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Technical Specification

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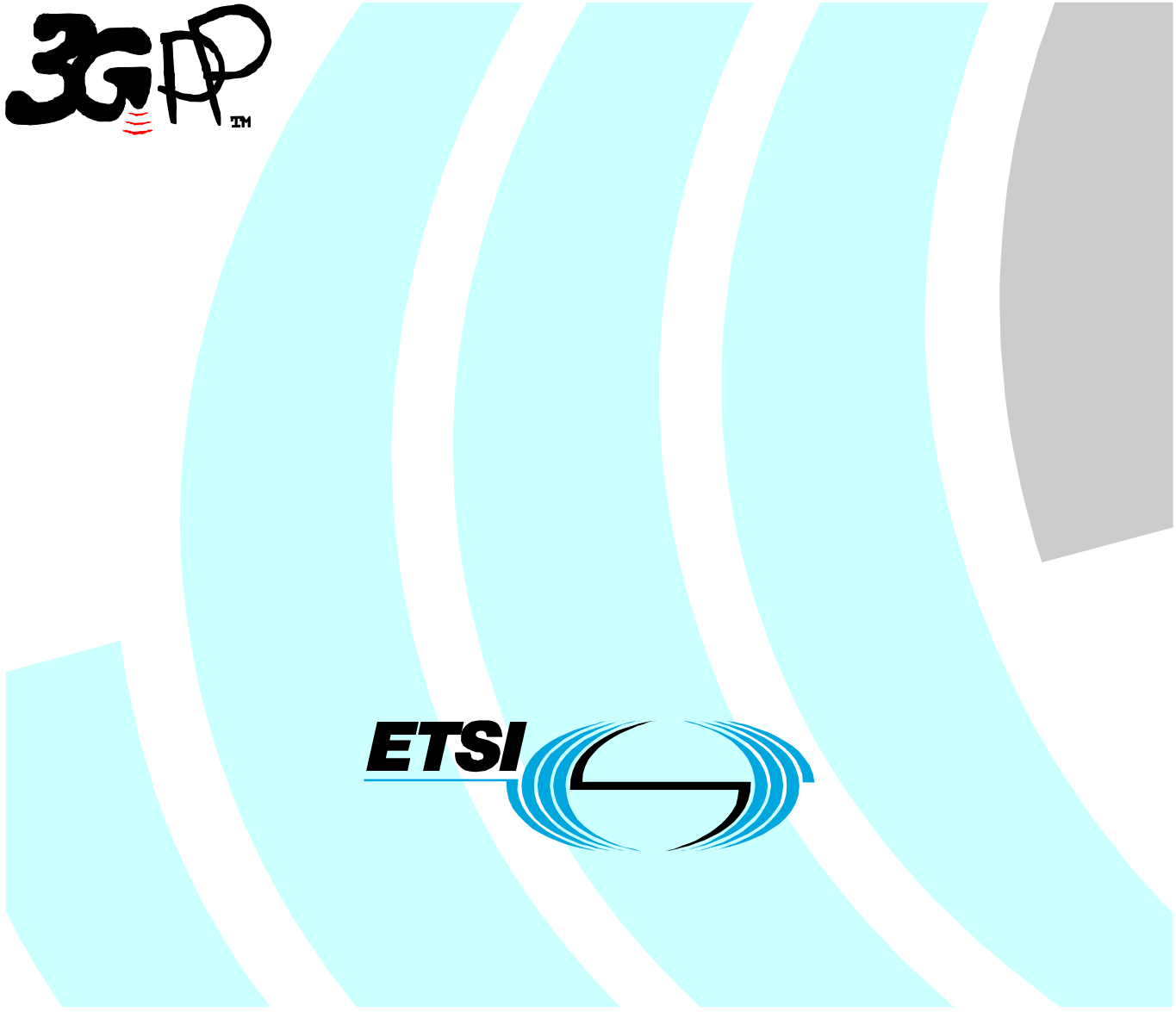

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Contents

Foreword

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1 Scope

The present document contains the description and definition of the measurements for FDD done at the UE and network in order to support operation in idle mode and connected mode.

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 TS 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".

[2] 3GPP TS 25.212: "Multiplexing and channel coding (FDD)".

[3] 3GPP TS 25.213: "Spreading and modulation (FDD)".

[4] 3GPP TS 25.214: "Physical layer procedures (FDD)".

[5] 3GPP TS 25.215: "Physical layer - Measurements (FDD)".

[6] 3GPP TS 25.221: "Physical channels and mapping of transport channels onto physical channels (TDD)".

[7] 3GPP TS 25.222: "Multiplexing and channel coding (TDD)".

[8] 3GPP TS 25.223: "Spreading and modulation (TDD)".

[9] 3GPP TS 25.224: "Physical layer procedures (TDD)".

[10] 3GPP TS 25.301: "Radio Interface Protocol Architecture".

[11] 3GPP TS 25.302: "Services provided by the Physical layer".

[12] 3GPP TS 25.303: "UE functions and interlayer procedures in connected mode".

[13] 3GPP TS 25.304: "UE procedures in idle mode".

[14] 3GPP TS 25.331: "RRC Protocol Specification".

[15] 3GPP TR 25.922: "Radio Resource Management Strategies".

[16] 3GPP TR 25.923: "Report on Location Services (LCS)".

[17] 3GPP TR 25.401: "UTRAN Overall Description".

[18] 3GPP TS 25.101: "UE Radio transmission and Reception (FDD)".

[19] 3GPP TS 25.104: "UTRA (BS) FDD; Radio transmission and Reception".

[20] 3GPP TS 25.133: " Requirements for Support of Radio Resource Management (FDD)"

[21] 3GPP TS 25.225: " Physical layer – Measurements (TDD)".

3 Abbreviations

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

BER	Bit Error Rate
BLER	Block Error Rate
Ec/No	Received energy per chip divided by the power density in the band
ISCP	Interference Signal Code Power
RL	Radio Link
RSCP	Received Signal Code Power
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference Ratio

4 Control of UE/UTRAN measurements

In this chapter the general measurement control concept of the higher layers is briefly described to provide an understanding on how L1 measurements are initiated and controlled by higher layers.

L1 provides with the measurement specifications a toolbox of measurement abilities for the UE and the UTRAN. These measurements can be differentiated in different reported measurement types: intra-frequency, inter-frequency, inter-system, traffic volume, quality and UE internal measurements (see [14]).

In the L1 measurement specifications the measurements, see chapter 5, are distinguished between measurements in the UE (the messages will be described in the RRC Protocol) and measurements in the UTRAN (the messages will be described in the NBAP and the Frame Protocol).

To initiate a specific measurement the UTRAN transmits a 'measurement control message' to the UE including a measurement ID and type, a command (setup, modify, release), the measurement objects and quantity, the reporting quantities, criteria (periodical/event-triggered) and mode (acknowledged/unacknowledged), see [14].

When the reporting criteria is fulfilled the UE shall answer with a 'measurement report message' to the UTRAN including the measurement ID and the results.

In idle mode the measurement control message is broadcast in a System Information.

Intra-frequency reporting events, traffic volume reporting events and UE internal measurement reporting events described in [14] define events which trigger the UE to send a report to the UTRAN. This defines a toolbox from which the UTRAN can choose the needed reporting events.

5 Measurement abilities for UTRA FDD

In this chapter the physical layer measurements reported to higher layers are defined. The GSM measurements are required only from the GSM capable terminals. The TDD measurements are required only from the terminals that are capable to operate in TDD mode.

5.1 UE measurement abilities

The structure of the table defining a UE measurement quantity is shown below.

Column field	Comment
Definition	Contains the definition of the measurement.
Applicable for	States in which RRC state according to [14] a measurement shall be possible to perform. For RRC connected mode states information is also given on the possibility to perform the measurement on intra-frequency and/or inter-frequency. The following terms are used in the tables: Idle = Shall be possible to perform in idle mode; URA_PCH = Shall be possible to perform in URA_PCH; CELL_PCH = Shall be possible to perform in CELL_PCH; CELL_FACH = Shall be possible to perform in CELL_FACH; CELL_DCH = Shall be possible to perform in CELL_DCH; For all RRC connected mode states i.e. URA_PCH, CELL_PCH, CELL_FACH and CELL_DCH Intra appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an intra-frequency cell; Inter appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an inter-frequency cell. Inter-RAT appended to the RRC state = Shall be possible to perform in the corresponding RRC state on an inter-RAT cell.

The term "antenna connector of the UE" used in this sub-clause to define the reference point for the UE measurements is defined in [18]. Performance and reporting requirements for the UE measurements are defined in [20].

5.1.1 CPICH RSCP

Definition	Received Signal Code Power, the received power on one code measured on the Primary CPICH. The reference point for the RSCP shall be the antenna connector of the UE. If Tx diversity is applied on the Primary CPICH the received code power from each antenna shall be separately measured and summed together in [W] to a total received code power on the Primary CPICH.
Applicable for	Idle, URA_PCH intra, URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH inter

5.1.2 PCCPCH RSCP

Definition	Received Signal Code Power, the received power on one code measured on the PCCPCH from a TDD cell. The reference point for the RSCP shall be the antenna connector of the UE. See [21] for further details on this measurement.
Applicable for	Idle, URA_PCH inter, CELL_PCH inter, CELL_FACH inter, CELL_DCH inter

5.1.3 UTRA carrier RSSI

Definition	The received wide band power, including thermal noise and noise generated in the receiver, within the bandwidth defined by the receiver pulse shaping filter. The reference point for the measurement shall be the antenna connector of the UE.
Applicable for	CELL_DCH intra, CELL_DCH inter

5.1.4 GSM carrier RSSI

Definition	Received Signal Strength Indicator, the wide-band received power within the relevant channel bandwidth. Measurement shall be performed on a GSM BCCH carrier. The reference point for the RSSI shall be the antenna connector of the UE.
Applicable for	Idle, URA_PCH inter-RAT CELL_PCH inter-RAT CELL_FACH inter-RAT CELL_DCH inter-RAT

5.1.5 CPICH Ec/No

Definition	The received energy per chip divided by the power density in the band. The CPICH Ec/No is identical to CPICH RSCP/UTRA Carrier RSSI. Measurement shall be performed on the Primary CPICH. The reference point for the CPICH Ec/No shall be the antenna connector of the UE. If Tx diversity is applied on the Primary CPICH the received energy per chip (Ec) from each antenna shall be separately measured and summed together in [Ws] to a total received chip energy per chip on the Primary CPICH, before calculating the Ec/No.
Applicable for	Idle, URA_PCH intra, URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter, CELL_DCH intra, CELL_DCH inter

5.1.6 Transport channel BLER

Definition	Estimation of the transport channel block error rate (BLER). The BLER estimation shall be based on evaluating the CRC of each transport block associated with the measured transport channel after RL combination. The BLER shall be computed over the measurement period as the ratio between the number of received transport blocks resulting in a CRC error and the number of received transport blocks. When either TFCI or guided detection is used, the measurement “Transport channel BLER” may only be requested for a transport channel when the associated CRC size is non zero and at least one transport format in the associated transport format set includes at least one transport block. When neither TFCI nor guided detection is used, the measurement “Transport channel BLER” may only be requested for a transport channel when the associated CRC size is non zero and all transport formats in the associated transport format set include at least one transport block. The measurement “Transport channel BLER” does not apply to transport channels mapped on a P-CCPCH and a S-CCPCH. The UE shall be able to perform the measurement “Transport channel BLER” on any transport channel configured such that the measurement “Transport channel BLER” can be requested as defined in this section.
Applicable for	CELL_DCH intra

5.1.7 UE transmitted power

Definition	The total UE transmitted power on one carrier. The reference point for the UE transmitted power shall be the antenna connector of the UE.
Applicable for	CCELL_FACH intra, CELL_DCH intra

5.1.8 SFN-CFN observed time difference

Definition	The SFN-CFN observed time difference to cell is defined as: OFF×38400+ T_m, where: T_m= (T_{UETx}-T_0) - T_{RxSFN}, given in chip units with the range [0, 1, …, 38399] chips T_{UETx} is the time when the UE transmits an uplink DPCCH/DPDCH frame. T_0 is defined in [1]. T_{RxSFN} is the time at the beginning of the neighbouring P-CCPCH frame received most recent in time before the time instant T_{UETx}-T_0in the UE. If the beginning of the neighbouring P-CCPCH frame is received exactly at T_{UETx}-T_0 then T_{RxSFN}=T_{UETx}-T_0 (which leads to T_m=0). and OFF=(SFN-CFN_{Tx}) mod 256, given in number of frames with the range [0, 1, …, 255] frames CFN_{Tx} is the connection frame number for the UE transmission of an uplink DPCCH/DPDCH frame at the time T_{UETx}. SFN is the system frame number for the neighbouring P-CCPCH frame received in the UE at the time T_{RxSFN}. The reference point for the SFN-CFN observed time difference shall be the antenna connector of the UE. In case the inter-frequency measurement is done with compressed mode, the UE is not required to read the cell SFN of the target inter-frequency neighbour cell and the value for the parameter OFF is always reported to be 0. In case that the SFN measurement indicator indicates that the UE does not need to read cell SFN of the target neighbour cell, the value of the parameter OFF is always be set to 0.
Applicable for	CELL_DCH intra, CELL_DCH inter

5.1.9 SFN-SFN observed time difference

Definition	**Type 1:** The SFN-SFN observed time difference to cell is defined as: OFF×38400+ T_m, where: T_m= T_{RxSFNj} - T_{RxSFNi}, given in chip units with the range [0, 1, …, 38399] chips T_{RxSFNj} is the time at the beginning of a received neighbouring P-CCPCH frame from cell j. T_{RxSFNi} is time at the beginning of the neighbouring P-CCPCH frame from cell i received most recent in time before the time instant T_{RxSFNj} in the UE. If the next neighbouring P-CCPCH frame is received exactly at T_{RxSFNj} then T_{RxSFNj}= T_{RxSFNi} (which leads to T_m=0). and OFF=(SFN_i- SFN_j) mod 256, given in number of frames with the range [0, 1, …, 255] frames SFN_j is the system frame number for downlink P-CCPCH frame from cell j in the UE at the time T_{RxSFNj}. SFN_i is the system frame number for the P-CCPCH frame from cell i received in the UE at the time T_{RxSFNi}. The reference point for the SFN-SFN observed time difference type 1 shall be the antenna connector of the UE. **Type 2:** The relative timing difference between cell j and cell i, defined as $T_{CPICHRxj}$ - $T_{CPICHRxi}$, where: $T_{CPICHRxj}$ is the time when the UE receives one Primary CPICH slot from cell j $T_{CPICHRxi}$ is the time when the UE receives the Primary CPICH slot from cell i that is closest in time to the Primary CPICH slot received from cell j. The reference point for the SFN-SFN observed time difference type 2 shall be the antenna connector of the UE.
Applicable for	**Type 1:** Idle, URA_PCH intra, CELL_PCH intra, CELL_FACH intra **Type 2:** URA_PCH intra, URA_PCH inter, CELL_PCH intra, CELL_PCH inter, CELL_FACH intra, CELL_FACH inter CELL_DCH intra, CELL_DCH inter

5.1.10 UE Rx-Tx time difference

Definition	The difference in time between the UE uplink DPCCH/DPDCH frame transmission and the first detected path (in time), of the downlink DPCH frame from the measured radio link. Type 1 and Type 2 are defined. For Type 1, the reference Rx path shall be the first detected path (in time) amongst the paths (from the measured radio link) used in the demodulation process. For Type 2, the reference Rx path shall be the first detected path (in time) amongst all paths (from the measured radio link) detected by the UE. The reference path used for the measurement may therefore be different for Type 1 and Type 2. The reference point for the UE Rx-Tx time difference shall be the antenna connector of the UE. Measurement shall be made for each cell included in the active set.
Applicable for	CELL_DCH intra

5.1.11 Observed time difference to GSM cell

Definition	The Observed time difference to GSM cell is defined as: T_{RxGSMj} - T_{RxSFNi}, where: T_{RxSFNi} is the time at the beginning of the P-CCPCH frame with SFN=0 from cell i. Cell i is an intra-frequency cell. T_{RxGSMj} is the time at the beginning of the GSM BCCH 51-multiframe from GSM frequency j received closest in time after the time T_{RxSFNi}. If the next GSM multiframe is received exactly at T_{RxSFNi} then T_{RxGSMj} =T_{RxSFNi} (which leads to T_{RxGSMj} - T_{RxSFNi} = 0). The reference point for the Observed time difference to GSM cell shall be the antenna connector of the UE. The beginning of the GSM BCCH 51-multiframe is defined as the beginning of the first tail bit of the frequency correction burst in the first TDMA-frame of the GSM BCCH 51-multiframe, i.e. the TDMA-frame following the IDLE-frame. The reported time difference is calculated from the actual measurement in the UE. The actual measurement shall be based on: $T_{MeasGSM,j}$: The start of the first tail bit of the most recently received GSM SCH on frequency j $T_{MeasSFN,i}$: The start of the last P-CCPCH frame received from cell i before receiving the GSM SCH on frequency j For calculating the reported time difference, the frame lengths are always assumed to be 10 ms for UTRA and (60/13) ms for GSM.
Applicable for	Idle, URA_PCH inter-RAT, CELL_PCH inter-RAT, CELL_DCH inter-RAT

5.1.12 UE GPS Timing of Cell Frames for UE positioning

Definition	The timing between cell j and GPS Time Of Week. $T_{UE-GPSj}$ is defined as the time of occurrence of a specified UTRAN event according to GPS time. The specified UTRAN event is the beginning of a particular frame (identified through its SFN) in the first detected path (in time) of the cell j CPICH, where cell j is a cell chosen by the UE. The reference point for $T_{UE-GPSj}$ shall be the antenna connector of the UE.
Applicable for	CELL_FACH intra, CELL_DCH intra

5.1.13 UE GPS code phase

Definition	The whole and fractional phase of the spreading code of the i^{th} GPS satellite signal. The reference point for the GPS code phase shall be the antenna connector of the UE.
Applicable for	Void (this measurement is not related to UTRAN/GSM signals; its applicability is therefore independent of the UE RRC state)

5.2 UTRAN measurement abilities

The structure of the table defining a UTRAN measurement quantity is shown below.

Column field	Comment
Definition	Contains the definition of the measurement.

The term "antenna connector" used in this sub-clause to define the reference point for the UTRAN measurements refers to the "BS antenna connector" test port A and test port B as described in [19]. The term "antenna connector" refers to Rx or Tx antenna connector as described in the respective measurement definitions.

5.2.1 Received total wide band power

Definition	The received wide band power, including noise generated in the receiver, within the bandwidth defined by the receiver pulse shaping filter. The reference point for the measurement shall be the Rx antenna connector. In case of receiver diversity the reported value shall be linear average of the power in the diversity branches.

5.2.2 SIR

Definition	Signal to Interference Ratio, is defined as: (RSCP/ISCP)×SF. Measurement shall be performed on the DPCCH of a Radio Link Set. In compressed mode the SIR shall not be measured in the transmission gap. The reference point for the SIR measurements shall be the Rx antenna connector. where: RSCP = Received Signal Code Power, unbiased measurement of the received power on one code. ISCP = Interference Signal Code Power, the interference on the received signal. SF=The spreading factor used on the DPCCH.

5.2.3 SIR_{error}

Definition	SIR_{error} = SIR – SIR_{target_ave}, where: SIR = the SIR measured by UTRAN, defined in section 5.2, given in dB. SIR_{target_ave} = the SIR_{target} averaged over the same time period as the SIR used in the SIR_{error} calculation. In compressed mode SIR_{target}=SIR_{cm_target} shall be used when calculating SIR_{target_ave}. In compressed mode the SIR_{target_ave} shall not be calculated over the transmission gap. The averaging of SIR_{target} shall be made in a linear scale and SIR_{target_ave} shall be given in dB.

5.2.4 Transmitted carrier power

Definition	Transmitted carrier power, is the ratio between the total transmitted power on one DL carrier from one UTRAN access point, and the maximum transmission power possible to use on that DL carrier at this moment of time. Total transmission power is the mean power [W] on one carrier from one UTRAN access point. Maximum transmission power is the mean power [W] on one carrier from one UTRAN access point when transmitting at the configured maximum power for the cell. Measurement shall be possible on any carrier transmitted from the UTRAN access point. The reference point for the transmitted carrier power measurement shall be the Tx antenna connector. In case of Tx diversity the transmitted carrier power for each branch shall be measured and the maximum of the two values shall be reported to higher layers, i.e. only one value will be reported to higher layers.

5.2.5 Transmitted code power

Definition	Transmitted code power, is the transmitted power on one channelisation code on one given scrambling code on one given carrier. Measurement shall be possible on the DPCCH-field of any dedicated radio link transmitted from the UTRAN access point and shall reflect the power on the pilot bits of the DPCCH-field. When measuring the transmitted code power in compressed mode all slots shall be included in the measurement, e.g. also the slots in the transmission gap shall be included in the measurement. The reference point for the transmitted code power measurement shall be the Tx antenna connector. In case of Tx diversity the transmitted code power for each branch shall be measured and summed together in [W].

5.2.6 Transport channel BER

Definition	The transport channel BER is an estimation of the average bit error rate (BER) of the DPDCH data of a Radio Link Set. The transport channel (TrCH) BER is measured from the data considering only non-punctured bits at the input of the channel decoder in Node B. It shall be possible to report an estimate of the transport channel BER for a TrCH after the end of each TTI of the TrCH. The reported TrCH BER shall be an estimate of the BER during the latest TTI for that TrCH.

5.2.7 Physical channel BER

Definition	The Physical channel BER is an estimation of the average bit error rate (BER) on the DPCCH of a Radio Link Set. An estimate of the Physical channel BER shall be possible to be reported after the end of each TTI of any of the transferred TrCHs. The reported physical channel BER shall be an estimate of the BER averaged over the latest TTI of the respective TrCH.

5.2.8 Round trip time

Definition	Round trip time (RTT), is defined as $RTT = T_{RX} - T_{TX}$, where T_{TX} = The time of transmission of the beginning of a downlink DPCH frame to a UE. The reference point for T_{TX} shall be the Tx antenna connector. T_{RX} = The time of reception of the beginning (the first detected path, in time) of the corresponding uplink DPCCH/DPDCH frame from the UE. The reference point for T_{RX} shall be the Rx antenna connector. Measurement shall be possible on DPCH for each RL transmitted from an UTRAN access point and DPDCH/DPCCH for each RL received in the same UTRAN access point.

5.2.9 UTRAN GPS Timing of Cell Frames for UE positioning

Definition	$T_{UTRAN-GPS}$ is defined as the time of the occurrence of a specified UTRAN event according to GPS Time Of Week. The specified UTRAN event is the beginning of the transmission of a particular frame in the cell. The reference point for $T_{UTRAN-GPS}$ shall be the Tx antenna connector.

5.2.10 PRACH/PCPCH Propagation delay

Definition	Propagation delay is defined as one-way propagation delay as measured during either PRACH or PCPCH access: PRACH : Propagation delay = $(T_{RX} - T_{TX} - 2560)/2$, where: T_{TX} = The transmission time of AICH access slot (n-2-AICH transmission timing), where $0 \leq$(n-2-AICH Transmission Timing)≤ 14 and AICH_Transmission_Timing can have values 0 or 1. The reference point for T_{TX} shall be the Tx antenna connector. T_{RX} = The time of reception of the beginning (the first detected path, in time) of the PRACH message from the UE at PRACH access slot n. The reference point for T_{RX} shall be the Rx antenna connector. PCPCH: Propagation delay = $(T_{RX} - T_{TX} - (L_{pc\text{-}preamble} + 1)*2560 - (k-1)*38400)/2$, where T_{TX} = The transmission time of CD-ICH at access slot (n-2-T_{cpch}), where $0 \leq$(n-2-T_{cpch})≤ 14 and T_{cpch} can have values 0 or 1. The reference point for T_{TX} shall be the Tx antenna connector. T_{RX} = The time of reception of the first chip (the first detected path, in time) of the kth frame of the PCPCH message from the UE, where $k \in \{1, 2, \ldots, N\_Max\_frames\}$. The reference point for T_{RX} shall be the Rx antenna connector. N_max_frames is a higher layer parameter and defines the maximum length of the PCPCH message. The PCPCH message begins at uplink access slot (n+$L_{pc\text{-}preamble}$/2), where $0 \leq (n + L_{pc\text{-}preamble}/2) \leq 14$ and where $L_{pc\text{-}preamble}$ can have values 0 or 8.

5.2.11 Acknowledged PRACH preambles

Definition	The Acknowledged PRACH preambles measurement is defined as the total number of acknowledged PRACH preambles per access frame per PRACH. This is equivalent to the number of positive acquisition indicators transmitted per access frame per AICH.

5.2.12 Detected PCPCH access preambles

Definition	The detected PCPCH access preambles measurement is defined as the total number of detected access preambles per access frame on the PCPCHs belonging to a CPCH set.

5.2.13 Acknowledged PCPCH access preambles

Definition	The Acknowledged PCPCH access preambles measurement is defined as the total number of acknowledged PCPCH access preambles per access frame on the PCPCHs belonging to a SF. This is equivalent to the number of positive acquisition indicators transmitted for a SF per access frame per AP-AICH.

5.2.14 SFN-SFN observed time difference

Definition	The relative timing difference between cell j and cell i, defined as $T_{CPICHRxj} - T_{CPICHRxi}$, where: $T_{CPICHRxj}$ is the time when the LMU receives the beginning of one Primary CPICH frame from cell j and $T_{CPICHRxi}$ is the time when the LMU receives the beginning of the Primary CPICH frame from cell i that is closest in time to the beginning of Primary CPICH frame received from cell j. The reference point for the measurements shall be the Rx antenna connector.

6 Measurements for UTRA FDD

6.1 UE measurements

6.1.1 Compressed mode

6.1.1.1 Use of compressed mode for monitoring

On command from the UTRAN, a UE shall monitor cells on other FDD frequencies and on other modes and radio access technologies that are supported by the UE (i.e. TDD, GSM). To allow the UE to perform measurements, UTRAN shall command that the UE enters in compressed mode, depending on the UE capabilities.

The UE capabilities define whether a UE requires compressed mode in order to monitor cells on other FDD frequencies and on other modes and radio access technologies. UE capabilities indicate the need for compressed mode separately for the uplink and downlink and for each mode, radio access technology and frequency band.

A UE shall support compressed mode for all cases for which the UE indicates that compressed mode is required.

A UE does not need to support compressed mode for cases for which the UE indicates that compressed mode is not required. For these cases, the UE shall support an alternative means of making the measurements.

The UE shall support one single measurement purpose for one transmission gap pattern sequence. The measurement purpose of the transmission gap pattern sequence is signalled by higher layers.

The following subclause provides rules to parameterise the compressed mode.

6.1.1.2 Parameterisation of the compressed mode

In response to a request from higher layers, the UTRAN shall signal to the UE the compressed mode parameters.

A transmission gap pattern sequence consists of alternating transmission gap patterns 1 and 2, each of these patterns in turn consists of one or two transmission gaps. See figure 1.

The following parameters characterise a transmission gap pattern:

- TGSN (Transmission Gap Starting Slot Number): A transmission gap pattern begins in a radio frame, henceforward called first radio frame of the transmission gap pattern, containing at least one transmission gap slot. TGSN is the slot number of the first transmission gap slot within the first radio frame of the transmission gap pattern;

- TGL1 (Transmission Gap Length 1): This is the duration of the first transmission gap within the transmission gap pattern, expressed in number of slots;

- TGL2 (Transmission Gap Length 2): This is the duration of the second transmission gap within the transmission gap pattern, expressed in number of slots. If this parameter is not explicitly set by higher layers, then TGL2 = TGL1;

- TGD (Transmission Gap start Distance): This is the duration between the starting slots of two consecutive transmission gaps within a transmission gap pattern, expressed in number of slots. The resulting position of the second transmission gap within its radio frame(s) shall comply with the limitations of [2]. If this parameter is not set by higher layers, then there is only one transmission gap in the transmission gap pattern;

- TGPL1 (Transmission Gap Pattern Length): This is the duration of transmission gap pattern 1, expressed in number of frames;

- TGPL2 (Transmission Gap Pattern Length): This is the duration of transmission gap pattern 2, expressed in number of frames. If this parameter is not explicitly set by higher layers, then TGPL2 = TGPL1.

The following parameters control the transmission gap pattern sequence start and repetition:

- TGPRC (Transmission Gap Pattern Repetition Count): This is the number of transmission gap patterns within the transmission gap pattern sequence;

- TGCFN (Transmission Gap Connection Frame Number): This is the CFN of the first radio frame of the first pattern 1 within the transmission gap pattern sequence.

In addition to the parameters defining the positions of transmission gaps, each transmission gap pattern sequence is characterised by:

- UL/DL compressed mode selection: This parameter specifies whether compressed mode is used in UL only, DL only or both UL and DL;

- UL compressed mode method: The methods for generating the uplink compressed mode gap are spreading factor division by two or higher layer scheduling and are described in [2];

- DL compressed mode method: The methods for generating the downlink compressed mode gap are puncturing, spreading factor division by two or higher layer scheduling and are described in [2];

- downlink frame type: This parameter defines if frame structure type 'A' or 'B' shall be used in downlink compressed mode. The frame structures are defined in [2];

- scrambling code change: This parameter indicates whether the alternative scrambling code is used for compressed mode method 'SF/2'. Alternative scrambling codes are described in [3];

- RPP: Recovery Period Power control mode specifies the uplink power control algorithm applied during recovery period after each transmission gap in compressed mode. RPP can take 2 values (0 or 1). The different power control modes are described in [4];

- ITP: Initial Transmit Power mode selects the uplink power control method to calculate the initial transmit power after the gap. ITP can take two values (0 or 1) and is described in [4].

The UE shall support simultaneous compressed mode pattern sequences which can be used for different measurements. The following measurement purposes can be signalled from higher layers:

- FDD

- TDD

- GSM carrier RSSI measurement

- Initial BSIC identification

- BSIC re-confirmation.

The UE shall support one compressed mode pattern sequence for each measurement purpose while operating in FDD mode, assuming the UE needs compressed mode to perform the respective measurement. In case the UE supports several of the measurement purposes, it shall support in parallel one compressed mode pattern sequence for each supported measurement purpose where the UE needs compressed mode to perform the measurement. The capability of the UE to operate in compressed mode in uplink and downlink is given from the UE capabilities.

The GSM measurements Initial BSIC identification and BSIC re-confirmation are defined in [20].

Higher layers will ensure that the compressed mode gaps do not overlap and are not scheduled to overlap the same frame. The behaviour when an overlap occurs is described in [11]. UE is not required to support two compressed mode gaps in a frame.

In all cases, higher layers have control of individual UE parameters. Any pattern sequence can be stopped on higher layers' command.

The parameters TGSN, TGL1, TGL2, TGD, TGPL1, TGPL2, TGPRC and TGCFN shall all be integers.

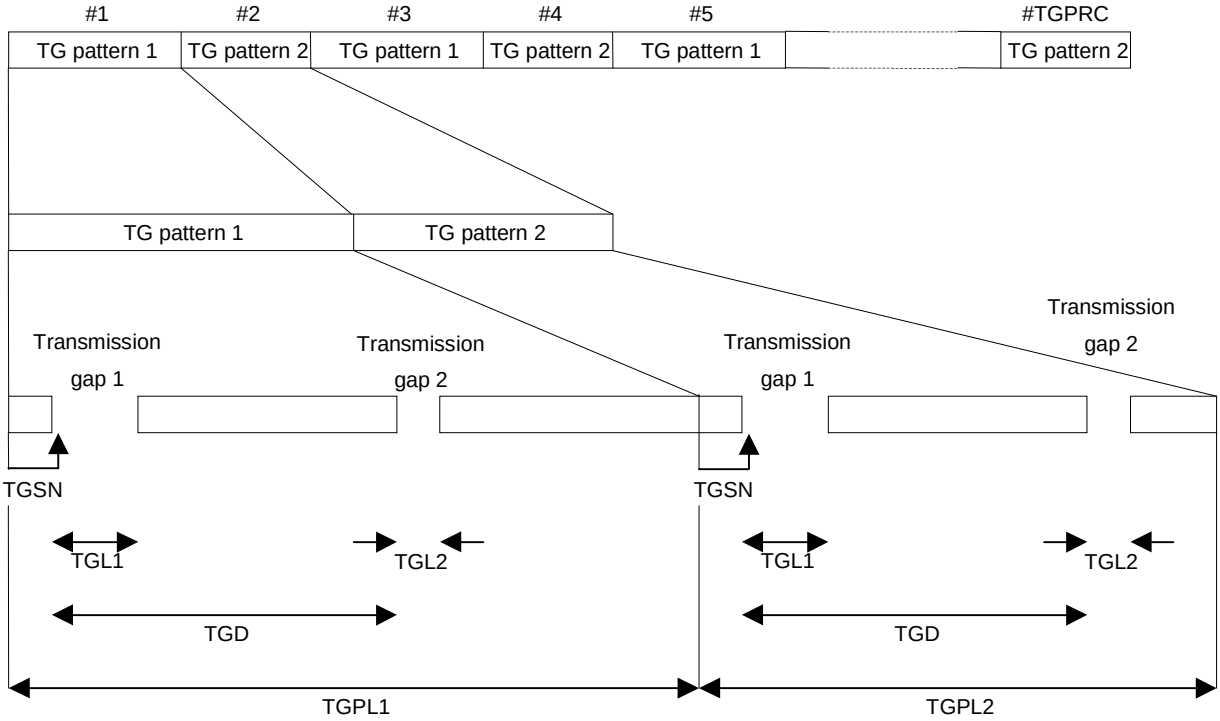

Figure 1: Illustration of compressed mode pattern parameters

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
14/01/00	RAN_05	RP-99590	-		Approved at TSG RAN #5 and placed under Change Control	-	3.0.0
14/01/00	RAN_06	RP-99688	001	3	Clarifications for compressed mode parameters	3.0.0	3.1.0
14/01/00	RAN_06	RP-99689	002	-	Definition of PCCPCH RSCP	3.0.0	3.1.0
14/01/00	RAN_06	RP-99689	003	-	Definition of observed time difference to GSM cell	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	004	-	Measurements are done on Primary CPICH	3.0.0	3.1.0
14/01/00	RAN_06	RP-99689	005	1	Physical channel BER on DPCCH	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	006	-	Definition of SIR measurement	3.0.0	3.1.0
14/01/00	RAN_06	RP-99689	007	2	Ranges and resolution of timing measurements	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	009	2	Range and resolution for RF related measurements	3.0.0	3.1.0
14/01/00	RAN_06	RP-99689	010	2	New subclauses: 5.1.15 - UE GPS Timing of Cell Frames for LCS; 5.2.8 UTRAN GPS Timing of Cell Frames for LCS	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	011	-	Removal of Annex A from TS 25.215	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	013	-	Definition of Transmitted code power	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	014	2	Range and resolution of BLER measurements	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	015	2	Range and resolution of BER measurements	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	020	-	Correction of SFN-SFN observed time difference	3.0.0	3.1.0
14/01/00	RAN_06	RP-99688	021	1	CFN-SFN measurement with compressed mode	3.0.0	3.1.0
14/01/00	-	-	-		Change history was added by the editor	3.1.0	3.1.1
31/03/00	RAN_07	RP-000066	024	1	Definition of Transmitted carrier power	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	025	-	Clarification of Observed time difference to GSM cell	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	027	-	Naming of BER/BLER mapping	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	028	-	Minor corrections in TS 25.215	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	029	-	Re-definition of timing measurements	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	030	2	Mapping of timing measurements	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	031	-	Removal of note in Round trip time measurement	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	033	-	Removal of fixed gap position in 25.215	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	036	4	Corrections to 25.215 compressed mode parameter list	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	037	3	Definition and range of physical channel BER	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	040	-	Clarification of CPICH measurements in Tx diversity	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	042	1	UTRAN RSSI measurement	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	043	1	UTRAN Propagation delay	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	044	2	Correction to subclauses: 5.1.15 UE GPS Timing of Cell Frames for LCS; 5.2.8 UTRAN GPS Timing of Cell Frames for LCS, including timing mapping	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	047	-	Removal of RSCP measurement	3.1.1	3.2.0
31/03/00	RAN_07	RP-000066	048	-	UE BER measurement removal and clarification for use of uplink compressed mode	3.1.1	3.2.0
26/06/00	RAN_08	RP-000270	049	1	Propagation delay for PCPCH	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	050	1	Maximum number of simultaneous compressed mode pattern sequences	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	051	1	Clarification of Physical channel BER	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	052	-	Clarification of transmitted code power	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	053	-	Editorial correction in TS 25.215	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	055	-	Proposed CR for Measurements of RACH in FDD	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	056	-	Proposed CR for Measurements of CPCH in FDD	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	057	-	Transfer of information from TS 25.212 table 9 to TS 25.215	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	058	-	Correction to CM parameter list	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	062	-	Clarification of radio link measurements in compressed mode	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	063	-	Clarification of the Transmitted code power measurement in Tx diversity	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	064	1	Removal of Range/mapping	3.2.0	3.3.0
26/06/00	RAN_08	RP-000270	066	-	Removal of UTRAN TrCH BLER measurement	3.2.0	3.3.0
23/09/00	RAN_09	RP-000343	067	-	Insertion of UTRAN SIRerro measurement in 25.215	3.3.0	3.4.0
23/09/00	RAN_09	RP-000343	068	-	Reporting of UTRAN Transmitted carrier power	3.3.0	3.4.0
23/09/00	RAN_09	RP-000343	070	-	Clarification of UTRAN SIR measurement	3.3.0	3.4.0
23/09/00	RAN_09	RP-000343	071	-	Clarification of first significant path	3.3.0	3.4.0
23/09/00	RAN_09	RP-000343	072	-	Clarification of radio link set as the measured object	3.3.0	3.4.0
15/12/00	RAN_10	RP-000541	069	3	Support of parallel compressed mode patterns	3.4.0	3.5.0
15/12/00	RAN_10	RP-000541	074	1	Clarification of SIRerror measurement during compressed mode	3.4.0	3.5.0
15/12/00	RAN_10	RP-000541	075	2	Definition of UTRAN RSSI	3.4.0	3.5.0
15/12/00	RAN_10	RP-000541	076	1	Clarification of GPS timing measurements	3.4.0	3.5.0
15/12/00	RAN_10	RP-000541	077	2	Clarification of reference point for UE/UTRAN measurements	3.4.0	3.5.0
15/12/00	RAN_10	RP-000541	078	1	Correction to measurement "Rx-Tx time difference"	3.4.0	3.5.0

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
15/12/00	RAN_10	RP-000541	080	1	Clarifications to compressed mode usage	3.4.0	3.5.0
16/03/01	RAN_11	-	-	-	Approved as Release 4 specification (v4.0.0) at TSG RAN #11	3.5.0	4.0.0
16/03/01	RAN_11	RP-010061	079	2	Correction of the observed time difference to GSM measurement	3.5.0	3.6.0
16/03/01	RAN_11	RP-010061	081	-	Removal of UE SIR measurement	3.5.0	3.6.0
16/03/01	RAN_11	RP-010061	082	1	Correction of GSM reference	3.5.0	3.6.0
16/03/01	RAN_11	RP-010061	083	-	Correction of GPS Timing measurement	3.5.0	3.6.0
16/03/01	RAN_11	RP-010061	086	-	Correction on transport channel BLER	3.5.0	3.6.0
16/03/01	RAN_11	RP-010072	085	-	RTD measurement in UTRAN for FDD	3.5.0	4.0.0
15/06/01	RAN_12	RP-010335	088	-	Renaming of LCS measurements	4.0.0	4.1.0
15/06/01	RAN_12	RP-010456	090	2	Correction the TrCH BLER measurement	4.0.0	4.1.0
21/09/01	RAN_13	RP-010521	096	-	Removal of the BLER measurement of the BCH	4.1.0	4.2.0
14/12/01	RAN_14	RP-010740	098	-	Clarification of internal measurements	4.2.0	4.3.0
14/12/01	RAN_14	RP-010740	103	-	Clarification of P-CCPCH RSCP in 25.215	4.2.0	4.3.0
14/12/01	RAN_14	RP-010740	105	-	Revised definitions of CPICH Ec/No and UTRA carrier RSSI	4.2.0	4.3.0
14/12/01	RAN_14	RP-010745	099	2	UE GPS code phase measurement	4.2.0	4.3.0
14/12/01	RAN_14	RP-010745	106	1	UTRAN SFN-SFN observed time difference measurement	4.2.0	4.3.0
08/03/02	RAN_15	RP-020245	114	3	Clarification of UE measurements Applicability	4.3.0	4.4.0
08/03/02	RAN_15	RP-020048	116	-	Correction to the definition of UTRAN GPS timing of cell frames for UE positioning	4.3.0	4.4.0
08/03/02	RAN_15	RP-020048	117	-	Correction to the definition of UE GPS timing of cell frames for UE positioning	4.3.0	4.4.0
08/03/02	RAN_15	RP-020231	111	1	Removal of channel coding option “no coding” for FDD	4.3.0	4.4.0
08/03/02	RAN_15	-	-	-	Raised up to v5.0.0 together with other specs.	4.4.0	5.0.0
18/09/02	RAN_17	RP-020530	119	4	Transmitted carrier power measurement correction	5.0.0	5.1.0
18/09/02	RAN_17	RP-020575	121	-	Measurements for observed time difference to GSM cell	5.0.0	5.1.0
18/09/02	RAN_17	RP-020575	130	-	Compressed mode limitation	5.0.0	5.1.0
18/09/02	RAN_17	RP-020558	128	-	Correction of UE SFN-SFN type 1 measurement	5.0.0	5.1.0
21/12/02	RAN_18	RP-020842	131	1	Received Total Wide Band Power Measurement Definition	5.1.0	5.2.0

History

Document history		
V5.0.0	March 2002	Publication
V5.1.0	September 2002	Publication
V5.2.0	December 2002	Publication