3GPP TSG CN Plenary Meeting #18 **NP-020570**
4th - 6th December 2002. New Orleans, USA.

Source: **TSG CN WG 1**

Title: **CRs to Rel-5 on Work Item TEI5 towards 23.034, 24.008, 24.011, 43.068 and 43.069**

Agenda item: **8.8**

Document for: **APPROVAL**

Introduction:

This document contains **5** CRs, **Rel-5** Work Item **"TEI5"**, that have been agreed by **TSG CN WG1**, and are forwarded to TSG CN Plenary meeting #18 for approval.

Spec	CR #	Rev	CAT	Rel	Tdoc Title	Meeting	TDoc #	C_Version
23.034	007	3	F	Rel-5	Introduction of GERAN Iu-mode	N1-27	N1-022427	5.0.0
24.008	698		F	Rel-5	Inclusion of EDGE RF Power Capability in the CM3 IE	N1-26	N1-021997	5.5.0
24.011	024	2	F	Rel-5	SMS over GPRS disabled	N1-27	N1-022498	5.0.0
43.068	008	1	F	Rel-5	MS late entry notification	N1-27	N1-022428	5.1.0
43.069	007	1	F	Rel-5	MS late entry notification	N1-27	N1-022429	5.1.0

3GPP TSG-CN1 Meeting #27 ***Tdoc N1-022429***
Bangkok, Thailand, 11 – 15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **43.069** **CR** **0078** ⌘ **rev** **1** ⌘ Current version: **5.10.01** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	MS late entry notification
Source:	⌘	Nortel Networks
Work item code:	⌘	TEI5
Date:	⌘	Oct. 31, 2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	During establishment of a railway emergency call, ASCI capable mobiles engaged in an other call receive a notification on the FACCH about this call. When a railway emergency call is ongoing in an area and an user moves into this area via handover (engaged into an other call), this notification on FACCH is not provided.
Summary of change:	⌘	The technical solution of MS late entry notification is described
Consequences if not approved:	⌘	The open issue will still be opened. The requirement will never be fulfilled.

Clauses affected:	⌘	11.3.1.3

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments:	⌘	

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2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

11.3.1.3 Notification procedures

Different notification procedures shall be applied in relation to the mode of the mobile station as presented in table 1 and defined in the following clauses.

Table 1: Overview on different information messages for new or on-going calls

call type: / MS states:	broadcast call	point-to-point call
Idle mode	(section a)	(standard paging)
group receive mode	(section b)	(section c)
dedicated mode	(section b)	(standard Call Waiting) (note)
NOTE: Only for point to point calls with certain restrictions as defined in 3GPP TS 22.083.		

b) Notification for mobile stations in group receive, group transmit or dedicated mode

In addition to sending initial notification messages on the NCH for the voice broadcast call, the BSS can provide initial notification into on-going voice broadcast, group calls, and point to point calls informing mobile stations partaking in these calls of new voice broadcast calls that are being set-up in the cell.

NOTE 2: The additional notification into on-going voice broadcast, group calls and point to point calls should be provided by the BSS if the priority level of the new call is equal or higher than the O&M defined priority level.

In order to do this the BSS sends initial notification messages on FACCH to all on-going voice broadcast, group calls, and point to point calls in the cell. The initial notification message on FACCH shall contain the broadcast call reference, the priority level if eMLPP applies and possibly the TCH description which allows the mobile station to connect directly to the new call without reading the NCH.

An indication of change of notifications in the current cell may be provided on SACCH by the BSS.

As a mobile station option, the mobile station may read the NCH of the current cell while in group receive, group transmit or dedicated mode in order to be notified on other voice broadcast calls.

NOTE 3: Mobile stations may require an additional receiver to read the NCH in order to ensure a higher probability of receiving notifications for all present voice broadcast calls without degradation of the received speech quality.

If a mobile station in group transmit or dedicated mode (including call setup phase) is moving to or roaming in an area where a voice broadcast call with priority level 0 is on-going, the BSS shall resend the notification message to the mobile station on FACCH, if the mobile station has ASCI capabilities.

If a mobile station in group receive mode is moving to a cell where a voice broadcast call with priority level 0 is on-going, the mobile station shall read the full NCH of the new cell.

3GPP TSG-CN1 Meeting #27
Bangkok, Thailand, 11 – 15 November 2002

Tdoc N1-022427
(rev of Tdoc N1-022238)

CR-Form-v7

CHANGE REQUEST

⌘ **23.034** **CR** **007** ⌘ **rev** **3** ⌘ Current version: **5.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [X]

Title:	⌘	Introduction of GERAN Iu-mode
Source:	⌘	Siemens AG
Work item code:	⌘	TEI5
Date:	⌘	04.11.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	HSCSD needs to be supported also in GERAN Iu mode.
Summary of change:	⌘	
Consequences if not approved:	⌘	Stage 2 specification for the support of HSCSD in GERAN Iu mode is missing.

Clauses affected:	⌘	all

	Y	N			
Other specs affected:	X		Other core specifications	⌘	23.910, 27.001, 29.007
		X	Test specifications		
		X	O&M Specifications		

Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

Contents

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.

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:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document contains the stage 2 service description for a High Speed Circuit Switched Data (HSCSD) on GSM/GERAN in A/Gb mode and Iu mode. HSCSD utilizes the multislot mechanism, i.e. using multiple traffic channels (/bearers) for the communication.

Additionally, the present document specifies some HSCSD related requirements for multi system mobile stations operating in UTRAN Iu mode. In UTRAN Iu mode one bearer can provide all needed data rates, and the multislot mechanism is therefore not needed. However, for inter-system handover to GERAN, certain information has to be provided by the mobile station during the service negotiation. The UTRAN Iu mode aspects concerning HSCSD are described exclusively in clause 4.2.

In analogy with ITU-T Recommendation I.130 [6] (refer to annex A) and with reference of ITU-T Recommendation Q.65 [7] VI.1 (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 3GPP 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] Void.

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

[2] 3GPP TS 45.002: "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 48.008: "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)".

[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: "The unified functional methodology for the characterization of services and network capabilities".

[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 43.020: "Security related network functions".

[11] 3GPP TS 44.021: "Rate adaption on the Mobile Station - Base Station System (MS - BSS) Interface".

[12] 3GPP TS 48.020: "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 45.008: "Radio Subsystem Link Control".

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

[17] 3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol".

[18] 3GPP TS 43.051: "GSM/EDGE Radio Access Network; Overall description - Stage 2".

[19] 3GPP TS 25.413: "UTRAN Iu interface RANAP Signalling".

[20] 3GPP TS 25.415: "UTRAN Iu interface user plane protocols".

[21] 3GPP TS 44.118: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) Protocol, Iu Mode".

[22] 3GPP TS 29.415: "Core Network Nb Interface User Plane Protocols".

[23] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[24] 3GPP TS 33.102: "3G Security; Security Architecture".

3 Definitions

For the purposes of the present document, the following terms and definitions apply:

A/Gb mode: mode of operation of the MS when connected to the Core Network via GERAN and the A and/or Gb interfaces.

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

Iu mode: mode of operation of the MS when connected to the Core Network via GERAN or UTRAN and the Iu interface. When preceded by the word GERAN or UTRAN, it means access over the Iu interface using the respective radio access network.

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

UTRAN: UMTS radio access network

For further GSM abbreviations see 3GPP TR 21.905 [1a].

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 the present 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 in A/Gb mode based on the concept of multiple independent channels in one HSCSD configuration. Figure 1a represents the network architecture to support HSCSD in GERAN Iu mode.

NOTE: 3GPP TS 43.051 [18] does not specify the GERAN internal interface between BSC and BTS.

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 kbps to 64 kbps service where two air interface time slots of 32 kbps are multiplexed onto one 64 kbps data stream on the network side.

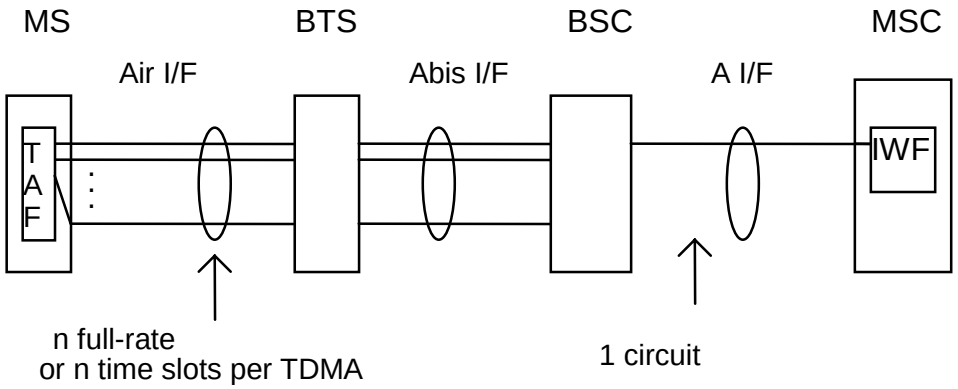


Figure 1: Network architecture for supporting HSCSD in A/Gb mode

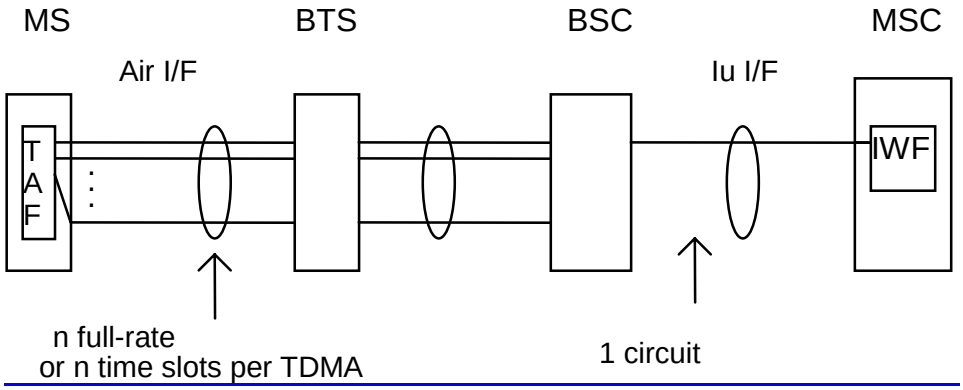


Figure 1a: Network architecture for supporting HSCSD in GERAN Iu mode

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 or GERAN Iu interface, and vice versa, following the rules defined in 3GPP TS 24.008 [3] and 3GPP TS 48.020 [12].

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

In GERAN Iu mode, the user plane at the Iu interface shall comply to the Iu UP protocol (3GPP TS 25.415 [20]). For transparent calls the Iu user plane is operated in transparent mode, version 1, for non-transparent calls it is operated in support mode for predefined SDU sizes, version 2.

After an inter-MSC SRNS relocation the user plane between the anchor MSC or MGW and the target MSC or MGW shall comply to

- the Iu UP protocol (3GPP TS 25.415 [20]), if both MSCs are connected via an ATM interface; and
- the Nb UP protocol (3GPP TS 29.415 [22]), if both MGWs are connected via an ATM interface or IP interface.

If both MSCs are connected via a TDM interface the use of resources on the E interface is restricted to one 64 kbps circuit (see 3GPP TS 29.007 [23]).

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 subclauses 5.2.4 and 5.2.4a) 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 subclauses 5.2.3 and 5.2.3a) 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 UTRAN Iu mode

The multislot mechanism is not needed in UTRAN Iu mode, as one bearer can provide all needed data rates. In UTRAN 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 UMTSUTRAN Iu mode to GSMGERAN Iu mode or A/Gb mode handover

In case of handover from UMTSUTRAN Iu mode to GSMGERAN Iu mode or A/Gb mode the multislot parameters are required in the middle of an ongoing call. A dual mode multi system mobile station supporting UTRAN Iu mode and at least one GERAN mode shall therefore always include the multislot parameters in the setup, also in UTRAN 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 45.002 [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.

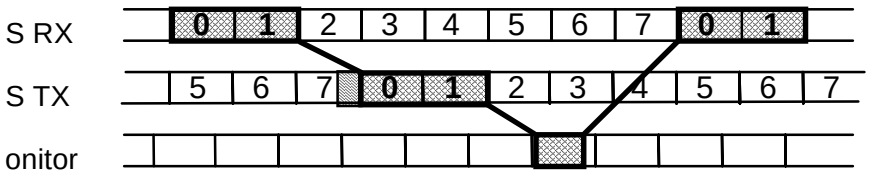


Figure 2: Double slot operation in the air interface

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 45.002 [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 3GPP TS 22.034 [9]:

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 in A/Gb mode with the RR Channel Mode Modify or the Configuration Change procedure, and in GERAN Iu mode with the Radio Bearer Reconfiguration 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 45.008 [15] for more detail on signal level and quality reporting.

In A/Gb mode, ~~S~~separate ciphering keys are used for each HSCSD channels. The ciphering keys used on different channels are derived from the Kc. See 3GPP TS 43.020 [10] for more details. In GERAN Iu mode, the same ciphering architecture is used as in UTRAN Iu mode. See 3GPP TS 43.051 [18] and 3GPP TS 33.102 [24] for more details.

5.2 Functions and information flows

The procedures discussed in this clause follow the procedures described in detail in 3GPP TS 48.008 [4], 3GPP TS 23.413 [19], 3GPP TS 23.415 [20], 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.

NOTE: 3GPP TS 43.051 [18] does not specify the GERAN internal interface between BSC and BTS. For the information flows in this document it is assumed that the protocols and procedures on this interface follow the conventions for the Abis interface, however, this is only an implementation option.

5.2.1 Call establishment procedures

5.2.1.1 Mobile originated call establishment (A/Gb mode)

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

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.

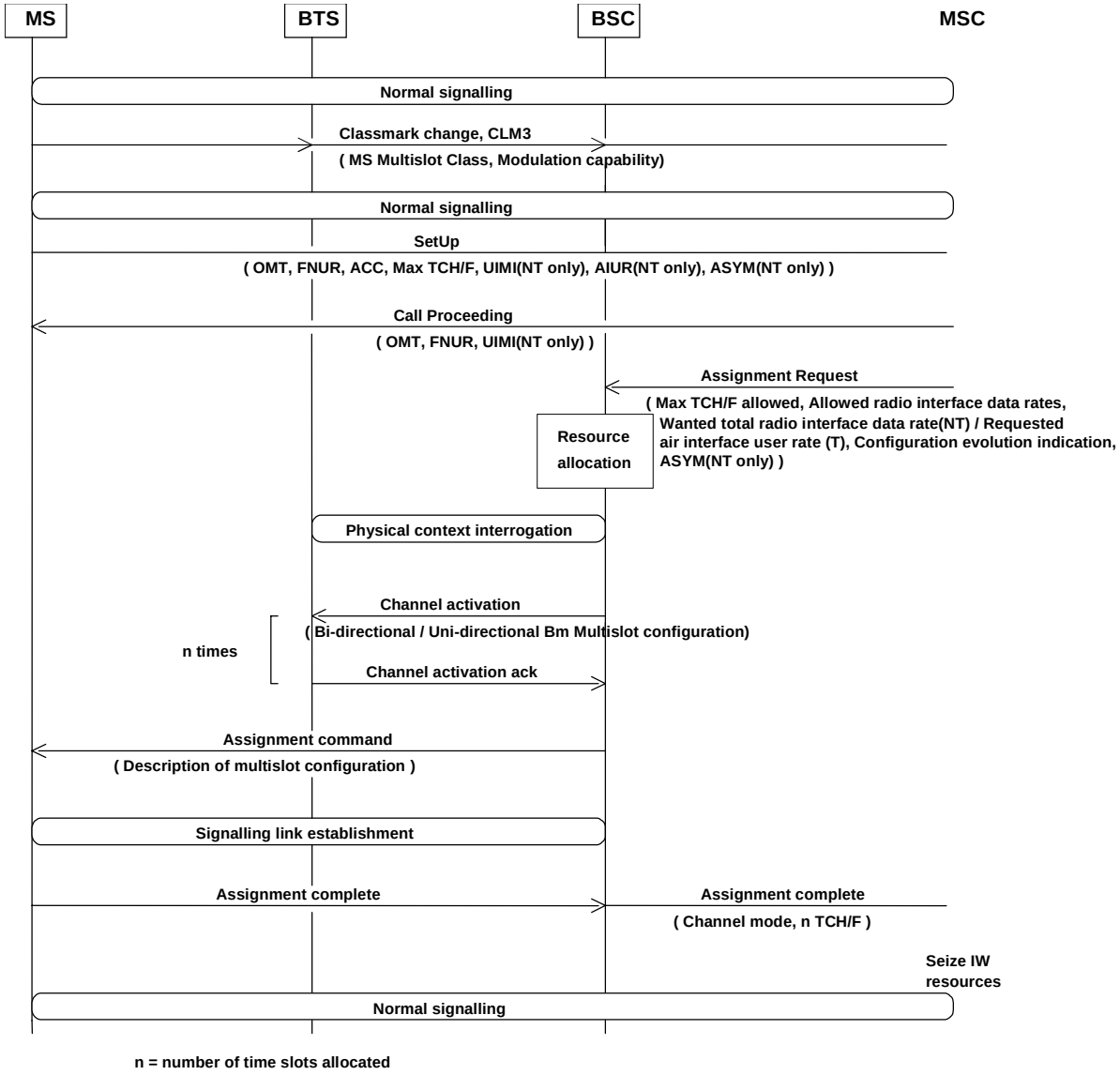


Figure 3: Mobile originated call establishment (A/Gb mode)

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 2 x 9,6 over 3 x 4,8 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.

5.2.1.1a Mobile originated call establishment (GERAN Iu mode)

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

The MS GERAN Iu mode radio access capabilities, including the multislot capabilities of the MS, are sent from the MS to the network during the establishment of the RRC connection.

The BSC includes the GERAN classmark in the RANAP Initial UE message to inform the MSC about the BSS capabilities of the serving cell:

- Acceptable Channel Codings, ACC (including ACC ext.); and
- maximum number of traffic channels, Max TCH/F.

The parameters in the Setup message and their presence requirements for transparent (T) and non-transparent (NT) calls are the same as for A/Gb mode, however, for non-transparent calls in GERAN Iu mode the channel coding asymmetry indication will be ignored. When negotiating the parameters for a transparent call, the MSC shall take the GERAN classmark into account.

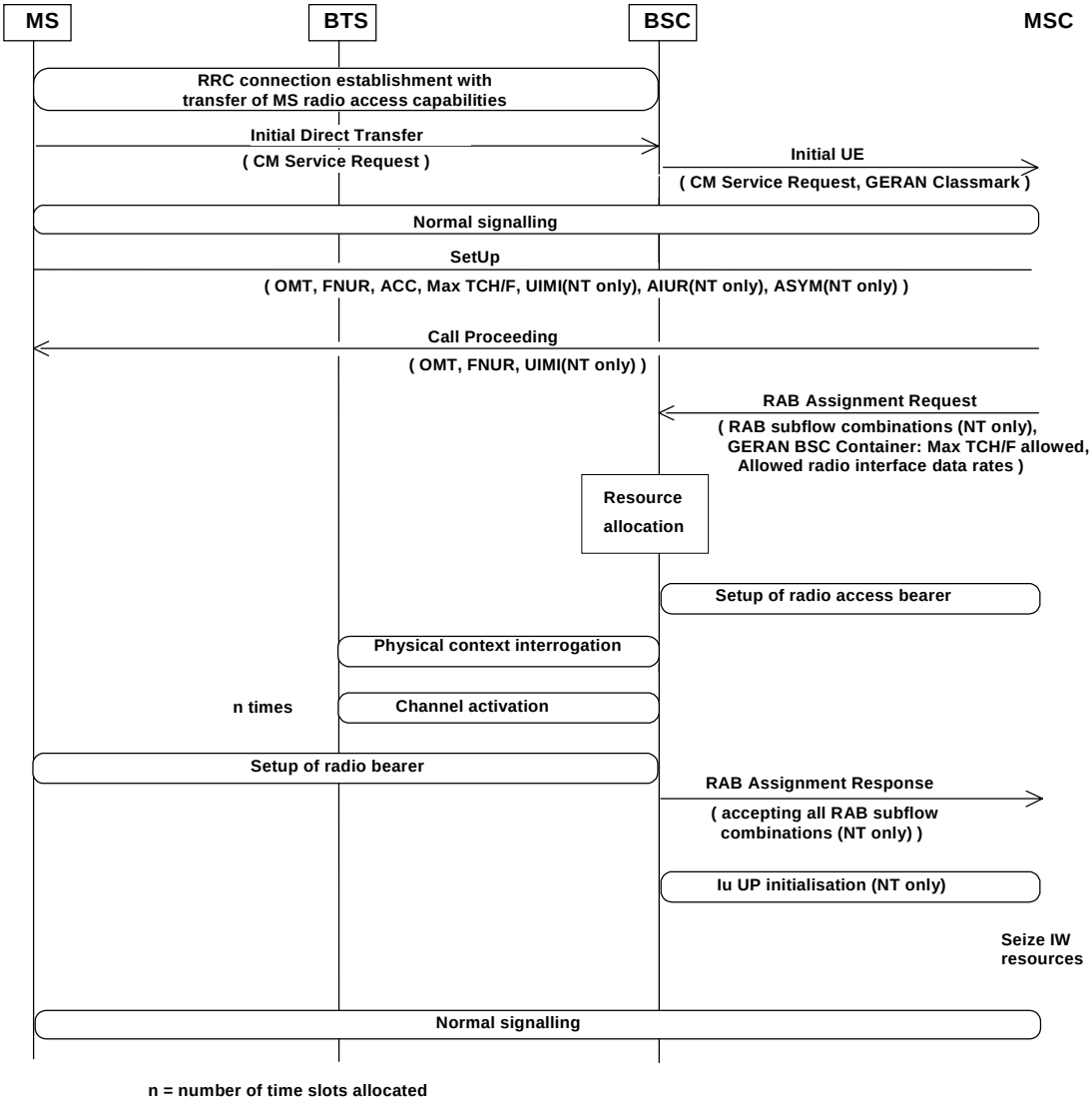


Figure 3a: Mobile originated call establishment (GERAN Iu mode)

The MSC requests the BSC to allocate a radio access bearer by sending a RANAP RAB Assignment Request message. The RAB parameters in this message are set according to the parameters negotiated between MS and MSC and the GERAN classmark of the serving cell. For non-transparent calls the RAB parameters contain the description of all RAB subflow combinations allowable for the maximum bit rate at the Iu interface, and thus for the maximum possible AIUR that can be allocated by the BSC for this call.

Additionally, the MSC includes a GERAN BSC container, indicating the Max TCH/F allowed and the Allowed radio interface data rates. In this version, the MSC shall indicate only one radio interface data rate as allowed.

Based on these parameters and operator preferences the BSC then allocates a suitable number of channels for the allowed channel coding.

After the successful setup of the radio access bearer, for non-transparent calls the BSC initiates the Iu user plane protocol. In the Iu UP initialisation message the first RAB subflow combination proposed in the list of RAB subflow combinations indicates the RAB subflow combination and thus the AIUR to be used by the IW function when starting the communication phase (see 3GPP TS 25.415 [20]). The BSC shall use the same RAB subflow combination in uplink direction.

5.2.1.2 Mobile terminated call establishment (A/Gb mode)

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

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).

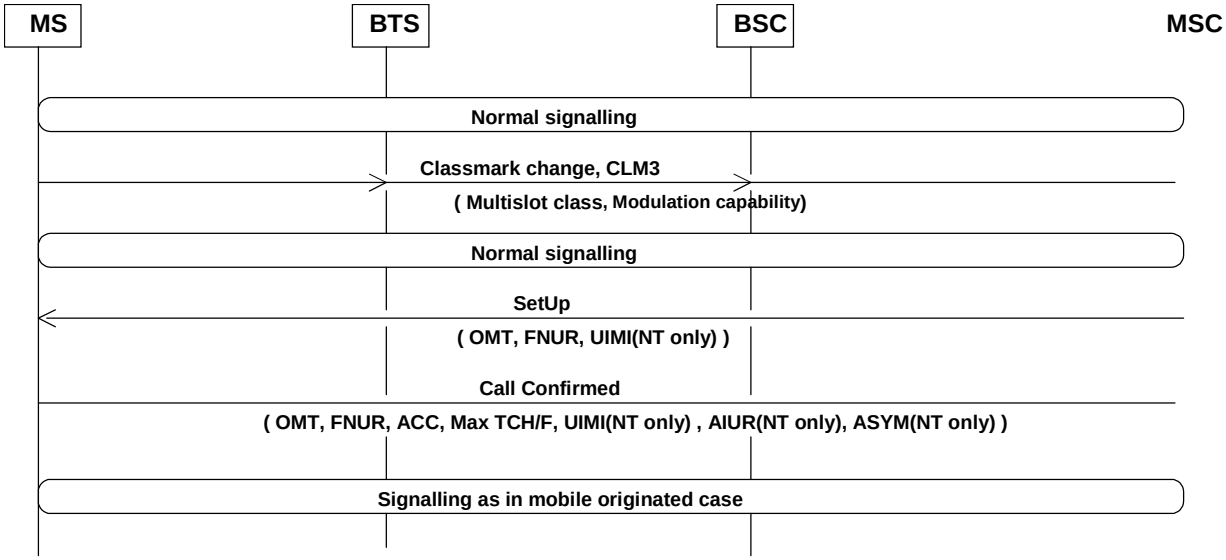


Figure 4: Mobile terminated call establishment (A/Gb mode)

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.

5.2.1.2a Mobile terminated call establishment (GERAN Iu mode)

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

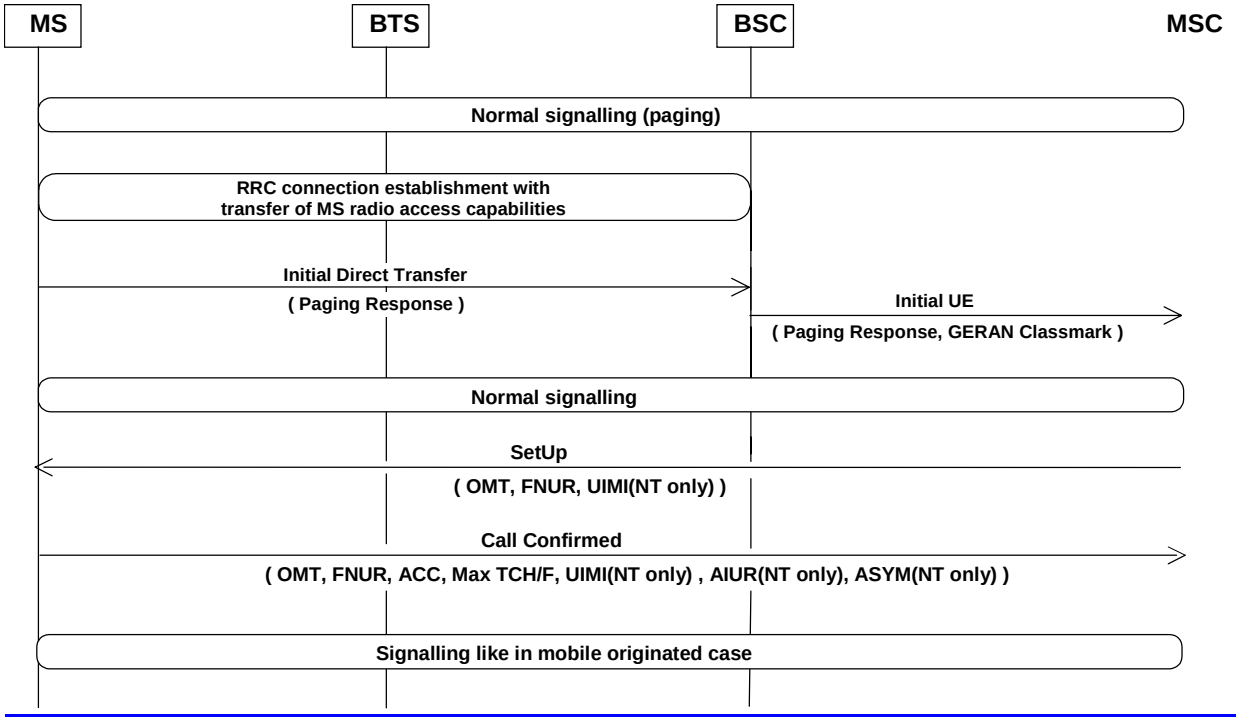


Figure 4a: Mobile terminated call establishment (GERAN Iu mode)

For the Setup message and the Call Confirmed message the same rules apply as in A/Gb mode.

The signalling for the setup of the radio bearer and the radio access bearer, and the initialisation of the Iu user plane (NT only) is as in the mobile originated case.

5.2.2 Handover procedures

5.2.2.1 Intra BSC handover (A/Gb mode)

Figure 5 depicts the procedures for a successful HSCSD intra BSC handover in A/Gb mode.

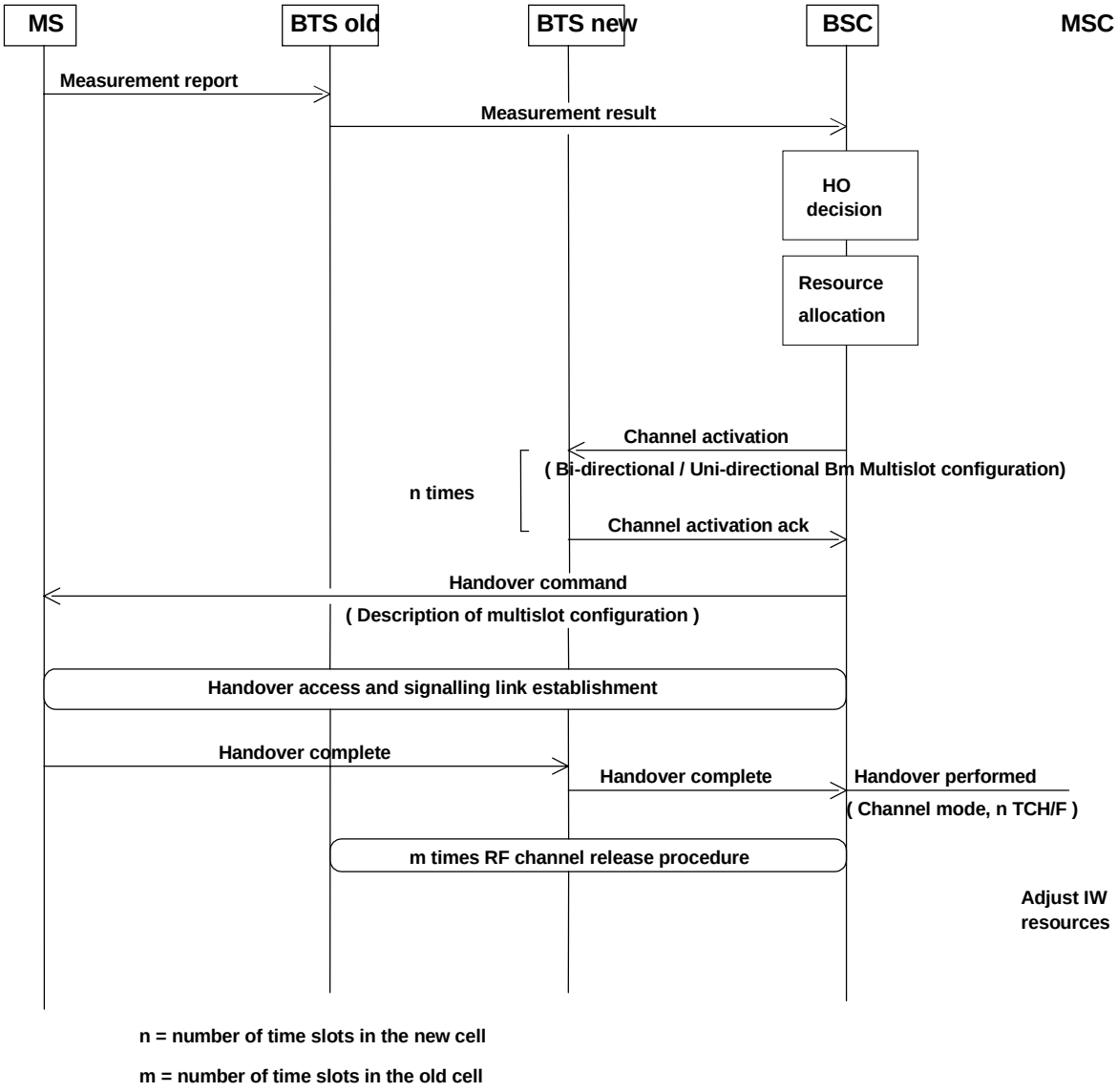


Figure 5: Intra BSC handover (A/Gb mode)

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.

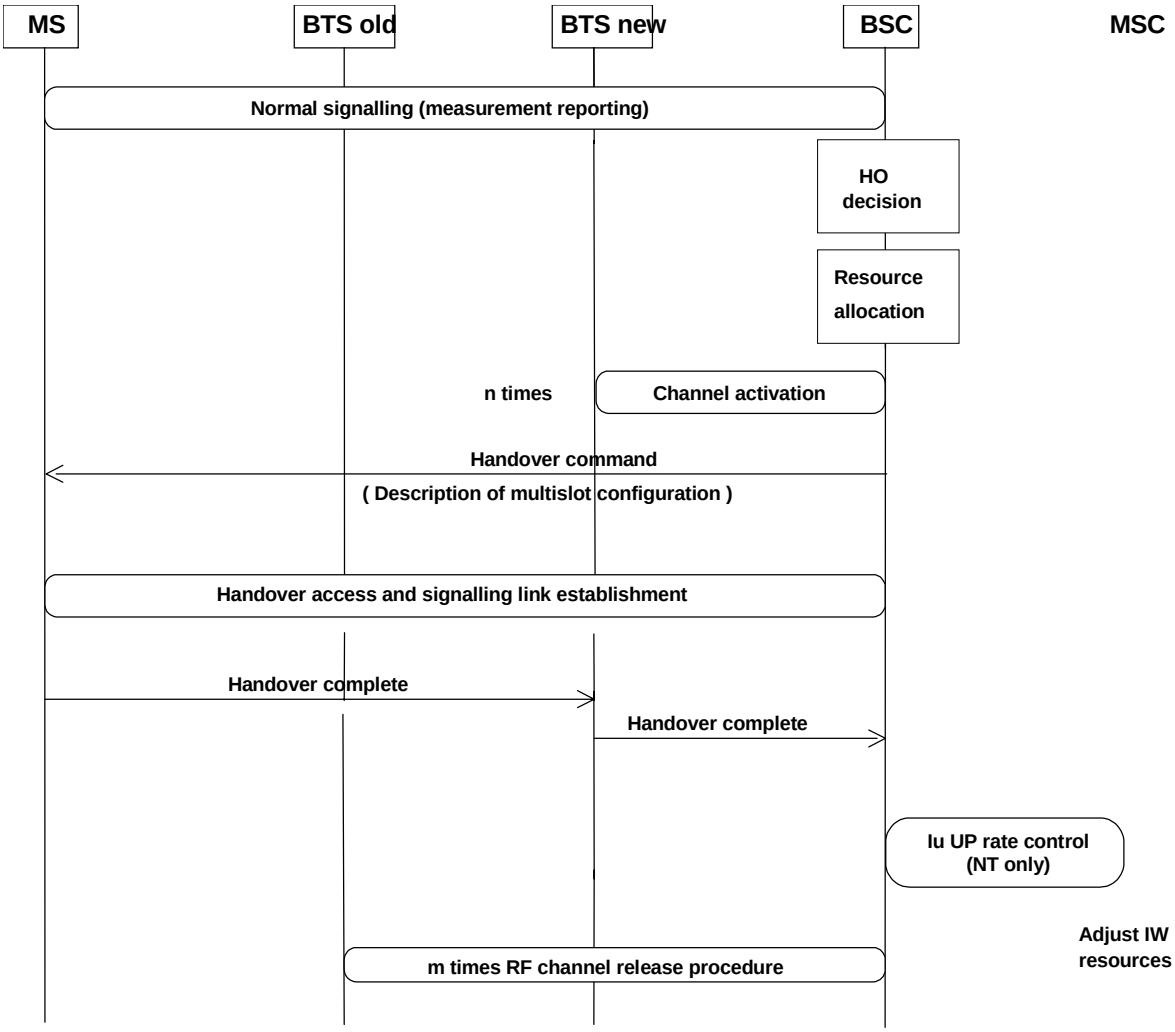
5.2.2.1a Intra BSC handover (GERAN Iu mode)

Figure 5a depicts the procedures for a successful HSCSD intra BSC handover in GERAN Iu mode.

For a non-transparent call in GERAN Iu mode, the HSCSD configuration may be modified during an intra BSS handover within the maximum number of TCH/F acceptable for the user and allowed by the network. The outcome of the handover shall be reported to the MSC by means of an Iu UP rate control procedure (see 3GPP TS 25.415 [20]). The

BSC shall set the maximum rate permitted downlink over the Iu interface according to the new HSCSD configuration, i.e. according to the AIUR to be used by the IW function when the communication is resumed after the handover. The BSC shall use the same RAB subflow combination in uplink direction.

For a transparent call in GERAN Iu mode, the AIUR remains unchanged during the handover. Since the payload format at the Iu interface only depends on the AIUR, the IW resources do not need to be readjusted.



n = number of time slots in the new cell

m = number of time slots in the old cell

Figure 5a: Intra BSC handover (GERAN Iu mode)

5.2.2.2 Inter BSC, intra-MSC handover (A/Gb mode)

Figure 6 depicts the procedures for a successful HSCSD inter BSC handover in A/Gb mode.

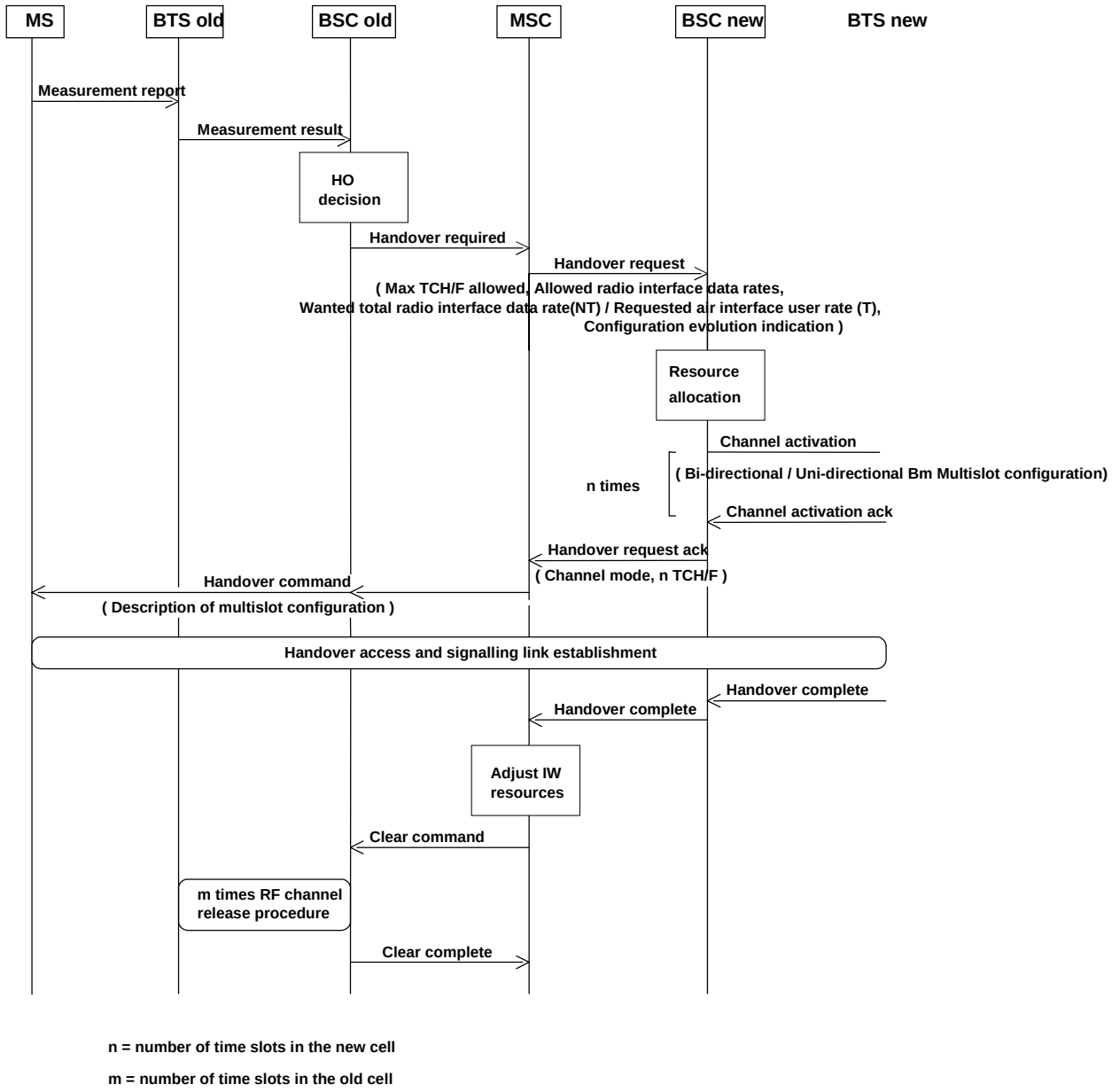


Figure 6: Inter BSC intra MSC handover (A/Gb mode)

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.

5.2.2.2a Inter BSC, intra-MSC handover (GERAN Iu mode)

Figure 6a depicts the procedures for a successful HSCSD inter BSC handover in GERAN Iu mode.

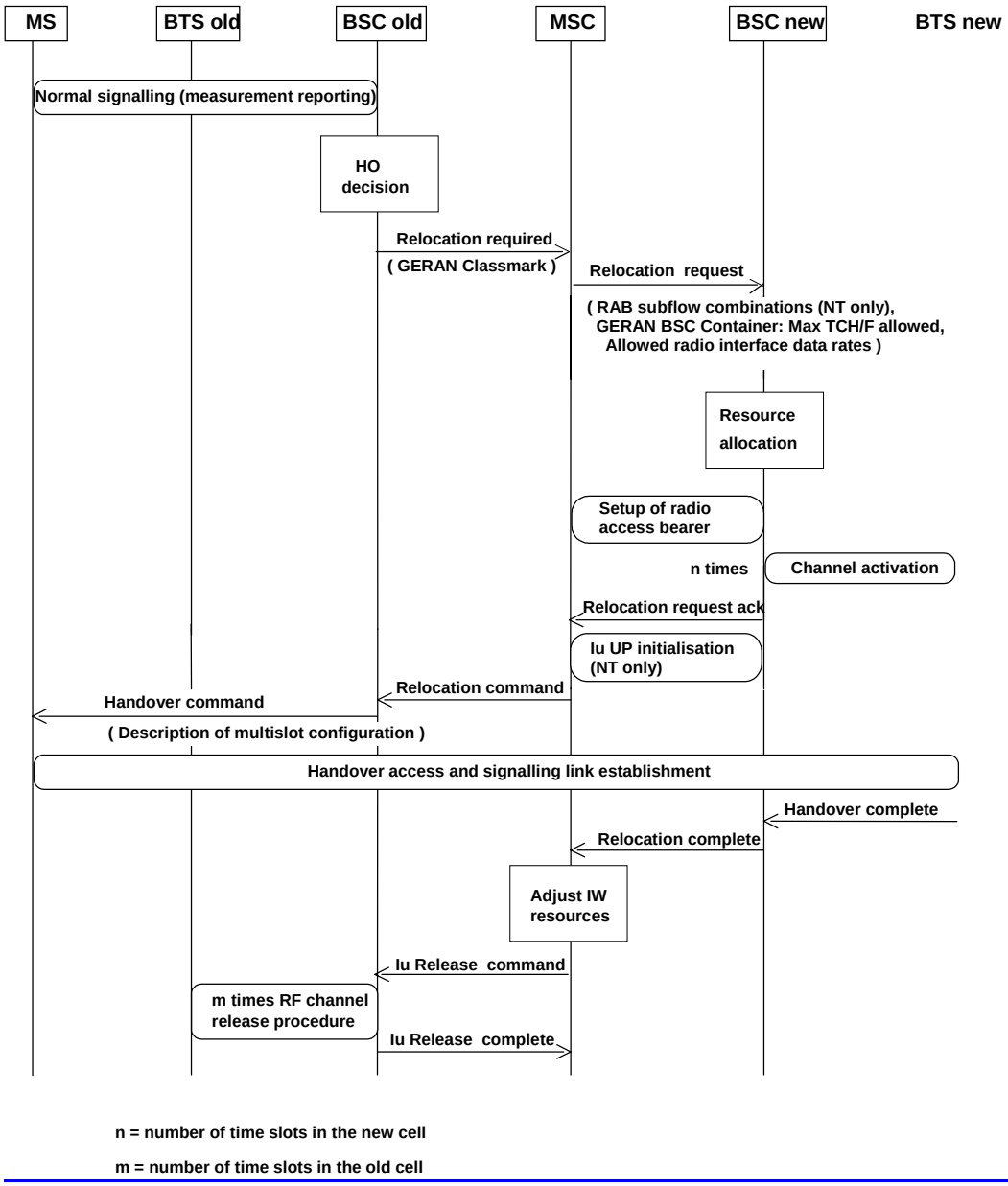


Figure 6a: Inter BSC intra MSC handover (GERAN Iu mode)

The serving BSC includes the GERAN classmark of the target cell in the RANAP Relocation Required message. The MSC takes this information into account when it selects the RAB parameters for the RANAP Relocation Request message.

For a non-transparent call in GERAN Iu mode, the HSCSD configuration may be modified during an inter BSC handover within the maximum number of TCH/F acceptable for the user and allowed by the network. After the successful setup of the radio access bearer towards the new BSC, for non-transparent calls the new BSC initiates the Iu user plane protocol. In the Iu UP initialisation message the first RAB subflow combination proposed in the list of RAB subflow combinations indicates the RAB subflow combination and thus the AIUR to be used by the IW function when the communication is resumed after the handover (see 3GPP TS 25.415 [20]). The new BSC shall use the same RAB subflow combination in uplink direction.

For a transparent call in GERAN Iu mode, the AIUR remains unchanged during the handover. Since the payload format at the Iu interface only depends on the AIUR, the IW resources do not need to be readjusted.

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.

In GERAN Iu mode, the GERAN classmark of the target cell is forwarded to the anchor MSC and to the target MSC using MAP protocol between MSCs.

5.2.3 Resource upgrading, downgrading and configuration change (A/Gb mode)

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 A/Gb mode, 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.

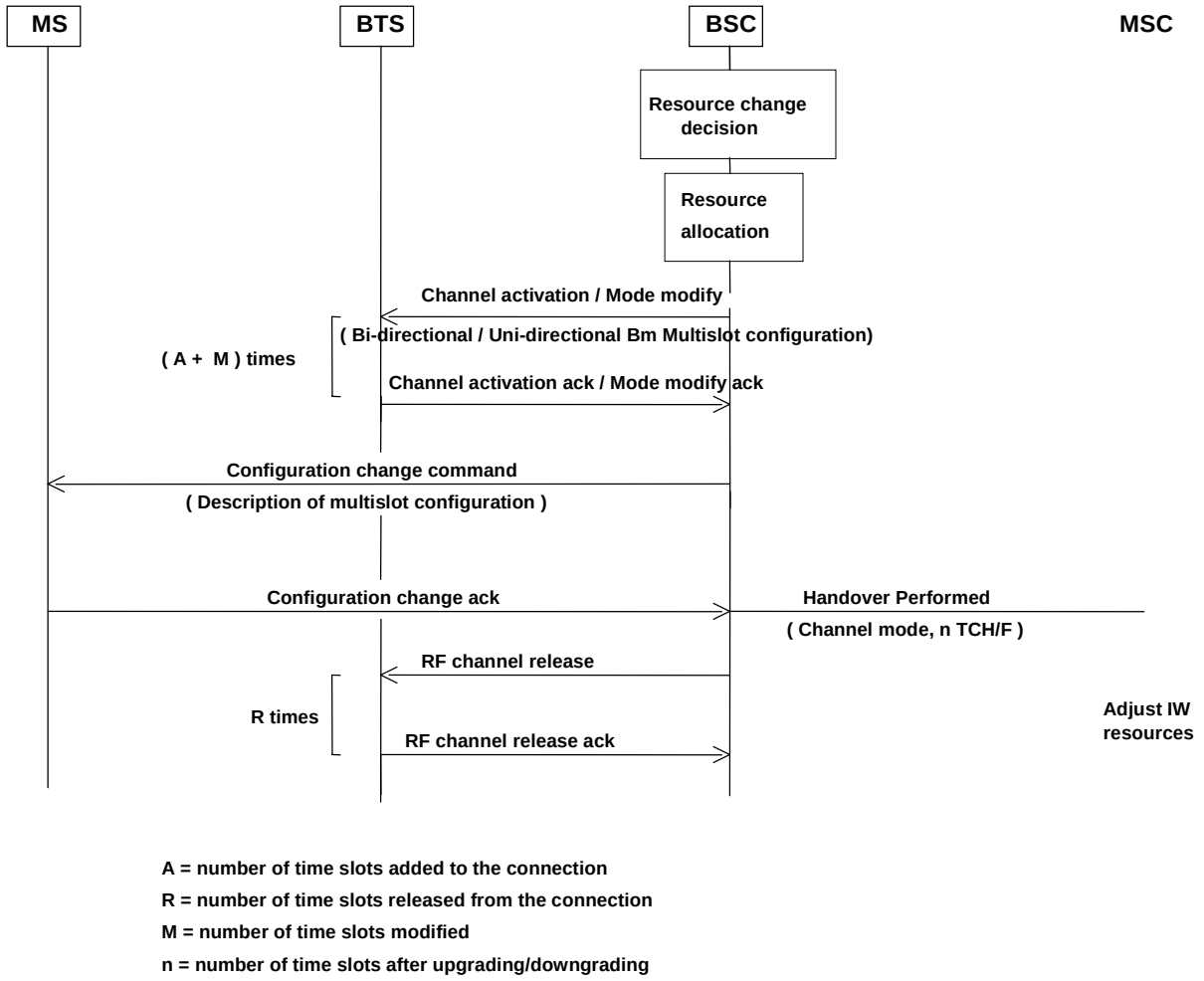
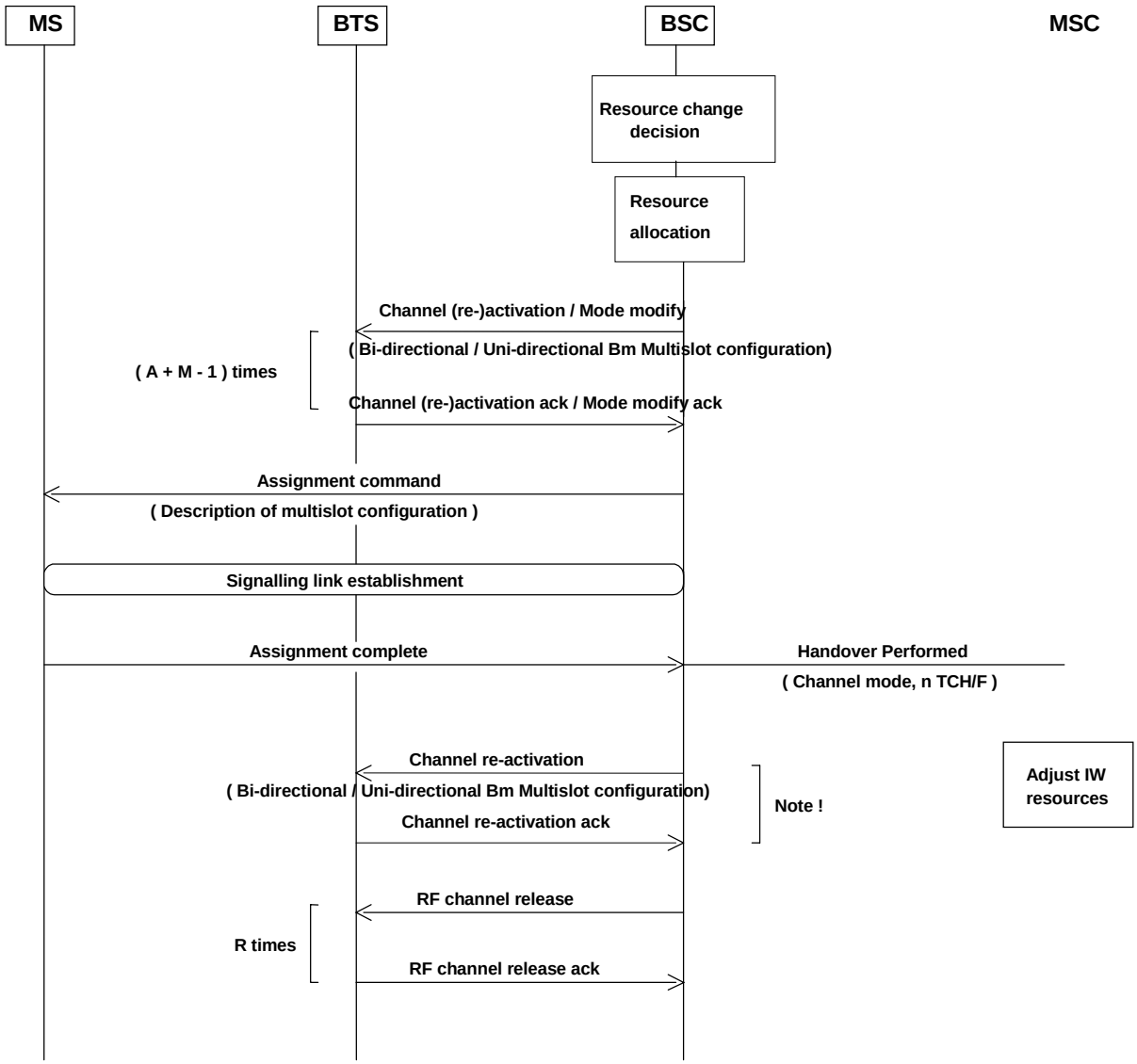


Figure 7: Resource upgrading and downgrading in A/Gb mode, the position of the main channel unchanged

Figure 8 depicts the procedures for a successful resource upgrading and downgrading for an ongoing HSCSD call in A/Gb mode 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 in A/Gb mode, the position of the main channel changed

5.2.3a Resource upgrading, downgrading and configuration change (GERAN Iu mode)

In GERAN Iu mode a Radio bearer reconfiguration procedure is used for forwarding the new channel configuration to the mobile station, regardless whether the position of the main channel is changed or not.

Figure 8a depicts the procedures for a successful resource upgrading and downgrading for an ongoing HSCSD call in GERAN Iu mode, in case the position of the main TCH/F remains unchanged.

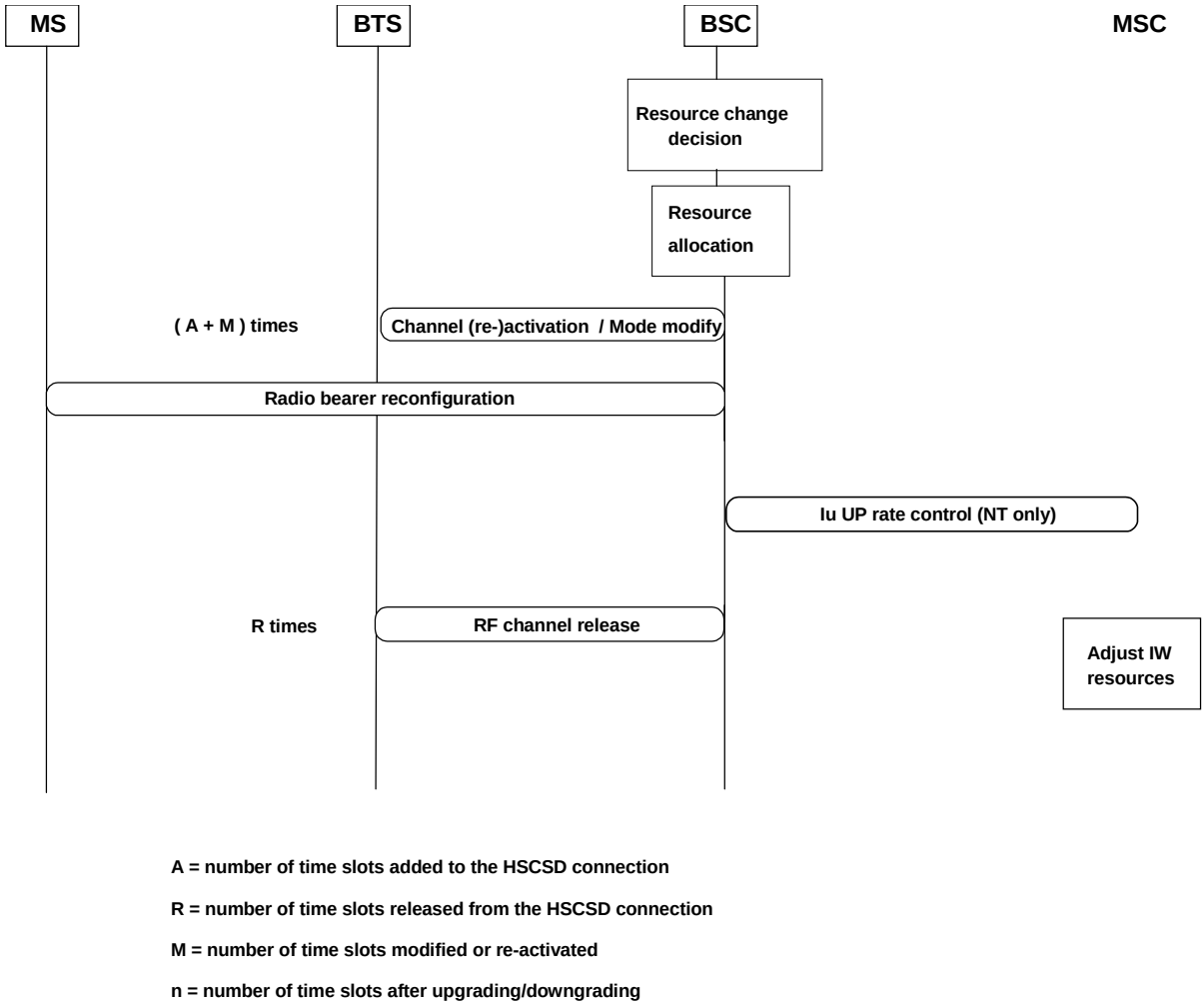


Figure 8a: Resource upgrading and downgrading in GERAN Iu mode, the position of the main channel unchanged

The outcome of the procedure shall be reported to the MSC by means of an Iu UP rate control procedure (see 3GPP TS 25.415 [20]). The BSC shall set the maximum rate permitted downlink over the Iu interface according to the new HSCSD configuration, i.e. according to the AIUR to be used by the IW function when the communication is resumed after the handover. The BSC shall use the same RAB subflow combination in uplink direction.

For a transparent call in GERAN Iu mode, the resource upgrading or downgrading is not applicable since the AIUR remains unchanged during the call, and the allowed radio interface data rate is set by the MSC.

5.2.4 User initiated service level up- and downgrading (A/Gb mode)

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

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.

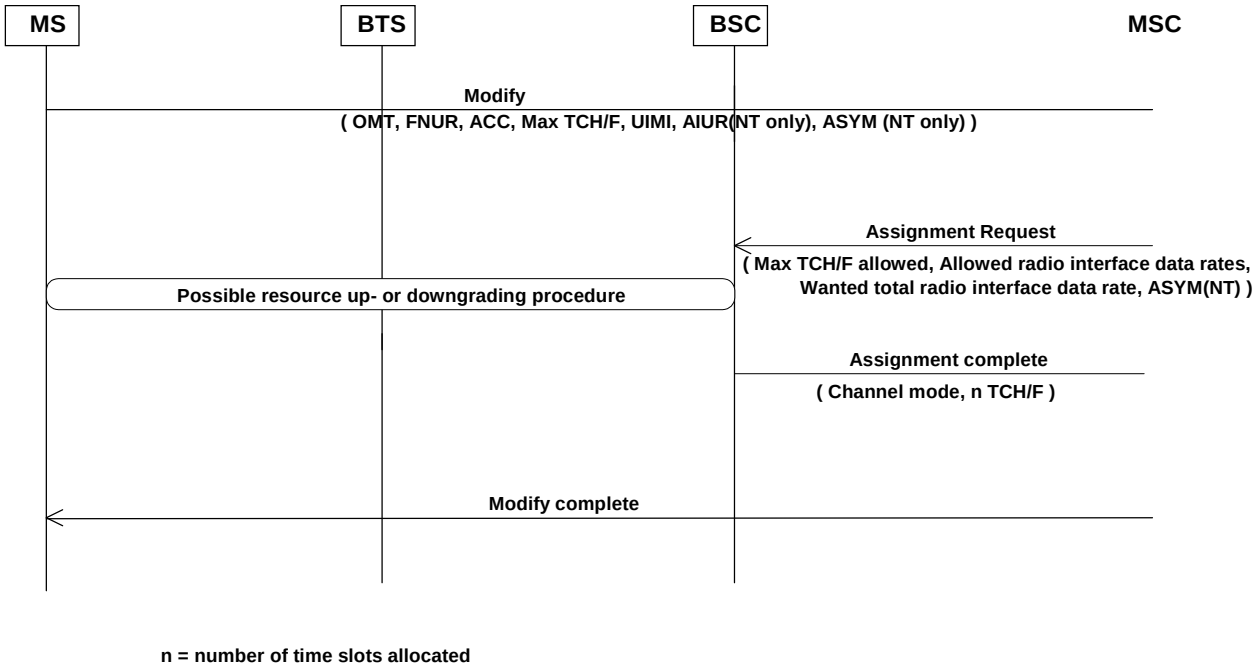


Figure 9: User initiated service level up- and downgrading in A/Gb mode

5.2.4a User initiated service level up- and downgrading (GERAN Iu mode)

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

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

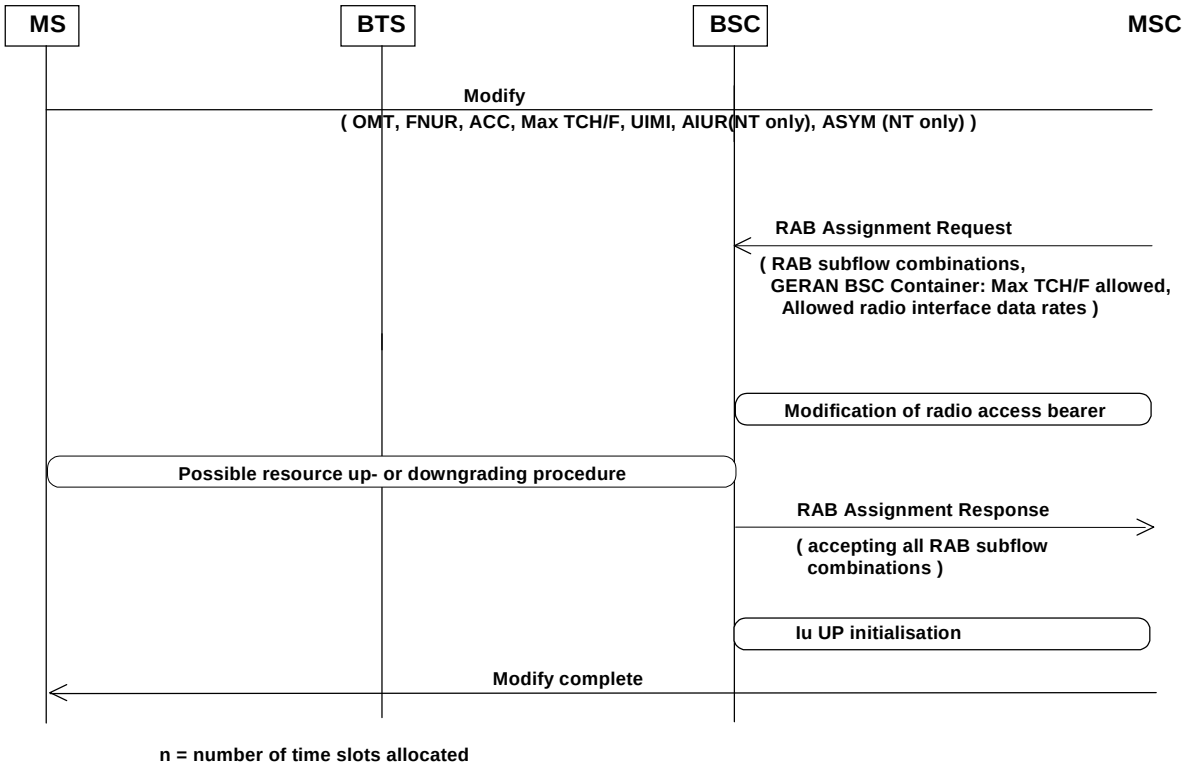


Figure 9a: User initiated service level up- and downgrading in GERAN Iu mode

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. In A/Gb mode, Ssignalling 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.

In GERAN Iu mode, the Radio bearer reconfiguration procedure is used for link adaptation.

5.2.6 Start of ciphering

In A/Gb mode, Iin 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.

In GERAN Iu mode, the Security mode control procedure is used to start ciphering (see 3GPP TS 44.118 [21]).

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. In A/Gb mode, Ddepending 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. In GERAN Iu mode, the split/combine functionality on the network side is always located in the BSS.

A detailed description of the numbering scheme is given in 3GPP TS 44.021 [11].

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].

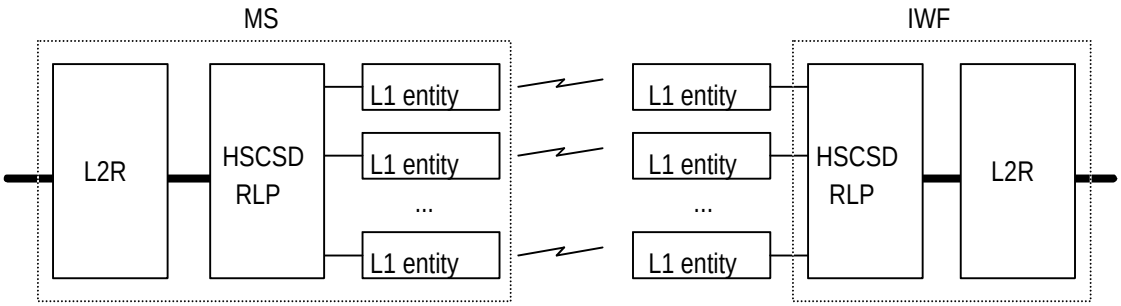


Figure 9a: The HSCSD concept in non-transparent mode

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 ~~0~~2 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).

3GPP TSG-CN1 Meeting #27 ***Tdoc N1-022428***
Bangkok, Thailand, 11 – 15 November 2002

CR-Form-v7

CHANGE REQUEST

⌘ **43.068** **CR** **008** ⌘ **rev** **1** ⌘ Current version: **5.10.01** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	MS late entry notification
Source:	⌘	Nortel Networks
Work item code:	⌘	TEI5
Date:	⌘	Oct. 31, 2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	During establishment of a railway emergency call, ASCI capable mobiles engaged in an other call receive a notification on the FACCH about this call. When a railway emergency call is ongoing in an area and an user moves into this area via handover (engaged into an other call), this notification on FACCH is not provided.
Summary of change:	⌘	The technical solution of MS late entry notification is described
Consequences if not approved:	⌘	The open issue will still be opened. The requirement will never be fulfilled.

Clauses affected:	⌘	11.3.1.3

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

11.3.1.3 Notification procedures

Different notification procedures shall be applied in relation to the mode of the mobile station as presented in table 1 and defined in the following sections.

Table 1: Overview on different information messages for new or on-going calls

call type: / MS states:	group call	point-to-point call
Idle mode	(section a)	(standard paging)
group receive mode and group transmit mode	(section b)	(section c)
dedicated mode	(section b)	(standard Call Waiting) (note)
NOTE: only for point to point calls with certain restrictions as defined in 3GPP TS 22.083.		

b) Notifications for mobile stations in group receive, group transmit or dedicated mode

In addition to sending initial notification messages on the NCH for the voice group call, the BSS can provide initial notification into on-going voice broadcast, group calls and point to point calls informing mobile stations partaking in these calls of new voice group calls that are being set-up in the cell.

NOTE 2: The additional notification into on-going voice broadcast and group calls and point to point calls should be provided by the BSS if the priority level of the new call is equal or higher than the O&M defined priority level.

In order to do this the BSS sends initial notification messages on FACCH to all on-going voice broadcast, group calls, and point to point calls in the cell. The initial notification message on FACCH shall contain the group call reference, the priority level if eMLPP applies and possibly the TCH description which allows the mobile station to connect directly to the new call without reading the NCH.

An indication of change of notifications in the current cell may be provided on SACCH by the BSS.

As a mobile station option, the mobile station may read the NCH of the current cell while in group receive, group transmit or dedicated mode in order to be notified on other voice group calls.

NOTE 3: Mobile stations may require an additional receiver to read the NCH in order to ensure a higher probability of receiving notifications for all present voice group calls without degradation of the received speech quality.

If a mobile station in group transmit or dedicated mode (including call setup phase) is moving to or roaming in an area where a voice group call with priority level 0 is on-going, the BSS shall resend the notification message to the mobile station on FACCH, if the mobile station has ASCI capabilities.

If a mobile station in group receive mode is moving to a cell where a voice group call with priority level 0 is on-going, the mobile sstation shall read the full NCH of the new cell.

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Bangkok, Thailand, 11 – 15 November 2002

Tdoc N1-022498
revision of N1-022477

CR-Form-v7

CHANGE REQUEST

⌘ **24.011** **CR** **024** ⌘ **rev** **2** ⌘ Current version: **5.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	SMS over GPRS disabled
Source:	⌘	Ericsson, Siemens, Panasonic
Work item code:	⌘	TEI5
Date:	⌘	15/11/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Whilst SMS over GPRS is mandatory, some network operators have not enabled this in their networks. This situation creates problems in the MS, since the MS is not properly informed that SMS over GPRS is not enabled in the network.
Summary of change:	⌘	An existing error cause #69 is returned by the network if the network does not allow support the use of GPRS for SMS. The CR mandates the network to send cause #69 when it does not support SMS over GPRS, and clarifies that the mobile upon receipt of cause #69, should not attempt using GPRS for SMS for a period of time based on implementations. During this time, the mobile may attempt to use the circuit switched domain.
Consequences if not approved:	⌘	The inablity to convey sufficient information to the mobile not to use GPRS for SMS will negatively affect the user, the mobile and the general use of SMS.

Clauses affected:	⌘	6.3.1, 6.3.3.1.2, 6.3.3.2.1.

Other specs affected:	⌘	Y	N		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.3 Short Message Relay procedures

The procedures needed for short message and notification relaying are:

- TP Data Unit (TPDU) relay procedures;
- notification relay procedures;
- procedures for abnormal cases.

6.3.1 TPDU relaying

When the SMR entity is in the Idle state and receives a request from SM-TL to relay a TPDU, it forms and transfers the RP-DATA message (containing the TPDU), sets the timer TR1* and enters the state Wait for RP-ACK.

Retransmission of RP data units by the CM-sublayer is described in clause 5.

When the SMR entity is in the "Wait for RP-ACK" state, the following situations may occur:

a) reception of an RP-ACK or RP-ERROR message (containing the same reference number as the transmitted RP-DATA message);

b) reception of an error indication from the CM-sublayer;

c) the timer TR1* expires.

In case a) or b), the timer TR1* is reset, a report indication is passed to SM-TL, a request to release the CM-connection is passed to CM-sublayer, and the SMR entity enters the Idle state.

In case a) when the SMR entity in the MS receives an RP-ERROR message, the MS shall then take one of the followings actions depending upon the received RP-ERROR cause:

#69 "Requested facility not implemented"

If this RP-ERROR cause was received in reaction to an SMS transfer via GPRS, the MS should not use GPRS for SMS transfer for an implementation dependent time. During this time, the MS may attempt SMS transfers via the circuit switched domain.

In case c), a request to abort the CM-connection is passed to the CM-sublayer, a report indication is passed to SM-TL, and the SMR entity enters the Idle state.

When the SMR entity is in the Idle state and receives an MNSMS-EST-Ind containing a valid RP-DATA message, it passes the SMS-TPDU to the SM-TL, starts timer TR2*, and enters the state "Wait to Send RP-ACK".

When the SMR entity in the SGSN is in the Idle state and receives an MNSMS-EST-Ind containing a valid RP-DATA message, but the delivery of SMS via GPRS is not activated, the network shall return an RP-ERROR message with cause #69 "Requested facility not implemented" and remain in the Idle state.

When the SMR entity is in the state "Wait to Send RP-ACK" and the SMR entity receives the SM-RL-Report-Request, the timer TR2* is reset, the RP-message (RP-ACK or RP-ERROR) is generated and relayed to the peer entity, a CM-connection release request is passed to the CM-sublayer, and the SMR entity enters the Idle state.

When the SMR entity is in the state "Wait to Send RP-ACK" and the SMR entity receives an error indication from the CM-sublayer, the timer TR2* is reset, a report indication is passed to the SM-TL and the SMR entity enters the Idle state.

When the SMR entity is in the state "Wait to send RP-ACK" and the timer TR2* expires, the SMR entity passes a CM-connection abort request to the CM-sublayer, a report indication is passed to the SM-TL, and the SMR entity enters the Idle state.

6.3.2 [Void]

6.3.3 Notification relaying

6.3.3.1 MS side

6.3.3.1.1 Idle state

When the SMR entity in the MS in the Idle state receives a request from the SM-TL to relay a notification to the network, it forms and transfers the RP-SMMA message, starts timer TR1M, and enters the state Wait for RP-ACK.

6.3.3.1.2 Wait for RP-ACK state

When the SMR entity in the MS is in the Wait for RP-ACK state and it receives either:

- an RP-ACK (containing the same reference number as the last transmitted RP-SMMA message); or
- an RP-ERROR (containing the same reference number as the last transmitted RP-SMMA message) with a permanent failure indication; or
- an error indication from the CP-sublayer;

then the MS shall reset timer TR1M, pass a report indication to SM-TL, give a CM-connection release request to the CM-sublayer, and enter the Idle state. If set, timer TRAM and the RETRANS flag are also reset.

If the SMR entity in the MS is in the Wait for RP-ACK state and receives an RP-ERROR message, the MS shall then take one of the followings actions depending upon the received RP-ERROR cause:

#69 "Requested facility not implemented"

If this RP-ERROR cause was received in reaction to an SMS transfer via GPRS, the MS should not use GPRS for SM transfer for an implementation dependent time. During this time, the MS may attempt SMS transfers via the circuit switched domain.

When the SMR entity in the MS is in the Wait for RP-ACK state and either:

- it receives an RP-ERROR (containing the same reference number as the last transmitted RP-SMMA message) with a temporary failure indication; or
- timer TR1M expires;

then the MS shall examine the RETRANS flag:

- if the RETRANS flag is set (i.e. no more transmissions of the RP-SMMA message are permitted) then:
  - the MS shall pass a report indication to SM-TL, give a CM-connection release request to the CM-sublayer, reset the RETRANS flag, reset TR1M, and enter the Idle state.
- If the RETRANS flag is not set (i.e. at least another transmission of the RP-SMMA message is currently permitted) then:
  - the MS shall give a CM-connection release request to the CM-sublayer, set the RETRANS flag, reset TR1M, start timer TRAM and enter the Wait for Retrans Timer state.

When the SMR entity in the MS is in the Wait for RP-ACK state and it receives an SM-RL-MEMORY-AVAILABLE-Req (SMS-MEM-NOTIF-ABORT) primitive, then the MS shall set the RETRANS flag and reenter the Wait for RP-ACK state.

***** NEXT MODIFIED SECTION *****

6.3.3.2 Network side

6.3.3.2.1 Idle state

When the SMR entity in the network is in the Idle state and receives an MNSMS-EST-Ind containing a valid RP-SMMA message, it passes the SMS-TPDU to the SM-TL, starts timer TR2N, and enters the state "Wait to send RP-ACK".

When the SMR entity in the SGSN is in the Idle state and receives an MNSMS-EST-Ind containing a valid RP-SMMA message, but the delivery of SMS via GPRS is not activated, the network shall return an RP-ERROR message with cause #69 "Requested facility not implemented" and remain in the Idle state.

3GPP TSG-CN1 Meeting #26 ***Tdoc N1-021997***
Miami Beach, Florida, USA, 23 – 27 September 2002

CR-Form-v7

CHANGE REQUEST

⌘ **24.008** **CR** 698 ⌘ **rev** **-** ⌘ Current version: **5.5.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [X]

Title:	⌘	Inclusion of EDGE RF Power Capability in the CM3 IE
Source:	⌘	Siemens AG
Work item code:	⌘	TEI5
Date:	⌘	19.08.2002
Category:	⌘	**F**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	With the 24.008 CR 510 r2 (N1-011995) it was clarified that the EDGE parameters in the CM3 IE are only applicable for the CS EDGE service ECSD. It was concluded not to rename the EDGE RF Power Capability variables, as they are reflecting basic MS capabilities which are equal for both the CS and the PS EDGE service. Nevertheless they shall only be included in the CM3 IE if ECSD is supported by the MS. Thus the struct "EDGE struct" was renamed to "ECSD Struct". But this was not reflected in the struct definition itself. When the IE description was transformed from table notation into CSN1 syntax the order of the bits of the " Multiband Supported" bit field has be reversed by error. In the CSN1 notation the left bit has the highest number, thus DCS 1800 which was bit 7 in table notation should be bit 3 in CSN1 and P-GSM which was bit 5 should be bit 1.
Summary of change:	⌘	The struct definition is renamed to "ECSD Struct" in order to reflect that it shall only be included if the MS supports ECSD. The numbering of the Bit1-3 of the Multiband Supported bit field description is re-ordered in order to keep the order defined in the Phase2 specification.
Consequences if not approved:	⌘	Inconsistency in the CM3 CSN1 IE definition with the risk that the MS includes the "EDGE Struct" even it does not support ECSD. If only the "EDGE Struct" is include but all other ECSD elements are not included, the network behaviour is unpredictable with the risk that the requested CS connection establishment fails. Different bit position definitions for the Multiband Supported bit map between the phase 2 and R96 and onwards specifications, which would lead to interoperability problems if the MS and the network is assuming different

	meaning of the bits.

Clauses affected:	⌘	10.5.1.7			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

10.5.1.7 Mobile Station Classmark 3

The purpose of the *Mobile Station Classmark 3* information element is to provide the network with information concerning aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station. The Mobile Station Classmark information indicates general mobile station characteristics and it shall therefore, except for fields explicitly indicated, be independent of the frequency band of the channel it is sent on.

The *MS Classmark 3* is a type 4 information element with a maximum of 14 octets length.

The value part of a *MS Classmark 3* information element is coded as shown in figure 10.5.7/3GPP TS 24.008 and table 10.5.7/3GPP TS 24.008.

NOTE: The 14 octet limit is so that the CLASSMARK CHANGE message will fit in one layer 2 frame.

SEMANTIC RULE: a multiband mobile station shall provide information about all frequency bands it can support. A single band mobile station shall not indicate the band it supports in the *Multiband Supported, GSM 400 Bands Supported, GSM 700 Associated Radio Capability, GSM 850 Associated Radio Capability* or PCS *1900 Associated Radio Capability* fields in the MS Classmark 3. Due to shared radio frequency channel numbers between DCS 1800 and PCS 1900, the mobile should indicate support for either DCS 1800 band OR PCS 1900 band.

SEMANTIC RULE: a mobile station shall include the MS Measurement Capability field if the *Multi Slot Class* field contains a value of 19 or greater (see 3GPP TS 45.002 [32]).

Typically, the number of spare bits at the end is the minimum to reach an octet boundary. The receiver may add any number of bits set to "0" at the end of the received string if needed for correct decoding.

```
<Classmark 3 Value part> ::=
    < spare bit >
    {    < Multiband supported : { 000 } >
             < A5 bits >
    |    < Multiband supported : { 101 | 110 } >
             < A5 bits >
             < Associated Radio Capability 2 : bit(4) >
             < Associated Radio Capability 1 : bit(4) >
    |    < Multiband supported : { 001 | 010 | 100 } >
             < A5 bits >
             < spare bit >(4)
             < Associated Radio Capability 1 : bit(4) > }
    { 0 | 1 < R Support > }
    { 0 | 1 < HSCSD Multi Slot Capability > }
    < UCS2 treatment: bit >
    < Extended Measurement Capability : bit >
    { 0 | 1 < MS measurement capability > }
    { 0 | 1 < MS Positioning Method Capability > }
    { 0 | 1 < ECSD Multi Slot Capability > }
    { 0 | 1 < ECSD Struct > }
    { 0 | 1 < GSM 400 Bands Supported : { 01 | 10 | 11 } >
             < GSM 400 Associated Radio Capability: bit(4) > }

    { 0 | 1 <GSM 850 Associated Radio Capability : bit(4) > }
    { 0 | 1 <PCS 1900 Associated Radio Capability : bit(4) > }
    < UMTS FDD Radio Access Technology Capability : bit >
    < UMTS 3.84 Mcps TDD Radio Access Technology Capability : bit >
    < CDMA 2000 Radio Access Technology Capability : bit >

    { 0 | 1  < DTM GPRS Multi Slot Class : bit(2) >
             < MAC Mode Support : bit >
             {0 | 1< DTM EGPRS Multi Slot Class : bit(2) > } }
    { 0 | 1 < Single Band Support > } -- Release 4 starts here:
    { 0 | 1 <GSM 700 Associated Radio Capability : bit(4)>}

    < UMTS 1.28 Mcps TDD Radio Access Technology Capability : bit >
    < GERAN Feature Package 1 : bit >

    { 0 | 1 < Extended DTM GPRS Multi Slot Class : bit(2) >
             < Extended DTM EGPRS Multi Slot Class : bit(2) > }

    < GERAN Iu Mode Capability : bit >

    < spare bit > ;

< A5 bits > ::=
    < A5/7 : bit > < A5/6 : bit > < A5/5 : bit > < A5/4 : bit >  ;

<R Support>::=
    < R-GSM band Associated Radio Capability : bit(3) > ;

< HSCSD Multi Slot Capability > ::=
    < HSCSD Multi Slot Class : bit(5) >  ;

< MS Measurement capability > ::=
    < SMS_VALUE : bit (4) >
    < SM_VALUE : bit (4) > ;

< MS Positioning Method Capability > ::=
    < MS Positioning Method : bit(5) > ;

< ECSD Multi Slot Capability > ::=
    < ECSD Multi Slot Class : bit(5) > ;

 < ECSD EDGE Struct> : :=
    < Modulation Capability : bit >
```

```
    { 0 | 1 < EDGE RF Power Capability 1: bit(2) > }
    { 0 | 1 < EDGE RF Power Capability 2: bit(2) > }

< Single Band Support > ::=
    < GSM Band : bit (4) > ;
```

Figure 10.5.7/3GPP TS 24.008 *Mobile Station Classmark 3* information element

Table 10.5.7/3GPP TS 24.008: *Mobile Station Classmark 3* information element

Multiband Supported (3 bit field)

Band 1 supported ~~(third bit of the field)~~
Bit 1~~3~~
0 P-GSM not supported
1 P-GSM supported

Band 2 supported ~~(second bit of the field)~~
Bit 2
0 E-GSM or R-GSM not supported
1 E-GSM or R-GSM supported

Band 3 supported ~~(first bit of the field)~~
Bit 3~~1~~
0 DCS 1800 not supported
1 DCS 1800 supported

The indication of support of P-GSM band or E-GSM or R-GSM band is mutually exclusive.

When the 'Band 2 supported' bit indicates support of E-GSM or R-GSM, the presence of the <R Support> field, see below, indicates if the E-GSM or R-GSM band is supported.

In this version of the protocol, the sender indicates in this field either none, one or two of these 3 bands supported.

For single band mobile station or a mobile station supporting none of the GSM 900 bands(P-GSM, E-GSM and R-GSM) and DCS 1800 bands, all bits are set to 0.

A5/4
0 Encryption algorithm A5/4 not available
1 Encryption algorithm A5/4 available

A5/5
0 Encryption algorithm A5/5 not available
1 Encryption algorithm A5/5 available

A5/6
0 Encryption algorithm A5/6 not available
1 Encryption algorithm A5/6 available

A5/7
0 Encryption algorithm A5/7 not available
1 Encryption algorithm A5/7 available

Associated Radio capability 1 and 2 (4 bit fields)

If either of P-GSM or E-GSM or R-GSM is supported, the radio capability 1 field indicates the radio capability for P-GSM, E-GSM or R-GSM, and the radio capability 2 field indicates the radio capability for DCS1800 if supported, and is spare otherwise.

If none of P-GSM or E-GSM or R-GSM are supported, the radio capability 1 field indicates the radio capability for DCS1800, and the radio capability 2 field is spare.

The radio capability contains the binary coding of the power class associated with the band indicated in multiband support bits (see 3GPP TS 45.005 [33]).

(continued...)

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

R-GSM band Associated Radio Capability (3 bit field)

In case where the R-GSM band is supported the R-GSM band associated radio capability field contains the binary coding of the power class associated (see GSM 45.005) (regardless of the number of GSM bands supported). A mobile station supporting the R-GSM band shall also when appropriate, (see 10.5.1.6) indicate its support in the 'FC' bit in the Mobile Station Classmark 2 information element.

NOTE: The coding of the power class for P-GSM, E-GSM, R-GSM and DCS 1800 in radio capability 1 and/or 2 is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

HSCSD Multi Slot Class (5 bit field)

In case the MS supports the use of multiple timeslots for HSCSD then the HSCSD Multi Slot Class field is coded as the binary representation of the multislot class defined in 3GPP TS 45.002 [32].

UCS2 treatment (1 bit field)

This information field indicates the likely treatment by the mobile station of UCS2 encoded character strings. If not included, the value 0 shall be assumed by the receiver.

0 the ME has a preference for the default alphabet (defined in 3GPP TS 03.38) over UCS2.
1 the ME has no preference between the use of the default alphabet and the use of UCS2.

Extended Measurement Capability (1 bit field)

This bit indicates whether the mobile station supports 'Extended Measurements' or not

0 the MS does not support Extended Measurements
1 the MS supports Extended Measurements

SMS_VALUE (Switch-Measure-Switch) (4 bit field)
The SMS field indicates the time needed for the mobile station to switch from one radio channel to another, perform a neighbour cell power measurement, and the switch from that radio channel to another radio channel.
Bits

4 3 2 1	
0 0 0 0	1/4 timeslot (~144 microseconds)
0 0 0 1	2/4 timeslot (~288 microseconds)
0 0 1 0	3/4 timeslot (~433 microseconds)
. . .	
1 1 1 1	16/4 timeslot (~2307 microseconds)

SM_VALUE (Switch-Measure) (4 bit field)
The SM field indicates the time needed for the mobile station to switch from one radio channel to another and perform a neighbour cell power measurement.
Bits

4 3 2 1	
0 0 0 0	1/4 timeslot (~144 microseconds)
0 0 0 1	2/4 timeslot (~288 microseconds)
0 0 1 0	3/4 timeslot (~433 microseconds)
. . .	
1 1 1 1	16/4 timeslot (~2307 microseconds)

MS Positioning Method (5 bit field)
This field indicates the Positioning Method(s) supported by the mobile station for the provision of location services (LCS) via the CS domain in A-mode.
MS assisted E-OTD
Bit 5

0 MS assisted E-OTD not supported
1 MS assisted E-OTD supported

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

MS based E-OTD
Bit 4
0 MS based E-OTD not supported
1 MS based E-OTD supported

MS assisted GPS
Bit 3
0 MS assisted GPS not supported
1 MS assisted GPS supported

MS based GPS
Bit 2
0 MS based GPS not supported
1 MS based GPS supported

MS Conventional GPS
Bit 1
0 conventional GPS not supported
1 conventional GPS supported

ECSD Multi Slot class (5 bit field)

In case the **ECSD** MS supports the use of multiple timeslots and the number of supported time slots is different from number of time slots supported for GMSK then the **ECSD** Multi Slot class field is included and is coded as the binary representation of the multislot class defined in 3GPP TS 45.002 [32].

Modulation Capability

The Modulation Capability field indicates the modulation scheme the MS supports in addition to GMSK.
0 8-PSK supported for downlink reception only
1 8-PSK supported for uplink transmission and downlink reception

EDGE RF Power Capability 1 (2 bit field)
If 8-PSK modulation is supported for both uplink and downlink, the **EDGE RF Power Capability 1** field indicates the radio capability for 8-PSK modulation in GSM 400, GSM700, GSM850 or GSM900.

EDGE RF Power Capability 2 (2 bit field)
If 8-PSK modulation is supported for both uplink and downlink, the **EDGE RF Power Capability 2** field indicates the radio capability for 8-PSK modulation in DCS1800 or PCS1900 if supported, and is not included otherwise.

The respective **EDGE RF Power Capability 1** and **EDGE RF Power Capability 2** fields contain the following coding of the 8-PSK modulation power class (see 3GPP TS 45.005 [33]):

Bits 2 1	
0 0	Reserved
0 1	Power class E1
1 0	Power class E2
1 1	Power class E3

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

GSM 400 Bands Supported (2 bit field)
See the semantic rule for the sending of this field.
Bits
2 1
0 1 GSM 480 supported, GSM 450 not supported
1 0 GSM 450 supported, GSM 480 not supported
1 1 GSM 450 supported, GSM 480 supported

GSM 400 Associated Radio Capability (4 bit field)
If either GSM 450 or GSM 480 or both is supported, the GSM 400 Associated Radio Capability field indicates the radio capability for GSM 450 and/or GSM 480.

The radio capability contains the binary coding of the power class associated with the band indicated in GSM 400 Bands Supported bits (see 3GPP TS 45.005 [33]).

NOTE: The coding of the power class for GSM 450 and GSM 480 in GSM 400 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

GSM 850 Associated Radio Capability (4 bit field)
See the semantic rule for the sending of this field.
This field indicates whether GSM 850 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the GSM 850 band (see 3GPP TS 45.005 [33]).

Note: the coding of the power class for GSM 850 in GSM 850 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

PCS 1900 Associated Radio Capability (4 bit field)
See the semantic rule for the sending of this field.
This field indicates whether PCS 1900 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the PCS 1900 band (see 3GPP TS 45.005 [33]).

Note: the coding of the power class for PCS 1900 in PCS 1900 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

Table 10.5.1.7/3GPP TS 24.008 (continued): *MS Classmark 3* information element

UMTS FDD Radio Access Technology Capability (1 bit field)
0 UMTS FDD not supported
1 UMTS FDD supported

UMTS 3.84 Mcps TDD Radio Access Technology Capability (1 bit field)
0 UMTS 3.84 Mcps TDD not supported
1 UMTS 3.84 Mcps TDD supported

CDMA 2000 Radio Access Technology Capability (1 bit field)
0 CDMA2000 not supported
1 CDMA2000 supported

DTM GPRS Multi Slot Class (2 bit field)
This field indicates the GPRS DTM multislot capabilities of the MS. It is coded as follows:
Bit
2 1
0 0 Multislot class 1 supported
0 1 Multislot class 5 supported
1 0 Multislot class 9 supported
1 1 Reserved for future extension. If received, the network shall interpret this as '00'

MAC Mode Support (1 bit field)
This field indicates whether the MS supports Dynamic and Fixed Allocation or only supports Exclusive Allocation. It is coded as follows:

0 Dynamic and Fixed Allocation not supported
1 Dynamic and Fixed allocation supported

EGPRS DTM Multi Slot Class (2 bit field)
This field indicates the EGPRS DTM multislot capabilities of the MS. This field shall be included only if the mobile station supports EGPRS DTM. This field is coded as the DTM GPRS Multi Slot Class field.

Single Band Support
This field shall be sent if the mobile station supports UMTS and one and only one GSM band with the exception of R-GSM; this field shall not be sent otherwise

GSM Band (4 bit field)
Bits
4 3 2 1
0 0 0 0 E-GSM is supported
0 0 0 1 P-GSM is supported
0 0 1 0 DCS 1800 is supported
0 0 1 1 GSM 450 is supported
0 1 0 0 GSM 480 is supported
0 1 0 1 GSM 850 is supported
0 1 1 0 PCS 1900 is supported
0 1 1 1 GSM 700 is supported
All other values are reserved for future use.

NOTE: When this field is received, the associated RF power capability is found in Classmark 1 or 2.

GSM 700 Associated Radio Capability (4 bit field)

See the semantic rule for the sending of this field.
This field indicates whether GSM 700 band is supported and its associated radio capability.

The radio capability contains the binary coding of the power class associated with the GSM 700 band (see 3GPP TS 45.005 [33]).

NOTE: The coding of the power class for GSM 700 in GSM 700 Associated Radio Capability is different to that used in the Mobile Station Classmark 1 and Mobile Station Classmark 2 information elements.

UMTS 1.28 Mcps TDD Radio Access Technology Capability (1 bit field)
0 UMTS 1.28 Mcps TDD not supported

1 UMTS 1.28 Mcps TDD supported

GERAN Feature Package 1 (1 bit field)
This field indicates whether the MS supports the GERAN Feature Package 1 (see 3GPP TS 44.060). It is coded as follows:

0 GERAN feature package 1 not supported.
1 GERAN feature package 1 supported.

Extended GPRS DTM Multi Slot Class (2 bit field)
This field indicates the extended GPRS DTM multislot capabilities of the MS and shall be interpreted in conjunction with the GPRS DTM Multi Slot Class field. It is coded as follows, where 'DGMSC' denotes the DTM GPRS Multi Slot Class field:

DGMSC Bit 2 1	**Bit 2 1**	
0 0	**0 0**	Multislot class 2 supported
0 0	**0 1**	Multislot class 3 supported
0 0	**1 0**	Multislot class 4 supported
0 0	**1 1**	Multislot class 8 supported
0 1	**0 0**	Multislot class 5 supported
0 1	**0 1**	Multislot class 6 supported
0 1	**1 0**	Multislot class 7 supported
0 1	**1 1**	Spare. If received, the network shall interpret it as '(01) **00**'.
1 0	**0 0**	Multislot class 9 supported
1 0	**0 1**	Multislot class 10 supported
1 0	**1 0**	Multislot class 11 supported
1 0	**1 1**	Multislot class 12 supported

The presence of this field indicates that the MS supports combined fullrate and halfrate GPRS channels in the downlink.When this field is not present, the MS supports the multislot class indicated by the *DTM GPRS Multi Slot Class* field.

Extended DTM EGPRS Multi Slot Class (2 bit field)
This field is not considered when the EGPRS DTM Multi Slot Class field is not included. This field indicates the extended EGPRS DTM multislot capabilities of the MS and shall be interpreted in conjunction with the EGPRS DTM Multi Slot Class field. This field is coded as the Extended DTM GPRS Multi Slot Class field. The presence of this field indicates that the MS supports combined fullrate and halfrate GPRS channels in the downlink.
When this field is not present, the MS supports the multislot class indicated by the *DTM GPRS Multi Slot Class* field.

GERAN Iu Mode Capability (1 bit field)
Bit
0 GERAN Iu mode not supported
1 GERAN Iu mode supported