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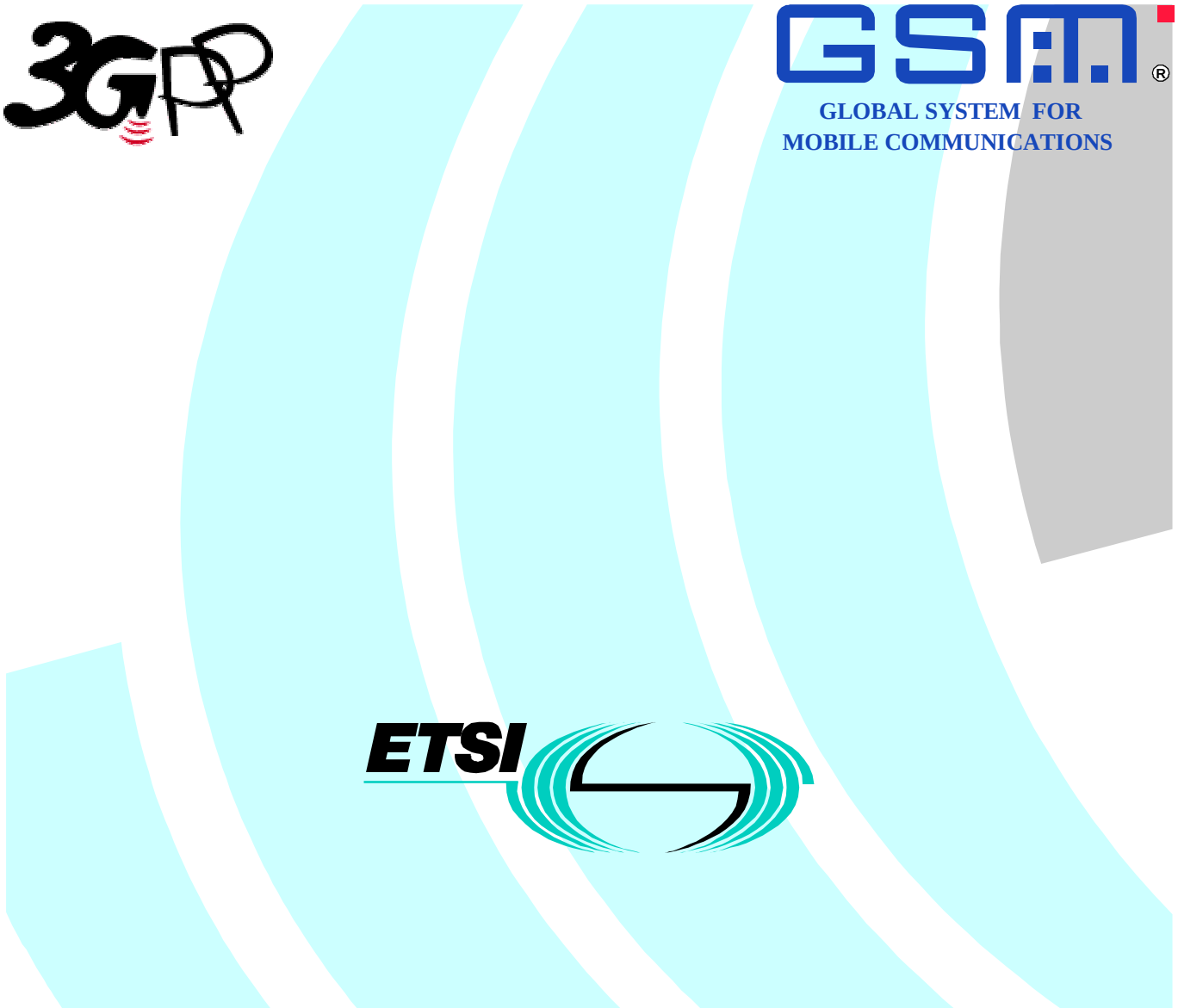
Technical Specification

**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
High Speed Circuit Switched Data (HSCSD) - Stage 2
(3GPP TS 23.034 version 3.3.0 Release 1999)**



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Foreword

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Contents

Foreword 4
1 Scope 5
2 References 5
3 Definitions 6
4 Main concepts 6
4.1 HSCSD service aspects 7
4.2 HSCSD service aspects in Iu mode 8
4.2.1 UMTS to GSM handover 8
5 HSCSD architecture and transmission 8
5.1 Air interface 8
5.2 Functions and information flows 9
5.2.1 Call establishment procedures 9
5.2.1.1 Mobile originated call establishment 9
5.2.1.2 Mobile terminated call establishment 11
5.2.2 Handover procedures 12
5.2.2.1 Intra BSC handover 12
5.2.2.2 Inter BSC, intra-MSC handover 13
5.2.2.3 Inter MSC handover 14
5.2.3 Resource upgrading, downgrading and configuration change 14
5.2.4 User initiated service level up- and downgrading 16
5.2.5 Link adaptation for ECSD 16
5.2.6 Start of ciphering 16
5.3 Transparent data transmission 17
5.3.1 Numbering of data substreams 17
5.3.2 Padding 17
5.4 Non-Transparent data transmission 17
5.4.1 HSCSD RLP 17
5.5 Interworking 17
5.6 Subscription aspects and storage of subscriber data 17
6 Charging 18
6.1 General principles 18
6.2 Call forwardings 18
6.3 AoC and toll ticketing 18
Annex A: Change history 19

Foreword

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

The present document specifies the Stage 2 description of High Speed Circuit Switched Data (HSCSD) within the 3GPP system.

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1 Scope

The present document contains the stage 2 service description for a High Speed Circuit Switched Data (HSCSD) on GSM/GERAN. HSCSD utilizes the multislot mechanism, i.e. using multiple traffic channels (/bearers) for the communication. In Iu mode one bearer can provide all needed data rates, and the multislot mechanism is therefore not needed. The Iu mode aspects concerning HSCSD are described exclusively in subclause 4.2.

In analogy with ITU-T Recommendations I.130 [6] (refer to annex A) and with reference of ITU-T Recommendations VI.1 Q.65 [7] (Stage 2 of the method for characterization of services supported by an ISDN), the second stage of the HSCSD is defined as follows.

Stage 2 identifies the functional capabilities and information flows needed to support the service as described in High Speed Circuit Switched Data (HSCSD) - Stage 1, TS 22.034 [9]. Furthermore, it identifies various possible physical locations for the functional capabilities. The output of Stage 2, which is signalling system independent, is used as an input to Stage 3, the design of signalling system and switching Recommendations.

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 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[1a] 3GPP TS 21.905: "3G Vocabulary for 3GPP Specifications".

[2] 3GPP TS 05.02: "Digital cellular telecommunications system (Phase 2+); Multiplexing and multiple access on the radio path".

[3] 3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core Network Protocols - Stage 3".

[4] 3GPP TS 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile-services Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

[5] 3GPP TS 24.022: "Radio Link Protocol (RLP) for data and telematic services on the Mobile Station - Base Station System (MS - BSS) interface and the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[6] ITU-T Recommendation I.130: "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[7] ITU-T Recommendation Q.65: "Stage 2 of the method for the characterization of services supported by an ISDN".

[8] ITU-T Recommendation I.460: "Multiplexing, rate adaptation and support of existing interfaces".

[9] 3GPP TS 22.034: "High Speed Circuit Switched Data (HSCSD) - Stage 1".

[10] 3GPP TS 03.20: "Digital cellular telecommunications system (Phase 2+); Security related network functions".

[11] 3GPP TS 04.21: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Mobile Station - Base Station System (MS - BSS) Interface".

[12] 3GPP TS 08.20: "Digital cellular telecommunications system (Phase 2+); Rate adaption on the Base Station System - Mobile-services Switching Centre (BSS - MSC) interface".

[13] 3GPP TS 27.002: "Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities".

[14] 3GPP TS 27.003: "Terminal Adaptation Functions (TAF) for services using synchronous bearer capabilities".

[15] 3GPP TS 05.08: "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control".

[16] 3GPP TS 23.008: "Organisation of subscriber data".

[17] 3GPP TS 04.18: "Mobile radio interface layer 3 specification, Radio Resource Control Protocol".

3 Definitions

GERAN: GSM/EDGE radio access network
HSCSD: High Speed Circuit Switched Data
HSCSD configuration: multislot configuration consisting of one or several full rate traffic channels for data transmission
HSCSD channel: full rate traffic channel belonging to a HSCSD configuration
main channel: only channel in a HSCSD configuration carrying an FACCH
symmetric configuration: configuration consisting of bi-directional channels
asymmetric configuration: configuration consisting of bi-directional channels and at least one uni-directional channel
For further GSM abbreviations see 3GPP TS 01.04 [1].

4 Main concepts

The air interface user rate in the original GSM data transmission is limited to 9.6 kbps with the 12 kbps air interface rate. The HSCSD described in the present document Stage 2 description allows higher air interface user rates to be used for transparent and non-transparent data services.

NOTE: In this document the term "air interface user rate" corresponds to the transfer rate in radio interface for user data and "air interface rate" includes additional data related to transmission protocols.

HSCSD is a feature enabling the co-allocation of multiple full rate traffic channels (TCH/F) into a HSCSD configuration. The aim of HSCSD is to provide a mixture of services with different air interface user rates by a single physical layer structure. Further improvements in data rates are achieved through enhancement of the radio interface (modulation and coding schemes), which allows higher bit rates per one GSM time slot. The available capacity of a HSCSD configuration is several times the capacity of a TCH/F, leading to a significant enhancement in the air interface data transfer rate.

Figure 1 represents the network architecture to support GSM HSCSD based on the concept of multiple independent channels in one HSCSD configuration. In case when enhanced modulation is used the number of time slots in the radio interface may not correspond to the number of data streams in the network side, for example a 28.8 kbps service may be offered through one air interface time slot, but it requires two 14.4 (16 kbps) Abis channels. Another example is bit transparent 56/64 kbps service where two air interface time slots of 32 kbps are multiplexed onto one 64 kbps data stream on the network side.

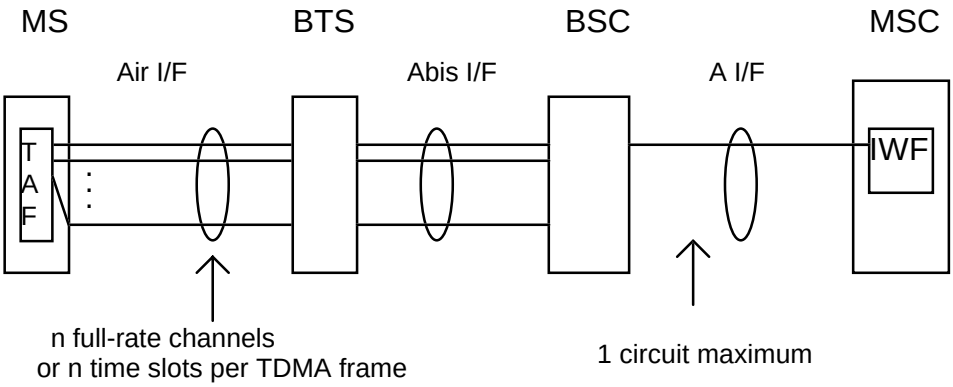


Figure 1: Network architecture for supporting HSCSD

A new functionality is introduced at the network and MS to provide the functions of combining and splitting the data into separate data streams which will then be transferred via n channels at the radio interface, where n = 1, 2, 3, ... 8. Once split, the data streams shall be carried by the n full rate traffic channels, called HSCSD channels, as if they were independent of each other, for the purpose of data relay and radio interface L1 error control, until to the point in the network where they are combined. However, logically the n full rate traffic channels at the radio interface belong to the same HSCSD configuration, and therefore they shall be controlled as one radio link by the network for the purpose of cellular operations, e.g. handover. This requires a new functionality in BSS.

The different user data substreams carried on the radio channels (one substream being the data flow over a single TCH) shall be mapped over the A interface, and vice versa, following the rules defined in 3GPPTS 24.008 [3] and 3GPP TS 08.20 [8].

On the A and E interfaces, the use of resources is restricted to one 64 kbps circuit by multiplexing the data streams into one A interface circuit (see ITU-T Recommendation I.460 [8]).

4.1 HSCSD service aspects

At call setup a user indicates a maximum number of TCH/F, acceptable channel codings (including extensions to acceptable channel codings for ECSD channel codings), possible other modem type, and fixed network user rate values. For non-transparent HSCSD connection, in addition, wanted air interface user rate is indicated and the network resource needs, if user wishes to make use of the user initiated modification of the maximum number of TCH/F and/or wanted air interface user rate (user initiated service level up- and downgrading described in subclause 5.2.4) during the call. In case the indicated acceptable channel coding(s) implies that enhanced modulation is possible, the user may indicate a preference for channel coding asymmetry, i.e. downlink biased channel coding asymmetry, uplink biased channel coding asymmetry or channel coding symmetry. Together these parameters describe the HSCSD characteristics and network uses them to allocate an appropriate HSCSD connection.

For both transparent and non-transparent HSCSD connections the call can be established with any number of TCH/F from one up to the maximum number of TCH/F, i.e. the minimum channel requirement is always one TCH/F.

If the wanted air interface user rate requirement cannot be met using a symmetric configuration, an asymmetric configuration can be chosen. The network shall in this case give priority to fulfilling the air interface user rate requirement in downlink direction.

For non-transparent HSCSD connection the network can use dynamic allocation of resources, i.e. TCH/F, as long as the configuration is not in contradiction with the limiting values defined by the MS and the mobile equipment is capable of handling the allocated channel configuration. For transparent HSCSD connection the dynamic resource allocation is applicable, if the air interface user rate is kept constant. The change of channel configuration within the limits of minimum and maximum channel requirements is done with resource upgrading and resource downgrading procedures (described in subclause 5.2.3) during the call.

The MS may request a service level up- or downgrading during the call, if so negotiated in the beginning of the call. In the user initiated modification procedure, the user can modify the channel coding asymmetry preference when enhanced modulation is indicated. This modification of channel requirements and/or wanted air interface user rate and/or channel coding asymmetry preference is applicable to non-transparent HSCSD connections only.

4.2 HSCSD service aspects in Iu mode

The multislot mechanism is not needed in Iu mode, as one bearer can provide all needed data rates. In Iu mode, consequently the parameters required for setup of a multislot call are not needed in a call setup, and the MSC shall ignore the parameters.

The parameters which are specific to multislot are (all contained in the Bearer Capability Information Element):

- Maximum number of traffic channels.
- Acceptable Channel coding(s).
- UIMI, User initiated modification indication.
- Acceptable Channel Codings extended.

4.2.1 UMTS to GSM handover

In case of handover from UMTS to GSM the multislot parameters are required in the middle of an ongoing call. A dual mode mobile station shall therefore always include the multislot parameters in the setup, also in Iu mode.

5 HSCSD architecture and transmission

5.1 Air interface

The HSCSD configuration is a multislot configuration using the TCH/F data channel mapping described in 3GPP TS 05.02 [2].

Two types of HSCSD configurations exist, symmetric configuration and asymmetric configuration. For both types of configurations the channels may be allocated on either consecutive or non-consecutive time slots taking into account the restrictions defined by the classmark.

An example of the HSCSD operation with two consecutive time slots is shown in figure 2.

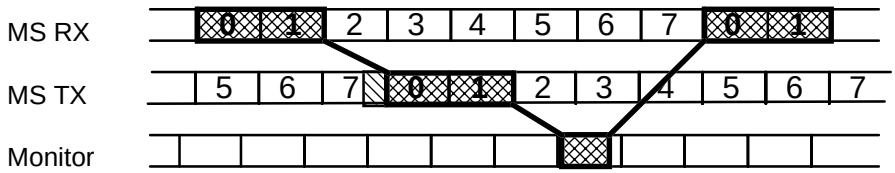


Figure 2: Double slot operation in the air interface

A symmetric HSCSD configuration consists of a bi-directional FACCH and co-allocated bi-directional TCH/F and SACCH channels. An asymmetric HSCSD configuration consists of a bi-direction FACCH and co-allocated uni-directional or bi-directional TCH/F and SACCH channels. A bi-directional channel is a channel on which the data is transferred in both uplink and downlink directions. On uni-directional channels for HSCSD the data is transferred in downlink direction, only.

In both symmetric and asymmetric HSCSD configurations one bi-directional channel, the main channel, carries a FACCH used for all the signalling not carried on the SACCH(s).

For HSCSD configuration all SACCHs are synchronized so that idle frames for each time slot coincide.

The classification of mobile stations used for HSCSD shall be based on Multislot classes, described in detail in 3GPP TS 05.02 [2]. Further classification shall be based on the Mobile Station Classmark depending on the supported modulations.

The same frequency hopping sequence and training sequence is used for all the channels in the HSCSD configuration.

The same channel coding is used for all the channels in the HSCSD configuration, though in the enhanced modulation mode, for non-transparent services, it is possible to have one channel coding used in the downlink and another channel coding used in the uplink. Different channel codings for up- and downlink could be applied in three cases, see 22.034:

a) If the mobile station only supports enhanced modulation in the downlink direction.

b) If the mobile station supports enhanced modulation in both directions, but the user indicates preference for uplink or downlink biased channel coding asymmetry.

c) If the mobile station supports enhanced modulation in both directions, and the user indicates preference for channel coding symmetry, but the link conditions justifies different channel coding in uplink or downlink.

For Mobile Stations supporting 8-PSK modulation additional channel codings shall apply. The change between different TCH/F channel codings can be provided with RR Channel Mode Modify or Configuration Change procedure. It shall be possible to change between channel codings of different modulation schemes.

In symmetric HSCSD configuration individual signal level and quality reporting for each HSCSD channel is applied.

For an asymmetric HSCSD configuration individual signal level and quality reporting is used for those channels, which have uplink SACCH associated with them. The quality measurements reported on the main channel are based on the worst quality measured among the main and the uni-directional downlink time slots used.

In both symmetric and asymmetric HSCSD configuration the neighbouring cell measurement reports are copied on every uplink channel used. See 3GPP TS 05.08 [15] for more detail on signal level and quality reporting.

Separate ciphering keys are used for each HSCSD channels. The ciphering keys used on different channels are derived from the Kc. See 3GPP TS 03.20 [10] for more details.

5.2 Functions and information flows

The procedures discussed in this subclause follow the procedures described in detail in 3GPP TS 08.08 [4] and 3GPP TS 24.008 [3]. Modifications are referred with text in brackets and conditional procedures with dashed line. Normal signalling or signalling presented earlier in the document is drawn with ovals.

5.2.1 Call establishment procedures

5.2.1.1 Mobile originated call establishment

Figure 3 depicts the procedures for a successful HSCSD call establishment in mobile originated case.

The Multislot class is sent from MS to network using the early classmark sending.

At the call setup the mobile station sends a set of parameters describing the HSCSD characteristics to the network. These parameters and their presence in the Setup message in transparent (T) and non-transparent (NT) calls are as follows:

- Other Modem Type, OMT (T/NT).
- Fixed Network User Rate, FNUR (T/NT).
- Acceptable Channel Codings, ACC (including ACC ext.) (T/NT).
- maximum number of traffic channels, Max TCH/F (T/NT).
- User Initiated Modification Indication, UIMI (NT).
- wanted Air Interface User Rate, AIUR (NT),and
- channel coding ASYMmetry indication, ASYM (NT).

In reply the network responds in Call Proceeding with the Other Modem Type, OMT, Fixed Network User Rate, FNUR, and User Initiated Modification Indication, UIMI (NT only), parameters it is prepared to give to the mobile station.

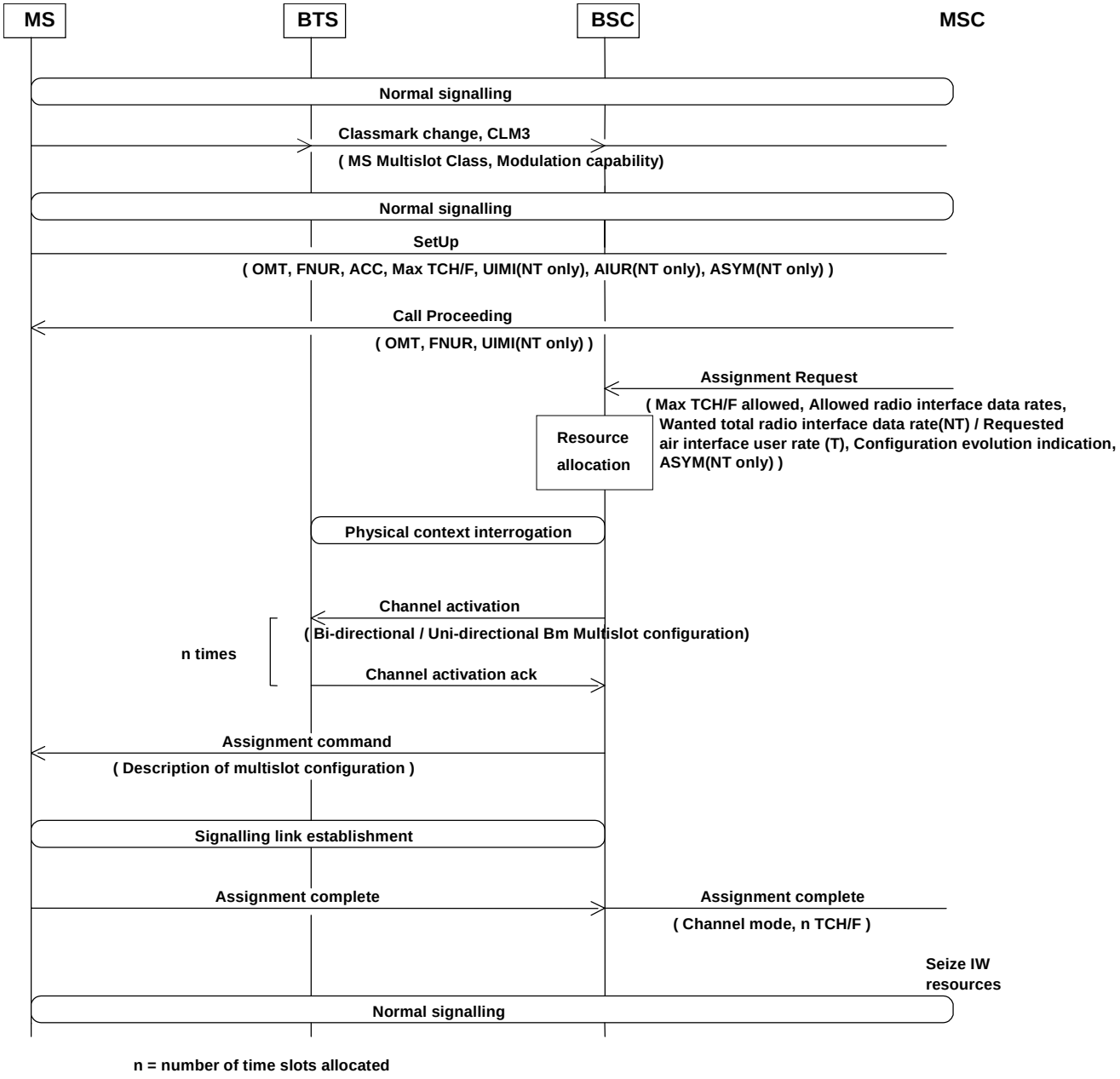


Figure 3: Mobile originated call establishment

The MSC requests the BSC to allocate the channel configuration using parameters derived from the HSCSD related parameters agreed in the setup phase. Based on these parameters and operator preferences the BSC then allocates a suitable number of channels and a suitable channel coding for the connection.

The following rule for the channel allocation apply:

- The BSS shall try to reach but not exceed, with one exception, the wanted AIUR. The exception is the case when the chosen configuration can reach the wanted AIUR with lower number of TCH/F, e.g. in case AIUR=14.4 kbit/s, max number of TCH/F=3, ACC=TCH/F4.8 and TCH/F9.6, the network shall choose 2x9.6 over 3x4.8 if the TCH/F9.6 is available in the cell.

- A separate channel activation is applied for each of the HSCSD channels before the selected channel configuration with information of the channel coding is forwarded to the mobile station. When the preference for downlink or uplink biased channel coding asymmetry is indicated by the user, and an asymmetric channel coding connection is set up based on this indication, the BSC shall always assign a TCH/F14.4 channel on the unbiased link of the connection.

- At assignment completion, the BSS informs the MSC of the chosen HSCSD configuration and the MSC may seize the IW resources accordingly.

5.2.1.2 Mobile terminated call establishment

Figure 4 depicts the procedures for a successful HSCSD call establishment in mobile terminated case.

At the call setup the network sends the Other Modem Type,OMT, Fixed Network User Rate,FNUR, and User Initiated Modification Indication,UIMI (NT only), parameters to the mobile station.

In reply the mobile station responds to the network with the set of parameters describing the HSCSD characteristics. These parameters and their presence in the Call Confirmed message in transparent (T) and non-transparent (NT) calls are as follows:

- wanted Other Modem Type, OMT (T/NT);
- wanted Fixed Network User Rate, FNUR (T/NT);
- Acceptable Channel Codings, ACC (including ACC ext.) (T/NT);
- maximum number of traffic channels, Max TCH/F (T/NT);
- User Initiated Modification Indication, UIMI (NT);
- wanted Air Interface User Rate, AIUR (NT),and
- channel coding ASYMmetry indication, ASYM (NT).

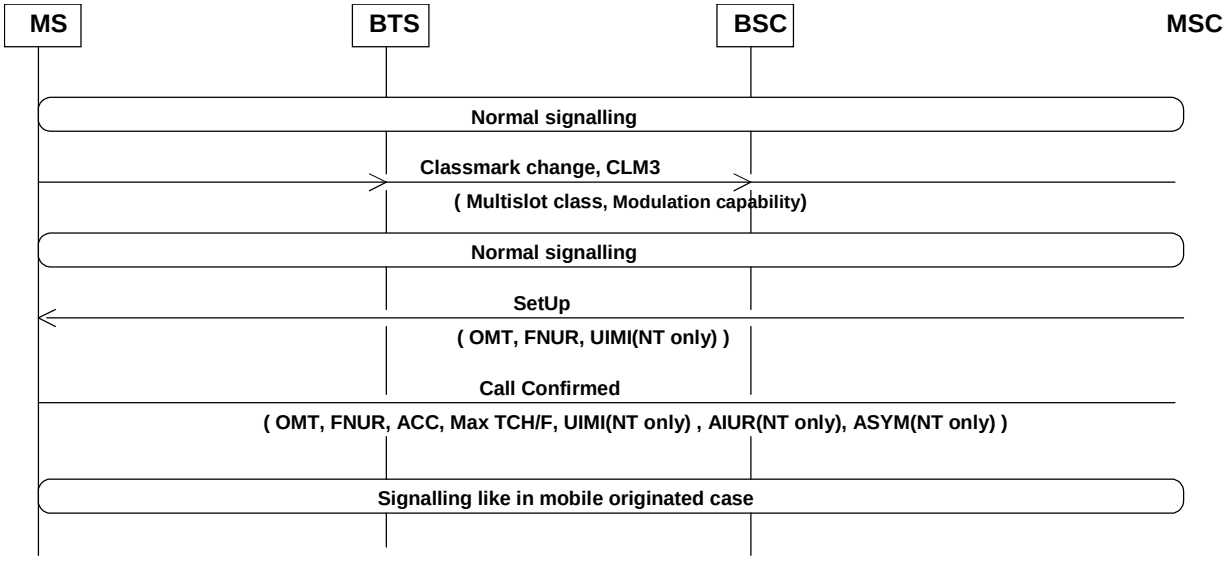


Figure 4: Mobile terminated call establishment

The MSC requests the BSC to allocate the channel configuration using parameters derived from the HSCSD related parameters agreed in the setup phase. Based on these parameters and operator preferences the BSC then allocates a suitable number of channels and a suitable channel coding for the connection.

The same channel allocation rules as in mobile originated case apply.

The same channel activation rules as in mobile originated case apply.

At assignment completion, the BSS informs the MSC of the chosen HSCSD configuration and the MSC may seize the IW resources accordingly.

5.2.2 Handover procedures

5.2.2.1 Intra BSC handover

Figure 5 depicts the procedures for a successful HSCSD intra BSC handover.

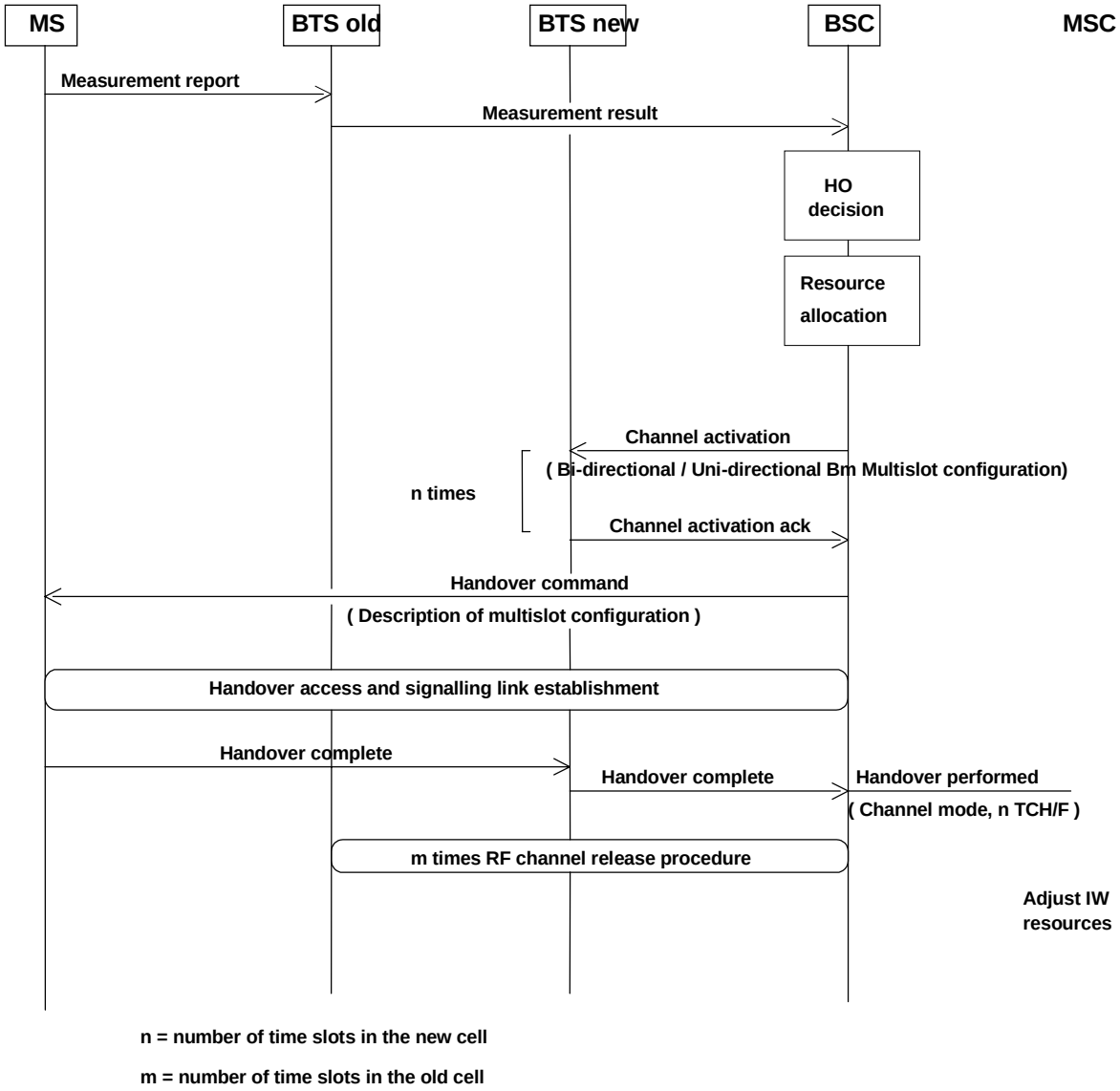


Figure 5: Intra BSC handover

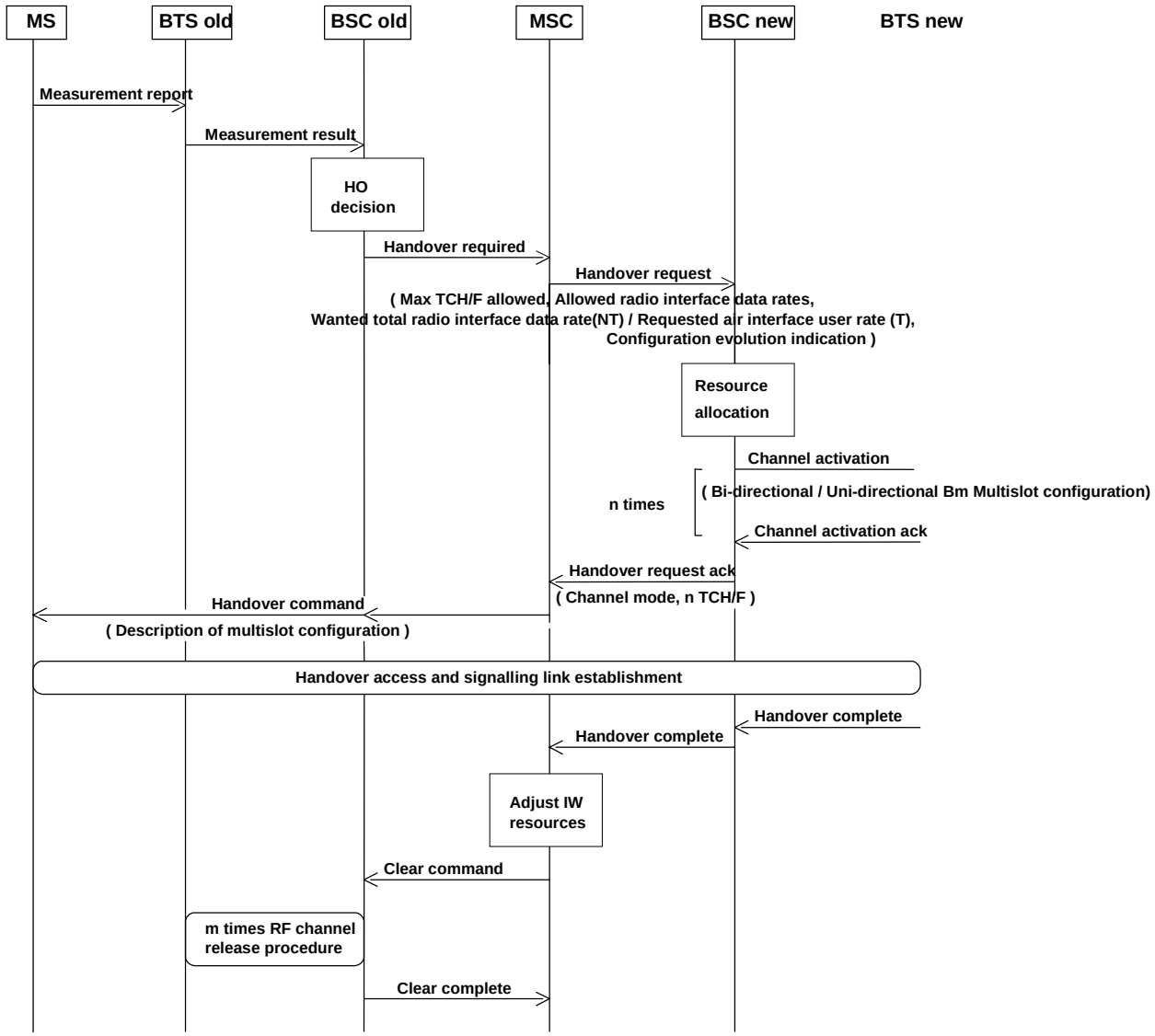
For a non-transparent call, the HSCSD configuration may be modified during an intra BSS handover within the maximum number of TCH/F and channel codings acceptable for the user and allowed by the network.

The same allocation and activation rules as in call establishment apply.

At handover completion, the BSC signals to the MSC the new HSCSD configuration and the MSC may adjust the IW resources accordingly.

5.2.2.2 Inter BSC, intra-MSC handover

Figure 6 depicts the procedures for a successful HSCSD inter BSC handover.



n = number of time slots in the new cell

m = number of time slots in the old cell

Figure 6: Inter BSC intra MSC handover

In inter BSS handover the MSC requests the new BSS to allocate a channel configuration using parameters derived from the HSCSD related parameters agreed earlier during the call. Based on these parameters and operator preferences the BSC then allocates a suitable number of TCH/F and a suitable channel coding for the connection.

For a non-transparent call, the HSCSD configuration may be modified during an intra BSS handover within the maximum number of TCH/F and channel codings acceptable for the user and allowed by the network.

The same channel allocation and activation rules as in call establishment apply.

The BSC informs the MSC of the chosen HSCSD configuration and at handover completion the MSC may adjusts the IW resources accordingly.

5.2.2.3 Inter MSC handover

In inter MSC handover the requested channel configuration is forwarded to a BSS within the new MSC using MAP protocol between MSCs. Procedures similar to those in inter BSS handover case can be applied in order to establish the HSCSD connection in a new cell.

5.2.3 Resource upgrading, downgrading and configuration change

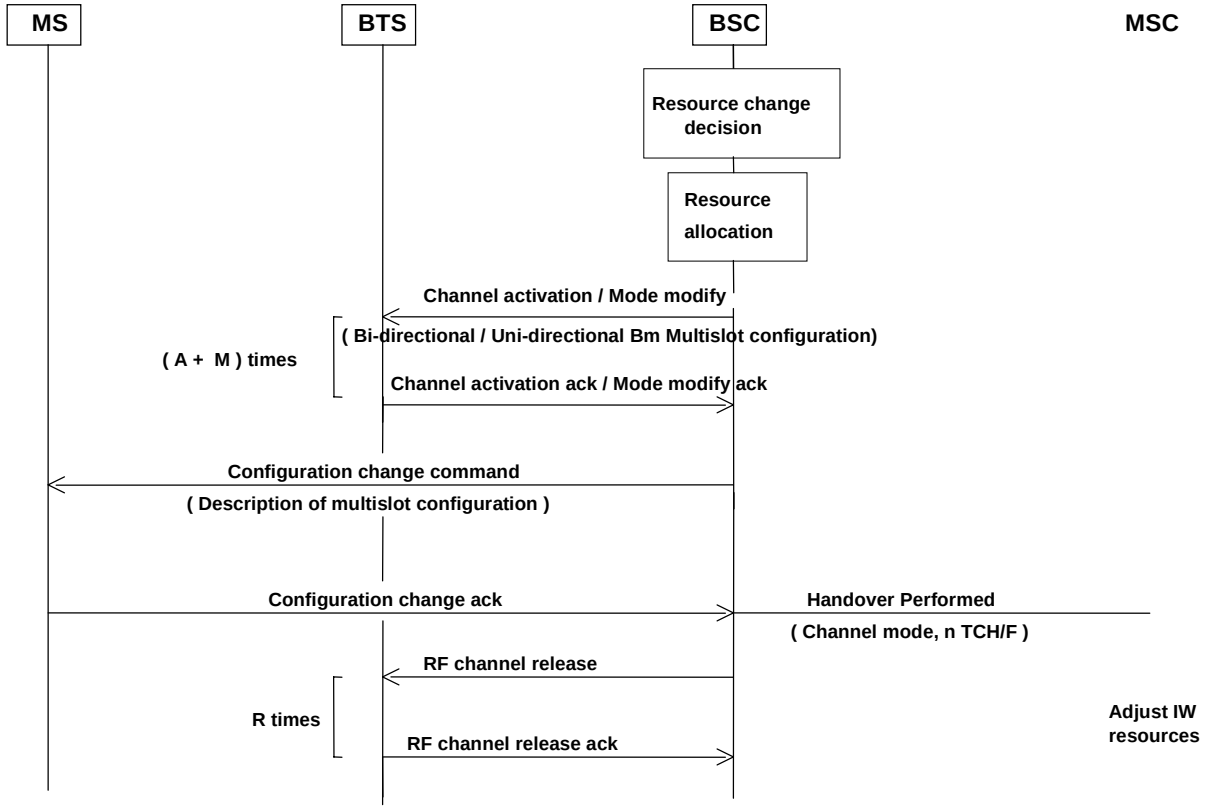
Resource upgrading means allocating more channels to the HSCSD configuration. Similarly, in resource downgrading channels are released.

Both of these procedures are initiated by the network and they are used in non-transparent calls to alter the channel resources between one TCH/F and the maximum number of TCH/F allowed. For transparent connection the alteration of resources is also applicable required that the AIUR for the connection remains constant.

Figure 7 depicts the procedures for a successful resource upgrading and downgrading for an ongoing HSCSD call, in case the position of the main TCH/F remains unchanged.

A separate channel activation for the new HSCSD channels is carried out and the earlier activated HSCSD channels may be modified, before RR Configuration change procedure is used for forwarding the new channel configuration to the mobile station. Similarly, the Configuration change procedure can be used in both transparent and non-transparent calls for reordering the channels in a call without changing the number of TCH/Fs allocated.

At resource modification completion, the BSC signals to the MSC the new HSCSD configuration and the MSC may adjusts the IW resources accordingly.



A = number of time slots added to the connection

R = number of time slots released from the connection

M = number of time slots modified

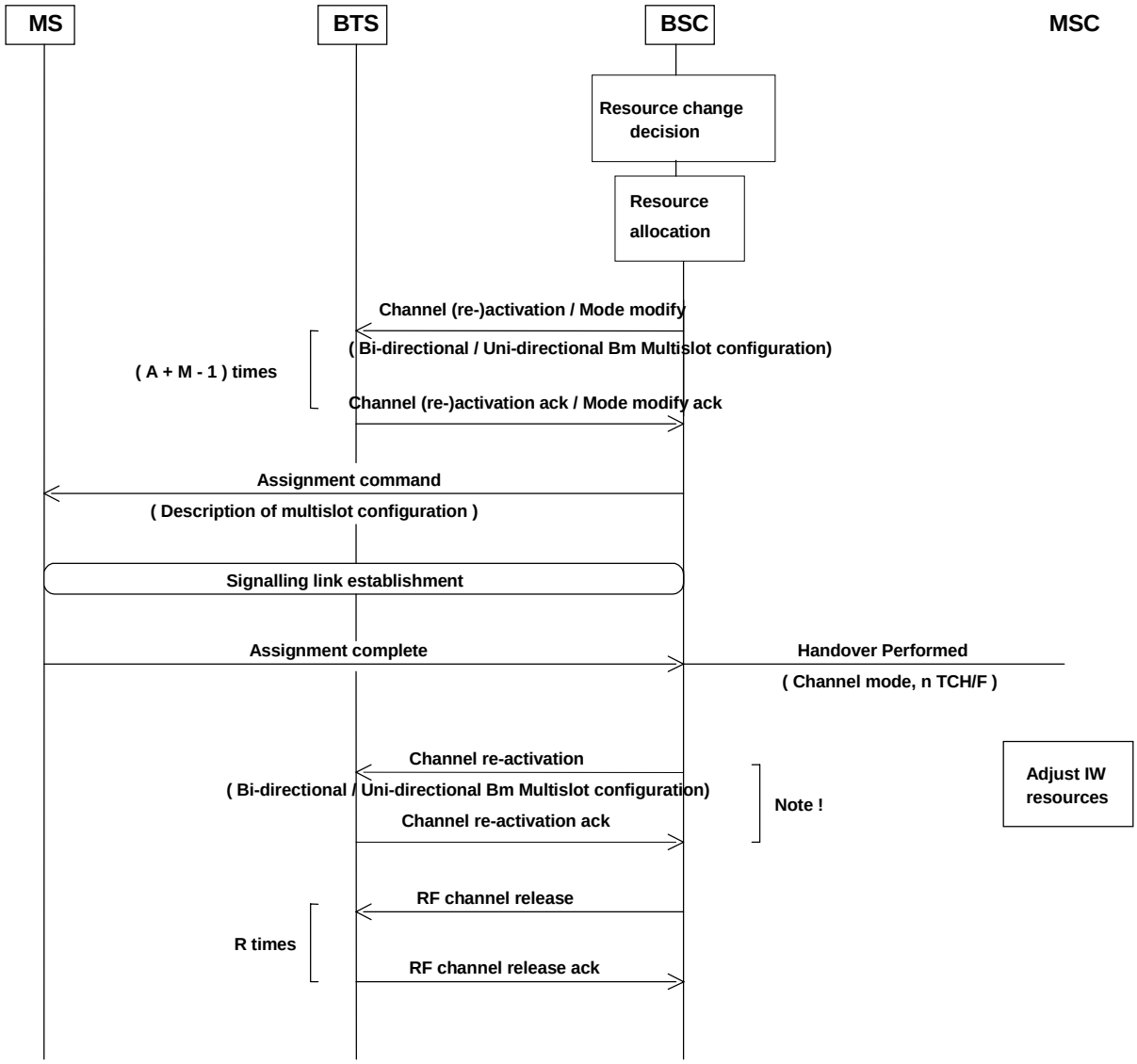
n = number of time slots after upgrading/downgrading

Figure 7: Resource upgrading and downgrading, the position of the main channel unchanged

Figure 8 depicts the procedures for a successful resource upgrading and downgrading for an ongoing HSCSD call in case the position of the main channel is changed.

A separate channel activation for the new HSCSD channels, is carried out and the earlier activated HSCSD channels may be modified or, in case of the new main channel, reactivated, before RR Assignment procedure is used for forwarding the new channel configuration to the mobile station. Similarly, the Assignment procedure can be used in both transparent and non-transparent calls for reordering the channels in a call without changing the number of TCH/Fs allocated.

At resource modification completion, the BSC signals to the MSC the new HSCSD configuration and the MSC may adjusts the IW resources accordingly.



NOTE: Deactivates the old signalling link by modifying the old main channel. The old main can not be modified before a new main has been established. If the time slot for the old main is not used in the new HSCSD configuration, RF channel release is used instead.

A = number of time slots added to the HSCSD connection

R = number of time slots released from the HSCSD connection

M = number of time slots modified or re-activated

n = number of time slots after upgrading/downgrading

Figure 8: Resource upgrading and downgrading, the position of the main channel changed

5.2.4 User initiated service level up- and downgrading

Figure 9 depicts the procedures for a successful user initiated service level up- and downgrading for on-going HSCSD call.

During a HSCSD call the user may request, if so indicated in the call setup, the network to change the current maximum number of traffic channels and air interface user rate parameters and/or channel coding asymmetry preference. This is done by using the CC User initiated service level up- and downgrading procedure.

If network allows the modification, the resulting new parameters are forwarded to BSC and the radio interface resources may be adjusted accordingly. The resource upgrading or downgrading is done separately from the change in HSCSD parameters. However, if a contradiction between the new parameters and the used air interface resources exists, the resource downgrading may be needed before the network acknowledges the new parameters.

The user initiated service level up- and downgrading is applicable in non-transparent mode connections, only.

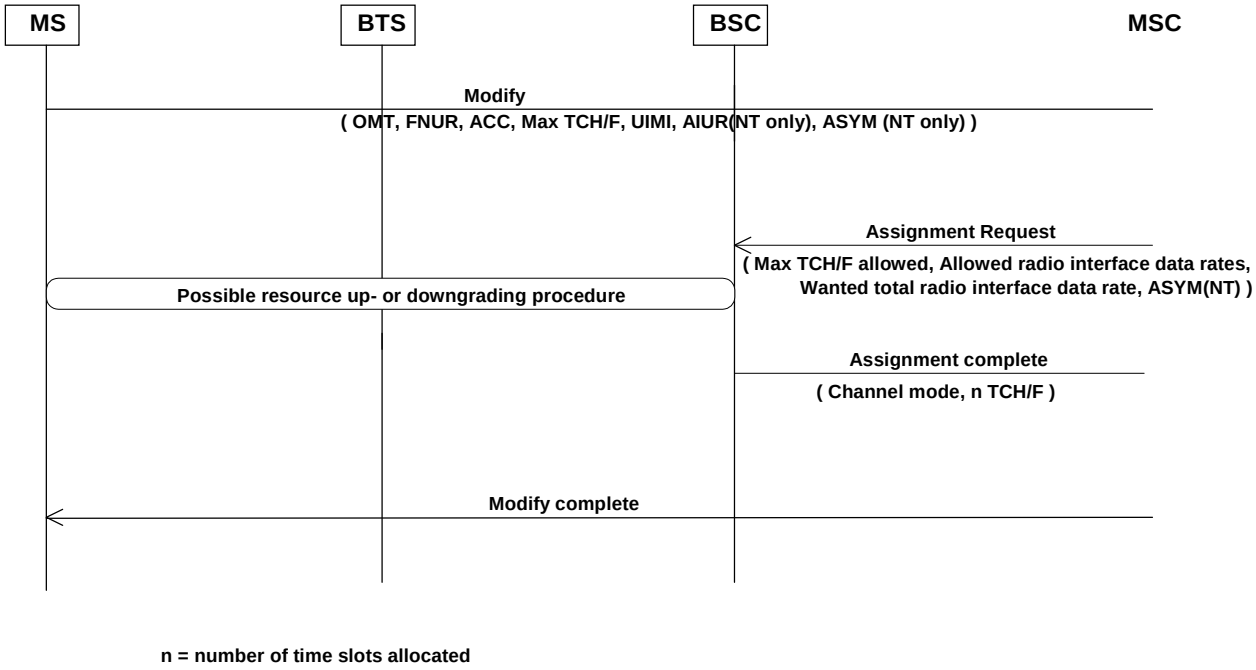


Figure 9: User initiated service level up- and downgrading

5.2.5 Link adaptation for ECSD

Link adaptation for ECSD particularly in high data rate call becomes essential in order to provide good enough service over large coverage areas. Signalling for link adaptation between channel coding schemes in 8-PSK modulation and between GMSK and 8-PSK coding schemes is done using existing signalling mechanisms, i.e. RR Channel Mode Modify procedure, intracell handover, etc. In performing link adaption between 8-PSK modulated channels, the normal Channel Mode (or the assignment or the intra-cell HO procedure) should be used and in case of link adaptation between 8-PSK modulated channels and GMSK modulated channels the assignment procedure or the intra-cell handover should be used.

5.2.6 Start of ciphering

In order to start ciphering, the RR Encryption procedure is controlled by the main signalling link, only. The encryption information for secondary HSCSD channel is forwarded to the corresponding TCH/F in initial channel activation or later in the channel reactivation or Mode modify message.

The change of ciphering modes for separate channels within the HSCSD connection might not be perfectly synchronized.

5.3 Transparent data transmission

5.3.1 Numbering of data substreams

In transparent data transmission the V.110 data frames on the HSCSD channels carry data substream numbers to retain the order of transmission over GSM, between the split/combine functions. Between these functions a channel internal multiframing is also used in order to increase the tolerance against inter channel transmission delays. Depending on the location of the access point to external networks the split/combine functionality is located in the BSS or in the IWF on the network side, and at the mobile station.

A detailed description of the numbering scheme is given in 3GPP TS 04.21 [12].

5.3.2 Padding

HSCSD also supports user rates which are not multiples of rates provided by one TCH/F.

If the selected user rate requires n TCH/F channels but is less than the total rate that can be achieved with these n TCH/F then in the first n-1 channels the data frames carry user data on all D bits. In the n th channel the unneeded D bits of the V.110 frames are padded with fill bits.

5.4 Non-Transparent data transmission

5.4.1 HSCSD RLP

Non-transparent mode of HSCSD is realized by modifying the RLP and L2R functions to support multiple parallel TCH/Fs instead of only one TCH/F (figure 9a). In addition the RLP frame numbering is increased to accommodate the enlarged data transmission rate.

The detailed specification of the RLP is given in 3GPP TS 24.022 [5], and L2R is defined in 3GPP TS 27.002 [13] and 3GPP TS 27.003 [14].

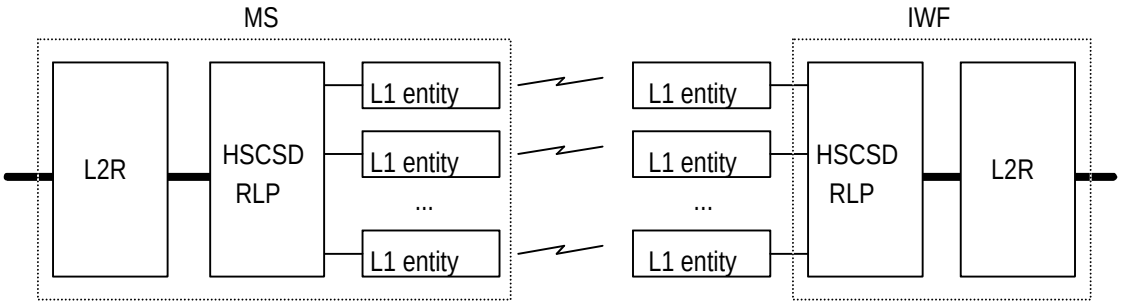


Figure 9a: The HSCSD concept in non-transparent mode

5.5 Interworking

Interworking of HSCSD will be arranged to all the services to which interworking is provided in the existing GSM-system; these services are PSTN, ISDN, CSPDN and PSPDN.

5.6 Subscription aspects and storage of subscriber data

The HSCSD uses general bearer services defined in 02 series specifications. No HSCSD related subscriber data is stored in HLR or VLR with the exception of the bearer capability allocation (see 3GPP TS 23.008 [16]).

6 Charging

6.1 General principles

The A party is liable for the usage of all TCH/F in her PLMN. The B party may have to pay for one or more TCH/F in her PLMN. In case the originating or terminating subscriber is in the PSTN there is no additional charge for them.

6.2 Call forwardings

The A party is liable for the leg A-B. The B party who forwards the call to the forwarded-to subscriber (C party) is liable for the primary (basic) channel on the leg B-C. Forwarded-to (C party) is liable for the usage of one or more TCH/F in her PLMN.

6.3 AoC and toll ticketing

MSC will send the modified e-parameters to the MS, both in MO and in MT calls, every time the charging rate will change. This can happen when:

- the coding on the air interface channel is changed;
- the number of TCH/F allocated is increased or decreased;

during an existing HSCSD data call and when AoC supplementary service is activated.

Appropriate information concerning these changes have to also be included in the charging record (toll ticket).

Annex A:
Change history

Change history								
TSG CN#	**Spec**	**Version**	**CR**	**Rev.**	**Rel.**	**New Version**	**Subject**	**Comment**
Apr 1999	GSM 03.34							Transferred to 3GPP CN1
CN#03	23.034					3.0.0		Approved at CN#03
CN#5	23.034	3.0.0	001	2	R99	3.1.0	CR to 23.034 due to asymmetry for ECSD	V3.1.1 was to correct the implementation of this CR
CN#7	23.034	3.1.1	003	2	R99	3.2.0	Modifications to Stage 2 service description due to EDGE	
CN#7	23.034	3.1.1	004	1	R99	3.2.0	Support of high speed data in UMTS/UTRAN	

TSGN	TSGN-number	WG Number	Spec	CR	Rev	Rel	Cat	Old vers	New ver	Title	WI	Notes
NP-10	NP-000674	N1-001321	23.034	005		R99	F	3.2.0	3.3.0	Terminology corrections	TEI	

History

Document history		
V3.1.1	January 2000	Publication
V3.2.0	March 2000	Publication
V3.3.0	December 2000	Publication