N _{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
\widehat{E}_{s}/N		dB	Reference Value in Table 8.4.1.2.4-4	5	3
BW _C	nannel	MHz	10	10	10
Subframe Co	onfiguration		Non-MBSFN	MBSFN	MBSFN
Time Offset be	etween Cells	μs	N/A	3	-1
Frequency shift	between Cells	Hz	N/A	300	-100
Cell	ld		0	126	1
ABS patter	n (Note 4)		N/A	0001000000 010000010 0000001000 00000000	0001000000 010000010 0000001000 00000000
RLM/RRM Measu Pattern (0001000000 010000010 000001000 00000000	N/A	N/A
CSI Subframe	C _{CSI,0}		0001000000 010000010 000001000 00000000	N/A	N/A
Sets (Note 6)	C _{CSI,1}		1110111111 1011111101 1111110111 1111111	N/A	N/A
MBSFN Subframe Allocation (Note 7)			N/A	001000 100001 000100 000000	001000 100001 000100 000000
Number of control			2	Note 8	Note 8
Number of PHIC			1	N/A	N/A
PHICH o Unused RE-s			Normal OCNG	N/A OCNG	N/A OCNG
Cyclic			Normal	Normal	Normal

Table 8.4.1.2.4-3: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS.
Note 2:	This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS.
Note 3:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [9]. The 4 th , 12 th , 19 th and 27 th subframes indicated by ABS pattern
	are MBSFN ABS subframes. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped
	with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in
1010 0.	[7].
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 7:	MBSFN Subframe Allocation as defined in [7], four frames with 24 bits are chosen for MBSFN subframe allocation.
Note 8:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 9:	The maximum number of uplink HARQ transmission is limited to 2 so that each PHICH channel transmission is in a subframe protected by MBSFN ABS in this test.
Note 10:	
Note 11:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in this test.

Table 8.4.1.2.4-4: Minimum performance PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregati on Level	Reference Channel	00	NG Patte	ern	Propagation Conditions (Note 1)				Correlation Matrix and	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3	Antenna Configuration (Note 2)	Pm- dsg (%)	SNR (dB) (Note 3)	
1	8 CCE	R.15-2 FDD	OP.1 FDD	OP.1 FDD	OP.1 FDD	EVA5	EVA5	EVA5	2x2 Low	1	-2.0	
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.											

8.4.2 TDD

The parameters specified in Table 8.4.2-1 are valid for all TDD tests unless otherwise stated.

Parame	eter	Unit	Single antenna port	Transmit diversity
Uplink downlink o (Note	•		0	0
Special subframe (Note	•		4	4
Number of PDC	CH symbols	symbols	2	2
Number of PHICH	l groups (<i>N</i> g)		1	1
PHICH du	ration		Normal	Normal
Unused RE-s a	and PRB-s		OCNG	OCNG
Cell I	D		0	0
Deurslink zeuer	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
Downlink power allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
N_{oc} at antenna port		dBm/15kHz	-98	-98
Cyclic p	refix		Normal	Normal
ACK/NACK feed	back mode		Multiplexing	Multiplexing
		2-2 in TS 36.211 [4 2-1 in TS 36.211 [4		

Table 8.4.2-1: Test Parameters for PDCCH/PCFICH

8.4.2.1 Single-antenna port performance

For the parameters specified in Table 8.4.2-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Referen	ce value
number		level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	10 MHz	8 CCE	R.15 TDD	OP.1 TDD	ETU70	1x2 Low	1	-1.6

8.4.2.2 Transmit diversity performance

8.4.2.2.1 Minimum Requirement 2 Tx Antenna Port

For the parameters specified in Table 8.4.2-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.4.2.2.1-1: Minimum performance PDCCH/PCFICH

Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Referen	ce value
number		level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	10 MHz	4 CCE	R.16 TDD	OP.1 TDD	EVA70	2 x 2 Low	1	0.1

8.4.2.2.2 Minimum Requirement 4 Tx Antenna Port

For the parameters specified in Table 8.4.2-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Reference	e value
number		level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	5 MHz	2 CCE	R.17 TDD	OP.1 TDD	EPA5	4 x 2 Medium	1	6.5

 Table 8.4.2.2.2-1: Minimum performance PDCCH/PCFICH

8.4.2.2.3 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS)

For the parameters for non-MBSFN ABS specified in Table 8.4.2-1 and Table 8.4.2.2.3-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3.. In Table 8.4.2.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

For the parameters for MBSFN ABS specified in Table 8.4.2-1 and Table 8.4.2.3-3, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.3-4. The downlink physical channel setup for Cell 1 is according to Annex C3.2 and for Cell 2 is according to Annex C.3.3, respectively.

	Paramete	r	Unit	Cell 1	Cell 2			
Uplii	nk downlink co			1	1			
	ial subframe co			4	4			
Davuali		PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3			
	ink power ocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3			
		N _{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A			
N_{oc} at a	ntenna port	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A			
		N _{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A			
	\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.4.2.2.3-2	1.5			
	BW _{Channe}	l	MHz	10	10			
S	ubframe Config	guration		Non-MBSFN	Non-MBSFN			
Tin	ne Offset betwe	en Cells	μs	2.5 (synchro	nous cells)			
	Cell Id			0	1			
	ABS pattern (N	ote 4)		N/A	0000010001 0000000001			
RLM/RI	RM Measurem Pattern(Note			0000000001 0000000001				
CSI S	Subframe	C _{CSI,0}		0000010001 0000000001	N/A			
Sets	(Note 6)	C _{CSI,1}		1100101000 1100111000	N/A			
Numbe	er of control OF	DM symbols		3				
AC	K/NACK feedba	ack mode		Multiplexing				
Num	ber of PHICH g			1				
	PHICH dura			extended				
Ur	nused RE-s and			OCNG				
	Cyclic pref			Normal	Normal			
Note 1: Note 2:	overlapping wi	th the aggressor <i>i</i> pplied in OFDM s	ymbols #1, #2, #3, #5, # ABS. ymbols #0, #4, #7, #11 o					
Note 3: This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS Note 4: ABS pattern as defined in [9]. PDCCH/PCFICH other than that associated with SIB1/Paging are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell.								
Note 5:								
			ime-domain measureme	ent resource restrictio	n pattern for CSI			
Note 7:		erving cell. Cell 2 i	s the aggressor cell. The	e number of the CRS	ports in Cell1			
Note 8:		be transmitted in C	Cell2 in the test.					

Table 8.4.2.2.3-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Test Numbe r	Aggregatio n Level	Referenc e Channel	OCNG	Pattern	ern Propagation Conditions (Note 1)		Correlation Matrix and Antenna	Reference Value		
			Cell 1	Cell 2	Cell 1	Cell 2	Configuration	Pm- dsg (%)	SNR (dB) (Note 2)	
1	8 CCE	R15-1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	2x2 Low	1	-3.9	
Note 1:	The propagation				are statisti	cally indep	endent.			
Note 2:	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.									
Note 3:	The correlation	n matrix and a	ntenna co	nfiguration	apply for	Cell 1 and	Cell 2.			

Table 8.4.2.2.3-2: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Paramete	er	Unit	Cell 1	Cell 2				
Uplink downlink co			1	1				
Special subframe c	- V		4	4				
Downlink power	PCFICH_RA PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3				
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3				
	N _{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A				
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A				
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A				
\widehat{E}_s/N_{oc}		dB	Reference Value in Table 8.4.2.2.3-4	1.5				
BW _{Channe}	9	MHz	10	10				
Subframe Config	guration		Non-MBSFN	MBSFN				
Time Offset betwe	een Cells	μS	2.5 (synchro	onous cells)				
Cell Id			0	126				
ABS pattern (N	lote 4)		N/A	0000000001 0000000001				
RLM/RRM Measurem Pattern(Not			0000000001 0000000001					
CSI Subframe	C _{CSI,0}		0000000001 0000000001	N/A				
Sets(Note 6)	C _{CSI,1}		1100111000 1100111000	N/A				
MBSFN Subframe Allo	cation (Note 9)		N/A	000010				
Number of control OF			3					
ACK/NACK feedb			Multiplexing					
Number of PHICH			1					
PHICH dura			extended					
Unused RE-s an			OCNG Normal	Normal				
Cyclic pret				1				
Note 1: This noise is applied in OFDM symbols #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13 of a subframe overlapping with the aggressor ABS. Note 2: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS. Note 3: This noise is applied in OFDM symbols #0 of a subframe overlapping with the aggressor ABS. Note 4: ABS pattern as defined in [9]. The 10 th and 20 th subframes indicated by ABS pattern are MBSFN ABS subframes.PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the MBSFN ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.								
[7].	Time-domain measurement resource restriction pattern for PCell measurements as defined in							
measurement Note 7: Cell 1 is the s	measurements defined in [7]. Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.							
Note 8: SIB-1 will not	be transmitted in rame Allocation as	Cell2 in this test. s defined in [7], one fram	ne with 6 bits is chose	en for MBSFN				

Table 8.4.2.2.3-3: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregati on Level	Reference Channel	OCNG	Pattern			Correlation Matrix and	Referen	Reference Value	
			Cell 1	Cell 2	Cell 1	Cell 2	Antenna Configurati on	Pm-dsg (%)	SNR (dB) (Note 2)	
1	8 CCE	R15-1 TDD	OP.1	OP.1	EVA5	EVA5	2x2 Low	1	-4.1	
			TDD	TDD						
Note 1:	The propagation				statistically ir	ndependen	t.			
Note 2:	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.									
Note 3:	The correlation	matrix and ar	ntenna confi	guration ap	ply for Cell 1	and Cell 2				

 Table 8.4.2.2.3-4: Minimum performance PDCCH/PCFICH – MBSFN ABS

8.4.2.2.4 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

For the parameters for non-MBSFN ABS specified in Table 8.4.2-1 and Table 8.4.2.2.4-1, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.4-2.

For the parameters for MBSFN ABS specified in Table 8.4.2-1 and Table 8.4.2.2.4-3, the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.4.2.2.4-4.

In Tables 8.4.2.2.4-1 and 8.4.2.2.4-3, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Param	eter	Unit	Cell 1	Cell 2	Cell 3					
Uplink downlink		onic	1	1	1					
Special subframe			4	4	4					
	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3					
Downlink power allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3					
	N _{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A					
N_{oc} at antenna	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A					
port	N _{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A					
\widehat{E}_s/N	oc2	dB	Reference Value in Table 8.4.2.2.4-2	5	3					
BW _{Cha}	annel	MHz	10	10	10					
Subframe Co	nfiguration		Non-MBSFN	Non-MBSFN	Non-MBSFN					
Time Offset be	tween Cells	μs	N/A	3	-1					
Frequency shift I	between Cells	Hz	N/A	300	-100					
Cell	Id		0	126	1					
ABS pattern			N/A	0000000001 0000000001	0000000001 0000000001					
RLM/RRM Me Subframe Patt			0000000001 0000000001	N/A	N/A					
CSI Subframe	C _{CSI,0}		0000000001 0000000001	N/A	N/A					
Sets (Note 6)	C _{CSI,1}		1100111000 1100111000	N/A	N/A					
Number of con symb			2	Note 7	Note 7					
ACK/NACK fee	dback mode		Multiplexing	N/A	N/A					
Number of PHIC	H groups (<i>N</i> g)		1	N/A	N/A					
PHICH d	uration		Normal	N/A	N/A					
Unused RE-s	and PRB-s		OCNG	OCNG	OCNG					
Cyclic p	orefix		Normal	Normal	Normal					
Note 1: This no	ise is applied in C	FDM symbols #1, #	#2, #3, #5, #6, #8,	#9, #10, #12, #13	of a subframe					
Note 2: This no		ressor ABS.)FDM symbols #0,	#4, #7, #11 of a su	bframe overlappir	ng with the					
Note 3: This no Note 4: ABS pa transmi										
		ent resource restrict	tion pattern for PC	ell measurements	s as defined in					
Note 6: As conf	igured according ements defined ir	to the time-domain	measurement reso	ource restriction p	attern for CSI					
Note 7: The nur		FDM symbols is not	available for ABS	and is 2 for the s	ubframe					
		ports in Cell1, Cell2 tted in Cell2 and Ce		ame.						

Table 8.4.2.2.4-1: Test Parameters for PDCCH/PCFICH – Non-MBSFN ABS

Test Number	Aggregati on Level	Reference Channel	00	NG Patte	ern	Propagation Conditions (Note 1)			Correlation Matrix and	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3	Antenna Configuration (Note 2)	Pm- dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	1	-2.0
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.										

Table 8.4.2.2.4-2: Minimum performance PDCCH/PCFICH – Non-MBSFN ABS

Para	meter	Unit	Cell 1	Cell 2	Cell 3
Uplink downli	nk configuration		1	1	1
Special subfra	me configuration		4	4	4
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
	N_{oc1}	dBm/15kHz	-98(Note 1)	N/A	N/A
N_{oc} at antenna	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
port	N _{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
\widehat{E}_{s} /	N _{oc2}	dB	Reference Value in Table 8.4.2.2.4-4	5	3
BW	Channel	MHz	10	10	10
Subframe (Configuration		Non-MBSFN	MBSFN	MBSFN
Time Offset	between Cells	μs	N/A	3	-1
Frequency shi	ft between Cells	Hz	N/A	300	-100
Ce	ell Id		0	126	1
ABS patte	ern (Note 4)		N/A	0000000001 00000000001	0000000001 00000000001
	Measurement attern (Note 5)		0000000001 0000000001	N/A	N/A
CSI Subframe	C _{CSI,0}		0000000001 0000000001	N/A	N/A
Sets (Note 6)	C _{CSI,1}		1100111000 1100111000	N/A	N/A
	rame Allocation ote 7)		N/A	000010	000010
Number of contr	ol OFDM symbols		2	Note 8	Note 8
	eedback mode		Multiplexing	N/A	N/A
Number of PH	ICH groups (Ng)		1	N/A	N/A
PHICH	duration		Normal	N/A	N/A
Unused RE	-s and PRB-s		OCNG	OCNG	OCNG
	c prefix		Normal	Normal	Normal
a sub Note 2: This r Note 3: This r Note 4: ABS r MBSF are tra	frame overlapping v noise is applied in O noise is applied in O pattern as defined ir N ABS subframes. Ansmitted in the ser subframe of aggress	FDM symbols #1, #2 vith the aggressor A FDM symbols #0 of FDM symbols of a s fn [9]. The 10 th and 20 PDSCH other than ving cell subframe w sor cell and the subf	BS. a subframe overla ubframe overlappi 0 th subframes indic SIB1/paging and it <i>r</i> hen the subframe	pping with the ag ng with aggresso ated by ABS pat s associated PD0 is overlapped wi	ggressor ABS. or non-ABS tern are CCH/PCFICH th the MBSFN
[7].		ent resource restricti			
meas	urements defined in				
subfra	ame allocation.	tion as defined in [7]	-		
indica	ted by "0" of ABS p				
Note 9: Cell 1		Cell 2 is the aggress	sor cell. The number	er of the CRS po	rts in Cell1 and
Note 10: SIB-1	will not be transmit	ted in Cell2 in this te	est.		

Table 8.4.2.2.4-3: Test Parameters for PDCCH/PCFICH – MBSFN ABS

Test Number	Aggregati on Level	Reference Channel	00	NG Patte	ern		ropagati itions (N		Correlation Matrix and	Reference Value	
			Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell3	Antenna Configuration (Note 2)	Pm- dsg (%)	SNR (dB) (Note 3)
1	8 CCE	R.15-2 TDD	OP.1 TDD	OP.1 TDD	OP.1 TDD	EVA5	EVA5	EVA5	2x2 Low	1	-1.8
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to \hat{E}_s/N_{ar2} of cell 1.										

 Table 8.4.2.2.4-4: Minimum performance PDCCH/PCFICH – MBSFN ABS

8.5 Demodulation of PHICH

The receiver characteristics of the PHICH are determined by the probability of miss-detecting an ACK for a NACK (Pm-an). It is assumed that there is no bias applied to the detection of ACK and NACK (zero-threshold delection).

8.5.1 FDD

The parameters specified in Table 8.5.1-1 are valid for all FDD tests unless otherwise stated.

Param	eter	Unit	Single antenna port	Transmit diversity
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH du	uration		Normal	Normal
Number of PHICH	groups (Note 1)		Ng = 1	Ng = 1
PDCCH C	Content			be included with the n aligned with A.3.6.
Unused RE-s	and PRB-s		OCNG	OCNG
Cell	D		0	0
N_{oc} at ante	enna port	dBm/15kHz	-98	-98
Cyclic p	orefix		Normal	Normal
Note 1: accordin	g to Clause 6.9 in	TS 36.211 [4]		

Table 8.5.1-1: Test Parameters for PHICH

8.5.1.1 Single-antenna port performance

For the parameters specified in Table 8.5.1-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.1.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth Reference OCNG Propagation		Antenna	Reference value			
number		Channel	Pattern	Condition	configuration and correlation Matrix	Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 FDD	ETU70	1 x 2 Low	0.1	5.5
2	10 MHz	R.24	OP.1 FDD	ETU70	1 x 2 Low	0.1	0.6

Table 8.5.1.1-1: Minimum performance PHICH

8.5.1.2 Transmit diversity performance

8.5.1.2.1 Minimum Requirement 2 Tx Antenna Port

For the parameters specified in Table 8.5.1-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.1.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.5.1.2.1-1: Minimum	performance PHICH
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Test	Bandwidth	Reference	OCNG	Propagation	Antenna	Reference value	
number		Channel	Pattern	Condition	configuration and correlation Matrix	Pm-an (%)	SNR (dB)
1	10 MHz	R.19	OP.1 FDD	EVA70	2 x 2 Low	0.1	4.4

8.5.1.2.2 Minimum Requirement 4 Tx Antenna Port

For the parameters specified in Table 8.5.1-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Reference	OCNG				
number		Channel	Pattern	Condition	configuration and correlation Matrix	Pm-an (%)	SNR (dB)
1	5 MHz	R.20	OP.1 FDD	EPA5	4 x 2 Medium	0.1	6.1

8.5.1.2.3 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS)

For the parameters specified in Table 8.5.1-1 and Table 8.5.1.2.3-1, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3. In Table 8.5.1.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Paramete	r	Unit	Cell 1	Cell 2
Downlink power allocation	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
N_{oc} at antenna port	N_{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N_{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
\widehat{E}_{s}/N_{oc2}		dB	Reference Value in Table 8.5.1.2.3- 2	1.5
BW _{Channe}	l	MHz	10	10
Subframe Config	guration		Non-MBSFN	Non-MBSFN
Time Offset betwe	een Cells	μs	2.5 (synchror	nous cells)
Cell Id			0	1
ABS pattern (N	lote 4)		N/A	00000100 00000100 00000100 01000100 00000100
RLM/RRM Measurem Pattern (Not			00000100 00000100 00000100 00000100 00000100	N/A
CSI Subframe Sets (Note 6)	C _{CSI,0}		00000100 00000100 00000100 01000100 00000100	N/A
	C _{CSI,1}		11111011 11111011 11111011 10111011 10111011 11111011	N/A
Number of control OF			3	
Number of PHICH of PHICH of PHICH dura			1 extended	
Unused RE-s and			OCNG	OCNG
Cyclic pref Note 1: This noise is a		 ymbols #1, #2, #3, #5, #	Normal	Normal
Note 2: This noise is a aggressor ABS Note 3: This noise is a Note 4: ABS pattern as subframe is ow indicated by th Note 5: Time-domain r [7] Note 6: As configured measurements	pplied in OFDM s s defined in [9]. Pl erlapped with the e ABS pattern. neasurement reso according to the ti s defined in [7]	ABS ymbols #0, #4, #7, #11 o ymbols of a subframe ov HICH is transmitted in th ABS subframe of aggre ource restriction pattern ime-domain measureme s the aggressor cell. The	verlapping with aggres e serving cell subfram ssor cell but not in the for PCell measuremer nt resource restriction	esor non-ABS be when the 26 th subframe nts as defined in pattern for CSI
Cell2 is the sa			- 1	

Table 8.5.1.2.3-1: Test	Parameters for PHICH

Test Number	Reference Channel	OCNG	Pattern	Conditions Conf (Note 1)		Antenna Configuration and	Refere	nce Value	
		Cell 1	Cell 2	Cell 1	Cell 2	Correlation Matrix	Pm-an (%)	SNR (dB) (Note 2)	
1	R.19	OP.1 FDD	OP.1 FDD	EPA5	EPA5	2x2 Low	0.1	4.6	
Note 1:					ell 2 are s	tatistically indepen	dent.		
Note 2:	SNR correspor	SNR corresponds to \hat{E}_s/N_{oc2} of cell 1.							
Note 3:	The correlation	matrix ar	d antenna	a configura	ation appl	y for Cell 1 and Ce	ll 2.		

Table 8.5.1.2.3-2: Minimum performance PHICH

8.5.1.2.4 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

For the parameters specified in Table 8.5.1-1 and Table 8.5.1.2.4-1, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.1.2.4-2. In Table 8.5.1.2.4-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Param	eter	Unit	Cell 1	Cell 2	Cell 3
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
N_{oc} at antenna	N_{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
port	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
\widehat{E}_s/N		dB	Reference Value in Table 8.5.1.2.4- 2	5	3
BW _{Cha}	annel	MHz	10	10	10
Subframe Co	nfiguration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset be	tween Cells	μs	N/A	3	-1
Frequency shift I	between Cells	Hz	N/A	300	-100
Cell	ld		0	126	1
PDCCH (PDCCH Content		UL Grant should be included with the proper information aligned with A.3.6.	N/A	N/A
ABS pattern	n (Note 4)		N/A	00000100 00000100 00000100 00000100 00000100	00000100 00000100 00000100 00000100 00000100
RLM/RRM Me Subframe Patt			00000100 00000100 00000100 00000100 00000100	N/A	N/A
CSI Subframe	C _{CSI,0}		00000100 00000100 00000100 00000100 00000100	N/A	N/A
Sets (Note 6)	C _{CSI,1}		11111011 11111011 11111011 11111011 11111011 11111011	N/A	N/A
Number of control			2	Note 7	Note 7
Number of PHIC			1	N/A	N/A
PHICH di			Normal	N/A	N/A
Unused RE-s	and PRB-s		OCNG Normal	OCNG Normal	OCNG Normal

Table 8.5.1.2.4-1:	Test Parameters for PHICH
1 abit 0.J.1.2.4-1.	

Note 1:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe
	overlapping with the aggressor ABS
Note 2:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 3:	This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 4:	ABS pattern as defined in [9]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in the 26 th subframe indicated by the ABS pattern.
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 7:	The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern.
Note 8:	The number of the CRS ports in Cell 1, Cell 2 and Cell 3 is the same.
Note 9:	SIB-1 will not be transmitted in Cell 2 and Cell 3 in the test.

Table 8.5.1.2.4-2: Minimum performance PHICH

Test Number	Reference Channel	00	NG Patte	ern	Propagation Conditions (Note 1)		Antenna Configuration	Refere	ence Value	
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	and Correlation Matrix (Note 2)	Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 FDD	OP.1 FDD	OP.1 FDD	EPA5	EVA5	EVA5	2x2 Low	0.1	5.0
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to \hat{E}_s/N_{oc2} of Cell 1.									

8.5.2 TDD

The parameters specified in Table 8.5.2-1 are valid for all TDD tests unless otherwise stated.

Param	eter	Unit	Single antenna port	Transmit diversity
Uplink downlink configuration (Note 1)			1	1
Special subframe (Note			4	4
	PDCCH_RA PHICH_RA OCNG_RA	dB	0	-3
Downlink power allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	0	-3
PHICH d	uration		Normal	Normal
Number of PHICH	groups (Note 3)		Ng = 1	Ng = 1
PDCCH (Content			I be included with the on aligned with A.3.6.
Unused RE-s	and PRB-s		OCNG	OCNG
Cell	ID		0	0
N_{oc} at ante	$N_{\it oc}$ at antenna port		-98	-98
Cyclic prefix			Normal	Normal
ACK/NACK fee			Multiplexing	Multiplexing
	fied in Table 4.2-2			
	fied in Table 4.2-1		.]	
Note 3: accordin	g to Clause 6.9 in	15 36.211 [4]		

Table 8.5.2-1: Test Parameters for PHICH

8.5.2.1 Single-antenna port performance

For the parameters specified in Table 8.5.2-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	width Reference OCNG Propagation Antenna		Antenna	Reference value		
number		Channel	Pattern	Condition	configuration and correlation Matrix	Pm-an (%)	SNR (dB)
1	10 MHz	R.18	OP.1 TDD	ETU70	1 x 2 Low	0.1	5.8
2	10 MHz	R.24	OP.1 TDD	ETU70	1 x 2 Low	0.1	1.3

Table 8.5.2.1-1: Minimum performance PHICH

8.5.2.2 Transmit diversity performance

8.5.2.2.1 Minimum Requirement 2 Tx Antenna Port

For the parameters specified in Table 8.5.2-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Reference	OCNG	Propagation	tion Antenna Reference		ce value
number		Channel	Pattern	Condition	configuration and correlation Matrix	Pm-an (%)	SNR (dB)
1	10 MHz	R.19	OP.1 TDD	EVA70	2 x 2 Low	0.1	4.2

Table 8.5.2.2.1-1: Minimum performance PHICH

8.5.2.2.2 Minimum Requirement 4 Tx Antenna Port

For the parameters specified in Table 8.5.2-1 the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Test number	Bandwidth	Reference Channel	OCNG Pattern	Propagation Condition	Antenna configuration and correlation Matrix	Referen Pm-an (%)	ce value SNR (dB)
1	5 MHz	R.20	OP.1 TDD	EPA5	4 x 2 Medium	0.1	6.2

Table 8.5.2.2.2-1: Minimum performance PHICH

8.5.2.2.3 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS)

For the parameters specified in Table 8.5.2-1 and Table 8.5.2.2.3-1, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.3-2. The downlink physical setup is in accordance with Annex C.3.2 and Annex C.3.3, In Table 8.5.2.2.3-1, Cell 1 is the serving cell, and Cell 2 is the aggressor cell. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 is according to Annex C.3.3, respectively.

Paramete	r	Unit	Cell 1	Cell 2
	Uplink downlink configuration		1	1
Special subframe configuration			4	4
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3
Downlink power allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3
	N _{oc1}	dBm/15kHz	-100.5 (Note 1)	N/A
N_{oc} at antenna port	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A
	N _{oc3}	dBm/15kHz	-95.3 (Note 3)	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 8.5.2.2.3-2	1.5
BW _{Channe}	I	MHz	10	10
Subframe Config	guration		Non-MBSFN	Non-MBSFN
Time Offset between Cells		μs	2.5 (synchrone	ous cells)
Cell Id			0	1
ABS pattern (Note 4)			N/A	0000010001 0000000001
	RLM/RRM Measurement Subframe Pattern (Note 5)		000000001 0000000001	N/A
CSI Subframe Sets	C _{CSI,0}		0000010001 0000000001	N/A
(Note 6)	C _{CSI,1}		1100101000 1100111000	N/A
Number of control OF	DM symbols		3	
ACK/NACK feedb	ack mode		Multiplexing	
Number of PHICH g			1	
PHICH dura			extended	
Unused RE-s and			OCNG	OCNG
Cyclic pref			Normal	Normal
 Note 1: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS Note 2: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS 				
Note 3:This noise is applied in OFDM symbols of a subframe overlapping with aggressor non-ABSNote 4:ABS pattern as defined in [9]. PHICH is transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell but not in subframe 5				
Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]				
Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]				
Note 7: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 Cell2 is the same.				
Note 8: SIB-1 will not	be transmitted in	Cell2 in the test.		

Test Number	Reference Channel	OCNG	Pattern	Propagation Conditions (Note 1)		Antenna Configuration and	Refere	nce Value
		Cell 1	Cell 2	Cell 1	Cell 2	Correlation Matrix	Pm-an (%)	SNR (dB) (Note 2)
1	R.19	OP.1 TDD	OP.1 TDD	EPA5	EPA5	2x2 Low	0.1	4.6
Note 1:		The propagation conditions for Cell 1 and Cell 2 are statistically independent.						
Note 2:	SNR corresponds to \widehat{E}_s/N_{oc2} of cell 1.							
Note 3:	The correlation	matrix ar	nd antenna	a configura	ation appl	y for Cell 1 and Ce	ll 2.	

Table 8.5.2.2.3-2: Minimum performance PHICH

8.5.2.2.4 Minimum Requirement 2 Tx Antenna Port (demodulation subframe overlaps with aggressor cell ABS and CRS assistance information are configured)

For the parameters specified in Table 8.5.2-1 and Table 8.5.2.2.4-1, the average probability of a miss-detecting ACK for NACK (Pm-an) shall be below the specified value in Table 8.5.2.2.4-2. In Table 8.5.2.2.4-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Paran	neter	Unit	Cell 1	Cell 2	Cell 3
Uplink downlink configuration			1	1	1
Special subfram	Special subframe configuration		4	4	4
Downlink power	PDCCH_RA PHICH_RA OCNG_RA	dB	-3	-3	-3
allocation	PCFICH_RB PDCCH_RB PHICH_RB OCNG_RB	dB	-3	-3	-3
	N_{oc1}	dBm/15kHz	-98 (Note 1)	N/A	N/A
N_{oc} at antenna	N _{oc2}	dBm/15kHz	-98 (Note 2)	N/A	N/A
port	N_{oc3}	dBm/15kHz	-93 (Note 3)	N/A	N/A
\widehat{E}_s/N	V _{oc2}	dB	Reference Value in Table 8.5.2.2.4-2	5	3
BW _{Cr}	nannel	MHz	10	10	10
Subframe Co	onfiguration		Non-MBSFN	Non-MBSFN	Non- MBSFN
Time Offset b	etween Cells	μs	N/A	3	-1
Frequency shift	between Cells	Hz	N/A	300	-100
Cell	ld		0	126	1
PDCCH Content			UL Grant should be included with the proper information aligned with A.3.6.	N/A	N/A
ABS patter	ABS pattern (Note 4)		N/A	0000000001 0000000001	000000001
RLM/RRM Measu	amont Subframa		000000001	000000001	000000001
Pattern (0000000001 0000000001	N/A	N/A
CSI Subframe	C _{CSI,0}		0000000001 0000000001	N/A	N/A
Sets (Note 6)	C _{CSI,1}		1100111000 1100111000	N/A	N/A
Number of contro	OFDM symbols		2	Note 7	Note 7
ACK/NACK fee			Multiplexing	N/A	N/A
Number of PHIC			1	N/A	N/A
PHICH c			Normal	N/A	N/A
Unused RE-s			OCNG	OCNG	OCNG
Cyclic Note 1: This noi			Normal	Normal	Normal
overlap Note 2: This noi aggress Note 3: This noi Note 4: ABS pa subfram	ping with the aggre se is applied in OF or ABS se is applied in OF ttern as defined in ne is overlapped wi	ssor ABS DM symbols #0, # DM symbols of a [9]. PHICH is tran th the ABS subfra	#2, #3, #5, #6, #8, #9 #4, #7, #11 of a subf subframe overlappir smitted in the servin me of aggressor cel tion pattern for PCel	rame overlapping ng with aggressor g cell subframe w l but not in subfra	y with the non-ABS /hen the me 5
 Note 6: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7] Note 7: The number of control OFDM symbols is not available for ABS and is 2 for the subframe indicated by "0" of ABS pattern. 					
	nber of the CRS po ill not be transmitte		2 and Cell 3 is the s ell 3 in the test.	ame.	

Table 8.5.2.2.4-1: Test Parameters for PHICH

Test Number	Reference Channel	OCNG Patter				Conditions (Note 1) Configu		Antenna Configuration	Refere	ence Value
		Cell 1	Cell 2	Cell 3	Cell 1	Cell 2	Cell 3	and Correlation Matrix (Note 2)	Pm-an (%)	SNR (dB) (Note 3)
1	R.19	OP.1 TDD	OP.1 TDD	OP.1 TDD	EPA5	EVA5	EVA5	2x2 Low	0.1	5.7
Note 1: Note 2: Note 3:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent. The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3. SNR corresponds to \hat{E}_s/N_{oc2} of Cell 1.									

Table 8.5.2.2.4-2: Minimum performance PHICH

8.6 Demodulation of PBCH

The receiver characteristics of the PBCH are determined by the probability of miss-detection of the PBCH (Pm-bch), which is defined as

$$Pm - bch = 1 - \frac{A}{B}$$

Where A is the number of correctly decoded MIB PDUs and B is the Number of transmitted MIB PDUs (Redundancy versions for the same MIB are not counted separately).

8.6.1 FDD

 Table 8.6.1-1: Test Parameters for PBCH

Parame	ter	Unit	Single antenna port	Transmit diversity	
Downlink power	PBCH_RA	dB	0	-3	
allocation	PBCH_RB	dB	0	-3	
$N_{\it oc}$ at anter	$N_{\scriptscriptstyle oc}$ at antenna port		-98	-98	
Cyclic pr	Cyclic prefix		Normal	Normal	
Cell I)		0	0	
Note 1:as specified in Table 4.2-2 in TS 36.211 [4]Note 2:as specified in Table 4.2-1 in TS 36.211 [4]					

8.6.1.1 Single-antenna port performance

For the parameters specified in Table 8.6.1-1 the average probability of a miss-detecting PBCH (Pm-bch) shall be below the specified value in Table 8.6.1.1-1. The downlink physical setup is in accordance with Annex C.3.2.

 Table 8.6.1.1-1: Minimum performance PBCH

Γ	Test	Bandwidth	Reference	Propagation	Antenna	Referen	ce value
	number		Channel	Condition	configuration and correlation Matrix	Pm-bch (%)	SNR (dB)
	1	1.4 MHz	R.21	ETU70	1 x 2 Low	1	-6.1

8.6.1.2 Transmit diversity performance

8.6.1.2.1 Minimum Requirement 2 Tx Antenna Port

For the parameters specified in Table 8.6.1-1 the average probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.1.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Reference	Propagation	Antenna	Referen	ce value
number		Channel	Condition	configuration and correlation Matrix	Pm-bch (%)	SNR (dB)
4		D 00		2 x 2 L our	1	4.0

Table 8.6.1.2.1-1: Minimum performance PBCH

8.6.1.2.2 Minimum Requirement 4 Tx Antenna Port

For the parameters specified in Table 8.6.1-1 the average probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.1.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.6.1.2.2-1: Minimum performance PBCH

Test	Bandwidth	Reference	Propagation	Antenna	Referen	ce value
number		Channel	Condition	configuration	Pm-bch (%)	SNR (dB)
				and		
				correlation		
				Matrix		
1	1.4 MHz	R.23	EVA5	4 x 2 Medium	1	-3.5

8.6.1.2.3 Minimum Requirement 2 Tx Antenna Port under Time Domain Measurement Resource Restriction with CRS Assistance Information

For the parameters specified in Table 8.6.1.2.3-1 and Table 8.6.1.2.3-2, the averaged probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.1.2.3-2. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, repectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Parameter		Unit	Cell 1	Cell 2	Cell 3
Downlink power	PBCH_RA OCNG_RA	dB	-3	-3	-3
allocation	PBCH_RB OCNG_RB	dB	-3	-3	-3
N_{oc} at ant	enna port	dBm/15kHz	-98	N/A	N/A
	5	dB	Reference Value in Table 8.6.1.2.3-2	4	2
BWc	hannel	MHz	1.4	1.4	1.4
Time Offset b	etween Cells	μs	N/A	3	-1
Frequency shift	Frequency shift between Cells		N/A	300	-100
Cel	l ld		0	126	1
ABS Patter	ABS Pattern (Note 4)		N/A	01000000 01000000 01000000 01000000 01000000	01000000 01000000 01000000 01000000 01000000
Unused RE-	s and PRB-s		OCNG	OCNG	OCNG
Cyclic			Normal	Normal	Normal
 Note 1: The number of the CRS ports in Cell1, Cell2 and Cell 3 is the same. Note 2: SIB-1 will not be transmitted in Cell2 and Cell 3 in the test. Note 3: The PBCH transmission from Cell 1, Cell 2 and Cell 3 overlap. The same PBCH transmission redundancy version is used for Cell 1, Cell 2 and Cell 3. Note 4: ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel. 					

Table 8.6.1.2.3-2: Minir	num performance PBCH
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Test	Reference	Propagation Conditions (Note 1)		Antenna Configuration	Reference Value		
Number	Channel	Cell 1	Cell 2	Cell 3	and Correlation Matrix (Note 2)	Pm-bch (%)	SNR (dB) (Note 3)
1	R.22	ETU30	ETU30	ETU30	2x2 Low	1	[-3.0]
Note 1:	The propagation	on conditions fo	or Cell 1, 0	Cell 2 and Cell	3 are statistically independent	t.	
Note 2:	The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.						
Note 3:	SNR correspo	nds to \hat{E}_s / N_o	$_c$ of cell 1.				

8.6.2 TDD

Parame	ter	Unit	Single antenna port	Transmit diversity	
Uplink downlink o (Note 1			1	1	
Special subframe (Note 2	•		4	4	
Downlink power allocation	PBCH_RA PBCH_RB	dB dB	0	-3 -3	
N_{oc} at antenna port		dBm/15kHz	-98	-98	
Cyclic pr	efix		Normal	Normal	
Cell I)		0	0	
Note 1:as specified in Table 4.2-2 in TS 36.211 [4].Note 2:as specified in Table 4.2-1 in TS 36.211 [4].					

Table 8.6.2-1: Test Parameters for PBCH

8.6.2.1 Single-antenna port performance

For the parameters specified in Table 8.6.2-1 the average probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

1	Test	Bandwidth	Reference	Propagation	Antenna	Referen	ce value
	number		Channel	Condition	configuration and correlation Matrix	Pm-bch (%)	SNR (dB)
	1	1.4 MHz	R.21	ETU70	1 x 2 Low	1	-6.4

8.6.2.2 Transmit diversity performance

8.6.2.2.1 Minimum Requirement 2 Tx Antenna Port

For the parameters specified in Table 8.6.2-1 the average probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.2.2.1-1. The downlink physical setup is in accordance with Annex C.3.2.

Test number	Bandwidth	Reference Channel	Propagation Condition	Antenna configuration and correlation Matrix	Referen Pm-bch (%)	ce value SNR (dB)
1	1.4 MHz	R.22	EPA5	2 x 2 Low	1	-4.8

8.6.2.2.2 Minimum Requirement 4 Tx Antenna Port

For the parameters specified in Table 8.6.2-1 the average probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.2.2.2-1. The downlink physical setup is in accordance with Annex C.3.2.

Test	Bandwidth	Reference	Propagation	Antenna	Referen	ce value
number		Channel	Condition	configuration and correlation Matrix	Pm-bch (%)	SNR (dB)
1	1.4 MHz	R.23	EVA5	4 x 2 Medium	1	-4.1

Table 8.6.2.2.2-1: Minimum performance PBCH

8.6.2.2.3 Minimum Requirement 2 Tx Antenna Port under Time Domain Measurement Resource Restriction with CRS Assistance Information

For the parameters specified in Table 8.6.2.2.3-1 and Table 8.6.2.3-2, the averaged probability of a miss-detected PBCH (Pm-bch) shall be below the specified value in Table 8.6.2.2.3-2. Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggressor cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Parameter			Unit	Cell 1	Cell 2	Cell 3	
Downlink power		PBCH_RA OCNG_RA	dB	-3	-3	-3	
allocati	ion	PBCH_RB OCNG_RB	dB	-3	-3	-3	
No	$_{c}$ at ante	enna port	dBm/15kHz	-98	N/A	N/A	
	$rac{\widehat{E}_s}{N_{oc}}$,	dB	Reference Value in Table 8.6.2.2.3-2	4	2	
	BW_{Char}	annel	MHz	1.4	1.4	1.4	
Time Offset between Cells			μs	N/A	3	-1	
Frequency shift between Cells			Hz	N/A	300	-100	
	Cell	ld		0	126	1	
ABS	S Patterr	n (Note 4)		N/A	0000000001 0000000001	0000000001 0000000001	
Unuse	ed RE-s	and PRB-s		OCNG	OCNG	OCNG	
	Cyclic p	orefix		Normal	Normal	Normal	
Note 2: Note 3:	Note 2:SIB-1 will not be transmitted in Cell2 and Cell 3 in the test.Note 3:The PBCH transmission from Cell 1, Cell 2 and Cell 3 overlap. The same PBCH transmission						
Note 4:	redundancy version is used for Cell 1, Cell 2 and Cell 3. te 4: ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is overlapped with the ABS subframe of aggressor cell and the subframe is available in the definition of the reference channel.						

Table 8.6.2.2.3-1: Test Parameters for PBCH

Table 8.6.2.2.3-2: Minimum	performance PBCH
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Test	Reference	Propagation Conditions (Note 1)		Antenna Configuration	Refe	erence Value		
Number	Channel	Cell 1	Cell 2	Cell 3	and Correlation Matrix (Note 2)	Pm-bch (%)	SNR (dB) (Note 3)	
1	R.22	ETU30	ETU30	ETU30	2x2 Low	1	[-3.0]	
Note 1:	The propagation	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.						
Note 2:	The correlation matrix and antenna configuration apply for Cell 1, Cell 2 and Cell 3.							
Note 3:	SNR correspo	SNR corresponds to \hat{E}_s/N_{ac} of cell 1.						

8.7 Sustained downlink data rate provided by lower layers

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum number of DL-SCH transport block bits received within a TTI for the UE category indicated. The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement. The size of the TB per TTI corresponds to the largest possible DL-SCH transport block for each UE category using the maximum number of layers for spatial multiplexing. Transmission modes 1 and 3 are used with radio conditions resembling a scenario where sustained maximum data rates are available. Test case is selected according to table 8.7-1 depending on UE capability for CA and EPDCCH.

Table 8.7-1: SDR test applicability

	Single carrier UE not supporting EPDCCH	CA UE not supporting EPDCCH	Single carrier UE supporting EPDCCH	CA UE supporting EPDCCH
FDD	8.7.1	8.7.1	8.7.3	8.7.1, 8.7.3
TDD	8.7.2	8.7.2	8.7.4	8.7.2, 8.7.4

8.7.1 FDD

The parameters specified in Table 8.7.1-1 are valid for all FDD tests unless otherwise stated.

Parameter	Unit	Value
Cyclic prefix		Normal
Cell ID		0
Inter-TTI Distance		1
Number of HARQ processes per component carrier	Processes	8
Maximum number of HARQ transmission		4
Redundancy version coding sequence		{0,0,1,2} for 64QAM
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1
Cross carrier scheduling		Not configured
Propagation condition		Static propagation condition No external noise sources are applied

Table 8.7.1-1: Common Test Parameters (FDD)

The requirements are specified in Table 8.7.1-3, with the addition of the parameters in Table 8.7.1-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified inTable 8.7.1-4. The TB success rate shall be sustained during at least 300 frames.

Test Bandwidth		th Transmission	Antenna	Codebook subset	Downlink power allocation (dB)			$\hat{E}_{_{s}}$ at	Symbols for
Test	(MHz)	mode	configuration	restriction	$ ho_{\scriptscriptstyle A}$	$ ho_{\scriptscriptstyle B}$	σ	antenna port (dBm/15kHz)	unused PRBs
1	10	1	1 x 2	N/A	0	0	0	-85	OP.6 FDD
2	10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3,4,6	20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3A	10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3B, 4A	2x10	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
3C, 4B	15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6A	2x20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6B	10+15	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6C	10+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
6D	15+20	3	2 x 2	10	-3	-3	0	-85	OP.1 FDD
Note 1	For CA test	•	rmat 1b with char	-			-		

Table 8.7.1-2: test parameters for sustained downlink data rate (FDD)

Note 1: For CA test cases, PUCCH format 1b with channel selection is used to feedback ACK/NACK.

Table 8.7.1-3: Minimum requirement (FDD)

Test	Number of bits of a DL-SCH transport	Measurement channel	Reference value					
	block received within a TTI		TB success rate [%]					
1	10296	R.31-1 FDD	95					
2	25456	R.31-2 FDD	95					
3	51024	R.31-3 FDD	95					
3A	36696 (Note 2)	R.31-3A FDD	85					
3B	25456	R.31-2 FDD	95					
3C	51024	R.31-3C FDD	85					
4	75376 (Note 3)	R.31-4 FDD	85					
4A	36696 (Note 2)	R.31-3A FDD	85					
4B	55056 (Note 5)	R.31-4B FDD	85]					
6	75376 (Note 3)	R.31-4 FDD	85					
6A	75376 (Note 3)	R.31-4 FDD	85					
6B	36696 (Note 2) for 10MHz CC	R.31-3A FDD for 10MHz carrier	85					
	55056 for 15MHz CC	CC						
		R.31-5 FDD for 15MHz CC						
6C	36696 (Note 2) for 10MHz CC	R.31-3A FDD for 10MHz CC	85					
	75376 (Note 3) for 20MHz CC	R.31-4 FDD for 20MHz CC						
6D	55056 for 15MHz CC	R.31-5 FDD for 15MHz CC	85					
	75376 (Note 3) for 20MHz CC	R.31-4 FDD for 20MHz CC						
Note 1:	For 2 layer transmissions, 2 transport blocks	are received within a TTI.						
Note 2:	35160 bits for sub-frame 5.							
Note 3:	71112 bits for sub-frame 5.							
Note 4:	The TB success rate is defined as TB success rate = 100%*N _{DL_correct_rx} / (N _{DL_newtx} + N _{DL_retx}), where N _{DL_newtx} is							
	the number of newly transmitted DL transport blocks, N _{DL_retx} is the number of retransmitted DL transport							
	blocks, and N _{DL_correct_rx} is the number of correctly received DL transport blocks.							
Note 5:	52752bits for sub-frame 5.							

CA config	Maximum supported Bandwidth/ Bandwidth combination (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7								
Cingle	10	1	2	ЗA	ЗA	-	-								
Single carrier	15	-	-	3C	4B	-	-								
Carrier	20	-	-	3	4	6	6								
	10+10	-	-	3B	4A	4A	4A								
	10+15	-	-	3B	4A	6B	6B								
CL_A_ A	10+20	-	-	3B	4A	6C	6C								
A	15+20	-	-	3B	4A	6D	6D								
	20+20	-	-	3B	4A	6A	6A								
CL_C	20+20	-	-	3 (Note 4)	4 (Note 4)	6A	6A								
Note 1:	If UE can be tested	for CA configu	iration, single	carrier test is sl	kipped.										
Note 2:															
Note 3:	For CA UE, test is selected for bandwidth combination corresponding to maximum aggregated bandwidth														
Note 4:				by category 3 of	r 4 UE, single c	arrier test is se	among all CA configuration supported by UE. If CL_C is the only CA configuration supported by category 3 or 4 UE, single carrier test is selected.								

Table 8.7.1-4: Test points for sustained data rate (FRC)

8.7.2 TDD

The parameters specified in Table 8.7.2-1 are valid for all TDD tests unless otherwise stated.

Parameter	Unit	Value				
Special subframe configuration (Note 1)		4				
Cyclic prefix		Normal				
Cell ID		0				
Inter-TTI Distance		1				
Maximum number of HARQ transmission		4				
Redundancy version coding sequence		{0,0,1,2} for 64QAM				
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1				
Cross carrier scheduling		Not configured				
Propagation condition		Static propagation condition No external noise sources are applied				
Note 1: as specified in Table 4.2-1 in TS 36.211 [4].						

Table 8.7.2-1: Common Test Parameters (TDD)

The requirements are specified in Table 8.7.2-3, with the addition of the parameters in Table 8.7.2-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified inTable 8.7.2-4. The TB success rate shall be sustained during at least 300 frames.

Test	Bandwidth (MHz)	Transmission mode	Antenna configuration	Codebook subset restriction		Downlink power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation (dB)		power allocation		power allocation		power allocation (dB)		\hat{E}_s at antenna port (dBm/15kHz)	ACK/NACK feedback mode	Symbols for unused PRBs
					O_A	$ ho_{\scriptscriptstyle B}$	σ	· ,																												
1	10	1	1 x 2	N/A	0	0	0	-85	Bundling	OP.6 TDD																										
2	10	3	2 x 2	10	- 3	-3	0	-85	Bundling	OP.1 TDD																										
3	20	3	2 x 2	10	- 3	-3	0	-85	Bundling	OP.1 TDD																										
ЗA	15	3	2 x 2	10	- 3	-3	0	-85	Muliplexing	OP.2 TDD																										
4,6	20	3	2 x 2	10	- 3	-3	0	-85	Multiplexing	OP.1 TDD																										
6A	2x20	3	2 x 2	10	- 3	-3	0	-85	- (Note 1)	OP.1 TDD																										
Note 1:	PUCCH for	mat 1b with chan	nel selection is us	sed to feedbac	ck A	CK/NA	ACK.	ı																												

Table 8.7.2-2: test parameters for sustained downlink data rate (TDD)

Table 8.7.2-3: Minimum requirement (TDD)

Test	Number of bits of a DL-SCH transport block received within a TTI for normal/special sub- frame	Measurement channel	Reference value TB success rate [%]	
1	10296/0	R31-1 TDD	95	
2	25456/0	R31-2 TDD	95	
3	51024/0	R31-3 TDD	95	
ЗA	51024/0	R31-3A TDD	85	
4	75376/0 (Note 2)	R31-4 TDD	85	
6	75376/0 (Note 2)	R.31-4 TDD	85	
6A 75376/0 (Note 2)		R.31-4 TDD	85	
Note 2: 71112 k	yer transmissions, 2 transport blocks are bits for sub-frame 5. success rate is defined as TB success ra		+ No) where No	

Note 3: The TB success rate is defined as TB success rate = 100%*N_{DL_correct_rx}/ (N_{DL_newtx} + N_{DL_retx}), where N_{DL_newtx} is the number of newly transmitted DL transport blocks, N_{DL_retx} is the number of retransmitted DL transport blocks, and N_{DL_correct_rx} is the number of correctly received DL transport blocks.

CA config	Bandwidth/ Bandwidth combination (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7		
Cincela	10	1	2	-	-	-	-		
Single	15	-	-	ЗA	ЗA	-	-		
carrier	20	-	-	3	4	6	6		
CL_C	20+20		-	3 (Note 4)	4 (Note 4)	6A	6A		
CL_A-A	20+20		-	3 (Note 4)	4 (Note 4)	6A	6A		
Note 1:	If UE can be tested	or CA configur	ation, single ca	rrier test is skip	ped.				
Note 2:	For non-CA UE, test	is selected for	maximum sup	ported bandwid	th.				
Note 3:									
Note 4:	If CL C is the only C	•••	•	category 3 or 4	UE, single carr	ier test is select	ed		

8.7.3 FDD (EPDCCH scheduling)

The parameters specified in Table 8.7.3-1 are valid for all FDD tests unless otherwise stated.

Table 8.7.3-1: Common test parameters (FDD)

Parameter	Unit	Value					
Cyclic prefix		Normal					
Cell ID		0					
Inter-TTI Distance		1					
Number of HARQ							
processes per	Processes	8					
component carrier							
Maximum number of		4					
HARQ transmission		+					
Redundancy version		{0,0,1,2} for 64QAM					
coding sequence		(0,0,1,2) 101 04 QAM					
Number of OFDM							
symbols for PDCCH per	OFDM symbols	1					
component carrier							
Cross carrier scheduling		Not configured					
Number of EPDCCH		1					
sets		1					
EPDCCH transmission		Localized					
type							
Number of PRB per		2 PRB pairs					
EPDCCH set and		10MHz BW: Resource blocks $n_{PRB} = 48, 49$					
EPDCCH PRB pair		15MHz BW: Resource blocks $n_{PRB} = 70, 71$					
allocation		20MHz BW: Resource blocks n _{PRB} = 98, 99					
EPDCCH Starting		Derived from CFI (i.e. default behaviour)					
Symbol							
ECCE Aggregation		2 ECCEs					
Level							
Number of EREGs per		4					
ECCE		EDDOOLL					
EPDCCH scheduling		EPDCCH candidate is randomly assigned					
•		in each subframe					
EPDCCH precoder		Fixed PMI 0					
(Note 1) EPDCCH monitoring SF		111111111 000000000					
0							
pattern		<u>111111111 000000000</u> 100					
Timing advance	μs	Static propagation condition					
Propagation condition		No external noise sources are applied					
Note 1: EPDCCH precoder parameters are defined for tests with 2 x 2 antenna							
configuration							
connyuration							

The requirements are specified in Table 8.7.3-3, with the addition of the parameters in Table 8.7.3-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified in Table 8.7.3-4. The TB success rate shall be sustained during at least 300 frames.

Table 8.7.3-2: Test parameters for SDR test for PDSCH scheduled by	
	y Ei DOOII (i DD)

Test	Bandwidth	Bandwidth Transmission Antenna Codebook			ownlinl Ilocatio			$\hat{E}_{_{s}}$ at	Symbols for	
Test	(MHz)	mode	configuration	restriction	$ ho_{\scriptscriptstyle A}$	$ ho_{\scriptscriptstyle B}$	σ	δ	antenna port (dBm/15kHz)	unused PRBs
1	10	1	1 x 2	N/A	0	0	0	0	-85	OP.6 FDD
2	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3,4,6	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
ЗA	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD
3C, 4B	15	3	2 x 2	10	-3	-3	0	3	-85	OP.1 FDD

Test	Number of bits of a DL-SCH transport	Measurement channel	Reference value					
	block received within a TTI		TB success rate [%]					
1	10296	R.31E-1 FDD	95					
2	25456	R.31E-2 FDD	95					
3	51024	R.31E-3 FDD	95					
ЗA	36696 (Note 2)	R.31E-3A FDD	85					
3C	51024	R.31E-3C FDD	85					
4	75376 (Note 3)	R.31E-4 FDD	85					
4B	55056 (Note 5)	R.31E-4B FDD	85					
6	75376 (Note 3)	R.31E-4 FDD	85					
Note 1:	For 2 layer transmissions, 2 transport blocks	are received within a TTI.						
Note 2:	35160 bits for sub-frame 5.							
Note 3:	71112 bits for sub-frame 5.							
Note 4:	The TB success rate is defined as TB success rate = 100%*N _{DL_correct_rx} / (N _{DL_newtx} + N _{DL_retx}), where N _{DL_newtx} is							
	the number of newly transmitted DL transport blocks, N _{DL retx} is the number of retransmitted DL transport							
	blocks, and N _{DL correct rx} is the number of correctly received DL transport blocks.							
Note 5:	52752 bits for sub-frame 5.							

Table 8.7.3-4: Test points for sustain	ed data rate (FRC)
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CA config	Bandwidth (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7
Single carrier	10	1	2	3A	3A	-	-
	15	-	-	3C	4B	-	-
	20	-	-	3	4	6	6
Note 1:	I: The test is selected for maximum supported bandwidth.						

8.7.4 TDD (EPDCCH scheduling)

The parameters specified in Table 8.7.4-1 are valid for all TDD tests unless otherwise stated.

Table 8.7.4-1: Common test parameters (TDD)

Parameter	Unit	Value			
Special subframe configuration (Note 1)		4			
Cyclic prefix		Normal			
Cell ID		0			
Inter-TTI Distance		1			
Maximum number of HARQ transmission		4			
Redundancy version coding sequence		{0,0,1,2} for 64QAM			
Number of OFDM symbols for PDCCH per component carrier	OFDM symbols	1			
Cross carrier scheduling		Not configured			
Number of EPDCCH sets		1			
EPDCCH transmission type		Localized			
Number of PRB per EPDCCH set and EPDCCH PRB pair allocation		2 PRB pairs 10MHz BW: Resource blocks $n_{PRB} = 48$, 49 15MHz BW: Resource blocks $n_{PRB} = 70$, 71 20MHz BW: Resource blocks $n_{PRB} = 98$, 99			
EPDCCH Starting Symbol		Derived from CFI (i.e. default behaviour)			
ECCE Aggregation Level		2 ECCEs			
Number of EREGs per ECCE		4 for normal subframe and 8 for special subframe			
EPDCCH scheduling		EPDCCH candidate is randomly assigned in each subframe			
EPDCCH precoder (Note 2)		Fixed PMI 0			
EPDCCH monitoring SF pattern		UL-DL configuration 1: 1101111111 000000000 UL-DL configuration 5: 1100111001 0000000000			
Timing advance	μs	100			
Propagation condition		Static propagation condition No external noise sources are applied			
Note 1: As specified in Table 4.2-1 in TS 36.211 [4]. Note 2: EPDCCH precoder parameters are defined for tests with 2 x 2 antenna configuration					

The requirements are specified in Table 8.7.4-3, with the addition of the parameters in Table 8.7.4-2 and the downlink physical channel setup according to Annex C.3.2. The test points are applied to UE category, CA capability and bandwidth combination with maximum aggregated bandwidth as specified inTable 8.7.4-4. The TB success rate shall be sustained during at least 300 frames.

Test	Bandwidth (MHz)	Transmission	Antenn a	Codebook subset		nlink catio			$\hat{E}_{_{s}}$ at antenna port	Symbols for unused	ACK/NACK feedback	
	(101712)	mode configu restrict		restriction	$ ho_{\scriptscriptstyle A}$	$ ho_{\scriptscriptstyle B}$	σ	δ	(dBm/15kHz)	PRBs	mode	
1	10	1	1 x 2	N/A	0	0	0	0	-85	OP.6 TDD	Bundling	
2	10	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Bundling	
3	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Bundling	
3A	15	3	2 x 2	10	-3	-3	0	3	-85	OP.2 TDD	Multiplexing	
4,6	20	3	2 x 2	10	-3	-3	0	3	-85	OP.1 TDD	Multiplexing	

Table 8.7.4-2: Test parameters for SDR test for PDSCH scheduled by EPDCCH (TDD)

Table 8.7.4-3: Minimum requirement (TDD)

Test	Number of bits of a DL transport block received a TTI for normal/specia frame	within	Reference value TB success rate [%]
1	10296/0	R.31E-1 TDD	95
2	25456/0	R.31E-2 TDD	95
3	51024/0	R.31E-3 TDD	95
ЗA	51024/0	R.31E-3A TDD	85
4	75376/0 (Note 2)	R.31E-4 TDD	85
6	75376/0 (Note 2)	R.31E-4 TDD	85
Note 2: 71 ² Note 3: The the	number of newly transmitted DL tr	blocks are received within a TTI. success rate = 100%*N _{DL_correct_rx} / (N _{DL_nev} ansport blocks, N _{DL_retx} is the number of re of correctly received DL transport blocks.	

Table 8.7.4-4: Test	points for sustained data rate (FRC)

CA config	Bandwidth/ Bandwidth combination (MHz)	Category 1	Category 2	Category 3	Category 4	Category 6	Category 7					
Circala	10	1	2	-	-	-	-					
Single	15	-	-	ЗA	ЗA	-	-					
carrier	20	-	-	3	4	6	6					
Note 1	The test is selected	The test is selected for maximum supported bandwidth										

The test is selected for maximum supported bandwidth. Note 1:

Demodulation of EPDCCH 8.8

The receiver characteristics of the EPDCCH are determined by the probability of miss-detection of the Downlink Scheduling Grant (Pm-dsg). For the distributed transmission tests in 8.8.1, EPDCCH and PCFICH are tested jointly, i.e. a miss detection of PCFICH implies a miss detection of EPDCCH. For other tests, EPDCCH and PCFICH are not tested jointly.

Distributed Transmission 8.8.1

8.8.1.1 FDD

The parameters specified in Table 8.8.1.1-1 are valid for all FDD distributed EPDCCH tests unless otherwise stated.

			1	1			
	Parame	Unit	Value				
	f PDCCH syr	symbols	2 (Note 1)				
PHICH du	ration		Normal				
	E-s and PRE	3-s		OCNG			
Cell ID			0				
		$ ho_{\scriptscriptstyle A}$	dB	-3			
Downlink	oower	$ ho_{\scriptscriptstyle B}$	dB	-3			
allocation		σ	dB	0			
		δ	dB	3			
$N_{\scriptscriptstyle oc}$ at an	tenna port	dBm/15 kHz	-98				
Cyclic pret	fix		Normal				
Subframe	Configuratio		Non-MBSFN				
Precoder Update Granularity			PRB	1			
			ms	1			
	ing Pre-Cod		Annex B. 4.4				
Cell Speci	fic Reference	e Signal		Port 0 and 1			
Number of	FEPDCCH S	ets Configured		2 (Note 2)			
Number of	FPRB per EF	PDCCH Set		4 (1 st Set) 8 (2 nd Set)			
EPDCCH	Subframe M	onitoring		NA			
PDSCH T	M			TM3			
DCI Forma	at			2A			
Note 1:	lote 1: The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling <i>epdcch-StartSymbol-r11</i> is not						
Note 2:	configured. ote 2: The two sets are distributed EPDCCH sets and non- overlapping with PRB = {3, 17, 31, 45} for the first set and PRB = {0, 7, 14, 21, 28, 35, 42, 49} for the second set. EPDCCH is scheduled in the first set for Test 1 and second set for Test 2, respectively. Both sets are always configured.						

 Table 8.8.1.1-1: Test Parameters for Distributed EPDCCH

For the parameters specified in Table 8.8.1.1-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.1.1-2. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.1.1-2: Minimum performance Distributed EPDCCH

Test	Bandwidth	Aggregatio	Reference	OCNG	Propagation	Antenna	Referenc	e value
number		n level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	10 MHz	4 ECCE	R.55 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	2.60
2	10 MHZ	16 ECCE	R.56 FDD	OP.7 FDD	EVA70	2 x 2 Low	1	-3.20

8.8.1.1.1 Void

Table 8.8.1.1.1-1: Void

8.8.1.2 TDD

The parameters specified in Table 8.8.1.2-1 are valid for all TDD distributed EPDCCH tests unless otherwise stated.

	Param	Unit	Value				
Number of	f PDCCH sy	symbols	2 (Note 1)				
PHICH du			Normal				
	E-s and PRE	3-s		OCNG			
Cell ID			0				
		$ ho_{\scriptscriptstyle A}$	dB	-3			
Downlink allocation	oower	$ ho_{\scriptscriptstyle B}$	dB	-3			
anocation		σ	dB	0			
		δ	dB	3			
$N_{\scriptscriptstyle oc}$ at an	tenna port	dBm/15 kHz	-98				
Cyclic pre	fix			Normal			
Subframe	Configuratio	n		Non-MBSFN			
Procedor	Update Grar	PRB	1				
Fiecodel	Opuale Grai	ms	1				
	ing Pre-Cod		Annex B. 4.4				
	fic Referenc		Port 0 and 1				
Number of	FEPDCCH S		2 (Note 2)				
Number o	f PRB per El		4 (1 st Set) 8 (2 nd Set)				
EPDCCH	Subframe M	onitoring		NA			
PDSCH T	М			TM3			
DCI Forma	at			2A			
TDD UL/D	L Configura	tion		0			
TDD Spec	ial Subfram			1 (Note 3)			
Note 1:	The starting symbol for EPDCCH is derived from the PCFICH. RRC signalling <i>epdcch-StartSymbol-r11</i> is not configured.						
Note 3:	Note 2:The two sets are distributed EPDCCH sets and non- overlapping with PRB = {3, 17, 31, 45} for the first set and PRB = {0, 7, 14, 21, 28, 35, 42, 49} for the second set. EPDCCH is scheduled in the first set for Test 1 and second set for Test 2, respectively. Both sets are always configured.						

 Table 8.8.1.2-1: Test Parameters for Distributed EPDCCH

For the parameters specified in Table 8.8.1.2-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.1.2-2. The downlink physical setup is in accordance with Annex C.3.2.

 Table 8.8.1.2-2: Minimum performance Distributed EPDCCH

ſ	Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Reference v	
	number		level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
	1	10 MHz	4 ECCE	R.55 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	2.8
[2	10 MHZ	16 ECCE	R.56 TDD	OP.7 TDD	EVA70	2 x 2 Low	1	-3.10

8.8.1.2.1 Void

Table 8.8.1.2.1-1: Void

8.8.2 Localized Transmission with TM9

8.8.2.1 FDD

The parameters specified in Table 8.8.2.1-1 are valid for all FDD TM9 localized ePDCCH tests unless otherwise stated.

Param	eter	Unit	Value				
Number of PDCCH sy	mbols	symbols	1 (Note 1)				
EPDCCH starting sym	bol	symbols	2 (Note 1)				
PHICH duration		-	Normal				
Unused RE-s and PRE	3-s		OCNG				
Cell ID			0				
	$ ho_{\scriptscriptstyle A}$	dB	0				
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0				
allocation	σ	dB	-3				
	δ	dB	0				
N_{oc} at antenna port		dBm/15 kHz	-98				
Cyclic prefix			Normal				
Subframe Configuration	n		Non-MBSFN				
		PRB	1				
Precoder Update Granularity		ms	1				
Beamforming Pre-Coc	ler		Annex B.4.5				
Cell Specific Reference	e Signal		Port 0 and 1				
CSI-RS Reference Sig			Port 15 and 16				
CSI-RS reference sigr	nal resource		0				
configuration			0				
CSI reference signal s	ubframe		2				
configuration I _{CSI-RS}							
ZP-CSI-RS configurati			00000100000000				
ZP-CSI-RS subframe	configuration I _{ZP-}		2				
CSI-RS							
Number of EPDCCH S			2 (Note 2)				
EPDCCH Subframe M			111111110 111111101 111111011				
subframePatternConfi	g-r11	-	111110111 (Note 3) TM9				
PDSCH TM							
set to 1. Note 2: The first set	Note 2: The first set is distributed transmission with PRB = {0, 49} and the second set is localized transmission with PRB = {0, 7, 14, 21, 28, 35, 42, 49}. ePDCCH is scheduled in the second set						
Note 3: EPDCCH is	scheduled in every		equired to monitor ePDCCH for UE-specific search atternConfig-r11. Legacy PDCCH is not scheduled.				

Table 8.8.2.1-1: Test Parameters for Localized EPDCCH with TM9
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For the parameters specified in Table 8.8.2.1-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.8.2.1-2. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is statDTX of [99.9%].

The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.2.1-2: Minimum	performance Localized EPDCCH with TM9

Test	Bandwidt	Aggregatio	Reference	OCNG	Propagatio	Antenna	Referenc	e value
numbe	r h	n level	Channel	Pattern	n Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	12.2
2	10 MHZ	8 ECCE	R.58 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	2.5

8.8.2.1.1 Void

Table 8.8.2.1.1-1: Void

8.8.2.1.2 Void

Table 8.8.2.1.2-1: Void

Table 8.8.2.1.2-2: Void

Table 8.8.2.1.2-3: Void

8.8.2.2 TDD

The parameters specified in Table 8.8.2.2-1 are valid for all TDD TM9 localized ePDCCH tests unless otherwise stated.

Parame	eter	Unit	Value	
Number of PDCCH syr	nbols	symbols	1 (Note 1)	
EPDCCH starting syml	loc	symbols	2 (Note 1)	
PHICH duration			Normal	
Unused RE-s and PRE	-s		OCNG	
Cell ID	-		0	
	$ ho_{\scriptscriptstyle A}$	dB	0	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0	
allocation	σ	dB	-3	
	δ	dB	0	
$N_{\scriptscriptstyle oc}$ at antenna port		dBm/15 kHz	-98	
Cyclic prefix			Normal	
Subframe Configuratio	n		Non-MBSFN	
		PRB	1	
Precoder Update Gran	ularity	ms	1	
Beamforming Pre-Cod	er		Annex B.4.5	
Cell Specific Reference			Port 0 and 1	
CSI-RS Reference Sig	nal		Port 15 and 16	
CSI-RS reference sign	al resource		0	
configuration			-	
CSI reference signal su	ubtrame		0	
configuration I _{CSI-RS}	an hitman		000001000000000	
ZP-CSI-RS configuration	on bilinap		00000100000000	
CSI-RS	configuration IZP-		0	
Number of EPDCCH S	ets		2 (Note 2)	
EPDCCH Subframe MosubframePatternConfig			1100011000 1100010000 1100011000 1100001000 1100011000 1000011000 1100011000 (Note 3)	
PDSCH TM			TM9	
TDD UL/DL Configurat	ion		0	
TDD Special Subframe			1 (Note 4)	
		H is signalle	d with epdcch-StartSymbol-r11. However, CFI is	
Note 2: The first set is distributed transmission with PRB = {0, 49} and the second set is localized transmission with PRB = {0, 7, 14, 21, 28, 35, 42, 49}. ePDCCH is scheduled in the second for all tests.				
space only i	equired to monitor ePDCCH for UE-specific search PatternConfig-r11. Legacy PDCCH is not scheduled.			
Note 4: Demodulation	on performance is a	veraged over	er normal and special subframe.	

Table 8.8.2.2-1: Test Parameters for Localized EPDCCH with TM9

For the parameters specified in Table 8.8.2.2-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified value in Table 8.2.2.2-2. EPDCCH subframe monitoring is configured and the subframe monitoring requirement in EPDCCH restricted subframes is statDTX of [99.9%].

The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.2.2-2: Minimum performance Localized EPDCCH with TM9

Test	Bandwidth	Aggregation	Reference	OCNG	Propagation	Antenna	Reference	e value
number		level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	10 MHz	2 ECCE	R.57 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	12.8
2	10 MHZ	8 ECCE	R.58 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	2.0

8.8.2.2.1 Void

Table 8.8.2.2.1-1: Void

8.8.2.2.2 Void

Table 8.8.2.2.2-1: Void

Table 8.8.2.2.2-2: Void

Table 8.8.2.2.2-3: Void

8.8.3 Localized transmission with TM10 Type B quasi co-location type

8.8.3.1 FDD

For the parameters specified in Table 8.8.3.1-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified values in Table 8.8.3.1-2. In Table 8.8.3.1-1, transmission point 1 (TP 1) is the serving cell. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.3.1-1: Test Parameters for Localized Transmission TM10 Type B quasi co-location type

Ba	Parameter		Te	est 1	Tes	st 2
		Unit	TP 1	TP 2	TP 1	TP 2
PHICH durat					ormal	
Downlink	$\rho_{\scriptscriptstyle A}$	dB			0	
power	$ ho_{\scriptscriptstyle B}$	dB			0	
allocation	σ	dB			-3	
	δ	dB			0	1
\hat{E}_s/N_{oc}		dB	0dB power imbalance is considered between TP 1 and TP 2,	Reference value in Table 8.8.3.1- 2	Reference value in Table 8.8.3.1- 2	Reference value in Table 8.8.3.1- 2
$N_{\scriptscriptstyle oc}$ at anten	na port	dBm/ 15kH z		-	98	
Bandwidth		MHz	10	10	10	10
Number of co EPDCCH Se	ts			lote 1)	2 (N	ote1)
EPDCCH-PR (setConfigId)			0	1	0	1
PRB-set	type of EPDCCH-		Localized	Localized	Localized	Localized
Number of P EPDCCH-PR	B-set	PRB	8	8	8	8
	amforming model		Annex B.4.5 TM10	Annex B.4.5 TM10	Annex B.4.5 TM10	Annex B.4.5 TM10
	PDSCH transmission mode PDSCH transmission scheduling		Blanked in all the subframes	Transmit in all the subframes	Probability of occurrence of PDSCH transmission is 30% (Note 3)	Probability of occurrence of PDSCH transmission is 70% (Note 3)
Non-zero power CSI	CSI reference signal configuration		N/A	0	N/A	0
reference signal (NZPId=1)	CSI reference signal subframe configuration I _{CSI-RS}		N/A	2	N/A	2
Non-zero power CSI	CSI reference signal configuration		N/A	N/A	10	N/A
reference signal (NZPId=2)	CSI reference signal subframe configuration <i>I</i> _{CSI-RS}		N/A	N/A	2	N/A
Zero power CSI reference	CSI-RS Configuration list (ZeroPowerCSI- RS bitmap)	Bitma p	N/A	0000010000000 000	N/A	1000010000000 000
signal (ZPId=1)	CSI-RS subframe configuration I _{CSI-RS}		N/A	2	N/A	2
Zero power CSI	CSI-RS Configuration list (ZeroPowerCSI- RS bitmap)	Bitma p	N/A	N/A	1000010000000 000	N/A
reference signal (ZPId=2)	CSI-RS subframe configuration I _{CSI-RS}		N/A	N/A	2	N/A
PQI set 0 (Note 4)	Non-Zero power CSI RS Identity (NZPId)		N/A	1	N/A	1

	Zero power CSI RS Identity (ZPId)		N/A	1	N/A	1		
PQI set 1	Non-Zero power CSI RS Identity (NZPId)		N/A	N/A	2	N/A		
(Note 4)	Zero power CSI RS Identity (ZPId)		N/A	N/A	2	N/A		
Number o	f PDCCH symbols	Symb ols	1 (Note 2)					
EPDCCH	starting position		pdsch-Start- r11=2 (Note 2)	pdsch-Start- r11=2 (Note 2)	pdsch-Start- r11=2 (Note 2)	pdsch-Start- r11=2 (Note 2)		
Subframe	configuration		Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN		
Time offs	et between TPs	μs	N/A	2	N/A	2		
Frequenc	y shift between TPs	Hz	N/A	200	N/A	200		
Cell ID			0	126	0	126		
Note 1: Note 2:	Note 1: Resource blocks n _{PRB} =0, 7, 14, 21, 28, 35, 42, 49 are allocated for both the first set and the second set.							
Note 3: The TP from which PDSCH is transmitted shall be randomly determined independently for each subframe Probabilities of occurrence of PDSCH transmission from TP 1 and TP 2 are specified.								
Note 4:	For PQI set 0, PDSCH transmitted from TP1.					and EPDCCH are		

Test	Aggregation	Reference	OCNG	Propagation	Antenna	Reference	e value
number	level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	2 ECCE	R.59 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	[13.4]
2	2 ECCE	R.59 FDD	OP.7 FDD	EVA5	2 x 2 Low	1	[13.4]

8.8.3.2 TDD

For the parameters specified in Table 8.8.3.2-1 the average probability of a missed downlink scheduling grant (Pm-dsg) shall be below the specified values in Table 8.8.3.2-2. In Table 8.8.3.2-1, transmission point 1 (TP1) is the serving cell. The downlink physical setup is in accordance with Annex C.3.2.

Table 8.8.3.2-1: Test Parameters for Localized Transmission TM10 Type B quasi co-location type

De	romotor	Unit	Те	est 1	Tes	st 2
	rameter	Unit	TP 1	TP 2	TP 1	TP 2
PHICH durat					ormal	
Downlink	$ ho_{\scriptscriptstyle A}$	dB			0	
power	$ ho_{\scriptscriptstyle B}$	dB			0	
allocation	σ	dB			-3	
	δ	dB			0	1
\hat{E}_s/N_{oc}		dB	0dB power imbalance is considered between TP 1 and TP 2,	Reference value in Table 8.8.3.2- 2	Reference value in Table 8.8.3.2- 2	Reference value in Table 8.8.3.2- 2
$N_{\scriptscriptstyle oc}$ at anten	na port	dBm/ 15kH z		-	98	
Bandwidth		MHz	10	10	10	10
Number of E			2 (N	lote 1)	2 (N	ote1)
EPDCCH-PR (setConfigId)			0	1	0	1
PRB-set	type of EPDCCH-		Localized	Localized	Localized	Localized
Number of P EPDCCH-PR	B-set	PRB	8	8	8	8
	amforming model		Annex B.4.5	Annex B.4.5	Annex B.4.5	Annex B.4.5
	PDSCH transmission mode PDSCH transmission scheduling		TM10 Blanked in all the subframes	TM10 Transmit in all the subframes	TM10 Probability of occurrence of PDSCH transmission is 30% (Note 3)	TM10 Probability of occurrence of PDSCH transmission is 70% (Note 3)
CSI reference configuration	S		Antenna ports 15,16	Antenna ports 15,16	Antenna ports 15,16	Antenna ports 15,16
Non-zero power CSI	CSI reference signal configuration		N/A	0	N/A	0
reference signal (NZPId=1)	CSI reference signal subframe configuration I _{CSI-RS}		N/A	0	N/A	0
Non-zero power CSI	CSI reference signal configuration		N/A	N/A	10	N/A
reference signal (NZPId=2)	CSI reference signal subframe configuration <i>I</i> _{CSI-RS}		N/A	N/A	0	N/A
Zero power CSI reference	CSI-RS Configuration list (ZeroPowerCSI- RS bitmap)	Bitma p	N/A	0000010000000 000	N/A	1000010000000 000
signal (ZPId=1)	CSI-RS subframe configuration I _{CSI-RS}		N/A	0	N/A	0
Zero power CSI reference	CSI-RS Configuration list (ZeroPowerCSI- RS bitmap)	Bitma p	N/A	N/A	1000010000000 000	N/A
signal (ZPId=2)	CSI-RS subframe configuration I _{CSI-RS}		N/A	N/A	0	N/A

PQI set 0	Non-Zero power CSI RS Identity (NZPId)		N/A	1	N/A	1		
(Note 4)	Zero power CSI RS Identity (ZPId)		N/A	1	N/A	1		
PQI set 1	Non-Zero power CSI RS Identity (NZPId)		N/A	N/A	2	N/A		
(Note 4)	Zero power CSI RS Identity (ZPId)		N/A	N/A	2	N/A		
Number of	f PDCCH symbols	Symb ols	1 (Note 2)					
EPDCCH	starting position		pdsch-Start- r11=2 (Note 2)	pdsch-Start- r11=2 (Note 2)	pdsch-Start- r11=2 (Note 2)	pdsch-Start- r11=2 (Note 2)		
Subframe	configuration		Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN		
Time offse	et between TPs	μs	N/A	2	N/A	2		
Frequency	/ shift between TPs	Hz	N/A	200	N/A	200		
Cell ID			0	126	0	126		
TDD UL/D	L configuration				0			
TDD spec	ial subframe				1			
Note 1:	Resource blocks n _{PRB}							
Note 2:	The starting OFDM sy	mbol for I	EPDCCH is deterr	nined from the high	er layer signalling p	dsch-Start-r11.		
	And CFI is set to 1.							
Note 3:	The TP from which PD					or each subframe.		
	Probabilities of occurre							
Note 4:	For PQI set 0, PDSCH					and EPDCCH are		
	transmitted from TP1. EPDCCH and PDSCH are transmitted from same TP.							

Table 8.8.3.2-2: Minimum Performance

Test	Aggregation	Reference	OCNG	Propagation	Antenna	Reference	e value
number	level	Channel	Pattern	Condition	configuration and correlation Matrix	Pm-dsg (%)	SNR (dB)
1	2 ECCE	R.59 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	[13.6]
2	2 ECCE	R.59 TDD	OP.7 TDD	EVA5	2 x 2 Low	1	[13.6]

9 Reporting of Channel State Information

9.1 General

This section includes requirements for the reporting of channel state information (CSI). For all test cases in this section,

the definition of SNR is in accordance with the one given in clause 8.1.1, where $S_{1.1}$

$$NR = \frac{\sum \hat{I}_{or}^{(j)}}{\sum N_{oc}^{(j)}}.$$

9.2 CQI reporting definition under AWGN conditions

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective conditions is determined by the reporting variance and the BLER performance using the transport format indicated by the reported CQI median. The purpose is to verify that the reported CQI values are in accordance with the CQI definition given in TS 36.213 [6]. To account for sensitivity of the input SNR the reporting definition is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.2.1 Minimum requirement PUCCH 1-0 (Cell-Specific Reference Symbols)

9.2.1.1 FDD

The following requirements apply to UE Category ≥ 1 . For the parameters specified in Table 9.2.1.1-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to Table A.4-1 shall be in the range of ± 1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI - 1) shall be less than or equal to 0.1.

Parameter		Unit	Te	Test 1 Test 2				
Bandwidth		MHz			10			
PDSCH transmission	on mode			1				
Downlink power	$ ho_{\scriptscriptstyle A}$	dB		0				
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0					
	σ	dB			0			
Propagation condit antenna configu				AWGI	N (1 x 2)			
SNR (Note 2	2)	dB	0	1	6	7		
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-98	-97	-92	-91		
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98 -98			98		
Max number of H transmission				1				
Physical channel f reporting	or CQI			PUCCH	Format 2			
PUCCH Report	Туре				4			
Reporting period	dicity	ms		Np	_d = 5			
cqi-pmi-Configurati	onIndex				6			
	Note 1: Reference measurement channel according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.							
Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.								

Table 9.2.1.1-1: PUCCH 1-0 static test (FDD)

9.2.1.2 TDD

The following requirements apply to UE Category ≥ 1 . For the parameters specified in Table 9.2.1.2-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported CQI value according to Table A.4-2 shall be in the range of ± 1 of the reported median more than 90% of the time. If the PDSCH BLER using the transport format indicated by median CQI is less than or equal to 0.1, the BLER using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER using the transport format indicated by the median CQI is greater than 0.1, the BLER using transport format indicated by (median CQI - 1) shall be less than or equal to 0.1.

Paramete	r	Unit	Те	st 1	Те	st 2
Bandwidt	า	MHz			10	
PDSCH transmiss	ion mode				1	
Uplink downlink co	nfiguration				2	
Special subfr	ame				4	
configuration	on				4	
Downlink nower	$ ho_{\scriptscriptstyle A}$	dB			0	
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB			0	
	σ	dB			0	
Propagation cond antenna configu				AWGI	N (1 x 2)	
SNR (Note	2)	dB	0	1	6	7
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-98	-97	-92	-91
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98 -98			98
Max number of	HARQ				1	
transmissio					I	
Physical channel	for CQI		PUSCH (Note 3)			
reporting				1 0001		
PUCCH Repor					4	
Reporting perio		ms		Np	_d = 5	
cqi-pmi-Configura					3	
ACK/NACK feedba					plexing	
		ent channel accordi		A.4-2 with one	sided dynam	IC OCNG
Pattern OP.1 TDD as described in Annex A.5.2.1. Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.						
Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2.						

Table 9.2.1.2-1: PUCCH 1-0 static test (TDD)

9.2.1.3 FDD (CSI measurements in case two CSI subframe sets are configured)

The following requirements apply to UE Category ≥ 1 . For the parameters specified in Table 9.2.1.3-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C.3.3-1 for Cell 2 and C.3.2-2, the reported CQI value according to Table A.4-1 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ± 1 of the reported median more than 90% of the time. If the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by (median CQI - 1) shall be less than or equal to 0.1. The value of the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets 0.1 and shall be larger than or equal to 0 and less than or equal to 1 in Test 2.

D		11-24		Tes	t 1		Te	st 2	
Parameter		Unit	Ce		Cell 2	Ce	ell 1	Cell 2	
Bandwidth		MHz		1(0	
PDSCH transmission	on mode		2	2	Note 10		2	Note 10	
Downlink power	$ ho_{\scriptscriptstyle A}$	dB		-3	3	-3			
allocation	$ ho_{\scriptscriptstyle B}$	dB		-3	3		-3		
	σ	dB		0			(C	
Propagation condit antenna configu			Clause B.1		3.1 (2x2)		Clause I	3.1 (2x2)	
\widehat{E}_{s}/N_{oc2} (Not		dB	4	5	6	4 5		-12	
$\mathbf{r}(i)$	$N_{oc1}^{(j)}$	dBm/15kHz	-102 (Note 7)		N/A		lote 7)	N/A	
$N_{oc}^{(j)}$ at antenna port	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (N	lote 8)	N/A		lote 8)	N/A	
pon	$N_{oc3}^{(j)}$	dBm/15kHz	-94.8 (I	Note 9)	N/A	-98(N	lote 9)	N/A	
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-94	-93	-92	-94	-93	-110	
Subframe Configu	uration		Non-N		Non-MBSFN		IBSFN	Non-MBSFN	
Cell Id			(1		0	1	
Time Offset betwee	en Cells	μs	2.5	(synchro	nous cells)	2.5	(synchr	onous cells)	
ABS pattern (Note 2)			N/A		01010101 01010101 01010101 01010101 01010101 01010101	N/A		01010101 01010101 01010101 01010101 01010101 01010101	
RLM/RRM Measu Subframe Pattern			00000100 00000100 00000100 00000100 00000100		N/A	00000100 00000100 00000100 00000100 00000100		N/A	
CSI Subframe Sets	C _{CSI,0}		0101 0101 0101 0101 0101 0101	0101 0101 0101 0101 0101	N/A	01010101 01010101 01010101 01010101 01010101 01010101		N/A	
(Note 3)	C _{CSI,1}		1010 1010 1010 1010	1010 1010 1010	N/A	1010 1010 1010 1010)1010)1010)1010)1010)1010)1010	N/A	
Number of control symbols	OFDM			3				3	
Max number of H transmission				1				1	
Physical channel for reporting	C _{CSI,0} CQI		F	PUCCH	Format 2		PUCCH	Format 2	
Physical channel for reporting	C _{CSI,1} CQI		F	PUSCH (Note 12)		PUSCH	(Note 12)	
PUCCH Report		N/-		4				4	
Reporting period cqi-pmi-Configurati C _{CSI,0} (Note 1	ionIndex	Ms	6	N _{pd}	= 5 N/A		N _{pd} 6	= 5 N/A	
cqi-pmi-Configuratio	onIndex2		5	;	N/A		5	N/A	

Table 9.2.1.3-1: PUCCH 1-0 static test (FDD)
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 Note 1: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level. Note 2: ABS pattern as defined in [9]. Note 3: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7] Note 4: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7] Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7] Note 6: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same. Note 7: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS. Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 10: Downlink physical channel setup in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 14: cq<i>i-pmi-ConfigurationIndex2</i> is applied for C_{CSI.0}. 		
 Note 2: ABS pattern as defined in [9]. Note 3: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7] Note 4: As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7] Note 5: Time-domain measurement resource restriction pattern for PCell measurements as defined in [7] Note 6: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same. Note 7: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS. Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 10: Downlink physical channel setup in Cell 1 accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQl it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: <i>cqi-pmi-ConfigurationIndex</i> is applied for C_{CS1.0}. 	Note 1:	
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 Note 6: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same. Note 7: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS. Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: <i>cqi-pmi-ConfigurationIndex</i> is applied for C_{CSI,0}. 	Note 4:	
 the same. Note 7: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS. Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: cqi-pmi-ConfigurationIndex is applied for CcsI.0. 	Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
 overlapping with the aggressor ABS. Note 8: This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS. Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: cqi-pmi-ConfigurationIndex is applied for C_{CSI,0}. 	Note 6:	
 ABS. Note 9: This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS. Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: cqi-pmi-ConfigurationIndex is applied for C_{CSI,0}. 	Note 7:	
 Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: cqi-pmi-ConfigurationIndex is applied for C_{CSI,0}. 	Note 8:	
 Note 10: Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5 Note 11: Reference measurement channel in Cell 1 according to Table A.4-1 for UE Cateogry 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: cqi-pmi-ConfigurationIndex is applied for C_{CSI,0}. 	Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
 dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP. 1/2 FDD as described in Annex A.5.1.1 and A.5.1.2. Note 12: To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: cqi-pmi-ConfigurationIndex is applied for C_{CSI,0}. 	Note 10	
instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3. Note 13: <i>cqi-pmi-ConfigurationIndex</i> is applied for C _{CSI,0} .	Note 11	dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1, and Table A.4-7 for Category 1 with
	Note 12	instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic
Note 14: cqi-pmi-ConfigurationIndex2 is applied for C _{CSI,1} .	Note 13	cqi-pmi-ConfigurationIndex is applied for C _{CSI,0}
	Note 14	cqi-pmi-ConfigurationIndex2 is applied for C _{CSI,1}

9.2.1.4 TDD (CSI measurements in case two CSI subframe sets are configured)

The following requirements apply to UE Category ≥ 1 . For the parameters specified in Table 9.2.1.4-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C3.3-1 for Cell 2 and C.3.2-2, the reported CQI value according to Table A.4-2 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ± 1 of the reported median more than 90% of the time. If the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by (median CQI - 1) shall be less than or equal to 0.1. The value of the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ minus the median CQI obtained by reports in CSI subframe sets 0.1 and shall be larger than or equal to 0 and less than or equal to 1 in Test 2.

				Tes	st 1		Te	st 2	
Parameter		Unit	Ce		Cell 2	Ce	ll 1	Cell 2	
Bandwidth		MHz			0		10		
PDSCH transmission			2	2	Note 10	2		Note 10	
Uplink downlink con					1		1		
Special subfra configuration				2	4		4	4	
Downlink power ρ_A		dB		-3			-3		
allocation	$ ho_{\scriptscriptstyle B}$	dB		-3			-3		
	σ	dB		()		(0	
Propagation condit antenna configu				Clause E	3.1 (2x2)		Clause I	B.1 (2x2)	
\widehat{E}_{s}/N_{oc2} (Not	te 1)	dB	4	5	6	4	5	-12	
	$N_{oc1}^{(j)}$	dBm/15kHz	-102 (1	Note 7)	N/A	-98 (N	lote 7)	N/A	
$N_{\scriptscriptstyle oc}^{(j)}$ at antenna	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)		N/A	-98 (N	lote 8)	N/A	
port	$N_{oc3}^{(j)}$	dBm/15kHz	-94.8 (Note 9)		N/A	-98 (N	lote 9)	N/A	
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-92	-94	-93	-110	
Subframe Configu	uration		Non-M	IBSFN	Non-MBSFN	Non-N	IBSFN	Non-MBSFN	
Cell Id			()	1	(C	1	
Time Offset betwee	en Cells	μs	2.5	(synchro	onous cells)	2.5	i (synchr	onous cells)	
ABS pattern (No	ote 2)		N/A		0100010001 0100010001	N	/A	0100010001 0100010001	
RLM/RRM Measu Subframe Pattern			000000001 0000000001		N/A		00001	N/A	
CSI Subframe Sets	C _{CSI,0}		0100010001 0100010001		N/A	0100010001 0100010001		N.A	
(Note 3)	C _{CSI,1}		1000101000 1000101000		N/A	1000101000 1000101000		N/A	
Number of control	OFDM		10001		-	10001		-	
symbols			3		3				
Max number of H transmission			1			1			
Physical channel for C _{CSI,0} CQI reporting			PUCCH Format 2			PUCCH Format 2			
Physical channel for $C_{CSI,1}$ CQI			PUSCH (Note 12)		1	PUS	SCH		
reporting PUCCH Report Type			4		+		1		
Reporting periodicity		ms			= 5		$\frac{4}{N_{\rm pd} = 5}$		
cqi-pmi-Configurati C _{CSI,0} (Note 1	ionIndex		3	3	N/A	:	3	N/A	
cqi-pmi-Configuratio	onIndex2			1	N/A		4	N/A	
ACK/NACK feedba				Multip	lexing		Multiplexing		

Table 9.2.1.4-1: PUCCH 1-0 static test (TDD)

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell1 and Cell2 is the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.2.5
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-2 for UE Category ≥2 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1, and Table A.4-8 for Category 1 with one/two sided dynami OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1 and Annex A.5.2.2.
Note 12:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 13:	
Note 14:	cqi-pmi-ConfigurationIndex2 is applied for C _{CSI,1} .

9.2.1.5 FDD (CSI measurements in case two CSI subframe sets are configured and with CRS assistance information)

The following requirements apply to UE Category ≥ 2 . For the parameters specified in Table 9.2.1.5-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C.3.3-2 for Cell 2 and Cell 3, and C.3.2-2, the reported CQI value according to Table A.4-1 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ± 1 of the reported median more than 90% of the time.

For test 1 and test 2, if the PDSCH BLER in ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ is less than or equal to 0.1, the BLER in ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by the set of the median CQI is greater than 0.1. If the PDSCH BLER in ABS subframes using transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

For test 2, if the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 2) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. The BLER in non-ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

		11. 2	Test 1 Test 2						
Parameter		Unit	Cell 1	Cell 2 and 3	Cell 1	Cell 2 and 3			
Bandwidth		MHz	1	-		0			
PDSCH transmission			2	Note 10	2 Note 10				
Downlink power	$ ho_{\scriptscriptstyle A}$	dB	-:			3			
allocation	$ ho_{\scriptscriptstyle B}$	dB			-3				
	σ	dB	C)	(0			
Propagation condition and antenna configuration			Clause E	3.1 (2x2)	Clause I	B.1 (2x2)			
$\widehat{E}_{s} ig / N_{oc2}$ (Not	te 1)	dB	4 5	Cell 2: 12 Cell 3: 10	13 14	Cell 2: 12 Cell 3: 10			
	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (Note 7)	N/A	-98 (Note 7)	N/A			
$N_{\scriptscriptstyle oc}^{(j)}$ at antenna port	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)	N/A	-98 (Note 8)	N/A			
pon	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)	N/A	-93 (Note 9)	N/A			
Subframe Config	uration		Non-MBSFN	Non-MBSFN	Non-MBSFN	Non-MBSFN			
Cell Id			0	Cell 2: 6 Cell 3: 1	0	Cell 2: 6 Cell 3: 1			
			Cell 2:		Cell 2:	3 usec			
Time Offset betwee	en Cells	μs	Cell 3: -1usec			-1usec			
Frequency Shift between Cells		Hz	Cell 2: 300Hz			300Hz			
			Cell 3: -100Hz		Cell 3: -100Hz				
ABS pattern (Note 2)			N/A	01010101 01010101 01010101 01010101 01010101 01010101	N/A	01010101 01010101 01010101 01010101 01010101 01010101			
RLM/RRM Measurement Subframe Pattern (Note 4)			00000100 00000100 00000100 00000100 00000100	N/A	00000100 00000100 00000100 00000100 00000100	N/A			
CSI Subframe Sets	C _{CSI,0}		01010101 01010101 01010101 01010101 01010101 01010101	N/A	01010101 01010101 01010101 01010101 01010101 01010101	N/A			
(Note 3)	C _{CSI,1}		10101010 10101010 10101010 10101010 10101010	N/A	10101010 10101010 10101010 10101010 10101010 10101010	N/A			
Number of control symbols	OFDM		3	8	;	3			
Max number of H transmissior			1			1			
Physical channel for C _{CSI,0} CQI reporting			PUCCH Format 2		PUCCH	Format 2			
Physical channel for C _{CSI,1} CQI reporting			PUSCH (Note 12)		PUSCH (Note 12)				
PUCCH Report Type			4	ŀ		4			
Reporting perio	dicity	Ms	N _{pd}	= 5	N _{pd}	= 5			
cqi-pmi-Configurati C _{CSI,0} (Note 1	3)		6	N/A	6	N/A			
cqi-pmi-Configuratio C _{CSI,1} (Note 1			5	N/A	5	N/A			

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell1, Cell2, and Cell3 are the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.
Note 12:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic
	CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 13:	cqi-pmi-ConfigurationIndex is applied for C _{CSL0} .
	$cqi-pmi-ConfigurationIndex2$ is applied for $C_{CSI,1}$.
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9.2.1.6 TDD (CSI measurements in case two CSI subframe sets are configured and with CRS assistance information)

The following requirements apply to UE Category ≥ 2 . For the parameters specified in Table 9.2.1.6-1, and using the downlink physical channels specified in tables C.3.2-1 for Cell 1, C3.3-2 for Cell 2 and Cell 3, and C.3.2-2, the reported CQI value according to Table A.4-2 in subframes overlapping with aggressor cell ABS and non-ABS subframes shall be in the range of ± 1 of the reported median more than 90% of the time.

For test 1 and test 2, if the PDSCH BLER in ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,0}$ is less than or equal to 0.1, the BLER in ABS subframes using the transport format indicated by the (median CQI + 1) shall be greater than 0.1. If the PDSCH BLER in ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by the set of the median CQI is greater than 0.1. If the PDSCH BLER in ABS subframes using transport format indicated by the median CQI is greater than 0.1, the BLER in ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

For test 2, if the PDSCH BLER in non-ABS subframes using the transport format indicated by median CQI obtained by reports in CSI subframe sets $C_{CSI,1}$ is less than or equal to 0.1, the BLER in non-ABS subframes using the transport format indicated by the (median CQI + 2) shall be greater than 0.1. If the PDSCH BLER in non-ABS subframes using the transport format indicated by the median CQI is greater than 0.1, the BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. If the PDSCH BLER in non-ABS subframes using transport format indicated by the median CQI is greater than 0.1. The BLER in non-ABS subframes using transport format indicated by (median CQI – 1) shall be less than or equal to 0.1.

				Tee	st 1	Test 2		
Parameter		Unit	Ce	<u> 1</u>	Cell 2 and 3	Ce	ell 1	Cell 2 and 3
Bandwidth		MHz			0			0
PDSCH transmission			2	2	Note 10		2	Note 10
Uplink downlink con					1			1
Special subfra configuratio				2	4			4
Downlink power ρ_A allocation ρ_B		dB		-3			-3	
		dB		-3			-3	
anocation	σ	dB		()			0
Propagation condi antenna configu	tion and			Clause E	3.1 (2x2)		Clause I	B.1 (2x2)
$\widehat{E}_{s}ig/N_{oc2}$ (No	te 1)	dB	4	5	Cell 2: 12 Cell 3: 10	13	14	Cell 2: 12 Cell 3: 10
	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (N	lote 7)	N/A	-98 (N	lote 7)	N/A
$N_{oc}^{(j)}$ at antenna	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (N	-98 (Note 8) N/A		-98 (Note 8)		N/A
port	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9) N/A		-93 (Note 9)		N/A	
Subframe Config	uration		Non-MBSFN		Non-MBSFN	Non-MBSFN		Non-MBSFN
Cell Id			0		Cell 2: 6 Cell 3: 1	0		Cell 2: 6 Cell 3: 1
Time Offset betwee	en Cells	μs	Cell 2: 3 usec Cell 3: -1usec		Cell 2: 3 usec Cell 3: -1usec			
Frequency shift betw	veen Cells	Hz	Cell 2: 300Hz Cell 3: -100Hz		Cell 2: 300Hz Cell 3: -100Hz		300Hz	
ABS pattern (No	ote 2)		N	/A	0100010001 0100010001	N	/A	0100010001 0100010001
RLM/RRM Measu Subframe Pattern			00000		N/A)00001)00001	N/A
CSI Subframe Sets	C _{CSI,0}		01000 01000	10001	N/A	01000)10001)10001	N.A
(Note 3)	C _{CSI,1}			01000 01000	N/A		01000 01000	N/A
Number of control symbols	OFDM		3		3			
Max number of H transmissior	ns		1		1		1	
Physical channel for reporting	C _{CSI,0} CQI		PUCCH Format 2			PUCCH	Format 2	
Physical channel for C _{CSI,1} CQI reporting			PUSCH (Note 12)		PUSCH (Note 12)		(Note 12)	
PUCCH Report Type					1	4		•
Reporting periodicity		ms		Npd	= 5		Npd	= 5
cqi-pmi-Configurati C _{CSI,0} (Note 1	3)		3	3	N/A	:	3	N/A
cqi-pmi-Configuratio	onIndex2		4	4	N/A		4	N/A
ACK/NACK feedba				Multip	lexing		Multip	lexing

Table 9.2.1.6-1: PUCCH 1-0 static test (TDD)

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell1, Cell2, and Cell3 is the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.2.5
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-2 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 12:	To avoid collisions between HARQ-ACK and wideband CQI it is necessary to report both on PUSCH
	instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and #9 to allow periodic
	CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8 and #3.
Note 13:	cqi-pmi-ConfigurationIndex is applied for C _{CSI,0.}
Note 14:	cai-pmi-ConfigurationIndex2 is applied for Cost

9.2.2 Minimum requirement PUCCH 1-1 (Cell-Specific Reference Symbols)

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

9.2.2.1 FDD

The following requirements apply to UE Category ≥ 2 . For the parameters specified in table 9.2.2.1-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median $CQI_1 - 1$, median $CQI_1 + 1$ } for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Parameter		Unit	Те	Test 1 Test 2				
Bandwidth		MHz			10			
PDSCH transmissio	on mode				4			
Downlink power ρ_A allocation ρ_B		dB						
		dB	-3					
	σ	dB	0					
Propagation condit antenna configur				Clause	B.1 (2 x 2)			
CodeBookSubsetRe bitmap	estriction			010000				
SNR (Note 2	2)	dB	10	11	16	17		
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-88	-87	-82	-81		
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98 -98					
Max number of H transmission			1					
Physical channel for reporting	CQI/PMI		PUCCH Format 2					
PUCCH Report Ty CQI/PMI	/pe for		2					
PUCCH Report Typ	e for RI		3					
Reporting period	dicity	ms		Np	_{od} = 5			
cqi-pmi-Configurati	onIndex				6			
ri-ConfigInde	x			1 (N	lote 3)			
Note 1: Reference measurement channel according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1. Note 2: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.								
Note 3: It is intende	ed to have	UL collisions betwee he eNB in this test.		and HARQ-A	CK, since the	RI reports		

Table 9.2.2.1-1: PUCCH 1-1 static test (FDD)

9.2.2.2 TDD

The following requirements apply to UE Category ≥ 2 . For the parameters specified in table 9.2.2.2-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median $CQI_1 - 1$, median $CQI_1 + 1$ } for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

	Parameter		Unit	Те	Test 1 Test 2			
	Bandwidth		MHz			10		
PDSCH transmission mode						4		
	ownlink conf					2		
	ecial subfrai configuratior					4		
Downlin	nk power	$ ho_{\scriptscriptstyle A}$	dB			-3		
	ation	$ ho_{\scriptscriptstyle B}$	dB			-3		
		σ	dB			0		
	ation conditi				Clause I	3.1 (2 x 2)		
	okSubsetRe bitmap				010	0000		
5	SNR (Note 2)	dB	10	11	16	17	
	$\hat{I}_{or}^{(j)}$	/	dB[mW/15kHz]	-88	-87	-82	-81	
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98 -98			98		
	number of H ransmission			1				
-	channel for	-						
,	reporting			PUSCH (Note 3)				
	CH Report			2				
	orting period		ms	$N_{\rm pd} = 5$				
	-Configuration					3		
	i-ConfigInde			805 (Note 4)				
	CK feedbac					plexing		
Note 1:			ent channel accord described in Annex		A.4-2 with one	sided dynam	ic OCNG	
Note 2:			imum requirements		lled for at leas	t one of the tv	vo SNR(s)	
			anted signal input le					
Note 3:			tween CQI/PMI rep					
	PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe							
	SF#7 and						k subirame	
Note 4:			s set to the maximur	n allowable l	enath of 160m	s to minimise	collisions	
11010 4.			and HARQ-ACK re					
			I reports will be dro					
			ction shall be skippe					

Table 9.2.2.2-1: PUCCH 1-1 static test (TDD)

9.2.3 Minimum requirement PUCCH 1-1 (CSI Reference Symbols)

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

9.2.3.1 FDD

The following requirements apply to UE Category ≥ 2 . For the parameters specified in table 9.2.3.1-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI₁ shall be within the set {median CQI₁ -1, median CQI₁ +1} for more than 90% of the time, where the resulting wideband values CQI₁ shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median CQI₀ – 1 and median CQI₁ – 1 shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER

using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Parameter	r	Unit	Те	st 1	Tes	st 2	
Bandwidth		MHz			10		
PDSCH transmissi	on mode				9		
	$ ho_{\scriptscriptstyle A}$	dB	0				
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0				
allocation	P _c	dB			-3		
	σ	dB			-3		
Cell-specific referen	ce signals			Antenna	ports 0, 1		
CSI reference s					orts 15,,18		
CSI-RS periodicity an				•			
offset				5	5/1		
$T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$	-RS						
CSI reference signal c	onfiguration				0		
Propagation condition				Clause	$= 1 (4 \times 2)$		
configuratio			Clause B.1 (4 x 2)				
Beamforming N			As specified in Section B.4.3				
CodeBookSubsetRestr		dB	0x0000 0000 0100 0000				
SNR (Note :	SNR (Note 2)		7	8	13	14	
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-91	-90	-85	-84	
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98 -98		8		
Max number of HARQ t	ransmissions				1		
Physical channel for	r CQI/PMI			PUSCH	H (Note3)		
reporting				10301	1 (110185)		
PUCCH Report Type					2		
Physical channel for I					Format 2		
PUCCH Report Ty					3		
Reporting perio		ms	$N_{\rm pd}=5$				
CQI delay		ms			8		
cqi-pmi-Configurat					2		
ri-ConfigInd					1		
		nannel according to T	Table A.4-1a	with one side	d dynamic OCI	NG Pattern	
		Annex A.5.1.1.					
	t, the minimum anted signal inj	requirements shall t	be fulfilled for	r at least one o	of the two SNR	(s) and the	
Note 3: To avoid coll	isions between	CQI/PMI reports an PDCCH DCI format					
		nultiplex with the HAF					

Table 9.2.3.1-1: PUCCH 1-1 static test (FDD)

9.2.3.2 TDD

The following requirements apply to UE Category ≥ 2 . For the parameters specified in table 9.2.3.2-1, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median CQI_1 -1, median CQI_1 +1} for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Parameter			Unit	Tes	st 1	Tes	st 2	
Bandwidth		MHz			10			
PDSCH transmission mode			9					
Uplink downlink configuration				2				
	ubframe co					4		
		$ ho_{\scriptscriptstyle A}$	dB			0		
Downlink		$ ho_{\scriptscriptstyle B}$	dB			0		
allocat	tion	P_c	dB			-6		
		σ	dB			-3		
	reference s					ports 0, 1		
CSI r	eference si	gnals			Antenna p	orts 15,,22		
CSI-RS pe	riodicity an	d subframe						
1	offset				5	5/3		
To	Δ_{CSI-RS} / Δ_{CSI-RS}	RS						
CSI referen	ice signal c	onfiguration				0		
		and antenna			Clause	B.1 (8 x 2)		
	configuratio							
Bear	mforming N	lodel				n Section B.4.		
		iction bitmap			0 0000 0020	000 0000 000		
S	SNR (Note 2	2)	dB	4	5	10	11	
	$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-94	-93	-88	-87	
	$N_{oc}^{(j)}$		dB[mW/15kHz]	-6	-98 -98		98	
Max number	of HARQ t	ransmissions				1		
	channel for				DUDO			
,	reporting				PUSCE	I (Note 3)		
PUCCH Rep		r CQI/second				2b		
Physical cl	hannel for F	RI reporting			PU	SCH		
		r RI/ first PMI				5		
	orting perio		ms		No	d = 5		
	CQI delay		ms			or 11		
cai-pmi-	-Configurat					3		
	-ConfigInde				805 (Note 4)		
	CK feedba					plexing		
			annel according to	Table A.4-2a	with one side	d dynamic OC	NG Pattern	
		described in A						
Note 2: Fo	or each test	, the minimum	requirements shall	be fulfilled for	at least one o	of the two SNR	(s) and the	
		anted signal inp						
Note 3: To	avoid colli	sions between	CQI/PMI reports an					
			PDCCH DCI forma					
			ultiplex with the HA					
RI	, CQI/PMI a	and HARQ-AC	the maximum allow K reports. In the cas	se when all th	ree reports co	ollide, it is expe	ected that	
			pped, while RI and H			xed. At eNB, C	QI report	
collection shall be skipped every 160ms during performance verification.								

Table 9.2.3.2-1: PUCCH 1-1 submode 1 static test (TDE

9.2.4 Minimum requirement PUCCH 1-1 (With Single CSI Process)

The minimum requirements for dual codeword transmission are defined in terms of a reporting spread of the wideband CQI value for codeword #1, and their BLER performance using the transport format indicated by the reported CQI median of codeword #0 and codeword #1. The precoding used at the transmitter is a fixed precoding matrix specified by the bitmap parameter *codebookSubsetRestriction*. The propagation condition assumed for the minimum performance requirement is defined in subclause B.1.

9.2.4.1 FDD

The following requirements apply to UE Category ≥ 2 . For the parameters specified in table 9.2.4.1-1, and using the downlink physical channels specified in tables C.3.4-1 and C.3.4-2, the reported offset level of the wideband spatial

differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median $CQI_1 - 1$, median $CQI_1 + 1$ } for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Parameter		Unit	Tes			Tes			
			TP1	TP		TP1	TF	22	
Bandwidt		MHz			0				
PDSCH transmission mode		15				10			
ρ_{A}		dB	[0]	[0	-	[0]		[0]	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	[0]	[0		[0]		[0]	
allocation (Note 1)	Pc	dB	[-3]	[-3	-	[-3]	[-:		
	σ	dB	[-3]	N/	A	[-3]	N	/A	
Cell ID			C)		C)		
Cell-specific refere	nce signals		Antenna ports 0, 1	(Not	e 2)	Antenna ports 0, 1	(Note 2)		
CSI reference	signals		Antenna ports 15,,18	N/	A	Antenna ports 15,,18	N	/A	
CSI-RS periodi subframe offset T_{CS}			5/1	N/	A	5/1	N	/A	
CSI-RS config			0	N/	A	0	N	/A	
Zero-Power C configurati I _{CSI-RS} / ZeroPowe bitmap	on		1 / 00100000000 0000	1 / 1000000000 00000		1 / 00100000000 0000	1 / 10000000000 00000		
CSI-IM configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap			1 / 00100000000 0000	N/A		1 / 00100000000 0000	N/A		
CSI process configuration Signal/Interference/Reporting mode			CSI-RS/CSI-IM/PUCCH 1-1		CSI-RS/CSI-IM/PUCCH 1-		H 1-1		
Propagation condition and antenna configuration			Clause B.1 (4 x 2)	Claus (2 x		Clause B.1 (4 x 2)	Claus (2)		
CodeBookSubsetl bitmap	Restriction		0x0000 0000 0100 0000	100000		0x0000 0000 0100 0000	100000		
SNR (Note	: 3)	dB	20	6	7	20	14	15	
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-78	-92	-91	-78	-84	-83	
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98				
Modulation / Infor payload			(Note4)	QPSK / 4392		(Note4)	QPSK / 4392		
Max number of transmissio			1	N/A		1	N/A		
Physical channel for reporting	9		PUSCH (Note5)	N/A		PUSCH (Note5)	N	/A	
PUCCH Report CQI/PM	l		2	N/		2	N		
PUCCH Report T			3	N/		3	N		
Reporting peri		ms	$N_{\rm pd} = 5$	N/		$N_{\rm pd} = 5$	N		
CQI Dela		ms	8	N/		8		<u>/A</u>	
cqi-pmi-Configura			2	N/		2	N		
ri-ConfigIn			1	N/	A	1	N/	/A	
PDSCH scheduled			[1,2,3,4,			[1,2,3,4,			
Timing offset bety Frequency offset be		us Hz	0			0			
Frequency offset he	erween LPS	H7	0			0 dynamic OCNG Pattern OP.1 FDD			

Note 2: REs for antenna ports 0 and 1 CRS have zero transmission power.

Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 4: Table A.4-3b is used for non CSI-RS subframes. Table A.4-3i is used for CSI-RS subframes.

Note 5: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

9.2.4.2 TDD

The following requirements apply to UE Category ≥ 2 . For the parameters specified in table 9.2.4.2-1, and using the downlink physical channels specified in tables C.3.4-1 and C.3.4-2, the reported offset level of the wideband spatial differential CQI for codeword #1 (Table 7.2-2 in TS 36.213 [6]) shall be used to determine the wideband CQI index for codeword #1 as

wideband CQI_1 = wideband CQI_0 – Codeword 1 offset level

The wideband CQI_1 shall be within the set {median $CQI_1 - 1$, median $CQI_1 + 1$ } for more than 90% of the time, where the resulting wideband values CQI_1 shall be used to determine the median CQI values for codeword #1. For both codewords #0 and #1, the PDSCH BLER using the transport format indicated by the respective median $CQI_0 - 1$ and median $CQI_1 - 1$ shall be less than or equal to 0.1. Furthermore, for both codewords #0 and #1, the PDSCH BLER using the transport format $CQI_0 + 1$ and median $CQI_1 + 1$ shall be greater than or equal to 0.1.

Paramete		Unit	Tes			Tes		
			TP1	TF	2 2	TP1	TP2	
Bandwidth		MHz				0		
PDSCH transmission mode						0		
Uplink downlink co						2		
Special subframe c			4					
-	$ ho_{\scriptscriptstyle A}$	dB	[0]	[0)]	[0]	[0]	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	[0]	[0)]	[0]	[(D]
allocation (Note 1)	Pc	dB	[-6]	[-(6]	[-6]	[-6]	
-	σ	dB	[-3]	N/	Ά	[-3]	N	/A
Cell ID			C)		C)	
Cell-specific refere	nce signals		Antenna ports 0, 1	(Not	e 2)	Antenna ports 0, 1	(Not	te 2)
CSI reference	signals		Antenna ports 15,,22	N/	Ά	Antenna ports 15,,22	N	/A
CSI-RS periodi subframe offset T _{CS}			5/3	N/	Ά	5/3	N	/A
CSI-RS config			0	N/	'A	0	N	/A
Zero-Power C configurati I _{CSI-RS} / ZeroPowe bitmap	on		3 / 00100000000 0000	3 / 10000100000 0010 00000		3 / 00100000000 0000	3 / 10000100000 00000	
CSI-IM configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap			3 / 00100000000 0000	N/A		3 / 00100000000 0000	N/A	
CSI process configuration Signal/Interference/Reporting mode			CSI-RS/CSI-IM/PUCCH 1-1		CSI-RS/CSI-IM/PUCCH		H 1-1	
Propagation condition and antenna configuration			Clause B.1 (8 x 2)	Claus (2 >		Clause B.1 (8 x 2)	Claus (2 x	
CodeBookSubsetl bitmap	Restriction		0x0000 0000 0020 0000 0000 0001 0000	100000 0020 00 0000 00		0x0000 0000 0020 0000 0000 0001 0000	100000	
SNR (Note	: 3)	dB	17	[6]	[7]	17	[14]	[15]
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-81	[-92]	[-91]	-81	[-84]	[-83]
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98		-98			
Modulation / Infor payload			(Note4)	QPSK	/ 4392	(Note4)	QPSK	/ 4392
Max number of transmissio	ons		1	N/	'A	1	N/A	
Physical channel for reporting	9		PUSCH (Note5)	N/	'A	PUSCH (Note5)	N	/A
PUCCH Report CQI/second	PMI		2b	N/		2b		/A
Physical channel for			PUSCH	N/	A	PUSCH	N	/A
PUCCH Report Type for RI/ first PMI			5	N/		5		/A
Reporting peri		ms	$N_{\rm pd} = 5$	N/		$N_{\rm pd} = 5$	N	
CQI Dela		ms	10 or 11	N/		10 or 11		<u>/A</u>
cqi-pmi-Configura			3	N/		3		/A
ri-ConfigIn			805 (Note 6)	N/		805 (Note 6)	N	
ACK/NACK feedb			Multiplexing	N/	А	Multiplexing	N/	A
PDSCH scheduled		us	[3,4, 0			[3,4,		
Timing offset bety								

Table 9.2.4.2-1: PUCCH	1-1 static test (TDD)
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Note1:	Reference measurement channel according to Table A.4-2d with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 2:	REs for antenna ports 0 and 1 CRS have zero transmission power.
Note 3:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 4:	Table A.4-3b is used for non CSI-RS subframes. Table A.4-3j is used for CSI-RS subframes.
Note 5:	To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#7 and #2.
Note 6:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification.

9.3 CQI reporting under fading conditions

9.3.1 Frequency-selective scheduling mode

The accuracy of sub-band channel quality indicator (CQI) reporting under frequency selective fading conditions is determined by a double-sided percentile of the reported differential CQI offset level 0 per sub-band, and the relative increase of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest reported differential CQI offset level the corresponding transport format compared to the case for which a fixed format is transmitted on any sub-band in set *S* of TS 36.213 [6]. The purpose is to verify that preferred sub-bands can be used for frequently-selective scheduling. To account for sensitivity of the input SNR the sub-band CQI reporting under frequency selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.3.1.1 Minimum requirement PUSCH 3-0 (Cell-Specific Reference Symbols)

9.3.1.1.1 FDD

For the parameters specified in Table 9.3.1.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.1.1-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6.

Parameter		Unit	Tes	st 1	Te	st 2	
Ba	andwidth	MHz	10 MHz				
Transmission mode			1 (port 0)				
Downlink ρ_A		dB		0			
power	$ ho_{\scriptscriptstyle B}$	dB	0				
allocation	σ	dB			0		
SN	R (Note 3)	dB	9	10	14	15	
	$\hat{I}^{(j)}_{or}$	dB[mW/15kHz]	-89	-88	-84	-83	
	$N_{oc}^{(j)}$	dB[mW/15kHz]	-98 -98			98	
			Clause B.2.4 with $\tau_d = 0.45 \mu s$,				
Propag	ation channel		$a = 1, f_D = 5 \text{ Hz}$				
Antenna	a configuration		<u>1 x 2</u> 5				
Repo	rting interval	ms					
	QI delay	ms	8				
	orting mode		PUSCH 3-0				
	-band size	RB	6 (full size)				
	mber of HARQ Ismissions		1				
	If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)						
Note 2:							
Note 3:		•	ents shall be fulfilled for at least ctive wanted signal input level.				

 Table 9.3.1.1.1-1 Sub-band test for single antenna transmission (FDD)

Table 9.3.1.1.1-2	Minimum rec	quirement	(FDD)
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	Test 1	Test 2
α[%]	2	2
β[%]	55	55
γ	1.1	1.1
UE Category	≥1	≥1

9.3.1.1.2 TDD

For the parameters specified in Table 9.3.1.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.1.2-2 and by the following

a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6.

Para	meter	Unit	Те	st 1	Tes	t 2	
Ban	dwidth	MHz		10 MHz			
Transmis	sion mode		1 (port 0)				
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0				
power	$ ho_{\scriptscriptstyle B}$	dB	0				
allocation	σ	dB		(0		
	downlink guration			:	2		
	subframe guration				4		
SNR	(Note 3)	dB	9	10	14	15	
Í	r(j) or	dB[mW/15kHz]	-89	-88	-84	-83	
Ν	$N_{oc}^{(j)}$		-98 -98			8	
			Clause B.2.4 with				
Propagat	ion channel		$ au_{d} = 0.45 \mu \text{s}, a = 1,$			1,	
				$f_D = 5 \mathrm{Hz}$			
	onfiguration		1 x 2				
	ng interval	ms	5				
	delay	ms	10 or 11				
	ing mode		PUSCH 3-0				
	and size	RB	6 (full size)				
	er of HARQ				1		
	nissions						
	eedback mode				lexing		
		an available uplink					
		l estimation at a do					
		ted subband or wid	leband (JQI cann	lot be app	blied	
	at the eNB downlink before SF#(n+4) Reference measurement channel according to Table A.4-5 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in						
						d in	
	nex A.5.2.1/2.		01.1/2	100 45			
		ninimum requiremer	nts shall	l be fulfill	ed for at	least	
		(s) and the respect					

 Table 9.3.1.1.2-1 Sub-band test for single antenna transmission (TDD)

	Test 1	Test 2
α[%]	2	2
β[%]	55	55
γ	1.1	1.1
UE Category	≥1	≥1

9.3.1.1.3 FDD (CSI measurements in case two CSI subframe sets are configured and with CRS assistance information)

For the parameters specified in Table 9.3.1.1.3-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.1.3-2 and by the following

- a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band;
- b) the ratio of the throughput in ABS subframes obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER in ABS subframes for the indicated transport formats shall be greater than or equal to ε .

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6.

				Taa	4 4		Та	-+ 0
Parameter		Unit	Test 1 Cell 1 Cell 2 and 3		Test 2 Cell 1 Cell 2 an			
Bandwidth		MHz		10		UCII		0
PDSCH transmission	on mode		1		Note 10	1		Note 10
Downlink power ρ_A allocation ρ_B		dB	0		0			
		dB	0		0			
anocation	σ	dB		0		0)
Propagation condition			Clause B.2.4 with Td = 0.45 us, a = 1, fd = 5 Hz		EVA5 Low antenna correlation	Clause B.2.4 with Td = 0.45 us, a = 1, fd = 5 Hz		EVA5 Low antenna correlation
Antenna configu	ration		1x2		1x2			
$\widehat{E}_{s} ig / N_{oc2}$ (Not	e 1)	dB	4	5	Cell 2: 12 Cell 3: 10	14	15	Cell 2: 12 Cell 3: 10
(.)	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (No	ote 7)	N/A	-98 (Not	te 7)	N/A
$N_{\scriptscriptstyle oc}^{(j)}$ at antenna	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (No	ote 8)	N/A	-98 (Note 8)		N/A
port	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)		N/A	-93 (Note 9)		N/A
Subframe Config	uration		Non-M	BSFN	Non-MBSFN	Non-MB	SFN	Non-MBSFN
Cell Id			0		Cell 2: 6 Cell 3: 1	0		Cell 2: 6 Cell 3: 1
Time Offset betwee	en Cells	μs	Cell 2: 3 usec Cell 3: -1usec		Cell 2: 3 usec Cell 3: -1usec			
Frequency Shift between Cells		Hz	Cell 2: 300Hz Cell 3: -100Hz		Cell 2: 300Hz Cell 3: -100Hz			
ABS pattern (Note 2)			010 010 N/A 010 010		01010101 01010101 01010101 01010101 01010101 01010101	N/A		01010101 01010101 01010101 01010101 01010101 01010101
RLM/RRM Measurement Subframe Pattern (Note 4))100)100)100	N/A	000001 000001 000001 000001 000001	100 100 100	N/A
CSI Subframe Sets	C _{CSI,0}		01010 01010 01010 01010 01010)101)101)101)101)101	N/A	010101 010101 010101 010101 010101 010101	101 101 101 101	N/A
(Note 3)	C _{CSI,1}		10101 10101 10101 10101 10101 10101	010 010 010 010	N/A	101010 101010 101010 101010 101010 101010	010 010 010 010 010	N/A
Number of control OFDM symbols			3		3			
Max number of HARQ transmissions			1		1			
CQI delay		ms	8					
Reporting interval (Note 13)	ms	10					
Reporting mo			PUSCH 3-0					
Sub-band siz	ze	RB			6 (full	size)		

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell1, Cell2, and Cell3 are the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.1.5
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-4 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.
Note 12:	If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).

Note 13: The CSI reporting is such that reference subframes belong to C_{csi,0}

	Test 1	Test 2
α[%]	2	2
β[%]	55	55
γ	1.1	1.1
3	0.01	0.01
UE Category	≥1	≥1

Table 9.3.1.1.3-2 Minimum requirement (FDD)

9.3.1.1.4 TDD (CSI measurements in case two CSI subframe sets are configured and with CRS assistance information)

For the parameters specified in Table 9.3.1.1.4-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.1.4-2 and by the following

- a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band;
- b) the ratio of the throughput in ABS subframes obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;
- c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER in ABS subframes for the indicated transport formats shall be greater than or equal to ε .

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6.

Parameter		Unit	Test 1			Test 2		
			Ce		Cell 2 and 3	Ce		Cell 2 and 3
Bandwidth		MHz			0			0
	PDSCH transmission mode		1	-	Note 10		1	Note 10
Uplink downlink conf	iguration				1	1		1
Special subframe configuration			4		4		4	
Downlink power	$ ho_{\scriptscriptstyle A}$	dB		0		0		
allocation	$ ho_{\scriptscriptstyle B}$	dB			0	0		
	σ	dB	0		0			
Propagation condition			Clause with Td us, a = 5 ł	= 0.45 1, fd =	EVA5 Low antenna correlation	with Td	1, fd =	EVA5 Low antenna correlation
Antenna configuratio	n			1)		1x2		
$\widehat{E}_{s} \big/ N_{oc2}$ (Note 1)		dB	4	5	Cell 2: 12 Cell 3: 10	14	15	Cell 2: 12 Cell 3: 10
	$N_{oc1}^{(j)}$	dBm/15kHz	-98 (N	lote 7)	N/A	-98 (N	lote 7)	N/A
$N_{oc}^{(j)}$ at antenna	$N_{oc2}^{(j)}$	dBm/15kHz	-98 (Note 8)		N/A	-98 (Note 8)		N/A
port	$N_{oc3}^{(j)}$	dBm/15kHz	-93 (Note 9)		N/A	-93 (Note 9)		N/A
Subframe Configurat	ion		Non-MBSFN		Non-MBSFN	Non-MBSFN		Non-MBSFN
Cell Id			0)	Cell 2: 6 Cell 3: 1	0 Cell 2: 6 Cell 3: 1		Cell 2: 6 Cell 3: 1
Time Offset between Cells		μs	Cell 2: 3 usec Cell 3: -1usec		Cell 2: 3 usec Cell 3: -1usec			
Frequency shift betw	een Cells	Hz	Cell 2: 300Hz Cell 3: -100Hz		Cell 2: 300Hz Cell 3: -100Hz			
ABS pattern (Note 2)			0100010001 0100010001	ΝΙ/Δ		0100010001 0100010001		
RLM/RRM Measurer Subframe Pattern (N			000000001 000000001 N/A		00000		N/A	
CSI Subframe Sets	C _{CSI,0}		01000 01000		N/A	01000 01000		N.A
(Note 3)	C _{CSI,1}		10001 10001	01000 01000	N/A	10001 10001	01000 01000	N/A
Number of control OFDM symbols			3		3			
Max number of HARQ transmissions			1			1		
CQI delay		ms	[14]					
Reporting interval (N	ote 13)	ms	10					
Reporting mode			PUSCH 3-0					
Sub-band size		RB	6 (full size)					
ACK/NACK feedback	< mode			Multip	lexing		Multip	lexing

Table 9.3.1.1.4-1 Sub-band test for single antenna transmission (TDD)

Note 1:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.
Note 2:	ABS pattern as defined in [9].
Note 3:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 4:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].
Note 5:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7]
Note 6:	Cell 1 is the serving cell. Cell 2 and Cell 3 are the aggressor cells. The number of the CRS ports in Cell1, Cell2, and Cell3 is the same.
Note 7:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 8:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS
Note 9:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS.
Note 10:	Downlink physical channel setup in Cell 2 and Cell 3 in accordance with Annex C.3.3 applying OCNG pattern as defined in Annex A.5.2.5
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-5 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.
Note 12:	If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
Note 13:	The CSI reporting is such that reference subframes belong to $C_{csi,0}$.

	Test 1	Test 2
α[%]	2	2
β[%]	55	55
γ	1.1	1.1
3	0.01	0.01
UE Category	≥1	≥1

Table 9.3.1.1.4-2 Minimum requirement (TDD)

9.3.1.2 Minimum requirement PUSCH 3-1 (CSI Reference Symbol)

FDD 9.3.1.2.1

For the parameters specified in Table 9.3.1.2.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.2.1-2 and by the following

- a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band;
- b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set S shall be $\geq \gamma$;
- c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6a or Table A.4-6b.

Parameter		Unit	Те	Test 1 Tes		st 2		
Bandwidth		MHz		10 MHz				
Transmission mode					9			
		$ ho_{\scriptscriptstyle A}$	dB			0		
Downlink pov	ver	$ ho_{\scriptscriptstyle B}$	dB	0				
allocation		P_c	dB					
		σ	dB	0				
	SNR (I	Note 3)	dB	4	5	11	12	
	\hat{I}_o^0	j) r	dB[mW/15kHz]	-94	-93	-87	86	
	N	(j)	dB[mW/15kHz]	-!	98	-9	98	
Dror	ogotio			Clause	e B.2.4 wi	ith $ au_d = 0$).45 <i>µ</i> s,	
Piop	agalic	n channel			$a = 1, f_D = 5 \text{ Hz}$			
Ante	nna co	nfiguration		2x2				
Bea	Beamforming Model			As specified in Section B.4.3			B.4.3	
CRS	refere	nce signals			Antenna ports 0			
		nce signals		A	ntenna p	oorts 15, ²	16	
		and subframe offset			5	/ 1		
		Δ_{CSI-RS}			0	/ 1		
		signal configuration			4			
		Restriction bitmap		000001				
Reporti		erval (Note 4)	ms	5				
	CQI		ms	8				
		g mode		PUSCH 3-1				
		nd size	RB	6 (full size)				
	-	RQ transmissions				1		
CQ	Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)							
Note 2: Ref	Reference measurement channel according to Table A.4-4a with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.							
Note 3: For	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.					two		
Note 4: PD0								

	Test 1	Test 2
α[%]	2	2
β [%]	40	40
γ	1.1	1.1

≥1

≥1

Table 9.3.1.2.1-2 Minimum requirement (FDD)

9.3.1.2.2 TDD

For the parameters specified in Table 9.3.1.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.1.2.2-2 and by the following

UE Category

- a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band;
- b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

c) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.05.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6a or Table A.4-6b.

Parameter			Unit	Те	Test 1 Test 2		
Bandwidth		MHz	10 MHz				
Tra	insmis	sion mode		9			
Uplink downlink configuration				2			
Special subframe configuration						4	
$ ho_{\scriptscriptstyle A}$			dB			0	
Downlink po		$ ho_{\scriptscriptstyle B}$	dB	0			
allocation	ו	P _c	dB	0			
		σ	dB	0			
	SNR (Note 3)	dB	4	5	11	12
	\hat{I}_{a}	(j) pr	dB[mW/15kHz]	-94	-93	-87	-86
	N	(j) oc	dB[mW/15kHz]	-!	98	-6	98
				Clause	e B.2.4 wi	th $\tau_d = 0$).45 <i>µ</i> s,
Propagation channel			ŭ				
Antenna configuration			$a = 1, f_D = 5 \text{ Hz}$ 2x2				
Beamforming Model			As specified in Section B.4.3			B.4.3	
CRS reference signals			1	Antenna port 0			
CSI reference signals				Antenna port 15,16			
		and subframe offset		5/ 3			
		$/\Delta_{CSI-RS}$		3/ 3			
		signal configuration			4		
		Restriction bitmap		000001			
Repor		erval (Note 4)	ms	5			
		delay	ms	10			
		ng mode		PUSCH 3-1			
		and size	RB	6 (full size)			
		ARQ transmissions		1			
		edback mode		Multiplexing			
		reports in an available					
CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband					bband		
or wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-5a with one/two sided							
		OCNG Pattern OP.1/2				wo sided	
		test, the minimum req				ne of the	two
		nd the respective want					
Note 4: PD	CCH E	OCI format 0 with a trig	ger for aperiodic CQI				
SF	#3 and	#8 to allow aperiodic	CQI/PMI/RI to be trar	nsmitted	on uplink	SF#2 ar	nd #7.

Table 9.3.1.2.2-2 Minimu	m requirement (TDD)
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	Test 1	Test 2
α[%]	2	2
β[%]	40	40
γ	1.1	1.1
UE Category	≥1	≥1

9.3.2 Frequency non-selective scheduling mode

The reporting accuracy of the channel quality indicator (CQI) under frequency non-selective fading conditions is determined by the reporting variance, and the relative increase of the throughput obtained when the transport format transmitted is that indicated by the reported CQI compared to the case for which a fixed transport format configured according to the reported median CQI is transmitted. In addition, the reporting accuracy is determined by a minimum BLER using the transport formats indicated by the reported CQI. The purpose is to verify that the UE is tracking the channel variations and selecting the largest transport format possible according to the prevailing channel state for frequently non-selective scheduling. To account for sensitivity of the input SNR the CQI reporting under frequency non-selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.3.2.1 Minimum requirement PUCCH 1-0 (Cell-Specific Reference Symbol)

9.3.2.1.1 FDD

For the parameters specified in Table 9.3.2.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.2.1.1-2 and by the following

a) a CQI index not in the set {median CQI -1, median CQI +1} shall be reported at least α % of the time;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02

The transport block sizes TBS for wideband CQI median and reported wideband CQI are selected according to Table A.4-3 (for Category 2-8) or Table A.4-9 (for Category 1).

Parameter		Unit	Test 1 Tes		st 2	
Ban	dwidth	MHz		10 MHz		
Transmi	ssion mode			1 (po	ort 0)	
Downlink ρ_A		dB		()	
power	$ ho_{\scriptscriptstyle B}$	dB		()	
allocation	σ	dB	0			
SNR	(Note 3)	dB	6	7	12	13
	$\hat{I}_{or}^{(j)}$	dB[mW/15kHz]	-92	-91	-86	-85
1	$V_{oc}^{(j)}$	dB[mW/15kHz]	-6	98	-9	8
	ion channel			EP	A5	
	ation and			Hiah ((1 x 2)	
	configuration			•	. ,	
	ing mode g periodicity				CH 1-0	
	l delay	ms		1	= 2	
	channel for	ms	8			
	eporting			PUSCH	(Note 4)	
	Report Type			4	4	
cq	i-pmi-				1	
	rationIndex				I	
	per of HARQ				1	
	nissions				-	
Note 1:	subframe SF# than SF#(n-4) eNB downlink	orts in an available u th based on CQI es this reported wide before SF#(n+4)	timation a band CQ	at a down I cannot I	llink SF n be applie	d at the
Note 2: Reference measurement channel according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.					DD as vith	
Note 3:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.					
Note 4:	To avoid collis necessary to DCI format 0 to allow period	sions between CQI report both on PUS shall be transmitted dic CQI to multiplex rame SF#5, #7, #1 a	CH instea in downl with the	ad of PU0 ink SF#1	CCH. PD0 , #3, #7 a	CCH ind #9

Table 9.3.2.1.1-1 Fadin	g test for single antenna (Fl	DD)
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Table 9.3.2.1.1-2 Minimum requirement (FDD)

	Test 1	Test 2
α[%]	20	20
γ	1.05	1.05
UE Category	≥1	≥1

9.3.2.1.2 TDD

For the parameters specified in Table 9.3.2.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.2.1.2-2 and by the following

a) a CQI index not in the set {median CQI -1, median CQI +1} shall be reported at least α % of the time;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The transport block sizes TBS for wideband CQI median and reported wideband CQI are selected according to Table A.4-3 (for Category 2-8) or Table A.4-9 (for Category 1).

Parameter		Unit	Test 1 Test		st 2	
	dwidth	MHz	10 MHz			
Transmis	ssion mode				ort 0)	
Downlink	$ ho_{\scriptscriptstyle A}$	dB		, u)	
power $\rho_{\scriptscriptstyle B}$		dB		()	
allocation σ		dB	0			
Uplink downlink configuration			2			
	subframe guration			2	1	
	(Note 3)	dB	6	7	12	13
Ĵ	(j) or	dB[mW/15kHz]	-92	-91	-86	-85
Λ	$V_{oc}^{(j)}$	dB[mW/15kHz]	-6	98	-9	8
	ion channel			EP	A5	
	ation and			Hiah ((1 x 2)	
	onfiguration			-		
	g periodicity	ms	$\frac{PUCCH 1-0}{N_{pd} = 5}$			
	delay	ms	10 or 11			
Physical	channel for		PUSCH (Note 4)			
	eporting				, ,	
	Report Type			4	4	
	i-pmi- rationIndex			3	3	
	per of HARQ					
	nissions				1	
ACK/NAC	K feedback		Multiplexing			
	ode				0	
		orts in an available u				
		n based on CQI es , this reported wide				
		before SF#(n+4).			be applie	
		easurement channel	l accordir	ng to Tab	le A.4-2 f	or
		with one sided dyna				
		Annex A.5.2.1 and T				
	one/two sided Annex A.5.2.1	l dynamic OCNG Pa	attern OP	9.1/2 TDD	as desci	ribed in
Note 3:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input					
	level.					
		sions between CQI				
	•	report both on PUS				
		shall be transmitted to multiplex with the				
	subframe SF#		- 17 (1 \ Q ² /-			ahuur

Table 9.3.2.1.2-1 Fading test for single antenna (TDD)

	Test 1	Test 2
α[%]	20	20
γ	1.05	1.05
UE Category	≥1	≥1

9.3.2.2 Minimum requirement PUCCH 1-1 (CSI Reference Symbol)

9.3.2.2.1 FDD

For the parameters specified in Table 9.3.2.2.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.2.2.1-2 and by the following

a) a CQI index not in the set {median CQI -1, median CQI +1} shall be reported at least α % of the time;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The transport block sizes TBS for wideband CQI median and reported wideband CQI are selected according to Table A.4-3b or Table A.4-3c.

Para	Unit	Tes	st 1	Tes	st 2	
Bandwidth		MHz	10 MHz			
Transmiss	Transmission mode		9			
	$ ho_{\scriptscriptstyle A}$	dB	0			
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0			
allocation	P_c	dB	-3			
	σ	dB		-	3	
SNR (1	Note 3)	dB	2	3	7	8
\hat{I}_{a}^{0}	(j) pr	dB[mW/15kHz]	-96	-95	-91	-90
N	(<i>j</i>) oc	dB[mW/15kHz]	-9	8	-9	98
Propagatio	on channel			EP	A5	
	tenna configuration			ULA Hig		
	ning Model				Section	
	ference signals				ports 0,1	
	nce signals		An	tenna po	rts 15,	,18
	and subframe offset			5/1		
	Δ_{CSI-RS}					
	signal configuration		2			
	Restriction bitmap		0x0		0 0000 0	001
Reportir					CH 1-1	
	periodicity	ms		N _{pd}	= 5	
	delay	ms	8			
	nel for CQI/ PMI			PUSCH (Note 4)		
repo	rting				. ,	
PUCCH Report	Type for CQI/PMI			-	2	
	I for RI reporting				Format 2	
PUCCH repo	ort type for RI				3	
	gurationIndex				2	
	igIndex				1	
	RQ transmissions	le uplink reporting in		toubtrom		
on CQI e	Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)					
Note 2: Reference measurement channel according to Table A.4-1a with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.						
SNR(s) a	Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.					
Note 4: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5.						

Table 9.3.2.2.1-2 Minimum	requirement ((FDD)
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	Test 1	Test 2
α[%]	20	20
γ	1.05	1.05
UE Category	≥1	≥1

9.3.2.2.2 TDD

For the parameters specified in Table 9.3.2.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.2.2.2-2 and by the following

a) a CQI index not in the set {median CQI -1, median CQI +1} shall be reported at least α % of the time;

b) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index and that obtained when transmitting a fixed transport format configured according to the wideband CQI median shall be $\geq \gamma$;

c) when transmitting the transport format indicated by each reported wideband CQI index, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The transport block sizes TBS for wideband CQI median and reported wideband CQI are selected according to Table A.4-3b or Table A.4-3d.

Parameter			Unit	Tes	st 1	Test 2	
Bandwidth		MHz	10 MHz				
Т	ransmiss	ion mode			9	9	
Uplink	Uplink downlink configuration					2	
Specia	l subfram	e configuration				4	
		$ ho_{\scriptscriptstyle A}$	dB	0			
Downlink		$ ho_{\scriptscriptstyle B}$	dB		(0	
allocati	on	P_c	dB		-	6	
		σ	dB		-	3	
	SNR (N	lote 3)	dB	1	2	7	8
	$\hat{I}_o^{(}$	j) r	dB[mW/15kHz]	-97	-96	-91	-90
	N_{a}	(j) 00	dB[mW/15kHz]	-9	8	-9	98
Pi	ropagatic	n channel				PA5	
		enna configuration				h (8 x 2)	
		ing Model				n Section	
		nce signals				ports 0, 1	
		nce signals		An	tenna po	orts 15,	,22
CSI-RS pe		and subframe offset			5/	/ 3	
	T _{CSI-RS} /	<u>Acsi-Rs</u>				2	
		× ×		0v000		-	
CodeBookSubsetRestriction bitmap			0x0000 0000 0000 0020 0000 0000 0001				
	Reportin			PUC		Sub-moc	le: 2)
R		periodicity	ms			= 5	
			ms		1	0	
Physic	al chann repo	el for CQI/ PMI rting			PUSCH	(Note 4)	
PUCCH		ype for CQI/ PMI			2	2c	
Physica	l channe	for RI reporting				Format 2	
		rt type for RI				3	
		gurationIndex			:	3	
	ri-Confi	gIndex			805 (N	Vote 5)	
Max numb	per of HA	RQ transmissions				1	
		edback mode				lexing	
		reports in an availabl					
		stimation at a downlir				orted wid	leband
		ot be applied at the e					dunamia
		e measurement chan attern OP.1 TDD as o			a with or	ie slaed (lynamic
		test, the minimum re			or at leas	st one of	the two
		nd the respective wa			or at load		
		collisions between C			CK it is i	necessar	y to
r	eport bot	h on PUSCH instead	of PUCCH. PDCC	H DCI for	mat 0 sh	all be	
	transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7.					with the	
Note 5: F	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three						
		ollide, it is expected the					
		CK will be multiplexed					
		ms during performar					
5	SF#7 of t	he previous frame is dropping) is available	applied in downlink				

Table 9.3.2.2.2-1 Fading test for TDD

Table 9.3.2.2.2-2	Minimum	requirement	(TDD)
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	Test 1	Test 2
α[%]	20	20
γ	1.05	1.05
UE Category	≥1	≥1

9.3.3 Frequency-selective interference

The accuracy of sub-band channel quality indicator (CQI) reporting under frequency selective interference conditions is determined by a percentile of the reported differential CQI offset level +2 for a preferred sub-band, and the relative increase of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest reported differential CQI offset level the corresponding transport format compared to the case for which a fixed format is transmitted on any sub-band in set *S* of TS 36.213 [6]. The purpose is to verify that preferred sub-bands are used for frequently-selective scheduling under frequency-selective interference conditions.

9.3.3.1 Minimum requirement PUSCH 3-0 (Cell-Specific Reference Symbol)

9.3.3.1.1 FDD

For the parameters specified in Table 9.3.3.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.3.1.1-2 and by the following

a) a sub-band differential CQI offset level of +2 shall be reported at least α % for at least one of the sub-bands of full size at the channel edges;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6.

Par	ameter	Unit	Test 1	Test 2
Bandwidth		MHz	10 MHz	10 MHz
Transm	ission mode		1 (port 0)	1 (port 0)
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0	0
power	$ ho_{\scriptscriptstyle B}$	dB	0	0
allocation	σ	dB	0	0
$I_{ot}^{(j)}$ fo	or RB 05	dB[mW/15kHz]	-102	-93
$I_{\scriptscriptstyle ot}^{(j)}$ fo	r RB 641	dB[mW/15kHz]	-93	-93
$I_{\scriptscriptstyle ot}^{(j)}$ for	RB 4249	dB[mW/15kHz]	-93	-102
	$\hat{I}_{or}^{(j)}$	dB[mW/15kHz]	-94 -94	
	ber of HARQ missions		1	
_			Clause B.2.4 with $\tau_d=0.45\mu$	
Propaga	tion channel		$a = 1, f_D = 5 \text{ Hz}$	
Report	ing interval	ms		5
	configuration		1:	x 2
	l delay	ms		8
	ting mode			CH 3-0
	oand size	RB	6 (full size)	
 Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-4 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2. 				

Table 9.3.3.1.1-1 Sub-band test for single antenna transmission (FDD)

	Test 1	Test 2
α[%]	60	60
γ	1.6	1.6
UE Category	≥1	≥1

Table 9.3.3.1.1-2 Minimum requirement (FDD)

9.3.3.1.2 TDD

For the parameters specified in Table 9.3.3.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.3.1.2-2 and by the following

a) a sub-band differential CQI offset level of +2 shall be reported at least α % for at least one of the sub-bands of full size at the channel edges;

b) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6.

Table 9.3.3.1.2-1 Sub-b	and test for sing	le antenna tran	smission (TDD)

Parameter		Unit	Test 1	Test 2
Band	dwidth	MHz	10 MHz	10 MHz
Transmis	sion mode		1 (port 0)	1 (port 0)
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0	0
power	$ ho_{\scriptscriptstyle B}$	dB	0	0
allocation	σ	dB	0	0
config	downlink juration		2	
	subframe juration		4	
$I_{\scriptscriptstyle ot}^{(j)}$ for	RB 05	dB[mW/15kHz]	-102	-93
$I_{\scriptscriptstyle ot}^{(j)}$ for	RB 641	dB[mW/15kHz]	-93	-93
$I_{\mathit{ot}}^{(j)}$ for F	RB 4249	dB[mW/15kHz]	-93	-102
Î	(<i>j</i>) or	dB[mW/15kHz]	-94	-94
	er of HARQ		1	
Propagati	ion channel		Clause B.2.4 with $a = 1, f_I$	
Antenna c	onfiguration		1 x	2
	ng interval	ms	1 x 5	2
	delay	ms	10 0	
	ng mode		PUSC	
	and size	RB	6 (full	
	K feedback ode		Multiplexing	
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4).				
Note 2: Reference measurement channel according to table A.4-5 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2.				

	Test 1	Test 2
α[%]	60	60
γ	1.6	1.6
UE Category	≥1	≥1

9.3.3.2 Void

9.3.3.2.1 Void

9.3.3.2.2 Void

9.3.4 UE-selected subband CQI

The accuracy of UE-selected subband channel quality indicator (CQI) reporting under frequency-selective fading conditions is determined by the relative increase of the throughput obtained when transmitting on the UE-selected subbands with the corresponding transport format compared to the case for which a fixed format is transmitted on any subband in set *S* of TS 36.213 [6]. The purpose is to verify that correct subbands are accurately reported for frequency-selective scheduling. To account for sensitivity of the input SNR the subband CQI reporting under frequency-selective fading conditions is considered to be verified if the reporting accuracy is met for at least one of two SNR levels separated by an offset of 1 dB.

9.3.4.1 Minimum requirement PUSCH 2-0 (Cell-Specific Reference Symbols)

9.3.4.1.1 FDD

For the parameters specified in Table 9.3.4.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.4.1.1-2 and by the following

a) the ratio of the throughput obtained when transmitting on a randomly selected subband among the best M subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each TTI for FDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [6] that corresponds to the subband size.

Par	ameter	Unit	Tes	st 1	Tes	st 2
Bar	dwidth	MHz		10 N	MHz	
Transmission mode			1 (port 0)			
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0			
power	$ ho_{\scriptscriptstyle B}$	dB		()	
allocation	σ	dB		()	
SNR	(Note 3)	dB	9	10	14	15
-	$\hat{I}_{or}^{(j)}$	dB[mW/15kHz]	-89	-88	-84	-83
1	$V_{oc}^{(j)}$	dB[mW/15kHz]	-9	98	-9	98
			Clause	B.2.4 wit	th $\tau_d = 0$).45 <i>μ</i> s,
Propagation channel			$a = 1, f_D = 5 \text{ Hz}$			
Reporti	ng interval	ms	5			
CQI delay		ms	8			
Repor	ing mode		PUSCH 2-0			
Max num	per of HARQ			1		
	missions					
	nd size (<i>k</i>)	RBs	3 (full size)			
	of preferred ands (<i>M</i>)		5			
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4)						
Note 2:	Reference measurement channel according to Table A.4-10 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2.					
Note 3:	For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.					

 Table 9.3.4.1.1-1 Subband test for single antenna transmission (FDD)

Table 9.3.4.1.1-2 Minimum requirement (FDD)

	Test 1	Test 2
γ	1.2	1.2
UE Category	≥1	≥1

9.3.4.1.2 TDD

For the parameters specified in Table 9.3.4.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.4.1.2-2 and by the following

a) the ratio of the throughput obtained when transmitting on a randomly selected subband among the best M subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each available downlink transmission instance for TDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [6] that corresponds to the subband size.

Para	meter	Unit	Test 1 Test 2		st 2	
Ban	dwidth	MHz	10 MHz			
Transmis	ssion mode		1 (port 0)			
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0			
power	$ ho_{\scriptscriptstyle B}$	dB		()	
allocation	σ	dB		()	
config	downlink guration			2	2	
	subframe guration			2	4	
SNR	(Note 3)	dB	9	10	14	15
ĺ	$\hat{f}(j)$ or	dB[mW/15kHz]	-89	-88	-84	-83
Λ	$V_{oc}^{(j)}$	dB[mW/15kHz]	-9	8	-6	98
_			Clause B.2.4 with $\tau_d = 0.45 \mu$).45 <i>μ</i> s,	
Propagat	ion channel		$a = 1, f_D = 5 \text{ Hz}$			
Reporti	ng interval	ms		5	5	
	delay	ms		10 c	or 11	
Report	ing mode			PUSC	CH 2-0	
Max numb	per of HARQ				1	
transr	nissions					
	nd size (<i>k</i>)	RBs		3 (full	size)	
	of preferred ands (<i>M</i>)			Ę	5	
	K feedback			Multin	lexing	
	ode			-	-	
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink subframe not later than SF#(n-4), this reported subband or wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-11 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2. Note 3: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.						

Table 9.3.4.1.2-1 Sub-band test for single antenna transmission (TDD)

Table 9.3.4.1.2-2 Minimum requirement (TDD)

	Test 1	Test 2
γ	1.2	1.2
UE Category	≥1	≥1

9.3.4.2 Minimum requirement PUCCH 2-0 (Cell-Specific Reference Symbols)

9.3.4.2.1 FDD

For the parameters specified in Table 9.3.4.2.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.4.2.1-2 and by the following

a) the ratio of the throughput obtained when transmitting on subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each TTI for FDD. The transport block size TBS (wideband CQI median) is that resulting

from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [6] that corresponds to the subband size.

Para	meter	Unit	Te	st 1	Tes	st 2
Bandwidth		MHz		10 MHz		
	sion mode			1 (pc		
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0			
power		-	0			
allocation	$ ho_{\scriptscriptstyle B}$	dB				
	σ	dB	-	(
	(Note 3)	dB	8	9	13	14
	(j) or	dB[mW/15kHz]	-90	-89	-85	-84
Ν	$V_{oc}^{(j)}$	dB[mW/15kHz]	-6	98	-9	98
Propagat	ion channel		Clause	B.2.4 wit	u).45 <i>μ</i> s,
				a = 1, f $N_{\rm P}$	$_{D} = 5 \text{ Hz}$	
	periodicity	ms				
	delay	ms		8	3	
	channel for eporting			PUSCH	(Note 4)	
PUCCH F	Report Type				1	
	band CQI			_	r	
	Report Type				1	
-	band CQI					
	er of HARQ		1			
	nd size (<i>k</i>)	RBs	6 (full size)			
-	f bandwidth	TLD3				
	ts (J)		3			
	K				1	
cqi-pmi-C	ConfigIndex		1			
		orts in an available u	plink rep	orting ins	tance at	
	subframe SF#	n based on CQI es	timation a	at a down	link subfi	rame
		SF#(n-4), this report				CQI
		olied at the eNB dov				
		easurement channe				
		I dynamic OCNG Pa	attern OP	.1/2 FDD	as desci	ribed in
	Annex A.5.1.1					1
		the minimum requi				
	least one of tr	ne two SNR(s) and t	ne respe	ctive war	ited signa	ai input
		sions between CQI	ronarte a			c .
		o report both on PUSCH instead of PUCCH. PDCCH 0 shall be transmitted in downlink SF#1, #3, #7 and #9				
		odic CQI to multiplex with the HARQ-ACK on PUSCH				
	in uplink subframe SF#5, #7, #1 and #3.					
		rt) are to be disrega				
		he most recent subl				dth part
	with j=1.					
	• •					
		cording to the most	recently	used sub	band CQ	I
report.						

Table 9.3.4.2.1-1 Subband test for single antenna transmission (FDD)

	Test 1	Test 2
γ	1.15	1.15
UE Category	≥1	≥1

9.3.4.2.2 TDD

For the parameters specified in Table 9.3.4.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.4.2.2-2 and by the following

a) the ratio of the throughput obtained when transmitting on subbands reported by the UE the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected subband in set *S* shall be $\geq \gamma$;

The requirements only apply for subbands of full size and the random scheduling across the subbands is done by selecting a new subband in each available downlink transmission instance for TDD. The transport block size TBS (wideband CQI median) is that resulting from the code rate which is closest to that indicated by the wideband CQI median and the N_{PRB} entry in Table 7.1.7.2.1-1 of TS 36.213 [6] that corresponds to the subband size.

Par	ameter	Unit	Tes	st 1	Tes	st 2
	ndwidth	MHz	10 MHz			
	ssion mode		1 (port 0)			
Downlink	$ ho_{\scriptscriptstyle A}$	dB	0			
power	$ ho_{\scriptscriptstyle B}$	dB	0			
allocation	σ	dB		(C	
Uplink	downlink					
	guration			2	2	
	l subframe			4	4	
	guration	15			-	
	(Note 3)	dB	8	9	13	14
-	$\hat{I}_{or}^{(j)}$	dB[mW/15kHz]	-90	-89	-85	-84
1	$V_{oc}^{(j)}$	dB[mW/15kHz]	-6	98	-9	8
Bronogo	tion obonnol		Clause	B.2.4 wi	th $ au_d = 0$.45 <i>μ</i> s,
гторауа	tion channel				$D_D = 5 \text{ Hz}$	
	g periodicity	ms		NP	= 5	
	I delay	ms		10 c	or 11	
	channel for reporting			PUSCH	(Note 4)	
	Report Type				4	
	eband CQI			2	+	
	Report Type				1	
	band CQI ber of HARQ					
	missions				1	
	nd size (<i>k</i>)	RBs		6 (ful	l size)	
	of bandwidth			:	3	
ра	<u>rts (J)</u> K				1	
cai-pmi-	ConfigIndex				3	
	CK feedback					
	node			-	lexing	
Note 1:	subframe SF# not later than cannot be app	orts in an available u th based on CQI es SF#(n-4), this repor blied at the eNB dow	timation a ted subb vnlink bei	at a dowr and or w fore SF#(ilink subfi ideband (n+4).	CQI
Note 2:		easurement channel				
	Annex A.5.2.1	l dynamic OCNG Pa	attern OP	.1/2 100	as desci	ni bea
Note 3:	For each test, least one of th	the minimum requine two SNR(s) and t				
Note 4:	necessary to DCI format 0	ollisions between CQI reports and HARQ-ACK it is to report both on PUSCH instead of PUCCH. PDCCH 0 shall be transmitted in downlink SF#3 and #8 to allow QI to multiplex with the HARQ-ACK on PUSCH in uplink				
Note 5:	subframe SF# CQI reports for bandwidth para according to t with j=1.	#7 and #2. for the short subband (having 2RBs in the last art) are to be disregarded and data scheduling the most recent subband CQI report for bandwidth part				
Note 6:			wideband CQI is reported, data is to be ng to the most recently used subband CQI			I

Table 9.3.4.2.2-1 Sub-band test for single antenna transmission (TDD)

	Test 1	Test 2
γ	1.15	1.15
UE Category	≥1	≥1

Table 9.3.4.2.2-2 Minimum requirement (TDD)

9.3.5 Additional requirements for enhanced receiver Type A

The purpose of the test is to verify that the reporting of the channel quality is based on the receiver of the enhanced Type A. Performance requirements are specified in terms of the relative increase of the throughput obtained when the transport format is that indicated by the reported CQI subject to an interference model compared to the case with a white Gaussian noise model, and a requirement on the minimum BLER of the transmitted transport formats indicated by the reported CQI subject to an interference model.

9.3.5.1 Minimum requirement PUCCH 1-0 (Cell-Specific Reference Symbol)

9.3.5.1.1 FDD

For the parameters specified in Table 9.3.5.1.1-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.5.1.1-2 and by the following

- a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;
- b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

The transport block sizes indicated by the reported wideband CQI are selected according to Table A.4-3 (for Category 2-8) or Table A.4-9 (for Category 1).

Par	ameter	Unit	Cell 1	Cell 2		
	ndwidth	MHz		MHz		
	ission mode			ort 0)		
	ic Prefix		Normal	Normal		
	ell ID		0	1		
	R (Note 8)	dB	-2	N/A		
	$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A		
Propaga	tion channel		EPA5	Static (Note 7)		
	lation and					
antenna	configuration		Low (1 x 2)	(1 x 2)		
DIP	(Note 4)	dB	N/A	-0.41		
Ret	ference		Note 2	N/A		
measure	ment channel		Note 2	N/A		
Repor	ting mode		PUCCH 1-0	N/A		
Reportin	g periodicity	ms	$N_{\rm pd} = 2$	N/A		
CC	l delay	ms	8	N/A		
	l channel for reporting		PUSCH (Note 3)	N/A		
	Report Type		4	N/A		
	qi-pmi-					
Configu	irationIndex		1	N/A		
	ber of HARQ		1	N/A		
Note 1:		rts in an available	uplink reporting in	stance at		
Note 2:	 subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-1 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1 and Table A.4-7 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 FDD as described in 					
Annex A.5.1.1/2. Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: The respective received power spectral density of each interfering cell relative to N_{ac} is defined by its associated DIP value as						
 specified in clause B.5.1. Note 5: Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. The number of the CRS ports in both cells is the same. Intefering cell is fully loaded. Note 6: Both cells are time-synchronous. Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present. 						
Note 8:		onds to $ \widehat{E}_{s} ig / N_{oc} $	of Cell 1 as define	ed in clause		
Note 9:		sical channel setur defined in Annex /		OCNG pattern		

 Table 9.3.5.1.1-1 Fading test for single antenna (FDD)



γ	1.8
UE Category	≥1

9.3.5.1.2 TDD

For the parameters specified in Table 9.3.5.1.2-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in 9.3.5.1.2-2 and by the following

- a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;
- b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

The transport block sizes indicated by the reported wideband CQI are selected according to Table A.4-3 (for Category 2-8) or Table A.4-9 (for Category 1).

	ameter	Unit	Cell 1	Cell 2
Bandwidth		MHz		MHz
Transmission mode			1 (po	ort 0)
	k downlink			2
	iguration			
	al subframe		4	1
	iguration			
	lic Prefix		Normal	Normal
		15	0	1
	R (Note 8)	dB	-2	N/A
	$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
	tion channel		EPA5	Static (Note 7)
	lation and		Low (1 x 2)	(1 x 2)
	configuration			
-	(Note 4)	dB	N/A	-0.41
-	ference		Note 2	N/A
	ment channel			
	rting mode		PUCCH 1-0	N/A
	ng periodicity	ms	$N_{\rm pd} = 5$	N/A
	l delay	ms	10 or 11	N/A
	I channel for		PUSCH (Note	N/A
	reporting		3)	
	Report Type		4	N/A
Configu	qi-pmi- urationIndex		3	N/A
	ber of HARQ		1	N/A
	CK feedback			
	node		Multiplexing	N/A
Note 1: Note 2:	 Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-2 for Category 2-8 with one sided dynamic OCNG Pattern OP.1 TDD as described in Annex A.5.2.1 and Table A.4-8 for Category 1 with one/two sided dynamic OCNG Pattern OP.1/2 TDD as described in 			
Annex A.5.2.1/2. Note 3: To avoid collisions between CQI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#7 and #2. Note 4: The respective received power spectral density of each interfering cell relative to N_{oc} is defined by its associated DIP value as				
Note 5: Note 6: Note 7:	2 is the interfering cell. The number of the CRS ports in both cells is the same. Intefering cell is fully loaded.Note 6: Both cells are time-synchronous.			
Note 8:	SINR corresp	onds to \widehat{E}_{+}/N_{+} (of Cell 1 as define	d in clause
Note 8: SINR corresponds to \hat{E}_s / N_{oc} of Cell 1 as defined in clause 8.1.1. Note 9: Downlink physical channel setup in Cell 2 applies OCNG pattern OP.1 TDD as defined in Annex A.5.2.1.				

Table 9.3.5.1.2-1	Fading to	est for singl	le antenna ((TDD)	
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Table 9.3.5.1.2-2	Minimum re	quirement	(TDD)
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γ	1.8
UE Category	≥1

9.3.5.2 Minimum requirement PUCCH 1-1 (CSI Reference Symbol)

9.3.5.2.1 FDD

For the parameters specified in Table 9.3.5.2.1-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in Table 9.3.5.2.1-2 and by the following

- a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;
- b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

The transport block sizes indicated by the reported wideband CQI are selected according to Table A.4-3b or Table A.4-3h.

_	-	-	
Parameter	Unit	Cell 1	Cell 2
Bandwidth Transmission mode	MHz	10	MHz 9
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-2	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	N/A
Propagation channel		EPA5	Static (Note 7)
Correlation and antenna configuration		Low (2 x 2)	(1 x 2)
DIP (Note 4)	dB	N/A	-0.41
Cell-specific reference	45	Antenna ports	Antenna port 0
signals		0,1	•
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/1	N/A
CSI-RS reference signal configuration		2	N/A
Zero-power CSI-RS			
configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap	Subframes / bitmap	N/A	1 / 001000000000 000
CodeBookSubsetRestr iction bitmap		001111	N/A
Reference measurement channel		Note 2	N/A
Reporting mode		PUCCH 1-1	N/A
Reporting periodicity	ms	$N_{\rm pd} = 5$	N/A
CQI delay	ms	8	N/A
Physical channel for CQI/PMI reporting		PUSCH (Note 3)	N/A
PUCCH Report Type for CQI/PMI		2	N/A
PUCCH channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi-		-	N1/A
ConfigurationIndex		2	N/A
ri-ConfigIndex		1	N/A
Max number of HARQ		1	N/A
transmissions			-
 Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-1c with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1. 			
 Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#0 and #5. Note 4: The respective received power spectral density of each interfering 			
	cell relative to N_{oc} is defined by its associated DIP value as specified in clause B.5.1.		
Note 5: Two cells are			
Note 6: Both cells are time-synchronous. Note 7: Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.			

Table 9.3.5.2.1-1	Fading	test for	single	antenna	(FDD)
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Note 8:	SINR corresponds to ${ar E}_s/N_{oc}$ ´ of Cell 1 as defined in clause
Note 9:	8.1.1. Downlink physical channel setup in Cell 2 applies OCNG pattern OP.1 FDD as defined in Annex A.5.1.1.

γ	1.8
UE Category	≥1

9.3.5.2.2 TDD

For the parameters specified in Table 9.3.5.2.2-1, and using the downlink physical channels specified in Annex C, the minimum requirements are specified in 9.3.5.2.2-2 and by the following

- a) the ratio of the throughput obtained when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP and that obtained when transmitting the transport format indicated by each reported wideband CQI index subject to a white Gaussian noise source shall be $\geq \gamma$;
- b) when transmitting the transport format indicated by each reported wideband CQI index subject to an interference source with specified DIP, the average BLER for the indicated transport formats shall be greater than or equal to 2%.

The transport block sizes indicated by the reported wideband CQI are selected according to Table A.4-3b or Table A.4-3h.

		0	0 " 0
Parameter	Unit	Cell 1	Cell 2 MHz
Bandwidth Transmission mode	MHz		
Uplink downlink			-
configuration		4	2
Special subframe			4
configuration		2	1
Cyclic Prefix		Normal	Normal
Cell ID		0	1
SINR (Note 8)	dB	-2	N/A
$N_{oc}^{(j)}$	dB[mW/15kHz]	-98	-98
Propagation channel		EPA5	Static (Note 7)
Correlation and		Low (2 x 2)	(1 x 2)
antenna configuration DIP (Note 4)	dB	N/A	-0.41
Cell-specific reference	uВ	Antenna ports	Antenna port 0
signals		0,1	Antenna port o
CSI reference signals		Antenna ports 15,16	N/A
CSI-RS periodicity and subframe offset		5/3	N/A
CSI-RS reference		2	N/A
signal configuration		2	
Zero-power CSI-RS configuration I _{CSI-RS} / ZeroPowerCSI-RS	Subframes / bitmap	N/A	3 / 001000000000 0000
bitmap CodeBookSubsetRestr		001111	N/A
iction bitmap Reference			NI/A
measurement channel		Note 2 PUCCH 1-1	N/A
Reporting mode		(Sub-mode: 2)	N/A
Reporting periodicity	ms	$N_{\rm pd} = 5$	N/A
CQI delay	ms	10	N/A
Physical channel for		PUSCH (Note	N/A
CQI/PMI reporting PUCCH Report Type		3)	
for CQI/PMI		2c	N/A
Physical channel for RI reporting		PUCCH Format 2	N/A
PUCCH Report Type for RI		3	N/A
cqi-pmi- ConfigurationIndex		3	N/A
ri-ConfigIndex		805 (Note 9)	N/A
Max number of HARQ transmissions		1	N/A
ACK/NACK feedback	<u> </u>	Multiplexing	N/A
mode			-
 Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: Reference measurement channel according to Table A.4-2c with one sided dynamic OCNG Pattern OP.1 TDD as described in 			
Annex A.5.2.1. Note 3: To avoid collisions between CQI/ PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#3 and #8 to allow periodic CQI/ PMI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#2 and #7. Note 4: The respective received power spectral density of each interfering			

Table 9.3.5.2.2-1	Fading test	for single anter	nna (TDD)
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	cell relative to $N_{_{oc}}$ ´ is defined by its associated DIP value as
	specified in clause B.5.1.
Note 5:	Two cells are considered in which Cell 1 is the serving cell and Cell 2 is the interfering cell. Intefering cell is fully loaded.
Note 6:	Both cells are time-synchronous.
Note 7:	Static channel is used for the interference model. In case for white Gaussian noise model Cell 2 is not present.
Note 8:	SINR corresponds to $ \widehat{E}_{s} ig / N_{oc} $ of Cell 1 as defined in clause
	8.1.1.
Note 9:	RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.
Note 10:	
	OP.1 TDD as defined in Annex A.5.2.1.

Table 9.3.5.2.2-2 Minimum requirement (TDD)

γ	1.8
UE Category	≥1

9.3.6 Minimum requirement (With multiple CSI processes)

The purpose of the test is to verify the reporting accuracy of the CQI and the UE processing capability for multiple CSI processes. Each CSI process is associated with a CSI-RS resource and a CSI-IM resource as shown in Table 9.3.6-1. For UE supports one CSI process, CSI process 2 is configured and the corresponding requirements shall be fulfilled. For UE supports three CSI processes, CSI processes 0, 1 and 2 are configured and the corresponding requirements shall be fulfilled. For UE supports four CSI processes, CSI processes 0, 1, 2 and 3 are configured and the corresponding requirements shall be fulfilled.

Table 9.3.6-1	Configuration of	of CSI processes
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	CSI process 0	CSI process 1	CSI process 2	CSI process 3
CSI-RS resource	CSI-RS signal 0	CSI-RS signal 1	CSI-RS signal 0	CSI-RS signal 1
CSI-IM resource	CSI-IM resource 0	CSI-IM resource 0	CSI-IM resource 1	CSI-IM resource 2

9.3.6.1 FDD

For the parameters specified in Table 9.3.6.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.6.1-2 and by the following

- a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band for CSI process 1, 2, or 3;
- b) a CQI index not in the set {median CQI -1, median CQI +1} shall be reported at least δ % of the time for CSI process 0;
- c) the difference of the median CQIs of the reported wideband CQI for configurated CSI processes shall be greater or equal to the values as in Table 9.3.6.1-3;
- d) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;

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e) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6c.

Table	9.3.6.1-1	Fading	test	for	FDD
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Parameter		l lucit		Tes	st 1			Te	st 2	
		Unit	TP		TF	22	TI	P1	TF	2
	width	MHz	 		MHz				MHz	
Iransmis	sion mode		10		10		1	0	1 0	0
	$ ho_{\scriptscriptstyle A}$	dB)				-	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB		()				0	
allocation	P_c	dB	-3	1	()	-:	3	()
	σ	dB		-3	3			-	3	
	Note 7)	dB	10	11	7	8	14	15	9	10
Î	(j) Dr	dB[mW/15kHz]	-88	-87	-91	-90	-84	-85	-89	-88
N	(j) oc	dB[mW/15kHz]		-9	98			-6	98	
Propagatio	on channel		EPA 5 Low Clause B.2.4.1 with $\tau_d = 0.45 \mu s$, $a = 1$, $f_D = 5 \text{Hz}$				Clause B.2.4.1 with $\tau_d = 0.45 \mu s$, a = 1, $f_D = 5 \text{Hz}$			
Antenna co	onfiguration		4x	2	2>	(2	4)	k 2	2)	(2
	ning Model		As spe		Section	B.4.3	As sp		Section	B.4.3
	between TPs	us)		0			
	et between TPs ference signals	Hz	4) ports 0,1		0 Antenna ports 0,1			
•	signal 0		Antenna ports 15,,18		N/A		Antenn	a ports ,18	N/	/Α
	and subframe offset / $\Delta_{\rm CSI-RS}$		5/1		N/A		5/1		N	Ά
CSI-RS 0 c	onfiguration		0		N/A		0		N/A	
CSI-RS	-		N/A		Antenna ports 15,16		N/A		Antenn 15	
	CSI-RS 1 periodicity and subframe offset $T_{CSI-RS} / \Delta_{CSI-RS}$		N/A		5/1		N/A		5/	′1
	onfiguration		N/A		5		N/A		Ę	
	RS 0 configuration erCSI-RS bitmap		N//		111000	1 / 00000000 N 0000		/A	1 111000 00	000000
	RS 1 configuration rerCSI-RS bitmap		1 / 00100110000 00000		N/A		00100 ⁻	/ 110000 000	N	/Α
T _{CSI-RS}	and subframe offset / Δ_{CSI-RS}		5/1 5/1		/1	5	/1	5/		
	onfiguration		2			2 2		2	2	2
T _{CSI-RS}	and subframe offset / $\Delta_{\rm CSI-RS}$		5/*	1	N	/A	5	/1	N	Ά
CSI-IM 1 c	onfiguration		6		N	/A	6	6	N	Ά
T _{CSI-RS}	and subframe offset $/ \Delta_{CSI-RS}$		N//		5/	/1	N	/A	5/	′1
CSI-IM 2 c	onfiguration		N//		· · · · ·	1	N	/A		
	CSI-RS				RS 0				RS 0	
	CSI-IM Reporting mode			PUCC	·IM 0				-IM 0 CH 1-1	
	CodeBookSubsetR estriction bitmap		0x00		0 0000 0	001	0x0		0 0000 0	001
	Reporting periodicity	ms		N _{pd} = 5		= 5 Nr		N _{pd}	= 5	
CSI process 0	CQI delay	ms		1	0		1	1	0	
	Physical channel for CQI/ PMI reporting				(Note 6)				(Note 6)	
	PUCCH Report Type for CQI/PMI				2				2	
	PUCCH channel		F	PUCCH	Format 2		PUCCH Format 2			

	for RI reporting					
	PUCCH report type for RI		:	3	3	3
	cqi-pmi- ConfigurationIndex			2	2	2
	ri-ConfigIndex			1		
	CSI-RS		CSI-	RS 1	CSI-	RS 1
	CSI-IM			IM 0	CSI-	
	Reporting mode			CH 3-1	PUSC	H 3-1
CSI process 1	CodeBookSubsetR estriction bitmap		000	001	000	001
	Reporting interval (Note 9)	ms		5	5	
	CQI delay	ms		0	1	
	Sub-band size	RB	6 (ful		6 (full	
	CSI-RS			RS 0	CSI-	
	CSI-IM			·IM 1	CSI-	
	Reporting mode		PUSC	CH 3-1	PUSCH 3-1	
CSI process 2	CodeBookSubsetR estriction bitmap		0x0000 0000 0000 0001		0x0000 0000 0000 0001	
	Reporting interval (Note 9)	ms	Į	5	Ę	5
	CQI delay	ms	10		1	0
	Sub-band size	RB	6 (full size	e) (Note 8)	6 (full size) (Note 8)	
	CSI-RS		CSI-RS 1 CSI-RS			
	CSI-IM			-IM 2	CSI-IM 2	
	Reporting mode		PUSC	CH 3-1	PUSCH 3-1	
CSI process 3	CodeBookSubsetR estriction bitmap		000001 000001		001	
	Reporting interval (Note 9)	ms	Į	5 5		5
	CQI delay	ms	1	0	1	0
	Sub-band size	RB	6 (ful	size)	6 (full	size)
CSI process for F	PDSCH scheduling		CSI pro	ocess 2	CSI pro	ocess 2
Ce	ell ID		0	6	0	6
Quasi-co-lo	cated CSI-RS		CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-l	ocated CRS		Same Cell ID as Cell 1	Same Cell ID as Cell 2	Same Cell ID as Cell 1	Same Cell IE as Cell 2
PMI for subframe	e 2, 3, 4, 7, 8 and 9		0x0000 0000 0000 0001	100000	0x0000 0000 0000 0001	100000
PMI for subf	frame 1 and 6		0x0000 0000 0001 0000	100000	0x0000 0000 0001 0000	100000
	ARQ transmissions		1	N/A	4	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4).
 Note 2: 3 symbols allocated to PDCCH.

Note 3: PDSCH transmission is scheduled on subframe 2, 3, 4, 7, 8 and 9 from TP1.

Note 4: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1 and 6 from TP1.

Note 5: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1, 2, 3, 4, 6, 7, 8 and 9 from TP2

Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

Note 7: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Note 9: For these sub-bands which are not selected for PDSCH transmission, TM10 OCNG should be transmitted.

	CSI process 0	CSI process 1	CSI process 2	CSI process 3		
α[%]	N/A	2	2	2		
β [%]	N/A	40	40	40		
δ [%]	10	N/A	N/A	N/A		
γ	N/A	N/A	1.02	N/A		
UE Category	≥1					

Table 9.3.6.1-2 Minimum requirement (FDD)

Table 9.3.6.1-3 Minimum median CQI difference between configured CSI processes (FDD)

	CSI process 1	CSI process 2	CSI process 3
CSI process 0	N/A	1	3
UE Category		≥1	

9.3.6.2 TDD

For the parameters specified in Table 9.3.6.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.3.6.2-2 and by the following

- a) a sub-band differential CQI offset level of 0 shall be reported at least α % of the time but less than β % for each sub-band for CSI process 1, 2, or 3;
- b) a CQI index not in the set {median CQI -1, median CQI +1} shall be reported at least δ % of the time for CSI process 0;
- c) the difference of the median CQIs of the reported wideband CQI for configurated CSI processes shall be greater or equal to the values as in Table 9.3.6.2-3;
- d) the ratio of the throughput obtained when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS and that obtained when transmitting the TBS indicated by the reported wideband CQI median on a randomly selected sub-band in set *S* shall be $\geq \gamma$;
- e) when transmitting on a randomly selected sub-band among the sub-bands with the highest differential CQI offset level the corresponding TBS, the average BLER for the indicated transport formats shall be greater or equal to 0.02.

The requirements only apply for sub-bands of full size and the random scheduling across the sub-bands is done by selecting a new sub-band in each TTI for FDD, each available downlink transmission instance for TDD. Sub-bands of a size smaller than full size are excluded from the test. The transport block sizes TBS for wideband CQI median and subband CQI are selected according to Table A.4-6c.

Parameter		Unit		Tes					st 2	
			TF	TP1 TP2		TP1 TP2			P2	
Bandwidth		MHz		10					MHz	<u>^</u>
	sion mode		1			0	10		10	
	nk configuration			<u>2</u> 1		<u>2</u> 1		<u>2</u> 1		<u>2</u> 4
Special Subilar		dB	-		<u> </u>	+			. · · · · · · · · · · · · · · · · · · ·	+
	$\rho_{\scriptscriptstyle A}$				-				-	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB		(0			(0	
allocation	P_c	dB	-:	3	()	-	3		C
	σ	dB			3				3	
	(Note 7)	dB	10	11	7	8	14	15	9	10
Ι	c(j) or	dB[mW/15kHz]	-88	-87	-91	-90	-84	-85	-89	-88
N	$T_{oc}^{(j)}$	dB[mW/15kHz]		-6	98			-9	98	
Propagati	on channel		EPA :	5 Low		th .45 μs,	EPA	5 Low	$\tau_d = 0$	B.2.4.1 ith).45 μs, = 1,
					a = 1, $f_D = 5 \text{ Hz}$					= 1, = 5 Hz
	onfiguration		4>		2	(2	4x2		2x2	
	ning Model		As sp	ecified ir	n Section	B.4.3	As sp	ecified ir	n Section	B.4.3
	t between TPs	us			0		0			
	set between TPs	Hz	0		0					
	eference signals		Antenn	Antenna			Antenna Antenna ports		ports 0,1	
	signal 0			., 18	N/A		15,, 18		N	/A
	CSI-RS 0 periodicity and subframe offset $T_{\text{CSI-RS}} / \Delta_{\text{CSI-RS}}$		5/	/3	N	/A	5/3		N	/A
CSI-RS 0 configuration			()	N	/Α	()	N	/A
CSI-RS	CSI-RS signal 1		N/A		Antenr 15,	a ports 16	N/A			a ports 16
	/ and subframe offset / Δ_{CSI-RS}		N/A			/3	N/A		5	/3
	configuration		N/A			5		/A		5
	RS 0 configuration verCSI-RS bitmap		N/A		3 / 11100000000 00000			/A	11100	; / 000000 000
I _{CSI-RS} / ZeroPow	RS 1 configuration verCSI-RS bitmap		3 / 00100110000 N/A 00000		00100 ⁻	/ 110000 000	N	/A		
	\prime and subframe offset $/ \Delta_{\rm CSI-RS}$		5,	/3	5	/3	5,	/3	5	/3
CSI-IM 0 c	onfiguration		2	2		2	1	2	:	2
	/ and subframe offset / $\Delta_{\rm CSI-RS}$		5/	/3	N	/A	5,	/3	N	/A
CSI-IM 1 c	configuration		6	6	N	/Α	6	6	N	/A
	\prime and subframe offset $/ \Delta_{\rm CSI-RS}$		N	/A	5	/3	N	/A	5	/3
	7 Acsi-Rs		N	Ά		1	N	/A		1
	CSI-RS		1		RS 0				RS 0	
	CSI-IM			CSI-	-IM 0			CSI-	-IM 0	
	Reporting mode			PUCC	CH 1-1			PUCC	CH 1-1	
	CodeBookSubsetR estriction bitmap		0x0	000 000	0 0000 0	001	0x0	000 000	0 0000 0	001
CSI process 0	Reporting periodicity	ms		$N_{\rm pd}$	= 5			$N_{\rm pd}$	= 5	
	CQI delay	ms		1	2			1	2	
	Physical channel for CQI/ PMI reporting				(Note 6)		PUSCH			
	PUCCH Report				2				2	

Table 9.3.6.2-1 Fading test for TDD

PUCCH channel for RI reporting PUCCH report type for RI <i>cqi-pmi-</i> <i>ConfigurationIndex</i> <i>ri-ConfigIndex</i> CSI-RS CSI-IM Reporting mode CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms ms RB	805 (N 805 (N CSI- CSI- PUSC 000	3 3 ote 10) RS 1 IM 0 CH 3-1	PUCCH I 3 3 805 (Ne CSI-I CSI- CSI- CSI- DUSC 000	3 3 ote 10) RS 1 IM 0 :H 3-1
PUCCH report type for RI cqi-pmi- ConfigurationIndex ri-ConfigIndex CSI-RS CSI-IM Reporting mode CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	805 (N 805 (N CSI- CSI- PUSC 000	3 ote 10) RS 1 IM 0 CH 3-1 001	3 805 (No CSI-I CSI- CSI- PUSC 000	3 ote 10) RS 1 IM 0 :H 3-1
ConfigurationIndex ri-ConfigIndex CSI-RS CSI-IM Reporting mode CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	805 (N CSI- CSI- CSI- PUSC 000	ote 10) RS 1 IM 0 CH 3-1 001	805 (Nr CSI-I CSI- PUSC 000	ote 10) RS 1 IM 0 :H 3-1
ri-ConfigIndex CSI-RS CSI-IM Reporting mode CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	CSI- CSI- PUSC 000	RS 1 IM 0 CH 3-1 001	CSI-I CSI- PUSC 000	RS 1 IM 0 IH 3-1
CSI-IM Reporting mode CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	CSI- PUSC 000	IM 0 CH 3-1 001	CSI- PUSC 000	IM 0 H 3-1
Reporting mode CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	PUSC 000 5	CH 3-1 001	PUSC 000	H 3-1
CodeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	000 5 1	001	000	
estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms				001
Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM	ms	1	5	E	
CQI delay Sub-band size CSI-RS CSI-IM				C C	5
Sub-band size CSI-RS CSI-IM	RB		2	1:	2
CSI-IM		6 (full	12 6 (full size)		size)
		CSI-		CSI-I	
-		CSI-	CSI-IM 1		IM 1
Reporting mode		PUSC	CH 3-1	PUSCH 3-1	
CodeBookSubsetR estriction bitmap		0x0000 0000	0x0000 0000 0000 0001		0000 0001
Reporting interval	ms	5	5	5	5
		2	12		
	RB			6 (full size) (Note 8)	
				PUSCH 3-1	
CodeBookSubsetR		000	001	000001	
Reporting interval	ms	Ę	5	5	
	ms	1	2	1:	2
Sub-band size	RB	6 (full			size)
SCH scheduling		CSI pro	ocess 2	CSI pro	ocess 2
D		0	6	0	6
ed CSI-RS		CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
ated CRS			Same Cell ID as Cell 2		Same Cell IE as Cell 2
me 4and 9		0x0000 0000	100000	0x0000 0000	100000
me 3 and 8		0x0000 0000	100000	0x0000 0000	100000
Q transmissions		1	N/A	1	N/A
		Multiplexing		Multiplexina	N/A
ports in an available		ance at subframe S	SF#n based on CO	I estimation at a	
	estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size CSI-RS CSI-IM Reporting mode codeBookSubsetR estriction bitmap Reporting interval (Note 9) CQI delay Sub-band size SCH scheduling D ed CSI-RS ted CRS me 4and 9 me 3 and 8 Q transmissions lback mode orts in an available F#(n-4), this reported	CodeBookSubsetR estriction bitmap Reporting interval (Note 9) ms CQI delay ms Sub-band size RB CSI-RS CSI-IM Reporting mode codeBookSubsetR estriction bitmap ms Reporting interval (Note 9) ms CQI delay ms CodeBookSubsetR ms estriction bitmap ms Reporting interval (Note 9) ms CQI delay ms Sub-band size RB SCH scheduling ms D cd CSI-RS tted CRS me 4and 9 me 3 and 8 Q transmissions Iback mode uplink reporting inst	CodeBookSubsetR estriction bitmap0x0000 000Reporting interval (Note 9)ms4CQI delayms1Sub-band sizeRB6 (full size CSI-RSCSI-RSCSI- CSI-IMCSI- CSI- CSI- Reporting modeReporting modePUSC CodeBookSubsetRcodeBookSubsetR0000estriction bitmap0000Reporting interval (Note 9)msCQI delaymsCQI delaymsCQI delaymsCQI delaymsCQI delaymsCQI delaymsCQI delaymsCQI delayCSI pro00code CSI-RSCSI-RS 0code CSI-RSCSI-RS 0code CSI-RSCSI-RS 0as Cell 1as Cell 1ne 4and 90x0000 0000ne 4and 80x0000 000000001 0000Q transmissions1Iback modeMultiplexingorsts in an available uplink reporting instance at subframe S#(n-4), this reported wideband CQI cannot be applied at th	CodeBookSubsetR estriction bitmap0x0000 0000 0000 0000 0001Reporting interval (Note 9)ms5CQI delayms12Sub-band sizeRB6 (full size) (Note 8)CSI-RSCSI-RS 1CSI-IMCSI-IM 2Reporting modePUSCH 3-1CodeBookSubsetR estriction bitmap000001Reporting interval (Note 9)ms5CQI delayms5COL delayms5COL delayms12Sub-band sizeRB6 (full size)CQI delayms12Sub-band sizeRB6 (full size)CCI delayms12Sub-band sizeRB6 (full size)CCI stressCSI process 2D06ad CSI-RSCSI-RS 0CSI-RS 1sted CRSSame Cell ID as Cell 1as Cell 2ne 4and 90x0000 0000 0001 0000100000ne 4and 80x0000 0000 0001 0000100000Q transmissions1N/AIback modeMultiplexingN/A	CodeBookSubsetR estriction bitmap0x0000 0000 0000 00010x0000 0000Reporting interval (Note 9)ms55CQI delayms121Sub-band sizeRB6 (full size) (Note 8)6 (full size)CSI-RSCSI-RSCSI-RS 1CSI-CSI-IMCSI-IM 2CSI-Reporting modePUSCH 3-1PUSCcodeBookSubsetR000001000estriction bitmap000001000Reporting interval (Note 9)ms55CQI delayms121Sub-band sizeRB6 (full size)6 (full size)CQI delayms1Same Cell ID as Cell 1DSame Cell ID as Cell 1Das Cell 1as Cell 1ne 4and 90x0000 0000 0000 00010x0000 0000 0000 00000001 00000x0000 0000 0001 00000x0000 0000 0001 0000001 00000x0000 0000 0001 00000x0

Note 3: PDSCH transmission is scheduled on subframe 4 and 9 from TP1.

Note 4: TM10 OCNG is transmitted as specified in A.5.2.8 on subframe 3 and 8 from TP1.

Note 5: TM10 OCNG is transmitted as specified in A.5.2.8 on subframe 3, 4, 8 and 9 from TP2.

Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

Note 7: For each test, the minimum requirements shall be fulfilled for at least one of the two SNR(s) and the respective wanted signal input level.

Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Note 9: For these sub-bands which are not selected for PDSCH transmission, TM10 OCNG should be transmitted.

Note 10: RI reporting interval is set to the maximum allowable length of 160ms to minimise collisions between RI, CQI/PMI and HARQ-ACK reports. In the case when all three reports collide, it is expected that CQI/PMI reports will be dropped, while RI and HARQ-ACK will be multiplexed. At eNB, CQI report collection shall be skipped every 160ms during performance verification and the reported CQI in subframe SF#7 of the previous frame is applied in downlink subframes until a new CQI (after CQI/PMI dropping) is available.

	CSI process 0	CSI process 1	CSI process 2	CSI process 3			
α[%]	N/A	2	2	2			
β [%]	N/A	40	40	40			
δ [%]	10	N/A	N/A	N/A			
γ	N/A	N/A	1.02	N/A			
UE Category	≥1						

Table 9.3.6.2-2 Minimum requirement (TDD)

Table 9.3.6.2-3 Minimum median CQI difference between configured CSI processes (TDD)

	CSI process 1	CSI process 2	CSI process 3
CSI process 0	N/A	1	3
UE Category	≥1		

9.4 Reporting of Precoding Matrix Indicator (PMI)

The minimum performance requirements of PMI reporting are defined based on the precoding gain, expressed as the relative increase in throughput when the transmitter is configured according to the UE reports compared to the case when the transmitter is using random precoding, respectively. When the transmitter uses random precoding, for each PDSCH allocation a precoder is randomly generated and applied to the PDSCH. A fixed transport format (FRC) is configured for all requirements.

The requirements for transmission mode 6 with 1 TX and transmission mode 9 with 4 TX are specified in terms of the ratio

$$\gamma = \frac{t_{ue}}{t_{rnd}} \, \cdot \,$$

In the definition of γ , for PUSCH 3-1 single PMI and PUSCH 1-2 multiple PMI requirements, t_{rnd} is 60% of the maximum throughput obtained at SNR_{rnd} using random precoding, and t_{ue} the throughput measured at SNR_{rnd} with precoders configured according to the UE reports;

For the PUCCH 2-1 single PMI requirement, t_{rnd} is 60% of the maximum throughput obtained at SNR_{rnd} using random precoding on a randomly selected full-size subband in set S subbands, and t_{ue} the throughput measured at SNR_{rnd} with both the precoder and the preferred full-size subband applied according to the UE reports;

For PUSCH 2-2 multiple PMI requirements, t_{rnd} is 60% of the maximum throughput obtained at SNR_{rnd} using random precoding on a randomly selected full-size subband in set S subbands, and t_{ue} the throughput measured at SNR_{rnd} with both the subband precoder and a randomly selected full-size subband (within the preferred subbands) applied according to the UE reports.

The requirements for transmission mode 9 with 8 TX are specified in terms of the ratio

$$\gamma = \frac{t_{ue, follow1, follow2}}{t_{rnd1, rnd2}}$$

In the definition of γ , for PUSCH 3-1 single PMI and PUSCH 1-2 multiple PMI requirements, $t_{follow1,follow2}$ is 70% of the maximum throughput obtained at $SNR_{follow1,follow2}$ using the precoders configured according to the UE reports, and $t_{rnd1, rnd2}$ is the throughput measured at $SNR_{follow1, follow2}$ with random precoding.

9.4.1 Single PMI

9.4.1.1 Minimum requirement PUSCH 3-1 (Cell-Specific Reference Symbols)

9.4.1.1.1 FDD

For the parameters specified in Table 9.4.1.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.1.1-2.

Para	meter	Unit	Test 1
Bandwidth		MHz	10
Transmis	sion mode		6
Propagati	on channel		EVA5
Precoding	granularity	PRB	50
	tion and onfiguration		Low 2 x 2
Downlink	$ ho_{\scriptscriptstyle A}$	dB	-3
power	$ ho_{\scriptscriptstyle B}$	dB	-3
allocation	σ	dB	0
N	oc	dB[mW/15kHz]	-98
Reporti	ng mode		PUSCH 3-1
Reportin	g interval	ms	1
PMI dela	y (Note 2)	ms	8
	ent channel		R. 10 FDD
	Pattern		OP.1 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
Note 1: For random precoder selection, the precoder shall be updated in each TTI (1 ms granularity).			
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n- 4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			

Table 9.4.1.1.1-1 PMI test for single-layer (FDD)

Table 9.4.1.1.1-2	Minimum rec	quirement ((FDD)
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Parameter	Test 1
γ	1.1
UE Category	≥1

9.4.1.1.2 TDD

For the parameters specified in Table 9.4.1.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in 9.4.1.1.2-2.

Para	meter	Unit	Test 1
Bandwidth		MHz	10
	sion mode		6
	downlink		-
	guration		1
	subframe		4
	guration		4
Propagat	ion channel		EVA5
Precoding	g granularity	PRB	50
	ation and		Low 2 x 2
antenna c	onfiguration		
Downlink	$ ho_{\scriptscriptstyle A}$	dB	-3
power	$ ho_{\scriptscriptstyle B}$	dB	-3
allocation	σ	dB	0
Ν	$V_{oc}^{(j)}$	dB[mW/15kHz]	-98
Report	ing mode		PUSCH 3-1
	ng interval	ms	1
	ay (Note 2)	ms	10 or 11
	nent channel		R.10 TDD
	B Pattern		OP.1 TDD
	per of HARQ		4
	nissions		т —
	ncy version		{0,1,2,3}
coding sequence			(0, . ,=,0)
ACK/NACK feedback			Multiplexing
mode			
Note 1: For random precoder selection, the precoder shall be updated in each available downlink			
	transmission i		
Note 2: If the UE reports in an available uplink reporting			plink reporting
		brame SF#n based	
	estimation at	a downlink SF not la	ater than SF#(n-
	this reported PMI cannot be applied at the		
	eNB downlink before SF#(n+4).		

Table 9.4.1.1.2-1 PMI test for single-layer (TDD)

Parameter	Test 1
γ	1.1
UE Category	≥1

9.4.1.2 Minimum requirement PUCCH 2-1 (Cell-Specific Reference Symbols)

9.4.1.2.1 FDD

For the parameters specified in Table 9.4.1.2.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.2.1-2.

ParameterUnitTest 1BandwidthMHz10Transmission mode6Propagation channelEVA5Correlation and antenna configurationLow 4 x 2Downlink P_A dBpower ρ_B dBallocation σ dB σ dB-6allocation σ dB σ dB3 $N_{ac}^{(1)}$ dB[mW/15kHz]-98PMI delayms8 or 9Reporting modePUCCH 2-1 (Note 6)Reporting periodicityms $N_{rd} = 2$ Physical channel for CQI reportingPUSCH (Note 3)PUCCH Report Type2for wideband CQI1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth parts (J)3k1datundancy version coding sequence $(0,1.2.3)$ Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of puck the not precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH PCCH DCI format 0 shall be transmitted on downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink s	Der	- motor	Unit	Test 1
Transmission mode6Propagation channelEVA5Correlation and antenna configurationLow 4 x 2Downlink power allocation P_A dB-6 ρ_B dB-6 σ dBallocation σ dB-7dB-6allocation σ dB-8or9PMI delayms8 or 9Reporting modePUCCH 2-1 (Note 6)Reporting periodicityms $N_{pd} = 2$ Physical channel for CQI reportingPUSCH (Note 3)PUCCH Report Type for wideband CQI/PMI2PUCCH Report Type for subband CQI1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)1Number of bandwidth parts (J)3K1Max number of HARQ transmissions4Redundancy version coding sequence $\{0,1,2,3\}$ Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions	-			
$\begin{array}{ c c c c c c } \hline Propagation channel & EVA5 \\ \hline Correlation and \\ antenna configuration & Low 4 x 2 \\ \hline Correlation and \\ antenna configuration & Low 4 x 2 \\ \hline Correlation and \\ \hline Downlink \\ \hline P_A & dB & -6 \\ \hline P_B & dB & -6 \\ \hline \sigma & dB & 3 \\ \hline \hline PUCH 2-1 (Note 6) \\ \hline Reporting mode & PUCCH 2-1 (Note 6) \\ \hline Reporting mode & PUSCH (Note 3) \\ \hline CQI reporting \\ PUSCH (Note 3) \\ \hline CQI reporting \\ PUCCH Report Type & 2 \\ \hline for subband CQI/PMI & 2 \\ \hline PUCCH Report Type & 1 \\ \hline for subband CQI \\ \hline Measurement channel & R.14-1 FDD \\ \hline OCNG Pattern & OP.1/2 FDD \\ \hline Precoding granularity & PRB & 6 (full size) \\ \hline Number of bandwidth & 3 \\ \hline parts (J) & 3 \\ \hline K & 1 \\ \hline Cqi-pmi-ConfigIndex & 1 \\ \hline Max number of HARQ & 4 \\ \hline transmissions & 4 \\ \hline Redundancy version \\ coding sequence & {0,1,2,3} \\ \hline Note 1: For random precoder selection, the precoder shall be updated \\ every two TTI (2 ms granularity). \\ Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink before SF#(n-4). \\ Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI Format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. \\ Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband. \\ Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3.2.0 To 37.5.2.11 [4] according to the last PMI \\ \hline \eet transmitted on the most recently used subband. \\ \hline \eet transmitted on the most recently used subband. \\ \hline \eet transmitted on$			INITZ	-
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				-
antenna configurationLow 4 x 2Downlink power allocation P_A dB-6 O_B dB-6allocation σ dB3 $N_{oc}^{(j)}$ dB[mW/15kHz]-98PMI delayms8 or 9Reporting modePUCCH 2-1 (Note 6)Reporting periodicityms $N_{bd} = 2$ Physical channel for CQI reportingPUSCH (Note 3)PUCCH Report Type2for wideband CQI/PMI2PUCCH Report Type1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)1Number of bandwidth parts (J)3K1Max number of HARQ every two TTI (2 ms granularity).4Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrand SH(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n-4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH-PDCH DCCH I format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports the short subband for bandwidth part with j=1.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.Note 6:The bit field f				EVAS
Downink power allocation P_B dB-6allocation σ dB3 $N_{ac}^{(j)}$ dB[mW/15kHz]-98PMI delayms8 or 9Reporting periodicityms $N_{pd} = 2$ Physical channel for CQI reportingPUSCH (Note 3)PUCCH Report Type2for wideband CQI/PMI2PUCCH Report Type1for subband CQI1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth3parts (J)3K1cqi-pmi-ConfigIndex1Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subband CQI, it is necessary to report both on PUSCH instead of PUCCH.PDCH PDC DMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PNI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH.PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband.Note 5:In the case where wideband PUI is reported, data is to be transmitted on the most recently used subband.Note				Low 4 x 2
aliocation r_{ac} dB σ dB3 $N_{ac}^{(j)}$ dB[mW/15kHz]-98PMI delayms8 or 9Reporting periodicityms $N_{pd} = 2$ Physical channel for CQI reportingPUCCH 2.1 (Note 6)Report Report Type for wideband CQI/PMI2PUCCH Report Type for wideband CQI1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth parts (J)3K1Max number of HARQ transmissions4Redundancy version coding sequence{0,1,2,3}Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.<		$ ho_{\scriptscriptstyle A}$	dB	-6
N000PMI delayms8 or 9Reporting modePUCCH 2-1 (Note 6)Reporting periodicityms $N_{pd} = 2$ Physical channel for CQI reportingPUSCH (Note 3)PUCCH Report Type for subband CQI/PMI2PUCCH Report Type for subband CQI1Measurement channelR:14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth parts (J)3K1Cqi-pmi-ConfigIndex1Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH PDCCH DCI format 0 shall be transmited on downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted on the most recently used subband for bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband.Note 6:The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI		$ ho_{\scriptscriptstyle B}$	dB	-6
PMI delayms8 or 9Reporting periodicityms $N_{pd} = 2$ Physical channel forPUSCH (Note 3)CQI reportingPUSCH (Note 3)PUCCH Report Type2for wideband CQI/PMI2PUCCH Report Type1for subband CQI1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth3parts (J)4Max number of HARQ4transmissions4Redundancy version coding sequence{0,1,2,3}Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband PMI is reported, data is to be transmitted on the most recently used subband.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.Note 6:The bit field for PMI confirmation in DCI format 1B shall be mapped to '0" and TPMI information shall indicate the codebook	allocation	σ	dB	3
Reporting modePUCCH 2-1 (Note 6)Reporting periodicityms $N_{pd} = 2$ Physical channel forPUSCH (Note 3)CQI reportingPUSCH (Note 3)PUCCH Report Type2for wideband CQI/PMI2PUCCH Report Type1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth3parts (J)3K1cqi-pmi-ConfigIndex1Max number of HARQ4transmissions4Redundancy version coding sequence{0,1,2,3}Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband for bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.Note 6:The bit field for PMI confirmation shall indica	1	$V_{oc}^{(j)}$	dB[mW/15kHz]	-98
Reporting modePUCCH 2-1 (Note 6)Reporting periodicityms $N_{pd} = 2$ Physical channel forPUSCH (Note 3)CQI reportingPUSCH (Note 3)PUCCH Report Type2for wideband CQI/PMI2PUCCH Report Type1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth3parts (J)3K1cqi-pmi-ConfigIndex1Max number of HARQ4transmissions4Redundancy version coding sequence{0,1,2,3}Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband for bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.Note 6:The bit field for PMI confirmation shall indica	PM	l delav	ms	8 or 9
Reporting periodicityms $N_{pd} = 2$ Physical channel for CQI reportingPUSCH (Note 3)PUCCH Report Type for wideband CQI/PMI2PUCCH Report Type for subband CQI1Measurement channelR.14-1 FDDOCNG PatternOP.1/2 FDDPrecoding granularityPRB6 (full size)Number of bandwidth parts (J)3K1Max number of HARQ transmissions4Redundancy version coding sequence $\{0,1,2,3\}$ Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband PMI is reported, data is to be transmitted on the most recently used subband.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.Note 6:The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI				PUCCH 2-1 (Note 6)
Physical channel for CQI reporting PUSCH (Note 3) PUCCH Report Type for wideband CQI/PMI 2 PUCCH Report Type for subband CQI 1 Measurement channel R.14-1 FDD OCNG Pattern OP.1/2 FDD Precoding granularity PRB 6 (full size) 3 Number of bandwidth parts (J) 3 K 1 cqi-pmi-ConfigIndex 1 Max number of HARQ transmissions 4 Redundancy version coding sequence {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband for bandwidth part with j=1. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most			ms	
PUCCH Report Type for wideband CQI/PMI 2 PUCCH Report Type for subband CQI 1 Measurement channel R.14-1 FDD OCNG Pattern OP.1/2 FDD Precoding granularity PRB 6 (full size) Number of bandwidth parts (J) 3 K 1 Cappmi-ConfigIndex 1 Max number of HARQ 4 transmissions 4 Redundancy version coding sequence {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used su	Physical	channel for		PUSCH (Note 3)
PUCCH Report Type for subband CQI 1 Measurement channel R.14-1 FDD OCNG Pattern OP.1/2 FDD Precoding granularity PRB 6 (full size) Number of bandwidth parts (J) 3 K 1 cqi-pmi-ConfigIndex 1 Max number of HARQ 4 transmissions 4 Redundancy version coding sequence {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband. Note 6: The bit field fo	PUCCH	Report Type		2
Measurement channel R.14-1 FDD OCNG Pattern OP.1/2 FDD Precoding granularity PRB 6 (full size) Number of bandwidth parts (J) 3 K 1 cqi-pmi-ConfigIndex 1 Max number of HARQ 4 transmissions 4 Redundancy version coding sequence {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband. Note 6: The bit field for PMI confirmation in DCI format	PUCCH	Report Type		1
OCNG Pattern OP.1/2 FDD Precoding granularity PRB 6 (full size) Number of bandwidth parts (J) 3 K 1 cqi-pmi-ConfigIndex 1 Max number of HARQ transmissions 4 Redundancy version coding sequence {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband. Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the				R.14-1 FDD
Precoding granularityPRB6 (full size)Number of bandwidth parts (J)3K1cqi-pmi-ConfigIndex1Max number of HARQ transmissions4Redundancy version coding sequence{0,1,2,3}Note 1:For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity).Note 2:If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).Note 3:To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3.Note 4:Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1.Note 5:In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband.Note 6:The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI				
Number of bandwidth parts (J) 3 K 1 cqi-pmi-ConfigIndex 1 Max number of HARQ transmissions 4 Redundancy version coding sequence {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband. Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI			PRB	
K 1 cqi-pmi-ConfigIndex 1 Max number of HARQ 4 transmissions 4 Redundancy version {0,1,2,3} Note 1: For random precoder selection, the precoder shall be updated every two TTI (2 ms granularity). Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). Note 3: To avoid collisions between HARQ-ACK and wideband CQI/PMI or subband CQI, it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1, #3, #7 and #9 to allow periodic CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#5, #7, #1 and #3. Note 4: Reports for the short subband (having 2RBs in the last bandwidth part) are to be disregarded and instead data is to be transmitted on the most recently used subband for bandwidth part with j=1. Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband. Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI				, , , , , , , , , , , , , , , , , , ,
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 Note 5: In the case where wideband PMI is reported, data is to be transmitted on the most recently used subband. Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI 				
 transmitted on the most recently used subband. Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI 	Note 5			
Note 6: The bit field for PMI confirmation in DCI format 1B shall be mapped to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI	1010 0.			
to "0" and TPMI information shall indicate the codebook index used in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI	Note 6:			
in Table 6.3.4.2.3-2 of TS36.211 [4] according to the latest PMI				
		•••••		

Table 9.4.1.2.1-1 PMI test for single-layer (FDD)

Table 9.4.1.2.1-2 Minimum requirement	

	Test 1
γ	1.2
UE Category	≥1

9.4.1.2.2 TDD

For the parameters specified in Table 9.4.1.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.2.2-2.

Parameter		Unit	Test 1		
Bandwidth		MHz	10		
Transmission mode			6		
	downlink guration		1		
Special	subframe		4		
	guration				
	ion channel ation and		EVA5		
	configuration		Low 4 x 2		
Downlink	$ ho_{\scriptscriptstyle A}$	dB	-6		
power	$ ho_{\scriptscriptstyle B}$	dB	-6		
allocation	σ	dB	3		
Ν	$V_{oc}^{(j)}$	dB[mW/15kHz]	-98		
	delay	ms	10		
	ing mode	1110	PUCCH 2-1 (Note 6)		
	periodicity	ms	$N_{\rm P} = 5$		
Physical	channel for		PUSCH (Note 3)		
	eporting				
for wideba	Report Type and CQI/PMI		2		
	Report Type band CQI		1		
	nent channel		R.14-1 TDD		
	Pattern		OP.1/2 TDD		
	g granularity	PRB	6 (full size)		
Number of bandwidth			, <i>, , , , , , , , , , , , , , , , , , </i>		
	rts (J)		3		
K			1		
cqi-pmi-ConfigIndex			4		
Max numb	per of HARQ		4		
transr	nissions		+		
	ncy version		{0,1,2,3}		
	sequence		[0,1,2,0]		
	CK fedback ode		Multiplexing		
Note 1:	For random p	recoder selection, th	ne precoder shall be updated in		
	each available	e downlink transmis	sion instance.		
Note 2:	If the UE repo	rts in an available u	plink reporting instance at		
			imation at a downlink SF not later		
	(,	· ·	cannot be applied at the eNB		
	downlink befo				
		sions between HARQ-ACK and wideband CQI/PMI or			
		it is necessary to report both on PUSCH instead of			
PUCCH. PDCCH DCI format 0 shall be transmitted in downlir SF#4 and #9 to allow periodic CQI to multiplex with the HARC					
on PUSCH in uplink subframe SF#8 and #3.					
Note 4: Reports for the short subband (having 2RBs in the last bandwidt					
	part) are to be disregarded and instead data is to be transmitted on				
	the most recently used subband for bandwidth part with j=1.				
Note 5:	In the case wh	nere wideband PMI	is reported, data is to be		
		the most recently u			
			in DCI format 1B shall be mapped		
			indicate the codebook index used		
			[4] according to the latest PMI		
report on PUCCH.					

Table 9.4.1.2.2-1 PMI test for single-layer (TDD)

Table 9.4.1.2.2-2 Minimum	requirement	(TDD)
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	Test 1
γ	1.2
UE Category	≥1

9.4.1.3 Minimum requirement PUSCH 3-1 (CSI Reference Symbol)

9.4.1.3.1 FDD

For the parameters specified in Table 9.4.1.3.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.3.1-2.

	neter	Unit	Test 1	
Bandwidth		MHz	10	
Transmiss			9	
	on channel		EPA5	
Precoding	granularity	PRB	50	
	tion and		Low	
antenna co	onfiguration		ULA 4 x 2	
	c reference		Antenna ports	
sigr	nals		0,1	
	nce signals		Antenna ports 15,,18	
	ning model		Annex B.4.3	
CSI-RS per	iodicity and			
	ne offset		5/ 1	
T _{CSI-RS}	/ Acsi-rs			
	eference		6	
signal cor	figuration			
	SubsetRestr		0x0000 0000	
iction			0000 FFFF	
	$ ho_{\scriptscriptstyle A}$	dB	0	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0	
allocation	Pc	dB	-3	
	σ	dB	-3	
N	(j) oc	dB[mW/15kHz]	-98	
Reportir	ng mode		PUSCH 3-1	
Reporting	g interval	ms	5	
PMI dela	y (Note 2)	ms	8	
	ent channel		R.44 FDD	
OCNG	Pattern		OP.1 FDD	
Max numbe	er of HARQ		4	
transm			4	
Redundancy version			{0,1,2,3}	
coding s	coding sequence {0,1,2,3}			
Note 1: F	Note 1: For random precoder selection, the precoder			
 shall be updated in each TTI (1 ms granularity) Note 2: If the UE reports in an available uplink reportininstance at subrame SF#n based on PMI estimation at a downlink SF not later than SF# 				
		ed PMI cannot be ap	oplied at the	
		before SF#(n+4).	OdD in and a	
	PDSCH_RA= 0 dB, PDSCH_RB= 0 dB in order			
	to have the same PDSCH and OCNG power per			
subcarrier at the receiver.				

Table 9.4.1.3.1-1 PMI test for single-layer (FDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

Table 9.4.1.3.1-2 Minimum requirement (FDD)

9.4.1.3.2 TDD

For the parameters specified in Table 9.4.1.3.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.1.3.2-2.

Parameter Bondwidth		Unit	Test 1
Bandwidth		MHz	10 9
Transmission mode Uplink downlink			9
	uration		1
Special	subframe		4
	uration		-
	on channel		EVA5
	granularity	PRB	50
	•		8 x 2 High, Cross
Correlation	n modeling		polarized
	c reference nals		Antenna ports 0,1
· · ·	nce signals		Antenna ports
	ning model		15,,22 Annex B.4.3
	riodicity and		Annex D.4.0
	ne offset		5/ 4
T _{CSI-RS}	/ Δ_{CSI-RS}		
CSI-RS	reference		0
signal cor	nfiguration		-
CodeBook	SubsetRestr		0x0000 0000 001F FFE0
	bitmap		0000 0000
iction	biinap		FFFF
	$ ho_{\scriptscriptstyle A}$	dB	0
Downlink	$ ho_{\scriptscriptstyle B}$	dB	0
power allocation	Pc	dB	-6
anocation	σ	dB	-3
	•(j) oc	dB[mW/15kHz]	-98
	ng mode		PUSCH 3-1
	g interval	ms	5
PMI dela	y (Note 2)	ms	10
			R.45-1 TDD
			for UE Category 1,
Measurem	ent channel		R.45 TDD for
			UE Category
			≥2
OCNG	Pattern		OP.1 TDD
	er of HARQ		4
	issions		4
Redundancy version			{0,1,2,3}
coding sequence			رن, ۱,۷,۵٫
ACK/NACK feedback mode			Multiplexing
Note 1: For random precoder selection, the precoder			
	shall be updated in each TTI (1 ms granularity).		
		orts in an available uplink reporting	
		brame SF#n based	
		a downlink SF not la	
4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			oplied at the
			or for one riadia
		format 0 with a trigge ransmitted in downli	
to allow aperiodic CQI/PMI/RI to be transm on uplink SF#3 and #8.			
Note 4: Randomization of the principle beam direction		am direction	
	shall be used as specified in B.2.3A.4		

Table 9.4.1.3.2-1 PMI test for single-layer (TDD)

Table 9.4.1.3.2-2 Minimum	requirement	(TDD)
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Parameter	Test 1
γ	3
UE Category	≥1

9.4.1a Void

- 9.4.1a.1 Void
- 9.4.1a.1.1 Void
- 9.4.1a.1.2 Void
- 9.4.2 Multiple PMI

9.4.2.1 Minimum requirement PUSCH 1-2 (Cell-Specific Reference Symbols)

9.4.2.1.1 FDD

For the parameters specified in Table 9.4.2.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in 9.4.2.1.1-2.

Parameter		Unit	Test 1
Bandwidth		MHz	10
	sion mode		6
	ion channel		EPA5
(only for re follow	granularity eporting and ng PMI)	PRB	6
	ation and onfiguration		Low 2 x 2
Downlink	$ ho_{\scriptscriptstyle A}$	dB	-3
power	$ ho_{\scriptscriptstyle B}$	dB	-3
allocation	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	1
PMI	delay	ms	8
Measurement channel			R.11-3 FDD for UE Category 1, R.11 FDD for UE Category ≥2
OCNG Pattern			OP.1/2 FDD
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
Note 2: Note 3:	For random precoder selection, the precoders shall be updated in each TTI (1 ms granularity). If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n- 4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4). One/two sided dynamic OCNG Pattern OP.1/2 FDD as described in Annex A.5.1.1/2 shall be used.		

Table 9.4.2.1.1-1 PMI test for single-layer (FDD)

Table 9.4.2.1.1-2 Minimum requirement (FDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

9.4.2.1.2 TDD

For the parameters specified in Table 9.4.2.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in 9.4.2.1.2-2.

Para	meter	Unit	Test 1
Band	lwidth	MHz	10
Transmis	sion mode		6
	downlink		1
	uration		•
	subframe		4
	uration		5045
Propagatio	on channel		EPA5
Precoding	granularity porting and	ססס	6
	ng PMI)	PRB	0
	tion and		
	onfiguration		Low 2 x 2
	ρ_A	dB	-3
Downlink power	$\rho_{\scriptscriptstyle B}$	dB	-3
allocation			-
	σ	dB	0
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98
Reporting mode			PUSCH 1-2
Reporting interval		ms	1
PMI delay		ms	10 or 11
			R.11-3 TDD
			for UE
Measurem	ent channel		Category 1
			R.11 TDD for
			UE Category
OCNG Pattern			≥2 OP.1/2 TDD
	er of HARQ		0P.1/2 TDD
	lissions		4
	ncy version		(0, 4, 0, 0)
	equence		{0,1,2,3}
	K feedback		Multiplaying
	ode		Multiplexing
		recoder selection, th	
shall be updated in each available downlink			e downlink
	transmission instance.		
	If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not later than SF#(n-		
			``
		ed PMI cannot be a	philed at the
		t before SF#(n+4).	ottorn OP 1/2
	One/two sided dynamic OCNG Pattern OP.1/2 TDD as described in Annex A.5.2.1/2 shall be		
	i DD as desci ised.	ibeu in Annex A.J.Z	. 1/2 SHAII DE
uoou.			

Table 9.4.2.1.2-1 PMI test for single-layer (TDD)

Table 9.4.2.1.2-2 Minimum requirement (TDD)

Parameter	Test 1
γ	1.2
UE Category	≥1

9.4.2.2 Minimum requirement PUSCH 2-2 (Cell-Specific Reference Symbols)

9.4.2.2.1 FDD

For the parameters specified in Table 9.4.2.2.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.2.2.1-2.

Parameter		Unit	Test 1	
Bandwidth		MHz	10	
Transmis	sion mode		6	
Propagati	on channel		EVA5	
	tion and onfiguration		Low 4 x 2	
Downlink	$ ho_{\scriptscriptstyle A}$	dB	-6	
power	$ ho_{\scriptscriptstyle B}$	dB	-6	
allocation	σ	dB	3	
Λ	$V_{oc}^{(j)}$	dB[mW/15kHz]	-98	
PMI	delay	ms	8	
Reporti	ng mode		PUSCH 2-2	
Reportir	ng interval	ms	1	
Measurem	ent channel		R.14-2 FDD	
OCNG	Pattern		OP.1/2 FDD	
Subban	d size (<i>k</i>)	RBs	3 (full size)	
Number of preferred subbands (<i>M</i>)			5	
Max number of HARQ transmissions			4	
Redundancy version coding sequence			{0,1,2,3}	
Note 1: For random p		recoder selection, the selection sel	ne precoder shall be updated in	
		orts in an available uplink reporting instance at		
		n based on PMI estimation at a downlink SF not later		
), this reported PMI cannot be applied at the eNB		
downlink befo				

Table 9.4.2.2.1-1 PMI test for single-layer (FDD)

Table 9.4.2.2.1-2 Minimu	m requirement (FDD)
--------------------------	---------------------

	Test 1
γ	1.2
UE Category	≥1

9.4.2.2.2 TDD

For the parameters specified in Table 9.4.2.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.4.2.2.2-2.

Parameter		Unit	Test 1
Bandwidth		MHz	10
Transmission mode			6
	downlink		1
	uration		
	subframe uration		4
	on channel		EVA5
Correla	tion and		Low 4 x 2
antenna co	onfiguration		
Downlink	$ ho_{\scriptscriptstyle A}$	dB	-6
power	$ ho_{\scriptscriptstyle B}$	dB	-6
allocation	σ	dB	3
	r(j) oc	dB[mW/15kHz]	-98
PMI	delay	ms	10
Reporti	ng mode		PUSCH 2-2
Reportin	g interval	ms	1
	ent channel		R.14-2 TDD
	Pattern		OP.1/2 TDD
	d size (<i>k</i>)	RBs	3 (full size)
Number of preferred subbands (<i>M</i>)			5
Max number of HARQ transmissions			4
Redundancy version coding sequence			{0,1,2,3}
ACK/NACK feedback mode			Multiplexing
Note 1: For random p		recoder selection, the downlink transmis	ne precoders shall be updated in sion instance.
Note 2: If the UE reports in an available uplink reporting instance at subrame SF#n based on PMI estimation at a downlink SF not late than SF#(n-4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).			imation at a downlink SF not later

Table 9.4.2.2.2-2	Minimum	requirement	(TDD)
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	Test 1
γ	1.15
UE Category	≥1

9.4.2.3 Minimum requirement PUSCH 1-2 (CSI Reference Symbol)

9.4.2.3.1 FDD

For the parameters specified in Table 9.4.2.3.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in 9.4.2.3.1-2.

r		1	
	meter	Unit	Test 1
Bandwidth		MHz	10
Transmission mode			9
Propagation channel			EVA5
	granularity	ממח	C
	ng PMI)	PRB	6
	ation and		Low
	onfiguration		ULA 4 x 2
	ic reference		Antenna ports
	nals		0,1
CSI refere	ence signals		Antenna ports 15,,18
Beamforr	ning model		Annex B.4.3
	riodicity and		
	ne offset		5/ 1
T _{CSI-RS}	/ Δ_{CSI-RS}		
CSI-RS	reference		8
signal co	nfiguration		_
	SubsetRestr		0x0000 0000
iction	bitmap		0000 FFFF
	$ ho_{\scriptscriptstyle A}$	dB	0
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0
allocation	Pc	dB	-3
	σ	dB	-3
Λ	$V_{oc}^{(j)}$	dB[mW/15kHz]	-98
	ng mode		PUSCH 1-2
	ng interval	ms	5
PMI	delay	ms	8
Measurement channel			R.45-1 FDD for UE Category 1, R.45 FDD for
			UE Category
0.0110	D "		≥2
OCNG Pattern			OP.1 FDD
Max number of HARQ			4
transmissions Redundancy version			
coding sequence			{0,1,2,3}
		recoder selection, th	ne precoders
		ted in each TTI (1 m	
		orts in an available u	
		brame SF#n based	
		a downlink SF not la	
		ed PMI cannot be a	oplied at the
		before SF#(n+4).	
		d dynamic OCNG Pa ibed in Annex A.5.1	
	used.		
Note 4: PDSCH _RA= 0		= 0 dB, PDSCH_RB ame PDSCH and O(
subcarrier at the receiver.			

Table 9.4.2.3.1-1 PMI test for single-layer (FDD)

Table 0.4.2.2.4.2 Minimum requirement (FDD)	
Table 9.4.2.3.1-2 Minimum requirement (FDD))

Parameter	Test 1
γ	1.3
UE Category	≥1

9.4.2.3.2 TDD

For the parameters specified in Table 9.4.2.3.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in 9.4.2.3.2-2.

Parameter Unit Test 1			
	meter dwidth	Unit MHz	Test 1 10
		IVIEZ	9
Transmission mode Uplink downlink			-
configuration			1
	subframe		4
	uration		4
	on channel		EVA5
	granularity		
	eporting and	PRB	6
	ng PMI) onfiguration		8 x 2
			High, Cross
Correlatio	n modeling		polarized
Cell-specif	ic reference		Antenna ports
	nals		0,1
CSI refere	nce signals		Antenna ports
			15,,22
	ning model		Annex B.4.3
	riodicity and ne offset		5/ 4
	/ Δ_{CSI-RS}		5/ 4
CSI-RS	reference		
	nfiguration		4
	U		0x0000 0000
CodeBook	SubsetRestr		001F FFE0
iction	bitmap		0000 0000
	T		FFFF
	$ ho_{\scriptscriptstyle A}$	dB	0
Downlink	$ ho_{\scriptscriptstyle B}$	dB	0
power allocation	Pc	db	-6
anocation		dB	-3
	σ	uв	-3
N	$q^{(j)}_{oc}$	dB[mW/15kHz]	-98
Reporti	ng mode		PUSCH 1-2
	ng interval	ms	5 (Note 4)
	delay	ms	8
	3		R.45-1 TDD
			for UE
Measurem	ent channel		Category 1,
modourom			R.45 TDD for
			UE Category
0010	D //		≥2
	Pattern		OP.1 TDD
Max number of HARQ transmissions			4
Redundancy version			
coding sequence			{0,1,2,3}
ACK/NACK feedback			Multiplaying
mode			Multiplexing
		recoder selection, th	
		ted in each TTI (1 m	
		orts in an available u	
		lbrame SF#n based a downlink SF not la	
4), this reported PMI cannot be applied at the eNB downlink before SF#(n+4).		Splied at the	
		d dynamic OCNG Pa	attern OP 1/2
		ibed in Annex A.5.2	
	used.		•
Note 4: PDCCH DCI format 0 with a trigg CQI shall be transmitted in down			
		ransmitted in downl	ink SF#4 and #9
1	to allow aperi	odic CQI/PMI/RI to b	be transmitted

Table 9.4.2.3.2-1 PMI test for single-layer (TDD)

	on uplink SF#3 and #8.
Note 5:	Randomization of the principle beam direction
	shall be used as specified in B.2.3A.4.

Table 9.4.2.3.2-2 Minimum requirement (TDD)

Parameter	Test 1
γ	3.5
UE Category	≥1

- 9.4.3 Void
- 9.4.3.1 Void
- 9.4.3.1.1 Void
- 9.4.3.1.2 Void

9.5 Reporting of Rank Indicator (RI)

The purpose of this test is to verify that the reported rank indicator accurately represents the channel rank. The accuracy of RI (CQI) reporting is determined by the relative increase of the throughput obtained when transmitting based on the reported rank compared to the case for which a fixed rank is used for transmission. Transmission mode 4 is used with the specified CodebookSubSetRestriction in section 9.5.1, transmission mode 9 is used with the specified CodebookSubSetRestriction in section 9.5.2 and transmission mode 3 is used with the specified CodebookSubSetRestriction in section 9.5.3, and transmission mode 10 is used with the specified CodebookSubSetRestriction in section 9.5.5.

For fixed rank 1 transmission in sections 9.5.1, 9.5.2 and 9.5.5, the RI and PMI reporting is restricted to two singlelayer precoders, For fixed rank 2 transmission in sections 9.5.1, 9.5.2 and 9.5.5, the RI and PMI reporting is restricted to one two-layer precoder, For follow RI transmission in sections 9.5.1, 9.5.2, the RI and PMI reporting is restricted to select the union of these precoders. Channels with low and high correlation are used to ensure that RI reporting reflects the channel condition.

For fixed rank 1 transmission in section 9.5.3, the RI reporting is restricted to single-layer, for fixed rank 2 transmission in section 9.5.3, the RI reporting is restricted to two-layers. For follow RI transmission in section 9.5.3, the RI reporting is either one or two layers.

9.5.1 Minimum requirement (Cell-Specific Reference Symbols)

9.5.1.1 FDD

The minimum performance requirement in Table 9.5.1.1-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband CQI is selected according to Table A.4-3a.

For the parameters specified in Table 9.5.1.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.1.1-2.

Parameter	Parameter Unit Test 1 Test 2 Te		Test 3		
Bandwidth		MHz	10		
PDSCH transmission	on mode		4		
Davaliates	$ ho_{\scriptscriptstyle A}$	dB	-3		
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB		-3	
	σ	dB		0	
Propagation condit antenna configur				2 x 2 EPA5	
CodeBookSubsetRe	estriction			11 for fixed $RI = 1$	
bitmap				0 for fixed RI = 2 for UE reported	
Antenna correla	ation		Low	Low	High
			Fixed RI=2 and	Fixed RI=1	Fixed RI=1
RI configuration	on		follow RI	and follow RI	and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-98	-78	-78
Maximum number o transmission			1		
Reporting mo			PUC	CH 1-1 (Note 4)	
Physical channel for	CQI/PMI		PL	ICCH Format 2	
reporting			10001110111412		
PUCCH Report Ty CQI/PMI	•		2		
Physical channel reporting	for RI		PL	JSCH (Note 3)	
PUCCH Report Typ	e for RI			3	
Reporting period	dicity	ms		$N_{\rm pd}=5$	
PMI and CQI d	elay	ms		8	
cqi-pmi-Configurati	onIndex			6	
ri-Configuratior	nInd			1 (Note 5)	
CQI estima	ation at a do	ownlink subframe ne	ting instance at subfra ot later than SF#(n-4),	this reported PM	
			NB downlink before S to Table A.4-1 with or		
		described in Annex		ie slueu uynamit	
			Id HARQ-ACK it is neo	cessary to report	both on
			format 0 shall be trans		
#9 to allow periodic RI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#8					
and #3.					
			DCI format 2 shall be r		
			recoding information b		
			recoding information b		
			recoding information b		
			when applying CQI and		
		ied at the TE with o	ne subframe delay in a	addition to Note 1	I to align with
CQI and P	MI reports.				

Table 9.5.1.1-2 Minimum requirement (FDD)

	Test 1	Test 2	Test 3
<i>)</i> 1	N/A	1.05	0.9
1/2	1	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.1.2 TDD

The minimum performance requirement in Table 9.5.1.2-2 is defined as

- a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;
- b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband CQI is selected according to Table A.4-3a.

For the parameters specified in Table 9.5.1.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.1.2-2.

Parameter		Unit	Test 1 Test 2 Test		
Bandwidth		MHz	10		
PDSCH transmission	on mode		4		
Downlink power	$ ho_{\scriptscriptstyle A}$	dB		-3	
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB		-3	
	σ	dB	0		
Uplink downlink con	figuration			2	
Special subfra configuration				4	
Propagation condit antenna configu				2 x 2 EPA5	
CodeBookSubsetRe bitmap	estriction		000011 for fixed RI = 1 010000 for fixed RI = 2 010011 for UE reported RI		
Antenna correla	ation				High
RI configurati	on		Fixed RI=2 and follow RI	Fixed RI=1 and follow RI	Fixed RI=1 and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]	z] -98 -98 -9		-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
Maximum number of transmission				1	
Reporting mo	de		PUS	CH 3-1 (Note 3)	
Reporting interval		ms		5	
PMI and CQI d	PMI and CQI delay		10 or 11		
ACK/NACK feedba	ck mode		Bundling		
Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on PMI and CQI estimation at a downlink subframe not later than SF#(n-4), this reported PMI and wideband CQI cannot be applied at the eNB downlink before SF#(n+4). Note 2: Reference measurement channel according to Table A.4-2 with one sided dynamic OCNG					
	Pattern OP.1 TDD as described in Annex A.5.2.1.				
Note 3: Reported	wideband C	QI and PMI are use	ed and sub-band CQI i	s discarded.	

Table 9.5.1.2-1 RI Test (TDD)

Table 9.5.1.2-2 Minimum requirement (TDD)

	Test 1	Test 2	Test 3
<i>γ</i> 1	N/A	1.05	0.9
<i>γ</i> 2	1	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.2 Minimum requirement (CSI Reference Symbols)

9.5.2.1 FDD

The minimum performance requirement in Table 9.5.2.1-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband CQI is selected according to Table A.4-3e or Table A.4-3f.

For the parameters specified in Table 9.5.2.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.2.1-2.

Paramete	r	Unit	Test 1	Test 2	Test 3
Bandwidt	h	MHz 10			
PDSCH transmiss	ion mode		9		
	$ ho_{\scriptscriptstyle A}$	dB	0		
Downlink power	$ ho_{\scriptscriptstyle B}$	dB	0		
allocation	Pc	dB		0	
	σ	dB		0	
Propagation cond	lition and				
antenna config	uration			2 x 2 EPA5	
Cell-specific referer				ntenna ports 0	
Beamforming				fied in Section B.	.4.3
CSI reference s			Ante	nna ports 15, 16	
CSI-RS periodic subframe of T_{CSI-RS} / Δ_{CS}	fset			5/1	
CSI reference configuration	signal			6	
CodeBookSubsetF bitmap	Restriction		01000	11 for fixed RI = 1 00 for fixed RI = 2 for UE reported	2
Antenna corre	lation		Low	Low	High
RI configura	tion		Fixed RI=2 and	Fixed RI=1	Fixed RI=1
SNR		dB	follow RI 0	and follow RI 20	and follow RI 20
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98	-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	z] -98 -78		-78
Maximum number	of HARQ			4	
transmissio				1	
Reporting m				PUCCH 1-1	
Physical channel for reporting			PL	JSCH (Note 3)	
PUCCH Report CQI/PMI	Type for			2	
Physical channe reporting	el for RI		PU	CCH Format 2	
PUCCH Report Ty				3	
Reporting perio		ms		$N_{\rm pd} = 5$	
PMI and CQI		ms		8	
cqi-pmi-Configura		-		6	
ri-Configuratio				1 (Note 4)	
Note 1: If the UE	reports in ar		porting instance at sub ot later than SF#(n-4),	oframe SF#n bas	
			NB downlink before S		
		neasurement channel according to Table A.4-1b with one sided dynamic OCNG 1 FDD as described in Annex A.5.1.1.			
Note 3: To avoid	collisions be	etween CQI/ PMI reports and HARQ-ACK it is necessary to report both on			
PUSCH i	nstead of Pl	JCCH. PDCCH DCİ	format 0 shall be tran	smitted in downli	nk SF#1 and
#6 to allo #5.	w periodic C	QI/ PMI to multiple>	with the HARQ-ACK	on PUSCH in up	link SF#0 and
_	the ambiguit	tv of TE behaviour v	when applying CQI and	d PMI during rank	switching. RI
reports a		lied at the TE with o	ne subframe delay in a		

Table 9.5.2.1-1 RI Test (FDD)

	Test 1	Test 2	Test 3
<i>)</i> 1	N/A	1.05	0.9
<i>7</i> 2	1	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.2.2 TDD

The minimum performance requirement in Table 9.5.2.2-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband CQI is selected according to Table A.4-3e or Table A.4-3f.

For the parameters specified in Table 9.5.2.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.2.2-2.

Parameter		Unit	Test 1	Test 2	Test 3
Bandwidth		MHz		10	
PDSCH transmissi	on mode		9		
	$\rho_{\scriptscriptstyle A}$	dB	0		
Downlink power	ρ_{B}	dB	0		
allocation		dB		0	
	σ	dB		0	
Uplink downlink con		<u>ub</u>		1	
Special subfra					
configuratio				4	
Propagation condi	tion and			2 x 2 EPA5	
antenna configu				ZXZEPAS	
Cell-specific referen	ce signals		Ar	ntenna ports 0	
CSI reference si				nna ports 15, 16	
Beamforming N			As speci	fied in Section B	.4.3
CSI reference s				4	
configuratio				•	
CSI-RS periodici				_ / .	
subframe offs				5/4	
$T_{\text{CSI-RS}}$ / $\Delta_{\text{CSI-RS}}$	RS		0000	14 for five al DL	1
CodeBookSubsetR	estriction			11 for fixed RI = 2 00 for fixed RI = 2	
bitmap				for UE reported	
Antenna correl	ation		Low	Low	High
			Fixed RI=2 and	Fixed RI=1	Fixed RI=1
RI configuration			follow RI	and follow RI	and follow RI
SNR		dB	0	20	20
$N_{oc}^{(j)}$		dB[mW/15kHz]			-98
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-78	-78
		[]			
Maximum number of transmission				1	
Reporting mc				PUCCH 1-1	
Physical channel for					
reporting			PL	JSCH (Note 3)	
PUCCH report type PMI	for CQI/			2	
Physical channel	for RI				
reporting			PU	CCH Format 2	
Reporting perio	dicity	ms		$N_{\rm pd} = 5$	
PMI and CQI d		ms		10	
ACK/NACK feedba	ck mode		Bundling		
cqi-pmi-Configurat	ionIndex		4		
<u>v</u>	i-ConfigurationInd 1				
CQI estim	ation at a de	ownlink subframe n	porting instance at sub ot later than SF#(n-4), NB downlink before S	this reported PM	
			ing to Table A.4-2b wit		amic OCNG
Pattern O	P.1 TDD as	described in Annex	A.5.2.1.	-	
PUSCH in	stead of PL	JCCH. PDCCH DCI	orts and HARQ-ACK i format 0 shall be tran with the HARQ-ACK o	smitted in downli	nk SF#4 and

Table 9.5.2.2-1 RI Test (TDD)

Table 9.5.2.2-2 Mini	num requirement	(TDD)
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	Test 1	Test 2	Test 3
2/1	N/A	1.05	0.9
1/2	1	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.3 Minimum requirement (CSI measurements in case two CSI subframe sets are configured)

9.5.3.1 FDD

The minimum performance requirement in Table 9.5.3.1-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband is selected according to Table A.4-3a.

For the parameters specified in Table 9.5.3.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.3.1-2.

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Parameter		Unit		est 1	Tes	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Randwidth		MH7	Cell 1	Cell 2	Cell 1	Cell 2
$ \begin{array}{ c c c c c c } \hline Downlink power allocation & P_n & dB & -3 & $		n mode	IVITIZ				
$ \begin{array}{ c c c c c c } \hline Downlink power allocation \\ \hline Propagation condition and \\ \hline Propagation condition and \\ \hline antenna configuration \\ \hline CodeBookSubsetRestriction \\ bitmap \\ \hline \hline CodeBookSubsetRestriction \\ bitmap \\ \hline \hline \hline CodeBookSubsetRestriction \\ \hline \hline CodeBookSubsetRestriction \\ \hline \hline CodeBookSubsetRestriction \\ \hline \hline \hline \hline \hline \hline CodeBookSubsetRestriction \\ \hline $		_	dB		•	•	
$ \frac{1}{1000000} \begin{tabular}{ c c c c c } \hline 0 & dB & 0 & 0 \\ \hline Propagation condition and antenna configuration & 2 x 2 EPA5 & 2 x 2 EPA5 \\ \hline 2 x 2 EPA5 & 2 x 2 EPA5 & 2 x 2 EPA5 & 0 1 for fixed RI = 1 & 0 10 for fixed RI = 1 & 0 10 for fixed RI = 2 & 0 1 for or fixed RI = 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 &$							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	allocation		-				
antenna configuration 212 EPRO 212 EPRO CodeBookSubsetRestriction bitmap 01 for fixed RI = 2 01 for fixed RI = 1 01 for fixed RI = 1 Antenna correlation Low Low Low Antenna correlation Low Low Low RI configuration Rised RI reported N/A Fixed RI and follow RI N/A \hat{E}_s/N_{oc2} dB 0 -12 20 6 $N_{oc1}^{(J)}$ $N_{oc1}^{(J)}$ dBmW/15kH z -98 (Note 3) N/A -102 (Note 3) N/A $\hat{N}_{oc2}^{(J)}$ dBmW/15kH z -98 (Note 5) N/A -98 (Note 4) N/A $\hat{N}_{oc2}^{(J)}$ dBmW/15kH z -98 -110 -78 -92 Subframe Configuration MSFN Non-MBSFN Non-MBSFN Non-MBSFN Non-MBSFN Non-MBSFN ABS Pattern (Note 6) N/A 10000000 10000000 10000000 10000000 10000000 10000000 10000000 10000000 10000000 10000000 N/A Cell Id 0 1 0 1 0 1	Propagation conditi	-			-		
$ \begin{array}{c c} CodeBookSubsetRestriction bitmap \\ CodeBookSubsetRestriction bitmap \\ bitmap \\ \hline \\ CodeBookSubsetRestriction \\ \hline \\ CodeB$					2 EPA5	2 x 2	EPA5
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		estriction		fixed RI = 10 for fixed RI = 2 11 for UE reported	N/A	= 1 10 for fixed RI = 2 11 for UE	N/A
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Antenna correla	tion			OW	Lo	W
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		on		RI=1 and	N/A		N/A
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	\widehat{E}_{s}/N_{oc2}		dB	0	-12	20	6
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		$N_{oc1}^{(j)}$			N/A	-102 (Note 3)	N/A
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$N_{oc}^{(j)}$	$N_{\rm oc2}^{(j)}$		-98 (Note	N/A	-98 (Note 4)	N/A
I or Hz] -90 -110 -78 -92 Subframe Configuration Non- MBSFN Non-MBSFN Non0000 10000000 N		$N_{oc3}^{(j)}$			N/A	-94.8 (Note 5)	N/A
Subtrame Configuration MBSFN Non-MBSFN Non	$\hat{I}_{or}^{(j)}$			-98	-110	-78	-92
Time Offset between Cells μs 2.5 (synchronous cells) 2.5 (synchronous cells) 1000000 N/A 10000000 N/A	-	iration			Non-MBSFN	Non-MBSFN	Non-MBSFN
ABS Pattern (Note 6) N/A 10000000 10000000 N/A 10000000 10000000 N/A 10000000 10000000 RLM/RRM Measurement Subframe Pattern (Note 7) 10000000 10000000 10000000 10000000 10000000 10000000 N/A 10000000 10000000 N/A Ccsl.0 10000000 10000000 10000000 10000000 10000000 10000000 N/A 10000000 10000000 N/A Ccsl.0 10000000 10000000 10000000 10000000 10000000 10000000 N/A 10000000 10000000 N/A Ccsl.1 Ccsl.1 01111111 01111111 N/A 01111111 01111111 N/A Number of control OFDM Symbols 3 3 3 3 3 Maximum number of HARQ transmissions 1 1 1 1 Reporting mode PUCCH 1-0 PUCCH 1-0 PUCCH 1-0 Physical channel for CQI PUCCH Format 2 PUCCH Format 2 PUCCH Format 2		<u> </u>		-	-		=
RLM/RRM Measurement Subframe Pattern (Note 7) 1000000 1000000 10000000 N/A 1000000 10000000 N/A Ccsi,0 10000000 10000000 10000000 10000000 10000000 10000000 10000000 10000000 N/A Csl Subframe Sets (Note 8) Ccsi,0 10000000 10000000 10000000 10000000 10000000 10000000 N/A Mumber of control OFDM Symbols 01111111 01111111 01111111 01111111 N/A 01111111 01111111 N/A Maximum number of HARQ transmissions 3 3 3 3 3 3 Maximum number of CQI PUCCH 1-0 PUCCH 1-0 PUCCH 1-0 PUCCH 1-0			μs		1000000 1000000 1000000 1000000		10000000 1000000 1000000 1000000 1000000
CSI Subframe Sets (Note 8) C _{CSI,0} 1000000 10000000 10000000 N/A 1000000 10000000 10000000 N/A CSI Subframe Sets (Note 8) C _{CSI,1} 01111111 01111111 N/A 01111111 01111111 N/A Ccsi,1 01111111 01111111 01111111 01111111 01111111 01111111 N/A Number of control OFDM Symbols 3 3 3 3 Maximum number of HARQ transmissions 1 1 1 Reporting mode PUCCH 1-0 PUCCH 1-0 PUCCH 1-0 Physical channel for CQI PUCCH Format 2 PUCCH Format 2				10000000 10000000 10000000		10000000 10000000 10000000	
Number of control OFDM Symbols 3 3 3 Maximum number of HARQ transmissions 1 1 Reporting mode PUCCH 1-0 PUCCH 1-0 Physical channel for CQI PUCCH Format 2 PUCCH Format 2				10000000 1000000 1000000 1000000 0111111	N/A	10000000 10000000 10000000 10000000 0111111	N/A
Maximum number of HARQ transmissions 1 1 Reporting mode PUCCH 1-0 PUCCH 1-0 Physical channel for CQI PUCCH Format 2 PUCCH Format 2		OFDM		3	3	3	3
transmissions PUCCH 1-0 Reporting mode PUCCH 1-0 Physical channel for CQI PUCCH Format 2	Maximum number o				1	1	
Physical channel for CQI PLICCH Format 2 PLICCH Format 2				5110	-		
reportingPOCCH Pointat 2POCCH Pointat 2PUCCH Report Type for CQI44	reporting			PUCCH			

Table 9.5.3.1-1 RI Test (FDD)

Physical	channel for RI reporting		PUCCH I	Format 2	PUCCH	Format 2
PUCC	PUCCH Report Type for RI		3		3	
Re	porting periodicity	ms	N _{pd} =	: 10	N _{pd} =	= 10
cqi-pn	ni-ConfigurationIndex		1	1	1	1
ri-	ConfigurationInd		5		4	5
cqi-pm	ni-ConfigurationIndex2		1	0	1	0
ri-0	ConfigurationInd2		2		4	2
	Cyclic prefix		Normal	Normal	Normal	Normal
Note 1:	If the UE reports in an av a downlink subframe not downlink before SF#(n+4	later than SF#(
Note 2:	Reference measurement channel in Cell 1 according to Table A.4-1 with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.					
Note 3:	3: This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.					oframe
Note 4:	This noise is applied in C ABS.	OFDM symbols #	#0, #4, #7, #11	of a subframe	overlapping with t	he aggressor
Note 5:	This noise is applied in a	II OFDM symbo	ls of a subfram	e overlapping v	with aggressor no	n-ABS
Note 6:	ABS pattern as defined i transmitted in the serving	n [9]. PDSCH of	ther than SIB1/	baging and its	associated PDCC	H/PCFICH are
	aggressor cell and the su					
Note 7:	Time-domain measurem					ned in [7].
Note 8:	As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7].					
Note 9:	e 9: Cell 1 is the serving cell. Cell 2 is the aggressor cell. The number of the CRS ports in Cell 1 and Cell 2 is the same.					
Note 10:	Downlink physical chann defined in Annex A.5.1.5	•	2 in accordance	e with Annex C	3.3 applying OCI	NG pattern as

Table 9.5.3.1-2 Minimum requirement (FDD)

	Test 1	Test 2
<i>γ</i> 1	0.9	1.05
UE Category	≥2	≥2

9.5.3.2 TDD

The minimum performance requirement in Table 9.5.3.2-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$.

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband is selected according to Table A.4-3a.

For the parameters specified in Table 9.5.3.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.3.2-2.

Cell 1 10 1 1 4 -3 -3 -3 0 2 x 2 EPA or fixed RI 1 = 1 0 or fixed RI 2 1 for UE 0 borted RI Low ked RI=1 1 1 follow RI 20 2 (Note 4) 1	Cell 2 Note 11	
3 1 4 -3 -3 0 2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE borted RI Evored RI Low ked RI=1 1 follow RI 20	45 N/A N/A	
$ \begin{array}{c} 1\\ 4\\ -3\\ -3\\ 0\\ 2 \times 2 EPA\\ 0r fixed RI\\ = 1\\ or fixed RI\\ = 2\\ 1 for UE\\ borted RI\\ \hline Low\\ ked RI=1\\ I follow RI\\ 20\\ \end{array} $	45 N/A N/A	
4 -3 0 2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
-3 -3 0 2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
-3 0 2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
0 2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
0 2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
2 x 2 EPA or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
or fixed RI = 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 I follow RI 20	N/A N/A	
= 1 or fixed RI = 2 1 for UE ported RI Low ked RI=1 1 follow RI 20	N/A	
ked RI=1 I follow RI 20		
ked RI=1 I follow RI 20		
1 follow RI 20		
	6	
2 (Note 4)		
. ,	N/A	
8 (Note 5)	N/A	
8 (Note 6)	N/A	
-78	-92	
n-MBSFN N	Ion-MBSFN	
0	1	
2.5 (synchrono	us cells)	
Ν/Δ 0	0000000001	
	N/A	
	N/A	
3	3	
1	1	
1	PUCCH 1-0	
-	PUCCH Format 2	
PUCCH 1	mat 2	
	1	

Table 9.5.3.2-1 RI Test (TDD)

	channel for C _{CSI,1} CQI nd RI reporting		PUSCH	(Note 3)	PUSCH	(Note 3)
PUCCH	PUCCH Report Type for RI		3		3	
Rep	orting periodicity	ms	N _{pd} =	= 10	N _{pd} =	= 10
ACK/NA	CK feedback mode		Multip	lexing	Multip	olexing
	-ConfigurationIndex		8			8
	ConfigurationInd		5			5
	ConfigurationIndex2		ç	-		9
	onfigurationInd2		0			0
	Cyclic prefix		Normal	Normal	Normal	Normal
Note 1:	If the UE reports in an estimation at a downli be applied at the eNB	nk subframe n downlink befo	ot later than S re SF#(n+4).	SF#(n-4), this	s reported wideba	and CQI cannot
Note 2:	Reference measurem OCNG Pattern OP.1				A.4-2 with one si	ded dynamic
Note 3:	To avoid collisions between RI/CQI reports and HARQ-ACK it is necessary to report them on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#9 to allow periodic RI/CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe SF#3.					ink SF#9 to
Note 4:	This noise is applied i overlapping with the a		ols #1, #2, #3	8, #5, #6, #8,	#9, #10,#12, #13	3 of a subframe
Note 5:	This noise is applied i aggressor ABS.	n OFDM symb	ols #0, #4, #7	7, #11 of a su	ıbframe overlappi	ing with the
Note 6:	This noise is applied i	n all OFDM sy	mbols of a su	lbframe over	apping with aggre	essor non-ABS
Note 7:	ABS pattern as define					
	PDCCH/PCFICH are		•			
	with the ABS subfram	e of aggressor	cell and the	subframe is a	available in the de	efinition of the
	reference channel.					
Note 8:	Time-domain measurement resource restriction pattern for PCell measurements as defined in [7].					
Note 9:	 As configured according to the time-domain measurement resource restriction pattern for CSI measurements defined in [7]. 					
Note 10:						
Note 11:	Downlink physical cha pattern as defined in A	annel setup in (Cell 2 in acco	ordance with	Annex C.3.3 appl	ying OCNG

Table 9.5.3.2-2 Minimum requirement (TDD)

	Test 1	Test 2
<i>)</i> /1	0.9	1.05
UE Category	≥2	≥2

9.5.4 Minimum requirement (CSI measurements in case two CSI subframe sets are configured and CRS assistance information are configured)

9.5.4.1 FDD

For the parameters specified in Table 9.5.4.1-1, the minimum performance requirement in Table 9.5.4.1-2 is defined as

- a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_{1;}$
- b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband is selected according to Table A.4-3a. In Table 9.5.4.1-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggresso cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10	10	10
PDSCH transmissio	n mode		3	As defined in Note 1	As defined in Note 1
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3	-3	-3
	σ	dB	0	N/A	N/A
Propagation conditi antenna configur			2×2 EPA5 (Note 2)	2x2 EPA5 (Note 2)	2x2 EPA5 (Note 2)
CodeBookSubsetRe bitmap			01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	As defined in Note 1	As defined in Note 1
	N _{oc1}	dB[mW/15k Hz]	-98 (Note 3)	N/A	N/A
N_{oc} at antenna port	N_{oc2}	dB[mW/15k Hz]	-98 (Note 4)	N/A	N/A
	N _{oc3}	dB[mW/15k Hz]	-93 (Note 5)	N/A	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 9.5.4.1-2 for each test	12	10
$\hat{I}_{or}^{(j)}$		dB[mW/15k Hz]	Reference Value in Table 9.5.4.1-2 for each test	-86	-88
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	een Cells	Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (No	te 6)		N/A	10000000 10000000 10000000 10000000 1000000	10000000 10000000 10000000 10000000 1000000
RLM/RRM Measur Subframe Pattern (10000000 10000000 10000000 10000000 1000000	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		1000000 1000000 1000000 1000000 1000000 1000000	N/A	N/A
(Note 8)	C _{CSI,1}		01111111 01111111 01111111 01111111 0111111	N/A	N/A
Number of control symbols	OFDM		3	Note 9	Note 9
Maximum number o			1	N/A	N/A
transmissions Reporting mod			PUCCH 1-0	N/A	N/A
Physical channel for			PUCCH format 2	N/A	N/A
reporting PUCCH Report Type	for COI		4	N/A	N/A
Physical channel for R			PUCCH Format 2	N/A N/A	N/A N/A
PUCCH Report Typ			3	N/A	N/A
Reporting period		ms	$N_{pd}=10$	N/A	N/A

Table 9.5.4.1-1: RI Test (FDD)

cqi-pm	ni-ConfigurationIndex		11	N/A	N/A	
ri-	ri-ConfigurationInd		5	N/A	N/A	
	i-ConfigurationIndex2		10	N/A	N/A	
ri-C	ConfigurationInd2		2	N/A	N/A	
	Cyclic prefix Normal Normal Normal					
Note 1:	Downlink physical chan			n Annex C.3.3 app	lying OCNG	
	pattern OP.5 FDD as de					
Note 2:	The propagation conditi					
Note 3:	This noise is applied in		#1, #2, #3, #5, #6, #8	3, #9, #10,#12, #1	3 of a subframe	
	overlapping with the age					
Note 4:	This noise is applied in (OFDM symbols	#0, #4, #7, #11 of a s	subframe overlapp	oing with the	
	aggressor ABS.					
Note 5:	This noise is applied in a					
Note 6:	ABS pattern as defined					
	PDCCH/PCFICH are tra					
	overlapped with the ABS definition of the reference		ggressor cell and the	subframe is available	able in the	
Note 7:	Time-domain measurem		striction nattern for P	Cell measuremen	ts as defined in	
Note 7.	[7]	ient resource re	Striction pattern for r	Cell measuremen		
Note 8:	As configured according	to the time-don	nain measurement re	source restriction	pattern for CSI	
11010 0.	measurements defined					
Note 9:	The number of control C		s not available for AE	3S and is 3 for the	subframe	
	indicated by "0" of ABS					
Note 10:	If the UE reports in an a		eporting instance at s	subframe SF#n ba	ased on CQI	
	estimation at a downlink subframe not later than SF#(n-4), this reported wideband CQI cannot					
	be applied at the eNB downlink before SF#(n+4).					
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-1 with one sided dynamic					
	OCNG Pattern OP.1 FD					
Note 12:	The number of the CRS			e same.		
Note 13:	SIB-1 will not be transm	itted in Cell2 an	d Cell 3 in this test.			

Table 9.5.4.1-2 Minimum requirement (FDD)

	Test 1	Test 2	Test 3
\widehat{E}_{s}/N_{oc2} for Cell 1 (dB)	4	20	20
$\hat{I}_{or}^{(j)}$ for Cell 1 (dB[mW/15kHz])	-94	-78	-78
Antenna correlation	High for Cell 1, low for Cell 2 and Cell 3	Low for Cell 1, Cell 2 and Cell 3	High for Cell 1, low for Cell 2 and Cell 3
'n	N/A	1.05	0.9
1/2	[1.05]	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.4.2 TDD

For the parameters specified in Table 9.5.4.2-1, the minimum performance requirement in Table 9.5.4.2-2 is defined as

- a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_{1;}$
- b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband is selected according to Table A.4-3a. In Table 9.5.4.2-1, Cell 1 is the serving cell, and Cell 2 and Cell 3 are the aggresso cells. The downlink physical channel setup for Cell 1 is according to Annex C.3.2 and for Cell 2 and Cell 3 is according to Annex C.3.3, respectively. The CRS assistance information [7] including Cell 2 and Cell 3 is provided.

Parameter		Unit	Cell 1	Cell 2	Cell 3
Bandwidth		MHz	10	10	10
PDSCH transmissio	n mode		3	As defined in Note 1	As defined in Note 1
Uplink downlink conf			1	1	1
Special subframe con	figuration		4	4	4
	$ ho_{\scriptscriptstyle A}$	dB	-3	-3	-3
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	-3	-3	-3
	σ	dB	0	N/A	N/A
Propagation conditi antenna configur			2×2 EPA5 (Note 2)	2×2 EPA5 (Note 2)	2×2 EPA5 (Note 2)
CodeBookSubsetRe bitmap			01 for fixed RI = 1 10 for fixed RI = 2 11 for UE reported RI	As defined in Note 1	As defined in Note 1
	N_{oc1}	dB[mW/15k Hz]	-98 (Note 3)	N/A	N/A
N_{oc} at antenna port	N _{oc2}	dB[mW/15k Hz]	-98 (Note 4)	N/A	N/A
	N_{oc3}	dB[mW/15k Hz]	-93 (Note 5)	N/A	N/A
\widehat{E}_s/N_{oc2}		dB	Reference Value in Table 9.5.4.2-2 for each test	12	10
$\hat{I}_{or}^{(j)}$		dB[mW/15k Hz]	Reference Value in Table 9.5.4.2-2 for each test	-86	-88
Subframe Configu	ration		Non-MBSFN	Non-MBSFN	Non-MBSFN
Time Offset betwee	n Cells	μs	N/A	3	-1
Frequency shift betwe	een Cells	Hz	N/A	300	-100
Cell Id			0	126	1
ABS pattern (No	te 6)		N/A	0000000001 0000000001	0000000001 0000000001
RLM/RRM Measur Subframe Pattern (0000000001 0000000001	N/A	N/A
CSI Subframe Sets	C _{CSI,0}		0000000001 0000000001	N/A	N/A
(Note 8)	C _{CSI,1}		1100111000 1100111000	N/A	N/A
Number of control symbols	OFDM		3	Note 9	Note 9
Maximum number o transmission			1	N/A	N/A
Reporting mod			PUCCH 1-0	N/A	N/A
Physical channel for (and RI reportir	C _{CSI,0} CQI		PUCCH format 2	N/A	N/A
Physical channel for (and RI reportin	C _{CSI,1} CQI		PUSCH (Note 14)	N/A	N/A
PUCCH Report Type			4	N/A	N/A
PUCCH Report Typ			3	N/A	N/A
Reporting period		ms	<i>N_{pd}</i> = 10	N/A	N/A
ACK/NACK feedbac	k mode		Multiplexing	N/A	N/A
cqi-pmi-Configuration			8	N/A	N/A
ri-Configuration			5	N/A	N/A
cqi-pmi-Configuratio			9	N/A	N/A
ri-Configuration			0	N/A	N/A
Cyclic prefix			Normal	Normal	Normal

Table 9.5.4.2-1: RI Test (TDD)

Note 1:	Downlink physical channel setup in Cell 2 in accordance with Annex C.3.3 applying OCNG
	pattern OP.5 TDD as defined in Annex A.5.2.5.
Note 2:	The propagation conditions for Cell 1, Cell 2 and Cell 3 are statistically independent.
Note 3:	This noise is applied in OFDM symbols #1, #2, #3, #5, #6, #8, #9, #10,#12, #13 of a subframe overlapping with the aggressor ABS.
Note 4:	This noise is applied in OFDM symbols #0, #4, #7, #11 of a subframe overlapping with the aggressor ABS.
Note 5:	This noise is applied in all OFDM symbols of a subframe overlapping with aggressor non-ABS
Note 6:	ABS pattern as defined in [9]. PDSCH other than SIB1/paging and its associated
	PDCCH/PCFICH are transmitted in the serving cell subframe when the subframe is
	overlapped with the ABS subframe of aggressor cell and the subframe is available in the
	definition of the reference channel.
Note 7:	Time-domain measurement resource restriction pattern for PCell measurements as defined in
	[7]
Note 8:	As configured according to the time-domain measurement resource restriction pattern for CSI
	measurements defined in [7].
Note 9:	The number of control OFDM symbols is not available for ABS and is 3 for the subframe
	indicated by "0" of ABS pattern.
Note 10:	If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI
11010 101	estimation at a downlink subframe not later than SF#(n-4), this reported wideband CQI cannot
	be applied at the eNB downlink before SF# $(n+4)$.
Note 11:	Reference measurement channel in Cell 1 according to Table A.4-2 with one sided dynamic
	OCNG Pattern OP.1 TDD as described in Annex A.5.2.1.
Note 12:	The number of the CRS ports in Cell1, Cell2 and Cell 3 is the same.
Note 13:	SIB-1 will not be transmitted in Cell2 and Cell 3 in this test.
	To avoid collisions between RI/CQI reports and HARQ-ACK it is necessary to report them on
	PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#4 and
	#9 to allow periodic RI/CQI to multiplex with the HARQ-ACK on PUSCH in uplink subframe
	SF#8 and #3.

Table 9.5.4.2-2 Minimum requirement (TDD)

	Test 1	Test 2	Test 3
${\hat E}_{_s}/N_{_{oc2}}$ for Cell 1 (dB)	4	20	20
$\hat{I}_{or}^{(j)}$ for Cell 1 (dB[mW/15kHz])	-94	-78	-78
Antenna correlation	High for Cell 1, low for Cell 2 and Cell 3	Low for Cell 1, Cell 2 and Cell 3	High for Cell 1, low for Cell 2 and Cell 3
<i>)</i> /1	N/A	1.05	0.9
1/2	[1.05]	N/A	N/A
UE Category	≥2	≥2	≥2

9.5.5 Minimum requirement (with CSI process)

Each CSI process is associated with a CSI-RS resource and a CSI-IM resource as shown in Table 9.5.5-1. For UE supports one CSI process, CSI process 0 is configured and the corresponding requirements shall be fulfilled. For UE supports multiple CSI processes, CSI processes 0 and 1 are configured for Test 2 and the corresponding requirements shall be fulfilled.

Table 9.5.5-1 Configuration of CSI processes

	CSI process 0	CSI process 1
CSI-RS resource	CSI-RS signal 0	CSI-RS signal 1
CSI-IM resource	CSI-IM resource 0	CSI-IM resource 1

9.5.5.1 FDD

The minimum performance requirement in Table 9.5.5.1-2 is defined as

a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;

- b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;
- c) For Test 2, the RI reported for CSI process 1 shall be the same as the most recent RI reported for CSI process 0 if UE is configured with multiple CSI processes.

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband CQI is selected according to Table A.4-3e.

For the parameters specified in Table 9.5.5.1-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.5.1-2.

Table 9.5.5.1-1 RI Test (FDD)

Der	amatar	l Init	Te	st 1	Te	st 2
	ameter	Unit MHz	TP1	TP2	TP1	TP2
Bandwidth			10 MHz		10 MHz	
Transmission mode			10	10	10	10
	$ ho_{\scriptscriptstyle A}$	dB	(0		0
Downlink power	$ ho_{\scriptscriptstyle B}$	dB		0		0
allocation	P_c	dB	0	0	0	0
	σ	dB	(0		0
SNR		dB	0	0	20	20
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-98	-98	-78	-78
$N_{oc}^{(j)}$		dB[mW/15kHz]		98	-9	98
Propagation chann	ما		EPA 5 Low	EPA 5 Low	EPA 5 Low	EPA 5 High
Antenna configurat			2x2	2x2	2x2	2x2
Beamforming Mode				Section B.4.3		Section B.4.3
Timing offset betwe	en TPs	US		0		0
Frequency offset be		Hz		0		0
Cell-specific referen	nce signals			a ports 0		a ports 0
CSI-RS signal 0			Antenna ports 15,16	N/A	Antenna ports 15,16	N/A
CSI-RS 0 periodicit $T_{CSI-RS} / \Delta_{CSI-RS}$	y and subframe offset		5/1	N/A	5/1	N/A
CSI-RS 0 configura	ition		0	N/A	0	N/A
CSI-RS signal 1			N/A	Antenna ports 15,16	N/A	Antenna ports 15,16
CSI-RS 1 periodicit $T_{CSI-RS} / \Delta_{CSI-RS}$	y and subframe offset		N/A	5/1	N/A	5/1
CSI-RS 1 configuration			N/A	3	N/A	3
Zero-power CSI-RS 0 configuration I _{CSI-RS} / ZeroPowerCSI-RS bitmap			N/A	1 / 10000010000 00000	N/A	1 / 10000010000 00000
Zero-power CSI-RS 1 configuration <i>I</i> _{CSI-RS} / <i>ZeroPowerCSI-RS</i> bitmap			1 / 00110000000 00000	N/A	1 / 00110000000 00000	N/A
CSI-IM 0 periodicity $T_{CSI-RS} / \Delta_{CSI-RS}$	/ and subframe offset		5/1	N/A	5/1	N/A
CSI-IM 0 configurat	tion		2	N/A	2	N/A
CSI-IM 1 periodicity $T_{CSI-RS} / \Delta_{CSI-RS}$	/ and subframe offset		N/A	5/1	N/A	5/1
CSI-IM 1 configurat	tion		N/A	6	N/A	6
RI configuration			Fixed RI=2 and follow RI	N/A	Fixed RI=1 and follow RI	N/A
Physical channel for	or CQI/PMI reporting		PUSCH (Note 6)	N/A	PUSCH (Note 6)	PUSCH (Note 6)
PUCCH Report Typ	be for CQI/PMI		2	N/A	2	2
Physical channel fo	or RI reporting		PUCCH Format 2	N/A	PUCCH Format 2	PUCCH Format 2
PUCCH Report Typ			3	N/A	3	3
	CSI-RS		CSI-RS 0	N/A	CSI-RS 0	N/A
	CSI-IM		CSI-IM 0	N/A	CSI-IM 0	N/A
	Reporting mode		PUCCH 1-1	N/A	PUCCH 1-1	N/A
CSI process 0 (Note 7)	Reporting periodicity	ms	$N_{\rm pd}=5$	N/A	$N_{\rm pd}=5$	N/A
	CQI delay	ms	8	N/A	10	N/A
	cqi-pmi- ConfigurationIndex		6	N/A	6	N/A
	ri-ConfigIndex		1	N/A	1	N/A
	CSI-RS		N/A	N/A	N/A	CSI-RS 1
CSI process 1	CSI-IM		N/A	N/A	N/A	CSI-IM 1
(Note 7)	Reporting mode		N/A	N/A	N/A	PUCCH 1-1
-	Reporting periodicity	ms	N/A	N/A	N/A	$N_{\rm pd}=5$

	CQI delay	ms	N/A	N/A	N/A	10
	cqi-pmi- ConfigurationIndex		N/A	N/A	N/A	4
	ri-ConfigIndex		N/A	N/A	N/A	1
CSI process for PDS	CH scheduling		CSI pro	ocess 0	CSI pro	ocess 0
Cell ID			0	6	0	6
Quasi-co-located CS	I-RS		CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1
Quasi-co-located CR	S		Same Cell ID	Same Cell ID	Same Cell ID	Same Cell ID
			as Cell 1	as Cell 2	as Cell 1	as Cell 2
PMI for subframe 2,	3, 4, 7, 8 and 9		010000 for fixed RI = 2 010011 for UE reported RI	100000	000011 for fixed RI = 1 010011 for UE reported RI	N/A
PMI for subframe 1 a	and 6		100000	100000	100000	N/A
Max number of HAR	Q transmissions		1	N/A	1	N/A

Note 1: If the UE reports in an available uplink reporting instance at subframe SF#n based on CQI estimation at a downlink SF not later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4) Note 2: 3 symbols allocated to PDCCH

Note 3: PDSCH transmission is scheduled on subframe 2, 3, 4, 7, 8 and 9 from TP1.

Note 4: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1 and 6 from TP1.

Note 5: TM10 OCNG as specified in A.5.1.8 is transmitted on subframe 1, 2, 3, 4, 6, 7, 8 and 9 from TP2 for Test 1; TP2 is blanked for Test 2.

Note 6: To avoid collisions between CQI/PMI reports and HARQ-ACK it is necessary to report both on PUSCH instead of PUCCH. PDCCH DCI format 0 shall be transmitted in downlink SF#1 and #6 to allow periodic CQI/PMI to multiplex with the HARQ-ACK on PUSCH in uplink SF#0 and #5.

Note 7: If UE supports multiple CSI processes, CSI process 0 is configured as 'RI-reference CSI process' for CSI process 1.

Note 8: PDCCH DCI format 0 with a trigger for aperiodic CQI shall be transmitted in downlink SF#1 and #6 to allow aperiodic CQI/PMI/RI to be transmitted in uplink SF#0 and #5.

Table 9.5.5.1-2 Minimum requirement (FDD)

	Test 1	Test 2
<i>7</i> 1	N/A	1.0
<i>Y</i> 2	1.0	N/A
UE Category	≥2	≥2

9.5.5.2 TDD

The minimum performance requirement in Table 9.5.5.2-2 is defined as

- a) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 1 shall be $\geq \gamma_1$;
- b) The ratio of the throughput obtained when transmitting based on UE reported RI and that obtained when transmitting with fixed rank 2 shall be $\geq \gamma_2$;
- c) For Test 2, the RI reported for CSI process 1 shall be the same as the most recent RI reported for CSI process 0 if UE is configured with multiple CSI processes.

TBS selection is based on the UE wideband CQI feedback. The transport block size TBS for wideband CQI is selected according to Table A.4-3e.

For the parameters specified in Table 9.5.5.2-1, and using the downlink physical channels specified in Annex C.3.2, the minimum requirements are specified in Table 9.5.5.2-2.

Table 9.5.5.2-1 RI Test (TDD)

Dar		11	Te	st 1	Te	st 2	
	ameter	Unit MHz	TP1	TP2	TP1	TP2	
Bandwidth			10 MHz			10 MHz	
Transmission mode	e		10	10	10	10	
	$ ho_{\scriptscriptstyle A}$	dB	(D		0	
Downlink power	$ ho_{\scriptscriptstyle B}$	dB		0		C	
allocation	P_c	dB	0	0	0	0	
		dB	_	0	-	0	
Uplink downlink co	o	UD	2	2	2	2	
Special subframe of			4	4	4	4	
SNR	Johngulation	dB	0	0	20	20	
			-	-			
$\hat{I}^{(j)}_{or}$		dB[mW/15kHz]	-98	-98	-78	-78	
$N_{oc}^{(j)}$		dB[mW/15kHz]	-9	98	-9	98	
Propagation chann			EPA 5 Low	EPA 5 Low	EPA 5 Low	EPA 5 High	
Antenna configurat			2x2	2x2	2x2	2x2	
Beamforming Mode			As specified in	Section B.4.3	As specified in	Section B.4.3	
Timing offset betwe		us		0		0	
Frequency offset b		Hz		0		0	
Cell-specific refere	nce signals			a ports 0		a ports 0	
CSI-RS signal 0			Antenna ports 15,16	N/A	Antenna ports 15,16	N/A	
CSI-RS 0 periodicit T _{CSI-RS} / Δ _{CSI-RS}	ty and subframe offset		5/3	N/A	5/3	N/A	
CSI-RS 0 configura	ation		0	N/A	0	N/A	
CSI-RS signal 1			N/A	Antenna ports 15,16	N/A	Antenna ports 15,16	
CSI-RS 1 periodicit T _{CSI-RS} / A _{CSI-RS}	ty and subframe offset		N/A	5/3	N/A	5/3	
CSI-RS 1 configura	ation		N/A	3	N/A	3	
Zero-power CSI-R I _{CSI-RS} / ZeroPower	S 0 configuration		N/A	3 / 10000010000 00000	N/A	3 / 10000010000 00000	
Zero-power CSI-RS I _{CSI-RS} / ZeroPower	S 1 configuration <i>CSI-RS</i> bitmap		3 / 00110000000 00000	N/A	3 / 00110000000 00000	N/A	
CSI-IM 0 periodicity	y and subframe offset		5/3	N/A	5/3	N/A	
CSI-IM 0 configura	tion		2	N/A	2	N/A	
CSI-IM 1 periodicity	y and subframe offset		N/A	5/3	N/A	5/3	
$T_{\text{CSI-RS}} / \Delta_{\text{CSI-RS}}$							
CSI-IM 1 configura	tion		N/A	6	N/A	6	
RI configuration			Fixed RI=2 and follow RI	N/A	Fixed RI=1 and follow RI	N/A	
	CSI-RS		CSI-RS 0	N/A	CSI-RS 0	N/A	
CSI process 0	CSI-IM		CSI-IM 0	N/A	CSI-IM 0	N/A	
(Note 6, 7)	Reporting mode		PUSCH 3-1	N/A	PUSCH 3-1	N/A	
(Reporting Interval	ms	5	N/A	5	N/A	
	CQI delay	ms	11	N/A	11	N/A	
	CSI-RS		N/A	N/A	N/A	CSI-RS 1	
CSI process 1	CSI-IM		N/A	N/A	N/A	CSI-IM 1	
(Note 6, 7)	Reporting mode		N/A	N/A	N/A	PUSCH 3-1	
· •	Reporting Interval	ms	N/A	N/A N/A	N/A N/A	5 11	
CSI process for PD	CQI delay	ms	N/A	DCess 0		Dicess 0	
Cell ID			0	6	0	6	
Quasi-co-located C	SI-RS		CSI-RS 0	CSI-RS 1	CSI-RS 0	CSI-RS 1	
			Same Cell ID	Same Cell ID	Same Cell ID	Same Cell ID	
Quasi-co-located C	CRS		as Cell 1	as Cell 2	as Cell 1	as Cell 2	
PMI for subframe 4	1 and 9		010000 for fixed RI = 2 010011 for UE	100000	000011 for fixed RI = 1 010011 for UE	N/A	

	reported R		reported RI			
PMI for subframe 3 and 8	100000	100000	100000	N/A		
Max number of HARQ transmissions	1	N/A	1	N/A		
ACK/NACK feedback mode	Multiplexing	g N/A	Multiplexing	N/A		
Note 1: If the UE reports in an available	e uplink reporting instance at subfran	ne SF#n based on C	QI estimation at a	downlink SF not		
later than SF#(n-4), this reported	later than SF#(n-4), this reported wideband CQI cannot be applied at the eNB downlink before SF#(n+4)					
Note 2: 3 symbols allocated to PDCCH	3 symbols allocated to PDCCH					
Note 3: PDSCH transmission is schedu						
Note 4: TM10 OCNG as specified in A.	TM10 OCNG as specified in A.5.2.8 is transmitted on subframe 3 and 8 from TP1.					
Note 5: TM10 OCNG as specified in A.	TM10 OCNG as specified in A.5.2.8 is transmitted on subframe 3, 4, 8 and 9 from TP2 for Test 1; TP2 is blanked for Test					
2.	2.					
Note 6: Reported wideband CQI and P	Reported wideband CQI and PMI are used and sub-band CQI is discarded.					
Note 7: If UE supports multiple CSI pro	cesses, CSI process 0 is configured	as 'RI-reference CS	process' for CSI	process 1.		

Table 9.5.5.2-2 Minimum requirement (TDD)

	Test 1	Test 2
<i>γ</i> 1	N/A	1.0
<i>7</i> 2	1.0	N/A
UE Category	≥2	≥2

9.6 Additional requirements for carrier aggregation

This clause includes requirements for the reporting of channel state information (CSI) with the UE configured for carrier aggregation. The purpose is to verify that the channel state for each cell is correctly reported with multiple cells configured for periodic reporting.

9.6.1 Periodic reporting on multiple cells (Cell-Specific Reference Symbols)

9.6.1.1 FDD

The following requirements apply to UE Category ≥ 3 . For the parameters specified in Table 9.6.1.1-1 and Table 9.6.1.1-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell reported according to Table A.4-3 shall be such that

wideband $CQI_{Pcell}-wideband\ CQI_{Scell} \geq 2$

for more than 90% of the time.

Parameter	Parameter		Pcell	Scell
PDSCH transmission mode			1	
Downlink power ρ_A		dB	0	
allocation	$ ho_{\scriptscriptstyle B}$	dB		0
Propagation condit antenna configur			AWGN (1 x 2)	
SNR		dB	10	4
$\hat{I}_{or}^{(j)}$		dB[mW/15kHz]	-88	-94
$N_{oc}^{(j)}$		dB[mW/15kHz]	-98	-98
Physical channel for reporting	vsical channel for CQI PUCCH Format 2		Format 2	
PUCCH Report Type				4
Reporting period	licity	ms	$N_{\rm pd} = 10$	
cqi-pmi-ConfigurationIndex			11	16 [shift of 5 ms relative to Pcell]
Note 1: 3 symbols are allocated to PDCCH. No PDSCH for user data is scheduled for the UE with one sided dynamic OCNG Pattern OP.1 FDD as described in Annex A.5.1.1.				

Table 9.6.1.1-1: Parameters for PUCCH 1-0 static test on multiple cells (FDD)

Table 9.6.1.1-2: PUCCH 1-0 static test (FDD)

Test number	Bandwidth combination	CA capability
1	10MHz for both cells	CL_A-A
2	20MHz for both cells	CL_C

9.6.1.2 TDD

The following requirements apply to UE Category ≥ 3 . For the parameters specified in Table 9.6.1.2-1 and Table 9.6.1.2-2, and using the downlink physical channels specified in tables C.3.2-1 and C.3.2-2 on each cell, the difference between the wideband CQI indices of Pcell and Scell reported according to Table A.4-3 shall be such that

wideband $CQI_{Pcell}-wideband\ CQI_{Scell} \geq 2$

for more than 90% of the time.

Parameter		Unit	Pcell	Scell
PDSCH transmission	PDSCH transmission mode			1
Uplink downlink con	figuration			2
Special subfra configuration			4	
Downlink power	$ ho_{\scriptscriptstyle A}$	dB		0
allocation	$ ho_{\scriptscriptstyle B}$	dB		0
Propagation condition and antenna configuration			AWG	GN (1 x 2)
SNR	SNR		10	4
$\hat{I}^{(j)}_{or}$	$\hat{I}_{or}^{(j)}$		-88	-94
$N_{oc}^{(j)}$	$N_{oc}^{(j)}$		-98	-98
Physical channel f reporting	or CQI		PUCCI	H Format 2
PUCCH Report	Туре		4	
Reporting period	Reporting periodicity		Nr	_{bd} = 10
cqi-pmi-ConfigurationIndex			8 13 [shift of 5 ms relat to Pcell]	

Table 9.6.1.2-1: PUCCH 1-0 static test on multiple cells (TDD)

Table 9.6.1.2-2: PUCCH 1-0 static test (TDD)

Test number	Bandwidth combination	CA capability
1	20MHz for both cells	CL_C, CL_A-A

10 Performance requirement (MBMS)

10.1 FDD (Fixed Reference Channel)

The parameters specified in Table 10.1-1 are valid for all FDD tests unless otherwise stated. For the requirements defined in this section, the difference between CRS EPRE and the MBSFN RS EPRE should be set to 0 dB as the UE demodulation performance might be different when this condition is not met (e.g. in scenarios where power offsets are present, such as scenarios when reserved cells are present).

Parameter	Unit	Value		
Number of HARQ processes	Processes	None		
Subcarrier spacing	kHz	15 kHz		
Allocated subframes per Radio Frame (Note 1)		6 subframes		
Number of OFDM symbols for PDCCH		2		
Cyclic Prefix	Cyclic Prefix Extended			
Note1: For FDD mode, up to 6 subframes (#1/2/3/6/7/8) are available for MBMS, in line with TS 36.331.				

Table 40.4.4. Common	Tool Devenedance	
Table 10.1-1: Common	n Test Parameters ((FUU)

10.1.1 Minimum requirement

The receive characteristic of MBMS is determined by the BLER. The requirement is valid for all RRC states for which the UE has capabilities for MBMS.

For the parameters specified in Table 10.1-1 and Table 10.1.1-1 and Annex A.3.8.1, the average downlink SNR shall be below the specified value for the BLER shown in Table 10.1.1-2.

Parameter		Unit	Test 1-4
Downlink power allocation	$ ho_{\scriptscriptstyle A}$	dB	0
	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna port		dBm/15kHz	-98
Note 1: $P_B = 0$.			

Table 10.1.1-1: Test Parameters for Testing

 Table 10.1.1-2: Minimum performance

Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Referen	ce value	MBMS
number		Channel	Pattern	condition	Matrix and antenna	BLER (%)	SNR(dB)	UE Category
1	10 MHz	R.37 FDD	OP.4 FDD				4.1	≥1
2	10 MHz	R.38 FDD	OP.4 FDD	MBSFN			11.0	≥1
3	10 MHz	R.39 FDD	OP.4 FDD	channel model (Table	1x2 low	1	20.1	≥2
	5.0MHz	R.39-1 FDD	OP.4 FDD	B.2.6-1)			20.5	1
4	1.4 MHz	R.40 FDD	OP.4 FDD]			6.6	≥1

10.2 TDD (Fixed Reference Channel)

The parameters specified in Table 10.2-1 are valid for all TDD tests unless otherwise stated. For the requirements defined in this section, the difference between CRS EPRE and the MBSFN RS EPRE should be set to 0 dB as the UE demodulation performance might be different when this condition is not met (e.g. in scenarios where power offsets are present, such as scenarios when reserved cells are present).

Parameter		Unit	Value	
Number of HARQ processes		Processes	None	
Subcarrier spacing		kHz	15 kHz	
Allocated subframes per Radio Frame (Note 1)			5 subframes	
Number of OFDM symbols for PDCCH			2	
Cyclic Prefix			Extended	
Note1: For TDD mode, in line with TS 36.331, Uplink-Downlink Configuration 5 is proposed, up to 5 subframes (#3/4/7/8/9) are available for MBMS.				

Table 10.2-1: Common Test Parameters (TDD)

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10.2.1 Minimum requirement

The receive characteristic of MBMS is determined by the BLER. The requirement is valid for all RRC states for which the UE has capabilities for MBMS.

For the parameters specified in Table 10.2-1 and Table 10.2.1-1 and Annex A.3.8.2, the average downlink SNR shall be below the specified value for the BLER shown in Table 10.2.1-2.

Parameter		Unit	Test 1-4
	$ ho_{\scriptscriptstyle A}$	dB	0
Downlink power allocation	$ ho_{\scriptscriptstyle B}$	dB	0 (Note 1)
	σ	dB	0
N_{oc} at antenna	port	dBm/15kHz	-98
Note 1: $P_B = 0$.			

Table 10.2.1-1: Test Parameters for Testing

Table 10.2.1-2: Minimum pe	erformance
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Test	Bandwidth	Reference	OCNG	Propagation	Correlation	Referen	ce value	MBMS
number		Channel	Pattern	condition	Matrix and antenna	BLER (%)	SNR(dB)	UE Category
1	10 MHz	R.37 TDD	OP.4 TDD				3.4	≥1
2	10 MHz	R.38 TDD	OP.4 TDD	MBSFN			11.1	≥1
3a	10 MHz	R.39 TDD	OP.4 TDD	channel model (Table	1x2 low	1	20.1	≥2
3b	5MHz	R.39-1 TDD	OP.4 TDD	B.2.6-1)			20.5	1
4	1.4 MHz	R.40 TDD	OP.4 TDD				5.8	≥1

Annex A (normative): Measurement channels

A.1 General

The throughput values defined in the measurement channels specified in Annex A, are calculated and are valid per datastream (codeword). For multi-stream (more than one codeword) transmissions, the throughput referenced in the minimum requirements is the sum of throughputs of all datastreams (codewords).

The UE category entry in the definition of the reference measurement channel in Annex A is only informative and reveals the UE categories, which can support the corresponding measurement channel. Whether the measurement channel is used for testing a certain UE category or not is specified in the individual minimum requirements.

A.2 UL reference measurement channels

A.2.1 General

A.2.1.1 Applicability and common parameters

The following sections define the UL signal applicable to the Transmitter Characteristics (clause 6) and for the Receiver Characteristics (clause 7) where the UL signal is relevant.

The Reference channels in this section assume transmission of PUSCH and Demodulation Reference signal only. The following conditions apply:

- 1 HARQ transmission
- Cyclic Prefix normal
- PUSCH hopping off
- Link adaptation off
- Demodulation Reference signal as per TS 36.211 [4] subclause 5.5.2.1.2.

Where ACK/NACK is transmitted, it is assumed to be multiplexed on PUSCH as per TS 36.212 [5] subclause 5.2.2.6.

- ACK/NACK 1 bit
- ACK/NACK mapping adjacent to Demodulation Reference symbol
- ACK/NACK resources punctured into data
- Max number of resources for ACK/NACK: 4 SC-FDMA symbols per subframe
- No CQI transmitted, no RI transmitted

A.2.1.2 Determination of payload size

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation N_{RB}

- 1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.
- 2. Find A such that the resulting coding rate is as close to R as possible, that is,

 $\min |R - (A + 24*(N_{CB} + 1))/N_{ch}|, where N_{CB} = \begin{cases} 0, if C = 1\\ C, if C > 1 \end{cases}$ subject to

- a) A is a valid TB size according to section 7.1.7 of TS 36.213 [6] assuming an allocation of N_{RB} resource blocks.
- b) C is the number of Code Blocks calculated according to section 5.1.2 of TS 36.212 [5].
- c) For RMC-s, which at the nominal target coding rate do not cover all the possible UE categories for the given modulation, reduce the target coding rate gradually (within the same modulation), until the maximal possible number of UE categories is covered.

3. If there is more than one *A* that minimises the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.

A.2.1.3 Overview of UL reference measurement channels

In Table A.2.1.3-1 are listed the UL reference measurement channels specified in annexes A.2.2 and A.2.3 of this release of TS 36.101. This table is informative and serves only to a better overview. The reference for the concrete reference measurement channels and corresponding implementation's parameters as to be used for requirements are annexes A.2.2 and A.2.3 as appropriate.

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Duplex	Table	Name	BW	Mod	TCR	RB	RB Off set	UE Cat eg	Notes
FDD, Ful	I RB allocation, QP	SK							
FDD	Table A.2.2.1.1-1		1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.2.2.1.1-1		3	QPSK	1/3	15		≥ 1	
FDD	Table A.2.2.1.1-1		5	QPSK	1/3	25		≥ 1	
FDD	Table A.2.2.1.1-1		10	QPSK	1/3	50		≥ 1	
FDD	Table A.2.2.1.1-1		15	QPSK	1/5	75		≥ 1	
FDD	Table A.2.2.1.1-1		20	QPSK	1/6	100		≥ 1	
FDD, Ful	I RB allocation, 16-	QAM						-	
FDD	Table A.2.2.1.2-1		1.4	16QAM	3/4	6		≥ 1	
FDD	Table A.2.2.1.2-1		3	16QAM	1/2	15		≥ 1	
FDD	Table A.2.2.1.2-1		5	16QAM	1/3	25		≥ 1	
FDD	Table A.2.2.1.2-1		10	16QAM	3/4	50		≥ 2	
FDD	Table A.2.2.1.2-1		15	16QAM	1/2	75		≥ 2	
FDD	Table A.2.2.1.2-1		20	16QAM	1/3	100		≥ 2	
FDD, Par	rtial RB allocation,	QPSK							
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	1		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	2		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	3		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	4		≥ 1	
FDD	Table A.2.2.2.1-1		1.4 - 20	QPSK	1/3	5		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	6		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	8		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	9		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	10		≥ 1	
FDD	Table A.2.2.2.1-1		3 - 20	QPSK	1/3	12		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	15		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	16		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	18		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	20		≥ 1	
FDD	Table A.2.2.2.1-1		5 - 20	QPSK	1/3	24		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	25		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	27		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	30		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	32		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	36		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	40		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	45		≥ 1	
FDD	Table A.2.2.2.1-1		10 - 20	QPSK	1/3	48		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/3	50		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/3	54		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/4	60		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/4	64		≥ 1	
FDD	Table A.2.2.2.1-1		15 - 20	QPSK	1/4	72		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/5	75		≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/5	80		≥ 1	

Table A.2.1.3-1: Overview of UL reference measurement channels

			20	0001	A /F	04		
FDD	Table A.2.2.2.1-1		20	QPSK	1/5	81	≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/6	90	≥ 1	
FDD	Table A.2.2.2.1-1		20	QPSK	1/6	96	≥ 1	
	tial RB allocation,	16-QAM		400.000				
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	1	≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	2	≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	3	≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	4	≥ 1	
FDD	Table A.2.2.2.2-1		1.4 - 20	16QAM	3/4	5	≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	6	≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	8	≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	9	≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	10	≥ 1	
FDD	Table A.2.2.2.2-1		3 - 20	16QAM	3/4	12	≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/2	15	≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/2	16	≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/2	18	≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/3	20	≥ 1	
FDD	Table A.2.2.2.2-1		5 - 20	16QAM	1/3	24	≥ 1	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	1/3	25	≥ 1	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	1/3	27	≥ 1	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	30	≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	32	≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	36	≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	40	≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	45	≥ 2	
FDD	Table A.2.2.2.2-1		10 - 20	16QAM	3/4	48	≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	3/4	50	≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	3/4	54	≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	2/3	60	≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	2/3	64	≥ 2	
FDD	Table A.2.2.2.2-1		15 - 20	16QAM	1/2	72	≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	1/2	75	≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	1/2	80	≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	1/2	81	≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	2/5	90	≥ 2	
FDD	Table A.2.2.2.2-1		20	16QAM	2/5	96	≥ 2	
FDD, Sus	stained data rate							
FDD	Table A.2.2.3-1	R.1-1 FDD) 10	QPSK	0.31	40	≥ 1	
FDD	Table A.2.2.3-1	R.1-2 FDD) 10	QPSK	0.31	40	≥ 1	
FDD	Table A.2.2.3-1	R.1-3 FDD) 20	QPSK	0.31	90	≥ 2	
FDD	Table A.2.2.3-1	R.1-3A FDI	D 10	QPSK	0.31	40	≥ 1	
FDD	Table A.2.2.3-1	R.1-4 FDD) 20	QPSK	0.31	90	≥ 2	
TDD, Ful	I RB allocation, QP	SK						
TDD	Table A.2.3.1.1-1		1.4	QPSK	1/3	6	≥ 1	
TDD	Table A.2.3.1.1-1		3	QPSK	1/3	15	≥ 1	
TDD	Table A.2.3.1.1-1		5	QPSK	1/3	25	≥ 1	
TDD	Table A.2.3.1.1-1		10	QPSK	1/3	50	≥ 1	

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TDD	Table A.2.3.1.1-1		15	QPSK	1/5	75		≥ 1	
TDD	Table A.2.3.1.1-1		20	QPSK	1/6	100		≥ 1	
-	I RB allocation, 16-	QAM		400.414	0/4	0			
TDD	Table A.2.3.1.2-1		1.4	16QAM	3/4	6		≥ 1	
TDD	Table A.2.3.1.2-1		3	16QAM	1/2	15		≥ 1	
TDD	Table A.2.3.1.2-1		5	16QAM	1/3	25		≥1	
TDD	Table A.2.3.1.2-1		10	16QAM	3/4	50		≥ 2	
TDD	Table A.2.3.1.2-1		15	16QAM	1/2	75		≥2	
TDD	Table A.2.3.1.2-1		20	16QAM	1/3	100		≥ 2	
	rtial RB allocation,			0.001/			1		
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	1		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	2		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	3		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	4		≥ 1	
TDD	Table A.2.3.2.1-1		1.4 - 20	QPSK	1/3	5		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	6		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	8		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	9		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	10		≥ 1	
TDD	Table A.2.3.2.1-1		3 - 20	QPSK	1/3	12		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	15		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	16		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	18		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	20		≥ 1	
TDD	Table A.2.3.2.1-1		5 - 20	QPSK	1/3	24		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	25		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	27		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	30		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	32		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	36		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	40		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	45		≥ 1	
TDD	Table A.2.3.2.1-1		10 - 20	QPSK	1/3	48		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/3	50		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/3	54		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/4	60		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/4	64		≥ 1	
TDD	Table A.2.3.2.1-1		15 - 20	QPSK	1/4	72		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/5	75		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/5	80		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/5	81		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/6	90		≥ 1	
TDD	Table A.2.3.2.1-1		20	QPSK	1/6	96		≥ 1	
TDD, Pa	tial RB allocation,	16-QAM							
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	1		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	2		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	3		≥ 1	
TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	4		≥ 1	
I		I I						1	1

TDD	Table A.2.3.2.2-1		1.4 - 20	16QAM	3/4	5		≥ 1	
						-			
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	6		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	8		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	9		≥1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	10		≥ 1	
TDD	Table A.2.3.2.2-1		3 - 20	16QAM	3/4	12		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/2	15		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/2	16		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/2	18		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/3	20		≥ 1	
TDD	Table A.2.3.2.2-1		5 - 20	16QAM	1/3	24		≥ 1	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	1/3	25		≥ 1	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	1/3	27		≥ 1	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	30		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	32		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	36		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	40		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	45		≥ 2	
TDD	Table A.2.3.2.2-1		10 - 20	16QAM	3/4	48		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	3/4	50		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	3/4	54		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	2/3	60		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	2/3	64		≥ 2	
TDD	Table A.2.3.2.2-1		15 - 20	16QAM	1/2	72		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	1/2	75		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	1/2	80		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	1/2	81		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	2/5	90		≥ 2	
TDD	Table A.2.3.2.2-1		20	16QAM	2/5	96		≥ 2	
TDD, Su	stained data rate	<u> </u>							
TDD	Table A.2.3.3-1	R.1-1 TDD	10	QPSK	0.43	40		≥ 1	
TDD	Table A.2.3.3-1	R.1-2 TDD		QPSK	0.61	40		≥ 2	
TDD	Table A.2.3.3-1	R.1-3 TDD		QPSK	0.49	90		≥ 2	
TDD	Table A.2.3.3-1	R.1-3B TDD		QPSK	0.42	60		≥ 2	
TDD	Table A.2.3.3-1	R.1-4 TDD		QPSK	0.49	90		≥ 2	
	100107.12.0.01	1.1 4 100	20		0.40	00			1

A.2.2 Reference measurement channels for FDD

A.2.2.1 Full RB allocation

A.2.2.1.1 QPSK

Table A.2.2.1.1-1 Reference Channels for QPSK with full RB allocation

Parameter	Unit			Va	lue			
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks		6	15	25	50	75	100	
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12	
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	
Target Coding rate		1/3	1/3	1/3	1/3	1/5	1/6	
Payload size	Bits	600	1544	2216	5160	4392	4584	
Transport block CRC	Bits	24	24	24	24	24	24	
Number of code blocks per Sub-Frame (Note 1)		1	1	1	1	1	1	
Total number of bits per Sub-Frame	Bits	1728	4320	7200	14400	21600	28800	
Total symbols per Sub-Frame		864	2160	3600	7200	10800	14400	
UE Category		≥1	≥ 1	≥ 1	≥ 1	≥ 1	≥1	
Note 1: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attact to each Code Block (otherwise L = 0 Bit)								

A.2.2.1.2 16-QAM

Table A.2.2.1.2-1 Reference Channels for 16-QAM with full RB allocation

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		3/4	1/2	1/3	3/4	1/2	1/3
Payload size	Bits	2600	4264	4968	21384	21384	19848
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)		1	1	1	4	4	4
Total number of bits per Sub-Frame	Bits	3456	8640	14400	28800	43200	57600
Total symbols per Sub-Frame		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥1	≥ 2	≥2	≥ 2
Note 1: If more than one Code Block is Code Block (otherwise L = 0 Bi		n additional	CRC sequ	ience of L :	= 24 Bits is	attached t	o each

A.2.2.1.3 64-QAM

[FFS]

A.2.2.2 Partial RB allocation

For each channel bandwidth, various partial RB allocations are specified. The number of allocated RBs is chosen according to values specified in the Tx and Rx requirements. The single allocated RB case is included.

The allocated RBs are contiguous and start from one end of the channel bandwidth. A single allocated RB is at one end of the channel bandwidth.

A.2.2.2.1 QPSK

Paramet er	Ch BW	Allocate d RBs	DFT- OFDM Symbols per Sub- Frame	Mod'n	Target Coding rate	Payload size	Transpo rt block CRC	Number of code blocks per Sub- Frame (Note 1)	Total number of bits per Sub- Frame	Total symbols per Sub- Frame	UE Categor y
Unit	MHz					Bits	Bits	, <i>,</i>	Bits		
	1.4 - 20	1	12	QPSK	1/3	72	24	1	288	144	≥1
	1.4 - 20	2	12	QPSK	1/3	176	24	1	576	288	≥1
	1.4 - 20	3	12	QPSK	1/3	256	24	1	864	432	≥1
	1.4 - 20	4	12	QPSK	1/3	392	24	1	1152	576	≥1
	1.4 - 20	5	12	QPSK	1/3	424	24	1	1440	720	≥1
	3-20	6	12	QPSK	1/3	600	24	1	1728	864	≥1
	3-20	8	12	QPSK	1/3	808	24	1	2304	1152	≥1
	3-20	9	12	QPSK	1/3	776	24	1	2592	1296	≥1
	3-20	10	12	QPSK	1/3	872	24	1	2880	1440	≥1
	3-20	12	12	QPSK	1/3	1224	24	1	3456	1728	≥ 1
	5-20	15	12	QPSK	1/3	1320	24	1	4320	2160	≥1
	5-20	16	12	QPSK	1/3	1384	24	1	4608	2304	≥ 1
	5-20	18	12	QPSK	1/3	1864	24	1	5184	2592	≥ 1
	5-20	20	12	QPSK	1/3	1736	24	1	5760	2880	≥1
	5-20	24	12	QPSK	1/3	2472	24	1	6912	3456	≥1
	10-20	25	12	QPSK	1/3	2216	24	1	7200	3600	≥ 1
	10-20	27	12	QPSK	1/3	2792	24	1	7776	3888	≥ 1
	10-20	30	12	QPSK	1/3	2664	24	1	8640	4320	≥1
	10-20	32	12	QPSK	1/3	2792	24	1	9216	4608	≥1
	10-20	36	12	QPSK	1/3	3752	24	1	10368	5184	≥ 1
	10-20	40	12	QPSK	1/3	4136	24	1	11520	5760	≥ 1
	10-20	45	12	QPSK	1/3	4008	24	1	12960	6480	≥1
	10-20	48	12	QPSK	1/3	4264	24	1	13824	6912	≥1
	15 - 20	50	12	QPSK	1/3	5160	24	1	14400	7200	≥1
	15 - 20	54	12	QPSK	1/3	4776	24	1	15552	7776	≥1
	15 - 20	60	12	QPSK	1/4	4264	24	1	17280	8640	≥1
	15 - 20	64	12	QPSK	1/4	4584	24	1	18432	9216	≥1
	15 - 20	72	12	QPSK	1/4	5160	24	1	20736	10368	≥1
	20	75	12	QPSK	1/5	4392	24	1	21600	10800	≥1
	20	80	12	QPSK	1/5	4776	24	1	23040	11520	≥1
	20	81	12	QPSK	1/5	4776	24	1	23328	11664	≥1
	20	90	12	QPSK	1/6	4008	24	1	25920	12960	≥1
	20	96	12	QPSK	1/6	4264	24	1	27648	13824	≥1

Table A.2.2.2.1-1 Reference Channels for QPSK with partial RB allocation

A.2.2.2.2 16-QAM

Paramet er	Ch BW	Allocate d RBs	DFT- OFDM Symbols per Sub- Frame	Mod'n	Target Coding rate	Payload size	Transpo rt block CRC	Number of code blocks per Sub- Frame (Note 1)	Total number of bits per Sub- Frame	Total symbols per Sub- Frame	UE Categor y
Unit	MHz					Bits	Bits		Bits		
	1.4 - 20	1	12	16QAM	3/4	408	24	1	576	144	≥1
	1.4 - 20	2	12	16QAM	3/4	840	24	1	1152	288	≥1
	1.4 - 20	3	12	16QAM	3/4	1288	24	1	1728	432	≥1
	1.4 - 20	4	12	16QAM	3/4	1736	24	1	2304	576	≥ 1
	1.4 - 20	5	12	16QAM	3/4	2152	24	1	2880	720	≥ 1
	3-20	6	12	16QAM	3/4	2600	24	1	3456	864	≥ 1
	3-20	8	12	16QAM	3/4	3496	24	1	4608	1152	≥ 1
	3-20	9	12	16QAM	3/4	3880	24	1	5184	1296	≥ 1
	3-20	10	12	16QAM	3/4	4264	24	1	5760	1440	≥1
	3-20	12	12	16QAM	3/4	5160	24	1	6912	1728	≥ 1
	5-20	15	12	16QAM	1/2	4264	24	1	8640	2160	≥1
	5-20	16	12	16QAM	1/2	4584	24	1	9216	2304	≥1
	5-20	18	12	16QAM	1/2	5160	24	1	10368	2592	≥ 1
	5-20	20	12	16QAM	1/3	4008	24	1	11520	2880	≥1
	5-20	24	12	16QAM	1/3	4776	24	1	13824	3456	≥1
	10-20	25	12	16QAM	1/3	4968	24	1	14400	3600	≥1
	10-20	27	12	16QAM	1/3	4776	24	1	15552	3888	≥1
	10-20	30	12	16QAM	3/4	12960	24	3	17280	4320	≥2
	10-20	32	12	16QAM	3/4	13536	24	3	18432	4608	≥2
	10-20	36	12	16QAM	3/4	15264	24	3	20736	5184	≥2
	10-20	40	12	16QAM	3/4	16992	24	3	23040	5760	≥2
	10-20	45	12	16QAM	3/4	19080	24	4	25920	6480	≥2
	10-20	48	12	16QAM	3/4	20616	24	4	27648	6912	≥2
	15 - 20	50	12	16QAM	3/4	21384	24	4	28800	7200	≥2
	15 - 20	54	12	16QAM	3/4	22920	24	4	31104	7776	≥2
	15 - 20	60	12	16QAM	2/3	23688	24	4	34560	8640	≥2
	15 - 20	64	12	16QAM	2/3	25456	24	4	36864	9216	≥2
	15 - 20	72	12	16QAM	1/2	20616	24	4	41472	10368	≥2
	20	75	12	16QAM	1/2	21384	24	4	43200	10800	≥ 2
	20	80	12	16QAM	1/2	22920	24	4	46080	11520	≥2
	20	81	12	16QAM	1/2	22920	24	4	46656	11664	≥2
	20	90	12	16QAM	2/5	20616	24	4	51840	12960	≥2
	20	96	12	16QAM	2/5	22152	24	4	55296	13824	≥2

Table A.2.2.2.2-1 Reference Channels for 16-QAM with partial RB allocation

A.2.2.2.3 64-QAM

[FFS]

A.2.2.3 Reference measurement channels for sustained downlink data rate provided by lower layers

Unit						
	R.1-1	R.1-2	R.1-3	R.1-3A	R.1-4	FFS
	FDD	FDD	FDD	FDD	FDD	
MHz	10	10	20	10	20	
	40	40	90	40	90	
	(Note 2)	(Note 2)	(Note 3)	(Note 2)	(Note 3)	
	10	10	10	10	10	
	12	12	12	12	12	
	QPSK	QPSK	QPSK	QPSK	QPSK	
	0.31	0.31	0.31	0.31	0.31	
Bits	3496	3496	7992	3496	7992	
	1	1	2	1	2	
	5760	5760	12960	5760	12960	
	11520	11520	25920	11520	25920	
Mbps	3.496	3.496	7.992	3.496	7.992	
	≥ 1	≥ 1	≥2	≥ 1	≥2	
resent, an	additional	CRC seque	nce of $L = 2$	4 Bits is atta	ached to ea	ch Code
	Bits	R.1-1 FDD MHz 10 40 40 (Note 2) 10 12 QPSK 0.31 3496 1 5760 11520 Mbps 3.496 ≥ 1 resent, an additional ($\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	R.1-1 FDDR.1-2 FDDR.1-3 FDDR.1-3A FDDMHz1010201040409040(Note 2)(Note 2)(Note 3)(Note 2)101010101012121212QPSKQPSKQPSKQPSK0.310.310.310.31Bits3496349679923496111215760576012960576011520115202592011520Mbps3.4963.4967.9923.496 ≥ 1 ≥ 1 ≥ 2 ≥ 1 resent, an additional CRC sequence of L = 24 Bits is attract	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$

Table A.2.2.3-1: Uplink Reference Channels for sustained data-rate test (FDD)

Note 3: RB-s 5-94 allocated with PUSCH.

A.2.3 Reference measurement channels for TDD

For TDD, the measurement channel is based on DL/UL configuration ratio of 2DL:2UL.

A.2.3.1 Full RB allocation

A.2.3.1.1 QPSK

Table A.2.3.1.1-1 Reference Channels for QPSK with full RB allocation

Parameter	Unit			Va	lue			
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks		6	15	25	50	75	100	
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1	
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12	
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	
Target Coding rate		1/3	1/3	1/3	1/3	1/5	1/6	
Payload size								
For Sub-Frame 2,3,7,8	Bits	600	1544	2216	5160	4392	4584	
Transport block CRC	Bits	24	24	24	24	24	24	
Number of code blocks per Sub-Frame								
(Note 1)								
For Sub-Frame 2,3,7,8		1	1	1	1	1	1	
Total number of bits per Sub-Frame								
For Sub-Frame 2,3,7,8	Bits	1728	4320	7200	14400	21600	28800	
Total symbols per Sub-Frame								
For Sub-Frame 2,3,7,8		864	2160	3600	7200	10800	14400	
UE Category		≥1	≥ 1	≥ 1	≥ 1	≥1	≥1	
Note 1: If more than one Code Block is to each Code Block (otherwise		n addition	al CRC s	equence	of L = 24	Bits is a	ttached	
Note 2: As per Table 4.2-2 in TS 36.211 [4]								

A.2.3.1.2 16-QAM

Table A.2.3.1.2-1 Reference Channels for 16-QAM with full RB allocation

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 2)		1	1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12	12
Modulation		16QAM	16QAM	16QAM	16QAM	16QAM	16QAM
Target Coding rate		3/4	1/2	1/3	3/4	1/2	1/3
Payload size							
For Sub-Frame 2,3,7,8	Bits	2600	4264	4968	21384	21384	19848
Transport block CRC	Bits	24	24	24	24	24	24
Number of code blocks per Sub-Frame (Note 1)							
For Sub-Frame 2,3,7,8		1	1	1	4	4	4
Total number of bits per Sub-Frame							
For Sub-Frame 2,3,7,8	Bits	3456	8640	14400	28800	43200	57600
Total symbols per Sub-Frame							
For Sub-Frame 2,3,7,8		864	2160	3600	7200	10800	14400
UE Category		≥ 1	≥ 1	≥1	≥ 2	≥2	≥2
Note 1: If more than one Code Block is Code Block (otherwise L = 0 B Note 2: As per Table 4.2-2 in TS 36.2	Bit)	an additiona	al CRC seq	uence of L	. = 24 Bits i	s attached	to each

A.2.3.1.3 64-QAM

[FFS]

A.2.3.2 Partial RB allocation

For each channel bandwidth, various partial RB allocations are specified. The number of allocated RBs is chosen according to values specified in the Tx and Rx requirements. The single allocated RB case is included.

The allocated RBs are contiguous and start from one end of the channel bandwidth. A single allocated RB is at one end of the channel bandwidth.

A.2.3.2.1 QPSK

Parame ter	Ch BW	Allocat ed RBs	UDL Configu ration (Note 2)	DFT- OFDM Symbol s per Sub- Frame	Mod'n	Target Coding rate	Payloa d size for Sub- Frame 2, 3, 7, 8	Transp ort block CRC	Number of code blocks per Sub- Frame (Note 1)	Total number of bits per Sub- Frame for Sub- Frame 2, 3, 7, 8	Total symbol s per Sub- Frame for Sub- Frame 2, 3, 7, 8	UE Categor y
Unit	MHz						Bits	Bits		Bits		
	1.4 - 20	1	1	12	QPSK	1/3	72	24	1	288	144	≥ 1
	1.4 - 20	2	1	12	QPSK	1/3	176	24	1	576	288	≥1
	1.4 - 20	3	1	12	QPSK	1/3	256	24	1	864	432	≥1
	1.4 - 20	4	1	12	QPSK	1/3	392	24	1	1152	576	≥1
	1.4 - 20	5	1	12 12	QPSK QPSK	1/3 1/3	424 600	24 24	1	1440 1728	720 864	≥1
	3-20 3-20	8	1	12	QPSK	1/3	808	24	1	2304	1152	≥ 1 ≥ 1
	3-20	9	1	12	QPSK	1/3	776	24	1	2592	1296	≥1 ≥1
	3-20	10	1	12	QPSK	1/3	872	24	1	2392	1290	≥1
	3-20	10	1	12	QPSK	1/3	1224	24	1	3456	1728	≥1
	5-20	15	1	12	QPSK	1/3	1320	24	1	4320	2160	≥1
	5-20	16	1	12	QPSK	1/3	1384	24	1	4608	2304	≥ 1
	5-20	18	1	12	QPSK	1/3	1864	24	1	5184	2592	≥ 1
	5-20	20	1	12	QPSK	1/3	1736	24	1	5760	2880	≥ 1
	5-20	24	1	12	QPSK	1/3	2472	24	1	6912	3456	≥1
	10-20	25	1	12	QPSK	1/3	2216	24	1	7200	3600	≥ 1
	10-20	27	1	12	QPSK	1/3	2792	24	1	7776	3888	≥ 1
	10-20	30	1	12	QPSK	1/3	2664	24	1	8640	4320	≥ 1
	10-20	32	1	12	QPSK	1/3	2792	24	1	9216	4608	≥1
	10-20	36	1	12	QPSK	1/3	3752	24	1	10368	5184	≥1
	10-20	40	1	12	QPSK	1/3	4136	24	1	11520	5760	≥1
	10-20	45 48	1	12 12	QPSK QPSK	1/3 1/3	4008	24 24	1	12960	6480 6912	≥ 1 ≥ 1
	10-20 15 - 20	48 50	1	12	QPSK QPSK	1/3	4264 5160	24	1	13824 14400	7200	≥1
	15 - 20	54	1	12	QPSK	1/3	4776	24	1	15552	7200	≥1
	15 - 20	60	1	12	QPSK	1/3	4264	24	1	17280	8640	≥1
	15 - 20	64	1	12	QPSK	1/4	4584	24	1	18432	9216	≥1
	15 - 20	72	1	12	QPSK	1/4	5160	24	1	20736	10368	≥1
	20	75	1	12	QPSK	1/5	4392	24	1	21600	10800	≥1
	20	80	1	12	QPSK	1/5	4776	24	1	23040	11520	≥ 1
	20	81	1	12	QPSK	1/5	4776	24	1	23328	11664	≥ 1
	20	90	1	12	QPSK	1/6	4008	24	1	25920	12960	≥ 1
	20	96	1	12	QPSK	1/6	4264	24	1	27648	13824	≥ 1

Table A.2.3.2.1-1 Reference Channels for QPSK with partial RB allocation

A.2.3.2.2 16-QAM

Parame ter	Ch BW	Allocat ed RBs	UDL Configu ration (Note 2)	DFT- OFDM Symbol s per Sub- Frame	Mod'n	Target Coding rate	Payloa d size for Sub- Frame 2, 3, 7, 8	Transp ort block CRC	Number of code blocks per Sub- Frame (Note 1)	Total number of bits per Sub- Frame for Sub- Frame 2, 3, 7, 8	Total symbol s per Sub- Frame for Sub- Frame 2, 3, 7, 8	UE Categor y
Unit	MHz						Bits	Bits		Bits		
	1.4 - 20	1	1	12	16QAM	3/4	408	24	1	576	144	≥1
	1.4 - 20	2	1	12	16QAM	3/4	840	24	1	1152	288	≥ 1
	1.4 - 20	3	1	12	16QAM	3/4	1288	24	1	1728	432	≥ 1
	1.4 - 20	4	1	12	16QAM	3/4	1736	24	1	2304	576	≥ 1
	1.4 - 20	5	1	12	16QAM	3/4	2152	24	1	2880	720	≥1
	3-20 3-20	6 8	1	12 12	16QAM 16QAM	3/4 3/4	2600 3496	24 24	1	3456 4608	864 1152	≥1
	3-20	9	1	12	16QAM 16QAM	3/4	3496	24	1	5184	1296	≥ 1 ≥ 1
	3-20	10	1	12	16QAM	3/4	4264	24	1	5760	1290	≥1
	3-20	10	1	12	16QAM	3/4	5160	24	1	6912	1728	≥1
	5-20	15	1	12	16QAM	1/2	4264	24	1	8640	2160	≥1
	5-20	16	1	12	16QAM	1/2	4584	24	1	9216	2304	≥1
	5-20	18	1	12	16QAM	1/2	5160	24	1	10368	2592	≥ 1
	5-20	20	1	12	16QAM	1/3	4008	24	1	11520	2880	≥ 1
	5-20	24	1	12	16QAM	1/3	4776	24	1	13824	3456	≥ 1
	10-20	25	1	12	16QAM	1/3	4968	24	1	14400	3600	≥ 1
	10-20	27	1	12	16QAM	1/3	4776	24	1	15552	3888	≥ 1
	10-20	30	1	12	16QAM	3/4	12960	24	3	17280	4320	≥ 2
	10-20	32	1	12	16QAM	3/4	13536	24	3	18432	4608	≥ 2
	10-20	36	1	12	16QAM	3/4	15264	24	3	20736	5184	≥ 2
	10-20	40	1	12	16QAM	3/4	16992	24	3	23040	5760	≥ 2
	10-20	45	1	12	16QAM	3/4	19080	24	4	25920	6480	≥ 2
	10-20	48	1	12	16QAM	3/4	20616	24	4	27648	6912	≥2
	15 - 20 15 - 20	50 54	1	12 12	16QAM 16QAM	3/4 3/4	21384 22920	24 24	4	28800 31104	7200 7776	≥2 ≥2
	15 - 20	54 60	1	12	16QAM 16QAM	2/3	22920	24	4	31104	8640	≥2 ≥2
	15 - 20	64	1	12	16QAM	2/3	25456	24	4	36864	9216	≥2
	15 - 20	72	1	12	16QAM	1/2	20616	24	4	41472	10368	≥ 2
	20	75	1	12	16QAM	1/2	21384	24	4	43200	10800	≥2
	20	80	1	12	16QAM	1/2	22920	24	4	46080	11520	≥2
	20	81	1	12	16QAM	1/2	22920	24	4	46656	11664	≥2
	20	90	1	12	16QAM	2/5	20616	24	4	51840	12960	≥ 2
	20	96	1	12	16QAM	2/5	22152	24	4	55296	13824	≥ 2

Table A.2.3.2.2-1 Reference Channels for 16QAM with partial RB allocation

A.2.3.2.3 64-QAM

[FFS]

A.2.3.3 Reference measurement channels for sustained downlink data rate provided by lower layers

Parameter	Unit			Value		
Reference Channel		R.1-1	R.1-2	R.1-3	R.1-3B	R.1-4
		TDD	TDD	TDD	TDD	TDD
Channel Bandwidth	MHz	10	10	20	15	20
Uplink-Downlink Configuration (Note 2)		5	5	5	1	1
Allocated Resource Blocks		40	40	90	60	90
		(Note 3)	(Note 3)	(Note 5)	(Note 4)	(Note 5)
Allocated Sub-Frames per Radio-Frame		1	1	1	1	1
DFT-OFDM Symbols per Sub-Frame		12	12	12	12	12
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK
Coding Rate						
For Sub-Frame 2		0.43	0.61	0.49	0.42	0.49
For Sub-Frame 3,7,8		n/a	n/a	n/a	0.42	0.49
Information Bit Payload per Sub-Frame	Bits					
For Sub-Frame 2		4968	6968	12576	7224	12576
For Sub-Frame 3,7,8		0	0	0	7224	12576
Number of Code Blocks per Sub-Frame						
(Note 1)						
For Sub-Frame 2		1	2	3	2	3
For Sub-Frame 3,7,8		0	0	0	2	3
Modulation Symbols per Sub-Frame						
For Sub-Frame 2		5760	5760	12960	8640	10240
For Sub-Frame 3,7,8		0	0	0	8640	10240
Binary Channel Bits per Sub-Frame						
For Sub-Frame 2		11520	11520	25920	17280	25920
For Sub-Frame 3,7,8		n/a	n/a	n/a	17280	25920
Max Throughput over 1 Radio-Frame	Mbps	0.4968	0.6968	1.2576	2.8896	5.0304
UE Category		≥ 1	≥ 2	≥2	≥ 2	≥2
Note 1: If more than one Code Block is p	oresent, an	additional C	CRC sequer	nce of $L = 2$	4 Bits is atta	ached to
each Code Block (otherwise L =						
Note 2: As per Table 4.2-2 in TS 36.211						
Note 3: RB-s 5-44 allocated with PUSCH						
Note 4: RB-s 7-66 allocated with PUSCH						
Note 5: RB-s 5-94 allocated with PUSCH	1.					

Table A.2.3.3-1: Uplink Reference Channels for sustained data-rate test (TDD)

A.3 DL reference measurement channels

A.3.1 General

The number of available channel bits varies across the sub-frames due to PBCH and PSS/SSS overhead. The payload size per sub-frame is varied in order to keep the code rate constant throughout a frame.

No user data is scheduled on subframes #5 in order to facilitate the transmission of system information blocks (SIB).

The algorithm for determining the payload size A is as follows; given a desired coding rate R and radio block allocation N_{RB}

1. Calculate the number of channel bits N_{ch} that can be transmitted during the first transmission of a given sub-frame.

2. Find A such that the resulting coding rate is as close to R as possible, that is,

$$\min |R - (A + 24*(N_{CB} + 1))/N_{ch}|, where N_{CB} = \begin{cases} 0, if C = 1\\ C, if C > 1 \end{cases}$$
 subject to

a) A is a valid TB size according to section 7.1.7 of TS 36.213 [6] assuming an allocation of $N_{\rm RB}$ resource blocks.

b) C is the number of Code Blocks calculated according to section 5.1.2 of TS 36.212 [5].

3. If there is more than one *A* that minimizes the equation above, then the larger value is chosen per default and the chosen code rate should not exceed 0.93.

4. For TDD, the measurement channel is based on DL/UL configuration ratio of 2DL+DwPTS (12 OFDM symbol): 2UL

A.3.1.1 Overview of DL reference measurement channels

In Table A.3.1.1-1 are listed the DL reference measurement channels specified in annexes A.3.2 to A.3.10 of this release of TS 36.101. This table is informative and serves only to a better overview. The reference for the concrete reference measurement channels and corresponding implementation's parameters as to be used for requirements are annexes A.3.2 to A.3.10 as appropriate.

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Duplex	Table	Name	BW	Mod	TCR	RB	RB Off set	UE Cat eg	Notes
FDD, Rece	iver requirements								
FDD	Table A.3.2-1		1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.2-1		3	QPSK	1/3	15		≥ 1	
FDD	Table A.3.2-1		5	QPSK	1/3	25		≥ 1	
FDD	Table A.3.2-1		10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.2-1		15	QPSK	1/3	75		≥ 1	
FDD	Table A.3.2-1		20	QPSK	1/3	100		≥ 1	
TDD, Rece	iver requirements								
TDD	Table A.3.2-2		1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.2-2		3	QPSK	1/3	15		≥ 1	
TDD	Table A.3.2-2		5	QPSK	1/3	25		≥ 1	
TDD	Table A.3.2-2		10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.2-2		15	QPSK	1/3	75		≥ 1	
TDD	Table A.3.2-2		20	QPSK	1/3	100		≥ 1	
FDD, Rece	iver requirements,	Maximum inp	out level	for UE Ca	tegorie	s 3-5			
FDD	Table A.3.2-3		1.4	64QAM	3/4	6		-	
FDD	Table A.3.2-3		3	64QAM	3/4	15		-	
FDD	Table A.3.2-3		5	64QAM	3/4	25		-	
FDD	Table A.3.2-3		10	64QAM	3/4	50		-	
FDD	Table A.3.2-3		15	64QAM	3/4	75		-	
FDD	Table A.3.2-3		20	64QAM	3/4	100		-	
FDD, Rece	iver requirements,	Maximum inp	out level	for UE Ca	tegorie	s 1		-	
FDD	Table A.3.2-3a		1.4	64QAM	3/4	6		-	
FDD	Table A.3.2-3a		3	64QAM	3/4	15		-	
FDD	Table A.3.2-3a		5	64QAM	3/4	18		-	
FDD	Table A.3.2-3a		10	64QAM	3/4	17		-	
FDD	Table A.3.2-3a		15	64QAM	3/4	17		-	
FDD	Table A.3.2-3a		20	64QAM	3/4	17		-	
FDD, Rece	iver requirements,	Maximum inp	out level	for UE Ca	tegorie	s 2	1	T	
FDD	Table A.3.2-3b		1.4	64QAM	3/4	6		-	
FDD	Table A.3.2-3b		3	64QAM	3/4	15		-	
FDD	Table A.3.2-3b		5	64QAM	3/4	25		-	
FDD	Table A.3.2-3b		10	64QAM	3/4	50		-	
FDD	Table A.3.2-3b		15	64QAM	3/4	75		-	
FDD	Table A.3.2-3b		20	64QAM	3/4	83		-	
TDD, Rece	iver requirements,	Maximum inp	out level	for UE Ca	tegorie	s 3-5	1	T	
TDD	Table A.3.2-4		1.4	64QAM	3/4	6		-	
TDD	Table A.3.2-4		3	64QAM	3/4	15		-	
TDD	Table A.3.2-4		5	64QAM	3/4	25		-	
TDD	Table A.3.2-4		10	64QAM	3/4	50		-	
TDD	Table A.3.2-4		15	64QAM	3/4	75		-	
TDD	Table A.3.2-4		20	64QAM	3/4	100		-	
	iver requirements,	Maximum inp	1	1	_	1			
TDD	Table A.3.2-4a		1.4	64QAM	3/4	6		-	
TDD	Table A.3.2-4a		3	64QAM	3/4	15		-	

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TDD	Table A.3.2-4a		5	64QAM	3/4	18		-	
TDD	Table A.3.2-4a		10	64QAM	3/4	17		-	
TDD	Table A.3.2-4a		15	64QAM	3/4	17		-	
TDD	Table A.3.2-4a		20	64QAM	3/4	17		-	
TDD, Reco	eiver requirements,	Maximum inp	ut level	for UE Ca	tegorie	s 2			
TDD	Table A.3.2-4b		1.4	64QAM	3/4	6		-	
TDD	Table A.3.2-4b		3	64QAM	3/4	15		-	
TDD	Table A.3.2-4b		5	64QAM	3/4	25		-	
TDD	Table A.3.2-4b		10	64QAM	3/4	50		-	
TDD	Table A.3.2-4b		15	64QAM	3/4	75		-	
TDD	Table A.3.2-4b		20	64QAM	3/4	83		-	
FDD, PDS	CH Performance, S	ingle-antenna	transm	ission (CR	(S)				
FDD	Table A.3.3.1-1	R.4 FDD	1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.3.1-1	R.42 FDD	20	QPSK	1/3	100		≥ 1	
FDD	Table A.3.3.1-1	R.2 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.1-2	R.3-1 FDD	5	16QAM	1/2	25		≥ 1	
FDD	Table A.3.3.1-2	R.3 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.1-3	R.5 FDD	3	64QAM	3/4	15		≥ 1	
FDD	Table A.3.3.1-3	R.6 FDD	5	64QAM	3/4	25		≥ 2	
FDD	Table A.3.3.1-3	R.7 FDD	10	64QAM	3/4	50		≥ 2	
FDD	Table A.3.3.1-3	R.8 FDD	15	64QAM	3/4	75		≥ 2	
FDD	Table A.3.3.1-3	R.9 FDD	20	64QAM	3/4	100		≥ 3	
FDD	Table A.3.3.1-3a	R.6-1 FDD	5	64QAM	3/4	18		≥ 1	
FDD	Table A.3.3.1-3a	R.7-1 FDD	10	64QAM	3/4	17		≥ 1	
FDD	Table A.3.3.1-3a	R.8-1 FDD	15	64QAM	3/4	17		≥ 1	
FDD	Table A.3.3.1-3a	R.9-1 FDD	20	64QAM	3/4	17		≥ 1	
FDD	Table A.3.3.1-3a	R.9-2 FDD	20	64QAM	3/4	83		≥ 2	
FDD	Table A.3.3.1-6	R.41 FDD	10	QPSK	1/10	50		≥ 1	
FDD, PDS	CH Performance, S	ingle-antenna	transm	ission (CR	S), Sin	gle PRE	3 (Cha	innel e	edge)
FDD	Table A.3.3.1-4	R.0 FDD	3	16QAM	1/2	1		≥ 1	
FDD	Table A.3.3.1-4	R.1 FDD	10 / 20	16QAM	1/2	1		≥ 1	
FDD, PDS	CH Performance, S	ingle-antenna		ission (CR	S), Sin	qle PRE	3 (MB	SFN C	onfiguration)
FDD	Table A.3.3.1-5	R.29 FDD	10	16QAM	1/2	1	•	≥ 1	
FDD, PDS	CH Performance: C	arrier aggrega	ation wit	h power i	mbalan	се			
FDD	Table A.3.3.1-7	R.49 FDD	20	64QAM	0.84- 0.87	100		≥5	
FDD	Table A.3.3.1-7	R.49-1 FDD	20	64QAM	0.89-	100		≥ 5	
	CH Performance, M				0.92		a port		
FDD	Table A.3.3.2.1-1	R.10 FDD	10	QPSK	1/3	50		3 ≥1	
FDD	Table A.3.3.2.1-1	R.11 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.2.1-1	R.11-2 FDD	5	16QAM	1/2	25		≥ 1	
FDD	Table A.3.3.2.1-1	R.11-3 FDD	10	16QAM	1/2	40		≥ 1 ≥ 1	
FDD	Table A.3.3.2.1-1	R.11-3 FDD	10	QPSK	1/2	50		≥ 1 ≥ 1	
FDD	Table A.3.3.2.1-1	R.30 FDD	20	16QAM	1/2	100		≥ 2	
FDD	Table A.3.3.2.1-1	R.30-1 FDD	15	16QAM	1/2	75		≥ 2 ≥ 2	
FDD	Table A.3.3.2.1-1	R.35 FDD	10	64QAM	1/2	50		≥ 2 ≥ 2	
FDD	Table A.3.3.2.1-1	R.35-1 FDD	20	64QAM	0.39	100		<u> </u>	
FDD	Table A.3.3.2.1-1	R.35-1 FDD R.35-2 FDD	15	64QAM	0.39	75		4 ≥ 2	
רטש	Table A.3.3.2.1-1	R.33-2 FUD	10	04QAIVI	0.39	10		< Z	

500			40	040404	0.00	50			
FDD	Table A.3.3.2.1-1	R.35-3 FDD	10	64QAM	0.39	50		≥2	
FDD	Table A.3.3.2.1-2	R.35-4 FDD	10	64QAM	0.47	50		≥2	
FDD	Table A.3.3.2.1-2	R.46 FDD	10	QPSK		50		≥ 1	
FDD	Table A.3.3.2.1-2	R.47 FDD	10	16QAM		50		≥ 1	
-	CH Performance, N		[1		na por	ts	
FDD	Table A.3.3.2.2-1	R.12 FDD	1.4	QPSK	1/3	6		≥ 1	
FDD	Table A.3.3.2.2-1	R.13 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.2.2-1	R.14 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.2.2-1	R.14-1 FDD	10	16QAM	1/2	6		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-2 FDD	10	16QAM	1/2	3		≥ 1	
FDD	Table A.3.3.2.2-1	R.14-3 FDD	20	16QAM	1/2	100		≥ 2	
FDD	Table A.3.3.2.2-1	R.36 FDD	10	64QAM	1/2	50		≥ 2	
FDD, PDS	CH Performance (U	E specific RS) Two ar	ntenna por	rts (CSI	-RS)			
FDD	Table A.3.3.3.1-1	R.51 FDD	10	16QAM	1/2	50		≥ 2	
FDD, PDS	CH Performance (U	IE specific RS) Two ar	ntenna por	rts (CSI	-RS, n	on Qua	asi Co-	located)
FDD	Table A.3.3.3.1-2	R.52 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.1-2	R.53 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.1-2	R.54 FDD	10	16QAM	1/2	50		≥ 2	
FDD, PDS	CH Performance (U	E specific RS) Four a	ntenna po	rts (CS	I-RS)			
FDD	Table A.3.3.3.2-1	R.43 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.3.2-1	R.50 FDD	10	64QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.2-2	R.44 FDD	10	QPSK	1/3	50		≥ 1	
FDD	Table A.3.3.3.2-2	R.45 FDD	10	16QAM	1/2	50		≥ 2	
FDD	Table A.3.3.3.2-2	R.45-1 FDD	10	16QAM	1/2	39		≥ 1	
FDD	Table A.3.3.3.2-1	R.48 FDD	10	QPSK		50		≥ 1	
TDD, PDS	CH Performance, S	ingle-antenna	transmi	ission (CR	S)				
TDD	Table A.3.4.1-1	R.4 TDD	1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.4.1-1	R.42 TDD	20	QPSK	1/3	100		≥ 1	
TDD	Table A.3.4.1-1	R.2 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.1-2	R.3-1 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.1-2	R.3 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.1-3	R.5 TDD	3	64QAM	3/4	15		≥ 1	
TDD	Table A.3.4.1-3	R.6 TDD	5	64QAM	3/4	25		≥ 2	
TDD	Table A.3.4.1-3	R.7 TDD	10	64QAM	3/4	50		≥ 2	
TDD	Table A.3.4.1-3	R.8 TDD	15	64QAM	3/4	75		≥ 2	
TDD	Table A.3.4.1-3	R.9 TDD	20	64QAM	3/4	100		≥ 3	
TDD	Table A.3.4.1-3a	R.6-1 TDD	5	64QAM	3/4	18		≥ 1	
TDD	Table A.3.4.1-3a	R.7-1 TDD	10	64QAM	3/4	17		≥ 1	
TDD	Table A.3.4.1-3a	R.8-1 TDD	15	64QAM	3/4	17		≥ 1	
TDD	Table A.3.4.1-3a	R.9-1 TDD	20	64QAM	3/4	17		≥ 1	
TDD	Table A.3.4.1-3a	R.9-2 TDD	20	64QAM	3/4	83		≥ 2	
TDD	Table A.3.4.1-6	R.41 TDD	10	QPSK	1/10	50		≥ 1	
TDD, PDS	CH Performance, S	ingle-antenna	transmi	ission (CR	S), Sin	gle PR	B (Cha	annel e	edge)
TDD	Table A.3.4.1-4	R.0 TDD	3	16QAM	1/2	1		≥ 1	
TDD	Table A.3.4.1-4	R.1 TDD	10 /	16QAM	1/2	1		≥ 1	
	CH Performance, S		20 transmi		I		B (MP		onfiguration)
TDD, PDS	Table A.3.4.1-5	R.29 TDD	10	16QAM	1/2			SFN C ≥ 1	
	CH Performance: C		-					<u> </u>	
100, 205	on renormance: C	anner aggrega	ation wit	in power li	ninaian	LE			

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TDD	Table A.3.4.1-7	R.49 TDD	20	64QAM	0.81- 087	100		≥ 5	
TDD	Table A.3.4.1-7	R.49-1 TDD	20	64QAM	0.86- 0.92	100		≥ 5	
TDD, PDSC	CH Performance, N	lulti-antenna t	ransmis	sion (CRS		antenn	na port	s	
TDD	Table A.3.4.2.1-1	R.10 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.2.1-1	R.11 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-1	R.11-1 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-1	R.11-2 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.2.1-1	R.11-3 TDD	10	16QAM	1/2	40		≥ 1	
TDD	Table A.3.4.2.1-1	R.11-4 TDD	10	QPSK	1/2	50		≥ 1	
TDD	Table A.3.4.2.1-1	R.30 TDD	20	16QAM	1/2	100		≥ 2	
TDD	Table A.3.4.2.1-1	R.30-1 TDD	20	16QAM	1/2	100		≥ 2	
TDD	Table A.3.4.2.1-1	R.30-2 TDD	20	16QAM	1/2	100		3	
TDD	Table A.3.4.2.1-1	R.35 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.1-1	R.35-1 TDD	20	64QAM	0.39	100		4	
TDD	Table A.3.4.2.1-2	R.35-2 TDD	10	64QAM	0.47	50		≥ 2	
TDD	Table A.3.4.2.1-2	R.46 TDD	10	QPSK		50		≥ 1	
TDD	Table A.3.4.2.1-2	R.47 TDD	10	16QAM		50		≥ 1	
TDD, PDSC	CH Performance, N	lulti-antenna t	ransmis	sion (CRS), Four	antenr	na por	ts	
TDD	Table A.3.4.2.2-1	R.12 TDD	1.4	QPSK	1/3	6		≥ 1	
TDD	Table A.3.4.2.2-1	R.13 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.2.2-1	R.14 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.2.2-1	R.14-1 TDD	10	16QAM	1/2	6		≥ 1	
TDD	Table A.3.4.2.2-1	R.14-2 TDD	10	16QAM	1/2	3		≥ 1	
TDD	Table A.3.4.2.2-1	R.43 TDD	20	16QAM	1/2	100		≥2	
TDD	Table A.3.4.2.2-1	R.36 TDD	10	64QAM	1/2	50		≥ 2	
TDD, PDSC	CH Performance, S	ingle antenna	port (DI	RS)					
TDD	Table A.3.4.3.1-1	R.25 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.3.1-1	R.26 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.1-1	R.26-1 TDD	5	16QAM	1/2	25		≥ 1	
TDD	Table A.3.4.3.1-1	R.27 TDD	10	64QAM	3/4	50		≥ 2	
TDD	Table A.3.4.3.1-1	R.27-1 TDD	10	64QAM	3/4	18		≥ 1	
TDD	Table A.3.4.3.1-1	R.28 TDD	10	16QAM	1/2	1		≥ 1	
TDD, PDSC	CH Performance, T	wo antenna p	orts (DR	S)					
TDD	Table A.3.4.3.2-1	R.31 TDD	10	QPSK	1/3	50		≥ 1	
TDD	Table A.3.4.3.2-1	R.32 TDD	10	16QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.2-1	R.32-1 TDD	5	16QAM	1/2	[25]		≥ 1	
TDD	Table A.3.4.3.2-1	R.33 TDD	10	64QAM	3/4	50		≥ 2	
TDD	Table A.3.4.3.2-1	R.33-1 TDD	10	64QAM	3/4	[18]		≥ 1	
TDD	Table A.3.4.3.2-1	R.34 TDD	10	64QAM	1/2	50		≥ 2	
TDD, PDSC	CH Performance (U	E specific RS) Two ar	ntenna por	ts (CSI	-RS)			
TDD	Table A.3.4.3.3-1	R.51 TDD	10	16QAM	1/2	50		≥ 2	
TDD, PDSC	CH Performance (U	E specific RS) Two ar	ntenna por	ts (CSI	-RS, no	on Qua	isi Co-	located)
TDD	Table A.3.4.3.3-2	R.52 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.3-2	R.53 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.3-2	R.54 TDD	10	16QAM	1/2	50		≥ 2	
	CH Performance (U) Four a		rts (CS	I-RS)			
TDD	Table A.3.4.3.4-1	R.44 TDD	10	64QAM	1/2	50		≥ 2	
TDD	Table A.3.4.3.4-1	R.48 TDD	10	QPSK	1	50		≥ 1	

TDD, PDSCH Performance (UE specific RS) Eight antenna ports (CSI-RS)									
TDD	Table A.3.4.3.5-1	R.50 TDD	10	QPSK	1/3	50	2	1	
TDD	Table A.3.4.3.5-2	R.45 TDD	10	16QAM	1/2	50	≥	2	
TDD	Table A.3.4.3.5-2	R.45-1 TDD	10	16QAM	1/2	39	≥	1	
FDD, PDC	CH / PCFICH Perfo	rmance							
FDD	Table A.3.5.1-1	R.15 FDD	10	PDCCH					
FDD	Table A.3.5.1-1	R.15-1 FDD	10	PDCCH					
FDD	Table A.3.5.1-1	R.15-2 FDD	10	PDCCH					
FDD	Table A.3.5.1-1	R.16 FDD	10	PDCCH					
FDD	Table A.3.5.1-1	R.17 FDD	5	PDCCH					
TDD, PDC	CH / PCFICH Perfo	rmance							
TDD	Table A.3.5.2-1	R.15 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.15-1 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.15-2 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.16 TDD	10	PDCCH					
TDD	Table A.3.5.2-1	R.17 TDD	5	PDCCH					
), PHICH Performar	nce							
FDD / TDD	Table A.3.6-1	R.18	10	PHICH					
FDD / TDD	Table A.3.6-1	R.19	10	PHICH					
FDD / TDD	Table A.3.6-1	R.20	5	PHICH					
FDD / TDD	Table A.3.6-1	R.24	10	PHICH					
), PBCH Performan	ce							
FDD /	Table A.3.7-1	R.21	1.4	QPSK	40/				
TDD FDD / TDD	Table A.3.7-1	R.22	1.4	QPSK	1920 40/ 1920				
FDD / TDD	Table A.3.7-1	R.23	1.4	QPSK	40/ 1920				
FDD, PMC	H Performance								
FDD	Table A.3.8.1-1	R.40 FDD	1.4	QPSK	1/3	6	≥	1	
FDD	Table A.3.8.1-1	R.37 FDD	10	QPSK	1/3	50	≥	1	
FDD	Table A.3.8.1-2	R.38 FDD	10	16QAM	1/2	50	≥	1	
FDD	Table A.3.8.1-3	R.39-1 FDD	5	64QAM	2/3	25	≥	1	
FDD	Table A.3.8.1-3	R.39 FDD	10	64QAM	2/3	50	≥	2	
TDD, PMC	CH Performance								
TDD	Table A.3.8.2-1	R.40 TDD	1.4	QPSK	1/3	6	≥	1	
TDD	Table A.3.8.2-1	R.37 TDD	10	QPSK	1/3	50	≥	1	
TDD	Table A.3.8.2-2	R.38 TDD	10	16QAM	1/2	50	≥	1	
TDD	Table A.3.8.2-3	R.39-1 TDD	5	64QAM	2/3	25	≥	1	
TDD	Table A.3.8.2-3	R.39 TDD	10	64QAM	2/3	50	2	2	
FDD, Sust	tained data rate (CR	(S)	F	Γ			T		
FDD	Table A.3.9.1-1	R.31-1 FDD	10	64QAM	0.40		≥	1	
FDD	Table A.3.9.1-1	R.31-2 FDD	10	64QAM	0.59- 0.64		2	2	
FDD	Table A.3.9.1-1	R.31-3 FDD	20	64QAM	0.59- 0.62		2	2	
FDD	Table A.3.9.1-1	R.31-3A FDD	10	64QAM	0.85- 0.90		2	2	
FDD	Table A.3.9.1-1	R.31-3C FDD	15	64QAM	0.87- 0.91		2	3	
FDD	Table A.3.9.1-1	R.31-4 FDD	20	64QAM	0.87- 0.90			3	
FDD	Table A.3.9.1-1	R.31-4B FDD	15	64QAM	0.85-		≥	4	

FDD Table A.3.9.11 R.315 FDD 15 64QAM 0.81 0.81 2 TDD Table A.3.9.2-1 R.31-1 TDD 10 64QAM 0.40 2 2 TDD Table A.3.9.2-1 R.31-1 TDD 10 64QAM 0.60 2 2 TDD Table A.3.9.2-1 R.31-3 TDD 20 64QAM 0.67 2 2 TDD Table A.3.9.2-1 R.31-3 TDD 20 64QAM 0.67 2 2 TDD Table A.3.9.2-1 R.31-4 TDD 0 64QAM 0.67 2 2 TDD Table A.3.9.2-1 R.31E-1 FDD 10 64QAM 0.40 2 2 FDD Table A.3.9.1 R.31E-2 FDD 10 64QAM 0.67 2 2 FDD Table A.3.9.1 R.31E-3 FDD 20 64QAM 0.87 2 2 FDD Table A.3.9.1 R.31E-4 FDD 20 64QAM 0.87 2 2 FD						0.88			
TDD. Sustained data rate (CRS) Union Union <thunion< th=""> <</thunion<>	EDD	Table & 3.9.1-1	R 31-5 EDD	15	640AM	0.85-		> 3	
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FDD Table A.3.10.1-1 R.58 FDD 10 EPDCC H H Image: Constraint of the state of the	FDD	Table A.3.10.1-1	R.57 FDD	10	EPDCC				
FDD Table A.3.10.1-1 R.59 FDD 10 EPDCC H Image: Constraint of the state of the st	FDD	Table A.3.10.1-1	R.58 FDD	10					
TDD, ePDCCH performance TDD Table A.3.10.2-1 R.55 TDD 10 EPDCC H Image: Colspan="5">Colspan="5"Colspan="5">Colspan="5"Colspan="5">Colspan="5"Colspan="5">Colspan="5"Colspan="5">Colspan="5"Colspan="5"Colspan="5">Colspan="5"Colspan="5"Colspan="5"Colspan="5">Colspan="5"	FDD	Table A.3.10.1-1	R.59 FDD	10	EPDCC				
TDD Table A.3.10.2-1 R.55 TDD 10 H TDD Table A.3.10.2-1 R.56 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.57 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H	TDD, ePD	CCH performance							
TDD Table A.3.10.2-1 R.56 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.57 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H	TDD	Table A.3.10.2-1	R.55 TDD	10					
TDD Table A.3.10.2-1 R.57 TDD 10 EPDCC H EPDCC H In TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H In In TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H In In	TDD	Table A.3.10.2-1	R.56 TDD	10	EPDCC				
TDD Table A.3.10.2-1 R.58 TDD 10 EPDCC H EPDCC TDD Table A.3.10.2-1 R.59 TDD 10 EPDCC Image: Comparison of the second secon	TDD	Table A.3.10.2-1	R.57 TDD	10	EPDCC				
TDD Table A 3 10 2-1 R 59 TDD 10 EPDCC	TDD	Table A.3.10.2-1	R.58 TDD	10	EPDCC				
	TDD	Table A.3.10.2-1	R.59 TDD	10	EPDCC				

A.3.2 Reference measurement channel for receiver characteristics

Tables A.3.2-1 and A.3.2-2 are applicable for measurements on the Receiver Characteristics (clause 7) with the exception of subclause 7.4 (Maximum input level).

Tables A.3.2-3, A.3.2-3a, A.3.2-3b, A.3.2-4, A.3.2-4a and A.3.2-4b are applicable for subclause 7.4 (Maximum input level).

Tables A.3.2-1 and A.3.2-2 also apply for the modulated interferer used in Clauses 7.5, 7.6 and 7.8 with test specific bandwidths.

Parameter	Unit			Va	lue					
Channel bandwidth	MHz	1.4	3	5	10	15	20			
Allocated resource blocks		6	15	25	50	75	100			
Subcarriers per resource block		12	12	12	12	12	12			
Allocated subframes per Radio Frame		9	9	9	9	9	9			
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK			
Target Coding Rate		1/3	1/3	1/3	1/3	1/3	1/3			
Number of HARQ Processes	Processes	8	8	8	8	8	8			
Maximum number of HARQ transmissions		1	1	1	1	1	1			
Information Bit Payload per Sub-Frame										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	1320	2216	4392	6712	8760			
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A			
For Sub-Frame 0	Bits	152	872	1800	4392	6712	8760			
Transport block CRC	Bits	24	24	24	24	24	24			
Number of Code Blocks per Sub-Frame										
(Note 3)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1	1	1	1	2	2			
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A			
For Sub-Frame 0	Bits	1	1	1	1	2	2			
Binary Channel Bits Per Sub-Frame										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	3780	6300	13800	20700	27600			
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A			
For Sub-Frame 0	Bits	528	2940	5460	12960	19860	26760			
Max. Throughput averaged over 1 frame	kbps	341.6	1143.	1952.	3952.	6040.	7884			
			2	8	8	8				
UE Category		≥1	≥1	≥ 1	≥1	≥1	≥ 1			
Note 1: 2 symbols allocated to PDCCH for						bols allo	cated to			
PDCCH for 5 MHz and 3 MHz. 4 s										
Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4]										
Note 3: If more than one Code Block is pro		tional CR	C seque	nce of L =	= 24 Bits	is attache	ed to			
each Code Block (otherwise L = 0	each Code Block (otherwise L = 0 Bit)									

Table A.3.2-1 Fixed Reference Channel for Receiver Requirements (FDD)

Parameter	Unit			Va	lue		
Channel Bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3	3+2	3+2	3+2	3+2	3+2
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmission		1	1	1	1	1	1
Modulation		QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
Target coding rate		1/3	1/3	1/3	1/3	1/3	1/3
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 4, 9		408	1320	2216	4392	6712	8760
For Sub-Frame 1, 6		N/A	968	1544	3240	4968	6712
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		208	1064	1800	4392	6712	8760
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frame 4, 9		1	1	1	1	2	2
For Sub-Frame 1, 6							2
For Sub-Frame 5		N/A N/A N/A N/A N/A					N/A
For Sub-Frame 0		1	1	1	1	2	2
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 4, 9		1368	3780	6300	13800	20700	27600
For Sub-Frame 1, 6		N/A	3276	5556	11256	16956	22656
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		672	3084	5604	13104	20004	26904
Max. Throughput averaged over 1 frame	kbps	102.4	564	932	1965.	3007.	3970.
					6	2	4
UE Category	L	≥1	≥1	≥1	≥ 1	≥1	≥1
Note 1: For normal subframes(0,4,5,9), 2 channel BW; 3 symbols allocated							
for 1.4 MHz. For special subframe							
Note 2: For 1.4MHz, no data shall be sche							all DVV5.
insufficient PDCCH performance				0) 10 avoi			
Note 3: Reference signal, Synchronization	n signals and F	BCH allo	ocated as	per TS 3	86.211 [4]	1	
Note 4: If more than one Code Block is pro-							ed to
each Code Block (otherwise L = 0							
Note 5: As per Table 4.2-2 in TS 36.211 [4	,						

Table A.3.2-2 Fixed Reference Channel for Receiver Requirements (TDD)

Parameter	Unit			Va	lue						
Channel bandwidth	MHz	1.4	3	5	10	15	20				
Allocated resource blocks		6	15	25	50	75	100				
Subcarriers per resource block		12	12	12	12	12	12				
Allocated subframes per Radio Frame		8	9	9	9	9	9				
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM				
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4				
Number of HARQ Processes	Processes	8	8	8	8	8	8				
Maximum number of HARQ transmissions		1	1	1	1	1	1				
Information Bit Payload per Sub-Frame											
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	14112	30576	46888	61664				
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A				
For Sub-Frame 0	Bits	N/A	6456	12576	28336	45352	61664				
Transport block CRC	Bits	24	24	24	24	24	24				
Number of Code Blocks per Sub-Frame											
(Note 3)											
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	3	5	8	11				
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A				
For Sub-Frame 0		N/A	2	3	5	8	11				
Binary Channel Bits Per Sub-Frame											
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	18900	41400	62100	82800				
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A				
For Sub-Frame 0	Bits	N/A	8820	16380	38880	59580	80280				
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	12547	27294	42046	55498				
for 5 MHz and 3 MHz. 4 symbols	allocated to PI	Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz.									

Table A.3.2-3 Fixed Reference Channel for Maximum input level for UE Categories 3-8 (FDD)

Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Table A.3.2-3a Fixed Reference Channel for Maximum input level for UE Category 1 (FDD)

Parameter	Unit			Va	lue			
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks		6	15	18	17	17	17	
Subcarriers per resource block		12	12	12	12	12	12	
Allocated subframes per Radio Frame		8	9	9	9	9	9	
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4	
Number of HARQ Processes	Processes	8	8	8	8	8	8	
Maximum number of HARQ transmissions		1	1	1	1	1	1	
Information Bit Payload								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	10296	10296	10296	10296	
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	
For Sub-Frame 0	Bits	N/A	6456	8248	10296	10296	10296	
Transport block CRC	Bits	24	24	24	24	24	24	
Number of Code Blocks per Sub-Frame (Note 3)								
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	2	2	2	2	
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A	
For Sub-Frame 0		N/A	2	2	2	2	2	
Binary Channel Bits Per Sub-Frame								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	13608	14076	14076	14076	
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	
For Sub-Frame 0	Bits	N/A	8820	11088	14076	14076	14076	
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	9079.6	9266.4	9266.4	9266.4	
 Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW. 3 symbols allocated to PDCCH for 5 MHz and 3 MHz. 4 symbols allocated to PDCCH for 1.4 MHz. Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4]. 								
Note 2. If mere then one Code Plagk is present on additional CPC assumption of $L = 24$ Pita is attached to each Code								

Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	83
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	9	9	9	9	9
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2984	8504	14112	30576	46888	51024
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	6456	12576	28336	45352	51024
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
(Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	3	5	8	9
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	2	3	5	8	9
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4104	11340	18900	41400	62100	68724
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	8820	16380	38880	59580	66204
Max. Throughput averaged over 1 frame	kbps	2387.2	7448.8	12547	27294	42046	45922
Note 1: 2 symbols allocated to PDCCH fo for 5 MHz and 3 MHz. 4 symbols Note 2: Reference signal. Synchronization	allocated to PI	DCCH for 1	.4 MHz.		-	llocated to	PDCCH

Table A.3.2-3b Fixed Reference Channel for Maximum input level for UE Category 2 (FDD)

Note 2: Reference signal, Synchronization signals and PBCH allocated as per TS 36.211 [4].
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	100
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	2984	8504	14112	30576	46888	61664
For Sub-Frames 1,6	Bits	N/A	6968	11448	23688	35160	46888
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	6968	12576	30576	45352	61664
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frames 4,9		1	2	3	5	8	11
For Sub-Frames 1,6		N/A	2	2	4	6	8
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	2	3	5	8	11
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	4104	11340	18900	41400	62100	82800
For Sub-Frames 1,6		N/A	9828	16668	33768	50868	67968
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	9252	16812	39312	60012	80712
Max. Throughput averaged over 1 frame	kbps	596.8	3791.2	6369.6	13910	20945	27877
Note 1: For normal subframes(0,4,5,9), 2							
3 symbols allocated to PDCCH for					OCCH for 1	.4 MHz. Fo	r special
subframe (1&6), only 2 OFDM syn							
Note 2: For 1.4MHz, no data shall be sche	eduled on spe	cial subfrar	nes(1&6) to	o avoid pro	blems with	insufficien	t PDCCH
performance.							
Note 3: Reference signal, Synchronization							
Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code							
Block (otherwise $L = 0$ Bit).	41						
Note 5: As per Table 4.2-2 in TS 36.211 [4	¥J.						

Table A.3.2-4 Fixed Reference Channel for Maximum input level for UE Categories 3-8 (TDD)

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	18	17	17	17
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	2984	8504	10296	10296	10296	10296
For Sub-Frames 1,6	Bits	N/A	6968	8248	7480	7480	7480
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	6968	8248	10296	10296	10296
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frames 4,9		1	2	2	2	2	2
For Sub-Frames 1,6		N/A	2	2	2	2	2
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	2	2	2	2	2
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	4104	11340	13608	14076	14076	14076
For Sub-Frames 1,6		N/A	9828	11880	11628	11628	11628
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	9252	11520	14076	14076	14076
Max. Throughput averaged over 1 frame	kbps	596.8	3791.2	4533.6	4584.8	4584.8	4584.8
 Note 1: For normal subframes(0,4,5,9), 2 3 symbols allocated to PDCCH for subframe (1&6), only 2 OFDM syr Note 2: For 1.4MHz, no data shall be sche performance. Note 3: Reference signal, Synchronization Note 4: If more than one Code Block is pro- Block (otherwise L = 0 Bit). 	r 5 MHz and 3 nbols are alloc eduled on spec n signals and F	MHz; 4 sy cated to PD cial subfran PBCH alloc	mbols alloc OCCH for al nes(1&6) to ated as pe	ated to PD I BWs. avoid pro r TS 36.21	OCCH for 1 blems with 1 [4].	.4 MHz. Fo	r special t PDCCH
Note 5: As per Table 4.2-2 in TS 36.211 [4	41						

Table A.3.2-4a Fixed Reference Channel for Maximum input level for UE Category 1 (TDD)

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	15	25	50	75	83
Subcarriers per resource block		12	12	12	12	12	12
Uplink-Downlink Configuration (Note 5)		1	1	1	1	1	1
Allocated subframes per Radio Frame		2	3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate		3/4	3/4	3/4	3/4	3/4	3/4
Number of HARQ Processes	Processes	7	7	7	7	7	7
Maximum number of HARQ transmissions		1	1	1	1	1	1
Information Bit Payload per Sub-Frame							
For Sub-Frames 4,9	Bits	2984	8504	14112	30576	46888	51024
For Sub-Frames 1,6	Bits	N/A	6968	11448	23688	35160	39232
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	6968	12576	30576	45352	51024
Transport block CRC	Bits	24	24	24	24	24	24
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frames 4,9		1	2	3	5	8	9
For Sub-Frames 1,6		N/A	2	3	5	7	7
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		N/A	2	3	5	8	9
Binary Channel Bits per Sub-Frame							
For Sub-Frames 4,9	Bits	4104	11340	18900	41400	62100	68724
For Sub-Frames 1,6		N/A	9828	16668	33768	50868	56340
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	N/A	9252	16380	39312	60012	66636
Max. Throughput averaged over 1 frame	kbps	596.8	3791.2	6369.6	13910	20945	23154
Note 1: For normal subframes(0,4,5,9), 2 s							
3 symbols allocated to PDCCH for					CCH for 1	.4 MHz. Fo	r special
subframe (1&6), only 2 OFDM syn							
Note 2: For 1.4MHz, no data shall be sch	eduled on spe	ecial subfra	mes(1&6) t	o avoid pro	blems with	n insufficier	nt
PDCCH performance.							
Note 3: Reference signal, Synchronization							
Note 4: If more than one Code Block is pre	esent, an addi	tional CRC	sequence	of $L = 24 E$	Bits is attac	ched to eac	h Code
Block (otherwise $L = 0$ Bit).							
Note 5: As per Table 4.2-2 in TS 36.211 [4	ŀ].						

Table A.3.2-4b Fixed Reference Channel for Maximum input level for UE Category 2 (TDD)

A.3.3 Reference measurement channels for PDSCH performance requirements (FDD)

A.3.3.1 Single-antenna transmission (Common Reference Symbols)

Parameter	Unit			Value	
Reference channel		R.4	R.42	R.2	
		FDD	FDD	FDD	
Channel bandwidth	MHz	1.4	20	10	
Allocated resource blocks (Note 4)		6	100	50	
Allocated subframes per Radio Frame		9	9	9	
Modulation		QPSK	QPSK	QPSK	
Target Coding Rate		1/3	1/3	1/3	
Information Bit Payload (Note 4)					
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	8760	4392	
For Sub-Frame 5	Bits	N/A	N/A	N/A	
For Sub-Frame 0	Bits	152	8760	4392	
Number of Code Blocks					
(Notes 3 and 4)					
For Sub-Frames 1,2,3,4,6,7,8,9		1	2	1	
For Sub-Frame 5		N/A	N/A	N/A	
For Sub-Frame 0		1	2	1	
Binary Channel Bits (Note 4)					
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1368	27600	13800	
For Sub-Frame 5	Bits	N/A	N/A	N/A	
For Sub-Frame 0	Bits	528	26760	12960	
Max. Throughput averaged over 1 frame	Mbps	0.342	7.884	3.953	
(Note 4)					
UE Category		≥ 1	≥ 1	≥ 1	
Note 1: 2 symbols allocated to PDCCH for					ols allocated
to PDCCH for 5 MHz and 3 MHz;					
Note 2: Reference signal, synchronization					
Note 3: If more than one Code Block is pre		tional CR	C sequer	nce of L = 24 Bits is	attached to
each Code Block (otherwise L = 0					
Note 4: Given per component carrier per c	odeword.				

Table A.3.3.1-1: Fixed Reference Channel QPSK R=1/3

Parameter	Unit			V	alue		
Reference channel				R.3-1	R.3		
				FDD	FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Allocated subframes per Radio Frame				9	9		
Modulation				16QAM	16QAM		
Target Coding Rate				1/2	1/2		
Information Bit Payload							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits			6456	14112		
For Sub-Frame 5	Bits			N/A	N/A		
For Sub-Frame 0	Bits			5736	12960		
Number of Code Blocks per Sub-Frame							
(Note 3)							
For Sub-Frames 1,2,3,4,6,7,8,9				2	3		
For Sub-Frame 5				N/A	N/A		
For Sub-Frame 0				1	3		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 1,2,3,4,6,7,8,9	Bits			12600	27600		
For Sub-Frame 5	Bits			N/A	N/A		
For Sub-Frame 0	Bits			10920	25920		
Max. Throughput averaged over 1 frame	Mbps			5.738	12.586		
UE Category				≥1	≥2		
Note 1: 2 symbols allocated to PDCCH for	or 20 MHz, 15	MHz and	10 MI	Iz channel	BW; 3 sym	nbols allo	ocated
to PDCCH for 5 MHz and 3 MHz;							
Note 2: Reference signal, synchronization							
Note 3: If more than one Code Block is p		itional CR	C sec	quence of L	. = 24 Bits i	s attache	ed to
each Code Block (otherwise L = 0) Bit).						

Table A.3.3.1-2: Fixed Reference Cha	annel 16QAM R=1/2
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Table A.3.3.1-3: Fixed Reference Channel 64QAM R=3/4

MHz	1.4	R.5 FDD	R.6	R.7	R.8	R.9 FDD
MHz	1.4	FDD			1.10	1.3100
MHz	1/		FDD	FDD	FDD	
	1.7	3	5	10	15	20
		15	25	50	75	100
		9	9	9	9	9
	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
	3/4	3/4	3/4	3/4	3/4	3/4
Bits		8504	14112	30576	46888	61664
Bits		N/A	N/A	N/A	N/A	N/A
Bits		6456	12576	28336	45352	61664
		2	3	5	8	11
		N/A	N/A	N/A	N/A	N/A
		2	3	5	8	11
Bits		11340	18900	41400	62100	82800
Bits		N/A	N/A	N/A	N/A	N/A
Bits		8820	16380	38880	59580	80280
Mbps		7.449	12.547	27.294	42.046	55.498
		≥ 1	≥2	≥ 2	≥ 2	≥ 3
20 MHz, 1	5 MHz and	10 MHz ch	annel BW;	3 symbols	allocated t	o PDCCH
esent, an ac	ditional CR	C sequence	e of L = 24	Bits is atta	ached to ea	ich Code
	Bits Bits Bits Bits Bits Bits Bits Bits	64QAM 3/4 Bits Bits Bits Bits Bits Sits Bits Comparison Sits Bits Mbps Comparison Signals and PBCH alloc	15964QAM $3/4$ $3/4$ $3/4$ BitsBitsN/ABits64562221Bits11340BitsBits11340BitsBits11340Bits11340Bits11340Bits120Mbps7.449212020MHz, 15MHz and 10MHz challocated to PDCCH for 1.4MHz.signals and PBCH allocated as p	15 25 9 9 64QAM 64QAM 3/4 3/4 3/4 3/4 Bits 8504 14112 Bits 8504 14112 Bits 6456 12576 2 3 2 3 1 2 1340 18900 Bits 11340 Bits 11340 Bits 16380 Mbps 7.449 12.547 2 1 20 1 20 1 20 12.547 21 2 22 1 23 20 MHz, 15 10 Allocated to PDCCH for 1.4 MHz. signals and PBCH allocated as per TS 36.2	15 25 50 9 9 9 9 64QAM 64QAM 64QAM 64QAM 3/4 3/4 3/4 3/4 Bits 8504 14112 30576 Bits N/A N/A N/A Bits 6456 12576 28336 2 3 5 5 1 2 3 5 2 3 5 5 1 1340 18900 41400 Bits 11340 18900 41400 Bits 11340 18900 41400 Bits 11340 18900 41400 Bits 12547 27.294 2 1 2 2 20 Mbps 7.449 12.547 27.294 21 2 2 2 20 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 1.4 MHz. signals and PBCH allocated as per TS 36.211 [4]. 4].	15 25 50 75 9 9 9 9 9 9 64QAM 64QAM 64QAM 64QAM 64QAM 64QAM 3/4 3/4 3/4 3/4 3/4 3/4 3/4 Bits 8504 14112 30576 46888 88 Bits N/A N/A N/A N/A N/A Bits 6456 12576 28336 45352 2 3 5 8 8 M/A N/A N/A N/A N/A 2 3 5 8 8 9 9 9 9 9 9 2 3 5 8 8 8 11340 18900 41400 62100 8820 Bits 11340 18900 41400 62100 Bits 8820 16380 38880 59580 Mbps 7.449 12.547 27.294 42.046 21 2 2 <td< td=""></td<>

Block (otherwise L = 0 Bit).

Parameter Unit Value									
Reference channel		R.6-1	R.7-1	R.8-1	R.9-1	R.9-2			
		FDD	FDD	FDD	FDD	FDD			
Channel bandwidth	MHz	5	10	15	20	20			
Allocated resource blocks (Note 3)		18	17	17	17	83			
Allocated subframes per Radio Frame		9	9	9	9	9			
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM			
Target Coding Rate		3/4	3/4	3/4	3/4	3/4			
Information Bit Payload									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	10296	10296	10296	10296	51024			
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A			
For Sub-Frame 0	Bits	8248	10296	10296	10296	51024			
Number of Code Blocks per Sub-Frame									
(Note 4)									
For Sub-Frames 1,2,3,4,6,7,8,9		2	2	2	2	9			
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A			
For Sub-Frame 0		2	2	2	2	9			
Binary Channel Bits Per Sub-Frame									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	13608	14076	14076	14076	68724			
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A			
For Sub-Frame 0	Bits	11088	14076	14076	14076	66204			
Max. Throughput averaged over 1 frame	Mbps	9.062	9.266	9.266	9.266	45.922			
UE Category		≥ 1	≥1	≥ 1	≥1	≥ 2			
Note 1: 2 symbols allocated to PDCCH for PDCCH for 5 MHz and 3 MHz; 4				/; 3 symbo	ls allocated	to			
Note 2: Reference signal, synchronizatio	n signals and P	BCH allocated as	per TS 36.	211 [4].					
Note 3: Localized allocation started from RB #0 is applied.									
Note 4: If more than one Code Block is present, an additional CRC sequence of L - 24 Bits is attached to each									

Table A.3.3.1-3a: Fixed Reference Cha	annel 64QAM R=3/4
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 Note 3:
 Localized allocation started from RB #0 is applied.

 Note 4:
 If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Parameter	Unit	Value									
Reference channel			R.0 FDD		R.1 FDD						
Channel bandwidth	MHz	1.4	3	5	10/20	15	20				
Allocated resource blocks			1		1						
Allocated subframes per Radio Frame			9		9						
Modulation			16QAM		16QAM						
Target Coding Rate			1/2		1/2						
Information Bit Payload											
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		224		256						
For Sub-Frame 5	Bits		N/A		N/A						
For Sub-Frame 0	Bits		224		256						
Number of Code Blocks per Sub-Frame (Note 3)											
For Sub-Frames 1,2,3,4,6,7,8,9			1		1						
For Sub-Frame 5			N/A		N/A						
For Sub-Frame 0			1		1						
Binary Channel Bits Per Sub-Frame											
For Sub-Frames 1,2,3,4,6,7,8,9	Bits		504		552						
For Sub-Frame 5	Bits		N/A		N/A						
For Sub-Frame 0	Bits		504		552						
Max. Throughput averaged over 1 frame	Mbps		0.202		0.230						
UE Category			≥ 1		≥ 1						
PDCCH for 5 MHz and 3 MHz; 4 Note 2: Reference signal, synchronizatio	2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]. If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each										

	Parameter	Unit	Value
Referenc	e channel		R.29 FDD
			(MBSFN)
Channel	bandwidth	MHz	10
Allocated	resource blocks		1
MBSFN (Configuration		TBD
Allocated	subframes per Radio Frame		3
Modulatio	วท		16QAM
Target Co	oding Rate		1/2
Informatio	on Bit Payload		
For Sub	-Frames 4,9	Bits	256
For Sub	-Frame 5	Bits	N/A
For Sub	-Frame 0	Bits	256
For Sub	-Frame 1,2,3,6,7,8	Bits	0 (MBSFN)
Number of	of Code Blocks per Sub-Frame		
(Note 3)			
For Sub	-Frames 4,9		1
For Sub	-Frame 5		N/A
For Sub	-Frame 0		1
	-Frame 1,2,3,6,7,8		0 (MBSFN)
Binary Ch	nannel Bits Per Sub-Frame		
For Sub	-Frames 4,9	Bits	552
For Sub	-Frame 5	Bits	N/A
For Sub	-Frame 0	Bits	552
For Sub	-Frame 1,2,3,6,7,8	Bits	0 (MBSFN)
Max. Thre	oughput averaged over 1 frame	kbps	76.8
UE Categ			≥ 1
Note 1:	2 symbols allocated to PDCCH.		
Note 2:	Reference signal, synchronization	on signals a	and PBCH
	allocated as per TS 36.211 [4].		
Note 3:	If more than one Code Block is p	,	
	CRC sequence of $L = 24$ Bits is	attached to	each Code
	Block (otherwise $L = 0$ Bit).		

Table A.3.3.1-5: Fixed Reference Channel Single PRB (MBSFN Configuration)

Parameter	Unit	Value							
Reference channel					R.41				
					FDD				
Channel bandwidth	MHz	1.4	3	5	10	15	20		
Allocated resource blocks					50				
Allocated subframes per Radio Frame					9				
Modulation					QPSK				
Target Coding Rate					1/10				
Information Bit Payload									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits				1384				
For Sub-Frame 5	Bits				N/A				
For Sub-Frame 0	Bits				1384				
Number of Code Blocks per Sub-Frame									
(Note 3)									
For Sub-Frames 1,2,3,4,6,7,8,9					1				
For Sub-Frame 5					N/A				
For Sub-Frame 0					1				
Binary Channel Bits Per Sub-Frame									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits				13800				
For Sub-Frame 5	Bits				N/A				
For Sub-Frame 0	Bits				12960				
Max. Throughput averaged over 1 frame	Mbps				1.246				
UE Category					≥1				
Note 1: 2 symbols allocated to PDCCH fo	or 20 MHz, 15	MHz and	10 MHz	channel	BW; 3 sym	bols allo	cated		
to PDCCH for 5 MHz and 3 MHz;									
Note 2: Reference signal, synchronization	n signals and F	PBCH allo	cated as	per TS 3	36.211 [4].				
Note 3: If more than one Code Block is pr	resent, an add	itional CR	C seque	nce of L	= 24 Bits is	s attache	ed to		
each Code Block (otherwise L = 0) Bit).								

Table A.3.3.1-6: Fixed Reference Chan	nel QPSK R=1/10
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Parameter	Unit	Va	lue							
Reference channel		R.49 FDD	R.49-1 FDD							
Channel bandwidth	MHz	20	20							
Number of CRS ports		1	2							
Allocated resource blocks		100	100							
Allocated subframes per Radio Frame		9	9							
Modulation		64QAM	64QAM							
Coding Rate										
For Sub-Frame 1,2,3,4,6,7,8,9,		0.84	0.89							
For Sub-Frame 5		n/a	n/a							
For Sub-Frame 0		0.87	0.92							
Information Bit Payload										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	63776	63776							
For Sub-Frame 5	Bits	n/a	n/a							
For Sub-Frame 0	Bits	63776	63776							
Number of Code Blocks per Sub-Frame										
(Note 3)										
For Sub-Frames 1,2,3,4,6,7,8,9	Code	11	11							
	Blocks									
For Sub-Frame 5	Code	n/a	n/a							
	Blocks									
For Sub-Frame 0	Code	11	11							
	Blocks									
Binary Channel Bits Per Sub-Frame										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	75600	72000							
For Sub-Frame 5	Bits	n/a	n/a							
For Sub-Frame 0	Bits	73080	69552							
Max. Throughput averaged over 1 frame	Mbps	57.398	57.398							
UE Category		≥ 5	≥ 5							
Note 1: 3 symbols allocated to PDCCH.										
Note 2: Reference signal, synchronizatio	n signals a	ind PBCH alloca	ated as per TS							
	36.211 [4].									
Note 3: If more than one Code Block is p										
L = 24 Bits is attached to each Code Block (otherwise $L = 0$ Bit).										

Table A.3.3.1-7: PCell Fixed Reference Channel for CA demodulation with power imbalance

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A.3.3.2 Multi-antenna transmission (Common Reference Symbols)

A.3.3.2.1 Two antenna ports

Table A.3.3.2.1-1: Fixed Reference Channel two antenna ports
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Parameter	Unit						Val	ue					
Reference		R.10	R.11	R.11-1	R.11-	R.11-	R.11-	R.30	R.30-	R.35-	R.35	R.35-	R.35-3
channel		FDD	FDD	FDD	2	3	4	FDD	1	1	FDD	2	FDD
					FDD	FDD Note 5	FDD		FDD	FDD		FDD	
Channel bandwidth	MHz	10	10	10	5	10	10	20	15	20	10	15	10
Allocated		50	50	50	25	40	50	100	75	100	50	75	50
resource blocks (Note 4)													
Allocated subframes per Radio Frame		9	9	9	9	9	9	9	8	8	9	8	8
Modulation		QPSK	16QAM	16QAM	16QA M	16QA M	QPS K	16QA M	16QA M	64QA M	64QAM	64QA M	64QA M
Target Coding Rate		1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	0.39	1/2	0.39	0.39
Information Bit Payload (Note 4)													
For Sub- Frames 1,2,3,4,6,7,8,9	Bits	4392	12960	12960	5736	1029 6	6968	2545 6	1908 0	3057 6	19848	2292 0	15264
For Sub- Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub- Frame 0	Bits	4392	12960	N/A	4968	1029 6	6968	2545 6	N/A	N/A	18336	N/A	N/A
Number of Code Blocks (Notes 3 and 4)													
For Sub- Frames 1,2,3,4,6,7,8,9	Bits	1	3	3	1	2	2	5	4	5	4	4	3
For Sub- Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub- Frame 0	Bits	1	3	N/A	1	2	2	5	N/A	N/A	3	N/A	N/A
Binary Channel Bits (Note 4)													
For Sub- Frames 1,2,3,4,6,7,8,9	Bits	13200	26400	26400	1200 0	2112 0	1320 0	5280 0	3960 0	7920 0	39600	5940 0	39600
For Sub- Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
For Sub- Frame 0	Bits	12384	24768	N/A	1036 8	1948 8	1238 4	5116 8	N/A	N/A	37152	N/A	N/A
Max. Throughput averaged over	Mbps	3.953	11.664	10.368	5.086	9.266	6.271	22.91 0	15.26 4	24.46 1	17.712	18.33 6	12.211
1 frame (Note 4)													
UE Category		≥1	≥2	≥2	≥1	≥ 1	≥1	≥2	≥2	4	≥2	≥2	≥2
MHz; 4 Note 2: Refere	1 symbol: nce sign	s allocate al, synchi	d to PDCC ronization	H for 1.4 M signals and	ИНz. J PBCH a	allocated	as per TS	6 36.211	[4].		to PDCCH		
L = 0 E	Bit).		•		ditional (CRC seq	uence of	L = 24 B	its is atta	ched to e	ach Code	Block (otl	herwise
Note 4: Given	per comp	ponent ca	rrier per co	deword.									

Note 5: For R.11-3 resource blocks of RB6–RB45 are allocated.

Parameter	Unit				Va	alue			
Reference channel		R.46	R.47	R.35-4					
		FDD	FDD	FDD					
Channel bandwidth	MHz	10	10	10					
Allocated resource blocks (Note 4)		50	50	50					
Allocated subframes per Radio Frame		9	9	9					
Modulation		QPSK	16QAM	64QAM					
Target Coding Rate				0.47					
Information Bit Payload (Note 4)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	5160	8760	18336					
For Sub-Frame 5	Bits	N/A	N/A	N/A					
For Sub-Frame 0	Bits	5160	8760	16416					
Number of Code Blocks									
(Notes 3 and 4)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1	2	3					
For Sub-Frame 5	Bits	N/A	N/A	N/A					
For Sub-Frame 0	Bits	1	2	3					
Binary Channel Bits (Note 4)									
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	13200	26400	39600					
For Sub-Frame 5	Bits	N/A	N/A	N/A					
For Sub-Frame 0	Bits	12384	24768	37152					
Max. Throughput averaged over 1	Mbps	4.644	7.884	16.310					
frame (Note 4)									
UE Category		≥ 1	≥ 1	≥2					
Note 1: 2 symbols allocated to PDCCI				IHz channe	I BW; 3	symbols	allocated	to PDCCH	I for 5 MHz
and 3 MHz; 4 symbols allocate									
Note 2: Reference signal, synchroniza									
Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block								Block	
(otherwise L = 0 Bit)									
Note 4: Given per component carrier p	per codewo	ord.							

Table A.3.3.2.1-2: Fixed Reference Channel two antenna ports

A.3.3.2.2 Four antenna ports

Parameter	Unit				Value			
Reference channel		R.12	R.13	R.14	R.14-1	R.14-2	R.14-3	R.36
		FDD	FDD	FDD	FDD	FDD	FDD	FDD
Channel bandwidth	MHz	1.4	10	10	10	10	20	10
Allocated resource blocks (Note 4)		6	50	50	6	3	100	50
Allocated subframes per Radio Frame		9	9	9	8	8	9	9
Modulation		QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	64QAM
Target Coding Rate		1/3	1/3	1/2	1/2	1/2	1/2	1/2
Information Bit Payload (Note 4)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	408	4392	12960	1544	744	[25456]	18336
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	n/a	N/A
For Sub-Frame 0	Bits	152	3624	11448	N/A	N/A	[22920]	18336
Number of Code Blocks								
(Notes 3 and 4)								
For Sub-Frames 1,2,3,4,6,7,8,9		1	1	3	1	1	5	3
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	n/a	N/A
For Sub-Frame 0		1	1	2	N/A	N/A	4	3
Binary Channel Bits (Note 4)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	1248	12800	25600	3072	1536	51200	38400
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	n/a	N/A
For Sub-Frame 0	Bits	480	12032	24064	N/A	N/A	49664	36096
Max. Throughput averaged over 1	Mbps	0.342	3.876	11.513	1.235	0.595	[22.656]	16.502
frame (Note 4)								
UE Category		≥ 1	≥ 1	≥ 2	≥ 1	≥ 1	≥2	≥ 2
Note 1: 2 symbols allocated to PDCC					el BW; 3 sy	mbols allo	cated to PD	CCH for
5 MHz and 3 MHz; 4 symbols					0 00 04 4 5	41		
Note 2: Reference signal, synchroniz								
Note 3: If more than one Code Block	is presen	t, an additi	onal CRC s	equence of	L = 24 Bits	s is attache	d to each C	ode
Block (otherwise $L = 0$ Bit).								
Note 4: Given per component carrier	per code	word.						

Table A.3.3.2.2-1: Fixed Reference Channel four antenna ports

Note 4: Given per component carrier per codeword.

A.3.3.3 Reference Measurement Channel for UE-Specific Reference Symbols

A.3.3.3.1 Two antenna port (CSI-RS)

The reference measurement channels in Table A.3.3.3.1-1 apply for verifying demodulation performance for UE-specific reference symbols with two cell-specific antenna ports and two CSI-RS antenna ports.

	Devenueter	Unit	Value			
D (Parameter	Unit	Value			
	e channel		R.51 FDD			
	bandwidth	MHz	10			
	I resource blocks		50 (Note 3)			
	I subframes per Radio Frame		9			
Modulatio			16QAM			
	oding Rate		1/2			
	on Bit Payload					
For Sub	-Frames 1,4,6,9	Bits	11448			
For Sub	-Frames 2,3,7,8	Bits	11448			
For Sub	-Frame 5	Bits	N/A			
For Sub	-Frame 0	Bits	9528			
Number	of Code Blocks (Note 4)					
For Sub	-Frames 1,4,6,9	Code	2			
		blocks				
For Sub	-Frames 2,3,7,8	Code	2			
		blocks				
For Sub	For Sub-Frame 5 Bits					
For Sub	-Frame 0	Bits	2			
Binary Cl	hannel Bits					
For Sub	-Frames 1,4,6,9	Bits	24000			
For Sub	-Frames 2,7		23600			
For Sub	-Frames 3,8		23200			
For Sub	-Frame 5	Bits	N/A			
For Sub	-Frame 0	Bits	19680			
Max. Thr	oughput averaged over 1	Mbps	10.1112			
frame		-				
UE Cate	gory		≥ 2			
Note 1:	2 symbols allocated to PDCC	H.				
Note 2:	Reference signal, synchroniza	ation signal	s and PBCH			
	allocated as per TS 36.211 [4					
Note 3:	50 resource blocks are alloca					
	4, 6, 7, 8, 9 and 41 resource I					
	RB30–RB49) are allocated in					
Note 4:	If more than one Code Block					
	CRC sequence of $L = 24$ Bits	is attached	I to each Code			
Block (otherwise $L = 0$ Bit).						

Table A.3.3.3.1-1: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports

The reference measurement channels in Table A.3.3.3.1-2 apply for verifying demudlation performance for UE-specific reference symbols with two cell specific antenna ports and two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS in same subframe.

Parameter	Unit		Value	
Reference channel		R.52 FDD	R.53 FDD	R.54 FDD
Channel bandwidth	MHz	10	10	10
Allocated resource blocks		50 (Note 3)	50 (Note 3)	50 (Note 3)
Allocated subframes per Radio Frame		9	9	9
Modulation		64QAM	64QAM	16QAM
Target Coding Rate		1/2	1/2	1/2
Information Bit Payload				
For Sub-Frames 1,3,4,6,8,9	Bits	18336	18336	11448
For Sub-Frames 2,7	Bits	16416	16416	11448
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	14688	14688	9528
Number of Code Blocks (Note 4)				
For Sub-Frames 1,3,4,6,8,9	Code	3	3	2
	blocks			
For Sub-Frames 2, 7	Code	3	3	2
	blocks			
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	3	3	2
Binary Channel Bits				
For Sub-Frames 1,3,4,6,8,9	Bits	36000	36000	24000
For Sub-Frames 2,7		34200	33600	22800
For Sub-Frame 5	Bits	n/a	n/a	n/a
For Sub-Frame 0	Bits	29520	29520	19680
Max. Throughput averaged over 1	Mbps	15.7536	15.7536	10.1112
frame				
Note 1: 2 symbols allocated to PDCC				
Note 2: Reference signal, synchroniza				
Note 3: 50 resource blocks are allocated			7, 8, 9 and 41 resourc	ce blocks (RB0–
RB20 and RB30–RB49) are a				
Note 4: If more than one Code Block		in additional CRC s	sequence of L = 24 Bi	ts is attached to
each Code Block (otherwise L	_ = 0 Bit).			

Table A.3.3.3.1-2: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS

A.3.3.3.2 Four antenna ports (CSI-RS)

The reference measurement channels in Table A.3.3.3.2-1 apply for verifying demodulation performance for UE-specific reference symbols with two cell-specific antenna ports and four CSI-RS antenna ports.

Parameter	Unit		Value			
Reference channel		R.43 FDD	R.50 FDD	R.48 FDD		
Channel bandwidth	MHz	10	10	10		
Allocated resource blocks		50 (Note 3)	50 (Note 3)	50 (Note		
				3)		
Allocated subframes per Radio Frame		9	9	9		
Modulation		QPSK	64QAM	QPSK		
Target Coding Rate		1/3	1/2			
Information Bit Payload						
For Sub-Frames 1,4,6,9	Bits	3624	18336	6200		
For Sub-Frames 2,3,7,8	Bits	3624	16416	6200		
For Sub-Frame 5	Bits	N/A	N/A	N/A		
For Sub-Frame 0	Bits	2984	14688	4968		
Number of Code Blocks (Note 4)						
For Sub-Frames 1,4,6,9	Code	1	3	2		
	blocks					
For Sub-Frames 2,3,7,8	Code	1	3	2		
	blocks					
For Sub-Frame 5	Bits	N/A	N/A	N/A		
For Sub-Frame 0	Bits	Bits 1 3 1				
Binary Channel Bits						
For Sub-Frames 1,4,6,9	Bits	12000	36000	12000		
For Sub-Frames 2,7		11600	34800	11600		
For Sub-Frames 3,8		11600	34800	12000		
For Sub-Frame 5	Bits	N/A	N/A	N/A		
For Sub-Frame 0	Bits	9840	29520	9840		
Max. Throughput averaged over 1	Mbps	3.1976	15.3696	5.4568		
frame						
UE Category		≥ 1	≥2	≥ 1		
Note 1: 2 symbols allocated to PDCCH						
Note 2: Reference signal, synchroniza	tion signal	s and PBCH a	llocated as pe	r TS 36.211		
[4].						
Note 3: For R.31-1 and R.34-1, 50 res						
6, 7, 8, 9 and 41 resource bloc	ks (RB0–I	RB20 and RB3	80–RB49) are a	allocated in		
sub-frame 0.		an addition of		- () 0 (
Note 4: If more than one Code Block is present, an additional CRC sequence of $L = 24$						
Bits is attached to each Code Block (otherwise $L = 0$ Bit).						

Table A.3.3.3.2-1: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

The reference measurement channels in Table A.3.3.3.2-2 apply for verifying FDD PMI accuracy measurement with two CRS antenna ports and four CSI-RS antenna ports.

Parameter	Unit		Value					
Reference channel		R.44	R.45	R.45-1				
		FDD	FDD	FDD				
Channel bandwidth	MHz	10	10	10				
Allocated resource blocks		50^{3}	50 ³	39				
Allocated subframes per Radio Frame		10	10	10				
Modulation		QPSK	16QAM	16QAM				
Target Coding Rate		1/3	1/2	1/2				
Information Bit Payload								
For Sub-Frames (Non CSI-RS subframe)	Bits	3624	11448	8760				
For Sub-Frames (CSI-RS subframe)	Bits	3624	11448	8760				
For Sub-Frames (ZeroPowerCSI-RS subframe)	Bits	N/A	N/A	N/A				
For Sub-Frame 5	Bits	N/A	N/A	N/A				
For Sub-Frame 0	Bits	2984	9528	8760				
Number of Code Blocks per Sub-Frame (Note 4)								
For Sub-Frames (Non CSI-RS subframe)		1	2	2				
For Sub-Frames (CSI-RS subframe)		1	2	2				
For Sub-Frames (ZeroPowerCSI-RS	Bits	N/A	N/A	N/A				
subframe)								
For Sub-Frame 5		N/A	N/A	N/A				
For Sub-Frame 0		1	2	2				
Binary Channel Bits Per Sub-Frame								
For Sub-Frames (Non CSI-RS subframe)	Bits	12000	24000	18720				
For Sub-Frames (CSI-RS subframe)	Bits	11600	23200	18096				
For Sub-Frames (ZeroPowerCSI-RS	Bits	N/A	N/A	N/A				
subframe)								
For Sub-Frame 5	Bits	N/A	N/A	N/A				
For Sub-Frame 0	Bits	9840	19680	18720				
Max. Throughput averaged over 1 frame	Mbps	3.1976	10.1112	7.884				
UE Category		≥ 1	≥2	≥ 1				
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz								
Note 2: Reference signal, synchronization	signals and PB	CH allocated a	s per TS 36.	211 [4]				
Note 3: For R. 44 and R.45, 50 resource b								
and 41 resource blocks (RB0-RB2								
Note 4: If more than one Code Block is pre								

Table A.3.3.3.2-2: Fixed Reference Channel for four antenna ports (CSI-RS)

A.3.4 Reference measurement channels for PDSCH performance requirements (TDD)

A.3.4.1 Single-antenna transmission (Common Reference Symbols)

	Parameter	Unit		Value	e	
Reference	e channel		R.4	R.42		R.2
			TDD	TDD		TDD
Channel b	pandwidth	MHz	1.4	20		10
Allocated	resource blocks (Note 6)		6	100		50
	wnlink Configuration (Note 4)		1	1		1
Allocated	subframes per Radio Frame (D+S)		3	3+2		3+2
Modulatio	n		QPSK	QPSK		QPSK
Target Co	oding Rate		1/3	1/3		1/3
Informatio	on Bit Payload (Note 6)					
For Sub-	-Frames 4,9	Bits	408	8760		4392
For Sub-	-Frames 1,6	Bits	N/A	7736		3240
For Sub-	-Frame 5	Bits	N/A	N/A		N/A
For Sub-	-Frame 0	Bits	208	8760		4392
Number of	of Code Blocks					
(Notes 5 a	and 6)					
For Sub-	-Frames 4,9		1	2		1
For Sub-	-Frames 1,6		N/A	2		1
For Sub-	-Frame 5		N/A	N/A		N/A
For Sub-	-Frame 0		1	2		1
Binary Ch	nannel Bits (Note 6)					
For Sub-	-Frames 4,9	Bits	1368	27600		13800
For Sub-	-Frames 1,6	Bits	N/A	22656		11256
	-Frame 5	Bits	N/A	N/A		N/A
	-Frame 0	Bits	672	26904		13104
Max. Thro	oughput averaged over 1 frame	Mbps	0.102	4.175		1.966
(Note 6)						
UE Categ			≥ 1	≥ 1		≥ 1
Note 1:	2 symbols allocated to PDCCH for 2					
	symbols allocated to PDCCH for 5 M					
	PDCCH for 1.4 MHz. For subframe	1&6, only 2	OFDM sy	mbols are a	allocate	ed to
	PDCCH.					
Note 2:	For BW=1.4 MHz, the information bi					
	zero (no scheduling) to avoid proble	ms with ins	ufficient P	DCCH perf	orman	ce at
	the test point.				TO 0	0.044
Note 3:	Reference signal, synchronization s	ignals and H	-BCH allo	cated as pe	er 153	6.211
Note 4:	[4].					
Note 4: Note 5:	As per Table 4.2-2 in TS 36.211 [4]. If more than one Code Block is pres		itional CP	Coquere	o of L	- 24
NOLE 5.	Bits is attached to each Code Block					- 24
Note 6:	Given per component carrier per co	•	с – о ын).			

Table A.3.4.1-1: Fixed Reference Channel QPSK R=1/3

Parameter	Unit			Va	lue		
Reference channel				R.3-1	R.3		
				TDD	TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks				25	50		
Uplink-Downlink Configuration (Note 3)				1	1		
Allocated subframes per Radio Frame (D+S)				3+2	3+2		
Modulation				16QAM	16QAM		
Target Coding Rate				1/2	1/2		
Information Bit Payload							
For Sub-Frames 4,9	Bits			6456	14112		
For Sub-Frames 1,6	Bits			5160	11448		
For Sub-Frame 5	Bits			N/A	N/A		
For Sub-Frame 0	Bits			5736	12960		
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frames 4,9				2	3		
For Sub-Frames 1,6				1	2		
For Sub-Frame 5				N/A	N/A		
For Sub-Frame 0				1	3		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits			12600	27600		
For Sub-Frames 1,6	Bits			11112	22512		
For Sub-Frame 5	Bits			N/A	N/A		
For Sub-Frame 0	Bits			11208	26208		
Max. Throughput averaged over 1 frame	Mbps			2.897	6.408		
UE Category				≥ 1	≥ 2		
Note 1: 2 symbols allocated to PDCCH for 2	20 MHz, 1	5 MHz an	d 10 MHz	channel BW	/; 3 symbol	s allocated	d to
PDCCH for 5 MHz and 3 MHz; 4 sy	mbols allo	ocated to F	DCCH fo	r 1.4 MHz. F	or subfram	ne 1&6, on	ly 2
OFDM symbols are allocated to PD							
Note 2: Reference signal, synchronization s	ignals and	d PBCH a	located as	s per TS 36.	211 [4]		
Note 3: As per Table 4.2-2 in TS 36.211 [4].							
Note 4: If more than one Code Block is pres	ent, an a	dditional C	RC seque	ence of $L = 2$	24 Bits is at	tached to	each
Code Block (otherwise $L = 0$ Bit).							

Table A.3.4.1-2: Fixed Reference Channel 16QAM R=1/2

Parameter	Unit			Val	ue		
Reference channel			R.5	R.6 TDD	R.7	R.8	R.9
			TDD		TDD	TDD	TDD
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks			15	25	50	75	100
Uplink-Downlink Configuration (Note 3)			1	1	1	1	1
Allocated subframes per Radio Frame (D+S)			3+2	3+2	3+2	3+2	3+2
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate			3/4	3/4	3/4	3/4	3/4
Information Bit Payload							
For Sub-Frames 4,9	Bits		8504	14112	30576	46888	61664
For Sub-Frames 1,6	Bits		6968	11448	23688	35160	46888
For Sub-Frame 5	Bits		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits		6968	12576	30576	45352	61664
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frames 4,9			2	3	5	8	11
For Sub-Frames 1,6			2	2	4	6	8
For Sub-Frame 5			N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0			2	3	5	8	11
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits		11340	18900	41400	62100	82800
For Sub-Frames 1,6	Bits		9828	16668	33768	50868	67968
For Sub-Frame 5	Bits		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits		9252	16812	39312	60012	80712
Max. Throughput averaged over 1 frame	Mbps		3.791	6.370	13.910	20.945	27.877
UE Category			≥1	≥2	≥2	≥ 2	≥ 3
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.							
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4] Note 3: As per Table 4.2-2 TS 36.211 [4]. Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code							

Table A.3.4.1-3: Fixed Reference Channel 64QAM R=3/4

Block (otherwise L = 0 Bit).

Parameter	Unit			Va	lue		
Reference channel			R.6-1	R.7-1	R.8-1	R.9-1	R.9-2
			TDD	TDD	TDD	TDD	TDD
Channel bandwidth	MHz		5	10	15	20	20
Allocated resource blocks (Note 3)			18	17	17	17	83
Uplink-Downlink Configuration (Note 4)			1	1	1	1	1
Allocated subframes per Radio Frame (D+S)			3+2	3+2	3+2	3+2	3+2
Modulation			64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate			3/4	3/4	3/4	3/4	3/4
Information Bit Payload							
For Sub-Frames 4,9	Bits		10296	10296	10296	10296	51024
For Sub-Frames 1,6	Bits		8248	7480	7480	7480	39232
For Sub-Frame 5	Bits		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits		8248	10296	10296	10296	51024
Number of Code Blocks per Sub-Frame							
(Note 5)							
For Sub-Frames 4,9			2	2	2	2	9
For Sub-Frames 1,6			2	2	2	2	7
For Sub-Frame 5			N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0			2	2	2	2	9
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits		13608	14076	14076	14076	68724
For Sub-Frames 1,6	Bits		11880	11628	11628	11628	56340
For Sub-Frame 5	Bits		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits		11520	14076	14076	14076	66636
Max. Throughput averaged over 1 frame	Mbps		4.534	4.585	4.585	4.585	23.154
UE Category			≥1	≥ 1	≥1	≥ 1	≥ 2
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.							
Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]							

Table A.3.4.1-3a: Fixed Reference Channel 64QAM R=3/4

Note 3: Note 4:

Exercicle signal, synchronization signals and PBCH allocated as per TS 36.211 [4] Localized allocation started from RB #0 is applied. As per Table 4.2-2 TS 36.211 [4]. If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). Note 5:

Parameter	Unit			Va	lue		
Reference channel			R.0		R.1 TDD		
			TDD				
Channel bandwidth	MHz	1.4	3	5	10/20	15	20
Allocated resource blocks			1		1		
Uplink-Downlink Configuration (Note 3)			1		1		
Allocated subframes per Radio Frame (D+S)			3+2		3+2		
Modulation			16QAM		16QAM		
Target Coding Rate			1/2		1/2		
Information Bit Payload							
For Sub-Frames 4,9	Bits		224		256		
For Sub-Frames 1,6	Bits		208		208		
For Sub-Frame 5	Bits		N/A		N/A		
For Sub-Frame 0	Bits		224		256		
Number of Code Blocks per Sub-Frame							
(Note 4)							
For Sub-Frames 4,9			1		1		
For Sub-Frames 1,6			1		1		
For Sub-Frame 5			N/A		N/A		
For Sub-Frame 0			1		1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits		504		552		
For Sub-Frames 1,6	Bits		456		456		
For Sub-Frame 5	Bits		N/A		N/A		
For Sub-Frame 0	Bits		504		552		
Max. Throughput averaged over 1 frame	Mbps		0.109		0.118		
UE Category			≥ 1		≥ 1		
Note 1: 2 symbols allocated to PDCCH for 2 PDCCH for 5 MHz and 3 MHz; 4 syn OFDM symbols are allocated to PD	mbols alloca						
Note 2: Reference signal, synchronization s		PBCH allo	ocated as per	· TS 36.2	211 [4]		
Note 3: As per Table 4.2-2 in TS 36.211 [4].			···· •				
Note 4: If more than one Code Block is pres		litional CF	RC sequence	of $L = 2$	4 Bits is attac	hed to e	ach
Code Pleak (otherwise L - 0 Pit)							

Table A.3.4.1-4: Fixed Reference Channel Single PRB

Note 4: Code Block (otherwise L = 0 Bit).

	Parameter	Unit	Value
Referenc	e channel		R.29 TDD
			(MBSFN)
Channel	bandwidth	MHz	10
Allocated	resource blocks		1
	Configuration		[TBD]
Uplink-Do	ownlink Configuration (Note 3)		1
Allocated	subframes per Radio Frame (D+S)		1+2
Modulatio	วท		16QAM
Target Co	oding Rate		1/2
Information	on Bit Payload		
For Sub	-Frames 4,9	Bits	0 (MBSFN)
For Sub	-Frames 1,6	Bits	208
For Sub	-Frame 5	Bits	N/A
For Sub	-Frame 0	Bits	256
Number of	of Code Blocks per Sub-Frame		
(Note 4)			
For Sub	-Frames 4,9	Bits	0 (MBSFN)
	-Frames 1,6	Bits	1
For Sub	-Frame 5	Bits	N/A
	-Frame 0	Bits	1
Binary Cl	nannel Bits Per Sub-Frame		
For Sub	-Frames 4,9	Bits	0 (MBSFN)
For Sub	-Frames 1,6	Bits	456
For Sub	-Frame 5	Bits	N/A
For Sub	-Frame 0	Bits	552
Max. Thre	oughput averaged over 1 frame	kbps	67.2
UE Cateo			≥ 1
	2 symbols allocated to PDCCH.		
Note 2:		ignals and I	PBCH allocated as
	per TS 36.211 [4].		
Note 3:			
Note 4:	If more than one Code Block is pres		
	sequence of $L = 24$ Bits is attached	to each Co	ae Block (otherwise
	L = 0 Bit).		

Table A.3.4.1-5: Fixed Reference Channel Single PRB (MBSFN Configuration)

Parameter	Unit	Value					
Reference channel					R.41		
					TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					50		
Uplink-Downlink Configuration (Note 4)					1		
Allocated subframes per Radio Frame (D+S)					3+2		
Modulation					QPSK		
Target Coding Rate					1/10		
Information Bit Payload							
For Sub-Frames 4,9	Bits				1384		
For Sub-Frames 1,6	Bits				1032		
For Sub-Frame 5	Bits				N/A		
For Sub-Frame 0	Bits				1384		
Number of Code Blocks per Sub-Frame							
(Note 5)							
For Sub-Frames 4,9					1		
For Sub-Frames 1,6					1		
For Sub-Frame 5					N/A		
For Sub-Frame 0					1		
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits				13800		
For Sub-Frames 1,6	Bits				11256		
For Sub-Frame 5	Bits				N/A		
For Sub-Frame 0	Bits				13104		
Max. Throughput averaged over 1 frame	Mbps				0.622		
UE Category					≥ 1		
Note 1: 2 symbols allocated to PDCCH for 2							
to PDCCH for 5 MHz and 3 MHz; 4			PDCCH	for 1.4 N	IHz. For su	bframe	1&6,
only 2 OFDM symbols are allocated							
Note 2: For BW=1.4 MHz, the information b					et to zero (i	no scheo	duling)
to avoid problems with insufficient F					. .		
Note 3: Reference signal, synchronization s		PBCH allo	cated as	per TS 3	36.211 [4]		
Note 4: As per Table 4.2-2 in TS 36.211 [4]							
Note 5: If more than one Code Block is pres		itional CR	C seque	nce of L	= 24 Bits is	s attache	ed to
each Code Block (otherwise L = 0 E	Bit).						

Table A.3.4.1-6: Fixed Reference Channel QPSK R=1/10

Parameter	Parameter Unit Value							
Reference channel		R.49 TDD	R.49-1 TDD					
Channel bandwidth	MHz	20	20					
Number of CRS ports		1	2					
Allocated resource blocks		100	100					
Uplink-Downlink Configuration (Note 2)		1	1					
Allocated subframes per Radio Frame		3+2	3+2					
(D+S)								
Modulation		64QAM	64QAM					
Coding Rate								
For Sub-Frames 4,9		0.84	0.89					
For Sub-Frames 1,6		0.81	0.86					
For Sub-Frames 5		n/a	n/a					
For Sub-Frames 0		0.87	0.92					
Information Bit Payload								
For Sub-Frames 4,9	Bits	63776	63776					
For Sub-Frame 1,6	Bits	55056	55056					
For Sub-Frame 5	Bits	n/a	n/a					
For Sub-Frames 0	Bits	63776	63776					
Number of Code Blocks per Sub-Frame								
(Note 3)								
For Sub-Frames 4,9	Code	11	11					
	Blocks							
For Sub-Frame 1,6	Code	9	9					
	Blocks							
For Sub-Frame 5	Code	n/a	n/a					
	Blocks							
For Sub-Frames 0	Code	11	11					
	Blocks							
Binary Channel Bits Per Sub-Frame								
For Sub-Frames 4,9	Bits	75600	72000					
For Sub-Frame 1,6	Bits	67968	64368					
For Sub-Frame 5	Bits	n/a	n/a					
For Sub-Frame 0	Bits	73512	69984					
Max. Throughput averaged over 1 frame	Mbps	30.144	30.144					
UE Category ≥5 ≥5								
Note 1:3 symbols allocated to PDCCH.Note 2:Reference signal, synchronization signals and PBCH allocated as per TS								
Note 2: Reference signal, synchronization	on signals a	nd PBCH alloc	ated as per IS					
36.211 [4].		additional ODO						
	Note 3: If more than one Code Block is present, an additional CRC sequence of							
L = 24 Bits is attached to each Code Block (otherwise $L = 0$ Bit).								

Table A.3.4.1-7: PCell Fixed Reference Channel for CA demodulation with power imbalance

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A.3.4.2 Multi-antenna transmission (Common Reference Signals)

A.3.4.2.1 Two antenna ports

Reference channel R.10 R.11 R.11-1 R.11-2 R.11-2 R.11-4 R.30 R.30-1 R.30-2 TDD	Parameter	Unit						Value			
Allocated resource blocks (Note 5) 50 50 50 25 40 50 100 100 100 Uplink-Downlink Configuration (Note 3) 1 </td <td>Reference channel</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>TDD</td> <td></td> <td></td> <td></td> <td>TDD</td>	Reference channel						TDD				TDD
blocks (Note 5) Image: stress of the stress of	Channel bandwidth	MHz	10	10	10	5	10	10	20	20	20
Configuration (Note 3) Note Note Note Note Note Allocated subframes per Radio Frame (D+S) 3+2 3+2 2+2 3+2 3+2 2 3+2 2 2 Modulation QPSK 16QAM 16QAM 16QAM 16QAM QPSK 16QAM 1/2 1/2 1/2 <td></td> <td></td> <td>50</td> <td>50</td> <td>50</td> <td>25</td> <td>40</td> <td>50</td> <td>100</td> <td>100</td> <td>100</td>			50	50	50	25	40	50	100	100	100
per Radio Frame (D+S) QPSK 16QAM 16QAM 16QAM 16QAM QPSK 16QAM 16QA 16QA 16QA	Configuration (Note 3)		-			1		1			
Target Coding Rate 1/3 1/2	per Radio Frame						3+2			2+2	
Information Bit Payload (Note 5) Bits 4392 12960 12960 5736 10296 6968 25456 N/A N/A<	Modulation		QPSK	16QAM	16QAM	16QAM	16QAM	QPSK	16QAM	16QAM	16QAM
Payload (Note 5) Image: constraint of the state of the s	Target Coding Rate		1/3	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
For Sub-Frames 1,6 3240 9528 9528 5160 9144 N/A 22920 21384 N/A For Sub-Frame 5 Bits N/A For Sub-Frame 0 Bits 4392 12960 N/A 4968 10296 N/A 25456 N/A N/A Number of Code Blocks N/A A 4968 10296 N/A 25456 N/A N/A For Sub-Frames 4,9 1 3 3 1 2 2 5 5 5 For Sub-Frames 1,6 1 2 2 1 2 N/A N/A N/A N/A For Sub-Frame 0 1 3 N/A 1 2 N/A N/A N/A Binary Channel Bits (Note 5) 13200 26400 26400 12000 21120											
For Sub-Frame 5 Bits N/A	For Sub-Frames 4,9	Bits	4392	12960	12960	5736	10296	6968	25456	25456	
For Sub-Frame 0 Bits 4392 12960 N/A 4968 10296 N/A 25456 N/A N/A Number of Code Blocks (Notes 4 and 5) Image: Constraint of Code Blocks Image: Code Blocks	For Sub-Frames 1,6		3240	9528	9528	5160	9144	N/A	22920	21384	N/A
Number of Code Blocks (Notes 4 and 5) Image: Second s	For Sub-Frame 5	Bits	N/A	N/A		N/A	N/A	N/A	N/A	N/A	
Blocks (Notes 4 and 5) Image: Marcol and Stress Stres	For Sub-Frame 0	Bits	4392	12960	N/A	4968	10296	N/A	25456	N/A	N/A
For Sub-Frames 1,6 1 2 2 1 2 N/A 4 4 N/A For Sub-Frame 5 N/A For Sub-Frame 0 1 3 N/A 1 2 N/A 5 N/A N/A Binary Channel Bits (Note 5)	Blocks										
For Sub-Frame 5 N/A	For Sub-Frames 4,9		1	3	3	1	2	2	5	5	5
For Sub-Frame 0 1 3 N/A 1 2 N/A 5 N/A N/A Binary Channel Bits (Note 5) 1 3 N/A 1 2 N/A 5 N/A N/A For Sub-Frames 4,9 Bits 13200 26400 26400 12000 21120 13200 52800 52800 52800 For Sub-Frames 1,6 10656 21312 21312 10512 16992 10656 42912 42912 N/A For Sub-Frame 5 Bits N/A N/A N/A N/A N/A N/A N/A For Sub-Frame 0 Bits 12528 25056 N/A 10656 19776 12528 51456 N/A N/A Max. Throughput averaged over 1 frame (Note 5) 1.966 5.794 4.498 2.676 4.918 1.39 12.221 9.368 5.091	For Sub-Frames 1,6		1	2	2	1	2	N/A	4	4	N/A
Binary Channel Bits (Note 5) Image: Second sec	For Sub-Frame 5		N/A	N/A	N/A						
(Note 5) Image: Constraint of the system Image: Consystem Ima	For Sub-Frame 0		1	3	N/A	1	2	N/A	5	N/A	N/A
For Sub-Frames 1,6 10656 21312 21312 10512 16992 10656 42912 42912 N/A For Sub-Frame 5 Bits N/A N/A <td></td>											
For Sub-Frame 5 Bits N/A	For Sub-Frames 4,9	Bits	13200	26400	26400	12000	21120	13200	52800	52800	52800
For Sub-Frame 0 Bits 12528 25056 N/A 10656 19776 12528 51456 N/A N/A Max. Throughput averaged over 1 frame (Note 5) Mbps 1.966 5.794 4.498 2.676 4.918 1.39 12.221 9.368 5.091	For Sub-Frames 1,6										
Max. Throughput averaged over 1 frame (Note 5) Mbps 1.966 5.794 4.498 2.676 4.918 1.39 12.221 9.368 5.091	For Sub-Frame 5	Bits		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
averaged over 1 frame (Note 5)											
UE Category $\geq 1 \geq 2 \geq 2 \geq 1 \geq 1 \geq 2 \geq 2 3$	averaged over 1	Mbps	1.966	5.794	4.498	2.676	4.918	1.39	12.221	9.368	
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW: 3 symbols allocated to PDCCH for 5 MHz	UE Category		-			-		-			

Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz; symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.

Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].

Note 3: As per Table 4.2-2 in TS 36.211 [4].

Note 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (other

Note 5: Given per component carrier per codeword.

Note 6: For R.11-3 resource blocks of RB6–RB45 are allocated.

Parameter	Unit	Value							
Reference channel	•	R.46 TDD	R.47 TDD	R.35-2					
		14.10 122		TDD					
Channel bandwidth	MHz	10	10	10					
Allocated resource		50	50	50					
blocks (Note 5)									
Uplink-Downlink		1	1	1					
Configuration (Note									
3)									
Allocated subframes		3+2	3+2	2+2					
per Radio Frame									
(D+S)									
Modulation		QPSK	16QAM	64QAM					
Target Coding Rate				0.47		_			
Information Bit									
Payload (Note 5)		- /							
For Sub-Frames 4,9	Bits	5160	8760	18336					
For Sub-Frames 1,6		3880	7480	14688					
For Sub-Frame 5	Bits	N/A	N/A	N/A					
For Sub-Frame 0	Bits	5160	8760	N/A					
Number of Code									
Blocks									
(Notes 4 and 5) For Sub-Frames 4,9		1	2	3					
For Sub-Frames 1,6		1	2	3	-	-	_		
For Sub-Frame 5		N/A	N/A	N/A		_	_		
For Sub-Frame 0		1	2	N/A					
Binary Channel Bits		1	2	11/7					
(Note 5)									
For Sub-Frames 4,9	Bits	13200	26400	39600					
For Sub-Frames 1,6	Bito	10656	21312	31968					
For Sub-Frame 5	Bits	N/A	N/A	N/A					
For Sub-Frame 0	Bits	12528	25056	N/A					
Max. Throughput	Mbps	2.324	4.124	6.604					
averaged over 1	-1 -	_							
frame (Note 5)									
UE Category		≥ 1	≥ 1	≥ 2					
Note 1: 2 symbols a	llocated to	PDCCH for 2	0 MHz, 15 MH	Iz and 10 MI	Iz channel	BW; 3 symb	ols allocated		
			symbols alloca	ted to PDCC	CH for 1.4 N	IHz. For sub	frame 1&6,		
		are allocated							
			gnals and PB	CH allocated	l as per TS	36.211 [4].			
	If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).								
Note 5: Given per co	omponent o	carrier per cod	ieword						

Table A.3.4.2.1-2: Fixed Reference Channel two antenna ports

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A.3.4.2.2 Four antenna ports

Parameter	Unit	Value							
Reference channel		R.12	R.13	R.14	R.14-1	R.14-2	R.43	R.36	
		TDD	TDD	TDD	TDD	TDD	TDD	TDD	
Channel bandwidth	MHz	1.4	10	10	10	10	20	10	
Allocated resource blocks (Note 6)		6	50	50	6	3	100	50	
Uplink-Downlink Configuration (Note 4)		1	1	1	1	1	1	1	
Allocated subframes per Radio		3	3+2	2+2	2	2	2+2	2+2	
Frame (D+S)									
Modulation		QPSK	QPSK	16QAM	16QAM	16QAM	16QAM	64QAM	
Target Coding Rate		1/3	1/3	1/2	1/2	1/2	1/2	1/2	
Information Bit Payload (Note 6)									
For Sub-Frames 4,9	Bits	408	4392	12960	1544	744	25456	18336	
For Sub-Frames 1,6	Bits	N/A	3240	9528	N/A	N/A	21384	15840	
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
For Sub-Frame 0	Bits	208	4392	N/A	N/A	N/A	N/A	N/A	
Number of Code Blocks									
(Notes 5 and 6)									
For Sub-Frames 4,9		1	1	3	1	1	5	3	
For Sub-Frames 1,6		N/A	1	2	N/A	N/A	4	3	
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A	N/A	
For Sub-Frame 0		1	1	N/A	N/A	N/A	N/A	N/A	
Binary Channel Bits (Note 6)									
For Sub-Frames 4,9	Bits	1248	12800	25600	3072	1536	51200	38400	
For Sub-Frames 1,6		N/A	10256	20512	N/A	N/A	41312	30768	
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
For Sub-Frame 0	Bits	624	12176	N/A	N/A	N/A	N/A	N/A	
Max. Throughput averaged over 1	Mbps	0.102	1.966	4.498	0.309	0.149	9.368	6.835	
frame (Note 6)									
UE Category		≥ 1	≥ 1	≥2	≥ 1	≥ 1	≥ 2	≥2	
Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH.									
Note 2: For BW=1.4 MHz, the information bit payloads of special subframes are set to zero (no scheduling) to avoid problems with insufficient PDCCH performance at the test point.									
Note 3: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4].									
Note 4: As per Table 4.2-2 in TS 36									
Note 5: If more than one Code Bloc (otherwise L = 0 Bit).	k is preser:	nt, an additio	nal CRC sec	luence of L	= 24 Bits i	s attached to	o each Coo	le Block	
Note 6: Given per component carrie	ar nor oodo	word							

Table A.3.4.2.2-1: Fixed Reference Channel four antenna ports

Note 6: Given per component carrier per codeword.

A.3.4.3 Reference Measurement Channels for UE-Specific Reference Symbols

A.3.4.3.1 Single antenna port (Cell Specific)

The reference measurement channels in Table A.3.4.3.1-1 apply for verifying demodulation performance for UE-specific reference symbols with one cell-specific antenna port.

Parameter	Unit			Val	ue		
Reference channel		R.25 TDD	R.26 TDD	R.26-1 TDD	R.27 TDD	R.27-1 TDD	R.28 TDD
Channel bandwidth	MHz	10	10	5	10	10	10
Allocated resource blocks		50 ⁴	50 ⁴	25 ⁴	50 ⁴	18 ⁶	1
Uplink-Downlink Configuration (Note 3)		1	1	1	1	1	1
Allocated subframes per Radio Frame (D+S)		3+2	3+2	3+2	3+2	3+2	3+2
Modulation		QPSK	16QAM	16QAM	64QAM	64QAM	16QAM
Target Coding Rate		1/3	1/2	1/2	3/4	3/4	1/2
Information Bit Payload							
For Sub-Frames 4,9	Bits	4392	12960	5736	28336	10296	224
For Sub-Frames 1,6	Bits	3240	9528	4584	22920	8248	176
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	2984	9528	3880	22152	10296	224
Number of Code Blocks per Sub-Frame (Note 5)							
For Sub-Frames 4,9		1	3	1	5	2	1
For Sub-Frames 1,6		1	2	1	4	2	1
For Sub-Frame 5		N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0		1	2	1	4	2	1
Binary Channel Bits Per Sub-Frame							
For Sub-Frames 4,9	Bits	12600	25200	11400	37800	13608	504
For Sub-Frames 1,6	Bits	10356	20712	10212	31068	11340	420
For Sub-Frame 5	Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-Frame 0	Bits	10332	20664	7752	30996	13608	504
Max. Throughput averaged over 1 frame	Mbps	1.825	5.450	2.452	12.466	4.738	0.102
UE Category		≥ 1	≥ 2	≥ 1	≥ 2	≥1	≥ 1
 Note 1: 2 symbols allocated to PDCCH for 20 MHz, 15 MHz and 10 MHz channel BW; 3 symbols allocated to PDCCH for 5 MHz and 3 MHz; 4 symbols allocated to PDCCH for 1.4 MHz. For subframe 1&6, only 2 OFDM symbols are allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211 [4]. Note 3: as per Table 4.2-2 in TS 36.211 [4]. Note 4: For R.25, R.26 and R.27, 50 resource blocks are allocated in sub-frames 1, 4, 6, 9 and 41 resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0. For R.26-1, 25 resource blocks are allocated in sub-frames 1, 4, 6, 9 and 17 resource blocks (RB0–RB7 and RB16–RB24) are allocated in sub-frame 0. Note 5: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit). 							
Note 6: Localized allocation started from	RB #0 is a	pplied.					

Two antenna ports (Cell Specific)

A.3.4.3.2

The reference measurement channels in Table A.3.4.3.2-1 apply for verifying demodulation performance for CDM-

multiplexed UE specific reference symbols with two cell-specific antenna ports.

Referer	nce channel		R.31	R.32	R.32-1	R.33	R.33-1	R.34
			TDD	TDD	TDD	TDD	TDD	TDD
Channel b	bandwidth MHz 10 10 5 10 10 10							
Allocated	resource		50 ⁴	50 ⁴	25 ⁴	50 ⁴	18 ⁶	50 ⁴
blocks								
Uplink-Do			1	1	1	1	1	1
	tion (Note 3)							
Allocated	subframes		3+2	3+2	3+2	3+2	3+2	3+2
	Frame (D+S)							
Modulatio			QPSK	16QAM	16QAM	64QAM	64QAM	64QAM
Target Co			1/3	1/2	1/2	3/4	3/4	1/2
	n Bit Payload							
	Frames 4,9	Bits	3624	11448	5736	27376	9528	18336
	Frames 1,6		2664	7736	3112	16992	7480	11832
For Sub-		Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-		Bits	2984	9528	3496	22152	9528	14688
	f Code Blocks							
per Sub-F	rame							
(Note 5)								
	Frames 4,9		1	2	1	5	2	3
	Frames 1,6		1	2	1	3	2	2
For Sub-			N/A	N/A	N/A	N/A	N/A	N/A
	Frame 0		1	2	1	4	2	3
	annel Bits Per							
Sub-Fram								
	Frames 4,9	Bits	12000	24000	10800	36000	12960	36000
	Frames 1,6		7872	15744	6528	23616	10368	23616
For Sub-		Bits	N/A	N/A	N/A	N/A	N/A	N/A
For Sub-		Bits	9840	19680	7344	29520	12960	29520
Max. Thro		Mbps	1.556	4.79	2.119	11.089	4.354	7.502
	over 1 frame							
UE Categ			≥ 1	≥2	≥1	≥2	≥ 1	≥2
Note 1:	2 symbols allo							
	allocated to PD						DCCH for 1.	.4 MHz.
	For subframe 1						TO 00 044	
Note 2:	Reference sign			gnais and	PBCH allo	cated as pe	er 1S 36.211	1 [4].
Note 3:	as per Table 4.			a a una a la la	alia ara alli		uh franca 4	0 and 11
Note 4:	Note 4: For R.31, R.32, R.33and R.34, 50 resource blocks are allocated in sub-frames 4,9 and 41							
	resource blocks (RB0–RB20 and RB30–RB49) are allocated in sub-frame 0 and the DwDTS parties of sub-frames 1.6. For R 22.1.25 resource blocks are allocated in sub-							
	DwPTS portion of sub-frames 1,6. For R.32-1, 25 resouce blocks are allocated in sub- frames 4,9 and 17 resource blocks (RB0–RB7 and RB16–RB24) are allocated in sub-frame							
	0 and the DwP					-11024) die	anocated II	i sub-iranie
Note 5:	If more than or				litional CR	C sequence	of I – 24 F	Rits is
11016 0.	attached to ead					C SCYLENC	5 51 2 - 2 + 1	2110 10
Note 6:	Localized alloc							
11010 0.				" 0 10 uppli				

Table A.3.4.3.2-1: Fixed Reference Channel for CDM-multiplexed DM RS

A.3.4.3.3 Two antenna ports (CSI-RS)

The reference measurement channels in Table A.3.4.3.3-1 apply for verifying demodulation performance for CDMmultiplexed UE specific reference symbols with two cell-specific antenna ports and two CSI-RS antenna ports.

Table A.3.4.3.3-1: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenn	а
ports	

	Parameter	Unit	Value					
Deference	e channel	Unit	R.51 TDD					
		MHz	10					
	bandwidth		. 🗸					
	I resource blocks		50 (Note 5)					
	ownlink Configuration (Note 3)		1					
	I subframes per Radio Frame		3+2					
(D+S)								
Modulatio			16QAM					
	oding Rate		1/2					
	on Bit Payload							
	-Frames 4,9 (non CSI-RS	Bits	11448					
subframe	/							
	-Frame 4,9	Bits	11448					
	-Frames 1,6	Bits	7736					
For Sub	-Frame 5	Bits	N/A					
For Sub	-Frame 0	Bits	9528					
	of Code Blocks							
(Note 4)								
For Sub	-Frames 4, 9 (non CSI-RS	Code	2					
subframe	e)	blocks						
For Sub	-Frames 4,9	Code	2					
		blocks						
For Sub	-Frames 1,6	Code	2					
		blocks						
For Sub	-Frame 5		N/A					
	-Frame 0	Code	N/A 2					
		blocks						
Binary Cl	hannel Bits							
For Sub	-Frames 4, 9 (non CSI-RS	Bits	24000					
subframe								
	-Frames 4,9		22800					
	-Frames 1,6		15744					
	-Frame 5	Bits	N/A					
	-Frame 0	Bits	19680					
	oughput averaged over 1	Mbps	4.7896					
frame		Mopo	1.7000					
UE Cate			≥ 2					
Note 1:	2 symbols allocated to PDCC	4	- 2					
Note 2:	Reference signal, synchroniza		s and PRCH					
11010 2.	allocated as per TS 36.211 [4]							
Note 3: as per Table 4.2-2 in TS 36.211 [4].								
Note 4: If more than one Code Block is present, an additional								
CRC sequence of $L = 24$ Bits is attached to each Code								
Block (otherwise L = 0 Bit).								
Note 5:	50 resource blocks are allocat	ed in sub-f	frames 4.9 and					
11010 0.	41 resource blocks (RB0–RB2							
	allocated in sub-frame 0 and th							
	sub-frames 1,6.							
L								

The reference measurement channels in Table A.3.4.3.3-2 apply for verifying demudlation performance for UE-specific reference symbols with two cell specific antenna ports and two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS in same subframe.

Parameter Unit Value						
Reference channel		R.52 TDD	R.53 TDD	R.54 TDD		
Channel bandwidth	MHz	10	10	10		
Allocated resource blocks		50 (Note 5)	50 (Note 5)	50 (Note 5)		
Uplink-Downlink Configuration (Note 3)		1	1	1		
Allocated subframes per Radio Frame		3+2	3+2	3+2		
(D+S)						
Modulation		64QAM	64QAM	16QAM		
Target Coding Rate		1/2	1/2	1/2		
Information Bit Payload						
For Sub-Frame 4,9	Bits	16416	16416	11448		
For Sub-Frames 1,6	Bits	11832	11832	7736		
For Sub-Frame 5	Bits	n/a	n/a	n/a		
For Sub-Frame 0	Bits	14688	14688	9528		
Number of Code Blocks						
(Note 4)						
For Sub-Frames 4,9	Code	3	3	2		
	blocks					
For Sub-Frames 1,6	Code	2	2	2		
	blocks					
For Sub-Frame 5		n/a	n/a	n/a		
For Sub-Frame 0	Code	3	3	2		
	blocks					
Binary Channel Bits						
For Sub-Frames 4,9		34200	33600	22800		
For Sub-Frames 1,6		23616	23616	15744		
For Sub-Frame 5	Bits	n/a	n/a	n/a		
For Sub-Frame 0	Bits	29520	29520	19680		
Max. Throughput averaged over 1	Mbps	7.1184	7.1184	4.7896		
frame						
UE Category		≥ 2	≥ 2	≥ 2		
Note 1: 2 symbols allocated to PDCCH						
Note 2: Reference signal, synchroniza		s and PBCH allo	cated as per TS	36.211 [4].		
Note 3: as per Table 4.2-2 in TS 36.21						
Note 4: If more than one Code Block i			C sequence of L	. = 24 Bits is		
attached to each Code Block (
Note 5: 50 resource blocks are allocat						
and RB30–RB49) are allocate	d in sub-fra	ame 0 and the D	wPTS portion of	sub-frames 1,		
6.						

Table A.3.4.3.3-2: Fixed Reference Channel for CDM-multiplexed DM RS with two CSI-RS antenna ports with ZP CSI-RS and NZP CSI-RS

A.3.4.3.4 Four antenna ports (CSI-RS)

The reference measurement channels in Table A.3.4.3.4-1 apply for verifying demodulation performance for CDMmultiplexed UE specific reference symbols with two cell-specific antenna ports and four CSI-RS antenna ports.

Parameter Unit Value										
	Unit									
Reference channel		R.44 TDD R.48 TDD								
Channel bandwidth	MHz	10	10							
Allocated resource blocks		50 (Note 4)	50 (Note							
	4)									
Uplink-Downlink Configuration (Note 3)		1	1							
Allocated subframes per Radio Frame (D+S)		3+2	3+2							
Modulation		64QAM	QPSK							
Target Coding Rate										
Information Bit Payload										
For Sub-Frames 4,9 (non CSI-RS	Bits	18336	N/A							
subframe)										
For Sub-Frames 4,9 (CSI-RS	Bits	16416	6200							
subframe)										
For Sub-Frames 1,6		11832	4264							
For Sub-Frame 5	Bits	N/A	N/A							
For Sub-Frame 0	Bits	14688	4968							
Number of Code Blocks per Sub-										
Frame										
(Note 5)										
For Sub-Frames 4,9 (non CSI-RS		3	2							
subframe)		-								
For Sub-Frames 4,9 (CSI-RS		3	2							
subframe)		-								
For Sub-Frames 1,6		2	1							
For Sub-Frame 5		N/A	N/A							
For Sub-Frame 0		3	1							
Binary Channel Bits Per Sub-										
Frame										
For Sub-Frames 4,9 (non CSI-RS	Bits	36000	12000							
subframe)										
For Sub-Frames 4,9 (CSI-RS	Bits	33600	11600							
subframe)										
For Sub-Frames 1,6		23616	7872							
For Sub-Frame 5	Bits	N/A	N/A							
For Sub-Frame 0	Bits	29520	9840							
Max. Throughput averaged over 1	Mbps	7.1184	2.5896							
frame	-									
UE Category		≥ 2	≥ 1							
Note 1: 2 symbols allocated to PD	OCCH.									
Note 2: Reference signal, synchro	nization sig	gnals and PBCI	Н							
allocated as per TS 36.21										
Note 3: as per Table 4.2-2 in TS 3										
Note 4: 50 resource blocks are allo										
resource blocks (RB0–RB										
in sub-frame 0 and the Dw										
Note 5: If more than one Code Blo										
sequence of $L = 24$ Bits is	attached t	o each Code B	lock							
(otherwise L = 0 Bit).										

Table A.3.4.3.4-1: Fixed Reference Channel for CDM-multiplexed DM RS with four CSI-RS antenna ports

A.3.4.3.5 Eight antenna ports (CSI-RS)

The reference measurement channels in Table A.3.4.3.5-1 apply for verifying demodulation performance for CDMmultiplexed UE specific reference symbols with two cell-specific antenna ports and eight CSI-RS antenna ports.

Table A.3.4.3.5-1: Fixed Reference Channel for CDM-multiplexed DM RS with eight CSI-RS antenna ports

Reference channelReformReference channelR.50 TDDChannel bandwidthMHz10Allocated resource blocksUplink-Downlink Configuration (Note13)3Allocated subframes per Radio3+2Frame (D+S)0ModulationQPSKTarget Coding Rate1/3Information Bit Payload1For Sub-Frames 4,9 (non CSI-RSBitsSubframe)3624For Sub-Frames 1,62664For Sub-Frames 1,62664For Sub-Frames 1,62664For Sub-Frame 0BitsNumber of Code Blocks per Sub- Frame1Subframe)1For Sub-Frames 4,9 (non CSI-RS1subframe)1For Sub-Frames 4,9 (non CSI-RS1Subframe)1For Sub-Frames 4,9 (non CSI-RS1Subframe)1For Sub-Frames 4,9 (non CSI-RS1Subframe)1For Sub-Frames 4,9 (non CSI-RS1For Sub-Frames 4,9 (non CSI-RS1Subframe)1For Sub-Frames 4,9 (non CSI-RSBitsSubframe)1For Sub-Frames 4,9 (non CSI-RSBitsFor Sub-Frames 4,9 (non CSI-RSBitsSubframe)1For Sub-Frames 4,9 (non CSI-RSBitsSubframe)1For Sub-Frames 4,9 (non CSI-RSBitsSubframe)1For Sub-Frames 4,9 (non CSI-RSBitsSubframe)1For Sub-Fram		Parameter	Unit	Value
Channel bandwidthMHz10Allocated resource blocks50 (Note 4)Uplink-Downlink Configuration (Note 3)1Allocated subframes per Radio3+2Frame (D+S)3+2ModulationQPSKTarget Coding Rate1/3Information Bit Payload1For Sub-Frames 4,9 (non CSI-RS subframe)BitsStorb-Frames 4,9 (CSI-RS subframe)BitsFor Sub-Frames 1,62664For Sub-Frames 1,62664For Sub-Frame 5BitsNumber of Code Blocks per Sub- Frame1For Sub-Frames 4,9 (CSI-RS subframe)1For Sub-Frame 5BitsPor Sub-Frame 61For Sub-Frame 71Subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)1For Sub-Frames 4,9 (CSI-RS subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)1For Sub-Frames 4,9 (non CSI-RS subframe)12000Subframe)1For Sub-Frames 4,9 (CSI-RS subframe)10400Subframe)10400For Sub-Frames 4,9 (CSI-RS subframe)1.556For Sub-Frames 4,9 (CSI-RS subframe)1.556For Sub-Frame 5Bits9840Max. Throughput averaged over 1 frameMbpsUE C	Peferenc			
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3)Allocated subframes per Radio3+2Frame (D+S)			-	
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Max. Throughput averaged over 1Mbps1.556frameUE Category≥ 1			Bits	N/A
Max. Throughput averaged over 1Mbps1.556frameUE Category≥ 1	For Sub	-Frame 0	Bits	9840
frame ≥ 1			Mbps	1.556
UE Category ≥ 1 Note 1: 2 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH		51 5		
Note 1: 2 symbols allocated to PDCCH. Note 2: Reference signal, synchronization signals and PBCH	UE Cateo	lory		≥1
Note 2: Reference signal, synchronization signals and PBCH	Note 1:	2 symbols allocated to PDC	CH.	
	Note 2:	Reference signal, synchron	ization sign	als and PBCH
allocated as per TS 36.211 [4].		allocated as per TS 36.211	[4].	
Note 3: as per Table 4.2-2 in TS 36.211 [4].	Note 3:			
Note 4: 50 resource blocks are allocated in sub-frames 4,9 and	Note 4:			o-frames 4,9 and
41 resource blocks (RB0–RB20 and RB30–RB49) are		41 resource blocks (RB0-R	B20 and RI	B30–RB49) are
allocated in sub-frame 0 and the DwPTS portion of sub-		allocated in sub-frame 0 and	d the DwPT	S portion of sub-
frames 1,6.		,		
Note 5: If more than one Code Block is present, an additional	Note 5:			
CRC sequence of L = 24 Bits is attached to each Code			ts is attache	ed to each Code
Block (otherwise L = 0 Bit).		Block (otherwise $L = 0$ Bit).		

The reference measurement channels in Table A.3.4.3.5-2 apply for verifying TDD PMI accuracy measurement with two CRS antenna ports and eight CSI-RS antenna ports.

	Parameter	Unit	Val	ue							
Reference	e channel		R.45	R.45-1							
			TDD	TDD							
Channel	bandwidth	MHz	10	10							
	I resource blocks		50 ⁴	39							
	ownlink Configuration (Note 3)		1	1							
	I subframes per Radio Frame		4+2	4+2							
(D+S)			112	112							
	I subframes per Radio Frame		10	10							
Modulatio			16QAM	16QAM							
	Target Coding Rate 1/2 1/2										
Information Bit Payload 1/2 1/2											
	p-Frames 4 and 9	Bits	N/A	N/A							
	SI-RS subframe)	Dito		11/7							
	p-Frames 4 and 9	Bits	11448	8760							
	S subframe)	Dito	11440	0700							
	Frames 1,6	Bits	7736	7480							
	-Frame 5	Bits	N/A	N/A							
	p-Frame 0	Bits	9528	8760							
	of Code Blocks per Sub-Frame	Dits	9526	8700							
(Note 5)	DI COUE BIOCKS PEI SUD-FTAILIE										
	-Frames 4 and 9		N/A	N/A							
	SI-RS subframe)		IN/A	IN/A							
	Frames 4 and 9		2	2							
	S subframe)		2	2							
	Frames 1,6		2	2							
	-Frame 5		N/A	Z N/A							
	p-Frame 0		2	2							
	hannel Bits Per Sub-Frame		2	2							
	p-Frames 4 and 9	Bits	N/A	N/A							
	SI-RS subframe)	DIIS	IN/A	IN/A							
	p-Frames 4 and 9	Bits	22400	17472							
	S subframe)	DIIS	22400	1/4/2							
	Frames 1,6	Bits	15744	14976							
	-Frame 5	Bits	N/A	N/A							
	p-Frame 0			18720							
		Bits	19680								
	oughput averaged over 1 frame	Mbps	4.7896	4.1240							
UE Categ			≥ 2	≥1							
Note 1:	2 symbols allocated to PDCCH fo										
	BW; 3 symbols allocated to PDCC										
	allocated to PDCCH for 1.4 MHz.		1&6, Only 2 OF	·DIVI							
Note 2:	symbols are allocated to PDCCH.										
Note 2:	Reference signal, synchronization	i signals and Pl	BCH allocated	as per 15							
Note 3:	36.211 [4].	41									
Note 3: Note 4:	As per Table 4.2-2 in TS 36.211 [4		oub fromas 4	0 and 11							
NOLE 4.	for For R. 45, 50 resource blocks resource blocks (RB0–RB20 and										
				Sub-							
Noto 5:	frame 0 and the DwPTS portion of			ulonce of							
Note 5:	If more than one Code Block is pr										
Noto 6:	L = 24 Bits is attached to each Co).							
Note 6: Localized allocation started from RB #0 is applied.											

A.3.5 Reference measurement channels for PDCCH/PCFICH performance requirements

A.3.5.1 FDD

Parameter	Unit	Value								
Reference channel		R.15 FDD	R.15-1 FDD	R.15-2 FDD	R.16 FDD	R.17 FDD				
Number of transmitter antennas		1	2	2	2	4				
Channel bandwidth	MHz	10	10	10	10	5				
Number of OFDM symbols for PDCCH	symbols	2	3	2	2	2				
Aggregation level	CCE	8	8	8	4	2				
DCI Format		Format 1	Format 1	Format 1	Format 2	Format 2				
Cell ID		0	0	0	0	0				
Payload (without CRC)	Bits	31	31	31	43	42				

Table A.3.5.1-1: Reference Channel FDD

A.3.5.2 TDD

Table A.3.5.2-1: Reference Channel TDD

Parameter	Unit	Value								
Reference channel		R.15 TDD	R.15-1 TDD	R.15-2 TDD	R.16 TDD	R.17 TDD				
Number of transmitter antennas		1	2	2	2	4				
Channel bandwidth	MHz	10	10	10	10	5				
Number of OFDM symbols for PDCCH	symbols	2	3	2	2	2				
Aggregation level	CCE	8	8	8	4	2				
DCI Format		Format 1	Format 1	Format 1	Format 2	Format 2				
Cell ID		0	0	0	0	0				
Payload (without CRC)	Bits	34	34	34	46	45				

A.3.6 Reference measurement channels for PHICH performance requirements

Table A.3.6-1: Reference Channel FDD/TDD

Parameter	Unit	Value							
Reference channel		R.18 R.19 R.20 R.24							
Number of transmitter antennas		1	2	4	1				
Channel bandwidth	MHz	10	10	5	10				
User roles (Note 1)		W I1 I2	W I1 I2	W I1 I2	W I1				
Resource allocation (Note 2)	(0,0) (0,1) (0,4) (0,0) (0,1) (0,4) (0,0) (0,1) (0,4)								
Power offsets (Note 3)	dB	-4 0 -3	-4 0 -3	-4 0 -3	+3 0				
Payload (Note 4)		A R R	ARR	ARR	A R				
Note 1:W=wanted user, I1=interfNote 2:The resource allocation pNote 3:The power offsets (per us relative to the first interfer	er user is ger) repres	given as (N_group_	PHICH, N_seq_PH		l per PHICH				

Note 4: A=fixed ACK, R=random ACK/NACK.

A.3.7 Reference measurement channels for PBCH performance requirements

Table A.3.7-1: Reference Channel FDD/TDD

Parameter	Unit	Value						
Reference channel		R.21	R.22	R.23				
Number of transmitter antennas		1	2	4				
Channel bandwidth	MHz	1.4	1.4	1.4				
Modulation		QPSK	QPSK	QPSK				
Target coding rate		40/1920	40/1920	40/1920				
Payload (without CRC)	Bits	24	24	24				

A.3.8 Reference measurement channels for MBMS performance requirements

A.3.8.1 FDD

Parameter	Parameter PMCH									
	Unit		Value							
Reference channel		R.40 FDD			R.37 FDD					
Channel bandwidth	MHz	1.4	3	5	10	15	20			
Allocated resource blocks		6			50					
Allocated subframes per Radio Frame (Note 1)		6			6					
Modulation		QPSK			QPSK					
Target Coding Rate		1/3			1/3					
Information Bit Payload (Note 2)										
For Sub-Frames 1,2,3,6,7,8	Bits	408			3624					
For Sub-Frames 0,4,5,9	Bits	N/A			N/A					
Number of Code Blocks per Subframe (Note 3)		1			1					
Binary Channel Bits Per Subframe										
For Sub-Frames 1,2,3,6,7,8	Bits	1224			10200					
For Sub-Frames 0,4,5,9	Bits	N/A			N/A					
MBMS UE Category		≥ 1			≥ 1					
Note 1: For FDD mode, up to 6 sub 36.331.										
Note 2: 2 OFDM symbols are reser 36.211.				Ū						
Note 3: If more than one Code Bloo attached to each Code Bloo			nal CR0	C sequ	ence of L = 24	4 Bits is	6			

Table A.3.8.1-1: Fixed Reference Channel QPSK R=1/3

Parameter	РМСН						
	Unit						
Reference channel					R.38 FDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks					50		
Allocated subframes per Radio Frame (Note 1)					6		
Modulation					16QAM		
Target Coding Rate					1/2		
Information Bit Payload (Note 2)							
For Sub-Frames 1,2,3,6,7,8	Bits				9912		
For Sub-Frames 0,4,5,9	Bits				N/A		
Number of Code Blocks per Subframe (Note 3)					2		
Binary Channel Bits Per Subframe							
For Sub-Frames 1,2,3,6,7,8	Bits				20400		
For Sub-Frames 0,4,5,9	Bits				N/A		
MBMS UE Category					≥ 1		
Note 1: For FDD mode, up to 6 subframes (#1 36.331.	/2/3/6/7/	8) are	availal	ble for	MBMS, in lin	e with	TS
Note 2: 2 OFDM symbols are reserved for PD 36.211.	CCH; an	d refer	ences	signal	allocated as p	er TS	
Note 3: If more than one Code Block is preser attached to each Code Block (otherwise			CRC	seque	ence of L = 24	Bits is	1

Table A.3.8.1-2: Fixed Reference Channel 16QAM R=1/2

Table A.3.8.1-3: Fixed Reference Channel 64QAM R=2/3

Parameter	РМСН							
	Unit			Value				
Reference channel				R.39-1 FDD	R.39 FDD			
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks				25	50			
Allocated subframes per Radio Frame(Note1)				6	6			
Modulation				64QAM	64QAM			
Target Coding Rate				2/3	2/3			
Information Bit Payload (Note 2)				1				
For Sub-Frames 1,2,3,6,7,8	Bits			9912	19848			
For Sub-Frames 0,4,5,9	Bits			N/A	N/A			
Number of Code Blocks per Sub-Frame (Note 3)				2	4			
Binary Channel Bits Per Subframe		11		1				
For Sub-Frames 1,2,3,6,7,8	Bits			15300	30600			
For Sub-Frames 0,4,5,9	Bits			N/A	N/A			
MBMS UE Category				≥ 1	≥ 2			
Note 1:For FDD mode, up to 6 subframes (#1/2/3/6Note 2:2 OFDM symbols are reserved for PDCCH;Note 3:If more than one Code Block is present, an Code Block (otherwise L = 0 Bit).	and refere	ence sig	nal all	ocated as p	er TS 36.211.		ach	

A.3.8.2 TDD

Parameter	РМСН							
	Unit	Value						
Reference channel		R.40 TDD			R.37 TDD			
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks		6			50			
Uplink-Downlink Configuration(Note 1)		5			5			
Allocated subframes per Radio Frame		5			5			
Modulation		QPSK			QPSK			
Target Coding Rate		1/3			1/3			
Information Bit Payload (Note 2)								
For Sub-Frames 3,4,7,8,9	Bits	408			3624			
For Sub-Frames 0,1,2,5,6	Bits	N/A			N/A			
Number of Code Blocks per Subframe		1			1			
(Note 3)								
Binary Channel Bits Per Subframe					-		-	
For Sub-Frames 3,4,7,8,9	Bits	1224			10200			
For Sub-Frames 0,1,2,5,6	Bits	N/A			N/A			
MBMS UE Category		≥ 1			≥1			
Note 1: For TDD mode, in line with TS 36	.331, Up	link-Downlink	Config	uratior	n 5 is propose	d, up to	5	
subframes (#3/4/7/8/9) are availa	ble for M	BMS.	0			· •		
Note 2: 2 OFDM symbols are reserved fo			ignal al	locate	d as per TS 3	6.211.		
Note 3: If more than one Code Block is pr to each Code Block (otherwise L		n additional C	RC sec	quence	of $L = 24$ Bits	s is atta	iched	

Table A.3.8.2-1: Fixed Reference Channel QPSK R=1/3

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 Table A.3.8.2-2: Fixed Reference Channel 16QAM R=1/2

Parameter	РМСН								
	Unit				Value				
Reference channel					R.38 TDD				
Channel bandwidth	MHz	1.4	3	5	10	15	20		
Allocated resource blocks					50				
Uplink-Downlink Configuration(Note 1)					5				
Allocated subframes per Radio Frame					5				
Modulation					16QAM				
Target Coding Rate					1/2				
Information Bit Payload (Note 2)									
For Sub-Frames 3,4,7,8,9	Bits				9912				
For Sub-Frames 0,1,2,5,6	Bits				N/A				
Number of Code Blocks per Subframe (Note 3)					2				
Binary Channel Bits Per Subframe									
For Sub-Frames 3,4,7,8,9	Bits				20400				
For Sub-Frames 0,1,2,5,6	Bits				N/A				
MBMS UE Category					≥ 1				
Note 1: For TDD mode, in line with TS 36.331, Uplink-Downlink Configuration 5 is proposed, up									
5 subframes (#3/4/7/8/9) are available for MBMS.									
Note 2: 2 OFDM symbols are reserved for PDCCH; reference signal allocated as per TS 36.211.									
Note 3: If more than one Code Block is preser	nt, an ado	ditional	CRC s	seque	nce of L = 24	Bits is			

attached to each Code Block (otherwise L = 0 Bit).

Parameter				PMCH			
	Unit			Val	ue		
Reference channel				R.39-1TDD	R.39 TDD		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks	ocated resource blocks		25	50			
Uplink-Downlink Configuration(Note 1)				5	5		
Allocated subframes per Radio Frame				5	5		
Modulation				64QAM	64QAM		
Target Coding Rate				2/3	2/3		
Information Bit Payload (Note 2)				1	1		
For Sub-Frames 3,4,7,8,9	Bits			9912	19848		
For Sub-Frames 0,1,2,5,6	Bits			N/A	N/A		
Number of Code Blocks per Sub-Frame (Note 3)				2	4		
Binary Channel Bits Per Subframe					•		
For Sub-Frames 3,4,7,8,9	Bits			15300	30600		
For Sub-Frames 0,1,2,5,6	Bits			N/A	N/A		
MBMS UE Category				≥ 1	≥ 2		
Note 1:For TDD mode, in line with TS subframes (#3/4/7/8/9) are ava 2 OFDM symbols are reserved Note 3:Note 3:If more than one Code Block is attached to each Code Block (ailable for for PDC s present	r MBMS CH; re , an ad	S. ferenc ditiona	ce signal allocat	ed as per TS :	36.211	

Table A.3.8.2-3: Fixed Reference Channel 64QAM R=2/3

A.3.9 Reference measurement channels for sustained downlink data rate provided by lower layers

A.3.9.1 FDD

Table A.3.9.1-1: Fixed Reference Channel for sustained data-rate test (FDD)

Parameter	Unit				Va	lue				
Reference channel		R.31-1	R.31-2	R.31-3	R.31-3A	R.31-3C	R.31-4	R.31-4B	R.31-5	
		FDD	FDD	FDD	FDD	FDD	FDD	FDD	FDD	
Channel bandwidth	MHz	10	10	20	10	15	20	15	15	
Allocated resource blocks (Note 8)		Note 5	Note 6	Note 7	Note 6	Note 10	Note 7	Note 11	Note 9	
Allocated subframes per Radio		10	10	10	10	10	10	10	10	
Frame										
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	64QAM	
Coding Rate										
									0.85	
									0.91	
For Sub-Frame 0 0.40 0.63 0.61 0.90 0.91 0.90 0.88 0.88										
Information Bit Payload (Note 8)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	10296	25456	51024	36696	51024	75376	55056	55056	
For Sub-Frame 5	Bits	10296	25456	51024	35160	51024	71112	52752	52752	
For Sub-Frame 0	Bits	10296	25456	51024	36696	51024	75376	55056	55056	
Number of Code Blocks										
(Notes 3 and 8)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2	5	9	6	9	13	9	9	
For Sub-Frame 5	Bits	2	5	9	6	9	12	9	9	
For Sub-Frame 0	Bits	2	5	9	6	9	13	9	9	
Binary Channel Bits (Note 8)										
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	26100	43200	86400	43200	58752	86400	64800	64800	
For Sub-Frame 5	Bits	26100	39744	82080	39744	57888	82080	60480	60480	
For Sub-Frame 0	Bits	26100	40752	83952	40752	56304	83952	62352	62352	
Number of layers		1	2	2	2	2	2	2	2	
Max. Throughput averaged over 1	Mbps	10.296	25.456	51.024	36.542	51.024	74.950	54.826	54.826	
frame (Note 8)										
UE Categories		≥ 1	≥ 2	≥ 2	≥ 2	≥ 3	≥ 3	≥ 4	≥ 3	
Note 1: 1 symbol allocated to PDC	CH for al	l tests.								
Note 2: Reference signal, synchro										
Note 3: If more than one Code Blo	ck is pres	sent, an ad	ditional CF	RC sequen	ce of L = 24	Bits is atta	ched to ea	ch Code Bl	ock	
(otherwise L = 0 Bit).										
Note 4: Resource blocks n _{PRB} = 02 are allocated for SIB transmissions in sub-frame 5 for all bandwidths.										
Note 5: Resource blocks $n_{PRB} = 614,3049$ are allocated for the user data in all sub-frames.										
Note 6: Resource blocks n _{PRB} = 349 are allocated for the user data in sub-frame 5, and resource blocks n _{PRB} = 049 in sub-										
frames 0,1,2,3,4,6,7,8,9.										
Note 7: Resource blocks n _{PRB} = 499 are allocated for the user data in sub-frame 5, and resource blocks n _{PRB} = 099 in sub-										
frames 0,1,2,3,4,6,7,8,9.										
Note 8: Given per component carr										
Note 9: Resource blocks nPRB =	474 are	allocated f	for the use	r data in si	ib-frame 5	and resource	e blocks n	PRB = 0.7	4 in sub-	

Note 9: Resource blocks nPRB = 4..74 are allocated for the user data in sub-frame 5, and resource blocks nPRB = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.

Note 10: Resource blocks $n_{PRB} = 4..71$ are allocated for the user data in sub-frames 0,1,2,3,4,5,6,7,8,9.

Note 11: Resource blocks n_{PRB} = 4..74 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..74 in sub-frames 0,1,2,3,4,6,7,8,9.

A.3.9.2 TDD

Table A.3.9.2-1: Fixed Reference Channel for sustained data-rate test ((TDD)	
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Parameter	Unit			Value		
Reference channel		R.31-1	R.31-2	R.31-3	R.31-3A	R.31-4
		TDD	TDD	TDD	TDD	TDD
Channel bandwidth	MHz	10	10	20	15	20
Allocated resource blocks		Note 6	Note 7	Note 8	Note 9	Note 8
Uplink-Downlink Configuration (Note 3)		5	5	5	1	1
Number of HARQ Processes per	Proces	15	15	15	7	7
component carrier	ses					
Allocated subframes per Radio Frame		8+1	8+1	8+1	4	4
(D+S)						
Modulation		64QAM	64QAM	64QAM	64QAM	64QAM
Target Coding Rate						
For Sub-Frames 4,9		0.40	0.59	0.59	0.87	0.88
For Sub-Frames 3,7,8		0.40	0.59	0.59	N/A	N/A
For Sub-Frames 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frames 5		0.40	0.64	0.62	0.88	0.87
For Sub-Frames 6		0.40	0.60	0.60	N/A	N/A
For Sub-Frames 0		0.40	0.62	0.61	0.90	0.90
Information Bit Payload						
For Sub-Frames 4,9	Bits	10296	25456	51024	51024	75376
For Sub-Frames 3,7,8	Bits	10296	25456	51024	0	0
For Sub-Frame 1	Bits	0	0	0	0	0
For Sub-Frame 5	Bits	10296	25456	51024	51024	71112
For Sub-Frame 6	Bits	10296	25456	51024	0	0
For Sub-Frame 0	Bits	10296	25456	51024	51024	75376
Number of Code Blocks per Sub-Frame						
(Note 4)						
For Sub-Frames 4,9		2	5	9	9	13
For Sub-Frames 3,7,8		2	5	9	N/A	N/A
For Sub-Frame 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5		2	5	9	9	12
For Sub-Frame 6	Bits	2	5	9	n/a	N/A
For Sub-Frame 0		2	5	9	9	13
Binary Channel Bits Per Sub-Frame						
For Sub-Frames 4,9	Bits	26100	43200	86400	58752	86400
For Sub-Frames 3,7,8	Bits	26100	43200	86400	0	0
For Sub-Frame 1	Bits	0	0	0	0	0
For Sub-Frame 5	Bits	26100	40176	82512	58320	82512
For Sub-Frame 6	Bits	26100	42768	85968	N/A	N/A
For Sub-Frame 0	Bits	26100	41184	84384	56736	84384
Number of layers		1	2	2	2	2
Max. Throughput averaged over 1 frame	Mbps	8.237	20.365	40.819	20.409	29.724
(Note 10)						
UE Category		≥ 1	≥ 2	≥2	≥2	≥ 3
Note 1: 1 symbol allocated to PDCCH for	or all tests.			·		
Note 2: Reference signal, synchronization	on signals a	and PBCH	allocated a	s per TS 3	6.211 [4].	
Note 3: As per Table 4.2-2 in TS 36.211	[4].			-		
Note 4: If more than one Code Block is to each Code Block (otherwise L		additional	CRC sequ	ence of L =	= 24 Bits is a	ttached
Note 5: Resource blocks $n_{PRB} = 02$ are bandwidths.		for SIB tran	smissions	in sub-fram	ne 5 for all	
	10 ara -	loootod for	the user de		h fu a va a a	

Note 6: Resource blocks $n_{PRB} = 6..14,30..49$ are allocated for the user data in all subframes.

Note 7: Resource blocks $n_{PRB} = 3..49$ are allocated for the user data in sub-frame 5, and resource blocks $n_{PRB} = 0..49$ in sub-frames 0,3,4,6,7,8,9.

Note 8: Resource blocks $n_{PRB} = 4..99$ are allocated for the user data in sub-frame 5, and resource blocks $n_{PRB} = 0..99$ in sub-frames 0,3,4,6,7,8,9.

Note 9: Resource blocks $n_{PRB} = 4..71$ are allocated for the user data in all sub-frames

Note10: Given per component carrier per codeword.

A.3.9.3 FDD (EPDCCH scheduling)

Table A.3.9.3-1: Fixed Reference Channel for sustained data-rate test with EPDCCH scheduling (FDD)

Parameter	Unit				Value			
Reference channel	•••••	R.31E-	R.31E-	R.31E-	R.31E-	R.31E-	R.31E-	R.31E-4B
		1 FDD	2 FDD	3 FDD	3A FDD	3C FDD	4 FDD	FDD
Channel bandwidth	MHz	10	10	20	10	15	20	15
Allocated resource blocks (Note 8)		Note 5	Note 6	Note 7	Note 6	Note 9	Note 7	Note 10
Allocated subframes per Radio Frame		10	10	10	10	10	10	10
Modulation		64QAM						
Coding Rate								
(subframes with PDCCH USS								
monitoring)								
For Sub-Frame 1,2,3,4,6,7,8,9,		0.3972	0.5926	0.5933	0.8533	0.8725	0.8763	0.8533
For Sub-Frame 5		0.3972	0.6441	0.6246	0.8889	0.8855	0.8702	0.8762
For Sub-Frame 0		0.3972	0.6282	0.6106	0.9046	0.9105	0.9018	0.8868
Coding Rate								
(subframes with EPDCCH USS								
monitoring)								
For Sub-Frame 1,2,3,4,6,7,8,9,		0.4114	0.6047	0.5993	0.8707	0.8855	0.8851	0.8649
For Sub-Frame 5		0.4114	0.6584	0.6312	0.9086	0.8990	0.8794	0.8889
For Sub-Frame 0		0.4114	0.6418	0.6170	0.9242	0.9246	0.9112	0.8993
Information Bit Payload (Note 8)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	10296	25456	51024	36696	51024	75376	55056
For Sub-Frame 5	Bits	10296	25456	51024	35160	51024	71112	52752
For Sub-Frame 0	Bits	10296	25456	51024	36696	51024	75376	55056
Number of Code Blocks								
(Notes 3 and 8)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	2	5	9	6	9	13	9
For Sub-Frame 5	Bits	2	5	9	6	9	12	9
For Sub-Frame 0	Bits	2	5	9	6	9	13	9
Binary Channel Bits (Note 8)								
(subframes with PDCCH USS								
monitoring)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	26100	43200	86400	43200	58752	86400	64800
For Sub-Frame 5	Bits	26100	39744	82080	39744	57888	82080	60480
For Sub-Frame 0	Bits	26100	40752	83952	40752	56304	83952	62352
Binary Channel Bits (Note 8)								
(subframes with EPDCCH USS								
monitoring)								
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	25200	42336	85536	42336	57888	85536	63936
For Sub-Frame 5	Bits	25200	38880	81216	38880	57024	81216	59616
For Sub-Frame 0	Bits	25200	39888	83088	39888	55440	83088	61488
Number of layers		1	2	2	2	2	2	2
Max. Throughput averaged over 1	Mbps	10.296	25.456	51.024	36.542	51.024	74.950	54.826
frame (Note 8)								
UE Categories Note 1: 1 symbol allocated to PDCCE		≥1	≥2	≥2	≥2	≥ 3	≥ 3	≥ 4

Note 1: 1 symbol allocated to PDCCH for all tests.

Note 2: Reference signal, synchronization signals and PBCH allocated as per TS 36.211.

Note 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit).

Note 4: Resource blocks n_{PRB} = 0..2 are allocated for SIB transmissions in sub-frame 5 for all bandwidths.

Note 5: Resource blocks $n_{PRB} = 6..14,30..49$ are allocated for the user data in all sub-frames.

Note 6: Resource blocks n_{PRB} = 3..49 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..49 in sub-frames 0,1,2,3,4,6,7,8,9.

Note 7: Resource blocks n_{PRB} = 4..99 are allocated for the user data in sub-frame 5, and resource blocks n_{PRB} = 0..99 in sub-frames 0,1,2,3,4,6,7,8,9.

Note 8: Given per component carrier per codeword.

Note 9: Resource blocks n_{PRB} = 4..71 are allocated for the user data in sub-frames 0,1,2,3,4,5,6,7,8,9.

Note 10: Resource blocks $n_{PRB} = 4..74$ are allocated for the user data in sub-frame 5, and resource blocks $n_{PRB} = 0..74$ in sub-frames 0,1,2,3,4,6,7,8,9.

A.3.9.4 TDD (EPDCCH scheduling)

Table A.3.9.4-1: Fixed Reference Channel for sustained data-rate with EPDCCH scheduling (TDD)

Parameter	Unit			Value		
Reference channel	0	R.31E-1	R.31E-2	R.31E-3	R.31E-3A	R.31E-4
		TDD	TDD	TDD	TDD	TDD
Channel bandwidth	MHz	10	10	20	15	20
Allocated resource blocks		Note 6	Note 7	Note 8	Note 9	Note 8
Uplink-Downlink Configuration (Note 3)		5	5	5	1	1
Number of HARQ Processes per component carrier	Processes	15	15	15	7	7
Allocated subframes per Radio Frame (D+S)		8+1	8+1	8+1	4	4
Coding Rate (subframes with PDCCH USS monitoring)						
For Sub-Frames 4,9		0.3972	0.5926	0.5933	0.8725	0.8763
For Sub-Frames 3,7,8		0.3972	0.5926	0.5933	N/A	N/A
For Sub-Frames 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frames 5		0.3972	0.6372	0.6213	0.8790	0.8656
For Sub-Frames 6		0.3972	0.5986	0.5963	N/A	N/A
For Sub-Frames 0		0.3972	0.6216	0.6075	0.9036	0.8972
Coding Rate (subframes with EPDCCH USS monitoring)						
For Sub-Frames 4,9		0.4114	0.6047	0.5993	0.8856	0.8851
For Sub-Frames 3,7,8		0.4114	0.6047	0.5993	N/A	N/A
For Sub-Frames 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frames 5		0.4114	0.6512	0.6279	0.8922	0.8748
For Sub-Frames 6		0.4114	0.6109	0.6024	N/A	N/A
For Sub-Frames 0	-	0.4114	0.6349	0.6138	0.9175	0.9065
Information Bit Payload						
For Sub-Frames 4,9	Bits	10296	25456	51024	51024	75376
For Sub-Frames 3,7,8	Bits	10296	25456	51024	N/A	N/A
For Sub-Frame 1 For Sub-Frame 5	Bits Bits	0 10296	0 25456	0 51024	N/A 51024	N/A 71112
For Sub-Frame 6	Bits	10296	25456	51024	N/A	N/A
For Sub-Frame 0	Bits	10296	25456	51024	51024	75376
Number of Code Blocks per Sub-	DIG	10290	20400	51024	51024	75570
Frame (Note 4)						4.0
For Sub-Frames 4,9		2	5	9	9	13
For Sub-Frames 3,7,8		2	5	9	N/A	N/A
For Sub-Frame 1		N/A	N/A	N/A	N/A	N/A
For Sub-Frame 5 For Sub-Frame 6	Bits	2	5 5	9 9	9 N/A	12 N/A
For Sub-Frame 0	DIIS	2	5	9	9	13
Binary Channel Bits per Sub-Frame (subframes with PDCCH USS monitoring)		2				10
For Sub-Frames 4,9	Bits	26100	43200	86400	58752	86400
For Sub-Frames 3,7,8	Bits	26100	43200	86400	N/A	N/A
For Sub-Frame 1	Bits	0	0	0	N/A	N/A
For Sub-Frame 5	Bits	26100	40176	82512	58320	82512
For Sub-Frame 6	Bits	26100	42768	85968	N/A	N/A
For Sub-Frame 0 Binary Channel Bits per Sub-Frame (subframes with EPDCCH USS	Bits	26100	41184	84384	56736	84384
monitoring) For Sub-Frames 4,9	Bits	25200	42336	85536	57888	85536
For Sub-Frames 3,7,8	Bits	25200	42336	85536	57888 N/A	N/A
For Sub-Frame 1	Bits	25200	42330	0	N/A N/A	N/A
For Sub-Frame 5	Bits	25200	39312	81648	57456	81648
For Sub-Frame 6	Bits	25200	41904	85104	N/A	N/A
	210	20200		00101		

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For Sub	-Frame 0	Bits	25200	40320	83520	55872	83520		
Number	of layers		1	2	2				
Max. Thr	oughput averaged over 1	40.819	20.409	29.724					
frame (N	ote 10)								
UE Cate	gory		≥ 1	≥2	≥ 2	≥ 2	≥ 3		
Note 1:	1 symbol allocated to PDCC	H for all tests	i.						
Note 2:	Reference signal, synchroni	zation signals	and PBCH al	located as pe	r TS 36.211 [4	·].			
Note 3:	As per Table 4.2-2 in TS 36.								
Note 4:	ote 4: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code								
	Block (otherwise L = 0 Bit).								
Note 5:	Resource blocks n _{PRB} = 02	are allocated	for SIB trans	missions in su	b-frame 5 for a	all bandwidths.			
Note 6:	Resource blocks n _{PRB} = 61	4,3049 are a	allocated for th	ne user data ir	all subframes	S.			
Note 7:	Resource blocks n _{PRB} = 34	9 are allocate	ed for the user	data in sub-fr	ame 5, and re	source blocks r	$n_{PRB} = 049$		
	in sub-frames 0,3,4,6,7,8,9.								
Note 8:	3: Resource blocks $n_{PRB} = 499$ are allocated for the user data in sub-frame 5, and resource blocks $n_{PRB} = 099$								
	in sub-frames 0,3,4,6,7,8,9.								
Note 9:	te 9: Resource blocks n _{PRB} = 471 are allocated for the user data in all sub-frames								
Note10:	Given per component carrie	r per codewo	rd.						

A.3.10 Reference Measurement Channels for EPDCCH performance requirements

A.3.10.1 FDD

Table A.3.10.1-1: Reference Channel FDD

Parameter	Unit	Value								
Reference channel		R.55 FDD	R.56 FDD	R.57 FDD	R.58 FDD	R.59 FDD				
Number of transmitter antennas		2	2	2	2	2				
Channel bandwidth	MHz	10	10	10	10	10				
Number of OFDM symbols for PDCCH	symbols	2	2	1	1	1				
Aggregation level	ECCE	4	16	2	8	2				
DCI Format		2A	2A	2C	2C	2D				

A.3.10.2 TDD

Table A.3.10.2-1: Reference Channel TDD

Parameter	Unit	Value								
Reference channel		R.55 TDD	R.56 TDD	R.57 TDD	R.58 TDD	R.59 TDD				
Number of transmitter antennas		2	2	2	2	2				
Channel bandwidth	MHz	10	10	10	10	10				
Number of OFDM symbols for PDCCH	symbols	2	2	1	1	1				
Aggregation level	CCE	4	16	2	8	2				
DCI Format		2A	2A	2C	2C	2D				

A.4 CSI reference measurement channels

CSI Performance for CA, PDSCH, Full allocation									
TDD	Table A.4-2		20	CQI	CQI	100			

This section defines the DL signal applicable to the reporting of channel quality information (Clause 9.2, 9.3 and 9.5).

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In Table A.4-0 are listed the UL/DL reference measurement channels specified in annex A.4 of this release of TS 36.101. This table is informative and serves only to a better overview. The reference for the concrete reference measurement channels and corresponding implementation's parameters as to be used for requirements are the other tables of this annex as appropriate.

Duplex	Table	Name	BW	Mod	TCR	RB	RB Off set	UE Cat eg	Notes
CSI Perfo	rmance, PDSCH, F	ull allocation ((CRS)						
FDD	Table A.4-1		10	CQI	CQI	50			
TDD	Table A.4-2		10	CQI	CQI	50			
CSI Perfo	rmance for CA, PD	SCH, Full allo	cation						
TDD	Table A.4-2		20	CQI	CQI	100			
CSI Perfo	rmance, PDSCH, F	ull allocation (CSI-RS): 2 CRS p	orts, 4	CSI-R	S ports	5	
FDD	Table A.4-1a		10	CQI	CQI	50			
CSI Perfo	rmance, PDSCH, F	ull allocation (CSI-RS): 2 CRS p	orts, 8	CSI-R	S ports	5	
TDD	Table A.4-2a		10	CQI	CQI	50			
CSI Perfo	rmance, PDSCH, F	ull allocation (CSI-RS): 1 CRS p	ort				
FDD	Table A.4-1b		10	CQI	CQI	50			
TDD	Table A.4-2b		10	CQI	CQI	50			
CSI Perfo	rmance, PDSCH, F	ull allocation (CSI-RS): 2 CRS p	orts, 2	CSI-R	S ports	5	
FDD	Table A.4-1c		10	CQI	CQI	50			
TDD	Table A.4-2c		10	CQI	CQI	50			
CSI Perfo	rmance, PDSCH, F	ull allocation (CSI-RS	and CSI-I	M): 2 C	RS po	rts		
FDD	Table A.4-1d		10	CQI	CQI	50			
TDD	Table A.4-2d		10	CQI	CQI	50			
CSI Perfo	rmance, PDSCH, Pa	artial allocatio	on (CRS) (6 RB-s)					
FDD	Table A.4-4		10	CQI	CQI	6			
TDD	Table A.4-5		10	CQI	CQI	6			
CSI Perfo	rmance, PDSCH, Pa	artial allocatio	on (CSI-l	RS) (6 RB·	·s)				
FDD	Table A.4-4a		10	CQI	CQI	6			
TDD	Table A.4-5a		10	CQI	CQI	6			
CSI Perfo	rmance, PDSCH, Pa	artial allocatio	on (CSI j	orocess) (6 RB-s))			
FDD	Table A.4-4b		10	CQI	CQI	6			
TDD	Table A.4-5b		10	CQI	CQI	6			
CSI Perfo	rmance, PDSCH, Pa	artial allocatio	on (CRS) (15 RB-s)				
FDD	Table A.4-7		10	CQI	CQI	15			
TDD	Table A.4-8		10	CQI	CQI	15			
CSI Perfo	rmance, PDSCH, Pa	artial allocatio	on (CRS) (3 RB-s)					
FDD	Table A.4-10		10	CQI	CQI	3			
TDD	Table A.4-11		10	CQI	CQI	3			

The reference channel in Table A.4-1 complies with the CQI definition specified in Sec. 7.2.3 of [6]. Table A.4-3 specifies the transport format corresponding to each CQI for single antenna transmission. Table A.4-3a specifies the transport format corresponding to each CQI for dual antenna transmission.

Table A.4-1: Reference channel for CQI requirements (FDD) full PRB allocation (CRS)

Parameter	Unit	Value							
Channel bandwidth	MHz	1.4	3	5	10		15	20	
Allocated resource blocks		6	15	25	50		75	100	
Subcarriers per resource block		12	12	12	12		12	12	
Allocated subframes per Radio Frame		8	8	8	8		8	8	
Modulation					Table	Table		Table	
					A.4-3	A.4- 3a		A.4-3g	
Target coding rate					TableTableA.4-3A.4-3a			Table A.4-3g	
Number of HARQ Processes	Processes	8	8	8	8		8	8	
Maximum number of HARQ transmissions		1	1	1	1		1	1	
Note 1: 3 symbols allocated to PDCCH. Note 2: Only subframes 1,2,3,4,6,7,8, an	d 9 are allocat	ted to avo	oid PBCH	and syncl	nronizatio	on signal	overhea	d.	

Table A.4-1a: Reference channel for CQI requirements (FDD) full PRB allocation (CSI-RS) : 2 CRS ports, 4 CSI-RS ports

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	15	25	50		75	100
Subcarriers per resource block		12	12	12	12		12	12
Allocated subframes per Radio Frame		8	8	8	8		8	8
Modulation					Table A.4-3b	Table A.4-3c		
Target coding rate					Table Table A.4-3b A.4-3c			
Number of HARQ Processes	Processes	8	8	8	8		8	8
Maximum number of HARQ transmissions		1	1	1	1		1	1
Note 1: 3 symbols allocated to PDCCH	۱.							
Note 2: Only subframes 1,2,3,4,6,7,8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-1b: Reference channel for CQI requirements (FDD) full PRB allocation (CSI-RS): 1 CRS port

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	15	25	50		75	100
Subcarriers per resource block		12	12	12	12		12	12
Allocated subframes per Radio Frame		8	8	8	8		8	8
Modulation					Table A.4-3e	Table A.4-3f		
Target coding rate					Table Table A.4-3e A.4-3f			
Number of HARQ Processes	Processes	8	8	8	8		8	8
Maximum number of HARQ transmissions		1	1	1	1		1	1
Note 1: 3 symbols allocated to PDCC Note 2: Only subframes 1,2,3,4,6,7,8,		ated to a	avoid P	BCH and	d synchron	ization si	gnal ovei	rhead.

Table A.4-1c: Reference channel for CQI requirements (FDD) full PRB allocation (CSI-RS) : 2 CRS ports, 2 CSI-RS ports

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	1	0	15	20
Allocated resource blocks		6	15	25	5	60	75	100
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		8	8	8		8	8	8
Modulation					Table A.4-3b	Table A.4-3h		
Target coding rate					Table A.4-3b	Table A.4-3h		
Number of HARQ Processes	Processes	8	8	8	1	8	8	8
Maximum number of HARQ 1 1 1 transmissions 1 1 1					1	1	1	
Note 1: 3 symbols allocated to PDCCH. Note 2: Only subframes 1,2,3,4,6,7,8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-1d: Reference channel for CQI requirements (FDD) full PRB allocation (CSI-RS and CSI-IM) : 2 CRS ports

Parameter	Unit				Value			
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	15	25	5	0	75	100
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		8	8	8	8	3	8	8
Modulation					Table A.4-3b	Table A.4-3i		
Target coding rate					Table A.4-3b	Table A.4-3i		
Number of HARQ Processes	Processes	8	8	8	8	3	8	8
Maximum number of HARQ 1 1 1 1 1 transmissions						1	1	
 Note 1: 3 symbols allocated to PDCCH. Note 2: Only subframes 1,2,3,4,6,7,8, and 9 are allocated to avoid PBCH and synchronization signal overhead. 								

Table A.4-1e: Reference channel for CQI requirements (FDD) full PRB allocation (CSI-RS and CSI-IM): 1 CRS port

Parameter	Unit				Value			
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks		6	15	25	50	75	100	
Subcarriers per resource block		12	12	12	12	12	12	
Allocated subframes per Radio Frame		8	8	8	8	8	8	
Modulation					Table A.4-3e			
Target coding rate					Table A.4-3e			
Number of HARQ Processes	Processes	8	8	8	8	8	8	
Maximum number of HARQ		1	1	1	1	1	1	
transmissions								
Note 1: 3 symbols allocated to PDCCH.								
Note 2: Only subframes 2, 3, 4, 7, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-2: Reference channel for CQI requirements (TDD) full PRB allocation (CRS)

Parameter	Unit				Value				
Channel bandwidth	MHz	1.4	3	5	1	0	15	20	
Allocated resource blocks		6	15	25	5	50		100	
Subcarriers per resource block		12	12	12	1	2	12	12	
Allocated subframes per Radio Frame		4	4	4	4	1	4	4	
Modulation					Table	Table		Table	
					A.4-3	A.4-		A.4-3g	
						3a			
Target coding rate					Table	Table		Table	
					A.4-3	A.4-		A.4-3g	
						3a		_	
Number of HARQ Processes	Processes	10	10	10	1	0	10	10	
Maximum number of HARQ transmissions 1 1 1 1 1 1						1			
Note 1: 3 symbols allocated to PDCCH.									
Note 2: When UL-DL configuration 1 is used and only subframes 4 and 9 are allocated to avoide PBCH and									

synchronization signal overhead. When UL-DL configuration 2 is used and only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and 9 are allocated to avoid PBCH and synchronization signal overhead.

Table A.4-2a: Reference channel for CQI requirements (TDD) full PRB allocation (CSI-RS) : 2 CRS ports, 8 CSI-RS ports

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	15	25	5	0	75	100
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		4	4	4	4	4	4	4
Modulation					Table A.4-3b	Table A.4-3d		
Target coding rate					Table A.4-3b	Table A.4-3d		
Number of HARQ Processes	Processes	10	10	10	1	0	10	10
Maximum number of HARQ transmissions		1	1	1		1	1	1
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-2b: Reference channel for CQI requirements (TDD) full PRB allocation (CSI-RS): 1 CRS port

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	1	0	15	20
Allocated resource blocks		6	15	25	5	0	75	100
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		2	2	2	1	2	2	2
Modulation					Table A.4-3e	Table A.4-3f		
Target coding rate					Table A.4-3e	Table A.4-3f		
Number of HARQ Processes	Processes	10	10	10	1	0	10	10
Maximum number of HARQ 1 1 1 1 1 transmissions							1	
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 1 is used and only subframes 4 and 9 are allocated to avoid PBCH and								

Note 2: UL-DL configuration 1 is used and only subframes 4 and 9 are allocated to avoid PBCH and synchronization signal overhead.

Table A.4-2c: Reference channel for CQI requirements (TDD) full PRB allocation (CSI-RS) : 2 CRS ports, 2 CSI-RS ports

Parameter	Unit				Value			
Channel bandwidth	MHz	1.4	3	5	1	10		20
Allocated resource blocks		6	15	25	5	0	75	100
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		4	4	4	4	4	4	4
Modulation					Table A.4-3b	Table A.4-3h		
Target coding rate					Table A.4-3b	Table A.4-3h		
Number of HARQ Processes	Processes	10	10	10	1	0	10	10
Maximum number of HARQ 1 1 1 1 transmissions 1 1 1 1							1	
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-2d: Reference channel for CQI requirements (TDD) full PRB allocation (CSI-RS and CSI-IM) : 2 CRS ports

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	15	25	5	0	75	100
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		4	4	4	4	1	4	4
Modulation					Table A.4-3b	Table A.4-3j		
Target coding rate					Table A.4-3b	Table A.4-3j		
Number of HARQ Processes	Processes	10	10	10	1	0	10	10
Maximum number of HARQ 1 1 1 1 transmissions 1 1 1 1							1	1
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-2e: Reference channel for CQI requirements (TDD) full PRB allocation (CSI-RS and CSI-IM):1 CRS port

Parameter	Unit	Value						
Channel bandwidth	MHz	1.4	3	5	10	15	20	
Allocated resource blocks		6	15	25	50	75	100	
Subcarriers per resource block		12	12	12	12	12	12	
Allocated subframes per Radio Frame		2	2	2	2	2	2	
Modulation					Table Table A.4-3e A.4-3 or Table A.4-3	¢		
Target coding rate					Table Table A.4-3e A.4-3 or Table A.4-3	K		
Number of HARQ Processes	Processes	10	10	10	10	10	10	
Maximum number of HARQ transmissions		1	1	1	1	1	1	
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead. Note 3: Table A.4-3k or Table A.4-3l is used for UE configured with 2 or 1 CSI process(es), respectively.								

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	1384	12600
2	QPSK	0.1172	0	1384	12600
3	QPSK	0.1885	2	2216	12600
4	QPSK	0.3008	4	3624	12600
5	QPSK	0.4385	6	5160	12600
6	QPSK	0.5879	8	6968	12600
7	16QAM	0.3691	11	8760	25200
8	16QAM	0.4785	13	11448	25200
9	16QAM	0.6016	16	15264	25200
10	64QAM	0.4551	18	16416	37800
11	64QAM	0.5537	21	21384	37800
12	64QAM	0.6504	23	25456	37800
13	64QAM	0.7539	25	28336	37800
14	64QAM	0.8525	27	31704	37800
15	64QAM	0.9258	27	31704	37800
Note1: Su	ub-frame#0 and a	#5 are not used for the	e correspondir	ng requirement.	

Table A.4-3: Transport format corresponding to each CQI index for 50 PRB allocation single antenna transmission (CRS)

Table A.4-3a: Transport format corresponding to each CQI index for 50 PRB allocation dual antenna transmission (CRS)

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame			
0	out of range	out of range	DTX	-	-			
1	QPSK	0.0762	0	1384	12000			
2	QPSK	0.1172	0	1384	12000			
3	QPSK	0.1885	2	2216	12000			
4	QPSK	0.3008	4	3624	12000			
5	QPSK	0.4385	6	5160	12000			
6	QPSK	0.5879	8	6968	12000			
7	16QAM	0.3691	11	8760	24000			
8	16QAM	0.4785	13	11448	24000			
9	16QAM	0.6016	15	14112	24000			
10	64QAM	0.4551	18	16416	36000			
11	64QAM	0.5537	20	19848	36000			
12	64QAM	0.6504	22	22920	36000			
13	64QAM	0.7539	24	27376	36000			
14	64QAM	0.8525	26	30576	36000			
15	64QAM	0.9258	27	31704	36000			
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.								

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	1384	10800
2	QPSK	0.1172	0	1384	10800
3	QPSK	0.1885	2	2216	10800
4	QPSK	0.3008	3	2856	10800
5	QPSK	0.4385	5	4392	10800
6	QPSK	0.5879	7	6200	10800
7	16QAM	0.3691	10	7992	21600
8	16QAM	0.4785	12	9912	21600
9	16QAM	0.6016	14	12960	21600
10	64QAM	0.4551	17	15264	32400
11	64QAM	0.5537	19	18336	32400
12	64QAM	0.6504	21	21384	32400
13	64QAM	0.7539	23	25456	32400
14	64QAM	0.8525	24	27376	32400
15	64QAM	0.9258	25	28336	32400
	ub-frame#0 and #5 ar ubframe (i.e. sub-fram				

Table A.4-3b: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS): 2CRS ports, Non CSI-RS subframe

Table A.4-3c: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS): 2
CRS ports, 4 CSI-RS ports, CSI-RS Subframe

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame		
0	out of range	out of range	DTX	-	-		
1	QPSK	0.0762	0	1384	10400		
2	QPSK	0.1172	0	1384	10400		
3	QPSK	0.1885	1	1800	10400		
4	QPSK	0.3008	3	2856	10400		
5	QPSK	0.4385	5	4392	10400		
6	QPSK	0.5879	7	6200	10400		
7	16QAM	0.3691	10	7992	20800		
8	16QAM	0.4785	12	9912	20800		
9	16QAM	0.6016	14	12960	20800		
10	64QAM	0.4551	17	15264	31200		
11	64QAM	0.5537	18	16416	31200		
12	64QAM	0.6504	20	19848	31200		
13	64QAM	0.7539	22	22920	31200		
14	64QAM	0.8525	24	27376	31200		
15	64QAM	0.9258	25	28336	31200		
	Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.						

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame		
0	out of range	out of range	DTX	-	-		
1	QPSK	0.0762	0	1384	10000		
2	QPSK	0.1172	0	1384	10000		
3	QPSK	0.1885	1	1800	10000		
4	QPSK	0.3008	3	2856	10000		
5	QPSK	0.4385	5	4392	10000		
6	QPSK	0.5879	7	6200	10000		
7	16QAM	0.3691	10	7992	20000		
8	16QAM	0.4785	12	9912	20000		
9	16QAM	0.6016	13	11448	20000		
10	64QAM	0.4551	17	15264	30000		
11	64QAM	0.5537	18	16416	30000		
12	64QAM	0.6504	20	19848	30000		
13	64QAM	0.7539	22	22920	30000		
14	64QAM	0.8525	23	25456	30000		
15	64QAM	0.9258	24	27376	30000		
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.							

Table A.4-3d: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS): 2CRS ports, 8 CSI-RS ports, CSI-RS Subframe

Table A.4-3e: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS): 1
CRS port, Non CSI-RS subframe

CQI inde	ex	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame	
0		out of range	out of range	DTX	-	-	
1		QPSK	0.0762	0	1384	11400	
2		QPSK	0.1172	0	1384	11400	
3		QPSK	0.1885	2	2216	11400	
4		QPSK	0.3008	4	3624	11400	
5		QPSK	0.4385	6	5160	11400	
6		QPSK	0.5879	8	6968	11400	
7		16QAM	0.3691	10	7992	22800	
8		16QAM	0.4785	13	11448	22800	
9		16QAM	0.6016	15	14112	22800	
10		64QAM	0.4551	17	15264	34200	
11		64QAM	0.5537	19	18336	34200	
12		64QAM	0.6504	21	21384	34200	
13		64QAM	0.7539	23	25456	34200	
14		64QAM	0.8525	25	28336	34200	
15		64QAM	0.9258	26	30576	34200	
	Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.						

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame		
0	out of range	out of range	DTX	-	-		
1	QPSK	0.0762	0	1384	11200		
2	QPSK	0.1172	0	1384	11200		
3	QPSK	0.1885	2	2216	11200		
4	QPSK	0.3008	4	3624	11200		
5	QPSK	0.4385	6	5160	11200		
6	QPSK	0.5879	7	6200	11200		
7	16QAM	0.3691	10	7992	22400		
8	16QAM	0.4785	12	9912	22400		
9	16QAM	0.6016	14	12960	22400		
10	64QAM	0.4551	17	15264	33600		
11	64QAM	0.5537	19	18336	33600		
12	64QAM	0.6504	21	21384	33600		
13	64QAM	0.7539	23	25456	33600		
14	64QAM	0.8525	25	28336	33600		
15	64QAM	0.9258	26	30576	33600		
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.							

Table A.4-3f: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS): 1CRS port, 2 CSI-RS ports, CSI-RS Subframe

Table A.4-3g: Transport format corresponding to each CQI index for 100 PRB allocation single
antenna transmission (CRS)

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame			
0	out of range	out of range	DTX	-	-			
1	QPSK	0.0762	0	2792	25200			
2	QPSK	0.1172	0	2792	25200			
3	QPSK	0.1885	2	4584	25200			
4	QPSK	0.3008	4	7224	25200			
5	QPSK	0.4385	6	10296	25200			
6	QPSK	0.5879	8	14112	25200			
7	16QAM	0.3691	11	17568	50400			
8	16QAM	0.4785	13	22920	50400			
9	16QAM	0.6016	16	30576	50400			
10	64QAM	0.4551	18	32856	75600			
11	64QAM	0.5537	21	43816	75600			
12	64QAM	0.6504	23	51024	75600			
13	64QAM	0.7539	25	57336	75600			
14	64QAM	0.8525	27	63776	75600			
15	64QAM	0.9258	27	63776	75600			
Note1: Su	Note1: Sub-frame#0 and #5 are not used for the corresponding requirement.							

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame	
0	out of range	out of range	DTX	-	-	
1	QPSK	0.0762	0	1384	10600	
2	QPSK	0.1172	0	1384	10600	
3	QPSK	0.1885	1	1800	10600	
4	QPSK	0.3008	3	2856	10600	
5	QPSK	0.4385	5	4392	10600	
6	QPSK	0.5879	7	6200	10600	
7	16QAM	0.3691	10	7992	21200	
8	16QAM	0.4785	12	9912	21200	
9	16QAM	0.6016	14	12960	21200	
10	64QAM	0.4551	17	15264	31800	
11	64QAM	0.5537	19	16416	31800	
12	64QAM	0.6504	21	19848	31800	
13	64QAM	0.7539	22	22920	31800	
14	64QAM	0.8525	24	27376	31800	
15	64QAM	0.9258	25	28336	31800	
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.						

Table A.4-3h: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS): 2CRS ports, 2 CSI-RS ports, CSI-RS Subframe

Table A.4-3i: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS and
CSI-IM): 2 CRS ports, 4 CSI-RS ports, 4 zero power CSI-RS ports, CSI-RS Subframe

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame			
0	out of range	out of range	DTX	-	-			
1	QPSK	0.0762	0	1384	10000			
2	QPSK	0.1172	0	1384	10000			
3	QPSK	0.1885	1	1800	10000			
4	QPSK	0.3008	3	2856	10000			
5	QPSK	0.4385	5	4392	10000			
6	QPSK	0.5879	7	6200	10000			
7	16QAM	0.3691	10	7992	20000			
8	16QAM	0.4785	12	9912	20000			
9	16QAM	0.6016	13	11448	20000			
10	64QAM	0.4551	17	15264	30000			
11	64QAM	0.5537	18	16416	30000			
12	64QAM	0.6504	20	19848	30000			
13	64QAM	0.7539	22	22920	30000			
14	64QAM	0.8525	23	25456	30000			
15	64QAM	0.9258	24	27376	30000			
	Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.							

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame	
0	out of range	out of range	DTX	-	-	
1	QPSK	0.0762	0	1384	9600	
2	QPSK	0.1172	0	1384	9600	
3	QPSK	0.1885	1	1800	9600	
4	QPSK	0.3008	3	2856	9600	
5	QPSK	0.4385	5	4392	9600	
6	QPSK	0.5879	7	5160	9600	
7	16QAM	0.3691	10	6968	19200	
8	16QAM	0.4785	12	8760	19200	
9	16QAM	0.6016	13	11448	19200	
10	64QAM	0.4551	17	12960	28800	
11	64QAM	0.5537	18	16416	28800	
12	64QAM	0.6504	20	18336	28800	
13	64QAM	0.7539	22	21384	28800	
14	64QAM	0.8525	23	25456	28800	
15	64QAM	0.9258	24	25456	28800	
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.						

Table A.4-3j: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS and
CSI-IM): 2 CRS ports, 8 CSI-RS ports, 4 zero power CSI-RS ports, CSI-RS Subframe

Table A.4-3k: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS and
CSI-IM): 1 CRS port, 2 CSI-RS ports, 2 CSI processes, CSI-RS and CSI-IM subframe

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame			
0	out of range	out of range	DTX	-	-			
1	QPSK	0.0762	0	1384	9800			
2	QPSK	0.1172	0	1384	9800			
3	QPSK	0.1885	1	1800	9800			
4	QPSK	0.3008	3	2856	9800			
5	QPSK	0.4385	5	4392	9800			
6	QPSK	0.5879	7	6200	9800			
7	16QAM	0.3691	10	7992	19600			
8	16QAM	0.4785	11	8760	19600			
9	16QAM	0.6016	13	11448	19600			
10	64QAM	0.4551	17	15264	29400			
11	64QAM	0.5537	18	16416	29400			
12	64QAM	0.6504	19	18336	29400			
13	64QAM	0.7539	21	21384	29400			
14	64QAM	0.8525	23	25456	29400			
15	64QAM	0.9258	23	25456	29400			
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.								

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame			
0	out of range	out of range	DTX	-	-			
1	QPSK	0.0762	0	1384	10600			
2	QPSK	0.1172	0	1384	10600			
3	QPSK	0.1885	1	1800	10600			
4	QPSK	0.3008	3	2856	10600			
5	QPSK	0.4385	5	4392	10600			
6	QPSK	0.5879	7	6200	10600			
7	16QAM	0.3691	10	7992	21200			
8	16QAM	0.4785	12	9912	21200			
9	16QAM	0.6016	14	12960	21200			
10	64QAM	0.4551	17	15264	31800			
11	64QAM	0.5537	19	18336	31800			
12	64QAM	0.6504	20	19848	31800			
13	64QAM	0.7539	22	22920	31800			
14	64QAM	0.8525	24	27376	31800			
15	64QAM	0.9258	25	28336	31800			
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement. The next subframe (i.e. sub-frame#1 or #6) shall be used for the retransmission.								

Table A.4-3I: Transport format corresponding to each CQI index for 50 PRB allocation (CSI-RS and
CSI-IM): 1 CRS port, 2 CSI-RS ports, 1 CSI process, CSI-RS and CSI-IM subframe

Table A.4-4: Reference channel for CQI requirements (FDD) 6 PRB allocation (CRS)

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	6	6	6	6	6
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	8	8	8	8	8
Modulation					Table A.4-6		
Target coding rate					Table A.4-6		
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Note 1:3 symbols allocated to PDCCH.Note 2:Only subframes 1,2,3,4,6,7,8, and	9 are allocate	d to avoid	PBCH and	l synchroni	zation signa	al overhea	d.

Table A.4-4a: Reference channel for CQI requirements (FDD) 6 PRB allocation (CSI-RS)

Parameter	Unit				Value			
Channel bandwidth	MHz	1.4	3	5	1	0	15	20
Allocated resource blocks		6	6	6	(6	6	6
Subcarriers per resource block		12	12	12	1	2	12	12
Allocated subframes per Radio Frame		8	8	8		8	8	8
Modulation					Table A.4-6a	Table A.4-6b		
Target coding rate					Table A.4-6a	Table A.4-6b		
Number of HARQ Processes	Proces ses	8	8	8		8	8	8
Maximum number of HARQ transmissions		1	1	1		1	1	1
Note 1:3 symbols allocated to PDCCNote 2:Only subframes 1,2,3,4,6,7,8,		llocated to a	avoid PB(CH and s	ynchroniza	tion signal	overhead	d.

Table A.4-4b: Reference channel for CQI requirements (FDD) 6 PRB allocation (CSI process)

/alue			
10	10	15	20
6	6	6	6
12	12	12	12
8	8	8	8
Table A.4-6c	e A.4-6c		
Table A.4-6c	e A.4-6c		
8	8	8	8
1	1	1	1
ni:	zatio	1 zation signal ove	1 1 zation signal overhead.

Table A.4-5: Reference channel for CQI requirements (TDD) 6 PRB allocation (CRS)

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		6	6	6	6	6	6
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		4	4	4	4	4	4
Modulation					Table A.4-6		
Target coding rate					Table A.4-6		
Number of HARQ Processes	Processes	10	10	10	10	10	10
Maximum number of HARQ transmissions		1	1	1	1	1	1
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and synchronization signal overhead.	d only subframe	es 3, 4, 8,	and 9 are a	allocated to	o avoid PBC	CH and	

Table A.4-5a: Reference channel for CQI requirements (TDD) 6 PRB allocation (CSI-RS)

Parameter	Unit				Value			
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	6	6	6		6	6
Subcarriers per resource block		12	12	12	12		12	12
Allocated subframes per Radio Frame		4	4	4	4		4	4
Modulation					Table A.4-6a	Table A.4-6b		
Target coding rate					Table A.4-6a	Table A.4-6b		
Number of HARQ Processes	Proces ses	10	10	10	10		10	10
Maximum number of HARQ transmissions		1	1	1	1		1	1
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal overhead.								

Table A.4-5b: Reference channel for CQI requirements (TDD) 6 PRB allocation (CSI-RS and CSI-IM)

Parameter	Unit				Value	e		
Channel bandwidth	MHz	1.4	3	5	10		15	20
Allocated resource blocks		6	6	6		6	6	6
Subcarriers per resource block		12	12	12	1	12	12	12
Allocated subframes per Radio Frame		4	4	4		4	4	4
Modulation					Table A.4-6c	Table A.4-6d, or Table A.4-6e, or Table A.4-6f		
Target coding rate					Table A.4-6c	Table A.4-6d, or Table A.4-6e, or Table A.4-6f		
Number of HARQ Processes	Proces ses	10	10	10	1	10	10	10
Maximum number of HARQ transmissions		1	1	1		1	1	1
Note 1: 3 symbols allocated to PDCCI Note 2: UL-DL configuration 2 is used synchronization signal overhe Note 3: Table A.4-6d, Table A.4-6e, or respectively.	and only so ad.							

г

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub-
					Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	152	1512
2	QPSK	0.1172	0	152	1512
3	QPSK	0.1885	2	256	1512
4	QPSK	0.3008	4	408	1512
5	QPSK	0.4385	6	600	1512
6	QPSK	0.5879	8	808	1512
7	16QAM	0.3691	11	1032	3024
8	16QAM	0.4785	13	1352	3024
9	16QAM	0.6016	16	1800	3024
10	64QAM	0.4551	19	2152	4536
11	64QAM	0.5537	21	2600	4536
12	64QAM	0.6504	23	2984	4536
13	64QAM	0.7539	25	3496	4536
14	64QAM	0.8525	27	3752	4536
15	64QAM	0.9258	27	3752	4536
Note1: Se	ub-frame#0 and	#5 are not used for the	e correspondi	ng requirement.	

Table A.4-6: Transport format corresponding to each CQI index for 6 PRB allocation (CRS)

Table A.4-6a: Transport format corresponding to each CQI index for 6 PRB allocation (CSI-RS): 1 CRS port, Non CSI-RS subframe

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	152	1368
2	QPSK	0.1172	0	152	1368
3	QPSK	0.1885	2	256	1368
4	QPSK	0.3008	4	408	1368
5	QPSK	0.4385	6	600	1368
6	QPSK	0.5879	8	808	1368
7	16QAM	0.3691	11	1032	2736
8	16QAM	0.4785	13	1352	2736
9	16QAM	0.6016	14	1544	2736
10	64QAM	0.4551	17	1800	4104
11	64QAM	0.5537	20	2344	4104
12	64QAM	0.6504	21	2600	4104
13	64QAM	0.7539	23	2984	4104
14	64QAM	0.8525	25	3496	4104
15	64QAM	0.9258	27	3752	4104
Note1: Su	ub-frame#0 and	#5 are not used for the	e correspondir	ng requirement.	

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	152	1344
2	QPSK	0.1172	0	152	1344
3	QPSK	0.1885	1	208	1344
4	QPSK	0.3008	4	408	1344
5	QPSK	0.4385	6	600	1344
6	QPSK	0.5879	8	808	1344
7	16QAM	0.3691	10	936	2688
8	16QAM	0.4785	12	1192	2688
9	16QAM	0.6016	14	1544	2688
10	64QAM	0.4551	17	1800	4032
11	64QAM	0.5537	19	2152	4032
12	64QAM	0.6504	21	2600	4032
13	64QAM	0.7539	23	2984	4032
14	64QAM	0.8525	25	3496	4032
15	64QAM	0.9258	26	3624	4032
Note1: Su	ub-frame#0 and a	#5 are not used for the	e correspondir	ng requirement.	

Table A.4-6b: Transport format corresponding to each CQI index for 6 PRB allocation (CSI-RS): 1 CRS port , 2 CSI-RS ports, CSI-RS Subframe

Table A.4-6c: Transport format corresponding to each CQI index for 6 PRB allocation (CSI-RS and CSI-IM): 2 CRS ports, Non CSI-RS and Non CSI-IM subframe

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	152	1296
2	QPSK	0.1172	0	152	1296
3	QPSK	0.1885	2	256	1296
4	QPSK	0.3008	4	408	1296
5	QPSK	0.4385	6	600	1296
6	QPSK	0.5879	8	808	1296
7	16QAM	0.3691	11	1032	2592
8	16QAM	0.4785	13	1352	2592
9	16QAM	0.6016	15	1736	2592
10	64QAM	0.4551	18	1928	3888
11	64QAM	0.5537	20	2344	3888
12	64QAM	0.6504	22	2792	3888
13	64QAM	0.7539	24	3240	3888
14	64QAM	0.8525	26	3624	3888
15	64QAM	0.9258	27	3752	3888
Note1: S	ub-frame#0 and a	#5 are not used for the	e correspondii	ng requirement.	

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	152	1056
2	QPSK	0.1172	0	152	1056
3	QPSK	0.1885	0	152	1056
4	QPSK	0.3008	3	328	1056
5	QPSK	0.4385	4	408	1056
6	QPSK	0.5879	6	600	1056
7	16QAM	0.3691	10	936	2112
8	16QAM	0.4785	11	1032	2112
9	16QAM	0.6016	12	1192	2112
10	64QAM	0.4551	17	1800	3168
11	64QAM	0.5537	17	1800	3168
12	64QAM	0.6504	18	1928	3168
13	64QAM	0.7539	20	2344	3168
14	64QAM	0.8525	21	2600	3168
15	64QAM	0.9258	22	2792	3168
Note1: Su	ub-frame#0 and a	#5 are not used for the	e correspondi	ng requirement.	

Table A.4-6d: Transport format corresponding to each CQI index for 6 PRB allocation (CSI-RS and
CSI-IM): 2 CRS ports, 4 CSI-RS ports, 4 CSI processes, CSI-RS and CSI-IM subframe

Table A.4-6e: Transport format corresponding to each CQI index for 6 PRB allocation (CSI-RS and CSI-IM): 2 CRS ports, 4 CSI-RS ports, 3 CSI processes, CSI-RS and CSI-IM subframe

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	152	1104
2	QPSK	0.1172	0	152	1104
3	QPSK	0.1885	1	208	1104
4	QPSK	0.3008	3	328	1104
5	QPSK	0.4385	5	504	1104
6	QPSK	0.5879	6	600	1104
7	16QAM	0.3691	10	936	2208
8	16QAM	0.4785	11	1032	2208
9	16QAM	0.6016	13	1352	2208
10	64QAM	0.4551	17	1800	3312
11	64QAM	0.5537	17	1800	3312
12	64QAM	0.6504	19	2152	3312
13	64QAM	0.7539	21	2600	3312
14	64QAM	0.8525	22	2792	3312
15	64QAM	0.9258	23	2984	3312
Note1: S	ub-frame#0 and	#5 are not used for the	e correspondi	ng requirement.	

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame	
0	out of range	out of range	DTX	-	-	
1	QPSK	0.0762	0	152	1200	
2	QPSK	0.1172	0	152	1200	
3	QPSK	0.1885	1	208	1200	
4	QPSK	0.3008	3	328	1200	
5	QPSK	0.4385	5	504	1200	
6	QPSK	0.5879	7	712	1200	
7	16QAM	0.3691	10	936	2400	
8	16QAM	0.4785	12	1192	2400	
9	16QAM	0.6016	13	1352	2400	
10	64QAM	0.4551	17	1800	3600	
11	64QAM	0.5537	18	1928	3600	
12	64QAM	0.6504	20	2344	3600	
13	64QAM	0.7539	21	2600	3600	
14	64QAM	0.8525	23	2984	3600	
15	64QAM	0.9258	24	3240	3600	
Note1: Sub-frame#0 and #5 are not used for the corresponding requirement.						

Table A.4-6f: Transport format corresponding to each CQI index for 6 PRB allocation (CSI-RS and
CSI-IM): 2 CRS ports, 4 CSI-RS ports, 1 CSI process, CSI-RS and CSI-IM subframe

Table A.4-7: Reference channel for CQI requirements (FDD) partial PRB allocation (CRS)

Parameter	Unit	Value				
Channel bandwidth	MHz	3	5	10	15	20
Allocated resource blocks				15		
				(Note 3)		
Subcarriers per resource block				12		
Allocated subframes per Radio				8		
Frame						
Modulation				Table A.4-9		
Target coding rate				Table A.4-9		
Number of HARQ processes				8		
Maximum number of HARQ				1		
transmissions						
Note 1: 3 symbols allocated to P	DCCH.					
Note 2: Only subframes 1,2,3,4,	Only subframes 1,2,3,4,6,7,8, and 9 are allocated to avoid PBCH and synchronization					
signal overhead.	signal overhead.					
Note 3: Centered within the Tran	smission Ba	andwidth C	Configurati	on (Figure 5.	6-1).	

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Table A.4-8: Reference channel for CQI requirements (TDD) partial PRB allocation (CRS)

Parameter		Unit			Value		
Channel bandwidth		MHz	3 5 10 15				20
Allocated resource blo	cks				15		
					(Note 3)		
Subcarriers per resour	ce block				12		
Allocated subframes p	er Radio				4		
Frame							
Modulation			Table A.4-9				
Target coding rate				-	Table A.4-9		
Number of HARQ proc	esses				10		
Maximum number of H	ARQ				1		
transmissions							
Note 1: 3 symbols a	llocated to PDC	CH.					
Note 2: When UL-D	L configuration	1 is used	and only s	subframes	4 and 9 are	allocated	to avoide
PBCH and s	PBCH and synchronizaiton signal overhead. When UL-DL configuration 2 is used and						ed and
only subfran overhead.	only subframes 3, 4, 8, and 9 are allocated to avoid PBCH and synchronization signal						signal
	thin the Transm	nission Ba	andwidth C	onfiguratio	n (Figure 5.	6-1).	

Table A.4-9: Transport format corresponding to each CQI index for 15 PRB allocation (CRS)

CQI index	Modulation	Target code rate	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	392	3780
2	QPSK	0.1172	0	392	3780
3	QPSK	0.1885	2	648	3780
4	QPSK	0.3008	4	1064	3780
5	QPSK	0.4385	6	1544	3780
6	QPSK	0.5879	8	2088	3780
7	16QAM	0.3691	11	2664	7560
8	16QAM	0.4785	13	3368	7560
9	16QAM	0.6016	16	4584	7560
10	64QAM	0.4551	18	4968	11340
11	64QAM	0.5537	21	6456	11340
12	64QAM	0.6504	23	7480	11340
13	64QAM	0.7539	25	8504	11340
14	64QAM	0.8525	27	9528	11340
15	64QAM	0.9258	27	9528	11340
Note1: S	ub-frame#0 and	#5 are not used for the	e correspondi	ng requirement.	

Table A.4-10: Reference channel for CQI requirements (FDD) 3 PRB allocation (CRS)

Parameter	Unit			Va	lue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		3	3	3	3	3	3
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		8	8	8	8	8	8
Modulation					Table A.4-12		
Target coding rate					Table A.4-12		
Number of HARQ Processes	Processes	8	8	8	8	8	8
Maximum number of HARQ transmissions		1	1	1	1	1	1
Note 1: 3 symbols allocated to PDCCH. Note 2: Only subframes 1,2,3,4,6,7,8, and 9 are allocated to avoid PBCH and synchronization signal overhead.							

Parameter	Unit			Va	alue		
Channel bandwidth	MHz	1.4	3	5	10	15	20
Allocated resource blocks		3	3	3	3	3	3
Subcarriers per resource block		12	12	12	12	12	12
Allocated subframes per Radio Frame		4	4	4	4	4	4
Modulation					Table A.4-12		
Target coding rate					Table A.4-12		
Number of HARQ Processes	Processes	10	10	10	10	10	10
Maximum number of HARQ transmissions		1	1	1	1	1	1
Note 1: 3 symbols allocated to PDCCH. Note 2: UL-DL configuration 2 is used and synchronization signal overhead.	d only subframe	es 3, 4, 8,	and 9 are a	allocated to	o avoid PBC	H and	

Table A.4-12: Transport format corresponding to each CQI index for 3 PRB allocation (CRS)

		-	Imcs	Information Bit Payload	Binary Channel Bits Per Sub- Frame
0	out of range	out of range	DTX	-	-
1	QPSK	0.0762	0	56	756
2	QPSK	0.1172	1	88	756
3	QPSK	0.1885	2	144	756
4	QPSK	0.3008	5	224	756
5	QPSK	0.4385	7	328	756
6	QPSK	0.5879	9	456	756
7	16QAM	0.3691	12	584	1512
8	16QAM	0.4785	13	744	1512
9	16QAM	0.6016	16	904	1512
10	64QAM	0.4551	19	1064	2268
11	64QAM	0.5537	21	1288	2268
12	64QAM	0.6504	23	1480	2268
13	64QAM	0.7539	25	1736	2268
14	64QAM	0.8525	27	1864	2268
15	64QAM	0.9258	27	1864	2268

Note1: Sub-frame#0 and #5 are not used for the corresponding requirement.

A.5 OFDMA Channel Noise Generator (OCNG)

A.5.1 OCNG Patterns for FDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test) and/or allocations used for MBSFN. The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level (γ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols with and without reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i _RA / OCNG _RA = PDSCH_i _RB / OCNG _RB,$$

where γ_i denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels γ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a constant transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given respectively by PDCCH_RA/RB and PHICH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

For the performance requirements of UE with the CA capability, the OCNG patterns apply for each CC.

A.5.1.1 OCNG FDD pattern 1: One sided dynamic OCNG FDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

Table A.5.1.1-1: OP.1 FDD: One sided dynamic OCNG FDD Pattern

Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dB]						
Subframe						
	0 5 1-4,6-9					
		Allocation		Data		
First u	unallocated PRB	First unallocated PRB	First unallocated PRB			
Last u	unallocated PRB	Last unallocated PRB	Last unallocated PRB			
	0	0	0	Note 1		
Note 1:			arbitrary number of virtual UEs wit PDSCHs shall be uncorrelated ps			
	data, which is QPS	K modulated. The parameter $\gamma_{_{Pl}}$	$_{RB}$ is used to scale the power of PI	DSCH.		
Note 2:	Note 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The					
	parameter $\gamma_{_{PRB}}$ applies to each antenna port separately, so the transmit power is equal between all					
	the transmit antenn section 7.1 in 3GPF		e antenna transmission modes ar	e specified in		

A.5.1.2 OCNG FDD pattern 2: Two sided dynamic OCNG FDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in two parts by the allocated area – two sided), starts with PRB 0 and ends with PRB $N_{_{RB}}-1$.

	R					
	0	5	1-4,6-9	1		
		Allocation		PDSCH Data		
0 – (Firs	t allocated PRB-1)	0 – (First allocated PRB-1)	0 – (First allocated PRB-1)	i boon bulu		
	and	and	and			
(Last all	located PRB+1) –	(Last allocated PRB+1) –	(Last allocated PRB+1) –			
	$(N_{RB} - 1)$	$(N_{RB} - 1)$	$(N_{RB} - 1)$			
	0	0	0	Note 1		
Note 1:		ource blocks are assigned to a mitted over the OCNG PDSCHs				
	modulated. The pa	rameter $\gamma_{\scriptscriptstyle PRB}$ is used to scale t	he power of PDSCH.			
Note 2:						
	users by all the transmit antennas with CRS according to transmission mode 2. The parameter $\gamma_{_{PRB}}$ applies					
		ort separately, so the transmit p				

Table A.5.1.2-1: OP.2 FDD: Two sided dynamic OCNG FDD Pattern

A.5.1.3 OCNG FDD pattern 3: 49 RB OCNG allocation with MBSFN in 10 MHz

		Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dB]					PMCH Data
Allocation n_{PRB}		Subframe				PDSCH Data	
		0	5	4, 9	1 – 3, 6 – 8	Duiu	Dulu
1 – 49		0	0 (Allocation: all empty PRB-s)	0	N/A	Note 1	N/A
0 – 49		N/A	N/A	N/A	0	N/A	Note 2
Note 1: Note 2:	one PDS uncorrel used to Each ph each PF measure contain	These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH. Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The parameter γ_{PRB} is used to scale the power of PMCH.					
Note 3:	the virtu transmit	f two or more transmit antennas are used in the test, the OCNG shall be transmitted to he virtual users by all the transmit antennas according to transmission mode 2. The ransmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.					
N/A:	Not App	licable					

Table A.5.1.3-1: OP.3 FDD: OCNG FDD Pattern 3

A.5.1.4 OCNG FDD pattern 4: One sided dynamic OCNG FDD pattern for MBMS transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided) and MBMS performance is tested.

		Re					
Alloca		Subframe			PDSCH Data	PMCH Data	
n_{PR}	В	0, 4, 9	5	1 – 3, 6 – 8	Dulu	Duiu	
First unallocated PRB – Last unallocated PRB		0	0 (Allocation: all empty PRB-s)	N/A	Note 1	N/A	
First unallocated PRB – Last unallocated PRB		N/A	N/A	N/A	N/A	Note 2	
Note 1:				ssigned to an arbitrary numb ransmitted over the OCNG F			
	uncorrel	ated pseudo ra	ndom data, wł	nich is QPSK modulated. The	e paramete	r $\gamma_{_{PRB}}$ is	
Note 2:	Each ph each PF measure	used to scale the power of PDSCH. Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any neasurement. The MBSFN data shall be QPSK modulated. PMCH subframes shall contain cell-specific Reference Signals only in the first symbol of the first time slot. The					
	paramet	er $\gamma_{\scriptscriptstyle PRB}$ is used	I to scale the p	ower of PMCH.			
Note 3:	the virtu transmit	If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.					
N/A:	Not App	licable					

Table A.5.1.4-1: OP.4 FDD: One sided dynamic OCNG FDD Pattern for MBMS transmission

A.5.1.5 OCNG FDD pattern 5: One sided dynamic 16QAM modulated OCNG FDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of DL sub-frames, when the unallocated area is continuous in the frequency domain (one sided).

	Relative power level $\gamma_{_{PRB}}$ [dB]						
Subframe							
	0 5 1-4,6-9						
		Allocation		Data			
First unallocated PRB First unallocated PRB First unallocated							
Last u	unallocated PRB	Last unallocated PRB	Last unallocated PRB				
	0	0	0	Note 1			
Note 1:			arbitrary number of virtual UEs wit PDSCHs shall be uncorrelated ps				
	data, which is 16QA	AM modulated. The parameter γ	$_{PRB}$ is used to scale the power of F	PDSCH.			
Note 2:	lote 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 3 (Large						
	Delay CDD). The parameter $\gamma_{_{PRB}}$ applies to each antenna port separately, so the transmit power is						
		ne transmit antennas with CRS u d in section 7.1 in 3GPP TS 36.2	ised in the test. The antenna trans 13.	mission			

Table A.5.1.5-1: OP.5 FDD: One sided dynamic 16QAM modulated OCNG FDD Pattern

A.5.1.6 OCNG FDD pattern 6: dynamic OCNG FDD pattern when user data is in 2 non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in two parts by the first allocated block). The second allocated block ends with PRB $N_{RB} - 1$.

	R					
	0	5	1-4,6-9			
		Allocation				
0 – (Firs	t allocated PRB of	0 – (First allocated PRB of	0 – (First allocated PRB of	PDSCH Data		
fii	rst block -1)	first block -1)	first block -1)			
	and	and	and			
	ocated PRB of first	(Last allocated PRB of first	(Last allocated PRB of first			
block +1) – (First allocated	block +1) – (First allocated	block +1) – (First allocated			
PRB of	second block -1)	PRB of second block -1)	PRB of second block -1)			
	0	0	0	Note 1		
Note 1:		ource blocks are assigned to a nitted over the OCNG PDSCHs				
	modulated. The pa	rameter $\gamma_{\scriptscriptstyle PRB}$ is used to scale t	he power of PDSCH.			
Note 2:	lote 2: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the					
	users by all the transmit antennas with CRS according to transmission mode 2. The parameter $\gamma_{_{PRB}}$ applies					
	•	ort separately, so the transmit p ne antenna transmission modes	•			

A.5.1.7 OCNG FDD pattern 7: dynamic OCNG FDD pattern when user data is in multiple non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data, EPDCCH or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in

multiple parts by the *M* allocated blocks for data transmission). The *m*-th allocated block starts with RPB $N_{Start,m}$ and ends with PRB $N_{End,m} - 1$, where m = 1, ..., M. The system bandwidth starts with RPB 0 and ends with $N_{RB} - 1$.

F						
0						
	Allocation					
$0 - (PRB N_{Start,1} - 1)$	$0 - (PRB N_{Start,1} - 1)$	$0 - (PRB N_{Start,1} - 1)$				
			PDSCH Data			
$(PRBN_{End,(m-1)}) - (PRB$	$(PRBN_{End,(m-1)}) - (PRB$	$(PRBN_{End,(m-1)}) - (PRB$				
$N_{Start,m} - 1$)	$N_{Start,m} - 1$)	$N_{Start,m} - 1$)				
$(PRBN_{End,M}) - (PRB$	$(PRBN_{End,M}) - (PRB$	$(PRBN_{End,M})$ – $(PRB$				
$N_{RB} - 1$)	$N_{RB} - 1$)	$N_{RB} - 1$)				
0	0	0	Note 1			
	source blocks are assigned to a mitted over the OCNG PDSCHs					
modulated. The pa	arameter $\gamma_{\scriptscriptstyle PRB}$ is used to scale t	he power of PDSCH.				
users by all the tra	users by all the transmit antennas with CRS according to transmission mode 2. The parameter $\gamma_{_{PRB}}$ applies					
	ort separately, so the transmit p					

Table A.5.1.7-1: OP.7 FDD: OCNG FDD Pattern when user data is in multiple non-contiguous blocks

A.5.1.8 OCNG FDD pattern 8: One sided dynamic OCNG FDD pattern for TM10 transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

		Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dl	3]				
Subframe							
	0 5 1-4,6-9						
		Allocation		Data			
First u	unallocated PRB	First unallocated PRB					
Last unallocated PRB		Last unallocated PRB	Last unallocated PRB				
	0 0		0	Note 1,2,3			
Note 1:	Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random						
	data, which is 16QAM modulated. The parameter $\gamma_{_{PRB}}$ is used to scale the power of PDSCH.						
Note 2:	transmission mode10. The the transmit power is equal between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.						
Note 3:	The detailed test se	t-up for TM10 transmission i.e P	MI configuration is specified to ea	ch test case.			

A.5.2 OCNG Patterns for TDD

The following OCNG patterns are used for modelling allocations to virtual UEs (which are not under test). The OCNG pattern for each sub frame specifies the allocations that shall be filled with OCNG, and furthermore, the relative power level of each such allocation.

In each test case the OCNG is expressed by parameters OCNG_RA and OCNG_RB which together with a relative power level (γ) specifies the PDSCH EPRE-to-RS EPRE ratios in OFDM symbols with and without reference symbols, respectively. The relative power, which is used for modelling boosting per virtual UE allocation, is expressed by:

$$\gamma_i = PDSCH_i _RA / OCNG _RA = PDSCH_i _RB / OCNG _RB,$$

where γ_i denotes the relative power level of the *i:th* virtual UE. The parameter settings of OCNG_RA, OCNG_RB, and the set of relative power levels γ are chosen such that when also taking allocations to the UE under test into account, as given by a PDSCH reference channel, a transmitted power spectral density that is constant on an OFDM symbol basis is targeted.

Moreover the OCNG pattern is accompanied by a PCFICH/PDCCH/PHICH reference channel which specifies the control region. For any aggregation and PHICH allocation, the PDCCH and any unused PHICH groups are padded with resource element groups with a power level given respectively by PDCCH_RA/RB and PHICH_RA/RB as specified in the test case such that a total power spectral density in the control region that is constant on an OFDM symbol basis is targeted.

A.5.2.1 OCNG TDD pattern 1: One sided dynamic OCNG TDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the subframes available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is continuous in frequency domain (one sided).

		Relative power	level $\gamma_{\scriptscriptstyle PRB}$ [dB]			
Subframe (only if available for DL)						
0 5		5	3, 4, 7, 8, 9 5 and 6 (as normal subframe) ^{Note 2}		PDSCH Data	
		Allo	cation			
First unallocated PRB		First unallocated PRB –	First unallocated PRB –	First unallocated PRB –		
Last una	llocated PRB	Last unallocated PRB	Last unallocated PRB	Last unallocated PRB		
	0	0	0	0	Note 1	
Note 1:			ssigned to an arbitrary num ne OCNG PDSCHs shall be			
	which is QPS	SK modulated. The param	neter $\gamma_{\scriptscriptstyle PRB}$ is used to scale	the power of PDSCH.		
Note 2:	Subframes a 3GPP TS 36		ion depends on the Uplink-	Downlink configuration in	Table 4.2-2 in	
Note 3:	te 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The					
	parameter $\gamma_{_{PRB}}$ applies to each antenna port separately, so the transmit power is equal between all the					
	transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.					

Table A.5.2.1-1: OP.1 TDD: One sided dynamic OCNG TDD Pattern

A.5.2.2 OCNG TDD pattern 2: Two sided dynamic OCNG TDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the subframes available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is

discontinuous in frequency domain (divided in two parts by the allocated area – two sided), starts with PRB 0 and ends with PRB $N_{\rm _{RB}}$ –1.

	Relative power level γ_{PRB} [dB]					
Subframe (only if available for DL)						
	0	5	3, 4, 6, 7, 8, 9	1,6		
			(6 as normal subframe)	(6 as special subframe)		
		Alloc	ation			
	0 —	0 —	0 —	0 —		
(First all	ocated PRB-1)	(First allocated PRB-1)	(First allocated PRB-1)	(First allocated PRB-1)		
	and	and	and	and		
	cated PRB+1) –	(Last allocated PRB+1) –	(Last allocated PRB+1) –	(Last allocated PRB+1) –		
()	$N_{RB} - 1$)	$(N_{RB} - 1)$	$(N_{RB} - 1)$	$(N_{RB} - 1)$		
	0	0	0	0	Note 1	
Note 1:	These physical UE; the data tra	resource blocks are assigned nsmitted over the OCNG PD	d to an arbitrary number of vi SCHs shall be uncorrelated (rtual UEs with one PDSCH p oseudo random data, which i	er virtual s QPSK	
	modulated. The	parameter $\gamma_{\scriptscriptstyle PRB}$ is used to set	cale the power of PDSCH.			
Note 2:						
Note 3:	If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual					
users by all the transmit antennas with CRS according to transmission mode 2. The parameter $\gamma_{_{PRB}}$ appl					applies to	
			it power is equal between all are specified in section 7.1 i	the transmit antennas with C n 3GPP TS 36.213.	CRS used	

A.5.2.3 OCNG TDD pattern 3: 49 RB OCNG allocation with MBSFN in 10 MHz

Table A.5.2.3-1: OP.3 TDD: OCNG TDD Pattern 3 for 5ms downlink-to-uplink switch-point periodicity

Allocation			Relative power level $\gamma_{_{PRB}}$ [dB]				
			Subf	PDSCH Data	PMCH Data		
n_{PR}	В	0	5	4, 9 ^{Note 2}	1, 6		
1 – 49		0	0 (Allocation: all empty PRB-s)	N/A	0	Note 1	N/A
0 - 4	19	N/A	N/A	0	N/A	N/A	Note 3
Note 2:	Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH. Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in						
Note 3:	3GPP TS 36.211.						
Note 4:	If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.						
N/A	Not A	pplicable					

A.5.2.4 OCNG TDD pattern 4: One sided dynamic OCNG TDD pattern for MBMS transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided) and MBMS performance is tested.

		Relative power	PDSCH Data	PMCH Data		
Allocation		Subframe (
n _{PRB}	0 and 6 (as normal subframe)	1 (as special subframe)	5	3, 4, 7 – 9	1 Door Data	1 morr Bata
First unallocate d PRB – Last unallocate d PRB	0	0 (Allocation: all empty PRB-s of DwPTS)	0 (Allocation: all empty PRB-s)	N/A	Note 1	N/A
First unallocate d PRB – Last unallocate d PRB	N/A	N/A	N/A	N/A	N/A	Note2
Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.						
u C	Each physical resource block (PRB) is assigned to MBSFN transmission. The data in each PRB shall be uncorrelated with data in other PRBs over the period of any measurement. The MBSFN data shall be QPSK modulated. PMCH symbols shall not contain cell-specific Reference Signals.					
b b	If two or more transmit antennas are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode 2. The transmit power shall be equally split between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.					
N/A N	lot Applicable					

Table A.5.2.4-1: OP.4 TDD: One sided dynamic OCNG TDD Pattern for MBMS transmission

A.5.2.5 OCNG TDD pattern 5: One sided dynamic 16QAM modulated OCNG TDD pattern

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the sub-frames available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is continuous in frequency domain (one sided).

	Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dB]					
		Subframe (only i	if available for DL)			
0		5	3, 4, 7, 8, 9 and 6 (as normal subframe) ^{Note 2}	1 and 6 (as special subframe) ^{Note 2}	PDSCH Data	
		Allo	cation			
First una	llocated PRB	First unallocated PRB	First unallocated PRB	First unallocated PRB		
Last una	located PRB	Last unallocated PRB	Last unallocated PRB	Last unallocated PRB		
	0	0	0	0	Note 1	
Note 1:	lote 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data,					
	which is 16Q	AM modulated. The para	meter $\gamma_{\scriptscriptstyle PRB}$ is used to scale	e the power of PDSCH.		
Note 2:	2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211					
Note 3:	Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 3 (Large Delay					
	CDD). The parameter $\gamma_{_{PRB}}$ applies to each antenna port separately, so the transmit power is equal					
	between all the transmit antennas with CRS used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.					

Table A.5.2.5-1: OP.5 TDD: One sided dynamic 16QAM modulated OCNG TDD Pattern

A.5.2.6 OCNG TDD pattern 6: dynamic OCNG TDD pattern when user data is in 2 non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the subframes available for DL transmission (depending on TDD UL/DL configuration), when the unallocated area is discontinuous in frequency domain (divided in two parts by the first allocated block). The second allocated block ends with PRB $N_{RB} - 1$.

Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dB]					PDSCH Data	
		Subframe (only in	f available for DL)		Data	
	0	5	3, 4, 6, 7, 8, 9	1,6		
			(6 as normal subframe)	(6 as special subframe)		
		Alloc	ation			
0 – (Firs	t allocated PRB	0 – (First allocated PRB	0 – (First allocated PRB	0 – (First allocated PRB		
of fir	st block -1)	of first block -1)	of first block -1)	of first block -1)		
	and	and	and	and		
(Last al	located PRB of	(Last allocated PRB of	(Last allocated PRB of	(Last allocated PRB of		
	ock +1) – (First	first block +1) – (First	first block +1) – (First	first block +1) – (First		
allocated	PRB of second	allocated PRB of second	allocated PRB of second	allocated PRB of second		
block -1)		block -1)	block -1)	block -1)		
0		0	0	0	Note 1	
Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK						
	modulated. The	parameter $\gamma_{\scriptscriptstyle PRB}$ is used to set	cale the power of PDSCH.			
Note 2:						
Note 3:	If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual					
users by all the transmit antennas with CRS according to transmission mode 2. The parameter ${\gamma}_{_{PRB}}$ app						
			it power is equal between all are specified in section 7.1 i		CRS used	

A.5.2.7 OCNG TDD pattern 7: dynamic OCNG TDD pattern when user data is in multiple non-contiguous blocks

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data, EPDCCH or system information) of the DL sub-frames, when the unallocated area is discontinuous in frequency domain (divided in multiple parts by the *M* allocated blocks for data transmission). The *m*-th allocated block starts with RPB $N_{Start,m}$ and ends with PRB $N_{End,m}$ -1, where m = 1, ..., M. The system bandwidth starts with RPB 0 and ends with N_{RB} -1.

The system bandwidth starts with Ki b 0 and ends with N_{RB} 1.

Table A.5.2.7-1: OP.7 TDD: OCNG TDD Pattern when user data is in multiple non-contiguous blocks

Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dB]						
	Subframe (only if	f available for DL)		Data		
0	5	3, 4, 6, 7, 8, 9	1,6			
		(6 as normal subframe)	(6 as special subframe)			
	Alloc	ation				
$0 - (PRB N_{Start,1} - 1)$	$0 - (PRB N_{Start,1} - 1)$	$0 - (PRB N_{Start,1} - 1)$	0 – (PRB $N_{Start,1}$ –1)			
$(PRBN_{End,(m-1)})$ –	$(PRBN_{End,(m-1)})$ –	$(PRBN_{End,(m-1)})$ –	$(PRBN_{End,(m-1)})$ –			
(PRB $N_{Start,m} - 1$)	(PRB $N_{Start,m} - 1$)	(PRB $N_{Start,m} - 1$)	(PRB $N_{Start,m} - 1$)			
$(PRBN_{End,M})$ – $(PRB$	$(PRBN_{End,M}) - (PRB$	$(PRBN_{End,M})$ – $(PRB$	$(PRBN_{End,M})$ – $(PRB$			
$N_{RB} - 1$)	$N_{RB} - 1$)	$N_{RB} - 1$)	$N_{RB} - 1$)			
0 0 0		0	Note 1			
Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random data, which is QPSK modulated. The parameter γ_{PRB} is used to scale the power of PDSCH.						
Note 2: Subframes available for DL transmission depends on the Uplink-Downlink configuration in Table 4.2-2 in 3GPP TS 36.211.						
Note 3: If two or more transmit antennas with CRS are used in the test, the OCNG shall be transmitted to the virtual users by all the transmit antennas with CRS according to transmission mode 2. The parameter γ_{PRB} applies to						
-	ort separately, so the transm antenna transmission modes			CRS used		

A.5.2.8 OCNG TDD pattern 8: One sided dynamic OCNG TDD pattern for TM10 transmission

This OCNG Pattern fills with OCNG all empty PRB-s (PRB-s with no allocation of data or system information) of the DL sub-frames, when the unallocated area is continuous in frequency domain (one sided).

Relative power level $\gamma_{\scriptscriptstyle PRB}$ [dB]						
Subframe						
0 5 1-4,6-9						
Allocation						
First u	unallocated PRB	First unallocated PRB	First unallocated PRB			
Last unallocated PRB		Last unallocated PRB	Last unallocated PRB			
0		0	0	Note 1,2,3		
Note 1:	Note 1: These physical resource blocks are assigned to an arbitrary number of virtual UEs with one PDSCH per virtual UE; the data transmitted over the OCNG PDSCHs shall be uncorrelated pseudo random					
	data, which is 16QAM modulated. The parameter $\gamma_{\scriptscriptstyle PRB}$ is used to scale the power of PDSCH.					
Note 2:	Note 2: The OCNG shall be transmitted to the virtual users by all the transmit antennas according to transmission mode10. The the transmit power is equal between all the transmit antennas used in the test. The antenna transmission modes are specified in section 7.1 in 3GPP TS 36.213.					
Note 3:			MI configuration is specified to ea			

Table A.5.1.1-1: OP.8 TDD: One sided dynamic OCNG TDD Pattern

Annex B (normative): Propagation conditions

B.1 Static propagation condition

For 2 port transmission the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{pmatrix} 1 & j \\ 1 & -j \end{pmatrix}.$$

For 4 port transmission the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & j & j \\ 1 & 1 - j & -j \end{bmatrix}$$

For 8 port transmission the channel matrix is defined in the frequency domain by

$$\mathbf{H} = \begin{bmatrix} 1 & 1 & 1 & 1 & j & j & j & j \\ 1 & 1 & 1 & 1 & -j & -j & -j & -j \end{bmatrix}$$

B.2 Multi-path fading propagation conditions

The multipath propagation conditions consist of several parts:

- A delay profile in the form of a "tapped delay-line", characterized by a number of taps at fixed positions on a sampling grid. The profile can be further characterized by the r.m.s. delay spread and the maximum delay spanned by the taps.

- A combination of channel model parameters that include the Delay profile and the Doppler spectrum, that is characterized by a classical spectrum shape and a maximum Doppler frequency

- A set of correlation matrices defining the correlation between the UE and eNodeB antennas in case of multi-antenna systems.

- Additional multi-path models used for CQI (Channel Quality Indication) tests

B.2.1 Delay profiles

The delay profiles are selected to be representative of low, medium and high delay spread environments. The resulting model parameters are defined in Table B.2.1-1 and the tapped delay line models are defined in Tables B.2.1-2, B.2.1-3 and B.2.1-4.

Model	Number of channel taps	Delay spread (r.m.s.)	Maximum excess tap delay (span)
Extended Pedestrian A (EPA)	7	45 ns	410 ns
Extended Vehicular A model (EVA)	9	357 ns	2510 ns
Extended Typical Urban model (ETU)	9	991 ns	5000 ns

Table B.2.1-1 Delay profiles for E-UTRA channel models

Excess tap delay [ns]	Relative power [dB]
0	0.0
30	-1.0
70	-2.0
90	-3.0
110	-8.0
190	-17.2
410	-20.8

Table B.2.1-2 Extended Pedestrian A model (EPA)

Table B.2.1-3 Extended	Vehicular A	A model ((EVA)
------------------------	-------------	-----------	-------

Excess tap delay [ns]	Relative power [dB]
0	0.0
30	-1.5
150	-1.4
310	-3.6
370	-0.6
710	-9.1
1090	-7.0
1730	-12.0
2510	-16.9

Table B.2.1-4 Extended Typical Urban model (ETU)

Excess tap delay [ns]	Relative power [dB]
0	-1.0
50	-1.0
120	-1.0
200	0.0
230	0.0
500	0.0
1600	-3.0
2300	-5.0
5000	-7.0

B.2.2 Combinations of channel model parameters

The propagation conditions used for the performance measurements in multi-path fading environment are indicated as EVA[number], EPA[number] or ETU[number] where 'number' indicates the maximum Doppler frequency (Hz).

Table B.2.2-1 Void

B.2.3 MIMO Channel Correlation Matrices

The MIMO channel correlation matrices defined in B.2.3 apply for the antenna configuration using uniform linear arrays at both eNodeB and UE.

B.2.3.1 Definition of MIMO Correlation Matrices

Table B.2.3.1-1 defines the correlation matrix for the eNodeB

	One antenna	Two antennas	Four antennas
eNode B Correlation	$R_{eNB} = 1$	$R_{eNB} = \begin{pmatrix} 1 & \alpha \\ \alpha^* & 1 \end{pmatrix}$	$R_{eNB} = \begin{pmatrix} 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} & \alpha \\ \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} \\ \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} \\ \alpha^{*} & \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 \end{pmatrix}$

Table B.2.3.1-1 eNodeB correlation matrix

Table B.2.3.1-2 defines the correlation matrix for the UE:

	One antenna	Two antennas	Four antennas
UE Correlation	<i>R_{UE}</i> = 1	$R_{UE} = \begin{pmatrix} 1 & \beta \\ \beta^* & 1 \end{pmatrix}$	$R_{UE} = \begin{pmatrix} 1 & \beta^{\frac{1}{9}} & \beta^{\frac{4}{9}} & \beta \\ \beta^{\frac{1}{9}^{*}} & 1 & \beta^{\frac{1}{9}} & \beta^{\frac{4}{9}} \\ \beta^{\frac{4}{9}^{*}} & \beta^{\frac{1}{9}^{*}} & 1 & \beta^{\frac{1}{9}} \\ \beta^{*} & \beta^{\frac{4}{9}^{*}} & \beta^{\frac{1}{9}^{*}} & 1 \end{pmatrix}$

Table B.2.3.1-2 UE correlation matrix

Table B.2.3.1-3 defines the channel spatial correlation matrix R_{spat} . The parameters, α and β in Table B.2.3.1-3 defines the spatial correlation between the antennas at the eNodeB and UE.

Table B.2.3.1-3:	R_{spat}	correlation matrices
------------------	------------	----------------------

1x2 case	$R_{spat} = R_{UE} = \begin{bmatrix} 1 & \beta \\ \beta^* & 1 \end{bmatrix}$
2x2 case	$R_{spat} = R_{eNB} \otimes R_{UE} = \begin{bmatrix} 1 & \alpha \\ \alpha^* & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & \beta \\ \beta^* & 1 \end{bmatrix} = \begin{bmatrix} 1 & \beta & \alpha & \alpha\beta \\ \beta^* & 1 & \alpha\beta^* & \alpha \\ \alpha^* & \alpha^*\beta & 1 & \beta \\ \alpha^*\beta^* & \alpha^* & \beta^* & 1 \end{bmatrix}$
4x2 case	$R_{spat} = R_{eNB} \otimes R_{UE} = \begin{bmatrix} 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} & \alpha \\ \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} \\ \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} \\ \alpha^{*} & \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & \beta \\ \beta^{*} & 1 \end{bmatrix}$
4x4 case	$R_{spat} = R_{eNB} \otimes R_{UE} = \begin{bmatrix} 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} & \alpha \\ \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} \\ \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} \\ \alpha^{\frac{4}{9}} & \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & \beta^{\frac{1}{9}} & \beta^{\frac{4}{9}} & \beta \\ \beta^{\frac{1}{9}} & 1 & \beta^{\frac{1}{9}} & \beta^{\frac{4}{9}} \\ \beta^{\frac{4}{9}} & \beta^{\frac{1}{9}} & 1 & \beta^{\frac{1}{9}} \\ \beta^{\frac{4}{9}} & \beta^{\frac{4}{9}} & \beta^{\frac{1}{9}} & 1 \end{bmatrix}$

For cases with more antennas at either eNodeB or UE or both, the channel spatial correlation matrix can still be expressed as the Kronecker product of R_{eNB} and R_{UE} according to $R_{spat} = R_{eNB} \otimes R_{UE}$.

B.2.3.2 MIMO Correlation Matrices at High, Medium and Low Level

The α and β for different correlation types are given in Table B.2.3.2-1.

Low co	rrelation	Medium C	orrelation	High Correlation		
α	β	α	β	α	β	
0	0	0.3	0.9	0.9	0.9	

Table B.2.3.2-1

The correlation matrices for high, medium and low correlation are defined in Table B.2.3.1-2, B.2.3.2-3 and B.2.3.2-4, as below.

The values in Table B.2.3.2-2 have been adjusted for the $4x^2$ and $4x^4$ high correlation cases to insure the correlation matrix is positive semi-definite after round-off to 4 digit precision. This is done using the equation:

$$\mathbf{R}_{high} = [\mathbf{R}_{spatial} + aI_n]/(1+a)$$

Where the value "a" is a scaling factor such that the smallest value is used to obtain a positive semi-definite result. For the $4x^2$ high correlation case, a=0.00010. For the $4x^4$ high correlation case, a=0.00012.

The same method is used to adjust the 4x4 medium correlation matrix in Table B.2.3.2-3 to insure the correlation matrix is positive semi-definite after round-off to 4 digit precision with a = 0.00012.

1x2 case		$R_{high} = \begin{pmatrix} 1 & 0.9 \\ 0.9 & 1 \end{pmatrix}$								
2x2 case		$R_{high} = \begin{pmatrix} 1 & 0.9 & 0.9 & 0.81 \\ 0.9 & 1 & 0.81 & 0.9 \\ 0.9 & 0.81 & 1 & 0.9 \\ 0.81 & 0.9 & 0.9 & 1 \end{pmatrix}$								
4x2 case	$R_{high} =$	$\begin{bmatrix} 1.0000 & 0.8999 & 0.9883 & 0.8894 & 0.9542 & 0.8587 & 0.8999 & 0.8099 \\ 0.8999 & 1.0000 & 0.8894 & 0.9883 & 0.8587 & 0.9542 & 0.8099 & 0.8999 \\ 0.9883 & 0.8894 & 1.0000 & 0.8999 & 0.9883 & 0.8894 & 0.9542 & 0.8587 \\ 0.8894 & 0.9883 & 0.8999 & 1.0000 & 0.8894 & 0.9883 & 0.8587 & 0.9542 \\ 0.9542 & 0.8587 & 0.9883 & 0.8894 & 1.0000 & 0.8999 & 0.9883 & 0.8894 \\ 0.8587 & 0.9542 & 0.8894 & 0.9883 & 0.8999 & 1.0000 & 0.8894 & 0.9883 \\ 0.8999 & 0.8099 & 0.9542 & 0.8587 & 0.9883 & 0.8894 & 1.0000 & 0.8894 \\ 0.8099 & 0.8999 & 0.8587 & 0.9542 & 0.8894 & 0.9883 & 0.8894 \\ 0.8099 & 0.8999 & 0.8587 & 0.9542 & 0.8894 & 0.9883 & 0.8894 \\ 1.0000 & 0.8894 & 1.0000 & 0.8894 & 0.9883 \\ 0.8999 & 0.8099 & 0.9542 & 0.8587 & 0.9883 & 0.8894 & 1.0000 & 0.8999 \\ 0.8099 & 0.8999 & 0.8587 & 0.9542 & 0.8894 & 0.9883 & 0.8999 & 1.0000 \end{bmatrix}$								
4x4 case	$R_{high} = \left(\begin{array}{c} 0.9882\ 1.0000\ 0.9541\ 0.9882\ 0.999\ 0.9541\ 0.9882\ 0.9767\ 0.9882\ 0.9767\ 0.9882\ 0.9430\ 0.9767\ 0.9884\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.9541\ 0.9430\ 0.8587\ 0.9105\ 0.8894\ 0.$	$\begin{array}{c} 0.9541 \ 0.8999 \ 0.9882 \ 0.9767 \ 0.9430 \ 0.8894 \ 0.9541 \ 0.9430 \ 0.9105 \ 0.8587 \ 0.8999 \ 0.8894 \ 0.8587 \ 0.8099 \\ 0.9882 \ 0.9541 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9430 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.9105 \ 0.8587 \ 0.8999 \ 0.8894 \ 0.8587 \ 0.8999 \\ 0.9882 \ 0.9541 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9105 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.8587 \ 0.8894 \ 0.8999 \ 0.8894 \ 0.8999 \\ 0.9882 \ 1.0000 \ 0.8894 \ 0.9430 \ 0.9767 \ 0.9882 \ 0.8587 \ 0.9105 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.8587 \ 0.8894 \ 0.8999 \ 0.8894 \\ 0.9882 \ 1.0000 \ 0.8894 \ 0.9430 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.9105 \ 0.8587 \\ 0.9430 \ 0.8894 \ 1.0000 \ 0.9882 \ 0.9541 \ 0.8999 \ 0.8824 \ 0.9767 \ 0.9430 \ 0.9430 \ 0.9541 \ 0.9430 \ 0.9105 \ 0.8587 \\ 0.9767 \ 0.9430 \ 0.9882 \ 1.0000 \ 0.9882 \ 0.9541 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9430 \ 0.9541 \ 0.9682 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9430 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.9767 \ 0.9882 \ 0.976$								

Table B.2.3.2-2: MIMO correlation matrices for high correlation

1x2 case		N/A															
2x2 case		$R_{medium} = \begin{pmatrix} 1 & 0.9 & 0.3 & 0.27 \\ 0.9 & 1 & 0.27 & 0.3 \\ 0.3 & 0.27 & 1 & 0.9 \\ 0.27 & 0.3 & 0.9 & 1 \end{pmatrix}$															
4x2 case		R _m	edium =	0 0 0 0 0 0 0	0000 .9000 .8748 .7873 .5856 .5271 .3000 .2700	0.900 1.000 0.787 0.874 0.527 0.585 0.270 0.300	00 0. 73 1. 48 0. 71 0. 56 0. 00 0.	8748 7873 0000 9000 8748 7873 5856 5271	0.787 0.874 0.900 1.000 0.787 0.874 0.527 0.585	8 0. 0 0. 0 0. 3 1. 8 0. '1 0.	8748 7873 0000 9000 .8748	0.527 0.5850 0.7872 0.8743 0.9000 1.0000 0.7872 0.8744	5 0.2 3 0.5 8 0.5 0 0.8 0 0.7 3 1.0	700 856 271 748 873 000	0.2700 0.3000 0.5271 0.5856 0.7873 0.8748 0.9000 1.0000		
4x4 case	R _{medium} =	0.9882 0.9541 0.8999 0.8747 0.8645 0.8347 0.7872 0.5855 0.5787 0.5588 0.5270 0.3000 0.2965 0.2862	1.0000 0.9882 0.9541 0.8645 0.8747 0.8645 0.8347 0.5787 0.5588 0.2965 0.3000 0.2965	0.9882 1.0000 0.9882 0.8347 0.8645 0.8747 0.8645 0.5588 0.5787 0.5855 0.5787 0.2862 0.2965 0.3000	0.9541 0.9882 1.0000 0.7872 0.8347 0.8645 0.8747 0.5270 0.5588 0.5787 0.5855 0.2700 0.2862 0.2965	0.8645 0.8347 0.7872 1.0000 0.9882 0.9541 0.8999 0.8747 0.8645 0.8347 0.7872 0.5855 0.5787 0.5588	0.8747 0.8645 0.8347 0.9882 1.0000 0.9882 0.9541 0.8645 0.8747 0.8645 0.8347 0.5787 0.5855 0.5787	0.8645 0.8747 0.8645 0.9541 0.9882 1.0000 0.9882 0.8347 0.8645 0.8747 0.8645 0.5588 0.5787 0.5855	0.8347 0.8645 0.8747 0.8999 0.9541 0.9882 1.0000 0.7872 0.8347 0.8645 0.8747 0.5270 0.5588 0.5787	0.5787 0.5588 0.5270 0.8747 0.8645 0.8347 0.7872 1.0000 0.9882 0.9541 0.8999 0.8747 0.8645 0.8347	5 0.5787 7 0.5855 3 0.5787 9 0.5588 7 0.8645 5 0.8747 7 0.8645 2 0.8347 9 0.9882 2 1.0000 1 0.9882 9 0.9541 7 0.86455 5 0.8747 7 0.86452 2 0.8747 7 0.8645 5 0.8747 7 0.86452 0.86452 0.8347	0.5787 0.5855 0.5787 0.8347 0.8645 0.8747 0.8645 0.9541 0.9882 1.0000 0.9882 0.8347 0.8645 0.8747	0.5588 0.5787 0.5855 0.7872 0.8347 0.8645 0.8747 0.8999 0.9541 0.9882 1.0000 0.7872 0.8347 0.8645	0.2965 0.2862 0.2700 0.5855 0.5787 0.5588 0.5270 0.8747 0.8645 0.8347 0.7872 1.0000 0.9882 0.9541	0.3000 0.2965 0.2862 0.5787 0.5588 0.8645 0.8747 0.8645 0.8347 0.9882 1.0000 0.9882	0.2965 0.3000 0.2965 0.5588 0.5787 0.5855 0.5787 0.8347 0.8645 0.8747 0.8645 0.9541 0.9882 1.0000	0.2862 0.2965 0.3000 0.5270 0.5588 0.5787 0.5855 0.7872 0.8347 0.8645 0.8747 0.8999 0.9541 0.9882

Table B.2.3.2-3: MIMO corre	elation matrices for	medium correlation
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Table B.2.3.2-4: MIMO correlation matrices for low correlation

1x2 case	$R_{low} = \mathbf{I}_2$
2x2 case	$R_{low} = \mathbf{I}_4$
4x2 case	$R_{low} = \mathbf{I}_8$
4x4 case	$R_{low} = \mathbf{I}_{16}$

In Table B.2.3.2-4, \mathbf{I}_d is the $d \times d$ identity matrix.

B.2.3A MIMO Channel Correlation Matrices using cross polarized antennas

The MIMO channel correlation matrices defined in B.2.3A apply for the antenna configuration using cross polarized antennas at both eNodeB and UE. The cross-polarized antenna elements with +/-45 degrees polarization slant angles are deployed at eNB and cross-polarized antenna elements with +90/0 degrees polarization slant angles are deployed at UE.

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For the cross-polarized antennas, the N antennas are labelled such that antennas for one polarization are listed from 1 to N/2 and antennas for the other polarization are listed from N/2+1 to N, where N is the number of transmit or receive antennas.

B.2.3A.1 Definition of MIMO Correlation Matrices using cross polarized antennas

For the channel spatial correlation matrix, the following is used:

$$R_{spat} = P(R_{eNB} \otimes \Gamma \otimes R_{UE})P^{T}$$

where

- R_{UE} is the spatial correlation matrix at the UE with same polarization,
- R_{eNB} is the spatial correlation matrix at the eNB with same polarization,
- Γ is a polarization correlation matrix, and
- $(\bullet)^T$ denotes transpose.

The matrix Γ is defined as

$$\Gamma = \begin{bmatrix} 1 & 0 & -\gamma & 0 \\ 0 & 1 & 0 & \gamma \\ -\gamma & 0 & 1 & 0 \\ 0 & \gamma & 0 & 1 \end{bmatrix}$$

A permutation matrix P elements are defined as

$$P(a,b) = \begin{cases} 1 & for \ a = (j-1)Nr + i \ and \ b = 2(j-1)Nr + i, \\ 1 & for \ a = (j-1)Nr + i \ and \ b = 2(j-Nt/2)Nr - Nr + i, \\ 0 & otherwise \end{cases} i = 1, \dots, Nr, \ j = Nt/2 + 1, \dots, Nt + i \\ 0 & otherwise \end{cases}$$

where N_t and N_r is the number of transmitter and receiver respectively. This is used to map the spatial correlation coefficients in accordance with the antenna element labelling system described in B.2.3A.

B.2.3A.2 Spatial Correlation Matrices using cross polarized antennas at eNB and UE sides

B.2.3A.2.1 Spatial Correlation Matrices at eNB side

For 2-antenna transmitter using one pair of cross-polarized antenna elements, $R_{eNB} = 1$.

For 4-antenna transmitter using two pairs of cross-polarized antenna elements, $R_{eNB} = \begin{pmatrix} 1 & \alpha \\ \alpha^* & I \end{pmatrix}$.

For 8-antenna transmitter using four pairs of cross-polarized antenna elements,
$$R_{eNB} = \begin{pmatrix} 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} & \alpha \\ \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} & \alpha^{\frac{4}{9}} \\ \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 & \alpha^{\frac{1}{9}} \\ \alpha^{\frac{4}{9}} & \alpha^{\frac{4}{9}} & \alpha^{\frac{1}{9}} & 1 \end{pmatrix}$$

B.2.3A.2.2 Spatial Correlation Matrices at UE side

For 2-antenna receiver using one pair of cross-polarized antenna elements, $R_{UE} = 1$.

For 4-antenna receiver using two pairs of cross-polarized antenna elements, $R_{UE} = \begin{pmatrix} 1 & \beta \\ \beta^* & 1 \end{pmatrix}$.

B.2.3A.3 MIMO Correlation Matrices using cross polarized antennas

The values for parameters α , β and γ for high spatial correlation are given in Table B.2.3A.3-1.

	Table	B	3.2.	3A.3-1	

High spatial correlation					
	0.9	0.9	0.3		
Note 1: Value of α applies when more than one pair of cross-polarized antenna elements at eNB side.					
Note 2:	Value of β applies when n	nore than one pair of cross-polarized ar	ntenna elements at UE side.		

The correlation matrices for high spatial correlation are defined in Table B.2.3A.3-2 as below.

The values in Table B.2.3A.3-2 have been adjusted to insure the correlation matrix is positive semi-definite after roundoff to 4 digit precision. This is done using the equation:

$$\mathbf{R}_{high} = [\mathbf{R}_{spat} + aI_n]/(1+a)$$

Where the value "a" is a scaling factor such that the smallest value is used to obtain a positive semi-definite result. For the 8x2 high spatial correlation case, a=0.00010.

Table B.2.3A.3-2: MIMO correlation matrices for high spatial correlation

		1.0000	0.0000	0.9883	0.0000	0.9542	0.0000	0.8999	0.0000	-0.3000	0.0000	-0.2965	0.0000	-0.2862	0.0000	-0.2700	0.0000
		0.0000	1.0000	0.0000	0.9883	0.0000	0.9542	0.0000	0.8999	0.0000	0.3000	0.0000	0.2965	0.0000	0.2862	0.0000	0.2700
		0.9883	0.0000	1.0000	0.0000	0.9883	0.0000	0.9542	0.0000	-0.2965	0.0000	-0.3000	0.0000	-0.2965	0.0000	-0.2862	0.0000
		0.0000	0.9883	0.0000	1.0000	0.0000	0.9883	0.0000	0.9542	0.0000	0.2965	0.0000	0.3000	0.0000	0.2965	0.0000	0.2862
		0.9542	0.0000	0.9883	0.0000	1.0000	0.0000	0.9883	0.0000	-0.2862	0.0000	-0.2965	0.0000	-0.3000	0.0000	-0.2965	0.0000
		0.0000	0.9542	0.0000	0.9883	0.0000	1.0000	0.0000	0.9883	0.0000	0.2862	0.0000	0.2965	0.0000	0.3000	0.0000	0.2965
		0.8999	0.0000	0.9542	0.0000	0.9883	0.0000	1.0000	0.0000	-0.2700	0.0000	-0.2862	0.0000	-0.2965	0.0000	-0.3000	0.0000
942 0000	D _	0.0000	0.8999	0.0000	0.9542	0.0000	0.9883	0.0000	1.0000	0.0000	0.2700	0.0000	0.2862	0.0000	0.2965	0.0000	0.3000
8x2 case	$R_{high} =$	-0.3000	0.0000	-0.2965	0.0000	-0.2862	0.0000	-0.2700	0.0000	1.0000	0.0000	0.9883	0.0000	0.9542	0.0000	0.8999	0.0000
		0.0000	0.3000	0.0000	0.2965	0.0000	0.2862	0.0000	0.2700	0.0000	1.0000	0.0000	0.9883	0.0000	0.9542	0.0000	0.8999
		-0.2965	0.0000	-0.3000	0.0000	-0.2965	0.0000	-0.2862	0.0000	0.9883	0.0000	1.0000	0.0000	0.9883	0.0000	0.9542	0.0000
		0.0000	0.2965	0.0000	0.3000	0.0000	0.2965	0.0000	0.2862	0.0000	0.9883	0.0000	1.0000	0.0000	0.9883	0.0000	0.9542
		-0.2862	0.0000	-0.2965	0.0000	-0.3000	0.0000	-0.2965	0.0000	0.9542	0.0000	0.9883	0.0000	1.0000	0.0000	0.9883	0.0000
		0.0000	0.2862	0.0000	0.2965	0.0000	0.3000	0.0000	0.2965	0.0000	0.9542	0.0000	0.9883	0.0000	1.0000	0.0000	0.9883
		-0.2700	0.0000	-0.2862	0.0000	-0.2965	0.0000	-0.3000	0.0000	0.8999	0.0000	0.9542	0.0000	0.9883	0.0000	1.0000	0.0000
		0.0000	0.2700	0.0000	0.2862	0.0000	0.2965	0.0000	0.3000	0.0000	0.8999	0.0000	0.9542	0.0000	0.9883	0.0000	1.0000

B.2.3A.4 Beam steering approach

Given the channel spatial correlation matrix in B.2.3A.1, the corresponding random channel matrix H can be calculated. The signal model for the k-th subframe is denoted as

$$y = HD_{\theta_{L}}Wx + n$$

Where

- H is the Nr xNt channel matrix per subcarrier.

- D_{θ_k} is the steering matrix, which is $D_{\theta_k} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \otimes \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & e^{j\theta_k} & 0 & 0 \\ 0 & 0 & e^{j2\theta_k} & 0 \\ 0 & 0 & 0 & e^{j3\theta_k} \end{bmatrix}$,

- θ_k controls the phase variation, and the phase for k-th subframe is denoted by $\theta_k = \theta_0 + \Delta \theta \cdot k$, where θ_0 is the random start value with the uniform distribution, i.e., $\theta_0 \in [0, 2\pi]$, $\Delta \theta$ is the step of phase variation, which is defined in Table B.2.3A.4-1, and *k* is the linear increment of 1 for every subframe throughout the simulation,

- W is the precoding matrix for 8 transmission antennas,
- y is the received signal, x is the transmitted signal, and n is AWGN.

Table B.2.3A.4-1: The step of phase variation

Variation Step	Value (rad/subframe)
$\Delta heta$	1.2566×10 ⁻³

B.2.4 Propagation conditions for CQI tests

For Channel Quality Indication (CQI) tests, the following additional multi-path profile is used:

$$h(t,\tau) = \delta(\tau) + a \exp(-i2\pi f_D t) \delta(\tau - \tau_d),$$

in continuous time (t, τ) representation, with τ_d the delay, *a* a constant and f_D the Doppler frequency. The same $h(t, \tau)$ is used to describe the fading channel between every pair of Tx and Rx.

B.2.4.1 Propagation conditions for CQI tests with multiple CSI processes

For CQI tests with multiple CSI processes, the following additional multi-path profile is used for 2 port transmission:

$$H = \begin{bmatrix} 1 & j \\ 1 & -j \end{bmatrix} \circ H_{MP}$$

Where \circ represents Hadamard product, H_{MP} indicates the 2x2 propagation channel generated in the manner defined in Clause B.2.4.

B.2.5 Void

B.2.6 MBSFN Propagation Channel Profile

Table B.2.6-1 shows propagation conditions that are used for the MBSFN performance requirements in multi-path fading environment in an extended delay spread environment.

Table B.2.6-1: Propagation Conditions for Multi-Path Fading Environments for MBSFN Performance
Requirements in an extended delay spread environment

Extended Delay Spread					
Maximum Doppler frequency [5Hz]					
Relative Delay [ns]	Relative Mean Power [dB]				
0	0				
30	-1.5				
150	-1.4				
310	-3.6				
370	-0.6				
1090	-7.0				
12490	-10				
12520	-11.5				
12640	-11.4				
12800	-13.6				
12860	-10.6				
13580	-17.0				
27490	-20				
27520	-21.5				
27640	-21.4				
27800	-23.6				
27860	-20.6				
28580	-27.0				

B.3 High speed train scenario

The high speed train condition for the test of the baseband performance is a non fading propagation channel with one tap. Doppler shift is given by

$$f_s(t) = f_d \cos \theta(t) \tag{B.3.1}$$

where $f_s(t)$ is the Doppler shift and f_d is the maximum Doppler frequency. The cosine of angle $\theta(t)$ is given by

$$\cos\theta(t) = \frac{D_s/2 - vt}{\sqrt{D_{\min}^2 + (D_s/2 - vt)^2}}, \ 0 \le t \le D_s/v$$
(B.3.2)

$$\cos\theta(t) = \frac{-1.5D_s + vt}{\sqrt{D_{\min}^2 + (-1.5D_s + vt)^2}}, \ D_s/v < t \le 2D_s/v$$
(B.3.3)

$$\cos\theta(t) = \cos\theta(t \mod (2D_s/v)), t > 2D_s/v \tag{B.3.4}$$

where $D_s/2$ is the initial distance of the train from eNodeB, and D_{\min} is eNodeB Railway track distance, both in meters; v is the velocity of the train in m/s, t is time in seconds.

Doppler shift and cosine angle are given by equation B.3.1 and B.3.2-B.3.4 respectively, where the required input parameters listed in table B.3-1 and the resulting Doppler shift shown in Figure B.3-1 are applied for all frequency bands.

Parameter	Value
D_s	300 m
D_{\min}	2 m
V	300 km/h
f_d	750 Hz

Table B.3-1: High speed train scenario

NOTE 1: Parameters for HST conditions in table B.3-1 including f_d and Doppler shift trajectories presented on figure B.3-1 were derived for Band 7.

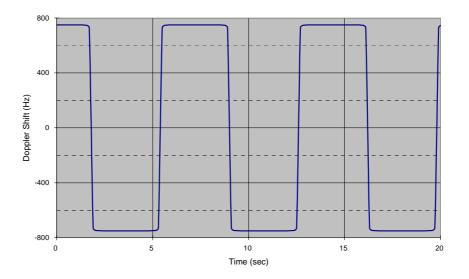


Figure B.3-1: Doppler shift trajectory

For 1x2 antenna configuration, the same $h(t,\tau)$ is used to describe the channel between every pair of Tx and Rx.

For 2x2 antenna configuration, the same $h(t,\tau)$ is used to describe the channel between every pair of Tx and Rx with phase shift according to $\mathbf{H} = \begin{pmatrix} 1 & j \\ 1 & -j \end{pmatrix}$.

B.4 Beamforming Model

B.4.1 Single-layer random beamforming (Antenna port 5, 7, or 8)

Single-layer transmission on antenna port 5 or on antenna port 7 or 8 without a simultaneous transmission on the other antenna port, is defined by using a precoder vector W(i) of size 2×1 randomly selected with the number of layers v = 1 from Table 6.3.4.2.3-1 in [4] as beamforming weights. This precoder takes as an input the signal $y^{(p)}(i)$, $i = 0,1,...,M_{symb}^{ap} - 1$, for antenna port $p \in \{5, 7, 8\}$, with M_{symb}^{ap} the number of modulation symbols including the user-specific reference symbols (DRS), and generates a block of signals $y_{bf}(i) = [y_{bf}(i) \quad \tilde{y}_{bf}(i)]^{T}$ the elements of which are to be mapped onto the same physical RE but transmitted on different antenna elements:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W(i)y^{(p)}(i)$$

Single-layer transmission on antenna port 7 or 8 with a simultaneous transmission on the other antenna port, is defined by using a pair of precoder vectors $W_1(i)$ and $W_2(i)$ each of size 2×1, which are not identical and randomly selected with the number of layers v = 1 from Table 6.3.4.2.3-1 in [4], as beamforming weights, and normalizing the transmit power as follows:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = \frac{1}{\sqrt{2}} \left(W_1(i) y^{(7)}(i) + W_2(i) y^{(8)}(i) \right)$$

The precoder update granularity is specific to a test case.

The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \mod 2 = 1$, $p \in \{15, 16, ..., 22\}$, are transmitted on the same physical antenna element as the modulation symbols $y_{bf}(i)$. The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \mod 2 = 0$, $p \in \{15, 16, ..., 22\}$, are transmitted on the same physical antenna element as the modulation symbols $\tilde{y}_{bf}(i)$.

B.4.2 Dual-layer random beamforming (antenna ports 7 and 8)

Dual-layer transmission on antenna ports 7 and 8 is defined by using a precoder matrix W(i) of size 2×2 randomly selected with the number of layers v = 2 from Table 6.3.4.2.3-1 in [4] as beamforming weights. This precoder takes as an input a block of signals for antenna ports 7 and 8, $y(i) = \begin{bmatrix} y^{(7)}(i) & y^{(8)}(i) \end{bmatrix}^T$, $i = 0, 1, ..., M_{symb}^{ap} - 1$, with M_{symb}^{ap} being the number of modulation symbols per antenna port including the user-specific reference symbols, and generates a block of signals $y_{bf}(i) = \begin{bmatrix} y_{bf}(i) & \tilde{y}_{bf}(i) \end{bmatrix}^T$ the elements of which are to be mapped onto the same physical RE but transmitted on different antenna elements:

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W(i) \begin{bmatrix} y^{(7)}(i) \\ y^{(8)}(i) \end{bmatrix},$$

The precoder update granularity is specific to a test case.

The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \mod 2 = 1$, $p \in \{15, 16, ..., 22\}$, are transmitted on the same physical antenna element as the modulation symbols $y_{bf}(i)$. The CSI reference symbols $a_{k,l}^{(p)}$ satisfying $p \mod 2 = 0$, $p \in \{15, 16, ..., 22\}$, are transmitted on the same physical antenna element as the modulation symbols $\tilde{y}_{bf}(i)$.

B.4.3 Generic beamforming model (antenna ports 7-14)

The transmission on antenna port(s) p = 7,8,...,v + 6 is defined by using a precoder matrix W(i) of size $N_{CSI} \times v$, where N_{CSI} is the number of CSI reference signals configured per test and v is the number of spatial layers. This precoder takes as an input a block of signals for antenna port(s) p = 7,8,...,v + 6, $y^{(p)}(i) = \left[y^{(7)}(i) \quad y^{(8)}(i) \quad \cdots \quad y^{(6+v)}(i)\right], i = 0,1,...,M_{symb}^{ap} - 1$, with M_{symb}^{ap} being the number of modulation symbols per antenna port including the user-specific reference symbols (DM-RS), and generates a block of signals $y_{bf}^{(q)}(i) = \left[y_{bf}^{(0)}(i) \quad y_{bf}^{(1)}(i) \quad \ldots \quad y_{bf}^{(N_{CSI}-1)}(i)\right]^{T}$ the elements of which are to be mapped onto the same time-frequency index pair (k, l) but transmitted on different physical antenna elements:

$$\begin{bmatrix} y_{bf}^{(0)}(i) \\ y_{bf}^{(1)}(i) \\ \vdots \\ y_{bf}^{(N_{CSI}-1)}(i) \end{bmatrix} = W(i) \begin{bmatrix} y^{(7)}(i) \\ y^{(8)}(i) \\ \vdots \\ y^{(6+\nu)}(i) \end{bmatrix}$$

The precoder matrix W(i) is specific to a test case.

The physical antenna elements are identified by indices $j = 0, 1, ..., N_{ANT} - 1$, where $N_{ANT} = N_{CSI}$ is the number of physical antenna elements configured per test.

Modulation symbols $y_{bf}^{(q)}(i)$ with $q \in \{0,1,...,N_{CSI}-1\}$ (i.e. beamformed PDSCH and DM-RS) are mapped to the physical antenna index j = q.

Modulation symbols $y^{(p)}(i)$ with $p \in \{0,1,..., P-1\}$ (i.e. PBCH, PDCCH, PHICH, PCFICH) are mapped to the physical antenna index j = p, where P is the number of cell-specific reference signals configured per test.

Modulation symbols $a_{k,l}^{(p)}$ with $p \in \{0,1,..., P-1\}$ (i.e. CRS) are mapped to the physical antenna index j = p, where P is the number of cell-specific reference signals configured per test.

Modulation symbols $a_{k,l}^{(p)}$ with $p \in \{15, 16, ..., 14 + N_{CSI}\}$ (i.e. CSI-RS) are mapped to the physical antenna index j = p - 15, where N_{CSI} is the number of CSI reference signals configured per test.

B.4.4 Random beamforming for EPDCCH distributed transmission (Antenna port 107 and 109)

EPDCCH distributed transmission on antenna port 107 and antenna port 109 is defined by using a pair of precoder vectors $W_1(i)$ and $W_2(i)$ each of size 2×1, which are not identical and randomly selected per EPDCCH PRB pair with the number of layers v = 1 from Table 6.3.4.2.3-1 in [4], as beamforming weights. This precoder takes as an input the signal $y^{(p)}(i)$, $i = 0,1,...,M_{symb}^{ap} - 1$, for antenna port $p \in \{107, 109\}$, with M_{symb}^{ap} the number of modulation symbols including the user-specific reference symbols (DMRS), and generates a block of signals $y_{bf}(i) = [y_{bf}(i) \ \tilde{y}_{bf}(i)]^{t}$. When EPDCCH is associated with port 107, the transmitted block of signals is deonted as

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W_1(i) y^{(107)}(i).$$

When EPDCCH is associated with port 109, the transmitted block of signals is denoted as

$$\begin{bmatrix} y_{bf}(i) \\ \tilde{y}_{bf}(i) \end{bmatrix} = W_2(i) y^{(109)}(i).$$

B.4.5 Random beamforming for EPDCCH localized transmission (Antenna port 107, 108, 109 or 110)

EPDCCH localized transmission on antenna port 107, 108, 109 or 110 is defined by using a precoder vector W(i) of size 2×1 randomly selected with the number of layers v = 1 from Table 6.3.4.2.3-1 in [4] as beamforming weights. This precoder takes as an input the signal $y^{(p)}(i)$, $i = 0,1,...,M_{symb}^{ap} - 1$, for antenna port $p \in \{107, 108, 109, 110\}$, with M_{symb}^{ap} the number of modulation symbols including the user-specific reference symbols (DMRS), and generates a

block of signals $y_{bf}(i) = [y_{bf}(i) \quad \tilde{y}_{bf}(i)]^T$ the elements of which are to be mapped onto the same physical RE but transmitted on different antenna elements:

$$\begin{bmatrix} y_{bf}(i) \\ \widetilde{y}_{bf}(i) \end{bmatrix} = W(i) y^{(p)}(i) \, .$$

B.5 Interference models for enhanced performance requirements Type-A

This clause provides a description for the modelling of interfering cell transmissions for enhanced performance requirements Type-A including: definition of dominant interferer proportion, transmission mode 3, 4 and 9 type of interference modelling.

B.5.1 Dominant interferer proportion

Each interfering cell involved in enhanced performance requirements Type-A is characterized by its associated dominant interferer proportion (DIP) value:

$$DIP_i = \frac{\hat{I}_{or(i+1)}}{N_{oc}}$$

where is $\hat{I}_{or(i+1)}$ is the average received power spectral density from the i-th strongest interfering cell involved in the requirement scenario ($\hat{I}_{or(1)}$ is assumed to be the power spectral density associated with the serving cell) and

 $N_{oc}' = \sum_{i=2}^{N} \hat{I}_{or(j)} + N_{oc}$ where N_{oc} is the average power spectral density of a white noise source consistent with the

definition provided in subclause 3.2 and N is the total number of cells involved in a given requirement scenario.

B.5.2 Transmission mode 3 interference model

This subclause provides transmission mode 3 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the entire PDSCH region and the full transmission bandwidth. Transmitted physical channels shall include PSS, SSS and PBCH.

For each subframe and each CQI subband as defined in subclause 7.2 of [6], a transmission rank shall be randomly determined independently from other CQI subbands as well as other interfering cells. Probabilities of occurrence of each possible transmission rank are as specified in the requirement scenario.

For rank-1 transmission over a subband, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to 16QAM randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [4].

For rank-2 transmission over a subband, precoding for spatial multiplexing with large delay CDD over two layers for the number of antenna ports in the requirement scenario shall be applied to 16QAM randomly modulated layer symbols, as specified in subclause 6.3.4.2.2 of [4].

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [4]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.5.3 Transmission mode 4 interference model

This subclause provides transmission mode 4 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the entire PDSCH region and the full transmission bandwidth. Transmitted physical channels shall include PSS, SSS and PBCH.

For each subframe and each CQI subband as defined in subclause 7.2 of [6], a transmission rank shall be randomly determined independently from other CQI subbands as well as other interfering cells. Probabilities of occurrence of each possible transmission rank are as specified in the requirement scenario.

For each subframe and CQI subband, a precoding matrix for the number of layers v associated to the selected rank shall be selected randomly from Table 6.3.4.2.3-1 of [4]. Note that codebook index 0 shall be excluded from random precoder selection when the number of layers is v = 2.

Precoding for spatial multiplexing with cell-specific reference signals for the number of antenna ports in the requirement scenario shall be applied to 16QAM randomly modulated layer symbols, as specified in subclause 6.3.4.2.1 of [4] with the selected precoding matrices for each subframe and each CQI subband.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [4]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

B.5.4 Transmission mode 9 interference model

This subclause provides transmission mode 9 interference modelling for each explicitly modelled interfering cell in the requirement scenario. In each subframe, each interfering cell shall transmit randomly modulated data over the entire PDSCH region and the full transmission bandwidth. Transmitted physical channels shall include PSS, SSS and PBCH.

For each subframe and each CQI subband as defined in subclause 7.2 of [6], a transmission rank shall be randomly determined independently from other CQI subbands as well as other interfering cells. Probabilities of occurrence of each possible transmission rank are as specified in the requirement scenario.

For each subframe and each CQI subband, a precoding matrix for the number of layers v associated to the selected rank shall be selected randomly from Table 6.3.4.2.3-2 of [4].

The generic beamforming model in subclause B.4.3 shall be applied assuming cell-specific reference signals and CSI reference signals as specified in the requirement scenario. Random precoding with selected rank and precoding matrices for each subframe and each CQI subband shall be applied to 16QAM randomly modulated layer symbols including the user-specific reference symbols over antenna port 7 when the rank is one and antenna ports 7, 8 when the rank is two.

For unallocated REs in the control region, precoding for transmit diversity for the number of antenna ports in the requirement scenario shall be applied to QPSK randomly modulated layer symbols, as specified in subclause 6.3.4.3 of [4]. The EPRE ratio for these REs shall be as defined for PDCCH in Annex C.3.2.

Annex C (normative): Downlink Physical Channels

C.1 General

This annex specifies the downlink physical channels that are needed for setting a connection and channels that are needed during a connection.

C.2 Set-up

Table C.2-1 describes the downlink Physical Channels that are required for connection set up.

Physical Channel
PBCH
SSS
PSS
PCFICH
PDCCH
EPDCCH
PHICH
PDSCH

Table C.2-1: Downlink Physical Channels required for connection set-up

C.3 Connection

The following clauses, describes the downlink Physical Channels that are transmitted during a connection i.e., when measurements are done.

C.3.1 Measurement of Receiver Characteristics

Table C.3.1-1 is applicable for measurements on the Receiver Characteristics (clause 7).

Table C.3.1-1: Downlink Physical Channels transmitted during a connection (FDD and TDD)

Physical Channel	EPRE Ratio
PBCH	$PBCH_RA = 0 dB$
	$PBCH_RB = 0 dB$
PSS	$PSS_RA = 0 dB$
SSS	$SSS_RA = 0 dB$
PCFICH	$PCFICH_RB = 0 dB$
PDCCH	$PDCCH_RA = 0 dB$
	$PDCCH_RB = 0 dB$
PDSCH	$PDSCH_RA = 0 dB$
	$PDSCH_RB = 0 dB$
OCNG	$OCNG_RA = 0 dB$
	$OCNG_RB = 0 dB$

NOTE 1: No boosting is applied.

Parameter	Unit	Value	Note
Transmitted power spectral density I_{or}	dBm/15 kHz	Test specific	1. I_{or} shall be kept constant throughout all OFDM symbols
Cell-specific reference signal power ratio $E_{\rm RS}$ / $I_{\rm or}$		0 dB	

Table C.3.1-2: Power allocation for OFDM symbols and reference signals

C.3.2 Measurement of Performance requirements

Table C.3.2-1 is applicable for measurements in which uniform RS-to-EPRE boosting for all downlink physical channels.

Table C.3.2-1: Downlink Physical Channels transmitted during a connection (FDD and TDD)

Physical Channel	EPRE Ratio
PBCH	$PBCH_RA = \rho_A + \sigma$
	$PBCH_RB = \rho_B + \sigma$
PSS	$PSS_RA = 0$ (Note 3)
SSS	SSS_RA = 0 (Note 3)
PCFICH	PCFICH_RB = ρ_B + σ
PDCCH	PDCCH_RA = ρ_A + σ
	PDCCH_RB = $\rho_B + \sigma$
EPDCCH	EPDCCH_RA = $\rho_A + \delta$
	EPDCCH_RB = $\rho_B + \delta$
PDSCH	PDSCH_RA = ρ_A
	PDSCH_RB = ρ_B
PMCH	PMCH_RA = ρ_A
	$PMCH_RB = \rho_B$
MBSFN RS	MBSFN RS_RA = ρ_A
	MBSFN RS_RB = ρ_B
OCNG	OCNG_RA = ρ_A + σ
	OCNG_RB = ρ_B + σ

NOTE 1: $\rho_A = \rho_B = 0$ dB means no RS boosting.

NOTE 2: MBSFN RS and OCNG are not defined downlink physical channels in [4].

NOTE 3: Assuming PSS and SSS transmitted on a single antenna port.

NOTE 4: ρ_A , ρ_B , σ and δ are test specific.

NOTE 5: For TM 8, TM 9 and TM10 ρ_A , ρ_B are used for the purpose of the test set up only.

Parameter	Unit	Value	Note
Total transmitted power spectral density I_{or}	dBm/15 kHz	Test specific	1. I_{or} shall be kept constant throughout all OFDM symbols
Cell-specific reference signal power ratio $E_{\rm RS}$ / $I_{\rm or}$		Test specific	1. Applies for antenna port <i>p</i>
Energy per resource element EPRE		Test specific	1. The complex-valued symbols $y^{(p)}(i)$ and $a_{k,l}^{(p)}$ defined in [4] shall
			conform to the given EPRE value. 2. For TM8, TM9, and TM10 the reference point for EPRE is before the precoder in Annex B.4.

Table C.3.2-2: Power allocation for OFDM symbols and reference signals

C.3.3 Aggressor cell power allocation for Measurement of Performance Requirements when ABS is Configured

For the performance requirements and channel state information reporting when ABS is configured, the power allocation for the physical channels of the aggressor cell in non-ABS and ABS is listed in Table C.3.3-1.

Table C.3.3-1: Downlink physical channels transmitted in aggressor cell when ABS is configured in this cell

Physical Channel	Parameters U		EPI	EPRE Ratio	
Physical Channel			Non-ABS	ABS	
PBCH	PBCH_RA	dB	ρΑ	Note 1	
РЬСП	PBCH_RB	dB	ρ _в	Note 1	
PSS	PSS_RA	dB	ρΑ	Note 1	
SSS	SSS_RA	dB	ρΑ	Note 1	
PCFICH	PCFICH_RB	dB	ρ _в	Note 1	
PHICH	PHICH_RA	dB	ρΑ	Note 1	
	PHICH_RB	dB	ρв	Note 1	
PDCCH	PDCCH_RA	dB	ρΑ	Note 1	
PDCCH	PDCCH_RB	dB	ρ _в	Note 1	
PDSCH	PDSCH_RA	dB	N/A	Note 1	
	PDSCH_RB	dB	N/A	Note 1	
OCNG	OCNG_RA	dB	ρΑ	Note 1	
OCNG	OCNG_RB	dB	ρ _Β	Note 1	

Physical Channel	Parameters	Unit	EPRE Ratio	
Filysical Chamler		Unit	Non-ABS	ABS
PBCH	PBCH_RA	dB	ρΑ	ρΑ
FBCH	PBCH_RB	dB	ρ _B	ρ _B
PSS	PSS_RA	dB	ρΑ	ρ _Α
SSS	SSS_RA	dB	ρΑ	ρΑ
PCFICH	PCFICH_RB	dB	ρв	Note 1
PHICH	PHICH_RA	dB	ρΑ	Note 1
	PHICH_RB	dB	ρ _B	Note 1
PDCCH	PDCCH_RA	dB	ρΑ	Note 1
PDCCH	PDCCH_RB	dB	ρ _B	Note 1
PDSCH	PDSCH_RA	dB	N/A	Note 1
FDSCH	PDSCH_RB	dB	N/A	Note 1
OCNG	OCNG_RA	dB	ρΑ	Note 1
OCING	OCNG_RB	dB	ρв	Note 1
Note 1: $-\infty$ dB is allocated for this channel in this test.				

Table C.3.3-2: Downlink physical channels transmitted in aggressor cell when ABS is configured in
this cell when the CRS assistance information is provided

C.3.4 Power Allocation for Measurement of Performance Requirements when Quasi Co-location Type B: same Cell ID

For the performance requirements related to quasi-colocation type B behaviour when transmission points share the same Cell ID, the power allocation for the physical channels of the serving cell is listed in table C.3.4-1 and the power allocation for the physical channels of the cell transmitting PDSCH is listed in table C.3-4-2

Physical Channel	EPRE Ratio
PBCH	PBCH_RA = ρ_A + σ
	PBCH_RB = ρ_B + σ
PSS	PSS_RA = 0 (Note 2)
SSS	$SSS_RA = 0$ (Note 2)
PDSCH	PDSCH_RA = ρ_A
	PDSCH_RB = ρ_B
PCFICH	PCFICH_RB = ρ_B + σ
PDCCH	PDCCH_RA = ρ_A + σ
	PDCCH_RB = $\rho_B + \sigma$

Table C.3.4-1: Downlink physical channels transmitted in the serving cell (TP1)

NOTE 1: $\rho_A = \rho_B = 0$ dB means no RS boosting.

NOTE 2: Assuming PSS and SSS transmitted on a single antenna port.

NOTE 3: ρ_A , ρ_B and σ are test specific.

Table C.3.4-2: Downlink physical channels for the transmission point transmitting PDSCH (TP2)

Physical Channel	Value
PDSCH	Test Specific

Annex D (normative): Characteristics of the interfering signal

D.1 General

When the channel band width is wider or equal to 5MHz, a modulated 5MHz full band width E-UTRA down link signal and CW signal are used as interfering signals when RF performance requirements for E-UTRA UE receiver are defined. For channel band widths below 5MHz, the band width of modulated interferer should be equal to band width of the received signal.

D.2 Interference signals

Table D.2-1 describes the modulated interferer for different channel band width options.

	Channel bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
BW Interferer	1.4 MHz	3 MHz	5 MHz	5 MHz	5 MHz	5 MHz
RB	6	15	25	25	25	25

Annex E (normative): Environmental conditions

E.1 General

This normative annex specifies the environmental requirements of the UE. Within these limits the requirements of the present documents shall be fulfilled.

E.2 Environmental

The requirements in this clause apply to all types of UE(s).

E.2.1 Temperature

The UE shall fulfil all the requirements in the full temperature range of:

Table E.2.1-1

+15°C to +35°C	for normal conditions (with relative humidity of 25 % to 75 %)
-10 [°] C to +55 [°] C	for extreme conditions (see IEC publications 68-2-1 and 68-2-2)

Outside this temperature range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in clause 6.2 for extreme operation.

E.2.2 Voltage

The UE shall fulfil all the requirements in the full voltage range, i.e. the voltage range between the extreme voltages.

The manufacturer shall declare the lower and higher extreme voltages and the approximate shutdown voltage. For the equipment that can be operated from one or more of the power sources listed below, the lower extreme voltage shall not be higher, and the higher extreme voltage shall not be lower than that specified below.

Power source	Lower extreme voltage	Higher extreme voltage	Normal conditions voltage
AC mains	0,9 * nominal	1,1 * nominal	nominal
Regulated lead acid battery	0,9 * nominal	1,3 * nominal	1,1 * nominal
Non regulated batteries:			
Leclanché	0,85 * nominal	Nominal	Nominal
Lithium	0,95 * nominal	1,1 * Nominal	1,1 * Nominal
Mercury/nickel & cadmium	0,90 * nominal		Nominal

Outside this voltage range the UE if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in clause 6.2 for extreme operation. In particular, the UE shall inhibit all RF transmissions when the power supply voltage is below the manufacturer declared shutdown voltage.

E.2.3 Vibration

The UE shall fulfil all the requirements when vibrated at the following frequency/amplitudes.

Frequency	ASD (Acceleration Spectral Density) random vibration
5 Hz to 20 Hz	0,96 m ² /s ³
20 Hz to 500 Hz	0,96 m ² /s ³ at 20 Hz, thereafter –3 dB/Octave

Table E.2.3-1

Outside the specified frequency range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 36.101 for extreme operation.

Annex F (normative): Transmit modulation

F.1 Measurement Point

Figure F.1-1 shows the measurement point for the unwanted emission falling into non-allocated RB(s) and the EVM for the allocated RB(s).

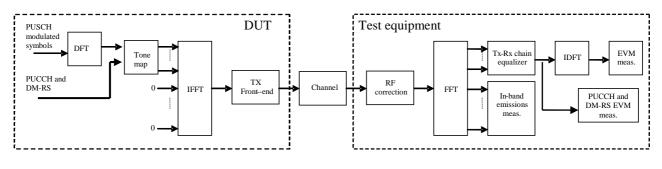


Figure F.1-1: EVM measurement points

F.2 Basic Error Vector Magnitude measurement

The EVM is the difference between the ideal waveform and the measured waveform for the allocated RB(s)

$$EVM = \sqrt{\frac{\sum_{v \in T_m} |z'(v) - i(v)|^2}{|T_m| \cdot P_0}}$$

where

 T_m is a set of $|T_m|$ modulation symbols with the considered modulation scheme being active within the measurement period,

z'(v) are the samples of the signal evaluated for the EVM,

i(v) is the ideal signal reconstructed by the measurement equipment, and

 P_0 is the average power of the ideal signal. For normalized modulation symbols P_0 is equal to 1.

The basic EVM measurement interval is defined over one slot in the time domain for PUCCH and PUSCH and over one preamble sequence for the PRACH.

F.3 Basic in-band emissions measurement

The in-band emissions are a measure of the interference falling into the non-allocated resources blocks. The in-band emission requirement is evaluated for PUCCH and PUSCH transmissions. The in-band emission requirement is not evaluated for PRACH transmissions.

The in-band emissions are measured as follows

$$Emissions_{absolute}(\Delta_{RB}) = \begin{cases} \frac{1}{|T_s|} \sum_{t \in T_s} \sum_{\substack{max(f_{\min}, f_l + 12 \cdot \Delta_{RB} + \Delta f) \\ min(f_{\max}, f_l + 12 \cdot \Delta_{RB} + \Delta f) \\ min(f_{\max}, f_h + 12 \cdot \Delta_{RB} + \Delta f) \\ \frac{1}{|T_s|} \sum_{t \in T_s} \sum_{\substack{f_h + (12 \cdot \Delta_{RB} - 11) + \Delta f \\ f_h + (12 \cdot \Delta_{RB} - 11) + \Delta f} |Y(t, f)|^2, \Delta_{RB} > 0 \end{cases}$$

where

 T_s is a set of $|T_s|$ SC-FDMA symbols with the considered modulation scheme being active within the measurement period,

 Δ_{RB} is the starting frequency offset between the allocated RB and the measured non-allocated RB (e.g. $\Delta_{RB} = 1$ or $\Delta_{RB} = -1$ for the first adjacent RB),

 f_{\min} (resp. f_{\max}) is the lower (resp. upper) edge of the UL system BW,

 $f_l\,\,{\rm and}\,\,f_h\,\,{\rm are}$ the lower and upper edge of the allocated BW, and

Y(t, f) is the frequency domain signal evaluated for in-band emissions as defined in the subsection (ii)

The relative in-band emissions are, given by

$$Emissions_{relative}(\Delta_{RB}) = \frac{Emissions_{absolute}(\Delta_{RB})}{\frac{1}{|T_s| \cdot N_{RB}} \sum_{t \in T_s} \sum_{f_l}^{f_l + (12 \cdot N_{RB} - 1)\Delta f} |Y(t, f)|^2}$$

where

 N_{RB} is the number of allocated RBs

The basic in-band emissions measurement interval is defined over one slot in the time domain. When the PUSCH or PUCCH transmission slot is shortened due to multiplexing with SRS, the in-band emissions measurement interval is reduced by one SC-FDMA symbol, accordingly.

In the evaluation of in-band emissions, the timing is set according to $\Delta \tilde{t} = \Delta \tilde{c}$, where sample time offsets $\Delta \tilde{t}$ and $\Delta \tilde{c}$ are defined in subclause F.4.

F.4 Modified signal under test

Implicit in the definition of EVM is an assumption that the receiver is able to compensate a number of transmitter impairments.

The PUSCH data or PRACH signal under test is modified and, in the case of PUSCH data signal, decoded according to::

$$Z'(t,f) = IDFT\left\{\frac{FFT\left\{z(v - \Delta \tilde{t}) \cdot e^{-j2\pi\Delta \tilde{f}v}\right\}}{\tilde{a}(t,f) \cdot e^{j\tilde{\varphi}(t,f)}}\right\}$$

where

z(v) is the time domain samples of the signal under test.

The PUCCH or PUSCH demodulation reference signal or PUCCH data signal under test is equalised and, in the case of PUCCH data signal decoded according to:

$$Z'(t,f) = \frac{FFT\left\{z(v - \Delta \tilde{t}) \cdot e^{-j2\pi\Delta \tilde{f}v}\right\}}{\tilde{a}(t,f) \cdot e^{j\tilde{\varphi}(t,f)}} e^{j2\pi j\Delta \tilde{t}}$$

where

z(v) is the time domain samples of the signal under test.

To minimize the error, the signal under test should be modified with respect to a set of parameters following the procedure explained below.

Notation:

 $\Delta \tilde{t}$ is the sample timing difference between the FFT processing window in relation to nominal timing of the ideal signal.

 $\Delta \tilde{f}$ is the RF frequency offset.

 $\tilde{\varphi}(t, f)$ is the phase response of the TX chain.

 $\tilde{a}(t, f)$ is the amplitude response of the TX chain.

In the following $\Delta \tilde{c}$ represents the middle sample of the EVM window of length W (defined in the next subsections) or the last sample of the first window half if W is even.

The EVM analyser shall

- > detect the start of each slot and estimate $\Delta \tilde{t}$ and $\Delta \tilde{f}$,
- > determine $\Delta \tilde{c}$ so that the EVM window of length W is centred
 - on the time interval determined by the measured cyclic prefix minus 16 samples of the considered OFDM symbol for symbol 0 for normal CP, i.e. the first 16 samples of the CP should not be taken into account for this step. In the determination of the number of excluded samples, a sampling rate of 30.72MHz was assumed. If a different sampling rate is used, the number of excluded samples is scaled linearly.
 - on the measured cyclic prefix of the considered OFDM symbol symbol for symbol 1 to 6 for normal CP and for symbol 0 to 5 for extended CP.
 - on the measured preamble cyclic prefix for the PRACH

To determine the other parameters a sample timing offset equal to $\Delta \tilde{c}$ is corrected from the signal under test. The EVM analyser shall then

> correct the RF frequency offset $\Delta \tilde{f}$ for each time slot, and

> apply an FFT of appropriate size. The chosen FFT size shall ensure that in the case of an ideal signal under test, there is no measured inter-subcarrier interference.

The IQ origin offset shall be removed from the evaluated signal before calculating the EVM and the in-band emissions; however, the removed relative IQ origin offset power (relative carrier leakage power) also has to satisfy the applicable requirement.

At this stage the allocated RBs shall be separated from the non-allocated RBs. In the case of PUCCH and PUSCH EVM, the signal on the non-allocated RB(s), Y(t, f), is used to evaluate the in-band emissions.

Moreover, the following procedure applies only to the signal on the allocated RB(s).

- In the case of PUCCH and PUSCH, the UL EVM analyzer shall estimate the TX chain equalizer coefficients $\tilde{a}(t, f)$ and $\tilde{\varphi}(t, f)$ used by the ZF equalizer for all subcarriers by time averaging at each signal subcarrier of the amplitude and phase of the reference and data symbols. The time-averaging length is 1 slot. This process creates an average amplitude and phase for each signal subcarrier used by the ZF equalizer. The knowledge of data modulation symbols may be required in this step because the determination of symbols by demodulation is not reliable before signal equalization.
- In the case of PRACH, the UL EVM analyzer shall estimate the TX chain coefficients $\tilde{a}(t)$ and $\tilde{\varphi}(t)$ used for phase and amplitude correction and are seleted so as to minimize the resulting EVM. The TX chain coefficients are not dependent on frequency, i.e. $\tilde{a}(t, f) = \tilde{a}(t)$ and $\tilde{\varphi}(t, f) = \tilde{\varphi}(t)$. The TX chain coefficient are chosen independently for each preamble transmission and for each $\Delta \tilde{t}$.

At this stage estimates of $\Delta \tilde{f}$, $\tilde{a}(t, f)$, $\tilde{\varphi}(t, f)$ and $\Delta \tilde{c}$ are available. $\Delta \tilde{t}$ is one of the extremities of the window W, i.e. $\Delta \tilde{t}$ can be $\Delta \tilde{c} + \alpha - \left| \frac{W}{2} \right|$ or $\Delta \tilde{c} + \left| \frac{W}{2} \right|$, where $\alpha = 0$ if W is odd and $\alpha = 1$ if W is even. The EVM

analyser shall then

> calculate EVM₁ with $\Delta \tilde{t}$ set to $\Delta \tilde{c} + \alpha - \left\lfloor \frac{W}{2} \right\rfloor$,

> calculate EVM_h with
$$\Delta \tilde{t}$$
 set to $\Delta \tilde{c} + \left\lfloor \frac{W}{2} \right\rfloor$

F.5 Window length

F.5.1 Timing offset

As a result of using a cyclic prefix, there is a range of $\Delta \tilde{t}$, which, at least in the case of perfect Tx signal quality, would give close to minimum error vector magnitude. As a first order approximation, that range should be equal to the length of the cyclic prefix. Any time domain windowing or FIR pulse shaping applied by the transmitter reduces the $\Delta \tilde{t}$ range within which the error vector is close to its minimum.

F.5.2 Window length

The window length W affects the measured EVM, and is expressed as a function of the configured cyclic prefix length. In the case where equalization is present, as with frequency domain EVM computation, the effect of FIR is reduced. This is because the equalization can correct most of the linear distortion introduced by the FIR. However, the time domain windowing effect can't be removed.

F.5.3 Window length for normal CP

The table below specifies the EVM window length at channel bandwidths 1.4, 3, 5, 10, 15, 20 MHz, for normal CP. The nominal window length for 3 MHz is rounded down one sample to allow the window to be centered on the symbol.

Channel Bandwidth MHz	Cyclic prefix length ¹ N_{cp} for symbol 0	Cyclic prefix length ¹ N_{cp} for symbols 1 to 6	Nominal FFT size	Cyclic prefix for symbols 1 to 6 in FFT samples	EVM window length <i>W</i> in FFT samples	Ratio of <i>W</i> to CP for symbols 1 to 6 ²	
1.4			128	9	5	55.6	
3		Γ	256	18	12	66.7	
5	160	144	512	36	32	88.9	
10	160	144	1024	72	66	91.7	
15			1536	108	102	94.4	
20			2048	144	136	94.4	
Note 1: The unit is number of samples, sampling rate of 30.72MHz is assumed. Note 2: These percentages are informative and apply to symbols 1 through 6. Symbol 0 has a longer CP and therefore a lower percentage.							

Table F.5.3-1 EVM window length for normal CP

F.5.4 Window length for Extended CP

The table below specifies the EVM window length at channel bandwidths 1.4, 3, 5, 10, 15, 20 MHz, for extended CP. The nominal window lengths for 3 MHz and 15 MHz are rounded down one sample to allow the window to be centered on the symbol.

Table F.5.4-1 EVM window length for extended CP

Channel Bandwidth MHz	Cyclic prefix length N_{cp}	Nominal FFT size	Cyclic prefix in FFT samples	EVM window length <i>W</i> in FFT samples	Ratio of W to CP ²	
1.4		128	32	28	87.5	
3		256	64	58	90.6	
5	512	512	128	124	96.9	
10	512	1024	256	250	97.4	
15		1536	384	374	97.4	
20		2048	512	504	98.4	
Note 1: The unit is number of samples, sampling rate of 30.72MHz is assumed. Note 2: These percentages are informative						

F.5.5 Window length for PRACH

The table below specifies the EVM window length for PRACH preamble formats 0-4.

Table F.5.5-1 EVM window length for PRACH

Preamble format	$\begin{array}{c} \textbf{Cyclic} \\ \textbf{prefix} \\ \textbf{length}^1 \ N_{cp} \end{array}$	Nominal FFT size ²	EVM window length <i>W</i> in FFT samples	Ratio of <i>W</i> to CP*			
0	3168	24576	3072	96.7%			
1	21024	24576	20928	99.5%			
2	2 6240		6144	98.5%			
3	21024	49152	20928	99.5%			
4	448	4096	432	96.4%			
	Note 1: The unit is number of samples, sampling rate of 30.72MHz is assumed						
	The use of other FFT sizes is possible as long as appropriate scaling of the window length is applied						
	hese percentage						

F.6 Averaged EVM

The general EVM is averaged over basic EVM measurements for 20 slots in the time domain.

$$\overline{EVM} = \sqrt{\frac{1}{20} \sum_{i=1}^{20} EVM_i^2}$$

The EVM requirements shall be tested against the maximum of the RMS average at the window W extremities of the EVM measurements:

Thus $\overline{\text{EVM}}_1$ is calculated using $\Delta \tilde{t} = \Delta \tilde{t}_1$ in the expressions above and $\overline{\text{EVM}}_h$ is calculated using $\Delta \tilde{t} = \Delta \tilde{t}_h$.

Thus we get:

$$EVM = \max(EVM_1, EVM_h)$$

The calculation of the EVM for the demodulation reference signal, EVM_{DMRS} , follows the same procedure as calculating the general EVM, with the exception that the modulation symbol set T_m defined in clause F.2 is restricted to symbols containing uplink demodulation reference signals.

The basic EVM_{DMRS} measurements are first averaged over 20 slots in the time domain to obtain an intermediate average \overline{EVM}_{DMRS} .

$$\overline{EVM}_{DMRS} = \sqrt{\frac{1}{20} \sum_{i=1}^{20} EVM_{DMRS,i}^2}$$

In the determination of each $EVM_{DMRS,i}$, the timing is set to $\Delta \tilde{t} = \Delta \tilde{t}_i$ if $\overline{EVM}_1 > \overline{EVM}_h$, and it is set to $\Delta \tilde{t} = \Delta \tilde{t}_i$ otherwise, where \overline{EVM}_1 and \overline{EVM}_h are the general average EVM values calculated in the same 20 slots over which the intermediate average \overline{EVM}_{DMRS} is calculated. Note that in some cases, the general average EVM may be calculated only for the purpose of timing selection for the demodulation reference signal EVM.

Then the results are further averaged to get the EVM for the demodulation reference signal, EVM DMRS,

$$EVM_{DMRS} = \sqrt{\frac{1}{6} \sum_{j=1}^{6} \overline{EVM}_{DMRS,j}^2}$$

The PRACH EVM, EVM_{PRACH} , is averaged over two preamble sequence measurements for preamble formats 0, 1, 2, 3, and it is averaged over 10 preamble sequence measurements for preamble format 4.

The EVM requirements shall be tested against the maximum of the RMS average at the window *W* extremities of the EVM measurements:

Thus $\overline{\text{EVM}}_{\text{PRACH,1}}$ is calculated using $\Delta \tilde{t} = \Delta \tilde{t}_l$ and $\overline{\text{EVM}}_{\text{PRACH,h}}$ is calculated using $\Delta \tilde{t} = \Delta \tilde{t}_h$.

Thus we get:

 $EVM_{PRACH} = \max(\overline{EVM}_{PRACH,1}, \overline{EVM}_{PRACH,h})$

F.7 Spectrum Flatness

The data shall be taken from FFT coded data symbols and the demodulation reference symbols of the allocated resource block.

Annex G (informative): Reference sensitivity level in lower SNR

This annex contains information on typical receiver sensitivity when HARQ transmission is enabled allowing operation in lower SNR regions (HARQ is disabled in conformance testing), thus representing the configuration normally used in live network operation under noise-limited conditions.

G.1 General

The reference sensitivity power level P_{SENS} with HARQ retransmission enabled (operation in lower SNR) is the minimum mean power applied to both the UE antenna ports at which the residual BLER after HARQ shall meet or exceed the requirements for the specified reference measurement channel. The residual BLER after HARQ transmission is defined as follows:

$$BLER_{residual} = 1 - \frac{A}{R}$$

A: Number of correctly decoded MAC PDUs

B: Number of transmitted MAC PDUs (Retransmitted MAC PDUs are not counted)

G.2 Typical receiver sensitivity performance (QPSK)

The residual BLER after HARQ shall be lower than 1% for the reference measurement channels as specified in Annexes G.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1) with parameters specified in Table G.2-1 and Table G.2-2

Channel bandwidth								
E-UTRA Band	1.4 MHz (dBm)	3 MHz (dBm)	5 MHz (dBm)	10 MHz (dBm)	15 MHz (dBm)	20 MHz (dBm)	Duplex Mode	
1				[-102]			FDD	
2				TBD			FDD	
3				TBD			FDD	
4				TBD			FDD	
5				TBD			FDD	
6				TBD			FDD	
7				TBD			FDD	
8				TBD			FDD	
9				TBD			FDD	
10				TBD			FDD	
11				TBD			FDD	
12				TBD			FDD	
13				TBD			FDD	
14	1			TBD			FDD	
	1							
17				TBD			FDD	
18				TBD			FDD	
19				TBD			FDD	
20				TBD			FDD	
21				TBD			FDD	
22				TBD			FDD	
23				TBD			FDD	
26				TBD			FDD	
27				TBD			FDD	
28				TBD			FDD	
33				[-102]			TDD	
34				[-102]			TDD	
35	1			[-102]			TDD	
36				[-102]			TDD	
37				[-102]			TDD	
38	1			[-102]			TDD	
39				[-102]			TDD	
40				[-102]			TDD	
42				[-102]			TDD	
43		1		[-102]			TDD	
44		1		[-102]			TDD	
Note 2: R C	he transmitter Reference meas DP.1 FDD/TDD	surement cl as describ	hannel is (ed in Anne	as defined G.3 with on ex A.5.1.1//	e sided dy	5.2.5 namic OCN		
Note 4: F	he signal powe or the UE whice evel is FFS.	h supports	both Band	d 3 and Bai			-	
	or the UE whic	h supports	both Band	d 11 and Ba	and 21 the	reference s	sensitivity	

Table G.2-1: Reference	sensitivity QPSK P _{SENS}
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Table G.2-2 specifies the minimum number of allocated uplink resource blocks for which the reference receive sensitivity requirement in lower SNR must be met.

E-UTRA Band / Channel bandwidth / NRB / Duplex mode								
E-UTRA Band	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Duplex Mode	
1				[6] ¹			FDD	
2				[6] ¹			FDD	
3				[6] ¹			FDD	
4				[6] ¹			FDD	
5				[6] ¹			FDD	
6				[6] ¹			FDD	
7				[6] ¹			FDD	
8				[6] ¹			FDD	
9				[6] ¹			FDD	
10				[6] ¹			FDD	
11				[6] ¹			FDD	
12				[6] ¹			FDD	
13				[6] ¹			FDD	
14				[6] ¹			FDD	
				[•]				
17				[6] ¹			FDD	
18				[6] ¹			FDD	
19				[6] ¹			FDD	
20				[6] ¹			FDD	
22				[6] ¹			FDD	
21				[6] ¹			FDD	
23				[6] ¹			FDD	
26				[6] ¹			FDD	
27				[6] ¹			FDD	
28				[6] ¹			FDD	
				[-]				
33				50			TDD	
34				50			TDD	
35				50			TDD	
36				50			TDD	
30				50			TDD	
38				50			TDD	
38				50 50			TDD	
<u> </u>				50			TDD	
40				50 50			TDD	
43				50			TDD	
44 Note 1: -	 Fhe UL resc		ke chall h	50 a located a	e close ac	nossible to	TDD	
Note 2: I Note 3: I	downlink op configuration For the UE v uplink config For Band 20 blocks shall	erating ba n for the c which sup guration fo); in the ca	and but co hannel ba ports both or reference ase of 15N	nfined with Indwidth (T I Band 11 a Re sensitivit	in the trans able 5.6-1 and Band 2 ty is FFS. el bandwid	smission ba). 21 the minir th, the UL r	andwidth num resource	

 Table G.2-2: Minimum uplink configuration for reference sensitivity

Unless given by Table G.2-3, the minimum requirements specified in Tables G.2-1 and G.2-2 shall be verified with the network signalling value NS_01 (Table 6.2.4-1) configured.

E-UTRA Band	Network Signalling value
2	NS_03
4	NS_03
10	NS_03
12	NS_06
13	NS_06
14	NS_06
17	NS_06
19	NS_08
21	NS_09
23	NS_03
35	NS_03
36	NS_03

Table G.2-3: Network Signalling Value fo	r reference sensitivity

G.3 Reference measurement channel for REFSENSE in lower SNR

Tables G.3-1A and G.3-2 are applicable for Annex G.2 (Reference sensitivity level in lower SNR).

Parameter	Unit	Value
Channel bandwidth	MHz	10
Allocated resource blocks		50
Subcarriers per resource block		12
Allocated subframes per Radio Frame		10
Modulation		QPSK
Target Coding Rate		1/3
Number of HARQ Processes	Processes	8
Maximum number of HARQ transmissions		[4]
Information Bit Payload per Sub-Frame		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	4392
For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	4392
Transport block CRC	Bits	24
Number of Code Blocks per Sub-Frame		
(Note 4)		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	
For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	
Binary Channel Bits Per Sub-Frame		
For Sub-Frames 1,2,3,4,6,7,8,9	Bits	13800
For Sub-Frame 5	Bits	N/A
For Sub-Frame 0	Bits	12960
Max. Throughput averaged over 1 frame	kbps	3952.
		8
UE Category		1-8
		/Hz and 10MHz channel BW. 3 symbols allocated to
PDCCH for 5 MHz and 3 MHz. 4 s		
		BCH allocated as per TS 36.211 [4]
		tional CRC sequence of $L = 24$ Bits is attached to
each Code Block (otherwise L = 0		
Note 4: Redundancy version coding seque	ence is {0, 1, 2	, 3} for QPSK.

Parameter	Unit	V	alue				
Channel Bandwidth	MHz		10				
Allocated resource blocks			50				
Uplink-Downlink Configuration (Note 5)			1				
Allocated subframes per Radio Frame			4+2				
(D+S)							
Number of HARQ Processes	Processes		7				
Maximum number of HARQ transmission			[4]				
Modulation			QPSK				
Target coding rate			1/3				
Information Bit Payload per Sub-Frame	Bits						
For Sub-Frame 4, 9			4392				
For Sub-Frame 1, 6			3240				
For Sub-Frame 5			N/A				
For Sub-Frame 0			4392				
Transport block CRC	Bits		24				
Number of Code Blocks per Sub-Frame							
(Note 5)							
For Sub-Frame 4, 9			1				
For Sub-Frame 1, 6			1				
For Sub-Frame 5			N/A				
For Sub-Frame 0			1				
Binary Channel Bits Per Sub-Frame	Bits						
For Sub-Frame 4, 9			13800				
For Sub-Frame 1, 6			11256				
For Sub-Frame 5			N/A				
For Sub-Frame 0			13104				
Max. Throughput averaged over 1 frame	kbps		1965.				
			6				
UE Category			1-5				
Note 1: For normal subframes(0,4,5,9), 2 channel BW; 3 symbols allocated for 1.4 MHz. For special subframe	to PDCCH for	5 MHz and 3 MHz; 4 sym	bols allocated	to PDCCH			
	2: For 1.4MHz, no data shall be scheduled on special subframes(1&6) to avoid problems with						
	•						
Note 4: If more than one Code Block is pl							
Note 5: As per Table 4.2-2 in TS 36.211 [
Note 6: Redundancy version coding sequ		2, 3} for QPSK.					

Table A.3.2-2A Fixed Reference Channel for Receiver Requirements (TDD)

Annex H (informative): Change history

Table G.1: Change History

Date	TSG#	TSG Doc.	CR	Subject	Old	New
11-2007	R4#45	R4-72206		TS36.101V0.1.0 approved by RAN4	-	
12-2007	RP#38	RP-070979		Approved version at TSG RAN #38	1.0.0	8.0.0
03-2008	RP#39	RP-080123	3	TS36.101 - Combined updates of E-UTRA UE requirements	8.0.0	8.1.0
05-2008	RP#40	RP-080325	4	TS36.101 - Combined updates of E-UTRA UE requirements	8.1.0	8.2.0
09-2008	RP#41	RP-080638	5r1	Addition of Ref Sens figures for 1.4MHz and 3MHz Channel bandwiidths	8.2.0	8.3.0
09-2008	RP#41	RP-080638	7r1	Transmitter intermodulation requirements	8.2.0	8.3.0
09-2008	RP#41	RP-080638	10	CR for clarification of additional spurious emission requirement	8.2.0	8.3.0
09-2008	RP#41	RP-080638	15	Correction of In-band Blocking Requirement	8.2.0	8.3.0
09-2008	RP#41	RP-080638	18r1	TS36.101: CR for section 6: NS_06	8.2.0	8.3.0
09-2008	RP#41	RP-080638	19r1	TS36.101: CR for section 6: Tx modulation	8.2.0	8.3.0
09-2008	RP#41	RP-080638	20r1	TS36.101: CR for UE minimum power	8.2.0	8.3.0
09-2008	RP#41	RP-080638	21r1	TS36.101: CR for UE OFF power	8.2.0	8.3.0
09-2008	RP#41	RP-080638	24r1	TS36.101: CR for section 7: Band 13 Rx sensitivity	8.2.0	8.3.0
09-2008	RP#41	RP-080638	26	UE EVM Windowing	8.2.0	8.3.0
09-2008	RP#41	RP-080638	29	Absolute ACLR limit	8.2.0	8.3.0
09-2008	RP#41	RP-080731	23r2	TS36.101: CR for section 6: UE to UE co-existence	8.2.0	8.3.0
09-2008	RP#41	RP-080731	30	Removal of [] for UE Ref Sens figures	8.2.0	8.3.0
09-2008	RP#41	RP-080731	31	Correction of PA, PB definition to align with RAN1 specification	8.2.0	8.3.0
09-2008	RP#41	RP-080731	37r2	UE Spurious emission band UE co-existence	8.2.0	8.3.0
09-2008	RP#41	RP-080731	44	Definition of specified bandwidths	8.2.0	8.3.0
09-2008	RP#41	RP-080731	48r3	Addition of Band 17	8.2.0	8.3.0
09-2008	RP#41	RP-080731	50	Alignment of the UE ACS requirement	8.2.0	8.3.0
09-2008	RP#41	RP-080731	52r1	Frequency range for Band 12	8.2.0	8.3.0
09-2008	RP#41	RP-080731	54r1	Absolute power tolerance for LTE UE power control	8.2.0	8.3.0
09-2008	RP#41	RP-080731	55	TS36.101 section 6: Tx modulation	8.2.0	8.3.0
09-2008	RP#41	RP-080732	6r2	DL FRC definition for UE Receiver tests	8.2.0	8.3.0
09-2008	RP#41	RP-080732	46	Additional UE demodulation test cases	8.2.0	8.3.0
09-2008	RP#41	RP-080732	47	Updated descriptions of FRC	8.2.0	8.3.0
09-2008	RP#41	RP-080732	49	Definition of UE transmission gap	8.2.0	8.3.0
09-2008	RP#41	RP-080732	51	Clarification on High Speed train model in 36.101	8.2.0	8.3.0
09-2008	RP#41	RP-080732	53	Update of symbol and definitions	8.2.0 8.2.0	8.3.0
09-2008	RP#41	RP-080743	56	Addition of MIMO (4x2) and (4x4) Correlation Matrices	8.3.0	8.3.0 8.4.0
12-2008	RP#42 RP#42	RP-080908	94r2	CR TX RX channel frequency separation	8.3.0	8.4.0
12-2008		RP-080909	105r1 60	UE Maximum output power for Band 13 UL EVM equalizer definition	8.3.0	8.4.0
12-2008	RP#42	RP-080909			8.3.0	8.4.0
12-2008	RP#42	RP-080909	63 66	Correction of UE spurious emissions Clarification for UE additional spurious emissions	8.3.0	8.4.0
12-2008 12-2008	RP#42 RP#42	RP-080909 RP-080909	72	Introducing ACLR requirement for coexistance with UTRA	8.3.0	8.4.0
				1.6MHZ channel from 36.803	8.3.0	8.4.0
12-2008	RP#42	RP-080909	75 81	Removal of [] from Section 6 transmitter characteristcs	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080909		Clarification for PHS band protection Alignement for the measurement interval for transmit signal quality	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080909 RP-080909	101 98r1	Maximum power	8.3.0	8.4.0
12-2008 12-2008	RP#42 RP#42	RP-080909 RP-080909	980 57r1	CR UE spectrum flatness	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080909 RP-080909	71r1	UE in-band emission	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080909 RP-080909	58r1	CR Number of TX exceptions	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080909 RP-080951	99r2	CR UE output power dynamic	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080951 RP-080951	79r1	LTE UE transmitter intermodulation	8.3.0	8.4.0
12-2008	RP#42	RP-080931	91	Update of Clause 8	8.3.0	8.4.0
12-2008	RP#42	RP-080910	106r1	Structure of Clause 9 including CSI requirements for PUCCH	8.3.0	8.4.0
12-2008	RP#42	RP-080911	59	mode 1-0 CR UE ACS test frequency offset	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080911 RP-080911	59 65	Correction of spurious response parameters	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080911 RP-080911	80	Removal of LTE UE narrowband intermodulation	8.3.0	8.4.0
12-2008	RP#42 RP#42	RP-080911 RP-080911	90r1	Introduction of Maximum Sensitivity Degradation	8.3.0	8.4.0
12-2008	RF#42	KE-000911	9011	Introduction of Maximum Sensitivity Degradation	0.5.0	0.4.0

12-2008	RP#42	RP-080911	103	Removal of [] from Section 7 Receiver characteristic	8.3.0	8.4.0
12-2008	RP#42	RP-080912	62	Alignement of TB size n Ref Meas channel for RX characteristics	8.3.0	8.4.0
12-2008	RP#42	RP-080912	78	TDD Reference Measurement channel for RX characterisctics	8.3.0	8.4.0
12-2008	RP#42	RP-080912	73r1	Addition of 64QAM DL referenbce measurement channel	8.3.0	8.4.0
12-2008	RP#42	RP-080912	74r1	Addition of UL Reference Measurement Channels	8.3.0	8.4.0
12-2008	RP#42	RP-080912	104	Reference measurement channels for PDSCH performance requirements (TDD)	8.3.0	8.4.0
12-2008	RP#42	RP-080913	68	MIMO Correlation Matrix Corrections	8.3.0	8.4.0
12-2008	RP#42	RP-080915	67	Correction to the figure with the Transmission Bandwidth configuration	8.3.0	8.4.0
12-2008	RP#42	RP-080916	77	Modification to EARFCN	8.3.0	8.4.0
12-2008	RP#42	RP-080917	85r1	New Clause 5 outline	8.3.0	8.4.0
12-2008	RP#42	RP-080919	102	Introduction of Bands 12 and 17 in 36.101	8.3.0	8.4.0
12-2008	RP#42	RP-080927	84r1	Clarification of HST propagation conditions	8.3.0	8.4.0
03-2009	RP#43	RP-090170	156r2	A-MPR table for NS_07	8.4.0	8.5.0
03-2009	RP#43	RP-090170	170	Corrections of references (References to tables and figures)	8.4.0	8.5.0
03-2009	RP#43	RP-090170	108	Removal of [] from Transmitter Intermodulation	8.4.0 8.4.0	8.5.0 8.5.0
03-2009	RP#43	RP-090170	155	E-UTRA ACLR for below 5 MHz bandwidths	8.4.0 8.4.0	8.5.0 8.5.0
03-2009	RP#43	RP-090170	116	Clarification of PHS band including the future plan	8.4.0 8.4.0	
03-2009	RP#43	RP-090170	119	Spectrum emission mask for 1.4 MHz and 3 MHz bandwidhts Removal of "Out-of-synchronization handling of output power"		8.5.0
03-2009	RP#43	RP-090170	120	heading	8.4.0	8.5.0
03-2009	RP#43	RP-090170	126	UE uplink power control	8.4.0	8.5.0
03-2009	RP#43	RP-090170	128	Transmission BW Configuration	8.4.0	8.5.0
03-2009	RP#43	RP-090170	130	Spectrum flatness	8.4.0	8.5.0
03-2009	RP#43	RP-090170	132r2		8.4.0 8.4.0	8.5.0
03-2009	RP#43	RP-090170	134	UL DM-RS EVM	8.4.0 8.4.0	8.5.0 8.5.0
03-2009	RP#43	RP-090170	140 113	Removal of ACLR2bis requirements	8.4.0 8.4.0	8.5.0 8.5.0
03-2009 03-2009	RP#43 RP#43	RP-090171 RP-090171	113	In-band blocking	8.4.0	8.5.0
03-2009	RP#43	RP-090171 RP-090171	127 137r1	In-band blocking and sensitivity requirement for band 17 Wide band intermodulation	8.4.0	8.5.0
03-2009	RP#43	RP-090171 RP-090171	13711	Correction of reference sensitivity power level of Band 9	8.4.0	8.5.0
03-2009	RP#43	RP-090171 RP-090172	109	AWGN level for UE DL demodulation performance tests	8.4.0	8.5.0
03-2009	RP#43	RP-090172	103	Update of Clause 8: additional test cases	8.4.0	8.5.0
03-2009	RP#43	RP-090172	139r1	Performance requirement structure for TDD PDSCH	8.4.0	8.5.0
03-2009	RP#43	RP-090172	142r1	Performance requirements and reference measurement channels for TDD PDSCH demodulation with UE-specific reference symbols	8.4.0	8.5.0
03-2009	RP#43	RP-090172	145	Number of information bits in DwPTS	8.4.0	8.5.0
03-2009	RP#43	RP-090172	160r1	MBSFN-Unicast demodulation test case	8.4.0	8.5.0
03-2009	RP#43	RP-090172	163r1	MBSFN-Unicast demodulation test case for TDD	8.4.0	8.5.0
03-2009	RP#43	RP-090173	162	Clarification of EARFCN for 36.101	8.4.0	8.5.0
03-2009	RP#43	RP-090369	110	Correction to UL Reference Measurement Channel	8.4.0	8.5.0
03-2009	RP#43	RP-090369	114	Addition of MIMO (4x4, medium) Correlation Matrix	8.4.0	8.5.0
03-2009	RP#43	RP-090369	121	Correction of 36.101 DL RMC table notes	8.4.0	8.5.0
03-2009	RP#43	RP-090369	125	Update of Clause 9	8.4.0	8.5.0
03-2009	RP#43	RP-090369	138r1	Clarification on OCNG	8.4.0	8.5.0
03-2009	RP#43	RP-090369	161	CQI reference measurement channels	8.4.0	8.5.0
03-2009	RP#43	RP-090369	164	PUCCH 1-1 Static Test Case	8.4.0	8.5.0
03-2009	RP#43	RP-090369	111	Reference Measurement Channel for TDD	8.4.0	8.5.0
03-2009	RP#44			Editorial correction in Table 6.2.4-1	8.5.0	8.5.1
05-2009	RP#44	RP-090540	167	Boundary between E-UTRA fOOB and spurious emission domain for 1.4 MHz and 3 MHz bandwiths. (Technically Endorsed CR in R4-50bis - R4-091205)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	168	EARFCN correction for TDD DL bands. (Technically Endorsed CR in R4-50bis - R4-091206)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	169	Editorial correction to in-band blocking table. (Technically Endorsed CR in R4-50bis - R4-091238)	8.5.1	8.6.0
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05-2009	RP#44	RP-090540	171	CR PRACH EVM. (Technically Endorsed CR in R4-50bis - R4- 091308)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	172	CR EVM correction. (Technically Endorsed CR in R4-50bis - R4- 091309)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	177	CR power control accuracy. (Technically Endorsed CR in R4- 50bis - R4-091418)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	179	Correction of SRS requirements. (Technically Endorsed CR in R4- 50bis - R4-091426)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	186	Clarification for EVM. (Technically Endorsed CR in R4-50bis - R4- 091512)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	187	Removal of [] from band 17 Refsens values and ACS offset frequencies	8.5.1	8.6.0
05-2009	RP#44	RP-090540	191	Completion of band17 requirements	8.5.1	8.6.0
05-2009	RP#44	RP-090540	192	Removal of 1.4 MHz and 3 MHz bandwidths from bands 13, 14 and 17.	8.5.1	8.6.0
05-2009	RP#44	RP-090540	223	CR: 64 QAM EVM	8.5.1	8.6.0
05-2009	RP#44	RP-090540	201	CR In-band emissions	8.5.1	8.6.0
05-2009	RP#44	RP-090540	203	CR EVM exclusion period	8.5.1	8.6.0
05-2009	RP#44	RP-090540	204	CR In-band emissions timing	8.5.1	8.6.0
05-2009	RP#44	RP-090540	206	CR Minimum Rx exceptions	8.5.1	8.6.0
05-2009	RP#44	RP-090540	207	CR UL DM-RS EVM	8.5.1	8.6.0
05-2009	RP#44	RP-090540	218r1	A-MPR table for NS_07	8.5.1	8.6.0
05-2009	RP#44	RP-090540	205r1	CR In-band emissions in shortened subframes	8.5.1	8.6.0
05-2009	RP#44	RP-090540	200r1	CR PUCCH EVM	8.5.1	8.6.0
05-2009	RP#44	RP-090540	178r2	No additional emission mask indication. (Technically Endorsed CR in R4-50bis - R4-091421)	8.5.1	8.6.0
05-2009	RP#44	RP-090540	220r1	Spectrum emission requirements for band 13	8.5.1	8.6.0
05-2009	RP#44	RP-090540	197r2	CR on aggregate power tolerance	8.5.1	8.6.0
05-2009	RP#44	RP-090540	196r2	CR: Rx IP2 performance	8.5.1	8.6.0
05-2009	RP#44	RP-090541	198r1	Maximum output power relaxation	8.5.1	8.6.0
05-2009	RP#44	RP-090542	166	Update of performance requirement for TDD PDSCH with MBSFN configuration. (Technically Endorsed CR in R4-50bis - R4-091180)	8.5.1	8.6.0
05-2009	RP#44	RP-090542	175	Adding AWGN levels for some TDD DL performance requirements. (Technically Endorsed CR in R4-50bis - R4- 091406)	8.5.1	8.6.0
05-2009	RP#44	RP-090542	182	OCNG Patterns for Single Resource Block FRC Requirements. (Technically Endorsed CR in R4-50bis - R4-091504)	8.5.1	8.6.0
05-2009	RP#44	RP-090542	170r1	Update of Clause 8: PHICH and PMI delay. (Technically Endorsed CR in R4-50bis - R4-091275)	8.5.1	8.6.0
05-2009	RP#44	RP-090543	183	Requirements for frequency-selective fading test. (Technically Endorsed CR in R4-50bis - R4-091505)	8.5.1	8.6.0
05-2009	RP#44	RP-090543	199	CQI requirements under AWGN conditions	8.5.1	8.6.0
05-2009	RP#44	RP-090543	188r1	Adaptation of UL-RMC-s for supporting more UE categories	8.5.1	8.6.0
05-2009	RP#44	RP-090543	193r1	Correction of the LTE UE downlink reference measurement channels	8.5.1	8.6.0
05-2009	RP#44	RP-090543	184r1	Requirements for frequency non-selective fading tests. (Technically Endorsed CR in R4-50bis - R4-091506)	8.5.1	8.6.0
05-2009	RP#44	RP-090543	185r1	Requirements for PMI reporting. (Technically Endorsed CR in R4- 50bis - R4-091510)	8.5.1	8.6.0
05-2009	RP#44	RP-090543	221r1	Correction to DL RMC-s for Maximum input level for supporting more UE-Categories	8.5.1	8.6.0
05-2009	RP#44	RP-090543	216	Addition of 15 MHz and 20 MHz bandwidths into band 38	8.5.1	8.6.0
05-2009	RP#44	RP-090559	180	Introduction of Extended LTE800 requirements. (Technically Endorsed CR in R4-50bis - R4-091432)	8.6.0	9.0.0
09-2009	RP#45	RP-090826	239	A-MPR for Band 19	9.0.0	9.1.0
09-2009	RP#45	RP-090822	225	LTE UTRA ACLR1 centre frequency definition for 1.4 and 3 MHz BW	9.0.0	9.1.0
09-2009	RP#45	RP-090822	227	Harmonization of text for LTE Carrier leakage	9.0.0	9.1.0
09-2009	RP#45	RP-090822	229	Sensitivity requirements for Band 38 15 MHz and 20 MHz bandwidths	9.0.0	9.1.0
09-2009	RP#45	RP-090822	236	Operating band edge relaxation of maximum output power for Band 18 and 19	9.0.0	9.1.0
09-2009	RP#45	RP-090822	238	Addition of 5MHz channel bandwidth for Band 40	9.0.0	9.1.0
09-2009	RP#45	RP-090822	245	Removal of unnecessary requirements for 1.4 and 3 MHz bandwidths on bands 13 and 17	9.0.0	9.1.0
09-2009	RP#45	RP-090877	261	Correction of LTE UE ACS test parameter	9.0.0	9.1.0
09-2009	RP#45	RP-090877	263R1	Correction of LTE UE ACLR test parameter	9.0.0	9.1.0
09-2009	RP#45	RP-090877	286	Uplink power and RB allocation for receiver tests	9.0.0	9.1.0
09-2009	RP#45	RP-090877	320	CR Sensitivity relaxation for small BW	9.0.0	9.1.0
09-2009	RP#45	RP-090877	324	Correction of Band 3 spurious emission band UE co-existence	9.0.0	9.1.0

09-2009	RP#45	RP-090877	249R1	CR Pcmax definition (working assumption)	9.0.0	9.1.0
09-2009	RP#45	RP-090877	330	Spectrum flatness clarification	9.0.0	9.1.0
09-2009	RP#45	RP-090877	332	Transmit power: removal of TC and modification of REFSENS note	9.0.0	9.1.0
09-2009	RP#45	RP-090877	282R1	Additional SRS relative power requirement and update of measurement definition	9.0.0	9.1.0
09-2009	RP#45	RP-090877	284R1	Power range applicable for relative tolerance	9.0.0	9.1.0
09-2009	RP#45	RP-090878	233	TDD UL/DL configurations for CQI reporting	9.0.0	9.1.0
09-2009	RP#45	RP-090878	235	Further clarification on CQI test configurations	9.0.0	9.1.0
09-2009	RP#45	RP-090878	243	Corrections to UL- and DL-RMC-s	9.0.0 9.0.0	9.1.0 9.1.0
09-2009 09-2009	RP#45 RP#45	RP-090878 RP-090878	247 290	Reference measurement channel for multiple PMI requirements CQI reporting test for a scenario with frequency-selective	9.0.0	9.1.0
09-2009	RP#45	RP-090878	265R2	interference CQI reference measurement channels	9.0.0	9.1.0
09-2009	RP#45	RP-090878	321R1	CR RI Test	9.0.0	9.1.0
09-2009	RP#45	RP-090875	231	Correction of parameters for demodulation performance requirement	9.0.0	9.1.0
09-2009	RP#45	RP-090875	241R1	UE categories for performance tests and correction to RMC references	9.0.0	9.1.0
09-2009	RP#45	RP-090875	333	Clarification of Ês definition in the demodulation requirement	9.0.0	9.1.0
09-2009	RP#45	RP-090875	326	Editorial corrections and updates to PHICH PBCH test cases.	9.0.0	9.1.0
09-2009	RP#45	RP-090875	259R3	Test case numbering in section 8 Performance tests	9.0.0	9.1.0
12-2009	RP-46	RP-091264	335	Test case numbering in TDD PDSCH performance test (Technically endorsed at RAN 4 52bis in R4-093523)	9.1.0	9.2.0
12-2009	RP-46	RP-091261	337	Adding beamforming model for user-specfic reference signal (Technically endorsed at RAN 4 52bis in R4-093525)	9.1.0	9.2.0
12-2009	RP-46	RP-091263	339R1	Adding redundancy sequences to PMI test (Technically endorsed at RAN 4 52bis in R4-093581)	9.1.0	9.2.0
12-2009	RP-46	RP-091264	341	Throughput value correction at FRC for Maximum input level (Technically endorsed at RAN 4 52bis in R4-093660)	9.1.0	9.2.0
12-2009	RP-46	RP-091261	343	Correction to the modulated E-UTRA interferer (Technically endorsed at RAN 4 52bis in R4-093662)	9.1.0	9.2.0
12-2009	RP-46	RP-091264	345R1	OCNG: Patterns and present use in tests (Technically endorsed at RAN 4 52bis in R4-093664)	9.1.0	9.2.0
12-2009	RP-46	RP-091264	347	OCNG: Use in receiver and performance tests (Technically endorsed at RAN 4 52bis in R4-093666)	9.1.0	9.2.0
12-2009	RP-46	RP-091263	349	Miscellaneous corrections on CSI requirements (Technically endorsed at RAN 4 52bis in R4-093676)	9.1.0	9.2.0
12-2009	RP-46	RP-091261	351	Removal of RLC modes (Technically endorsed at RAN 4 52bis in R4-093677)	9.1.0	9.2.0
12-2009	RP-46	RP-091261	353	CR Rx diversity requirement (Technically endorsed at RAN 4 52bis in R4-093703) A-MPR notation in NS_07 (Technically endorsed at RAN 4 52bis	9.1.0	9.2.0
12-2009	RP-46	RP-091261	355	in R4-093706)	9.1.0	9.2.0
12-2009	RP-46	RP-091263	359	Single- and multi-PMI requirements (Technically endorsed at RAN 4 52bis in R4-093846)	9.1.0	9.2.0
12-2009	RP-46	RP-091263	363	CQI reference measurement channel (Technically endorsed at RAN 4 52bis in R4-093970) LTE MBSFN Channel Model (Technically endorsed at RAN 4	9.1.0	9.2.0
12-2009	RP-46	RP-091292	364	52bis in R4-094020)	9.1.0	9.2.0
12-2009	RP-46	RP-091264	367	Numbering of PDSCH (User-Specific Reference Symbols) Demodulation Tests Numbering of PDSCH/PCEICH_PHICH_PRCH_Perced Tests	9.1.0	9.2.0
12-2009 12-2009	RP-46 RP-46	RP-091264 RP-091261	369 371	Numbering of PDCCH/PCFICH, PHICH, PBCH Demod Tests Remove [] from Reference Measurement Channels in Annex A	9.1.0 9.1.0	9.2.0 9.2.0
12-2009	RP-46	RP-091264	373R1	Corrections to RMC-s for Maximum input level test for low UE categories	9.1.0	9.2.0
12-2009	RP-46	RP-091261	377	Correction of UE-category for R.30	9.1.0	9.2.0
12-2009	RP-46	RP-091286	378	Introduction of Extended LTE1500 requirements for TS36.101	9.1.0	9.2.0
12-2009	RP-46	RP-091262	384	CR: Removal of 1.4 MHz and 3 MHz channel bandwidths from additional spurious emissions requirements for Band 1 PHS protection	9.1.0	9.2.0
12-2009	RP-46	RP-091262	386R3	Clarification of measurement conditions of spurious emission requirements at the edge of spurious domain	9.1.0	9.2.0
12-2009	RP-46	RP-091262	390	Spurious emission table correction for TDD bands 33 and 38.	9.1.0	9.2.0
12-2009	RP-46	RP-091262	392R2	36.101 Symbols and abreviations for Pcmax	9.1.0	9.2.0
12-2009	RP-46	RP-091262	394	UTRAACLR1 requirement definition for 1.4 and 3 MHz BW completed Introduction of the ACK/NACK feedback modes for TDD	9.1.0	9.2.0
12-2009 12-2009	RP-46 RP-46	RP-091263 RP-091262	396 404R3	requirements CR Power control exception R8	9.1.0 9.1.0	9.2.0 9.2.0
12-2009	RP-46 RP-46	RP-091262 RP-091262	404R3 416R1	Relative power tolerance: special case for receiver tests	9.1.0	9.2.0
12-2009	RP-46	RP-091263	420R1	CSI reporting: test configuration for CQI fading requirements	9.1.0	9.2.0
12-2009	RP-46	RP-091284	421R1	Inclusion of Band 20 UE RF parameters	9.1.0	9.2.0

		[T	Editorial corrections and undetes to Clause 0.24 EDD		1
12-2009	RP-46	RP-091264	425	Editorial corrections and updates to Clause 8.2.1 FDD demodulation test cases	9.1.0	9.2.0
12-2009	RP-46	RP-091262	427	CR: time mask	9.1.0	9.2.0
12-2009	RP-46	RP-091264	430	Correction of the payload size for PDCCH/PCFICH performance	9.1.0	9.2.0
				requirements		
12-2009	RP-46	RP-091263	432	Transport format and test point updates to RI reporting test cases	9.1.0	9.2.0
12-2009	RP-46	RP-091263	434	Transport format and test setup updates to frequency-selective interference CQI tests	9.1.0	9.2.0
12-2009	RP-46	RP-091263	436	CR RI reporting configuration in PUCCH 1-1 test	9.1.0	9.2.0
12-2009	RP-46	RP-091261	438	Addition of R.11-1 TDD references	9.1.0	9.2.0
12-2009	RP-46	RP-091292	439	Performance requirements for LTE MBMS	9.1.0	9.2.0
12-2009	RP-46	RP-091262	442R1	In Band Emissions Requirements Correction CR	9.1.0	9.2.0
12-2009	RP-46	RP-091262	444R1	PCMAX definition	9.1.0	9.2.0
03-2010	RP-47	RP-100246	453r1	Corrections of various errors in the UE RF requirements	9.2.0	9.3.0
03-2010	RP-47	RP-100246	462r1	UTRA ACLR measurement bandwidths for 1.4 and 3 MHz	9.2.0	9.3.0
03-2010	RP-47	RP-100246	493	Band 8 Coexistence Requirement Table Correction	9.2.0	9.3.0
03-2010	RP-47	RP-100246	489r1	Rel 9 CR for Band 14	9.2.0	9.3.0
03-2010	RP-47	RP-100246	485r1	CR Band 1- PHS coexistence	9.2.0	9.3.0
03-2010	RP-47	RP-100247	501	Fading CQI requirements for FDD mode	9.2.0	9.3.0
03-2010	RP-47	RP-100247	499	CR correction to RI test Reporting mode, Reporting Interval and Editorial corrections for	9.2.0	9.3.0
03-2010	RP-47	RP-100249	451	demodulation	9.2.0	9.3.0
03-2010	RP-47	RP-100249	464r1	Corrections to 1PRB PDSCH performance test in presence of MBSFN.	9.2.0	9.3.0
03-2010	RP-47	RP-100249	458r1	OCNG corrections	9.2.0	9.3.0
03-2010	RP-47	RP-100249	467	Addition of ONCG configuration in DRS performance test	9.2.0	9.3.0
03-2010	RP-47	RP-100249	465r1	PDSCH performance tests for low UE categories	9.2.0	9.3.0
03-2010	RP-47	RP-100250	460r1	Use of OCNG in CSI tests	9.2.0	9.3.0
03-2010	RP-47	RP-100250	491r1	Corrections to CQI test configurations	9.2.0	9.3.0
03-2010	RP-47	RP-100250	469r1	Corrections of some CSI test parameters	9.2.0	9.3.0
03-2010	RP-47	RP-100251	456r1	TBS correction for RMC UL TDD 16QAM full allocation BW 1.4 MHz	9.2.0	9.3.0
03-2010	RP-47	RP-100262	449	Editorial corrections on Band 19 REFSENS	9.2.0	9.3.0
03-2010	RP-47	RP-100263	470r1	Band 20 UE RF requirements	9.2.0	9.3.0
03-2010	RP-47	RP-100264	446r1	A-MPR for Band 21	9.2.0	9.3.0
03-2010	RP-47	RP-100264	448	RF requirements for UE in later releases	9.2.0	9.3.0
03-2010	RP-47	RP-100268	445	36.101 CR: Editorial corrections on LTE MBMS reference measurement channels	9.2.0	9.3.0
03-2010	RP-47	RP-100268	454	The definition of the Doppler shift for LTE MBSFN Channel Model	9.2.0	9.3.0
03-2010	RP-47	RP-100239	478r3	Modification of the spectral flatness requirement and some editorial corrections	9.2.0	9.3.0
06-2010	RP-48	RP-100619	559	Corrections of tables for Additional Spectrum Emission Mask	9.3.0	9.4.0
06-2010	RP-48	RP-100619	538	Correction of transient time definition for EVM requirements	9.3.0	9.4.0
06-2010	RP-48	RP-100619	557r2	CR on UE coexistence requirement	9.3.0	9.4.0
06-2010	RP-48	RP-100619	547r1	Correction of antenna configuration and beam-forming model for DRS	9.3.0	9.4.0
06-2010	RP-48	RP-100619	536r1	CR: Corrections on MIMO demodulation performance requirements	9.3.0	9.4.0
06-2010	RP-48	RP-100619	528r1	Corrections on the definition of PCMAX	9.3.0	9.4.0
06-2010				Relaxation of the PDSCH demodulation requirements due to	9.3.0	9.4.0
	RP-48	RP-100619	568	control channel errors	9.3.0	9.4.0
06-2010	RP-48	RP-100619	566	Correction of the UE output power definition for RX tests	9.3.0	9.4.0
06-2010	RP-48	RP-100620	505r1	Fading CQI requirements for TDD mode	9.3.0	9.4.0
06-2010	RP-48	RP-100620	521	Correction to FRC for CQI index 0	9.3.0	9.4.0
06-2010	RP-48	RP-100620	516r1	Correction to CQI test configuration	9.3.0	9.4.0
06-2010	RP-48	RP-100620	532	Correction of CQI and PMI delay configuration description for TDD	9.3.0	9.4.0
06-2010	RP-48	RP-100620	574	Correction to FDD and TDD CSI test configurations	9.3.0	9.4.0
06-2010	RP-48	RP-100620	571	Minimum requirements for Rank indicator reporting	9.3.0	9.4.0
06-2010	RP-48	RP-100628	563	LTE MBMS performance requirements (FDD)	9.3.0	9.4.0
06-2010	RP-48	RP-100628	564	LTE MBMS performance requirements (TDD)	9.3.0	9.4.0
06-2010 06-2010	RP-48 RP-48	RP-100629 RP-100630	553r2 524r2	Performance requirements for dual-layer beamforming CR: low Category CSI requirement	9.3.0 9.3.0	9.4.0 9.4.0
06-2010	RP-48	RP-100630 RP-100630	52412	Correction of FRC reference and test case numbering	9.3.0	9.4.0
06-2010	RP-48			Correction of carrier frequency and EARFCN of Band 21 for	9.3.0	9.4.0
06-2010	RP-48	RP-100630	526	TS36.101 Addition of PDSCH TDD DRS demodulation tests for Low UE	9.3.0	9.4.0
06-2010	RP-48	RP-100630	508r1	categories Specification of minimum performance requirements for low UE	9.3.0	9.4.0
06-2010		RP-100630	539	category Addition of minimum performance requirements for low UE	9.3.0	9.4.0
06-2010	RP-48	RP-100630	569	category TDD CRS single-antenna port tests Introduction of sustained downlink data-rate performance		
	RP-48	RP-100631	549r3	requirements	9.3.0	9.4.0
06-2010	RP-48	RP-100683	530r1	Band 20 Rx requirements	9.3.0	9.4.0

00.0040	DD 40	DD 400000	014-0		0.4.0	0.5.0
09-2010	RP-49	RP-100920	614r2	Add OCNG to MBMS requirements	9.4.0	9.5.0
09-2010	RP-49	RP-100916	599 597r1	Correction of PDCCH content for PHICH test	9.4.0	9.5.0
09-2010	RP-49	RP-100920		Beamforming model for transmission on antenna port 7/8	9.4.0	9.5.0
09-2010	RP-49	RP-100920	600r1	Correction of full correlation in frequency-selective CQI test	9.4.0	9.5.0
09-2010	RP-49	DD 400000	004	Correction on single-antenna transmission fixed reference channel	0.4.0	050
	RP-49	RP-100920	601		9.4.0	9.5.0
09-2010		DD 400044	005	Reference sensitivity requirements for the 1.4 and 3 MHz	0.4.0	050
	RP-49	RP-100914	605	bandwidths	9.4.0	9.5.0
09-2010	RP-49	RP-100920	608r1	CR for DL sustained data rate test	9.4.0	9.5.0
09-2010	DD 40	DD 400040	014	Correction of references in section 10 (MBMS performance	0.4.0	050
00.0040	RP-49	RP-100919	611	requirements)	9.4.0	9.5.0
09-2010	RP-49	RP-100914	613	Band 13 and Band 14 spurious emission corrections	9.4.0	9.5.0
09-2010	RP-49	RP-100919	617r1	Rx Requirements	9.4.0	9.5.0
09-2010	RP-49	RP-100926	576r1	Clarification on DL-BF simulation assumptions	9.4.0	9.5.0
09-2010	RP-49	RP-100920	582r1	Introduction of additional Rel-9 scenarios	9.4.0	9.5.0
09-2010	RP-49	RP-100925	575r1	Correction to band 20 ue to ue Co-existence table	9.4.0	9.5.0
09-2010	RP-49	RP-100916	581r1	Test configuration corrections to CQI reporting in AWGN	9.4.0	9.5.0
09-2010	RP-49	RP-100916	595	Corrections to RF OCNG Pattern OP.1 and 2	9.4.0	9.5.0
09-2010	RP-49	RP-100919	583	Editorial corrections of 36.101	9.4.0	9.5.0
09-2010				Addition of minimum performance requirements for low UE		
	RP-49	RP-100920	586	category TDD tests	9.4.0	9.5.0
09-2010	RP-49	RP-100914	590r1	Downlink power for receiver tests	9.4.0	9.5.0
09-2010	RP-49	RP-100920	591	OCNG use and power in beamforming tests	9.4.0	9.5.0
09-2010	RP-49	RP-100916	593	Throughput for multi-datastreams transmissions	9.4.0	9.5.0
09-2010	RP-49	RP-100914	588	Missing note in Additional spurious emission test with NS_07	9.4.0	9.5.0
09-2010	RP-49	RP-100927	596r2	CR LTE_TDD_2600_US spectrum band definition additions to TS	9.5.0	10.0.0
				36.101		
12-2010	RP-50	RP-101309	680	Demodulation performance requirements for dual-layer	10.0.0	10.1.0
				beamforming		
12-2010	RP-50	RP-101325	672	Correction on the statement of TB size and subband selection in	10.0.0	10.1.0
			-	CSI tests		
12-2010	RP-50	RP-101327	652	Correction to Band 12 frequency range	10.0.0	10.1.0
12-2010	RP-50	RP-101329	630	Removal of [] from TDD Rank Indicator requirements	10.0.0	10.1.0
12-2010	RP-50	RP-101329	635r1	Test configuration corrections to CQI TDD reporting in AWGN	10.0.0	10.1.0
12 2010	14 00	101020	00011	(Rel-10)	10.0.0	10.1.0
12-2010	RP-50	RP-101330	645	EVM window length for PRACH	10.0.0	10.1.0
12-2010	RP-50	RP-101330	649	Removal of NS signalling from TDD REFSENS tests	10.0.0	10.1.0
12-2010	RP-50	RP-101330	642r1	Correction of Note 4 In Table 7.3.1-1: Reference sensitivity QPSK	10.0.0	10.1.0
12 2010	141 00	101000	04211	PREFSENS	10.0.0	10.1.0
12-2010	RP-50	RP-101341	627	Add 20 RB UL Ref Meas channel	10.0.0	10.1.0
12-2010	RP-50	RP-101341	654r1	Additional in-band blocking requirement for Band 12	10.0.0	10.1.0
12-2010	RP-50	RP-101341	678	Further clarifications for the Sustained Downlink Data Rate Test	10.0.0	10.1.0
12-2010	RP-50	RP-101341	673r1	Correction on MBMS performance requirements	10.0.0	10.1.0
12-2010	RP-50	RP-101341	667r3	CR Removing brackets of Band 41 reference sensitivity to TS	10.0.0	10.1.0
12-2010	KF-30	KF-101349	00/13	36.101	10.0.0	10.1.0
12 2010	RP-50	RP-101356	666*2	Band 42 and 43 parameters for UMTS/LTE 3500 (TDD) for TS	10.0.0	10.1.0
12-2010	KP-50	RP-101350	666r2		10.0.0	10.1.0
40.0040		DD 404050	0.40=4	36.101	10.0.0	40.4.0
12-2010	RP-50	RP-101359	646r1	CR for CA, UL-MIMO, eDL-MIMO, CPE	10.0.0	10.1.0
12-2010	RP-50	RP-101361	620r1	Introduction of L-band in TS 36.101	10.0.0	10.1.0
12-2010	RP-50	RP-101379	670r1	Correction on the PMI reporting in Multi-Laye Spatial Multiplexing	10.0.0	10.1.0
40.00.0	DD 77		070 /	performance test	40.0-	46.1
12-2010	RP-50	RP-101380	679r1	Adding antenna configuration in CQI fading test case	10.0.0	10.1.0
01-2011				Clause numbering correction	10.1.0	10.1.1
03-2011	RP-51	RP-110359	695	Removal of E-UTRA ACLR for CA	10.1.1	10.2.0
03-2011	RP-51	RP-110338	699	PDCCH and PHICH performance: OCNG and power settings	10.1.1	10.2.0
03-2011	RP-51	RP-110336	706r1	Spurious emissions measurement uncertainty	10.1.1	10.2.0
03-2011	RP-51	RP-110352	707r1	REFSENSE in lower SNR	10.1.1	10.2.0
03-2011	RP-51	RP-110338	710	PMI performance: Power settings and precoding granularity	10.1.1	10.2.0
03-2011	RP-51	RP-110359	715r2	Definition of configured transmitted power for Rel-10	10.1.1	10.2.0
03-2011	RP-51	RP-110359	717	Introduction of requirement for adjacent intraband CA image	10.1.1	10.2.0
				rejection		
03-2011	RP-51	RP-110343	719	Minimum requirements for the additional Rel-9 scenarios	10.1.1	10.2.0
03-2011	RP-51	RP-110343	723	Corrections to power settings for Single layer beamforming with	10.1.1	10.2.0
				simultaneous transmission		
03-2011	RP-51	RP-110343	726r1	Correction to the PUSCH3-0 subband tests for Rel-10	10.1.1	10.2.0
03-2011	RP-51	RP-110338	730	Removing the square bracket for TS36.101	10.1.1	10.2.0
03-2011	RP-51	RP-110349	739	Removal of square brackets for dual-layer beamforming	10.1.1	10.2.0
			-	demodulation performance requirements		
	RP-51	RP-110359	751	CR: Maximum input level for intra band CA	10.1.1	10.2.0
03-2011			754r2	UE category coverage for dual-layer beamforming	10.1.1	10.2.0
03-2011 03-2011	RP-51	RP-110349	73412			
03-2011	RP-51 RP-51	RP-110349 RP-110343				10.2.0
03-2011 03-2011	RP-51	RP-110343	756r1	Further clarifications for the Sustained Downlink Data Rate Test	10.1.1	10.2.0
03-2011 03-2011 03-2011	RP-51 RP-51	RP-110343 RP-110343	756r1 759	Further clarifications for the Sustained Downlink Data Rate Test Removal of square brackets in sustained data rate tests	10.1.1 10.1.1	10.2.0
03-2011 03-2011	RP-51	RP-110343	756r1	Further clarifications for the Sustained Downlink Data Rate Test	10.1.1	

02 2011		DD 110242	765	Varification from quark for DUSCU 2.2 and DUCCU 2.4 reporting	1011	10.2.0
03-2011	RP-51	RP-110343	765	Verification framework for PUSCH 2-2 and PUCCH 2-1 reporting	10.1.1 10.2.0	10.2.0
06-2011	RP-52	RP-110804	766	Editorial: Spec Title correction, removal of "Draft" Add Expanded 1900MHz Band (Band 25) in 36.101	10.2.0	10.2.1
06-2011	RP-52 RP-52	RP-110804 RP-110795	768	Fixing Band 24 inclusion in TS 36.101	10.2.1	10.3.0
06-2011	RP-52 RP-52	RP-110795	700	CR: Corrections for UE to UE co-existence requirements of Band	10.2.1	10.3.0
00-2011	NF -92	KF-110700	112	3	10.2.1	10.3.0
06-2011	RP-52	RP-110812	774	Add 2GHz S-Band (Band 23) in 36.101	10.2.1	10.3.0
06-2011	RP-52	RP-110789	782	CR: Band 19 A-MPR refinement	10.2.1	10.3.0
06-2011	RP-52	RP-110796	787	REFSENS in lower SNR	10.2.1	10.3.0
06-2011	RP-52	RP-110789	805	Clarification for MBMS reference signal levels	10.2.1	10.3.0
06-2011	RP-52	RP-110792	810	FDD MBMS performance requirements for 64QAM mode	10.2.1	10.3.0
06-2011	RP-52	RP-110787	814	Correction on CQI mapping index of RI test	10.2.1	10.3.0
06-2011	RP-52	RP-110789	824	Corrections to in-band blocking table	10.2.1	10.3.0
06-2011	RP-52	RP-110794	826	Correction of TDD Category 1 DRS and DMRS RMCs	10.2.1	10.3.0
06-2011	RP-52	RP-110794	828	TDD MBMS performance requirements for 64QAM mode	10.2.1	10.3.0
06-2011	RP-52	RP-110796	829	Correction of TDD RMC for Low SNR Demodulation test	10.2.1	10.3.0
06-2011	RP-52	RP-110796	830	Informative reference sensitivity requirements for Low SNR for	10.2.1	10.3.0
00 2011	14 02		000	TDD	10.2.1	10.0.0
06-2011	RP-52	RP-110787	778r1	Minor corrections to DL-RMC-s for Maximum input level	10.2.1	10.3.0
06-2011	RP-52	RP-110789	832	PDCCH and PHICH performance: OCNG and power settings	10.2.1	10.3.0
06-2011	RP-52	RP-110789	818r1	Correction on 2-X PMI test for R10	10.2.1	10.3.0
06-2011	RP-52	RP-110789	816r1	Addition of performance requirements for dual-layer beamforming	10.2.1	10.3.0
06-2011	RP-92	RP-110/91	01011	category 1 UE test	10.2.1	10.3.0
06-2011	RP-52	RP-110789	834	Performance requirements for PUCCH 2-0, PUCCH 2-1 and	10.2.1	10.3.0
				PUSCH 2-2 tests		
06-2011	RP-52	RP-110807	835r1	CR for UL MIMO and CA	10.2.1	10.3.0
09-2011	RP-53	RP-111248	862r1	Removal of unnecessary channel bandwidths from REFSENS	10.3.0	10.4.0
00 2011	14 00	14 111210	00211	tables	10.0.0	10.110
09-2011	RP-53	RP-111248	869r1	Clarification on BS precoding information field for RI FDD and	10.3.0	10.4.0
		_		PUCCH 2-1 PMI tests		
09-2011	RP-53	RP-111248	872r1	CR for B14Rx requirement Rrel 10	10.3.0	10.4.0
09-2011	RP-53	RP-111248	890r1	CR to TS36.101: Correction on the accuracy test of CQI.	10.3.0	10.4.0
09-2011	RP-53	RP-111248	893	CR to TS36.101: Correction on CQI mapping index of TDD RI test	10.3.0	10.4.0
09-2011	RP-53	RP-111248	904	Correction of code block numbers for some RMCs	10.3.0	10.4.0
09-2011	RP-53	RP-111248	907	Correction to UL RMC for FDD and TDD	10.3.0	10.4.0
09-2011	RP-53	RP-111248	914r1	Adding codebook subset restriction for single layer closed-loop	10.3.0	10.4.0
00 2011	11 00	111240	01411	spatial multiplexing test	10.0.0	10.4.0
09-2011	RP-53	RP-111251	883	Sustained data rate: Correction of the ACK/NACK feedback mode	10.3.0	10.4.0
09-2011	RP-53	RP-111251	929	36.101 CR on MBSFN FDD requirements(R10)	10.3.0	10.4.0
09-2011	RP-53	RP-111251	938	TDD MBMS performance requirements for 64QAM mode	10.3.0	10.4.0
09-2011	RP-53	RP-111252	895	Further clarification for the dual-layer beamforming demodulation	10.3.0	10.4.0
				requirements		
09-2011			908r1	Introduction of Band 22		10.4.0
09-2011	RP-53	RP-111255	90011		10.3.0	10.4.0
	RP-53	RP-111255 RP-111255	939	Modifications of Band 42 and 43	10.3.0 10.3.0	10.4.0
09-2011				Modifications of Band 42 and 43 CR for TS 36.101 Annex B: Static channels for CQI tests		
	RP-53 RP-53	RP-111255 RP-111260	939 944		10.3.0 10.3.0	10.4.0 10.4.0
09-2011	RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262	939	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description	10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0
09-2011 09-2011	RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262	939 944 878r1 887	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO	10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262	939 944 878r1 887 926r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262	939 944 878r1 887	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation	10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262	939 944 878r1 887 926r1 927r1 930r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265	939 944 878r1 887 926r1 927r1 930r1 848	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265	939 944 878r1 887 926r1 927r1 930r1 848 863	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguos CA MPR requirement refinement	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements for TDD	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements	$\begin{array}{c} 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.3.0\\ 10.4.0\\ \end{array}$	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111266 RP-111684	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for	10.3.0 10.4.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.5.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 10-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111266 RP-111684	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.4.0 10.4.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.5.0 10.5.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111684	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 947 948 949	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI	10.3.0 10.4.0	10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.5.0
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111686 RP-111680	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 947 948 949	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111684 RP-111684 RP-111686 RP-111680 RP-111734	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 947 947 948 949 950 953r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction	10.3.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ \end{array}$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111680 RP-111734 RP-111680	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 947 947 948 949 950 953r1 956	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.4.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ 10.5.0\\ \end{array}$
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09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111684 RP-111684 RP-111684 RP-111680	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 947 947 948 949 950 953r1 956 959 960r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\$
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09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111680	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948 949 950 953r1 956 959 960r1 962	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition Pcmax,c Computation Assumptions	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\$
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09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 10-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111684 RP-111684 RP-111684 RP-111680 RP-111683 RP-111683 RP-111683 RP-111683 RP-111693 RP-111733	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948 949 950 953r1 956 959 960r1 962 963r1	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition Pcmax,c Computation Assumptions Correction of frequency range for spurious emission requirements Corrections of Rel-10 demodulation performance requirements	10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.4.0 \\ 10.5.$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 109-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 </td <td>RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111684 RP-111680 RP-111680</td> <td>939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948 949 950 953r1 956 959 960r1 962 963r1 966</td> <td>CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition Pcmax,c Computation Assumptions Corrections of Rel-10 demodulation performance requirements This CR is only partially implemented due to confliction with CR</td> <td>10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0</td> <td>$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\$</td>	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111684 RP-111680	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948 949 950 953r1 956 959 960r1 962 963r1 966	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition Pcmax,c Computation Assumptions Corrections of Rel-10 demodulation performance requirements This CR is only partially implemented due to confliction with CR	10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\$
09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 09-2011 10-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011 12-2011	RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-53 RP-54 RP-54 </td <td>RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111684 RP-111680 RP-111680</td> <td>939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948 949 950 953r1 956 959 960r1 962 963r1 966</td> <td>CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition Pcmax,c Computation Assumptions Correction of frequency range for spurious emission requirements Corrections of Rel-10 demodulation performance requirements</td> <td>10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0</td> <td>$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\$</td>	RP-111255 RP-111260 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111262 RP-111265 RP-111265 RP-111265 RP-111265 RP-111266 RP-111266 RP-111684 RP-111684 RP-111684 RP-111680	939 944 878r1 887 926r1 927r1 930r1 848 863 866r1 935 936r1 947 948 949 950 953r1 956 959 960r1 962 963r1 966	CR for TS 36.101 Annex B: Static channels for CQI tests Correction of CSI reference channel subframe description Correction to UL MIMO Power control accuracy for intra-band carrier aggregation In-band emissions requirements for intra-band carrier aggregation Adding the operating band for UL-MIMO Corrections to intra-band contiguous CA RX requirements Intra-band contiguous CA MPR requirement refinement Intra-band contiguous CA EVM Introduction of the downlink CA demodulation requirements Introduction of CA UE demodulation requirements for TDD Corrections of UE categories of Rel-10 reference channels for RF requirements Alternative way to define channel bandwidths per operating band for CR for TS36.101: Adding note to the function of MPR Clarification on applying CSI reports during rank switching in RI FDD test - Rel-10 Corrections for Band 42 and 43 introduction UE spurious emissions Add scrambling identity n_SCID for MU-MIMO test P-MPR definition Pcmax,c Computation Assumptions Correction of frequency range for spurious emission requirements Corrections of Rel-10 demodulation performance requirements	10.3.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0 10.4.0	$\begin{array}{c} 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.4.0\\ 10.5.0\\$

				This CR is only partially implemented due to confliction with CR 966		
12-2011	RP-54	RP-111691	982r2	Introduction of SDR TDD test scenario for CA UE demodulation This CR is only partially implemented due to confliction with CR 966	10.4.0	10.5.0
12-2011	RP-54	RP-111693	971r1	CR on Colliding CRS for non-MBSFN ABS	10.4.0	10.5.0
12-2011	RP-54	RP-111693	972r1	Introduction of eICIC demodulation performance requirements for FDD and TDD	10.4.0	10.5.0
12-2011	RP-54	RP-111686	985	Adding missing UL configuration specification in some UE receiver requirements for case of 1 CC UL capable UE	10.4.0	10.5.0
12-2011	RP-54	RP-111684	998	Correction and maintenance on CQI and PMI requirements (Rel- 10)	10.4.0	10.5.0
12-2011	RP-54	RP-111735	1004	MPR for CA Multi-cluster	10.4.0	10.5.0
12-2011	RP-54	RP-111691	1004	CA demodulation performance requirements for LTE FDD	10.4.0	10.5.0
12-2011	RP-54	111-111031	1005	CQI reporting accuracy test on frequency non-selective	10.4.0	10.5.0
12-2011	RP-54	RP-111692	1006	scheduling on eDL MIMO CQI reporting accuracy test on frequency-selective scheduling on	10.4.0	10.5.0
		RP-111692	1007	eDL MIMO		
12-2011	RP-54	RP-111692	1008	PMI reporting accuracy test for TDD on eDL MIMO	10.4.0	10.5.0
12-2011	RP-54	RP-111692	1009r1	CR for TS 36.101: RI performance requirements	10.4.0	10.5.0
12-2011	RP-54	RP-111692	1010r1	CR for TS 36.101: Introduction of static CQI tests (ReI-10)	10.4.0	10.5.0
03-2012	RP-55	RP-120291	1014	RF: Updates and corrections to the RMC-s related annexes (Rel- 10)	10.5.0	10.6.0
03-2012	RP-55	RP-120300	1015r1	On elCIC ABS pattern	10.5.0	10.6.0
03-2012	RP-55	RP-120300	1016r1	On eICIC interference models	10.5.0	10.6.0
03-2012	RP-55	RP-120299	1017r1	TS36.101 CR: on eDL-MIMO channel model using cross- polarized antennas	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1020r1	TS36.101 CR: Correction to MBMS Performance Test Parameters	10.5.0	10.6.0
03-2012	RP-55	RP-120303	1021	Harmonic exceptions in LTE UE to UE co-ex tests	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1023	Unified titles for Rel-10 CSI tests	10.5.0	10.6.0
03-2012	RP-55	RP-120300	1033r1	Introduction of reference channel for eICIC demodulation	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1040r1	Correction of Actual code rate for CSI RMCs	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1041r1	Definition of synchronized operation	10.5.0	10.6.0
03-2012	RP-55	RP-120296	1048r1	Intra band contiguos CA Ue to Ue Co-ex	10.5.0	10.6.0
03-2012	RP-55	RP-120296	1049r1	REL-10 CA specification editorial consistency	10.5.0	10.6.0
03-2012	RP-55	RP-120299	1053	Beamforming model for TM9	10.5.0	10.6.0
03-2012	RP-55	RP-120296	1054	Requirement for CA demodulation with power imbalance	10.5.0	10.6.0
03-2012	RP-55	RP-120298	1057	Updating Band 23 duplex specifications	10.5.0	10.6.0
03-2012	RP-55	RP-120298	1058r1	Correcting UE Coexistence Requirements for Band 23	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1059r1	CA demodulation performance requirements for LTE TDD	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1061	Requirement for CA SDR FDD test scenario	10.5.0	10.6.0
03-2012	RP-55	RP-120293	1064r1	TS36.101 RF editorial corrections Rel 10	10.5.0	10.6.0
03-2012	RP-55	RP-120299	1067r1	Introduction of TM9 demodulation performance requirements	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1071r1	Introduction of a CA demodulation test for UE soft buffer management testing	10.5.0	10.6.0
03-2012	RP-55	RP-120296	1072	MPR formula correction For intra-band contiguous CA Bandwidth Class C	10.5.0	10.6.0
03-2012	RP-55	RP-120303	1077r1	CR for 36.101: B41 REFSENS and MOP changes to accommodate single filter architecture	10.5.0	10.6.0
03-2012	RP-55	RP-120300	1082	TM3 tests for eICIC	10.5.0	10.6.0
03-2012	RP-55	RP-120300	1083r1	Introduction of requirements of CQI reporting definition for ecICIC	10.5.0	10.6.0
03-2012	RP-55	RP-120304	1084	eDL MIMO CSI requirements	10.5.0	10.6.0
03-2012	RP-55	RP-120306	1070r1	Introduction of Band 26/XXVI to TS 36.101	10.6.0	11.0.0
03-2012	RP-55	RP-120310	1074	Band 41 CA CR for TS36.101, section 5	10.6.0	11.0.0
03-2012	RP-55	RP-120310	1075r1 1076	Band 41 CA CR for TS36.101, section 6	10.6.0	11.0.0
03-2012 06-2012	RP-55 RP-56	RP-120310 RP-120795	1076 1085r2	Band 41 CA CR for TS36.101, section 7 Modulator specification tightening	11.0.0	11.0.0 11.1.0
06-2012	RP-56 RP-56	RP-120795 RP-120777	1085r2 1087r1	Carrier aggregation Relative power tolerance, removal of TBD.	11.0.0	11.1.0
06-2012	RP-56	RP-120777	108711	UE spurious emissions for Band 7 and Band 38 coexistence	11.0.0	11.1.0
06-2012	RP-56	RP-120780	1009	Deleting square brackets in Reference Measurement Channels	11.0.0	11.1.0
06-2012	RP-56	RP-120780	1092	CR to TS36.101: Correction on parameters for the eDL-MIMO CQI and PMI tests	11.0.0	11.1.0
00-2012	11-30	111-120/19	1091	CR to TS36.101: Fixed reference channel for PDSCH	11.0.0	11.1.0
06 2012		DD 100700	1000-1	demodulation performance requirements on eDL-MIMO – NOT	11.0.0	11 1 0
	RP-56	RP-120780 RP-120774	1098r1 1107	implemented as it is based on a wrong version of the spec RMC correction on eDL-MIMO RI test	11.0.0	11.1.0 11.1.0
06-2012		- DE-1/11//4	1 1 1 07			
06-2012	RP-56			ERC correction on frequency selective COL and DML test (Pol. 11)	1100	
06-2012 06-2012	RP-56	RP-120774	1108r1	FRC correction on frequency selective CQI and PMI test (Rel-11)	11.0.0	11.1.0
06-2012 06-2012 06-2012	RP-56 RP-56	RP-120774 RP-120774	1108r1 1111	Correction on test point for PMI test (Rel-11)	11.0.0	11.1.0
06-2012 06-2012 06-2012 06-2012	RP-56 RP-56 RP-56	RP-120774 RP-120774 RP-120784	1108r1 1111 1114r1	Correction on test point for PMI test (Rel-11) Corrections and clarifications on eICIC demodulation test	11.0.0 11.0.0	11.1.0 11.1.0
06-2012 06-2012 06-2012 06-2012 06-2012	RP-56 RP-56 RP-56 RP-56	RP-120774 RP-120774 RP-120784 RP-120784	1108r1 1111 1114r1 1117r1	Correction on test point for PMI test (Rel-11) Corrections and clarifications on elCIC demodulation test Corrections and clarifications on elCIC CSI tests	11.0.0 11.0.0 11.0.0	11.1.0 11.1.0 11.1.0
06-2012 06-2012 06-2012 06-2012 06-2012 06-2012	RP-56 RP-56 RP-56 RP-56 RP-56	RP-120774 RP-120774 RP-120784 RP-120784 RP-120783	1108r1 1111 1114r1 1117r1 1119r1	Correction on test point for PMI test (Rel-11) Corrections and clarifications on elCIC demodulation test Corrections and clarifications on elCIC CSI tests Corrections on UE performance requirements	11.0.0 11.0.0 11.0.0 11.0.0	11.1.0 11.1.0 11.1.0 11.1.0
06-2012 06-2012 06-2012 06-2012 06-2012	RP-56 RP-56 RP-56 RP-56	RP-120774 RP-120774 RP-120784 RP-120784	1108r1 1111 1114r1 1117r1	Correction on test point for PMI test (Rel-11) Corrections and clarifications on elCIC demodulation test Corrections and clarifications on elCIC CSI tests	11.0.0 11.0.0 11.0.0	11.1.0 11.1.0 11.1.0

06-2012	RP-56	RP-120773	1140	Addition of Maximum Throughput for R.30-1 TDD RMC	11.0.0	11.1.0
06-2012	RP-56	RP-120779	1141	CR for 36.101: The clarification of MPR and A-MPR for CA	11.0.0	11.1.0
06-2012	RP-56	RP-120784	1142	Corrections for eICIC demod test case with MBSN ABS	11.0.0	11.1.0
06-2012	RP-56	RP-120785	1144	Removing brackets of contiguous allocation A-MPR for CA_NS_04	11.0.0	11.1.0
06-2012	RP-56	RP-120784	1149r1	Introduction of PDCCH test with colliding RS on MBSFN-ABS	11.0.0	11.1.0
06-2012	RP-56	RP-120784	1153r1	Some clarifications and OCNG pattern for eICIC demodulation requirements	11.0.0	11.1.0
06-2012	RP-56	RP-120773	1155	Introduction of TDD CA Soft Buffer Limitation	11.0.0	11.1.0
06-2012	RP-56	RP-120795	1156	B26 and other editorial corrections	11.0.0	11.1.0
06-2012	RP-56	RP-120779	1161	Corrections on CQI and PMI test	11.0.0	11.1.0
06-2012	RP-56	RP-120780	1163	FRC for TDD PMI test	11.0.0	11.1.0
06-2012	RP-56	RP-120778	1165r1	Clean-up of UL-MIMO for TS36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120782	1171	Removal of unnecessary references to single carrier requirements from Interband CA subclauses	11.0.0	11.1.0
06-2012	RP-56	RP-120781	1174	PDCCH wrong detection in receiver spurious emissions test	11.0.0	11.1.0
06-2012	RP-56	RP-120776	1184	Corrections to 3500 MHz	11.0.0	11.1.0
06-2012	RP-56	RP-120793	1189r2	Introduction of Band 44	11.0.0	11.1.0
06-2012	RP-56	RP-120784	1193r1	Target SNR setting for eICIC demodulation requirement	11.0.0	11.1.0
06-2012	RP-56	RP-120780	1196	Editorial simplification to CA REFSENS UL allocation table	11.0.0	11.1.0
06-2012	RP-56	RP-120778	1199	Correction of wrong table refernces in CA receiver tests	11.0.0	11.1.0
06-2012	RP-56	RP-120791	1200r1	Introduction of e850_LB (Band 27) to TS 36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120764	1212	Correction of PHS protection requirements for TS 36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120793	1213r1	Introduction of Band 28 into TS36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120781	1215r1	Proposed revision of subclause 4.3A for TS36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120781	1217r1	Proposed revision on subclause 6.3.4A for TS36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120795	1219r1	Aligning requirements between Band 18 and Band 26 in TS36.101	11.0.0	11.1.0
06-2012	RP-56	RP-120782	1221	SNR definition	11.0.0	11.1.0
06-2012	RP-56	RP-120778	1223	Correction of CSI configuraiton for CA TM4 tests R11	11.0.0	11.1.0
06-2012	RP-56	RP-120773	1225	CR on CA UE receiver timing window R11	11.0.0	11.1.0
06-2012	RP-56	RP-120784	1226	Extension of static eICIC CQI test	11.0.0	11.1.0
09-2012	RP-57	RP-121294	1230	Correct Transport Block size in 9RB 16QAM Uplink Reference Measurement Channel	11.1.0	11.2.0
09-2012	RP-57	RP-121313	1233r1	RF: Corrections to power allocation parameters for transmission mode 8 (Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121304	1235	RF-CA: non-CA notation and applicability of test points in scenarios without and with CA operation (Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121305	1237	ACK/NACK feedback modes for FDD and TDD TM4 CA demodulation requirements (Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121305	1239	Correction of feedback mode for CA TDD demodulation requirements (resubmission of R4-63AH-0194 for Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121302	1241	ABS pattern setup for MBSFN ABS test (resubmission of R4- 63AH-0204 for Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121302	1243	CR on eICIC CQI definition test (resubmission of R4-63AH-0205 for Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121302	1245	Transmission of CQI feedback and other corrections (Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121302	1247	Target SNR setting for eICIC MBSFN-ABS demodulation requirements (Rel-11)	11.1.0	11.2.0
09-2012	RP-57	RP-121335	1248	Introduction of CA_1_21 RF requirements into TS36.101	11.1.0	11.2.0
09-2012	RP-57	RP-121300	1251	Corrections of spurious emission band UE co-existence applicable	11.1.0	11.2.0
09-2012	RP-57	RP-121306	1253	in Japan Correction on RMC for frequency non-selective CQI test	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121306 RP-121306	1255	Requirements for the eDL-MIMO CQI test	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121306 RP-121302	1255	Clarification on PDSCH test setup under MBSFN ABS	11.1.0	11.2.0
09-2012	RP-57	RP-121302	1257	Update of Band 28 requirements	11.1.0	11.2.0
09-2012	RP-57	RP-121313	1262	Applicability of statement allowing RBW < Meas BW for spurious	11.1.0	11.2.0
09-2012	RP-57	RP-121313 RP-121298	1265	Clarification of RB allocation for DRS demodulation tests	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121296 RP-121304	1265	Removal of brackets for CA Tx	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121304 RP-121337	1267 1268r1	TS 36.101 CR for CA_38	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121337 RP-121327	1269	Introduction of CA_B7_B20 in 36.101	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121327 RP-121313	1269	Corrections of FRC subframe allocations and other minor	11.1.0	11.2.0
09-2012	RP-57	RP-121305	1274	problems Introduction of requirements for TDD CA Soft Buffer Limitation	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121305 RP-121307	1274	Correction of eDL-MIMIO CSI RMC tables and references	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121307 RP-121307	1276	Correction of MIMO channel model for polarized antennas	11.1.0	11.2.0
09-2012	RP-57 RP-57	RP-121307 RP-121303	1278	Addition of 15 and 20MHz Bandwidths for Band 23 to TS 36.101	11.1.0	11.2.0
	RP-57	RP-121334	1283r1	(Rel-11) Add requirements for inter-band CA of B_1-18 and B_11-18 in	11.1.0	11.2.0
09-2012			4005-4	TS36.101 CR for MPR mask for multi-clustered simultaneous transmission	11.1.0	11.2.0
09-2012 09-2012	RP-57	RP-121304	1285r1		11.1.0	_
	RP-57 RP-57	RP-121304 RP-121447	1285r1 1288r2	in single CC in Rel-11 Introduction of Japanese Regulatory Requirements to LTE Band 8(R11)	11.1.0	11.2.0

09-2012	RP-57	RP-121315	1290	CR for Band 27 A-MPR	11.1.0	11.2.0
09-2012	RP-57	RP-121316	1291	CR to replace protected frequency range with new band number 27	11.1.0	11.2.0
09-2012	RP-57	RP-121215	1292r1	Introduction of CA band combination Band3 + Band5 to TS 36.101	11.1.0	11.2.0
09-2012	RP-57	RP-121306	1300r1	Requirements for eDL-MIMO RI test	11.1.0	11.2.0
09-2012	RP-57	RP-121306	1304	Corrections to TM9 demodulation tests	11.1.0	11.2.0
09-2012	RP-57	RP-121313	1306	Correction to PCFICH power parameter setting	11.1.0	11.2.0
09-2012	RP-57	RP-121306	1310r1	Correction on frequency non-selective CQI test	11.1.0	11.2.0
09-2012	RP-57	RP-121306	1313r1	eDL-MIMO CQI/PMI test	11.1.0	11.2.0
09-2012	RP-57	RP-121313	1316	Correction of the definition of unsynchronized operation	11.1.0	11.2.0
09-2012	RP-57	RP-121304	1320r1	Correction to Transmit Modulation Quality Tests for Intra-Band CA	11.1.0	11.2.0
09-2012	RP-57	RP-121338	1324r2	36.101 CR for LTE_CA_B7	11.1.0	11.2.0
09-2012	RP-57	RP-121331	1325	Introduction of CA_3_20 RF requirements into TS36.101	11.1.0	11.2.0
09-2012	RP-57	RP-121316	1326	A-MPR table correction for NS_18	11.1.0	11.2.0
09-2012	RP-57	RP-121304	1332r1	Bandwidth combination sets for intra-band and inter-band carrier aggregation	11.1.0	11.2.0
09-2012	RP-57	RP-121325	1339	Introduction of LTE Advanced Carrier Aggregation of Band 4 and Band 13	11.1.0	11.2.0
09-2012	RP-57	RP-121326	1340r1	Introduction of CA configurations CA-12A-4A and CA-17A-4A	11.1.0	11.2.0
09-2012	RP-57	RP-121324	1341	Introduction of CA_B3_B7 in 36.101	11.1.0	11.2.0
09-2012	RP-57	RP-121328	1343	Introduction of Band 2 + Band 17 inter-band CA configuration into 36.101	11.1.0	11.2.0
09-2012	RP-57	RP-121306	1351	FRC for TM9 FDD	11.1.0	11.2.0
09-2012	RP-57	RP-121295	1352	Random precoding granularity in PMI tests	11.1.0	11.2.0
09-2012	RP-57	RP-121302	1358	Introduction of RI test for eICIC	11.1.0	11.2.0
09-2012	RP-57	RP-121304	1360	Notes for deltaTib and deltaRib tables	11.1.0	11.2.0
09-2012	RP-57	RP-121304	1361	CR for A-MPR masks for NS_CA_1C	11.1.0	11.2.0
12-2012	RP-58	RP-121884	1362	Introduction of CA_3_8 RF requirements to TS 36.101	11.2.0	11.3.0
12-2012	RP-58	RP-121870	1363	Removal of square brackets for Band 27 in Table 5.6.1-1	11.2.0	11.3.0
12-2012	RP-58	RP-121861	1366	Some changes related to CA tests and overview table of DL measurement channels	11.2.0	11.3.0
12-2012	RP-58	RP-121860	1368	Correction of elCIC CQI tests	11.2.0	11.3.0
12-2012	RP-58	RP-121860	1370	Correction of eICIC demodulation tests	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1374	Correction on CSI-RS subframe offset parameter	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1376	Correction on FRC table in CSI test	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1382	Correction of reference channel table for TDD eDL-MIMIO RI test	11.2.0	11.3.0
12-2012 12-2012	RP-58	RP-121850	1386	OCNG patterns for Sustained Data rate testing	11.2.0	11.3.0
12-2012	RP-58 RP-58	RP-121867 RP-121894	1388r1 1396	Introduction of one periodic CQI test for CA deployments Introduction of CA_B5_B12 in 36.101	11.2.0 11.2.0	11.3.0 11.3.0
12-2012	RP-58	RP-121850	1401	Introduction of CA_B5_B12 in 36.101 Introducing the additional frequency bands of 5 MHz x 2 in 1.7 GHz in Japan to Band 3	11.2.0	11.3.0
12-2012	RP-58	RP-121887	1406r1	Reference sensitivity for the small bandwidth of CA_4-12	11.2.0	11.3.0
12-2012	RP-58	RP-121860	1407	CR on elCIC RI test	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1409	Cleaning of 36.101 Performance sections Rel-11	11.2.0	11.3.0
12-2012	RP-58	RP-121861	1416	Out-of-band blocking requirements for inter-band carrier aggregation	11.2.0	11.3.0
12-2012	RP-58	RP-121861	1418	Adding missed SNR reference values for CA soft buffer tests	11.2.0	11.3.0
12-2012	RP-58	RP-121890	1422	Introduction of CA_4A-5A into 36.101	11.2.0	11.3.0
12-2012	RP-58	RP-121867	1431	Clean up of specification R11	11.2.0	11.3.0
12-2012	RP-58	RP-121867	1436	Band 1 to Band 33 and Band 39 UE coexistence requirements	11.2.0	11.3.0
12-2012	RP-58	RP-121871	1437r1	Editorial corrections for Band 26	11.2.0	11.3.0
12-2012	RP-58	RP-121896	1438	Introduction of Band 5 + Band 17 inter-band CA configuration into 36.101	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1442	Correction of eDL-MIMO RI test and RMC table for the CSI test	11.2.0	11.3.0
12-2012	RP-58	RP-121861	1444	Minor correction to ceiling function example - rel11	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1449	Correction of SNR definition	11.2.0	11.3.0
12-2012	RP-58	RP-121860	1450	Brackets clean up for eICIC CSI/demodulation	11.2.0	11.3.0
12-2012	RP-58	RP-121860	1455	CR on elCIC RI testing (Rel-11)	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1459	Correction on FRC table	11.2.0	11.3.0
12-2012	RP-58	RP-121879	1461r1	CR for LTE B14 HPUE (Power Class 1)	11.2.0	11.3.0
12-2012	RP-58	RP-121862	1464	Adding references to the appropriate beamforming model (Rel-11)	11.2.0	11.3.0
12-2012	RP-58	RP-121898	1465r1	Introduction of CA_8_20 RF requirements into TS36.101	11.2.0	11.3.0
12-2012 12-2012	RP-58 RP-58	RP-121882 RP-121903	1468r1 1472r1	Introduction of inter-band CA_11-18 into TS36.101 Introduction of advanced receivers demodulation performance	11.2.0 11.2.0	11.3.0 11.3.0
12-2012	RP-58	RP-121903	1473r1	(FDD) Introduction of performance requirements for verifying the receiver type for advanced receivers (FDD/TDD)	11.2.0	11.3.0
12-2012	PD. 59	RP-121886	1474	CR to remove the square bracket of A-MPR in TS36.101	11.2.0	11 2 0
12-2012 12-2012	RP-58 RP-58	RP-121886 RP-121861	1474	Correction of some errors in reference sensitivity for CA in TS	11.2.0	11.3.0 11.3.0
12-2012	RP-58	RP-121903	1480r1	36.101 (R11) Introduction of Advanced Receivers Test Cases for TDD	11.2.0	11.3.0
12-2012	RP-58	RP-121903 RP-121901	148011 1490r1	Introduction of Band 29	11.2.0	11.3.0
12-2012	RP-58	RP-121901 RP-121849	149011	Low-channel Band 1 coexistence with PHS	11.2.0	11.3.0
12 2012	111-00	11 12 1043	1707		11.2.0	11.0.0

12-2012RP-58RP-1218611498r1Completion of the tables of bandwidth combinations specified for CA12-2012RP-58RP-1218611499r1Exceptions to REFSENS requirements for class A2 CA combinations12-2012RP-58RP-1218921500Introduction of carrier aggregation configuration CA_4-712-2012RP-58RP-1218701504Editorial corrections to Band 27 specifications	or 11.2.0 11.2.0	11.3.0
12-2012RP-58RP-1218611499r1Exceptions to REFSENS requirements for class A2 CA combinations12-2012RP-58RP-1218921500Introduction of carrier aggregation configuration CA_4-712-2012RP-58RP-1218701504Editorial corrections to Band 27 specifications	11.2.0	
12-2012RP-58RP-1218921500Introduction of carrier aggregation configuration CA_4-712-2012RP-58RP-1218701504Editorial corrections to Band 27 specifications		11.3.0
12-2012 RP-58 RP-121870 1504 Editorial corrections to Band 27 specifications	11.2.0	11.3.0
	11.2.0	11.3.0
12-2012 RP-58 RP-121878 1505 Band 28 AMPR for DTV protection	11.2.0	11.3.0
12-2012 RP-58 RP-121852 1509r1 UE-UE coexistence between bands with small frequency separation	11.2.0	11.3.0
12-2012 RP-58 RP-121911 1510 Adding UE-UE Coexistence Requirement for Band 3 and Band 3		11.3.0
12-2012 RP-58 RP-121866 1513 Maintenance of Band 23 UE Coexistence	11.2.0	11.3.0
12-2012 RP-58 RP-121851 1515 Corrections to TM4 rank indicator Test 3 12-2012 RP-58 RP-121861 1517 Correction of test configurations and FRC for CA demodulation	11.2.0	11.3.0
12-2012 RP-58 RP-121861 1517 Correction of test configurations and FRC for CA demodulation with power imbalance 12-2012 RP-58 RP-121860 1518 Applicable OFDM symbols of Noc_2 for PDCCH/PCFICH ABS-	11.2.0	11.3.0
MBSFN test cases	11.2.0	11.0.0
03-2013 RP-59 RP-130279 1519 OCNG patterns for Enhanced Performance Requirements Type		11.4.0
03-2013 RP-59 RP-130277 1520 Corrections on in-band blocking for Band 29 for carrier aggregation	11.3.0	11.4.0
03-2013 RP-59 RP-130268 1523 Brackets removal in Rel-11 TM4 rank indicator Test 3	11.3.0	11.4.0
03-2013 RP-59 RP-130279 1524r1 Cleanup of Advanced Receivers requirement scenarios for demodulation and CSI (FDD/TDD)	11.3.0	11.4.0
03-2013 RP-59 RP-130258 1528 Corrections to CQI reporting	11.3.0	11.4.0
03-2013 RP-59 RP-130262 1536 Corrections for eICIC performance requirements (rel-11)	11.3.0	11.4.0
03-2013RP-59RP-1302641539Correction of CA power imbalance performance requirements03-2013RP-59RP-1302871543Correction of a symbol for MPR in single carrier for TS26 104 (R14)	11.3.0 11.3.0	11.4.0 11.4.0
36.101(R11) 03-2013 RP-59 RP-130287 1544r1 Correction of some inter-band CA requiements for TS 36.101 (R11)	11.3.0	11.4.0
03-2013 RP-59 RP-130276 1546 Correction of contigous allocation A-MPR for CA_NS_05	11.3.0	11.4.0
03-2013 RP-59 RP-130263 1547r1 Clarification of spurious emission domain for CA in TS 36.101 (R11)	11.3.0	11.4.0
03-2013 RP-59 RP-130264 1548 CR for CA performance requirements	11.3.0	11.4.0
03-2013 RP-59 RP-130284 1553r1 Introduction of downlink non-contiguous CA into REL -11 TS 36.101	11.3.0	11.4.0
03-2013 RP-59 RP-130263 1557 CA_1C: CA_NS_02 and CA_NS_03 A-MPR REL-11	11.3.0	11.4.0
03-2013 RP-59 RP-130287 1560 Editorial corrections to subclause 5	11.3.0	11.4.0
03-2013 RP-59 RP-130267 1562 Addition of UE Regional Requirements to Band 23 Based on Ne Regulatory Order in the US		11.4.0
03-2013 RP-59 RP-130272 1567 Band 26: modification of A-MPR for 'NS_15'	11.3.0	11.4.0
03-2013 RP-59 RP-130287 1571r1 Band 41 requirements for operation in China and Japan 03-2013 RP-59 RP-130260 1574 Remove [] from CSI test case parameters	<u>11.3.0</u> 11.3.0	11.4.0
03-2013 RP-59 RP-130287 1575 Corrections to UE co-existence	11.3.0	11.4.0
03-2013 RP-59 RP-130287 1579 UE-UE co-existence between Band 1 and Band 33/39	11.3.0	11.4.0
03-2013 RP-59 RP-130287 1580 Correction on reference to note for Band 7 and 38 co-existence	11.3.0	11.4.0
03-2013 RP-59 RP-130263 1584r1 Cleanup for CA UE RF requirements	11.3.0	11.4.0
03-2013 RP-59 RP-130263 1586 Corrections on UL configuration for CA UE receiver requirement		11.4.0
03-2013 RP-59 RP-130263 1588 Correction of Transmit modulation quality requirements for CA	11.3.0	11.4.0
03-2013 RP-59 RP-130268 1590 Revision of Common Test Parameters for User-specific Demodulation Tests	11.3.0	11.4.0
03-2013 RP-59 RP-130278 1595 Correction for a Band 27 A-MPR table 03-2013 RP-59 RP-130264 1597 Correction of CA CQI test setup	11.3.0	11.4.0
03-2013 RP-59 RP-130287 1600r1 Correction of B12 DL Specification in Table 5.5A-2	11.3.0	11.4.0
03-2013 RP-59 RP-130263 1602 Correction of table reference	11.3.0	11.4.0
06-2013 RP-60 RP-130765 1604r1 Complementary description for definition of MIMO Correlation Matrices using cross polarized antennas	11.4.0	11.5.0
06-2013 RP-60 RP-130763 1607 Correction of transport format parameters for CQI index 10 (15 RBs) - Rel 11	11.4.0	11.5.0
06-2013 RP-60 RP-130765 1610 Maintenance of Band 23 A-MPR (NS_11) in TS 36.101 (Rel-11)	11.4.0	11.5.0
06-2013 RP-60 RP-130770 1613 CR for 36.101 : Adding the definition of CA_NS_05 and CA_NS_06 for additional spurious emissions for CA 00-2010 RP-60 RP-130770 1613 CR for 36.101 : Adding the definition of CA_NS_05 and CA_NS_06 for additional spurious emissions for CA	11.4.0	11.5.0
06-2013 RP-60 RP-130770 1619 CR for introducing UE TM3 demodulation performance requirements under high speed 06-2012 RP-60 RP-130776 1622 Cerrection of test perspectors for alCIC performance for alCIC performance	11.4.0	11.5.0
06-2013 RP-60 RP-130765 1623 Correction of test parameters for elCIC performance requirement 06-2013 RP-60 RP-130765 1625 Correction of test parameters for elCIC CSI requirements	nts 11.4.0 11.4.0	11.5.0 11.5.0
06-2013 RP-60 RP-130765 1625 Correction of test parameters for elCiC CS1 requirements 06-2013 RP-60 RP-130765 1627 Correction of resource allocation for the multiple PMI Cat 1 UE test	11.4.0	11.5.0
06-2013 RP-60 RP-130766 1629 Removal of note 2 from band 28	11.4.0	11.5.0
06-2013 RP-60 RP-130770 1641 Correction of the CSI-RS parameter configuration	11.4.0	11.5.0
06-2013 RP-60 RP-130770 1650r1 Addition of Band 41 for intra-band non-contiguous CA for 36.10	1 11.4.0	11.5.0
06-2013 RP-60 RP-130770 1654r1 MPR for intra-band non-contiguous CA	11.4.0	11.5.0
06-2013 RP-60 RP-130765 1656 Modification of configured output power to account for larger tolerance	11.4.0	11.5.0
06-2013 RP-60 RP-130769 1658r1 Missing symbols in the NS_15 table	11.4.0	11.5.0

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06-2013	RP-60	RP-130766	1673	Corrections to Rx requirements for inter-band CA configurations with REFSENS exceptions	11.4.0	11.5.0
06-2013	RP-60	RP-130770	1681r1	Correction for TS 36.101	11.4.0	11.5.0
06-2013	RP-60	RP-130763	1684	RF: Corrections to RMC-s for sustained data rate test	11.4.0	11.5.0
06-2013	RP-60	RP-130770	1685	Non-contiguous intraband CA channel spacing	11.4.0	11.5.0
06-2013	RP-60	RP-130766	1689	Carrier aggregation in multi RAT and multiple band combination	11.4.0	11.5.0
				terminals		
06-2013	RP-60	RP-130766	1691	Completion of out-of-band blocking requirements for inter-band CA with one UL	11.4.0	11.5.0
06-2013	RP-60	RP-130767	1695r1	CR on the bandwidth coverage issue of CA demodulation performance (Rel-11)	11.4.0	11.5.0
06-2013	RP-60	RP-130765	1697	Correction on UE maximum output power for intra-band CA (R11)	11.4.0	11.5.0
06-2013	RP-60	RP-130770	1698r1	CR for introduction of FeICIC demodulation performance requirements	11.4.0	11.5.0
06-2013	RP-60	RP-130770	1701	Removing bracket from CA_11A-18A requirments	11.4.0	11.5.0
06-2013	RP-60	RP-130767	1703	CR on the bandwidth coverage issue of CA CQI performance	11.4.0	11.5.0
00.0040		DD 400700	4705	(Rel-11)	44.4.0	44 5 0
06-2013	RP-60	RP-130766	1705	Corrections to ACLR for Rel-11 CA	11.4.0	11.5.0
06-2013	RP-60	RP-130765	1716	Corrections to NS_11 A-MPR Table	11.4.0	11.5.0
06-2013	RP-60	RP-130769	1717	Corrections to NS_12 A-MPR Table	11.4.0	11.5.0
09-2013	RP-61	RP-131285	1731r1	CR on performance requirements of CA soft buffer managemen (Rel-11)	11.5.0	11.6.0
09-2013	RP-61	RP-131281	1735	CR on applicability of CA sustained data rate tests (Rel-11)	11.5.0	11.6.0
09-2013	RP-61	RP-131293	1738r1	Performance requirement for UE under EVA200	11.5.0	11.6.0
09-2013	RP-61	RP-131290	1742r1	CR for introduction of FeICIC PBCH performance requirement	11.5.0	11.6.0
09-2013	RP-61	RP-131290	1744r1	CR for introduction of FeICIC RI reporting requirements	11.5.0	11.6.0
09-2013	RP-61	RP-131292	1746	Beamforming model for EPDCCH test	11.5.0	11.6.0
09-2013	RP-61	RP-131285	1753r1	Introduction of performance requirements for verifying the receiver	11.5.0	11.6.0
		RP-131285		type for CSI-RS based advanced receivers (FDD/TDD)		
09-2013	RP-61		1754r1	CR for 36.101 : Add the definition of 5+20MHz for spectrum emission mask for CA	11.5.0	11.6.0
09-2013	RP-61	RP-131281	1766	UE REFSENS when supporting intra-band CA and inter-band CA	11.5.0	11.6.0
09-2013	RP-61	RP-131279	1771	Correlation matrix for high speed train demodulation scenarios (Rel-11)	11.5.0	11.6.0
09-2013	RP-61	RP-131280	1775	Corrections to sustained data rate test (Rel-11)	11.5.0	11.6.0
09-2013	RP-61	RP-131290	1785r1	CR for introduction of FeICIC CQI requirements	11.5.0	11.6.0
09-2013	RP-61	RP-131281	1793	Clarification of multi-cluster transmission	11.5.0	11.6.0
09-2013	RP-61	RP-131293	1799r1	CA UE Coexistence Table update (Release 11)	11.5.0	11.6.0
					11.0.0	11.0.0
09-2013	RP-61	RP-131302	1801	Coexistence between Band 27 and Band 38 (Release 11)	11.5.0	11.6.0
09-2013	RP-61				11.5.0	11.6.0
09-2013 09-2013	RP-61 RP-61	RP-131302 RP-131281	1801 1806	Incorrect REFSENS UL allocation for CA_1C	11.5.0 11.5.0	11.6.0 11.6.0
09-2013	RP-61	RP-131302	1801	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous	11.5.0	11.6.0
09-2013 09-2013 09-2013 09-2013	RP-61 RP-61 RP-61 RP-61	RP-131302 RP-131281 RP-131281 RP-131293	1801 1806 1810 1812r1	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA	11.5.0 11.5.0 11.5.0 11.5.0	11.6.0 11.6.0 11.6.0 11.6.0
09-2013 09-2013 09-2013 09-2013 09-2013	RP-61 RP-61 RP-61 RP-61 RP-61	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281	1801 1806 1810 1812r1 1816	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281 RP-131281	1801 1806 1810 1812r1 1816 1820	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281 RP-131281 RP-131285	1801 1806 1810 1812r1 1816 1820 1830	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281 RP-131281 RP-131285 RP-131928	1801 1806 1810 1812r1 1816 1820 1830 1846r1	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11)	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281 RP-131281 RP-131285 RP-131928 RP-131924	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1851	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11)	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281 RP-131281 RP-131285 RP-131928 RP-131928 RP-131924 RP-131937	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1851 1853r2	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131293 RP-131281 RP-131281 RP-131285 RP-131928 RP-131927 RP-131931	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131928 RP-131924 RP-131931 RP-131939	1801 1806 1810 1812r1 1816 1820 1830 1830 1846r1 1851 1853r2 1866 1868	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 10-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131928 RP-131924 RP-131931 RP-131939 RP-131928	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1868 1876r2	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131928 RP-131924 RP-131931 RP-131939	1801 1806 1810 1812r1 1816 1820 1830 1830 1846r1 1851 1853r2 1866 1868	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 10-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131928 RP-131924 RP-131931 RP-131939 RP-131928	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1868 1876r2	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131924 RP-131931 RP-131932 RP-131931 RP-131939 RP-131937 RP-131937 RP-131937 RP-131937	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1879 1886	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 109-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131924 RP-131931 RP-131932 RP-131931 RP-131939 RP-131939 RP-131939	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1876r2 1879 1886 1888	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 109-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131924 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1868 1876r2 1879 1886 1888 1888	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 109-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131928 RP-131924 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1879 1886 1888 1892r1 1894r3	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 10-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131928 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1879 1886 1892r1 1894r3 1896r3	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 109-2013 109-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131928 RP-131924 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938	1801 1806 1810 1812r1 1812r1 1820 1830 1846r1 1853r2 1866 1879 1886 1899r1 18988	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
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09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 10-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131928 RP-131924 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938	1801 1806 1810 1812r1 1812r1 1820 1830 1846r1 1853r2 1866 1879 1886 1899r1 18988	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test Car for receiver type verification test of CSI-RS based advanced	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 <td< td=""><td>RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62<!--</td--><td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938 RP-131938 RP-131938 RP-131931</td><td>1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1898 1900 1903</td><td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11)</td><td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td><td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td></td></td<>	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 </td <td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938 RP-131938 RP-131938 RP-131931</td> <td>1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1898 1900 1903</td> <td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11)</td> <td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td> <td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td>	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938 RP-131938 RP-131938 RP-131931	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1898 1900 1903	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11)	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131938 RP-131938 RP-131938 RP-131939	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1857 1866 1868 1879 1888 1892r1 1894r3 1898 1900 1903 1905 1915r2	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 <td< td=""><td>RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62<!--</td--><td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938 RP-131938 RP-131938 RP-131931</td><td>1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1898 1900 1903</td><td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11)</td><td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td><td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td></td></td<>	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 </td <td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938 RP-131938 RP-131938 RP-131931</td> <td>1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1898 1900 1903</td> <td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11)</td> <td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td> <td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td>	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131938 RP-131938 RP-131938 RP-131931	1801 1806 1810 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1898 1900 1903	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11)	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131938 RP-131938 RP-131938 RP-131939	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1857 1866 1868 1879 1888 1892r1 1894r3 1898 1900 1903 1905 1915r2	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62 RP-62 </td <td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131924 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131938 RP-131938 RP-131938 RP-131938 RP-131938 RP-131936 RP-131937</td> <td>1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1868 1879 1888 1892r1 1894r3 1896r3 1900 1905 1915r2 1925r2</td> <td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test</td> <td>$\begin{array}{c} 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.6.0\\$</td> <td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td>	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131285 RP-131928 RP-131924 RP-131937 RP-131938 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131938 RP-131938 RP-131938 RP-131938 RP-131938 RP-131936 RP-131937	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1851 1853r2 1866 1868 1879 1888 1892r1 1894r3 1896r3 1900 1905 1915r2 1925r2	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on RI reporting requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test	$\begin{array}{c} 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.5.0\\ 11.6.0\\$	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 <td< td=""><td>RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62</td><td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937</td><td>1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1894r3 1896r3 1903 1905 1915r2 1933r1 1936</td><td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement Beamforming model for EPDCCH localized test Correction on the UE category for eICIC CQI test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test UE-UE coexistence for Band 40</td><td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td><td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td></td<>	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1894r3 1896r3 1903 1905 1915r2 1933r1 1936	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement Beamforming model for EPDCCH localized test Correction on the UE category for eICIC CQI test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test UE-UE coexistence for Band 40	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 <td< td=""><td>RP-61 RP-61 RP-61 RP-61 RP-61 RP-62</td><td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131936 RP-131936 RP-131937 RP-131938 RP-131936 RP-131937 RP-131938 RP-131937 RP-131937</td><td>1801 1806 1810 1812r1 1812r1 1812r1 1812r1 1812r1 1820 1830 1846r1 1853r2 1866 1868 1879 1886 1892r1 1894r3 1896r3 1900 1903 1905 1915r2 1925r2 1933r1 1936</td><td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH localized test Correction on the UE category for eICIC CQI test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test UE-UE coexistence for Band 40 CR to Introduce fading CQI test for CoMP (FDD)</td><td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td><td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td></td<>	RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131936 RP-131936 RP-131937 RP-131938 RP-131936 RP-131937 RP-131938 RP-131937 RP-131937	1801 1806 1810 1812r1 1812r1 1812r1 1812r1 1812r1 1820 1830 1846r1 1853r2 1866 1868 1879 1886 1892r1 1894r3 1896r3 1900 1903 1905 1915r2 1925r2 1933r1 1936	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of definition on Fraction of Maximum Throughput for CA CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement Beamforming model for EPDCCH localized test Downlink physical setup for EPDCCH localized test Correction on the UE category for eICIC CQI test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test UE-UE coexistence for Band 40 CR to Introduce fading CQI test for CoMP (FDD)	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0
09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 09-2013 12-2013 <td< td=""><td>RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62</td><td>RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937</td><td>1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1894r3 1896r3 1903 1905 1915r2 1933r1 1936</td><td>Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement Beamforming model for EPDCCH localized test Correction on the UE category for eICIC CQI test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test UE-UE coexistence for Band 40</td><td>11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0</td><td>11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0</td></td<>	RP-61 RP-61 RP-61 RP-61 RP-61 RP-61 RP-62	RP-131302 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131281 RP-131928 RP-131924 RP-131937 RP-131939 RP-131939 RP-131939 RP-131939 RP-131936 RP-131936 RP-131938 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131936 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937 RP-131938 RP-131937	1801 1806 1810 1812r1 1812r1 1816 1820 1830 1846r1 1853r2 1866 1868 1879 1888 1892r1 1894r3 1896r3 1903 1905 1915r2 1933r1 1936	Incorrect REFSENS UL allocation for CA_1C Contiguous intraband CA REFSENS with one UL Remianed Transmitter requirements for intra-band non-contiguous CA Correction to Rel-11 A-MPR for CA_NS_04 The Pcmax clauses restructured MPR for intra-band non-contiguous CA Corrections to the notes in the band UE co-existence requirements table (Rel-11) Clean-up of uplink reference measurement channels (Rel-11) Introduction of test 1-A for CoMP CA_NS_05 Emissions NS signaling for CA refsens Intraband CA channel bandwidth combination table restructuring CR Minimum requirement with Same Cell ID (with multiple NZP CSI-RS resources) CR on correction of test configurations of CA soft buffer tests CR for FeICIC demodulation performance requirements CR on FeICIC PBCH performance requirement CR on RI reporting requirement Beamforming model for EPDCCH localized test Correction on the UE category for eICIC CQI test CR for receiver type verification test of CSI-RS based advanced receivers (Rel-11) Allowed power reductions for multiple transmissions in a subframe Introduce high SNR TM3 test for FeICIC PDSCH CR on correction of FRC of power imbalance test UE-UE coexistence for Band 40	11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.5.0 11.6.0	11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.6.0 11.7.0

40.0040		DD 404004	4000		44.0.0	44 7 0
12-2013	RP-62	RP-131931	1960	CA performance requirements for TDD intra-band NC CA	11.6.0	11.7.0
12-2013	RP-62	RP-131936	1961r1	Introduction of reference SNR-s for FeICIC demodulation	11.6.0	11.7.0
12-2013	RP-62	RP-131938	1963	performance requirements OCNG pattern for EPDCCH test	11.6.0	11.7.0
12-2013	RP-62 RP-62	RP-131938 RP-131939	1963 1967r1	Introduction of UE TM3 demodulation performance requirements	11.6.0	11.7.0
12-2013	RP-62	RP-131939	196711		11.6.0	11.7.0
40.0040		RP-131937	4000=4	under ETU300	44.0.0	44 7 0
12-2013	RP-62		1969r1	Introduction of test 1-A for CoMP TDD	11.6.0	11.7.0
12-2013	RP-62	RP-131939	1971	Modification of TM9 test to verify correct SNR estimation	11.6.0	11.7.0
12-2013	RP-62	RP-131928	1983r1	Correction to blocking requirements and use of ΔR_{IB}	11.6.0	11.7.0
12-2013	RP-62	RP-131939	1987r1	CR on test point clarification for CA demodulation test	11.6.0	11.7.0
12-2013	RP-62	RP-131937	1993r1	CR to Introduce fading CQI test for CoMP (TDD)	11.6.0	11.7.0
12-2013	RP-62	RP-131937	1995	CR to Introduce channel model for CoMP fading CQI tests	11.6.0	11.7.0
12-2013	RP-62	RP-131937	1997r1	CR to Introduce RI test for CoMP (FDD)	11.6.0	11.7.0
12-2013	RP-62	RP-131924	1999r1	Simplification of Band 12/17 in-band blocking test cases	11.6.0	11.7.0
12-2013	RP-62	RP-131938	2000r1	Distributed EPDCCH Demodulation Test	11.6.0	11.7.0
12-2013	RP-62	RP-131938	2002r1	Localized EPDCCH Demodulation Test	11.6.0	11.7.0
12-2013	RP-62	RP-131938	2004r1	Reference Measurement Channels for EPDCCH	11.6.0	11.7.0
12-2013	RP-62	RP-131937	2006r1	Introduction of DL CoMP FDD static CQI test	11.6.0	11.7.0
12-2013	RP-62	RP-131937	2008r1	Introduction of DL CoMP TDD static CQI test	11.6.0	11.7.0
12-2013	RP-62	RP-131924	2013	P-max for Band 38 to Band 7 coexistence	11.6.0	11.7.0
12-2013	RP-62	RP-131937	2023r2	Minimum requirement with Same Cell ID (with multiple NZP CSI-	11.6.0	11.7.0
				RS resources) TDD		
12-2013	RP-62	RP-131937	2025r2	CR Minimum requirement with Different Cell ID and Colliding CRS	11.6.0	11.7.0
0.0	52	101001		(with single NZP CSI-RS resource) TDD		
12-2013	RP-62	RP-131936	2027	Editoral change on FeICIC PBCH Noc setup	11.6.0	11.7.0
12-2013	RP-62	RP-131930	2027 2034r1	Correction of nominal guard bands for bandwidth classes A and C	11.6.0	11.7.0
12-2013	RP-62	RP-131931	203411 2041r1	CR to Introduce RI test for CoMP (TDD)	11.6.0	11.7.0
12-2013	RP-62 RP-62	RP-131937 RP-131931	204111	Correction of TDD PCFICH/PDCCH test parameter table	11.6.0	11.7.0
			-			
12-2013	RP-62	RP-131939	2046	Add EVA200 to table of channel model parameters	11.6.0	11.7.0
12-2013	RP-62	RP-131926	2058	CA_1C: Correction on CA_NS_02 A-MPR table	11.6.0	11.7.0
12-2013	RP-62	RP-131938	2065	Introduction of EPDCCH TM10 localized test R-11	11.6.0	11.7.0
12-2013	RP-62	RP-131938	2067	Introduction of SDR test for PDSCH with EPDCCH scheduling	11.6.0	11.7.0
03-2014	RP-63	RP-140368	2091r1	CR for maintanence of CA soft buffer tests in Rel-11	11.7.0	11.8.0
03-2014	RP-63	RP-140374	2096r1	CR on TM9 localized ePDCCH test	11.7.0	11.8.0
03-2014	RP-63	RP-140374	2100r1	CR on reference measurement channel for ePDCCH test	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2105	Cleanup of the specification for FeICIC (Rel-11)	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2107r1	UL-DL configuration and other parameters for FeICIC TDD CQI	11.7.0	11.8.0
				fading test (Rel-11)		
03-2014	RP-63	RP-140375	2088	CR for introduction of 15MHz based SDR tests in Rel-11	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2109r1	CR for TS36.101 COMP demodulation requirements	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2111r1	CR for Combinations of channel model parameters	11.7.0	11.8.0
03-2014	RP-63	RP-140374	2112	CR for EPDCCH power allocation (Rel-11)	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2085	CR on reference measurement channel for TM10 PDSCH	11.7.0	11.8.0
				demodulation test		
03-2014	RP-63	RP-140374	2073r1	CR of EPDCCH localzied test with TM10 QCL Type-B	11.7.0	11.8.0
		-		configuration (Rel-11)	-	-
03-2014	RP-63	RP-140368	2146	Correction of coding rate for 18RBs in UL RMC table	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2130r1	CR to finalize RI test for CoMP	11.7.0	11.8.0
03-2014	RP-63	RP-140374	2162r1	Distributed EPDCCH Demodulation Test	11.7.0	11.8.0
03-2014	RP-63	RP-140371	2128r1	CR to finalize fading CQI test for CoMP	11.7.0	11.8.0
03-2014	RP-63	RP-140371	212011 2159r1	Correction of table notes for NS_12-NS_15 spurious emissions	11.7.0	11.8.0
00-2014	111-00	11-1403/0	210011	requirements	11.7.0	11.0.0
03-2014	RP-63	RP-140368	2136	Configured transmitted power for CA	11.7.0	11.8.0
03-2014	RP-63	RP-140308	2130 2143r1	Channel spacing for non-contiguous intra-band carrier	11.7.0	11.8.0
05-2014	11-00	11 - 1403/1	214011	aggregation	11.7.0	11.0.0
03-2014	RP-63	PD_1/0271	2141	Clarification of contiguous and non-contiguous intra-band UE	11 7 0	11 0 0
03-2014	50-77	RP-140371	2141		11.7.0	11.8.0
02 2044	RP-63	RP-140368	2150	capabilities in the same band	11 7 0	11.0.0
03-2014			2158	Correction of a table note for Pcmax	11.7.0	11.8.0
			0404		11 7 0	11.8.0
03-2014	RP-63	RP-140368	2121	CR for 36.101. Editorial correction on OCNG pattern	11.7.0	44 0 0
03-2014	RP-63 RP-63	RP-140368 RP-140374	2124r1	CR on correction of downlink SDR tests with EPDCCH scheduling	11.7.0	11.8.0
03-2014 03-2014	RP-63 RP-63 RP-63	RP-140368 RP-140374 RP-140375	2124r1 2118	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9	11.7.0 11.7.0	11.8.0
03-2014 03-2014 03-2014	RP-63 RP-63 RP-63 RP-63	RP-140368 RP-140374 RP-140375 RP-140371	2124r1 2118 2126r2	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11)	11.7.0 11.7.0 11.7.0	11.8.0 11.8.0
03-2014 03-2014	RP-63 RP-63 RP-63	RP-140368 RP-140374 RP-140375	2124r1 2118	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS	11.7.0 11.7.0	11.8.0
03-2014 03-2014 03-2014 06-2014	RP-63 RP-63 RP-63 RP-63 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909	2124r1 2118 2126r2 2176r2	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11)	11.7.0 11.7.0 11.7.0 11.8.0	11.8.0 11.8.0 11.9.0
03-2014 03-2014 03-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914	2124r1 2118 2126r2 2176r2 2197r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0
03-2014 03-2014 03-2014 06-2014	RP-63 RP-63 RP-63 RP-63 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909	2124r1 2118 2126r2 2176r2	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B	11.7.0 11.7.0 11.7.0 11.8.0	11.8.0 11.8.0 11.9.0
03-2014 03-2014 06-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914 RP-140917	2124r1 2118 2126r2 2176r2 2197r1 2206r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B configuration (Rel-11): correction of CSI-RS configurations	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0 11.9.0
03-2014 03-2014 03-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914	2124r1 2118 2126r2 2176r2 2197r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0
03-2014 03-2014 06-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914 RP-140917	2124r1 2118 2126r2 2176r2 2197r1 2206r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B configuration (Rel-11): correction of CSI-RS configurations	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0 11.9.0
03-2014 03-2014 03-2014 06-2014 06-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914 RP-140917 RP-140918	2124r1 2118 2126r2 2176r2 2197r1 2206r1 2208	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B configuration (Rel-11): correction of CSI-RS configurations Clean up of TM9 SNR tests	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0
03-2014 03-2014 03-2014 06-2014 06-2014 06-2014 06-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914 RP-140917 RP-140918 RP-140917	2124r1 2118 2126r2 2176r2 2197r1 2206r1 2208 2214r1 2215r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B configuration (Rel-11): correction of CSI-RS configurations Clean up of TM9 SNR tests Correction of UE TM3 demodulation performance requirements CR for EPDCCH test (Rel-11)	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0
03-2014 03-2014 03-2014 06-2014 06-2014 06-2014 06-2014 06-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64 RP-64 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914 RP-140917 RP-140918 RP-140917 RP-140917	2124r1 2118 2126r2 2176r2 2197r1 2206r1 2208 2214r1 2215r1 2217r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B configuration (Rel-11): correction of CSI-RS configurations Clean up of TM9 SNR tests Correction of UE TM3 demodulation performance requirements CR for EPDCCH test (Rel-11) CR of modification on FeICIC rank testing (Rel-11)	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0
03-2014 03-2014 03-2014 06-2014 06-2014 06-2014 06-2014 06-2014 06-2014	RP-63 RP-63 RP-63 RP-64 RP-64 RP-64 RP-64 RP-64 RP-64	RP-140368 RP-140374 RP-140375 RP-140371 RP-140909 RP-140914 RP-140917 RP-140918 RP-140917	2124r1 2118 2126r2 2176r2 2197r1 2206r1 2208 2214r1 2215r1	CR on correction of downlink SDR tests with EPDCCH scheduling Introduction of requirements for SNR test for TM9 Correction on DL CoMP static CQI tests (Rel 11) RF: Corrections to spurious emission requirements with NS different than NS_01 (Rel-11) CR on correction on TDD IRC CQI test CR of EPDCCH localzied test with TM10 QCL Type-B configuration (Rel-11): correction of CSI-RS configurations Clean up of TM9 SNR tests Correction of UE TM3 demodulation performance requirements CR for EPDCCH test (Rel-11)	11.7.0 11.7.0 11.7.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0 11.8.0	11.8.0 11.8.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0 11.9.0

06-2014 RP-64 RP-140911 2227r1 Correction for CA sustained data rate test (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2232 Clarification of Intra-band configuous CA class C Narrow band 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2232 Clarification of Intra-band configuous CA class C Narrow band 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2238 Correction for CA soft buffer test (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 22461 Remove [] from elCC TDD R requirements for carrier aggregation 11.8.0 11.9.0 06-2014 RP-64 RP-140918 226171 Applicability of exceptions to reference sensitivity requirements for R11 11.8.0 11.9.0 06-2014 RP-64 RP-140918 226171 Editorial corrections for UE performance requirments for R11 11.8.0 11.9.0 06-2014 RP-64 RP-140918 22671 CR for TS36.101 FRC tables for COMP demodulation 11.8.0 11.9.0 06-2014 RP-64 RP-140911 22871 CR					categories		
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06-2014 RP-64 RP-140914 2285 CR for finalizing DL COMP CSI reporting requirements 11.8.0 11.9.0 06-2014 RP-64 RP-140914 2287r1 CR for adding DL COMP CSI RMC tables (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2313 UE to UE co-existence between B42/B43 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2317 Perf: Corrections to CA (Class C) performance with power imbalance (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140914 2320r1 CR of introducing FeICIC TMs testing (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140914 2322r1 CR of introducing FeICIC TMs testing (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2327 Clean-up CR for demodulation requirements (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2336r1 Add missing Uplink downlink configuration to eICIC TDD RI 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2336r1 Add missing Uplink downlink configuration to eICIC					requirements		
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06-2014 RP-64 RP-140911 2313 UE to UE co-existence between B42/B43 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2317 Perf: Corrections to CA (Class C) performance with power imbalance (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140914 2320r1 CR of modification on FelCIC rank testing (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140917 2324r1 CR of introducing FelCIC TM9 testing (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2322r1 Clean-up CR for demodulation requirements (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2332 Throughput calculation for elCIC demodulation requirements 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2334r1 Introduction of Band 28 requirements for flexible operation in Japan 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2340 Cleanup of terminology for Rx requirements 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2340 Cleanup of terminology for Rx require	06-2014		RP-140914	2285	CR for finalizing DL COMP CSI reporting requirements	11.8.0	11.9.0
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06-2014 RP-64 RP-140911 2364 Clarification on CA bandwidth classes 11.8.0 11.8.0 11.9.0 06-2014 RP-64 RP-140917 2373 CR on correction of downlink SDR tests with EPDCCH scheduling 11.8.0 11.9.0 06-2014 RP-64 RP-140917 2376 Corrections on CA CQI tests 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2376 Corrections on CA CQI tests 11.8.0 11.9.0 06-2014 RP-64 RP-140911 2386r1 CR on PDSCH transmission for eICIC CSI requirements (Rel-11) 11.8.0 11.9.0 06-2014 RP-64 RP-140914 2390 CA_7C A-MPR Corrections 11.8.0 11.9.0 06-2014 RP-64 RP-140918 2393 CR for TS36.101 CSI RMC table 11.8.0 11.9.0	06-2014	RP-64	RP-140914	2361r1	Correction of test configurations for intra-band non-contiguous	11.8.0	11.9.0
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	06-2014	RP-64	RP-140914	2424	CR on correction for TM10 CSI reporting requirements	11.8.0	11.9.0

History

Document history					
V11.2.0	November 2012	Publication			
V11.3.0	February 2013	Publication			
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