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Technical Specification

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Foreword

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Contents

Foreword

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

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

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1 Scope

1.1 General

The present document specifies the procedures used at the radio interface (Reference Point Um, see 3GPP TS 24.002) for Radio Resource management. The Radio Resource Control Protocol (RRC) is specified. RRC is the Radio Resource control plane protocol for Radio Resource management that is used when a mobile station is operating in Iu mode.

Notation "Reserved sub-clause number" is used to indicate which sub-clauses of the specification were moved from this part of the standard to the other part when this standard was split between RAN and CN parts.

When the notations for "further study" or "FS" or "FFS" are present in this specification they mean that the indicated text is not a normative portion of this standard.

These procedures are defined in terms of messages exchanged over the control channels of the radio interface. The control channels are described in 3GPP TS 44.003.

The structured functions and procedures of this protocol and the relationship with other layers and entities are described in general terms in 3GPP TS 24.007.

1.2 Scope of the Technical Specification

The procedures currently described in the present document are for radio resource management for circuit switched and GPRS services.

3GPP TS 24.010 contains functional procedures for support of supplementary services.

3GPP TS 24.011 contains functional procedures for support of point-to-point short message services.

3GPP TS 44.012 contains functional description of short message cell broadcast.

3GPP TS 44.060 contains procedures for radio link control and medium access control (RLC/MAC) of packet data physical channels.

3GPP TS 44.071 contains functional descriptions and procedures for support of location services.

3GPP TS 24.008 contains the procedures for CN protocols.

> NOTE: "layer 3" includes the functions and protocols described in this Technical Specification. The terms "data link layer" and "layer 2" are used interchangeably to refer to the layer immediately below layer 3.

1.3 Application to the interface structures

The layer 3 procedures apply to the interface structures defined in 3GPP TS 44.003. They use the functions and services provided by layer 2 defined in 3GPP TS 44.005 and 3GPP TS 44.006. 3GPP TS 24.007 gives the general description of layer 3 including procedures, messages format and error handling.

1.4 Structure of layer 3 procedures

A building block method is used to describe the layer 3 procedures.

The basic building blocks are "elementary procedures" provided by the protocol control entities of the three sublayers, i.e. radio resource management, mobility management and connection management sublayer.

Complete layer 3 transactions consist of specific sequences of elementary procedures. The term "structured procedure" is used for these sequences.

1.5 Test procedures

Test procedures of the GSM radio interface signalling are described in 3GPP TS 51.010 and 3GPP TS 51.02x series.

1.6 Applicability of implementations

NOTE: This sub-clause is FFS.

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 21.905: "Vocabulary for 3GPP Specifications".

[2]   3GPP TS 22.011: "Service accessibility".

[3]   3GPP TS 23.003: "Numbering, addressing and identification".

[4]   3GPP TS 23.022: "Functions related to Mobile Station (MS) in idle mode".

[5]   3GPP TS 23.060: "General Packet Radio Service (GPRS); Service Description; Stage 2".

[6]   3GPP TS 23.101: "General UMTS Architecture".

[7]   3GPP TS 23.110: " UMTS Access Stratum; Services and Functions".

[8]   3GPP TS 23.221: "Architectural requirements".

[9]   3GPP TS 24.002: "GSM Public Land Mobile Network (PLMN) access reference configuration".

[10]   3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".

[11]   3GPP TS 24.008: "Mobile radio interface layer 3 specification;Core Network Protocols - Stage 3"

[12]   3GPP TS 24.010: "Mobile radio interface layer 3 Supplementary services specification; General aspects".

[13]   3GPP TS 24.011: "Point-to-point (PP) Short Message Service (SMS) support on mobile radio interface".

[14]   3GPP TS 24.080: "Mobile radio interface layer 3 supplementary services specification Formats and coding".

[15]   3GPP TS 25.323: "Packet Data Convergence Protocol (PDCP) Specification".

[16]   3GPP TS 25.331: "Radio Access Network; RRC Protocol Specification".

[17]   3GPP TS 31.102: "Characteristics of the USIM Application".

[18]   3GPP TS 33.102: "3G Security; Security Architecture".

[19]   3GPP TS 43.013: "Discontinuous Reception (DRX) in the GSM system".

[20]   3GPP TS 43.051: "Radio Access Network; Overall description Stage 2".

[21]   3GPP TS 43.059: "Functional Stage 2 Description of Location Services in GERAN".

[22]   3GPP TS 44.004: "Layer 1 General requirements".

[23]   3GPP TS 44.005: "Data Link (DL) layer General aspects".

[24]   3GPP TS 44.006: "Mobile Station - Base Station System (MS - BSS) interface Data Link (DL) layer specification".

[25]   3GPP TS 44.003: "Mobile Station Base Station System (MS - BSS) interface Channel structures and access capabilities".

[26]   3GPP TS 44.012: "Short Message Service Cell Broadcast (SMSCB) support on the mobile radio interface".

[27]   3GPP TS 44.018:" GSM EDGE Radio Access Network, Mobile radio interface layer 3 specification, Radio Resource Control Protocol"

[28]   3GPP TS 44.031: "Location Services;Mobile Station (MS) – Serving Mobile Location Centre (SMLC); Radio Resource LCS Protocol (RRLP)".

[29]   3GPP TS 44.071: "Mobile radio interface layer 3 location services specification.

[30]   3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station - Base Station System (MS-BSS) interface; Radio Link Control and Medium Access Control (RLC/MAC) layer specification".

[31]   3GPP TS 44.160: "General Packet Radio Service (GPRS); Mobile Station - Base Station System (MS-BSS) interface; Radio Link Control and Medium Access Control (RLC/MAC) layer specification, Iu mode".

[32]   3GPP TS 45.002: "Multiplexing and multiple access on the radio path".

[33]   3GPP TS 45.005: "Radio transmission and reception".

[34]   3GPP TS 45.008: "Radio subsystem link control".

[35]   3GPP TS 45.010: "Radio subsystem synchronization".

[36]   3GPP TS 51.010: "Mobile Station (MS) conformity specification".

[37]   ITU-T Recommendation Q.931: ISDN user-network interface layer 3 specification for basic control".

[38]   TIA/EIA/IS-2000-5-A: "Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems".

[39]   TIA/EIA/IS-833: "Multi-Carrier Specification for Spread Spectrum Systems on GSM MAP (MC-MAP) (Lower Layers Air Interface)".

[40]   TIA/EIA/IS-2000-4-A: "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems".

[41]   Michel MOULY, "CSN.1 Specification, Version 2.0", Cell & Sys, ISBN: 2-9510062-0-9. Web: http://perso.wanadoo.fr/cell.sys/.

[42]   IANA ROHC profile identifier definition (http://www.iana.org/assignments/rohc-pro-ids)

3 Definitions, symbols and abbreviations

3.1 Definitions

The following terms are used in this Technical Specification:

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

Access Stratum (AS): defined in 3GPP TS 23.101.

Iu mode: mode of operation of the MS when connected to the Core Network via GERAN or UTRAN and the Iu interface.

Non Access Stratum (NAS): defined in 3GPP TS 21.905.

RR idle: defined in 3GPP TS 44.018.

RR: Radio Resource control plane protocol for radio resource management that is used when a mobile station is operating in *A/Gb mode*.

RRC: Radio Resource control plane protocol for radio resource management that is used when a mobile station is operating in Iu mode.

RRC Connection: A point-to-point bi-directional connection between RRC peer entities in the MS and the GERAN characterised by the allocation of a G-RNTI. An MS has either zero or one RRC connection.

RRC-Idle mode: In RRC-Idle mode, the MS has no established RRC connection.

RRC-Connected mode: In RRC-Connected mode, the MS has an established RRC connection.

Inter-RAT handover: indicates the transfer of the connection, under the control of the network, between the MS and two different radio access technologies (e.g. UMTS to GERAN Iu mode).

Inter-mode handover: indicates the transfer of the connection, under the control of the network, between the MS and GERAN *Iu mode* to/from GERAN *A/Gb mode*.

RR group receive mode: defined in 3GPP TS 44.018.

RR dedicated mode: defined in 3GPP TS 44.018.

RR group transmit mode: defined in 3GPP TS 44.018.

RR packet idle mode: defined in 3GPP TS 44.018.

RR packet transfer mode: defined in 3GPP TS 44.018.

RR dual transfer mode: defined in 3GPP TS 44.018.

"channel set": is used to identify TCHs that carry related user information flows, e.g., in a multislot configuration used to support circuit switched connection(s), which therefore need to be handled together.

Temporary block flow (TBF): is defined in 3GPP TS 44.060.

RLC/MAC block: A RLC/MAC block is the protocol data unit exchanged between RLC/MAC entities, see 3GPP TS 44.060.

The network modes of operation for GERAN *Iu mode* are:

NMO I: the network has a Gs interface. The network sends CS paging and PS paging messages for an attached MS via the SGSN and the Iu-ps interface to GERAN Iu. Paging co-ordination is achieved at the SGSN thanks to the Gs interface. GERAN Iu pages the MS on PACCH if available, else PCCCH. MS can initiate combined procedures according to its capabilities.

NMO II: the network has no Gs interface. For an attached MS, the network sends CS paging messages, via the MSC plus the Iu-cs interface, and sends PS paging messages, via the SGSN plus the Iu-ps interface to GERAN Iu. GERAN Iu performs paging co-ordination and pages the MS on PACCH if available, else PCCCH. MSs cannot initiate combined procedures.

3.2 Abbreviations

Abbreviations used in this specification are listed in 3GPP TS 21.905.

NOTE: 3GPP TS 21.905 may need to be updated.

3.3 Random values

In a number of places in this Technical Specification, it is mentioned that some value must take a "random" value, in a given range, or more generally with some statistical distribution. Such cases interest only the Mobile Station.

It is required that there is a low probability that two MSs in the same conditions (including the case of two MSs of the same type from the same manufacturer) will choose the same value. Moreover, it is required that, if it happens that two MSs in similar conditions choose the same value, the probability of their choices being identical at the next occasion is the same as if their first choices had been different.

The meaning of such a specification is that any statistical test for these values, done on a series of similar events, will obtain a result statistically compatible with the specified distribution. This shall hold even in the cases where the tests are conducted with a subset of possible events, with some common parameters. Moreover, basic tests of independence of the values within the series shall pass.

Data against which correlation with the values shall not be found are the protocol state, or the IMSI, or identities or other unrelated information broadcast by the network, or the current TDMA frame number.

3.4 Specification Notations

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

Procedure When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. RRC Estabilshment procedure.

Message When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. CELL UPDATE message.

IE When referring to an information element (IE) in the specification the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font precedeed by the abbreviation "IE", e.g. IE *"Initial MS Identity"*.

Value of an IE When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in sub-clause 9.2 enclosed by quotation marks, e.g. "Abstract Syntax Error (Reject)" or "Geographical Coordinates"

4 RRC Functions and Services provided to upper layers

4.1 RRC Functions

RRC performs following functions. A more detailed description of the functions can be found in 3GPP TS 43.051.

- Broadcast of information provided by the Non-Access stratum (Core Network)

- Broadcast of information related to the access stratum

- Establishment, re-establishment, maintenance and release of an RRC connection between the MS and GERAN

- Establishment, reconfiguration and release of Radio Bearers

- Assignment, reconfiguration and release of radio resources for the RRC connection

- RRC connection mobility functions

- Release of signalling connections

- Paging/notification

- Listening to BCCH

- Routing of higher layer PDUs

- Control of requested QoS

- MS measurement reporting and control of the reporting

- Power control

- Control of ciphering

- Integrity protection

- Support for Location Services

- Timing advance control

4.2 RRC Services provided to upper layers

The RRC offers the following services to upper layers (NAS), a description and primitives of these services are provided in 3GPP TS 43.051 and 3GPP TS 23.110.

- General Control;

- Notification;

- Dedicated control.

The RRC layer provides the MS GERAN portion of signalling connections to the upper layers to support the exchange of upper layer's information flow. The signalling connection is used between the mobile station and the core network to transfer upper layer information. For each core network domain, at most one signalling connection may exist at the same time. The RRC layer maps the signalling connections for one MS on a single RRC connection. For the upper layer data transfer on signalling connections, the RRC layer supports the discrimination between two different classes, named "High priority" (corresponding to "SAPI 0" when using RR) realised using SRB3 and "Low priority" (corresponding to "SAPI 3" when using RR) realised using SRB4.

5 Services expected from lower layers

5.1 Services required from layer 2 and physical layers

RRC uses RLC/MAC as layer 2 in the control plane, except for operation on the BCCH, where the data link layer as specified in 3GPP TS 44.006 is used (see 3GPP TS 43.051).

5.2 Signalling Radio Bearers

The Radio Bearers used for transferring signalling messages are called Signalling Radio Bearers (SRBs). The SRBs are defined as:

- SRB1 is used to carry RRC signaling performed in support of Access Stratum specific needs (RLC operates in unacknowledged mode).

- SRB2 is used to carry RRC signaling performed in support of Access Stratum specific needs (RLC operates in acknowledged mode).

- SRB3 is used to carry RRC signaling performed in support of Non-Access Stratum specific needs (RLC operates in acknowledged mode).

- SRB4 is used to carry RRC signaling performed in support of Non-Access Stratum specific needs (RLC operates in acknowledged mode).

6 RRC Protocol modes and states

6.1 General

An overall picture of the transitions between RR modes of operation and RRC states and modes is in Figure 6.1.1. The RRC modes are RRC-Idle mode and RRC-Connected mode. RRC-Connected mode consists of three different RRC states RRC-Cell_Shared, RRC-Cell_Dedicated and RRC-GRA_PCH. The RR modes of operation are RR Dedicated mode, RR Group receive mode, RR Group transmit mode, RR Packet Idle mode, RR Packet Transfer mode and RR DTM (see 3GPP TS 43.064).

RR Group receive mode and RR Group transmit Mode are not described in Figure 6.1.1.
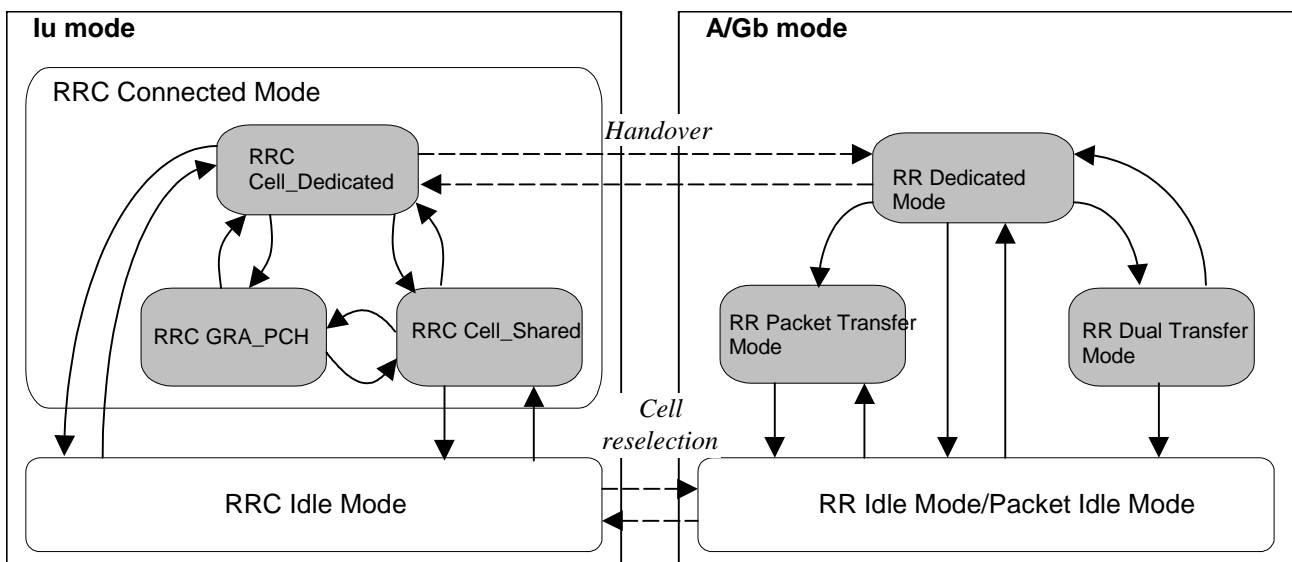
Figure 6.1.1: Transitions between RR modes of operation and RRC states and modes.

6.2 Relation between Iu mode and A/Gb mode

6.2.1 Handover between Iu and A/Gb modes

When a handover which results in change from *Iu mode* (i.e. from the RRC-Cell_Dedicated state) to *A/Gb mode* is performed, the RR dedicated mode of operation shall be entered.

When a handover which results in change from *A/Gb mode* (i.e. from the RR dedicated mode of operation) to *Iu mode* is performed, the RRC-Cell_Dedicated state shall be entered. If handover to *Iu mode* is triggered in RR dual transfer mode of operation, the RR dedicated mode of operation shall be entered before the handover is initiated.

6.2.2 Cell reselection between Iu and A/Gb mode

Cell reselection in this sub-clause refers to aborting the operation in the old cell and switching to the new selected cell.

When a cell reselection which results in change from *Iu mode* (i.e from the RRC-Idle Mode) to *A/Gb mode* is performed, the RR Idle/ RR Packet Idle mode of operation shall be entered. If cell reselection is triggered in RRC-Cell_Shared or RRC-GRA_PCH state, the RRC-Idle mode shall be entered before the cell reselection is initiated.

When a cell reselection which result in change from *A/Gb mode* (i.e. from the RR Idle/RR packet Idle mode of operation) to *Iu mode*, is performed the RRC-Idle mode shall be entered. If cell reselection is triggered in RR Packet Transfer mode of operation, the RR packet Idle mode of operation shall be entered before the cell reselection is initiated.

6.2a Relation between GERAN Iu mode RRC and UTRA RRC

6.2a.1 Handover between GERAN Iu mode and UTRAN

When a handover which results in change from GERAN *Iu mode* (i.e. RRC-Cell_Dedicated state) to UTRAN is performed, the UTRAN RRC connected mode of operation shall be entered.

When a handover which results in change from UTRAN (i.e. from the UTRA RRC Cell_DCH state) to GERAN *Iu mode* is performed, the RRC-Cell_Dedicated state shall be entered.

6.2a.2 Cell reselection between GERAN Iu mode and UTRAN

Cell reselection in this sub-clause refers to aborting the operation in the old cell and switching to the new selected cell.

When a cell reselection which results in change from GERAN *Iu mode* to UTRAN is performed, when the MS is in RRC-Idle mode, the Idle mode of operation shall be entered.

When a cell reselection which results in change from GERAN *Iu mode* to UTRAN is performed, when the MS is in GERAN RRC-Cell_Shared state, the MS shall initiate the cell update procedure and enter the UTRAN RRC CELL_FACH state. If the cell update is rejected by UTRAN, the MS shall release the RRC connection according to the cell update failure case and enter Idle mode.

When a cell reselection which results in change from GERAN *Iu mode* to UTRAN is performed, when the MS is in GERAN RRC-GRA_PCH state, the MS shall enter the UTRAN RRC URA_PCH state. If the GRA identity which the MS had been assigned to in GERAN is not present in the list of URA identities broadcast in the UTRAN cell, the MS shall initiate the UTRAN URA update procedure. If the URA update is rejected by UTRAN, the MS shall release the RRC connection according to the URA update failure case and enter Idle mode.

When a cell reselection which results in change from UTRAN to GERAN *Iu mode* is performed, when the MS is in UTRAN RRC-Cell_FACH or Cell_PCH state, the MS shall initiate the cell update procedure and enter the GERAN RRC Cell Shared state. If the cell update is rejected by GERAN, the MS shall release the RRC connection according to the cell update failure case and enter RRC Idle mode in GERAN *Iu mode*.

When a cell reselection which results in change from UTRAN to GERAN *Iu mode* is performed, when the MS is in UTRAN RRC-URA_PCH state, the MS shall enter the GERAN RRC GRA_PCH state. . If the URA identity which the MS had been assigned to in UTRAN is not present in the list of GRA identities broadcast in the GERAN cell, the MS shall initiate the GERAN GRA update procedure. If the GRA update is rejected by GERAN, the MS shall release the RRC connection according to the GRA update failure case and enter RRC Idle mode in GERAN *Iu mode*.

6.3 RR modes of operation

The RR modes of operation are described in 3GPP TS 43.064.

6.4 RRC modes and states

6.4.1 RRC-Idle Mode

6.4.1.1 General

After power on having selected the *Iu mode*, the MS enters RRC-Idle mode. The MS stays in RRC-Idle mode until a successful establishment of a RRC Connection. In RRC-Idle mode the connection of the MS is closed on all layers of the access stratum. In RRC-Idle mode the MS is identified by Non-Access stratum identities such as IMSI, TMSI and P-TMSI. In addition, the GERAN has no own information about the individual MS's in RRC-Idle mode, and it can only address e.g. all MS's in a cell (broadcasting) or all MS's monitoring a paging occasion.

6.4.1.2 Transition from RRC-Idle Mode to RRC-Connected mode

The transition to the RRC-Connected mode from the RRC-Idle mode can only be initiated by the MS by transmitting a request for an RRC Connection. The event is triggered by a request from upper layers in the MS.

At RRC connection establishment the MS is assigned a GERAN radio network temporary identity (G-RNTI) to be used as MS identity on both common control channels and traffic channels.

When the MS receives a message from the network that confirms the RRC connection establishment, the MS enters the RRC-Connected mode. The RRC-Connected mode is characterised by three states: RRC-Cell_Shared, RRC-Cell_Dedicated and RRC-GRA_PCH.

6.4.2 RRC-Connected mode: RRC-Cell_Shared state

6.4.2.1 General

RRC-Cell_Shared state is characterized by:

- no dedicated basic physical subchannel (DBPSCH) is allocated to the MS.

- the position of the MS is known by GERAN on cell level according to the cell where the MS last made a cell update.

In RRC-Cell_Shared state the MS shall perform the following actions:

1> initiate a Cell Update procedure on cell change to *Iu mode* in another GERAN or UTRAN cell;

1> transmit signalling messages and user data in the uplink and/or the downlink using PDTCH when the MS is assigned use of those resources;

1> the management of radio resources within the cell is handled at MAC level;

1> listen to the PBCCH control channel of the serving cell for the decoding of system information messages;

1> listen to neighbouring cells for neighbour cell measurements (see 3GPP TS 45.008);

1> use G-RNTI assigned in the current cell as the MS identity on common control channels.

NOTE: In that state, if the network wants to initiate any activity, no paging request is required to be sent. The network can directly allocate radio resources to the MS.

6.4.2.2 Transition from RRC-Cell_Shared state to RRC-Idle Mode

The transition to RRC-Idle Mode is realised through the release of the RRC connection.

6.4.2.3 Transition from RRC-Cell_Shared state to RRC-Cell_Dedicated state

The transition from RRC-Cell_Shared state to RRC-Cell_Dedicated state occurs when a DBPSCH is allocated to the MS.

6.4.2.4 Transition from RRC-Cell_Shared state to RRC-GRA_PCH state

The transition occurs when GERAN orders the MS to move to RRC-GRA_PCH state via explicit signaling.

When such a transition occurs, the mobile station shall abort any TBF in progress by immediately ceasing to decode the downlink, ceasing to transmit on the uplink, stopping all RLC/MAC timers except for timers related to measurement reporting, prior to moving to RRC-GRA_PCH state.

6.4.2.5 Radio resource allocation tasks

RRC is in this state responsible for allocating dedicated basic physical subchannels, which causes the MS to enter the RRC-Cell_Dedicated state. MAC is responsible for allocating / reallocating / releasing shared basic physical subchannels (SBPSCH) (see 3GPP TS 44.160). This allocation of the PDTCHs by MAC is done according to the QoS class of the radio bearer and multislot capability of the MS. The RRC provides the MAC with QoS class and indication of the MS multislot capability.

6.4.2.6 RRC connection mobility tasks

In RRC-Cell_Shared state the MS shall initiate a Cell Update procedure when:

1> a new GERAN cell has been selected and the MS operates in *Iu mode*, or

1> a UTRAN cell has been selected.

1> when T305 in the MS expires and the MS is operating in *Iu mode*.

When the GERAN cell has been selected that would require the MS to operate in the *A/Gb mode* then the MS shall enter the RRC-Idle Mode, enter RR Idle or RR Packet Idle Mode of operation. Access in the cell will then be made according to the *A/Gb mode* procedures.

6.4.2.7 MS measurements

MAC is responsible for measurement reporting, using the procedures defined in 3GPP TS 44.060.

6.4.3 RRC-Connected mode: RRC-Cell_Dedicated state

6.4.3.1 General

RRC-Cell_Dedicated state is characterized by:

- the MS is assigned one or more dedicated basic physical subchannels (see 3GPP TS 43.051) in the uplink and downlink, which it can use anytime. Furthermore, the MS may be assigned one or more shared basic physical subchannels.

- the position of the MS is known by GERAN on cell level.

In RRC-Cell_Dedicated state the MS shall perform the following actions:

1> perform necessary procedures for measurement reporting;

1> listen to neighbouring cells for neighbouring cell measurements (see 3GPP TS 45.008);

1> perform a handover procedure of the dedicated basic physical subchannels on cell change of another GERAN or UTRAN cell;

1> transmit signalling message in the uplink using available signalling radio bearers.

6.4.3.2 Transition from RRC-Cell_Dedicated state to RRC-Cell_Shared state

The transition occurs when all the dedicated basic physical subchannels are released and

1> shared basic physical subchannels exist; or

1> no shared basic physical subchannels exist and the network indicates transition to the RRC-Cell_Shared state.

6.4.3.3 Transition from RRC-Cell_Dedicated state to RRC-Idle Mode

The transition to RRC-Idle mode is realised through the release of the RRC connection.

6.4.3.4 Transition from RRC-Cell_Dedicated state to RRC-GRA_PCH state

The transition occurs when GERAN orders the MS to move to the RRC-GRA_PCH state via explicit signalling.

When such a signalling is received, the mobile station shall release all the allocated dedicated basic physical suchannel(s) and, if any, all the shared basic physical subchannels, prior to moving to RRC-GRA_PCH state.

6.4.3.5 Radio resource allocation tasks

RRC is responsible for allocating new dedicated basic physical subchannels, while MAC or RRC are responsible for allocation of new shared basic physical subchannels depending on the MAC control state. RRC is also responsible for intra-cell handovers of dedicated basic physical sub-channels.

6.4.3.6 RRC connection mobility tasks

RRC connection mobility tasks are realised in RRC-Cell_Dedicated state using RRC handover procedures.

6.4.3.7 MS measurements

MS measurement results are signaled using RRC measurement procedures.

6.4.4 RRC-Connected mode: RRC-GRA_PCH state

6.4.4.1 General

The RRC-GRA_PCH state is characterized by:

- no physical subchannel is allocated to the MS.

- the MS may use DRX for monitoring a PCCCH.

- no uplink activity is possible.

- the location of the MS is known on GERAN Registration area level.

In this state the MS performs the following actions:

1> monitor the paging occasions according to the DRX cycle and receive paging information on the PCCCH;

1> listen to the PBCCH control channel of the serving cell for the decoding of system information messages;

1> initiate a GRA Update procedure upon GRA change.

If the network wants to initiate any activity, it shall make a paging request on the PCCCH logical channel within the GRA where the MS is.

GRA updating is initiated by the MS, which, upon the detection of the new GERAN registration area, sends the network the registration area update information to the new cell. Any activity causes a transition to either the RRC-Cell_Shared state or the RRC-Cell_Dedicated state, depending on the activity.

6.4.4.2 Transition from RRC-GRA_PCH state to RRC-Cell_Shared state

The transition can occur due to GRA update, cell update or answer to paging. If there has been a cell change since last GRA update, the MS has to do immediately a cell update except when GRA update is initiated.

6.4.4.3 Transition from RRC-GRA_PCH state to RRC-Cell_Dedicated state

When the MS is in RRC-GRA_PCH state, the MS may request a radio resource to answer to a paging message or to perform a GRA/Cell Update procedure. The network may choose to allocate a dedicated resource in which case the MS enters RRC-Cell_Dedicated state.

6.4.4.4 Radio resource allocation tasks

No radio resource allocation tasks are executed within this state. In case of transition to RRC-Cell_Shared state is needed, the MAC is responsible for allocating the shared physical subchannels. In case of transition to RRC-Cell_Dedicated state is needed, the RRC is responsible for allocating the physical subdedicated channel.

6.4.4.5 RRC connection mobility tasks

In the RRC-GRA_PCH state the location of a MS is known on GERAN Registration area level.

In this state, the MS mobility is performed through Cell Reselection procedures. The MS shall perform cell reselection and upon selecting a new GERAN cell belonging to a GRA which does not match the GRA used by the MS, the MS shall move to RRC-Cell_Shared state and initiate a GRA update towards the network. After the GRA Update procedure has been performed, the MS shall change its state back to RRC-GRA PCH state if neither the MS nor the network has any more data to transmit.

In RRC-GRA_PCH state the MS shall initiate:

 1> a GRA Update procedure when a new GERAN cell has been selected that does not belong to the current registration area and the MS operates in Iu mode, or

 1> a GRA Update procedure when T305 in the MS expires and the MS is operating in Iu mode, or

 1> a URA Update procedure when a UTRAN cell has been selected that does not belong to the current registration area (see 3GPP TS 25.331).

When the GERAN cell has been selected that would require the MS to operate in the *A/Gb mode* then the MS shall enter the RRC-Idle mode, then enter RR Idle or RR Packet Idle Mode of operation. Access in the cell will then be made according to the *A/Gb mode* procedures.

6.4.4.6 MS measurements

The MS monitors the broadcast channels on its own and neighbouring cells and identifies the need for GRA updating. No measurement reports are sent to the network in this state.

6.4.4.7 Transfer and update of system information

The MS shall listen to the PBCCH to acquire a valid system information.

7 Radio Resource Control procedures

7.1 General

The mobile station can operate either in *A/Gb mode* or in *Iu mode*. How mobile station selects the operation mode is specified in 3GPP TS 23.221. The behaviour of mobile stations operating in *A/Gb mode* is specified in 3GPP TS 44.018.

After the reception of a message which invoked a procedure, the MS shall be prepared to receive and act on another message which invokes the second procedure. Whether this second invocation of a procedure (transaction) is accepted or rejected by the MS is specified in the sub-clauses that specifies the procedure. On receiving a message the MS shall first apply integrity check as appropriate and then proceed with error handling as specified in clause 8 and 9 before continuing on with the procedure as specified in the relevant sub-clause. The RRC entity in the MS shall consider PDUs to have been transmitted when they are submitted to the lower layers. If the RRC entity in the MS submits a message

for transmission using AM RLC, it shall consider the message successfully transmitted when GERAN reception of all relevant PDUs is acknowledged by RLC.

7.2   Change of channels in case of handover

7.2.1   Change of channel serving SRB1

The RLC procedures for unacknowledged mode, described in 3GPP TS 44.160, do not provide protection against message loss or duplication. No functionality for handling SRB1 during change of channels is defined, as SRB1 is used by RRC procedures that are not very sensitive to message loss or duplication.

7.2.2   Change of channel serving SRB2

The RLC procedures for acknowledged mode, described in 3GPP TS 44.160, provide delivery of received messages to the upper layers in the order they were originally transmitted, provide protection against message loss, but do not provide protection against message duplication. SRB2 is used by RRC procedures that need reliable transport service and are sensitive to message duplication.

When changing channel, the RRC layer will request the RLC layer to suspend operation on SRB2 before the mobile station leaves the old channel. When the channel change has been completed, the RRC layer station will request the RLC layer to resume operation on SRB2. The RLC layer suspend/resume procedures are described in 3GPP TS 44.160.

It may happen that the RLC layer duplicates a message, if it has been transmitted but not yet completely acknowledged within the RLC layer, before the mobile station leaves the old channel. However, the RRC layer controls the channels change in such a way that duplication of RRC messages does not occur.

7.2.3   Change of channel serving SRB3

The RLC procedures for acknowledged mode, described in 3GPP TS 44.160, provide delivery of received messages to the upper layers in the order they were originally transmitted, provide protection against message loss, but do not provide protection against message duplication. SRB3 is used for RRC messages carrying upper layer (NAS) signalling. If these messages are sensitive to message duplication, the upper layer protocol should define its own protection mechanism.

7.2.4   Change of channel serving SRB4

The RLC procedures for acknowledged mode, described in 3GPP TS 44.160, provide delivery of received messages to the upper layers in the order they were originally transmitted, provide protection against message loss, but do not provide protection against message duplication. SRB4 is used for RRC messages carrying upper layer (NAS) signalling. If these messages are sensitive to message duplication, the upper layer protocol should define its own protection mechanism.

7.3   System information broadcasting

7.3.1   General

The purpose of this procedure is to broadcast SYSTEM INFORMATION (SI) messages from the GERAN to MSs in a cell.

GERAN is required to broadcast SI messages on BCCH as specified in 3GPP TS 44.018.

7.3.2   Broadcast of Iu mode specific System Information

The support of *Iu mode* shall be indicated in SYSTEM INFORMATION TYPE 3 message sent on BCCH. In addition, the support of *Iu mode* shall be indicated in either SYSTEM INFORMATION TYPE 4 or SYSTEM INFORMATION TYPE 7 and 8 messages. The SI3, SI4, SI7 and SI8 messages contain the CBQ3 parameter that indicates if *Iu mode* is supported in the cell (see 3GPP TS 44.018).

If *Iu mode* is supported and Gb mode is not supported in the cell, SYSTEM INFORMATION TYPE 13alt message shall be sent and the mobile station shall read SI13alt message. SI 13 message is not sent in this case. SI13alt message shall not be sent if *Iu mode* is not supported.

If Gb mode is supported, SYSTEM INFORMATION TYPE 13 message shall be sent and the mobile station shall read SI 13 message in this case. SI13alt message is not sent in this case. Additional requirements for the broadcast of system information in a cell supporting *Iu mode* and *Gb mode* are specified in 3GPP TSs 44.060 and 44.160.

Figure 7.3.2.1 presents the behaviour of *Iu mode* only capable mobile station and figure 7.3.2.2 presents the behaviour of *A/Gb mode* and *Iu mode* capable mobile station on BCCH (see 3GPP TS 44.018).
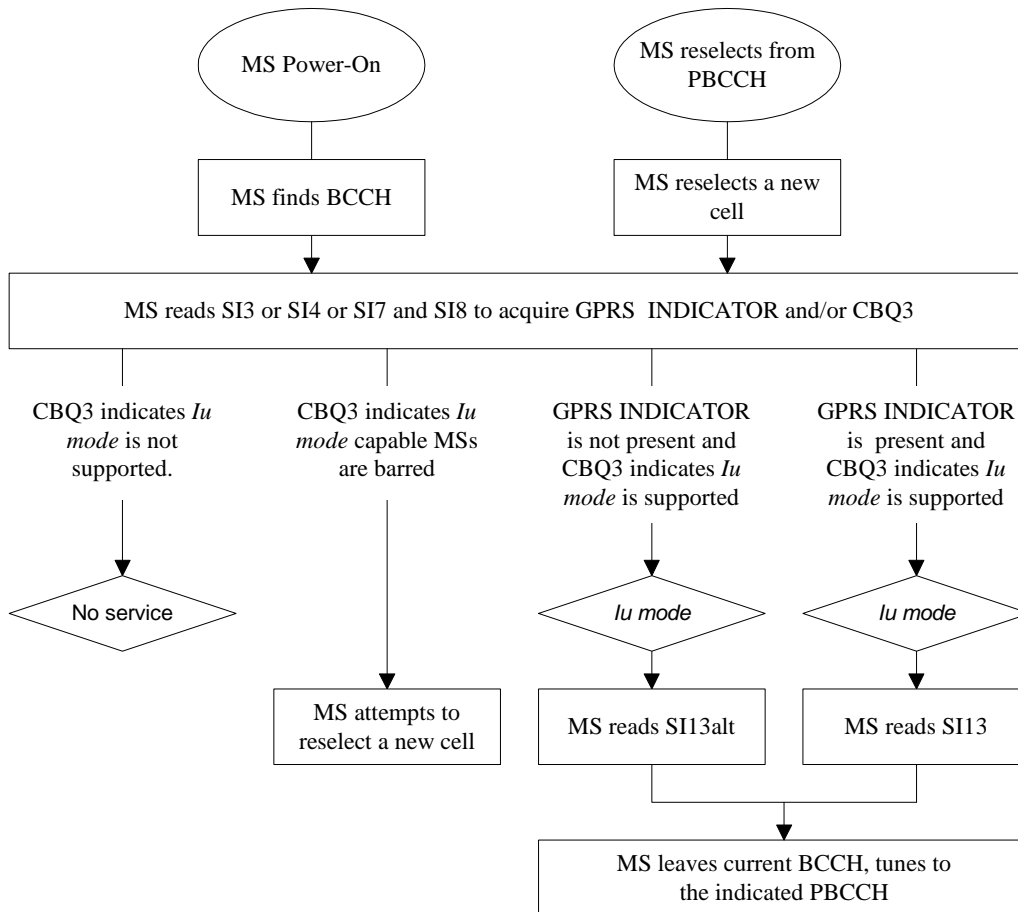
Figure 7.3.2.1: Behaviour of *Iu mode* only capable MS on BCCH.
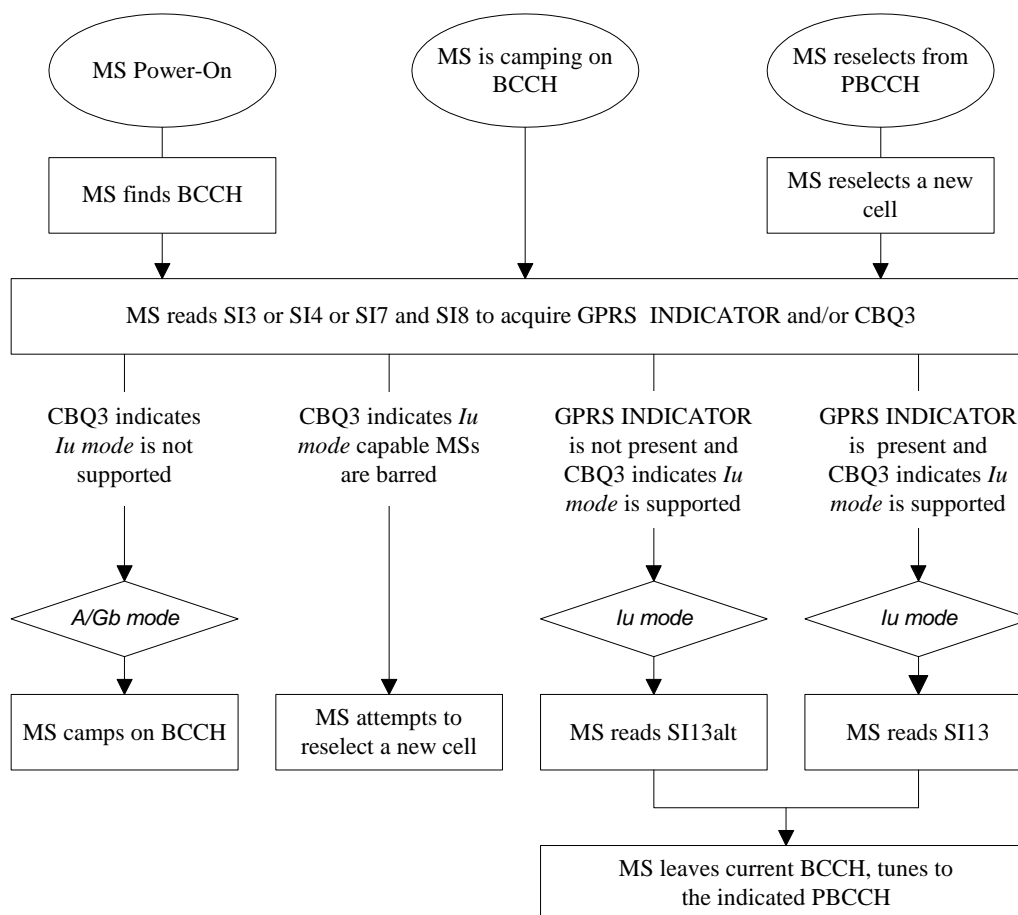
Figure 7.3.2.2: Behaviour of *A/Gb* and *Iu mode*s capable MS on BCCH.

7.4 Paging procedure

7.4.1 General

The GERAN will start a Paging Request procedure to trigger:

   1> an Initial Direct Transfer procedure for CN originated paging; or

   1> a Cell Update procedure for GERAN initiated paging.

Paging is done by the GERAN on the PCCCH or PACCH (when available) when the MS is in RRC-Idle mode, RRC-Cell_Shared state or RRC-GRA_PCH state and on SRB2 when the MS is in RRC-Cell_Dedicated state.

7.4.2 Paging initiation in RRC-Idle mode, RRC-Cell_Shared or RRC-GRA_PCH state

7.4.2.1 General

The paging initiation in RRC-Idle mode, RRC-Cell_Shared state or RRC-GRA_PCH state is done by sending a PAGING REQUEST service primitive to the GERAN MAC layer.
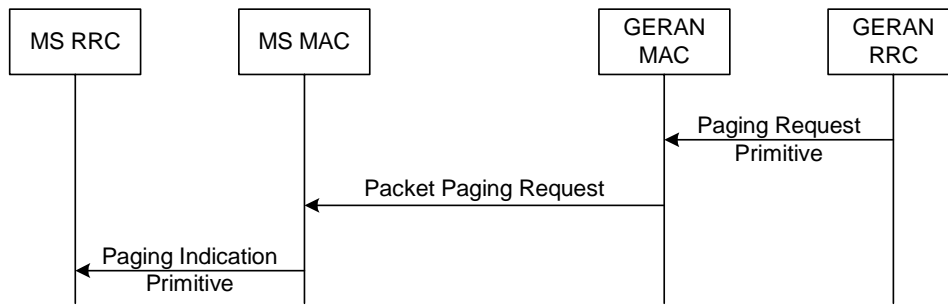
Figure 7.4.2.1.1: Paging Request procedure

This procedure is used to initiate transmission of paging information by the GERAN MAC to an MS in RRC-Idle mode, RRC-Cell_Shared state, or RRC-GRA_PCH state. Upper layers in the network may request paging, to e.g. establish a signalling connection between a mobile station and the CN. The GERAN may initiate paging of an MS in RRC-GRA_PCH state or {RRC-Cell_Shared, MAC-Idle state} to trigger a Cell Update procedure in order to establish a signalling connection between the network and this MS.

An MS may use Discontinuous Reception (DRX) to reduce its power consumption. An MS in non-DRX mode monitors all paging blocks on the monitored PCCCH. An MS in DRX mode needs only to monitor the blocks corresponding to its paging group in order to reduce its battery consumption, see 3GPP TS 44.160.

7.4.2.2 Initiation

GERAN RRC initiates the Paging procedure by transmitting a PAGING REQUEST service primitive to the GERAN MAC sublayer.

The GERAN shall set the IEs in the PAGING service primitive as follows:

1> if the Paging procedure was initiated by the CN

    2> if the MS is in RRC-Cell_Shared or RRC-GRA_PCH state, then

        3> the *MS Identity* IE shall be set to G-RNTI;

        3> the *Paging Record Type Identifier* IE shall be set to the value determined by the MS identity received in the CN paging request;

        3> the *CN Domain identity* IE shall be set to the value received in the CN paging request;

        3> if a value for Paging Cause is received from the CN, then the GERAN RRC shall:

            4> set the *Paging Cause* IE in the PAGING service primitive to the value received in the CN paging request; .

        3> if no value for Paging Cause is received from the CN then the GERAN RRC shall:

            4> set the *Paging Cause* IE in the PAGING service primitive to the value "Terminating – cause unknown".

    2> if the MS is in RRC-Idle mode then:

        3> the *MS Identity* IE shall be set to the value received from the CN;

        3> the *CN Domain Identity* IE shall be set to the value received in the CN paging request;

        3> if a value for Paging Cause is received from the CN then the GERAN RRC shall:

            4> set the *Paging Cause* IE in the PAGING service primitive to the value received in the CN paging request;

        3> if no value for Paging Cause is received from the CN then the GERAN RRC shall:

            4> set the *Paging Cause* IE in the PAGING service primitive to the value "Terminating – cause unknown".

1> if the Paging procedure was initiated by the GERAN, the GERAN RRC shall:

    2> set the *MS Identity* IE to G-RNTI; and

    2> the procedure ends.

    NOTE: If the Paging procedure is initiated by the GERAN, the GERAN shall indicate this to the MS by the absence of any information in the PAGING message other than the G-RNTI IE.

7.4.2.3   Reception of a PAGING INDICATION service primitive

The MS RRC in RRC-Idle mode, RRC-GRA_PCH state or RRC-Cell_Shared state shall receive the paging information in a PAGING INDICATION service primitive from the MS MAC layer.

If the MS is in RRC-Idle mode, for each MS paged in the PAGING INDICATION service primitive, the MS shall:

    1> if the *MS Identity* IE is present in the message and it is a CN identity

        2> compare the *MS Identity* IE with all of its allocated CN MS identities;

        2> if one match is found:

            3> forward the *MS Identity* IE, the *CN Domain Identity* IE and the *Paging cause* IE to upper layers; and

            3> ignore any other paging information that may be present in the PAGING service primitive;

    1> otherwise:

        2> ignore the PAGING service primitive.

If the MS is in RRC-Cell_Shared or RRC-GRA_PCH state, for each MS paged in the PAGING INDICATION service primitive, the GERAN RRC shall:

    1> if the *MS Identity* IE is a GERAN identity; and

        2> if this G-RNTI is the same as the G-RNTI allocated to the MS:

            3> if paging request contains page info with CN domain identity

                4>forward the *MS identity* IE, the *CN Domain Identity* IE and the *Paging Cause IE* to upper layers;

            3>otherwise

                4> initiate the Cell Update procedure with the cause 'paging response' as defined in sub-clause 7.8; and

                4> forward the *CN Domain Identity* IE if present, the *Paging Record Type Identifier* IE if present and the *Paging cause* IE if present to upper layers; and

            3> ignore any other paging information that may be present in the primitive;

    1> otherwise

        2> ignore the Paging primitive.

7.4.3   Paging initiation in RRC-Cell_Dedicated state

Figure 7.4.3.1.1: Dedicated Paging Request procedure

7.4.3.1   General

This procedure is used to transmit dedicated paging information to one MS in RRC-Cell_Dedicated state.

7.4.3.2   Initiation

For an MS in RRC-Cell_Dedicated state the GERAN initiates the procedure by transmitting a DEDICATED PAGING REQUEST message on the SRB2 assigned to the MS. If not stated otherwise, the GERAN may initiate the Dedicated Paging Request when another RRC procedure is ongoing, and in this case the state of the latter procedure shall not be affected.

In the DEDICATED PAGING REQUEST message, the GERAN RRC shall set the IE "*Paging Cause*", the IE "*CN Domain Identity*", the IE "*Paging Record Type Identifier*" respectively to the Paging Cause, the CN domain Indicator and the Paging Record Type Identifier received from upper layers.

If no cause for pagingis received from upper layers, GERAN RRC shall set the IE "*Paging Cause*" to the value "Terminating – cause unknown".

7.4.3.3   Reception of a DEDICATED PAGING REQUEST message by the MS

When the MS receives a DEDICATED PAGING REQUEST message on SRB 2, it shall not affect the state of any other ongoing RRC procedures, if not stated otherwise.

Upon receipt of a DEDICATED PAGING REQUEST message the MS shall:

> 1> forward the *Paging Cause* IE, the *CN Domain Identity* IE and the *Paging Record Type Identifier* IE to upper layers;

> 1> the procedure ends.

7.4.4   Abnormal cases

If the MS receives a DEDICATED PAGING REQUEST message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE, the MS shall perform procedure specific error handling as follows:

> 1> transmit an RRC STATUS message on the uplink SRB2;

> 1> include the IE "*Identification of Received Message*";

> 1> set the IE "*Received Message Type*" to DEDICATED PAGING REQUEST;

> 1> include the *Protocol Error Information* IE and set the content to the value of the variable PROTOCOL_ERROR_INFORMATION.

> 1> if the RRC STATUS message has been submitted to lower layers for transmission:

>> 2> continue with any ongoing processes and procedures as if the invalid DEDICATED PAGING REQUEST message was not received.

7.5 RRC Connection management procedures

7.5.1 RRC connection establishment
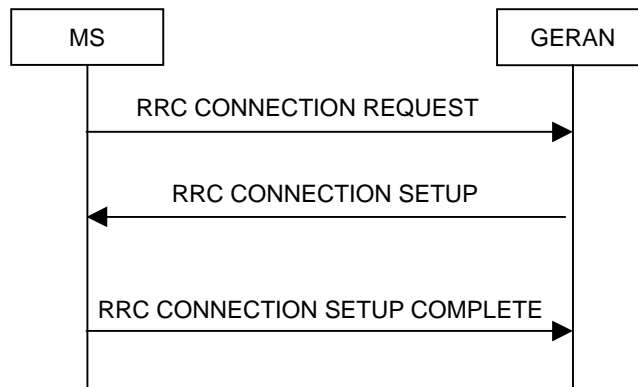
Figure 7.5.1.1: RRC Connection Establishment, network accepts RRC connection
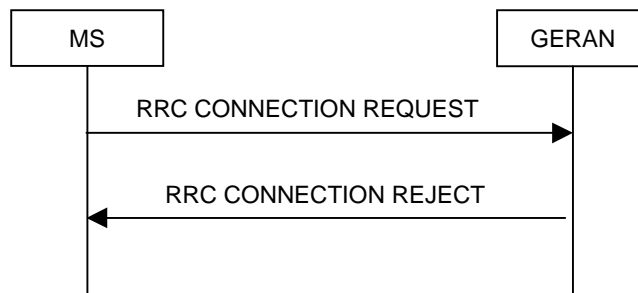
Figure 7.5.1.2: RRC Connection Establishment, network rejects RRC connection

7.5.1.1 General

The purpose of this procedure is to establish an RRC connection.

7.5.1.2 Initiation

The MS shall initiate the procedure when upper layers in the MS requests the establishment of a signalling connection and the MS is in RRC-Idle mode (no RRC connection exists), as specified in sub-clause 7.17.

Upon initiation of the procedure, the MS shall:

1> set the variable PROTOCOL_ERROR_INDICATOR to FALSE;

1> if the USIM is present:

2> set the value of "THRESHOLD" in the variable "START_THRESHOLD" by the 20 MSBs of the value stored in the USIM (see 3GPP TS 31.102) for the maximum value of START for each CN Domain;

1> if the SIM is present:

2> set the value of "THRESHOLD" in the variable "START_THRESHOLD" to the default value in 3GPP TS 33.102 for each CN Domain.

1> set the IE "*Initial MS Identity*" in the variable INITIAL_MS_IDENTITY according to sub-clause 7.18;

1> set the contents of the RRC CONNECTION REQUEST message according to sub-clause 7.5.1.3;

1> submit the RRC CONNECTION REQUEST message for transmission on the uplink SRB2;

1> set counter V300 to 1; and

1> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

    2> start timer T300;

1> if the RLC sub-layer indicates a link failure to the RRC layer:

    2> enter RRC-Idle mode;

    2> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

    2> consider the RRC Connection Establishment procedure to be unsuccessful;

    2> the procedure ends.

7.5.1.3 RRC CONNECTION REQUEST message contents to set

The MS shall, in the transmitted RRC CONNECTION REQUEST message:

1> set the IE "*Establishment Cause*" to the value of the variable ESTABLISHMENT_CAUSE;

1> set the IE "*Initial MS Identity*" to the value of the variable INITIAL_MS_IDENTITY;

1> set the IE "*Protocol Error Indicator*" to the value of the variable PROTOCOL_ERROR_INDICATOR.

7.5.1.4 Reception of an RRC CONNECTION REQUEST message by the GERAN

Upon receiving an RRC CONNECTION REQUEST message, the GERAN shall either:

1> submit an RRC CONNECTION SETUP message to the lower layers for transmission on the downlink SRB2; or

1> submit an RRC CONNECTION REJECT message on the downlink SRB2. In the RRC CONNECTION REJECT message, the GERAN may direct the MS to another GERAN cell. After the RRC CONNECTION REJECT message has been sent, all context information for the MS may be deleted in GERAN.

7.5.1.5 Cell re-selection or T300 timeout

If the MS has not yet received an RRC CONNECTION SETUP message with the value of the IE "*Initial MS Identity*" equal to the value of the variable INITIAL_MS_IDENTITY and if cell re-selection or expiry of timer T300 occurs the MS shall:

1> check the value of V300; and

    2> if V300 is equal to or smaller than N300:

        3> set the IEs in the RRC CONNECTION REQUEST message according to sub-clause 7.5.1.3;

        3> submit a new RRC CONNECTION REQUEST message to lower layers for transmission on the uplink SRB2;

        3> increment counter V300;

        3> if the RLC sub-layer indicates to the RRC layer a successful transmission of the RRC CONNECTION REQUEST message:

            4> restart timer T300;

        3> if the RLC sub-layer indicates a link failure to the RRC layer:

            4> enter RRC-Idle mode;

            4> perform the actions specified in clause 6 and in sub sub-clause 7.18;

            4> consider the RRC Connection Establishment procedure to be unsuccessful;

            4> the procedure ends.

    2> if V300 is greater than N300:

        3> enter RRC-Idle mode.

        3> consider the procedure to be unsuccessful;

        3> other actions the MS shall perform when MS is in RRC-Idle mode are specified in sub-clause 6;

        3> the procedure ends.

7.5.1.6 Abortion of RRC connection establishment

If the MS has not yet entered GERAN RRC-Connected mode and the RRC Connection Establishment is to be aborted as specified in sub-clause 7.17.1.4, the MS shall:

    1> consider the procedure to be unsuccessful;

    1> perform the actions when MS is in RRC-Idle mode as specified in clause 6 and sub-clause 7.18.

The procedure ends.

7.5.1.7 Reception of an RRC CONNECTION SETUP message by the MS

On receipt of an RRC CONNECTION SETUP message with the value of the IE "*Initial MS Identity*" equal to the value of the variable INITIAL_MS_IDENTITY, the MS shall:

    1> stop timer T300, and act upon all received information elements as specified in sub-clause 7.19, unless specified otherwise in the following;

        2> if the MS will be in the RRC-Cell_Shared state at the conclusion of this procedure:

            3> set the GERAN DRX cycle length coeffcient as specified in sub-clause 7.19;

    1> enter in RRC-Connected mode according to sub-clause 7.19;

    1> submit an RRC CONNECTION SETUP COMPLETE message to the lower layers on the uplink SRB2 after successful state transition, with the contents set as specified below:

        2> set the IE "*RRC Transaction Identifier*" to

            3> the value of "RRC transaction identifier" in the entry for the RRC CONNECTION SETUP message in the table "Accepted transactions" in the variable TRANSACTIONS; and

            3> clear that entry.

        2> if the USIM or SIM is present:

            3> set the "START" for each CN domain in the IE "*START List*" in the RRC CONNECTION SETUP COMPLETE message with the corresponding START value that is stored in the USIM (see 3GPP TS 31.102) if present, or as stored in the MS if the SIM is present; and then

            3> set the START value stored in the USIM (see 3GPP TS 31.102) if present, and as stored in the MS if the SIM is present, for any CN domain to the value "THRESHOLD" of the variable START_THRESHOLD;

        2> if neither the USIM nor SIM is present:

            3> set the "START" for each CN domain in the IE "*START List*" in the RRC CONNECTION SETUP message to zero;

            3> set the value of "THRESHOLD" in the variable "START_THRESHOLD" to the default value as specified in 3GPP TS 33.102.

        2> retrieve its GERAN *Iu mode* MS radio access capability information elements from variable the MS_CAPABILITY_REQUESTED; and then

2> include this in IE "*MS GERAN Iu mode Radio Access Capability*", in the RRC CONNECTION SETUP COMPLETE message;

2> retrieve its inter-RAT specific MS and UE radio access capability information elements from the variable MS_CAPABILITY_REQUESTED; and then

2> include this in structure "*Inter-RAT MS Radio Access Capability*".

The RRC CONNECTION SETUP COMPLETE message is submitted to lower layers for transmission:

1> If the RLC sub-layer indicates to the RRC layer a successful transmission of the RRC CONNECTION SETUP COMPLETE message the MS shall:

2> if the MS has entered RRC-Cell_Shared state:

3> start timer T305 using its initial value if periodical update has been configured by T305 in the IE "*MS Timers and Constants in Connected mode*" set to any other value than "infinity" the variable TIMERS_AND_CONSTANTS ;

2> store the contents of the variable MS_CAPABILITY_REQUESTED into the variable MS_CAPABILITY_TRANSFERRED

2> initialise variables upon entering RRC-Connected mode as specified in sub-clause 10.4;

2> consider the procedure to be successful;

2> and the procedure ends.

1> Else, the RLC sub-layer indicates to the RRC layer a link failure condition. The MS shall:

2> enter RRC-Idle mode;

2> perform the actions specified in clause 6 and in sub sub-clause 7.18;

2> consider the RRC Connection Establishment procedure to be unsuccessful;

2> the procedure ends.

7.5.1.8   Cell re-selection

1> If the MS performs cell re-selection; or

1> if the MS will be in the RRC-Cell_Shared state at the conclusion of this procedure; and

1> if the contents of the variable G_RNTI is empty;

1> after having received an RRC CONNECTION SETUP message; and

1> before the RRC CONNECTION SETUP COMPLETE message is delivered to lower layers for transmission:

the MS shall:

1> clear the entry for the RRC CONNECTION SETUP message in the table "Accepted transactions" in the variable TRANSACTIONS;

1> check the value of V300, and:

2> if V300 is equal to or smaller than N300:

3> set the IEs in the RRC CONNECTION REQUEST message according to sub-clause 7.5.1.3;

3> submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink SRB2;

3> increment counter V300; and

3> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

4> restart timer T300;

3> if the RLC sub-layer indicates a link failure to the RRC layer:

4> enter RRC-Idle mode;

4> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

4> consider the RRC Connection Establishment procedure to be unsuccessful;

4> the procedure ends.

2> if V300 is greater than N300:

3> enter RRC-Idle mode;

3> perform the actions specified in clause 6 MS is in RRC-Idle mode;

3> consider the RRC Establishment procedure to be unsuccessful;

3> the procedure ends.

7.5.1.9 Invalid RRC CONNECTION SETUP message

If the MS receives an RRC CONNECTION SETUP message and the RRC CONNECTION SETUP message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows:

1> clear the entry for the RRC CONNECTION SETUP message in the table "Rejected transactions" in the variable TRANSACTIONS and proceed as below;

1> if V300 is equal to or smaller than N300:

2> set the variable PROTOCOL_ERROR_INDICATOR to TRUE;

2> set the IEs in the RRC CONNECTION REQUEST message according to sub-clause 7.5.1.3;

2> submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink SRB2;

2> increment counter V300; and

2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

3> restart timer T300;

2> if the RLC sub-layer indicates a link failure to the RRC layer:

3> enter RRC-Idle mode;

3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

3> consider the RRC Connection Establishment procedure to be unsuccessful;

3> the procedure ends.

1> if V300 is greater than N300:

2> enter RRC-Idle mode;

2> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

2> consider the RRC Establishment procedure to be unsuccessful;

2> the procedure ends.

7.5.1.10 Reception of an RRC CONNECTION REJECT message by the MS

When the MS receives an RRC CONNECTION REJECT message on the downlink SRB2 with the value of the IE "*Initial MS Identity*" equal to the value of the variable INITIAL_MS_IDENTITY, the MS shall stop timer T300 and:

1> clear the entry for the RRC CONNECTION REJECT message in the table "Accepted transactions" in the variable TRANSACTIONS;

1> if the IE "*Wait Time*" is not equal to '0';

2> if V300 is equal to or smaller than N300:

3> set the IEs in the RRC CONNECTION REQUEST message according to 7.5.1.3;

3> then submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink SRB2.

3> increment counter V300; and

3> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

4> restart timer T300;

3> if the RLC sub-layer indicates a link failure to the RRC layer:

4> enter RRC-Idle mode;

4> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

4> consider the RRC Connection Establishment procedure to be unsuccessful;

4> the procedure ends.

2> if V300 is greater than N300:

3> enter RRC-Idle mode;

3> perform the actions specified in clause 6 when entering RRC-Idle mode;

mode;

3> consider the RRC Establishment procedure to be unsuccessful;

3> the procedure ends.

1> if the IE "*Wait Time*" is equal to '0':

2> enter RRC-Idle mode;

2> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

2> consider the RRC Establishment procedure to be unsuccessful;

2> the procedure ends.

7.5.1.11 Invalid RRC CONNECTION REJECT message

If the MS receives an RRC CONNECTION REJECT message which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows.

The MS shall:

1> clear the entry for the RRC CONNECTION REJECT message in the table "Rejected transactions" in the variable TRANSACTIONS;

1> if V300 is equal to or smaller than N300:

    2> set the variable PROTOCOL_ERROR_INDICATOR to TRUE;

    2> set the IEs in the RRC CONNECTION REQUEST message according to sub-clause 7.5.1.3;

    2> submit a new RRC CONNECTION REQUEST message to the lower layers for transmission on the uplink SRB2;

    2> increment counter V300; and

    2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

        3> restart timer T300;

    2> if the RLC sub-layer indicates a link failure to the RRC layer:

        3> enter RRC-Idle mode;

        3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

        3> consider the RRC Connection Establishment procedure to be unsuccessful;

        3> procedure ends.

1> if V300 is greater than N300:

    2> enter RRC-Idle mode;

    2> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

    2> consider the RRC Establishment procedure to be unsuccessful;

    2> the procedure ends.

7.5.2 RRC connection release
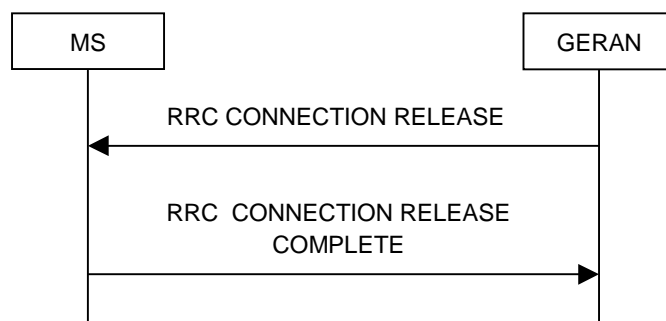
Figure 7.5.2.1: RRC Connection Release procedure

7.5.2.1 General

The purpose of this procedure is to release the RRC connection and all radio bearers between the MS and the GERAN. By doing so, all established signalling connections will be released.

7.5.2.2 Initiation

When the MS is in state RRC-Cell_Dedicated state or RRC-Cell_Shared state, the GERAN may at anytime initiate an RRC connection release by transmitting an RRC CONNECTION RELEASE message using SRB2.

7.5.2.3 Reception of an RRC CONNECTION RELEASE message by the MS

The MS shall receive and act on an RRC CONNECTION RELEASE message in states RRC-Cell_Dedicated state and RRC-Cell_Shared state. Furthermore this procedure can interrupt any ongoing procedures with the MS in the above listed states.

When the MS receives the RRC CONNECTION RELEASE message, it shall:

> 1> in state RRC-Cell_Dedicated state:

>> 2> set the IE "*RRC Transaction Identifier*" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS; and

>> 2> if the IE "*RPLMN Information*" is present:

>>> 3> the MS may:

>>>> 4> store the IE on the ME together with the PLMN id for which it applies;

>>> 3> the MS may then:

>>>> 4> utilise this information, typically indicating where a number of BCCH frequency ranges of a RAT may be expected to be found, during subsequent RPLMN selections of the indicated PLMN.

>> 2> submit an RRC CONNECTION RELEASE COMPLETE message to the lower layers for transmission the SRB2 to the GERAN;

> 1> in state RRC-Cell_Shared state:

>> 2> set the IE "RRC *Transaction Identifier* " in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS; and

>> 2> submit an RRC CONNECTION RELEASE COMPLETE message to the lower layers for transmission using the SRB2;

> 1> when the successful transmission of the RRC CONNECTION RELEASE COMPLETE message has been confirmed by the lower layers:

>> 2> release all its radio resources; and

>> 2> indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers; and

>> 2> clear any entry for the RRC CONNECTION RELEASE message in the tables "Accepted transactions" and "Rejected transactions" in the variable TRANSACTIONS;

>> 2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

>> 2> clear the variable ESTABLISHED_RABS;

>> 2> pass the value of the IE "*Release Cause*" received in the RRC CONNECTION RELEASE message to upper layers;

>> 2> enter RRC-Idle mode;

>> 2> perform the actions specified in sub-clause 7.18 and clause 6 when entering RRC-Idle mode from RRC-Connected mode;

>> 2> and the procedure ends.

7.5.2.4 Invalid RRC CONNECTION RELEASE message

If the RRC CONNECTION RELEASE message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, and if the "protocol error cause" in PROTOCOL_ERROR_INFORMATION is set to any cause value except "CSN.1 violation or encoding error", the MS shall perform procedure specific error handling as follows.

The MS shall:

1> ignore any IE(s) causing the error but treat the rest of the RRC CONNECTION RELEASE message as normal according to sub-clause 7.5.2.3, with an addition of the following actions;

1> set the IE "*RRC Transaction Identifier*" in the RRC CONNECTION RELEASE COMPLETE message to the value of "RRC transaction identifier" in the entry for the RRC CONNECTION RELEASE message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> include the IE "*Error Indication*" in the RRC CONNECTION RELEASE COMPLETE message with:

2> the IE "*Failure Cause*" set to the cause value "Protocol error"; and

2> the IE "*Protocol Error Information*" set to the value of the variable PROTOCOL_ERROR_INFORMATION.

7.5.2.5 Cell re-selection or radio link failure

If the MS performs cell re-selection or the radio link failure criteria in sub-clause 7.18 is met at any time during the RRC connection release procedure and the MS has not yet entered idle mode, the MS shall:

1> if cell re-selection occurred (RRC-Cell_Shared state):

2> perform a Cell Update procedure according to sub-clause 7.8 using the cause "cell reselection";

1> if radio link failure occurred (RRC-Cell_Dedicated state):

2> release all its radio resources;

2> indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

2> clear the variable ESTABLISHED_RABS;

2> enter RRC-Idle mode;

2> perform the actions specified in clause 6 and sub-clause 7.18 when entering RRC-Idle mode from RRC-Connected mode;

2> and the procedure ends.

7.5.2.6 Reception of an RRC CONNECTION RELEASE COMPLETE message by GERAN

When GERAN receives an RRC CONNECTION RELEASE COMPLETE message from the MS, it shall:

1> release all MS dedicated resources and the procedure ends on the GERAN side.

7.5.2.7 Unsuccessful transmission of the RRC CONNECTION RELEASE COMPLETE message, acknowledged mode transmission

When RLC does not succeed in transmitting the RRC CONNECTION RELEASE COMPLETE message, the MS shall:

1> release all its radio resources;

1> indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> clear the variable ESTABLISHED_RABS;

1> enter RRC-Idle mode;

1> perform the actions specified in clause 6 and sub-clause 7.18 when entering RRC-Idle mode from RRC-Connected mode;

1> and the procedure ends.

7.5.2.8 Detection of loss of dedicated physical channel by GERAN in RRC-Cell_Dedicated state

If the release is performed from the state RRC-Cell_Dedicated state, and GERAN detects loss of the dedicated basic physical channel according to sub-clause 7.18, GERAN may release all MS dedicated resources, even if no RRC CONNECTION RELEASE COMPLETE message has been received.

7.5.2.9 Failure to receive RRC CONNECTION RELEASE COMPLETE message by GERAN

If GERAN does not receive any RRC CONNECTION RELEASE COMPLETE message, it shall release all MS dedicated resources.

7.6 Transmission of MS capability information

7.6.1 General
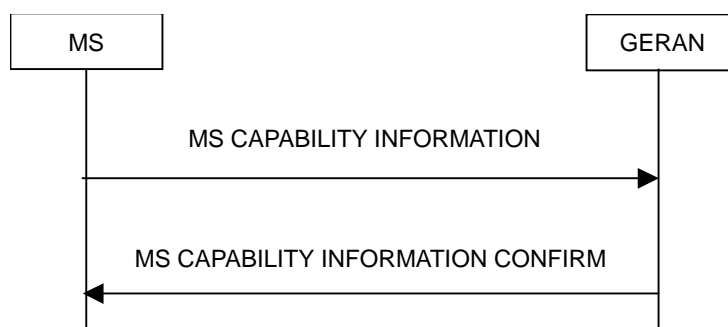
Figure 7.6.1.1 : Transmission of MS capability information, normal flow

The MS Capability Update procedure is used by the MS to convey MS specific capability information to the GERAN.

7.6.2 Initiation

The MS shall initiate the MS Capability Update procedure in the following situations:

1> the MS receives a MS CAPABILITY ENQUIRY message from the GERAN;

1> while in RRC-Connected mode the MS capabilities change compared to those stored in the variable MS_CAPABILITY_TRANSFERRED.

If the MS CAPABILITY INFORMATION message is sent in response to a MS CAPABILITY ENQUIRY message, the MS shall:

1> include the IE "*RRC Transaction Identifier*"; and

1> set it to the value of "RRC Transaction Identifier" in the entry for the MS CAPABILITY ENQUIRY message in the table "Accepted transactions" in the variable TRANSACTIONS;

1> retrieve the GERAN *Iu mode* radio access capability information elements from variable MS_CAPABILITY_REQUESTED; and

1> include this in IE " *MS GERAN Iu mode Radio Access Capability*", provided this IE is included in variable MS_CAPABILITY_REQUESTED.

1> retrieve its inter-RAT and inter-mode specific MS radio access capability information elements from variable MS_CAPABILITY_REQUESTED; and

1> include this in IE "*MS GERAN A/Gb mode Radio Access Capability*", IE " *UE UTRAN Radio Access Capability*", IE "*UE UTRAN Predefined Configuration Status Information*" and in IE "*UE CDMA2000 Radio Access Capability*", provided this IE is included in variable MS_CAPABILITY_REQUESTED.

If the MS CAPABILITY INFORMATION message is sent because one or more of the MS capabilities change compared to those stored in the variable MS_CAPABILITY_TRANSFERRED while in RRC-Connected mode, the MS shall include the information elements associated with the capabilities that have changed in the MS CAPABILITY INFORMATION message.

If the MS is in RRC-GRA_PCH state, it shall first perform a Cell Update procedure using the cause "Uplink Data Transmission", see sub-clause 7.8.

The MS RRC shall submit the MS CAPABILITY INFORMATION message to the lower layers for transmission on the uplink using SRB2. The MS RRC shall:

1> set counter V304 to 1;

1> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

2> start timer T304;

1> if the RLC sub-layer indicates a link failure to the RRC layer:

2> enter RRC-Idle mode;

2> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

2> consider the MS Capability Update procedure to be unsuccessful;

2> the procedure ends.

7.6.3 Reception of an MS CAPABILITY INFORMATION message by the GERAN

Upon reception of a MS CAPABILITY INFORMATION message, the GERAN should transmit a MS CAPABILITY INFORMATION CONFIRM message on the downlink SRB2. After the MS CAPABILITY INFORMATION CONFIRM message has been submitted to the lower layers for transmission, the procedure is complete.

7.6.4 Reception of the MS CAPABILITY INFORMATION CONFIRM message by the MS

Upon reception of a MS CAPABILITY INFORMATION CONFIRM message, the MS shall:

1> stop timer T304;

1> if there is an entry for the MS CAPABILITY ENQUIRY message present in the table "Accepted transactions" in the variable TRANSACTIONS:

2> clear that entry.

1> update its variable MS_CAPABILITY_TRANSFERRED with the MS capabilities it has last transmitted to the GERAN during the current RRC connection;

1> clear the variable MS_CAPABILITY_REQUESTED;

1> and the procedure ends.

7.6.5 Invalid MS CAPABILITY INFORMATION CONFIRM message

If the MS receives a MS CAPABILITY INFORMATION CONFIRM message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows:

1> stop timer T304;

1> transmit an RRC STATUS message on the uplink using SRB2;

1> include the IE "*Identification of Received Message";* and

1> set the IE "*Received Message Type*" to MS CAPABILITY INFORMATION CONFIRM; and

1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the MS CAPABILITY INFORMATION CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> when the RRC STATUS message has been submitted to lower layers for transmission:

2> restart timer T304 and continue with any ongoing procedures or processes as if the invalid MS CAPABILITY INFORMATION CONFIRM message has not been received.

7.6.6 T304 timeout

Upon expiry of timer T304, the MS shall check the value of V304 and:

1> if V304 is smaller than or equal to N304:

2> prior to retransmitting the MS CAPABILITY INFORMATION message:

3> if the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Started":

4> include the same IEs as in the last unsuccessful attempt of this message, except for the IE "*Integrity Check Info*", which is modified as follows:

5> increment the "Uplink RRC Message sequence number" for signalling radio bearer RB2 in the variable INTEGRITY_PROTECTION_INFO by one;

5> set the IE "*RRC Message Sequence Number*" in the IE "*Integrity Check Info*" by the value of the "Uplink RRC Message sequence number" for signalling radio bearer RB2 in the variable INTEGRITY_PROTECTION_INFO in this message;

5> recalculate the IE "*Message Authentication Code*" in the IE "*Integrity Check Info*" in this message, in accordance with sub-clause 7.18;

3> else:

4> include the same IEs as in the last unsuccessful attempt of this message.

2> send the MS CAPABILITY INFORMATION message on SRB2;

2> restart timer T304;

2> increment counter V304.

1> if V304 is greater than N304:

2> initiate the Cell Update procedure as specified in sub-clause 7.8 using the cause "radio link failure".

7.7 MS capability enquiry

7.7.1 General
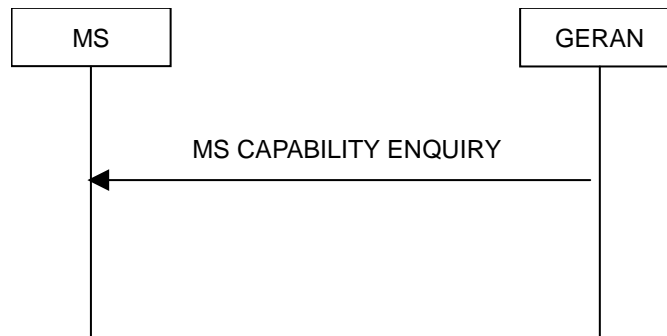
Figure 7.7.1.1: MS Capability Enquiry procedure, normal flow

The MS Capability Enquiry procedure can be used to request the MS to transmit its capability information related to any radio access network that is supported by the MS. For a multi-RAT MS this procedure allows in addition to request UTRAN predefined configuration status informatio.

7.7.2 Initiation

The MS Capability Enquiry procedure is initiated by the GERAN by transmitting a MS CAPABILITY ENQUIRY message using SRB2.

7.7.3 Reception of an MS CAPABILITY ENQUIRY message by the MS

Upon reception of an MS CAPABILITY ENQUIRY message, the MS shall act on the received information elements as specified in sub-clause 7.19 and 7.18 and initiate the transmission of MS Capability Information procedure, which is specified in sub-clause 7.6.

7.7.4 Invalid MS CAPABILITY ENQUIRY message

If the MS receives a MS CAPABILITY ENQUIRY message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows:

1> transmit an RRC STATUS message on the uplink using SRB2;

1> include the IE "*Identification of Received Message*"; and

1> set the IE "*Received Message Type*" to MS CAPABILITY ENQUIRY; and

1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the MS CAPABILITY ENQUIRY message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> when the RRC STATUS message has been submitted to lower layers for transmission:

2> continue with the ongoing processes and procedures as if the invalid MS CAPABILITY ENQUIRY message has not been received.

7.8 RRC Connection mobility procedures

7.8.1 Cell and GRA Update procedures
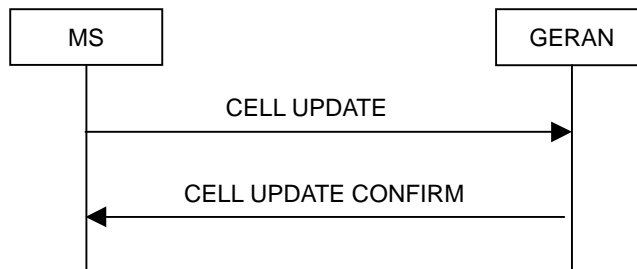
Figure 7.8.1.1: Cell Update procedure, basic flow
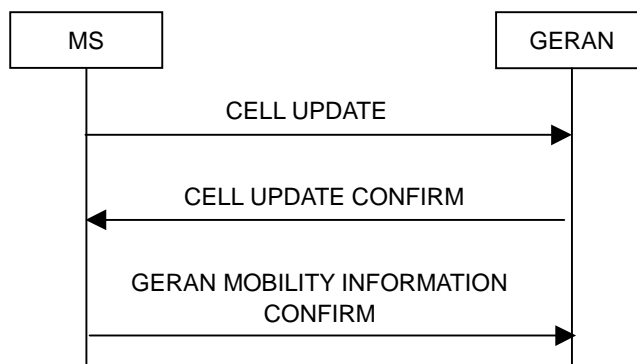
Figure 7.8.1.2: Cell Update procedure with update of GERAN mobility information
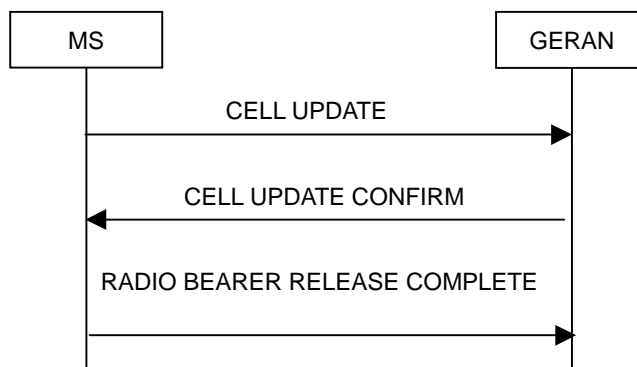
Figure 7.8.1.3: Cell Update procedure with radio bearer release
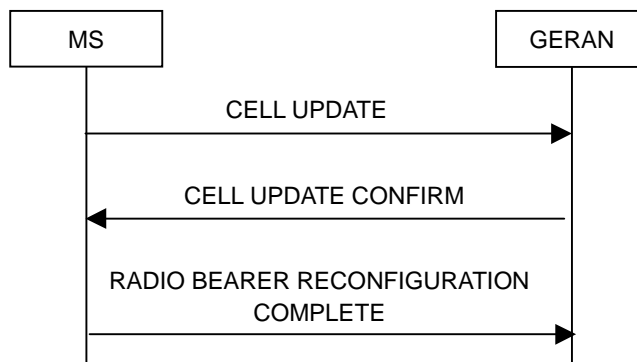
Figure 7.8.1.4: Cell Update procedure with radio bearer reconfiguration
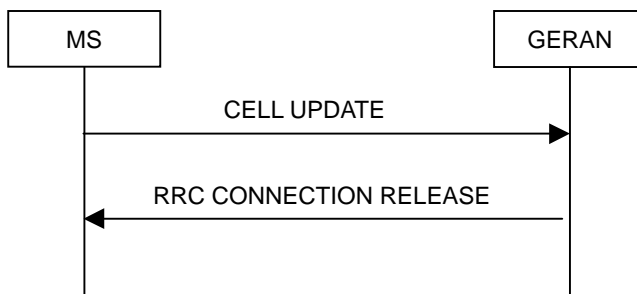
Figure 7.8.1.5: Cell Update procedure, failure case
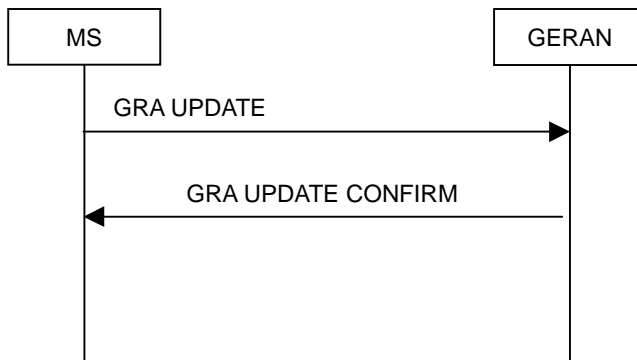
Figure 7.8.1.6: GRA Update procedure, basic flow
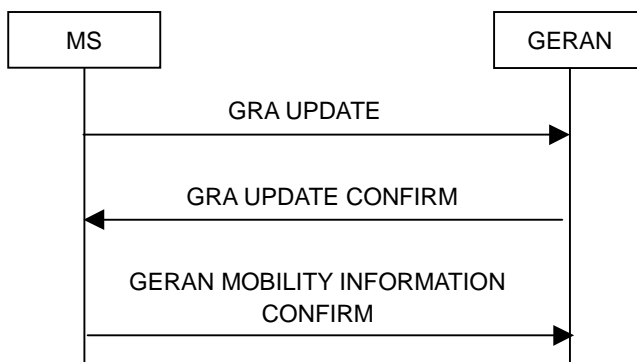
Figure 7.8.1.7: GRA Update procedure with update of GERAN mobility information
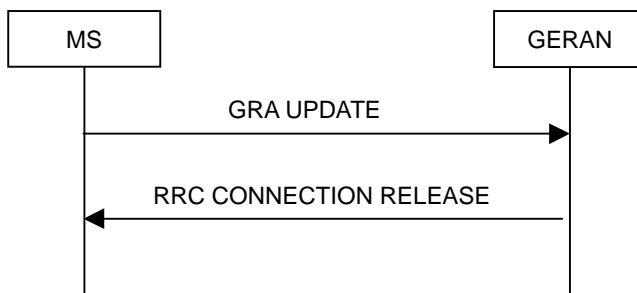
Figure 7.8.1.8: GRA Update procedure, failure case

7.8.1.1 General

The GRA Update and Cell Update procedures serve several main purposes:

- to notify GERAN of an RLC unrecoverable error (see 3GPP TS 44.160) on an AM RLC entity;

- to be used as a supervision mechanism in the RRC-Cell_Shared state or RRC-GRA_PCH state by means of periodical update;

In addition, the GRA Update procedure also serves the following purpose:

- to retrieve a new GRA identity after cell re-selection to a cell not belonging to the current GRA assigned to the MS in RRC-GRA_PCH state;

In addition, the Cell Update procedure also serves the following purposes:

- to update GERAN with the current cell the MS is camping on after cell reselection;

- to act on a radio link failure or notification of invalid RLC/MAC control message in the RRC-Cell_Dedicated state;

- to act on the transmission failure of the MS CAPABILITY INFORMATION message;

- when triggered in the RRC-GRA_PCH state, to notify GERAN of a transition to the RRC-Cell_Shared state due to the reception of GERAN originated paging or due to a request to transmit uplink data.

The GRA Update and Cell Update procedures may:

- include an update of mobility related information in the MS;

- cause a state transition from the RRC-Cell_Shared state to the RRC-Cell_Dedicated state, or from RRC-GRA_PCH state to RRC-Idle mode.

The Cell Update procedure may also include:

- a re-establish of layer 2, AM RLC entities;

- a radio bearer release,or radio bearer reconfiguration;

- a DBPSCH assignment.

7.8.1.2   Initiation

A MS shall initiate the Cell Update procedure in the following cases:

1> Uplink data transmission:

   2> if the MS is in RRC-GRA_PCH state; and

   2> if the MS has uplink signalling or data to transmit except a GRA UPDATE message;

      3> perform cell update using the cause "uplink data transmission".

1> Paging response:

   2> if the criteria for performing cell update with the cause specified above in the current sub-clause is not met; and

   2> if the MS in RRC-GRA_PCH state or RRC-Cell_Shared state, receives paging information from the lower layers fulfilling the conditions for initiating a Cell Update procedure specified in 7.4:

      3> perform cell update using the cause "paging response".

1> Radio link failure:

   2> if none of the criteria for performing cell update with the causes specified above in the current sub-clause is met; and

      3> if the MS is in RRC-Cell_Dedicated state; and the criteria for radio link failure is met as specified in sub-clause 7.18; or

      3> if the criteria for radio link failure is met as specified in sub-clause 7.18 the transmission of the MS CAPABILITY INFORMATION message fails as specified in sub-clause 7.6.6:

4> perform cell update using the cause "radio link failure".

1> Invalid RLC/MAC control message:

    2> if none of the criteria for performing cell update with the causes specified above in the current sub-clause is met; and

    2> if the MS is in RRC-Cell_Dedicated state; and

    2> if notification is received of the reception of an invalid RLC/MAC control message on DBPSCH:

        3> act as specified in sub-clause 7.18.10:

            4> perform cell update using the cause "invalid RLC/MAC control message".

1> RLC unrecoverable error:

    2> if none of the criteria for performing cell update with the causes specified above in the current sub-clause is met; and

    2> if the MS detects an RLC unrecoverable error (see 3GPP TS 44.160) in an AM RLC entity:

        3> perform cell update using the cause "RLC unrecoverable error".

1> Cell reselection:

    2> if none of the criteria for performing cell update with the causes specified above in the current sub-clause is met; and

    2> if the MS is in RRC-Cell_Shared state; and

    2> if the MS performs cell re-selection:

        3> perform cell update using the cause "cell reselection".

1> Periodical cell update:

    2> if none of the criteria for performing cell update with the causes specified above in the current sub-clause is met; and

    2> if the MS is in RRC-Cell_Shared state; and

    2> if the timer T305 expires;

        3> perform cell update using the cause "periodical cell update".

A MS in RRC-GRA_PCH state shall initiate the GRA Update procedure in the following cases:

1> GRA reselection:

    2> if the MS detects that the current GRA assigned to the MS, stored in the variable GRA_IDENTITY, is not present in the list of GRA identities in packet system information 16; or

    2> if the list of GRA identities in packet system information 16 is empty; or

    2> if the packet system information 16 can not be found:

        3> perform GRA update using the cause "change of GRA".

1> Periodic GRA update:

    2> if the criteria for performing GRA update with the causes as specified above in the current sub-clause are not met; and

    2> if the timer T305 expires while the MS is in RRC-GRA_PCH;

        3> perform GRA update using the cause "periodic GRA update".

When initiating the GRA Update or Cell Update procedure, the MS shall:

1> stop timer T305;

1> if the MS is in RRC-Cell_Dedicated state:

2> in the variable RB_TIMER_INDICATOR, set the IE "*T314 Expired*" and the IE "*T315 Expired*" to FALSE;

2> if the stored values of the timer T314 and timer T315 are both equal to zero, or if the stored value of the timer T314 is equal to zero and there are no radio bearers associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment timer*" is set to "useT315":

3> release all its radio resources;

3> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

3> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

3> clear the variable ESTABLISHED_RABS;

3> enter RRC-Idle mode;

3> perform other actions when entering RRC-Idle mode from RRC-Connected mode as specified in clause 6 and sub-clause 7.18;

3> and the procedure ends.

2> if the stored value of the timer T314 is equal to zero:

3> release all radio bearers, associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "useT314";

3> in the variable RB_TIMER_INDICATOR set the IE "T314 expired" to TRUE;

2> if the stored value of the timer T315 is equal to zero:

3> release all radio bearers associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "useT315";

3> in the variable RB_TIMER_INDICATOR set the IE "T315 expired" to TRUE;

2> if the stored value of the timer T314 is greater than zero:

3> if there are radio bearers associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "useT314":

4> start timer T314.

2> if the stored value of the timer T315 is greater than zero:

3> if there are radio bearers associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment timer*" is set to "useT315":

4> start timer T315.

2> for the released radio bearer(s):

3> delete the information about the radio bearer from the variable ESTABLISHED_RABS;

3> when all radio bearers belonging to the same radio access bearer have been released:

4> indicate local end release of the radio access bearer to upper layers using the CN domain identity together with the RAB identity stored in the variable ESTABLISHED_RABS;

4> delete all information about the radio access bearer from the variable ESTABLISHED_RABS;

> 2> set the variable ORDERED_RECONFIGURATION to FALSE;

1> set the variables PROTOCOL_ERROR_INDICATOR, FAILURE_INDICATOR, UNSUPPORTED_CONFIGURATION and INVALID_CONFIGURATION to FALSE;

1> set the variable CELL_UPDATE_STARTED to TRUE;

1> in case of a Cell Update procedure:

> 2> set the contents of the CELL UPDATE message according to sub-clause 7.8.1.3;

> 2> submit the CELL UPDATE message for transmission on the SRB2;

1> in case of a GRA Update procedure:

> 2> set the contents of the GRA UPDATE message according to sub-clause 7.8.1.3;

> 2> submit the GRA UPDATE message for transmission on the SRB2;

1> set counter V302 to 1;

1> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

> 2> start timer T302;

1> if the RLC sub-layer indicates a link failure to the RRC layer:

> 2> enter RRC-Idle mode;

> 2> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

> 2> consider the GRA Update procedure or Cell Update procedure to be unsuccessful;

> 2> the procedure ends.

7.8.1.3   CELL UPDATE / GRA UPDATE message contents to set

In case of Cell Update procedure the MS shall transmit a CELL UPDATE message.

In case of GRA Update procedure the MS shall transmit a GRA UPDATE message.

The MS shall set the IEs in the CELL UPDATE message as follows:

1> set the IE "*Cell Update Cause*" corresponding to the cause specified in sub-clause 7.8.1.2 that is valid when the CELL UPDATE message is submitted to lower layers for transmission;

NOTE: During the time period starting from when a cell update procedure is initiated by the MS until when the procedure ends, additional CELL UPDATE messages may be transmitted by the MS with different causes.

1> set the IE "*G-RNTI*" to the value of the variable G-RNTI;

1> if the value of the variable PROTOCOL_ERROR_INDICATOR is TRUE:

> 2> include the IE "*RRC Transaction Identifier*"; and

> > 3> set it to the value of "RRC Transaction Identifier" in the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

> 2> include and set the IE "*Failure Cause*" to the cause value "protocol error";

> 2> set the IE "*Protocol Error Information*" set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> if the value of the variable FAILURE_INDICATOR is TRUE:

> 2> include the IE "*RRC Transaction Identifier*"; and

3> set it to the value of "RRC Transaction Identifier" in the entry for the CELL UPDATE CONFIRM message in the table "Accepted transactions" in the variable TRANSACTIONS;

2> include and set the IE "*Failure Cause*" to the value of the variable FAILURE_CAUSE;

1> include the START values for each CN domain, calculated according to sub-clause 7.18;

1> if an unrecoverable error (see 3GPP TS 44.160) in any of the AM RLC entities for the signalling radio bearers SRB2, SRB3 or SRB4 is detected:

2> set the IE "*AM_RLC error indication for c-plane*" to TRUE;

1> otherwise:

2> set the IE "*AM_RLC error indication for c-plane"* to FALSE;

1> if an unrecoverable error (see 3GPP TS 44.160) in any of the AM RLC entities for the RB5 or upward is detected:

2> set the IE "*AM_RLC error indication for u-plane*" to TRUE;

1> otherwise:

2> set the IE "*AM_RLC error indication for u-plane*" to FALSE;

1> set the IE "*RB Timer Indicator*" to the value of the variable RB_TIMER_INDICATOR;

The MS shall set the IEs in the GRA UPDATE message as follows:

1> set the IE "*G-RNTI*" to the value of the variable G-RNTI;

1> set the IE "*GRA Update Cause*" corresponding to which cause as specified in sub-clause 7.8.1.2 that is valid when the GRA UPDATE message is submitted to lower layers for transmission;

2> if the value of the variable PROTOCOL_ERROR_INDICATOR is TRUE:

3> include the IE "*RRC Transaction Identifier*"; and

4> set it to the value of "RRC Transaction Identifier" in the entry for the GRA UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

3> set the IE "*Protocol Error Indicator*" to TRUE;

3> include the IE "*Protocol Error Information*" set to the value of the variable PROTOCOL_ERROR_INFORMATION.

2> if the value of the variable PROTOCOL_ERROR_INDICATOR is FALSE:

3> if the value of the variable INVALID_CONFIGURATION is TRUE:

4> include the IE "*RRC Transaction Identifier*"; and

5> set it to the value of "RRC transaction identifier" in the entry for the GRA UPDATE CONFIRM message in the table "Accepted transactions" in the variable TRANSACTIONS;

4> set the IE " *Protocol Error Indicator* " to TRUE;

4> include the IE "*Protocol Error Information*" set to "Information element value not comprehended";

3> if the value of the variable INVALID_CONFIGURATION is FALSE:

4> set the IE "*Protocol Error Indicator*" to FALSE.

7.8.1.4 Reception of an CELL UPDATE/GRA UPDATE message by the GERAN

When the GERAN receives a CELL UPDATE/GRA UPDATE message, the GERAN shall:

1> in case the procedure was triggered by reception of a CELL UPDATE:

    2> if SBSS relocation was performed:

        3> transmit a CELL UPDATE CONFIRM message on the downlink SRB2.

    2> if SBSS relocation was not performed:

        3> update the START value for each CN domain as maintained in GERAN sub-clause 7.18 with "START" in the IE "*START List*" for the CN domain as indicated by "*CN Domain Identity*" IE in the IE "*START List*";

        3> transmit a CELL UPDATE CONFIRM message on the SRB2;

        3> optionally set the IE "*RLC re-establish indicator (RB2, RB3 and RB4)*" and/or the IE "*RLC re-establish indicator (RB5 and upwards)*" to TRUE to request a RLC re-establishment in the MS, in which case the corresponding RLC entities shall also be re-established in GERAN; or

1> in case the procedure was triggered by reception of a GRA UPDATE:

    2> if SBSS relocation was performed:

        3> transmit a GRA UPDATE CONFIRM message on the downlink SRB2;

    2> if SBSS relocation was not performed:

        3> transmit a GRA UPDATE CONFIRM message to the lower layers for transmission on SRB2 in which case the GERAN should include the IE "*GRA Identity*" in the GRA UPDATE CONFIRM message in a cell where multiple GRA identifiers are broadcast; or

1> initiate an RRC Connection Release procedure (see sub-clause 7.5.2) by transmitting an RRC CONNECTION RELEASE message on the SRB2. In particular GERAN shall:

    2> if the CELL UPDATE message was sent because of an unrecoverable error in SRB2, SRB3 or SRB4:

        3> initiate an RRC Connection Release procedure (sub-clause 7.5.2) by transmitting an RRC CONNECTION RELEASE message on the SRB2.

7.8.1.5 Reception of the CELL UPDATE CONFIRM/GRA UPDATE CONFIRM message by the MS

When the MS receives a CELL UPDATE CONFIRM/GRA UPDATE CONFIRM message the MS shall:

1> stop timer T302;

1> in case of a Cell Update procedure and the CELL UPDATE CONFIRM message:

    2> includes one of the RB information elements (*RB Information to Release list, RB Information to Reconfigure list, RB Information to Be Affected list*); and/or

    2> includes the IE "*DBPSCH Description*"; and

    2> if the variable ORDERED_RECONFIGURATION is set to FALSE:

        3> set the variable ORDERED_RECONFIGURATION to TRUE;

1> act upon all received information elements as specified in sub-clause 7.19 unless specified otherwise in the following;

    2> if the CELL UPDATE CONFIRM message includes the field "*RLC Re-establish indicator SRB2-4*":

        3> re-establish the RLC entities for signalling radio bearer SRB2, signalling radio bearer SRB3 and signalling radio bearer SRB4 (if established);

        3> if the value of the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN is set to "Started":

4> set the HFN component of the respective COUNT-C values for AM RLC entities SRB2, SRB3 and SRB4 (if established) equal to the START value included in the latest transmitted CELL UPDATE message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN.

2> if the CELL UPDATE CONFIRM message includes the field "*RLC re-establish indicator RB5+*":

3> for radio bearers with RB identity larger than 4:

4> re-establish the AM RLC entities;

4> if the value of the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain as indicated in the IE "*CN Domain Identity*" in the IE "*RAB Info*" in the variable ESTABLISHED_RABS is set to "Started":

5> set the HFN component of the respective COUNT-C values for AM RLC entities equal to the START value included in the latest transmitted CELL UPDATE message for the CN domain as indicated in the IE "CN domain identity" in the IE "RAB info" in the variable ESTABLISHED_RABS.

1> if the CELL UPDATE CONFIRM / GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*" or contained the IE "*Integrity Protection Mode Info*":

2> set the IE "*Status*" in the variable SECURITY_MODIFICATION for all the CN domains in the variable SECURITY_MODIFICATION to "Affected";

1> enter a state according to sub-clause 7.19 applied on the CELL UPDATE CONFIRM / GRA UPDATE CONFIRM message.

If the MS after state transition remains in RRC-Cell_Shared state, it shall

1> start the timer T305 using its initial value if timer T305 is not running and periodical cell update has been configured by T305 in the IE "*MS Timers and Constants in Connected mode*" set to any other value than "infinity";

1> if the CELL UPDATE CONFIRM / GRA UPDATE CONFIRM message contained the IE "*GERAN DRX Cycle Length Coefficient*":

2> use the value in the IE "*GERAN DRX Cycle Length Coefficient*" for calculating Paging occasion as specified in sub-clause 7.19;

If the MS after state transition enters RRC-GRA_PCH state, it shall

1> start the timer T305 using its initial value if timer T305 is not running and periodical update has been configured by T305 in the IE "*MS Timers and Constants in Connected mode*" set to any other value than "infinity";

The MS after state transition shall:

1> if the CELL UPDATE CONFIRM / GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

2> include and set the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" in any response message transmitted below to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO.

1> in case cell reselection interrupted an ongoing cell update procedure and a CELL UPDATE CONFIRM/GRA UPDATE CONFIRM was received with the IE "*Downlink counter synchronisation info*" present and the response to which was not submitted to the lower layers due to the cell re-selection:

2> include the IE "*START list*" in the response message transmitted according to sub-clause 7.8.1.6;

2> if the CELL UPDATE CONFIRM/GRA UPDATE CONFIRM, the response to which was not delivered to the lower layers, due to the cell re-selection, included the IE "*RB with PDCP information list*":

3> include the IE "*RB with PDCP information list*" in the response message transmitted according to sub-clause 7.8.1.6;

1> in case of a Cell Update procedure:

2> set the IE "*RRC Transaction Identifier*" in any response message transmitted below to the value of "RRC transaction identifier" in the entry for the CELL UPDATE CONFIRM message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry.

1> in case of a GRA Update procedure:

2> set the IE "*RRC Transaction Identifier*" in any response message transmitted below to the value of "RRC transaction identifier" in the entry for the GRA UPDATE CONFIRM message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry;

1> if the variable PDCP_SN_INFO is non-empty:

2> include the IE "*RB with PDCP Information List*" in any response message transmitted below and set it to the value of the variable PDCP_SN_INFO;

1> if the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message included the structure "*Downlink Counter Synchronisation Info*":

2> if the variable PDCP_SN_INFO is empty:

3> configure the corresponding RLC entity for all AM and UM radio bearers and AM and UM signalling radio bearers except SRB2 to "stop";

2> else:

3> configure the RLC entity for signalling radio bearers SRB1, SRB3 and SRB4 to "stop";

3> configure the RLC entity for UM and AM radio bearers for which the IE "*PDCP SN Info*" is not included to "stop";

2> re-establish SRB2;

2> for the downlink and the uplink, apply the ciphering configuration as follows:

3> if the received re-configuation message included the IE "*Ciphering Mode Info*":

4> use the ciphering configuration in the received message when transmitting the response message;

3> if the ciphering configuration for SRB2 from a previously received SECURITY MODE COMMAND has not yet been applied because of the activation times not having been reached:

4> if the previous SECURITY MODE COMMAND was received due to new keys being received:

5> consider the new ciphering configuration to include the received new keys;

4> if the ciphering configuration for SRB2 from a previously received SECURITY MODE COMMAND has not yet been applied because of the corresponding activation times not having been reached and the previous SECURITY MODE COMMAND caused a change in LATEST_CONFIGURED_CN_DOMAIN:

5> consider the new ciphering configuration to include the keys associated with the LATEST_CONFIGURED_CN_DOMAIN;

4> apply the new ciphering configuration immediately following RLC re-establishment.

3> else:

4> continue using the current ciphering configuration;

2> set the new uplink and downlink HFN of SRB2 to MAX(uplink HFN of SRB2, downlink HFN of SRB2);

2> increment by one the downlink and uplink HFN values for SRB2;

2> calculate the START value according to sub-clause 7.18;

2> include the calculated START values for each CN domain in the IE "*START List*" in the structure "*Uplink Counter Synchronisation Info*" in any response message transmitted below;

2> if the cell reselection from UTRAN is performed :

    3> set the 20 most significant bits of the uplink and downlink HFN component of COUNT-C of SRB2 to MAX(uplink HFN_U, downlink HFN_U) where HFN_U is the HFN component of COUNT-C of SRB2 in UTRAN;

    3> set the remaining bits of the uplink and downlink HFN component of COUNT-C of SRB2 equal to zero;

    3> calculate the START value according to sub-clause 7.18;

    3> include the calculated START values for each CN domain in the IE "*START list*" in the GERAN MOBILITY INFORMATION CONFIRM message;

    3> set the variable LATEST_CONFIGURED_CN_DOMAIN equal to the corresponding UTRAN variable *;*

    3> set the variable MS_CAPABILITY_TRANSFERRED equal to the corresponding UTRAN variable *;*

    3> set the variable ESTABLISHED_RABS equal to the corresponding UTRAN variable *;*

    3> set the variable ESTABLISHED_SIGNALLING_CONNECTIONS equal to the corresponding UTRAN variable *;*

    3> set the variable CIPHERING_STATUS equal to the corresponding UTRAN variable*;*

    3> set the variable START_THRESHOLD equal to the corresponding UTRAN variable *;*

    3> set the variable START_VALUE_TO_TRANSMIT equal to the corresponding UTRAN variable*;*

    3> set IE "*Status*" for the ciphering status in the the variable SECURITY_MODIFICATION equal to the corresponding UTRAN variable;

    3> set IE "*Status*" for the integrity protection in the variable INTEGRITY_PROTECTION_INFO equal to the corresponding UTRAN variable;

1> transmit a response message as specified in sub-clause 7.8.1.6;

1> if the IE "*Integrity Protection Mode Info*" was present in the CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message:

2> start applying the new integrity protection configuration in the uplink for signalling radio bearer SRB2 from and including the transmitted response message;

1> if the variable ORDERED_RECONFIGURATION is set to TRUE caused by the received CELL UPDATE CONFIRM message in case of a cell update procedure:

2> set the variable ORDERED_RECONFIGURATION to FALSE;

1> clear the variable PDCP_SN_INFO;

1> when the response message transmitted per sub-clause 7.8.1.6 to the GERAN has been confirmed by RLC:

2> if the CELL UPDATE CONFIRM / GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

    3> resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;

    3> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

    3> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

    2> if the CELL UPDATE CONFIRM / GRA UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*":

        3> allow the transmission of RRC messages on all signalling radio bearers with any RRC SN;

        3> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

    2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

  1> in case of a Cell Update procedure:

    2> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

  1> in case of a GRA update procedure:

    2> clear the entry for the GRA UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

  1> set the variable CELL_UPDATE_STARTED to FALSE;

  1> clear the variable SECURITY_MODIFICATION.

The procedure ends.

7.8.1.6 Transmission of a response message to GERAN

If the CELL UPDATE CONFIRM message

- includes the IE "*RB Information to Release List*":

the MS shall:

  1> transmit a RADIO BEARER RELEASE COMPLETE as response message using SRB2.

If the CELL UPDATE CONFIRM message

- does not include the IE "*RB Information to Release List*"; and

- includes the IE "*RB Information to Reconfigure List*"; or

- includes the IE "*RB Information to Be Affected List*"; and

- does not include the IE "*DBPSCH Description*":

the MS shall:

  1> transmit a RADIO BEARER RECONFIGURATION COMPLETE as response message using SRB2.

If the CELL UPDATE CONFIRM message:

- does not includethe IE "*RB Information to Release list*"; and

- does not include the IE "*RB Information to Be Affected list*"; and

- includes the IE "*RB Information to Reconfigure list*"; and

- includes the IE "*DBPSCH description*":

the MS shall:

  1> transmit a RADIO BEARER SETUP COMPLETE as response message on SRB2.

If the CELL UPDATE CONFIRM message

- does not include RB Information Elements (*RB Information to Release list, RB Information to Reconfigure list, RB Information to Be Affected list)*; and

- includes the IE "*CN Information Info*"; or

- includes the IE "*Ciphering Mode Info*"; or

- includes the IE "*Integrity Protection Mode Info*"; or

- includes the IE "*New G-RNTI*":

the MS shall:

1> transmit a GERAN MOBILITY INFORMATION CONFIRM as response message on the SRB2.

If the CELL UPDATE CONFIRM message:

- does not include RB Information Elements (*RB Information to Release list, RB Information to Reconfigure list, RB Information to Be Affected list*); and

- does not include "*CN Information Info*"; and

- does not include the IE "*Ciphering Mode Info*"; and

- does not include the IE "*Integrity Protection Mode Info*"; and

- does not include the IE "*New G-RNTI*":

the MS shall:

1> transmit no response message.

If the GRA UPDATE CONFIRM message:

- includes the IEs "*CN Information Info*"; or

- includes the IE "*Ciphering Mode Info*"; or

- includes the IE "*Integrity Protection Mode Info*"; or

- includes the IE "*New G-RNTI*":

the MS shall:

1> transmit a GERAN MOBILITY INFORMATION CONFIRM as response message on SRB2.

If the GRA UPDATE CONFIRM message:

- does not include "*CN Information Info*" ; and

- does not include the IE " *Ciphering Mode Info* "; and

- does not include the IE " *Integrity Protection Mode Info* "; and

- does not include the IE "*New G-RNTI*"; and

the MS shall:

1> transmit no response message.

If the new state is RRC-Cell_Dedicated or RRC-Cell_Shared state, the response message shall be transmitted using the new configuration after the state transition, and the MS shall:

1> if the structure "*Downlink Counter Synchronisation Info*" was included in the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message:

2> when RLC has confirmed the successful transmission of the response message:

3> if the variable PDCP_SN_INFO is empty:

4> configure the RLC entity for all AM and UM radio bearers and AM and UM signalling radio bearers except SRB2 to "continue";

3> else:

4> configure the RLC entity for signalling radio bearers SRB1, SRB3 and SRB4 to "continue";

4> configure the RLC entity for UM and AM radio bearers for which the IE "*PDCP SN Info*" is not included to "continue";

3> re-establish all AM and UM RLC entities with RB identities larger than 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the corresponding CN domain;

3> re-establish the RLC entities with RB identities 1, 3 and 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;

3> set the remaining bits of the HFN component of the COUNT-C values of all UM RLC entities to zero;

3> set the remaining bits of the HFN component of the COUNT-C values of all AM RLC entities to zero, for those bearers to which RLC entitie where re-established;

3> if the IE "*PDCP Context Relocation Info*" is not present:

4> re-initialise the PDCP header compression entities of each radio bearer in the variable ESTABLISHED_RABS as specified in 3GPP TS 25.323;.

3> if the IE "*PDCP Context Relocation Info"* is present:

4> perform the actions as specified in 7.19.

1> if the variable PDCP_SN_INFO is empty:

2> if the CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

3> when RLC has confirmed the successful transmission of the response message:

4> continue with the remainder of the procedure;

2> if the CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message did not contain the IE "*Ciphering Mode Info*":

3> when RLC has been requested to transmit the response message,

4> continue with the remainder of the procedure;

1> if the variable PDCP_SN_INFO non-empty:

2> when RLC has confirmed the successful transmission of the response message:

3> for each radio bearer in the variable PDCP_SN_INFO:

4> if the IE "*RB Started*" in the variable ESTABLISHED_RABS is set to "started":

5> configure the RLC entity for that radio bearer to "continue";

3> continue with the remainder of the procedure.

If the new RRC state is RRC-GRA_PCH state, the response message shall be transmitted in RRC-Cell_Shared state, and the MS shall:

1> when RLC has confirmed the successful transmission of the response message:

2> if the IE "*Downlink Counter Synchronisation Info*" was included in the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message:

      3> re-establish all AM and UM RLC entities with RB identities larger than 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the corresponding CN domain;

      3> re-establish the RLC entities with RB identities 1, 3 and 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;

      3> set the remaining bits of the HFN component of the COUNT-C values of all UM RLC entities to zero;

      3> set the remaining bits of the HFN component of the COUNT-C values of all AM RLC entities to zero, for those bearers to which RLC entitie where re-established;

      3> re-initialise the PDCP header compression entities of each radio bearer in the variable ESTABLISHED_RABS as specified in 3GPP TS 25.323.

   2> for each radio bearer in the variable PDCP_SN_INFO:

      3> if the IE "*RB Started*" in the variable ESTABLISHED_RABS is set to "started":

         4> configure the RLC entity for that radio bearer to "continue";

   2> enter the RRC-GRA_PCH state;

 1> continue with the remainder of the procedure.

7.8.1.7   Physical channel failure

If the received CELL UPDATE CONFIRM message would cause the MS to transit to RRC-Cell_Dedicated state; and

 1> if the MS failed to establish the physical channel(s) indicated in the received CELL UPDATE CONFIRM message according to the criteria defined in sub-clause 7.8.1.6 are not fulfilled; or

 1> the received CELL UPDATE CONFIRM message does not contain the IE "*DBPSCH Description*";

the MS shall:

 1> the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE; and/or

 1> the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE:

   2> abort the ongoing integrity and/or ciphering reconfiguration;

   2> if the received CELL UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

      3> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

      3> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

   2> if the received CELL UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*":

      3> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

      3> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

 1> if the variable ORDERED_RECONFIGURATION is set to TRUE caused by the received CELL UPDATE CONFIRM message:

   2> set the variable ORDERED_RECONFIGURATION to FALSE;

 1> if V302 is equal to or smaller than N302:

   2> select a suitable GERAN cell according to 3GPP TS 45.008;

   2> set the contents of the CELL UPDATE message according to sub-clause 7.8.1.3, except for the IE "*Cell Update Cause*" which shall be set to "radio link failure";

    2> submit the CELL UPDATE message for transmission on the uplink SRB2;

    2> increment counter V302; and

    2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

        3> restart timer T302;

    2> if the RLC sub-layer indicates a link failure to the RRC layer:

        3> enter RRC-Idle mode;

        3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

        3> consider the Cell Update procedure to be unsuccessful;

        3> the procedure ends.

1> if V302 is greater than N302:

    2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

    2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

    2> in case of a cell update procedure:

        3> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

    2> release all its radio resources;

    2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

    2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

    2> clear the variable ESTABLISHED_RABS;

    2> set the variable CELL_UPDATE_STARTED to FALSE;

    2> enter RRC-Idle mode.

7.8.1.8 Unsupported configuration by the MS

If the MS does not support the configuration in the CELL UPDATE CONFIRM message and/or the variable UNSUPPORTED_CONFIGURATION is set to TRUE, the MS shall:

1> if V302 is equal to or smaller than N302, the MS shall:

    2> if, caused by the received CELL UPDATE CONFIRM message

        3> the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE; and/or

        3> the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE:

            4> abort the ongoing integrity and/or ciphering reconfiguration;

            4> if the received CELL UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

                5> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

                5> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

            4> if the received CELL UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*":

                5> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

    5> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

2> if the variable ORDERED_RECONFIGURATION is set to TRUE caused by the received CELL UPDATE CONFIRM message in case of a cell update procedure:

    3> set the variable ORDERED_RECONFIGURATION to FALSE;

2> set the variable FAILURE_INDICATOR to TRUE;

2> set the variable FAILURE_CAUSE to "configuration unsupported";

2> set the content of the CELL UPDATE message according to 7.8.1.3;

2> submit the CELL UPDATE message for transmission on the uplink SRB2;

2> increment counter V302; and

2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

    3> restart timer T302;

2> if the RLC sub-layer indicates a link failure to the RRC layer:

    3> enter RRC-Idle mode;

    3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

    3> consider the Cell Update procedure to be unsuccessful;

    3> the procedure ends.

1> if V302 is greater than N302, the MS shall:

    2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

    2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

    2> clear the variable PDCP_SN_INFO;

    2> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

    2> release all its radio resources;

    2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

    2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

    2> clear the variable ESTABLISHED_RABS;

    2> set the variable CELL_UPDATE_STARTED to FALSE;

    2> enter RRC-Idle mode;

    2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in sub-clause 7.18;

    2> and the procedure ends.

7.8.1.9   Invalid configuration

If the variable INVALID_CONFIGURATION is set to TRUE, the MS shall:

1> if V302 is equal to or smaller than N302:

    2> if, caused by the received CELL UPDATE CONFIRM message

> > > 3> the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE; and/or

> > > 3> the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE:

> > > > 4> abort the ongoing integrity and/or ciphering reconfiguration;

> > > > 4> if the received CELL UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

> > > > > 5> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

> > > > > 5> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

> > > > 4> if the received CELL UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*";

> > > > > 5> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

> > > > > 5> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

> > 2> if the variable ORDERED_RECONFIGURATION is set to TRUE caused by the received CELL UPDATE CONFIRM message in case of a cell update procedure:

> > > 3> set the variable ORDERED_RECONFIGURATION to FALSE;

> > 2> in case of a Cell Update procedure:

> > > 3> set the variable FAILURE_INDICATOR to TRUE;

> > > 3> set the variable FAILURE_CAUSE to "Invalid configuration";

> > > 3> set the contents of the CELL UPDATE message according to sub-clause 7.8.1.3;

> > > 3> submit the CELL UPDATE message for transmission on the uplink SRB2;

> > 2> in case of a GRA Update procedure:

> > > 3> set the contents of the GRA UPDATE message according to sub-clause 7.8.1.3;

> > > 3> submit the GRA UPDATE message for transmission on the uplink SRB2;

> > 2> increment counter V302; and

> > 2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

> > > 3> restart timer T302;

> > 2> if the RLC sub-layer indicates a link failure to the RRC layer:

> > > 3> enter RRC-Idle mode;

> > > 3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

> > > 3> consider the Cell Update procedure or GRA Update procedure to be unsuccessful;

> > > 3> the procedure ends.

> 1> if V302 is greater than N302:

> > 2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

> > 2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

> > 2> clear the variable PDCP_SN_INFO;

> > 2> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

> > 2> release all its radio resources;

    2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

    2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

    2> clear the variable ESTABLISHED_RABS;

    2> set the variable CELL_UPDATE_STARTED to FALSE;

    2> enter RRC-Idle mode;

    2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in sub-clause 7.18;

  1> the procedure ends.

7.8.1.10 Incompatible simultaneous reconfiguration

In case of a cell update procedure and if the received CELL UPDATE CONFIRM message:

- includes RB information elements (*RB Information to Release list, RB Information to Reconfigure list, RB Information to Be Affected list*) ; and

- if the variable ORDERED_RECONFIGURATION is set to TRUE because of an ongoing Reconfiguration procedure;

or

- if the variable INCOMPATIBLE_SECURITY_RECONFIGURATION is set to TRUE due to the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message:

the MS shall:

  1> if V302 is equal to or smaller than N302:

    2> if, caused by the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message

      3> the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE; and/or

      3> the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE:

        4> abort the ongoing integrity and/or ciphering reconfiguration;

        4> if the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

          5> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

          5> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

        4> if the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*":

          5> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

          5> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

    2> if the variable ORDERED_RECONFIGURATION is set to TRUE caused by the received CELL UPDATE CONFIRM message in case of a Cell Update procedure:

      3> set the variable ORDERED_RECONFIGURATION to FALSE;

    2> set the variable FAILURE_INDICATOR to TRUE;

    2> set the variable FAILURE_CAUSE to "Incompatible simultaneous reconfiguration";

  2> set the content of the CELL UPDATE message according to sub-clause 7.8.1.3;

  2> submit the CELL UPDATE message for transmission on the uplink SRB2;

  2> increment counter V302; and

  2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

   3> restart timer T302;

  2> if the RLC sub-layer indicates a link failure to the RRC layer:

   3> enter RRC-Idle mode;

   3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

   3> consider the Cell Update procedure to be unsuccessful;

   3> the procedure ends.

 1> if V302 is greater than N302:

  2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

  2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

  2> clear the variable PDCP_SN_INFO;

  2> set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;

  2> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

  2> release all its radio resources;

  2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

  2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

  2> clear the variable ESTABLISHED_RABS;

  2> set the variable CELL_UPDATE_STARTED to FALSE;

  2> enter RRC-Idle mode;

  2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in clause 6 and sub-clause 7.18;

 1> the procedure ends.

7.8.1.10a Security reconfiguration during Cell update procedure

If:

- the variable CELL_UPDATE_STARTED is set to TRUE; and

- the MS receives a SECURITY MODE COMMAND message:

the MS shall:

 1> ignore the received SECURITY MODE COMMAND message and continue with any ongoing processes and procedures as if the SECURITY MODE COMMAND message had not been received.

7.8.1.11 Confirmation error of GRA ID list

If the GRA UPDATE CONFIRM message causes a confirmation error of GRA identity list as specified in sub-clause 7.19.3 the MS shall:

   1> check the value of V302; and

   1> if V302 is smaller or equal than N302:

      2> if, caused by the received GRA UPDATE CONFIRM message

         3> the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE; and/or

         3> the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE:

            4> abort the ongoing integrity and/or ciphering reconfiguration;

            4> if the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

               5> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

               5> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

            4> if the received GRA UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*"

               5> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

               5> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

      2> set the IEs in the GRA UPDATE message according to sub-clause 7.8.1.3;

      2> submit the GRA UPDATE message for transmission on the uplink SRB2;

      2> increment counter V302; and

      2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

         3> restart timer T302;

      2> if the RLC sub-layer indicates a link failure to the RRC layer:

         3> enter RRC-Idle mode;

         3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

         3> consider the GRA Update procedure to be unsuccessful;

         3> the procedure ends.

   1> if V302 is greater than N302:

      2> release all its radio resources;

      2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

      2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

      2> clear the variable PDCP_SN_INFO;

      2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

      2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

      2> clear the variable ESTABLISHED_RABS;

2> set the variable CELL_UPDATE_STARTED to FALSE;

2> enter RRC-Idle mode;

2> perform the actions specified in clause 6 and sub-clause 7.18 when entering RRC-Idle mode from RRC-Connected mode;

2> the procedure ends.

7.8.1.12 Invalid CELL UPDATE CONFIRM/GRA UPDATE CONFIRM message

If the MS receives an CELL UPDATE CONFIRM/GRA UPDATE CONFIRM message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MSshall perform procedure specific error handling as follows:

1> if V302 is equal to or smaller than N302, the MS shall:

2> set the variable PROTOCOL_ERROR_INDICATOR to TRUE;

2> in case of a Cell Update procedure:

3> set the contents of the CELL UPDATE message according to sub-clause 7.8.1.3;

3> submit the CELL UPDATE message for transmission on the uplink SRB2;

2> in case of a GRA Update procedure:

3> set the contents of the GRA UPDATE message according to sub-clause 7.8.1.3;

3> submit the GRA UPDATE message for transmission on the uplink SRB2;

2> increment counter V302; and

2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

3> restart timer T302;

2> if the RLC sub-layer indicates a link failure to the RRC layer:

3> enter RRC-Idle mode;

3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

3> consider the Cell Update procedure or GRA update procedure to be unsuccessful;

3> the procedure ends.

1> if V302 is greater than N302, the MS shall:

2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

2> in case of a Cell Update procedure:

3> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

2> in case of a GRA Update procedure:

3> clear the entry for the GRA UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

2> clear the variable ESTABLISHED_RABS;

2> set the variable CELL_UPDATE_STARTED to FALSE;

2> release all its radio resources;

2> enter RRC-Idle mode;

2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in clause 6 and sub-clause 7.18;

2> the procedure ends.

7.8.1.13 T302 expiry or cell reselection

If any or several of the following conditions are true:

- expiry of timer T302;

- reselection to another GERAN cell (including the previously serving cell) before completion of the Cell Update or GRA Update procedure;

the MS shall:

1> stop T302 if it is running;

1> if the MS was in RRC-Cell_Dedicated state prior to the initiation of the procedure; and

2> if timers T314 and T315 have elapsed while T302 was running:

3> enter RRC-Idle mode.

3> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers. Other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in clause 6 and sub-clause 7.18.

3> and the procedure ends.

2> if timer T314 has elapsed while T302 was running and,

3> if "*T314 Expired*" in the variable RB_TIMER_INDICATOR is set to FALSE and

3> if T315 is still running:

4> release locally all radio bearers which are associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "useT314";

4> indicate release of those radio access bearers to upper layers;

4> delete all information about those radio access bearers from the variable ESTABLISHED_RABS;

4> set "*T314 Expired*" in the variable RB_TIMER_INDICATOR to TRUE;

2> if timer T315 has elapsed while T302 was running and,

3> if "*T315 Expired*" in the variable RB_TIMER_INDICATOR is set to FALSE and,

3> if T314 is still running:

4> release locally all radio bearers which are associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "useT315";

4> indicate release of those radio access bearers to upper layers;

4> delete all information about those radio access bearers from the variable ESTABLISHED_RABS;

4> set "*T315 Expired*" in the variable RB_TIMER_INDICATOR to TRUE;

1> if, caused by the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE and/or the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE:

    2> abort the ongoing integrity and/or ciphering reconfiguration;

    2> if the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message contained the IE "*Ciphering Mode Info*":

        3> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

        3> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

    2> if the received CELL UPDATE CONFIRM or GRA UPDATE CONFIRM message contained the IE "*Integrity Protection Mode Info*":

        3> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

        3> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

1> if the variable ORDERED_RECONFIGURATION is set to TRUE caused by the received CELL UPDATE CONFIRM message in case of a cell update procedure:

    2> set the variable ORDERED_RECONFIGURATION to FALSE;

1> in case of a Cell Update procedure:

    2> clear any entry for the CELL UPDATE CONFIRM message in the table "Accepted transactions" in the variable TRANSACTIONS;

1> in case of a GRA Update procedure:

    2> clear any entry for the GRA UPDATE CONFIRM message in the table "Accepted transactions" in the variable TRANSACTIONS;

If the MS has not entered RRC-Idle mode, and:

1> if V302 is equal to or smaller than N302, the MS shall:

    2> in case of a Cell Update procedure:

        3> set the contents of the CELL UPDATE message according to sub-clause 7.8.1.3;

        3> if a CELL UPDATE CONFIRM message was received and caused the IE "Reconfiguration" in the variable CIPHERING_STATUS to be set to TRUE and/or the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE:

            4> if the IE "Downlink counter sychnronization info" was included in the received CELL UPDATE CONFIRM message:

                5> apply the new security (integrity protection) configuration received in the CELL UPDATE CONFIRM on the CELL UPDATE message.

        3> submit the CELL UPDATE message for transmission on the uplink SRB2;

    2> in case of a GRA Update procedure:

        3> set the contents of the GRA UPDATE message according to sub-clause 7.8.1.3;

        3> if a GRA UPDATE CONFIRM message was received and caused the IE "Reconfiguration" in the variable CIPHERING_STATUS to set to TRUE and/or the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE:

            4> if the IE "Downlink counter sychnronization info" was included in the received GRA UPDATE CONFIRM message:

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5> apply the new security (integrity protection) configuration received in the GRA UPDATE CONFIRM on the GRA UPDATE message.

3> submit the GRA UPDATE message for transmission on the uplink SRB2.;

2> increment counter V302;

2> if the RLC sub-layer indicates to the RRC layer a successful transmission of the message:

3> restart timer T302;

2> if the RLC sub-layer indicates a link failure to the RRC layer:

3> enter RRC-Idle mode;

3> perform the actions specified in clause 6 when MS is in RRC-Idle mode;

3> consider the Cell Update procedure or GRA Update procedure to be unsuccessful;

3> the procedure ends.

1> if V302 is greater than N302, the MS shall:

2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

2> clear the variable PDCP_SN_INFO;

2> in case of a Cell Update procedure:

3> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

2> in case of a GRA Update procedure:

3> clear the entry for the GRA UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

2> release all its radio resources;

2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

2> clear the variable ESTABLISHED_RABS;

2> set the variable CELL_UPDATE_STARTED to FALSE;

2> enter RRC-Idle mode;

2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in clause 6 and sub-clause 7.18;

2> and the procedure ends.

7.8.1.14 T314 expiry

Upon expiry of timer T314 the MS shall:

1> if timer T302 is running:

2> continue awaiting response message from GERAN;

1> if timer T302 is not running and timer T315 is running:

2> set IE "*T314 Expired*" in variable RB_TIMER_INDICATOR to TRUE;

2> release locally all radio bearers which are associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "use T314";

2> indicate release of those radio access bearers to upper layers;

2> delete all information about those radio access bearers from the variable ESTABLISHED_RABS;

1> if timers T302 and T315 are not running:

2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

2> clear the variable PDCP_SN_INFO;

2> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

2> release all its radio resources;

2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

2> clear the variable ESTABLISHED_RABS;

2> set the variable CELL_UPDATE_STARTED to FALSE;

2> enter RRC-Idle mode;

2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in clause 6 and sub-clause 7.18;

2> and the procedure ends.

7.8.1.15   T315 expiry

Upon expiry of timer T315 the MS shall:

1> if timer T302 is running:

2> continue awaiting response message from GERAN;

1> if timer T302 is not running and timer T314 is running:

2> set IE "*T315 Expired*" in variable RB_TIMER_INDICATOR to TRUE;

2> release locally all radio bearers which are associated with any radio access bearers for which in the variable ESTABLISHED_RABS the value of the IE "*Re-establishment Timer*" is set to "use T315";

2> indicate release of those radio access bearers to upper layers;

2> delete all information about those radio access bearers from the variable ESTABLISHED_RABS;

1> if timers T302 and T314 are not running:

2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

2> clear the variable PDCP_SN_INFO;

2> clear the entry for the CELL UPDATE CONFIRM message in the table "Rejected transactions" in the variable TRANSACTIONS;

2> release all its radio resources;

2> indicate release (abort) of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

2> clear the variable ESTABLISHED_RABS;

2> set the variable CELL_UPDATE_STARTED to FALSE;

2> enter RRC-Idle mode;

2> other actions the MS shall perform when entering RRC-Idle mode from RRC-Connected mode are specified in clause 6 and sub-clause 7.18;

2> and the procedure ends.

7.8.1.16 Reception of the GERAN MOBILITY INFORMATION CONFIRM message by the GERAN

See sub-clause 7.8.1.6.

7.8.1.17 Inter-RAT cell reselection to GERAN *Iu mode*

7.8.1.17.1 General

The purpose of the inter-RAT cell reselection procedure to GERAN *Iu mode* is to transfer, under the control of the MS and to some extent the source radio access technology, a connection between the MS and another radio access technology (e.g. UTRAN) to GERAN *Iu mode*.

7.8.1.17.2 Initiation

When the MS makes an inter-RAT cell reselection to GERAN *Iu mode* according to the criteria specified in 3GPP TS 44.160, it shall initiate this procedure. The inter-RAT cell reselection made by the MS may use system information broadcast from the source radio access technology or MS dedicated information.

When the MS performs an inter-RAT cell reselection from a RAT other than UTRAN, the MS shall:

1> set the variable ESTABLISHMENT_CAUSE to "Inter-RAT cell reselection";

1> initiate an RRC connection establishment procedure as specified in sub-clause 7.5;

1> after initiating an RRC connection establishment:

2> release all resources specific to the other radio access technology.

When the MS performs an inter-RAT cell reselection from UTRAN Cell_FACH or Cell_PCH state to GERAN *Iu mode*, the MS shall:

1> initiate the cell update procedure as specified in sub-clause 7.8, using the cause "cell reselection"and setting the U-RNTI in the IE "*G-RNTI*".

When the MS performs an inter-RAT cell reselection from UTRAN URA_PCH, the MS shall:

1> compare the URA identity which the MS had been assigned to in UTRAN against the GRA identities which are broadcast in the GERAN cell.

2> If the assigned URA identity is not present in the list of GRA identities that are broadcast in the GERAN cell:

3> initiate the GRA update procedure as specified for the GRA reselection case in sub-clause 7.8, using the cause "change of GRA" and setting the U-RNTI in the IE "*G-RNTI*".

7.8.1.17.3 MS fails to complete an inter-RAT cell reselection

When the MS performs an inter-RAT cell reselection from a RAT other than UTRAN, and if the inter-RAT cell reselection fails before the MS has initiated the RRC connection establishment, the MS may return back to the other radio access technology.

When the MS performs an inter-RAT cell reselection from a RAT other than UTRAN, and if the RRC connection establishment fails, the MS shall enter RRC-Idle mode.

When the MS performs an inter-RAT cell reselection from UTRAN to GERAN *Iu mode*, and the cell reselection fails, the MS may return back to the UTRAN RRC Connected state, from which it initiated the inter-RAT cell reselection.

7.8.1.18 Inter-RAT cell reselection from GERAN Iu mode

7.8.1.18.1 General

The purpose of the inter-RAT cell reselection procedure from GERAN *Iu mode* is to transfer, under the control of the MS and to some extent the GERAN, a connection between the MS and GERAN *Iu mode* to another radio access technology (e.g. UTRAN).

7.8.1.18.2 Initiation

This procedure is applicable in states RRC-Cell_Shared or RRC GRA_PCH.

When the MS based on received system information makes a inter-RAT cell reselection to a radio access technology other than UTRAN, according to the criteria specified in 3GPP TS 44.160, the MS shall:

1> initiate the establishment of a connection to the target radio access technology according to its specifications.

When the MS in RRC-Cell_Shared state performs an inter-RAT cell reselection to UTRAN, according to the criteria specified in 3GPP TS 44.160, the MS shall:

1> initiate the cell update procedure according to 3GPP TS 25.331, using the cause "cell reselection"and setting the G-RNTI in the IE "*U-RNTI*". When the MS in RRC-GRA_PCH state performs an inter-RAT cell reselection to UTRAN, according to the criteria specified in 3GPP TS 44.160, the MS shall:

1> compare the GRA identity which the MS had been assigned to in GERAN against the URA identities which are broadcast in the UTRAN cell.

2> If the assigned GRA identity is not present in the list of URA identities that are broadcast in the UTRAN cell:

3> initiate the URA update procedure as specified in 3GPP TS 25.331, using the cause "change of URA"and setting the G-RNTI in the IE "*U-RNTI*".

7.8.1.18.3 Successful cell reselection

When the MS has succeeded in reselecting a cell in the target radio access technology other than UTRAN and has initiated the establishment of a connection, it shall release all GERAN specific resources.

When the MS has succeeded in reselecting to a UTRAN cell, it shall release all GERAN specific radio resources.

7.8.1.18.4 MS fails to complete an inter-RAT cell reselection

If the inter-RAT cell reselection to another radio access technology fails, the MS shall resume the connection to GERAN *Iu mode* using the resources used before initiating the inter-RAT cell reselection procedure.

7.8.2 GRA update

See sub-clause 7.8.1.

7.8.3 GERAN mobility information
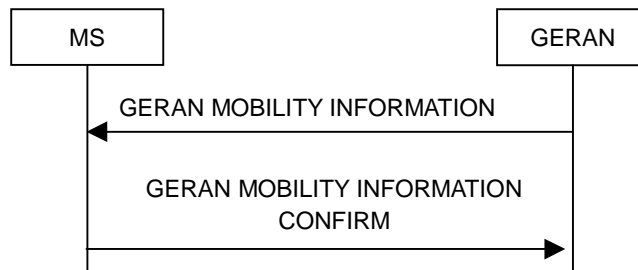
Figure 7.8.3.1: GERAN Mobility Information procedure, normal flow
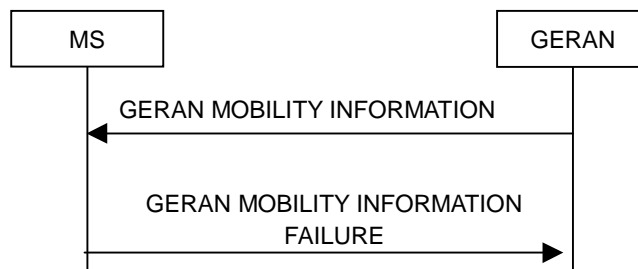
Figure 7.8.3.2: GERAN Mobility Information procedure, failure case

7.8.3.1 General

The purpose of this procedure is to allocate any one or a combination of the following to a MS in Connected Mode:

- a new G-RNTI;

- other mobility related information.

7.8.3.2 Initiation

To initiate the procedure GERAN transmits a GERAN MOBILITY INFORMATION message to the MS on the downlink SRB2.

7.8.3.3 Reception of GERAN MOBILITY INFORMATION message by the MS

When the MS receives a GERAN MOBILITY INFORMATION message, it shall:

1> act on received information elements as specified in sub-clause 7.19;

1> if the IE "*MS Timers and Constants in Connected Mode*" is present:

2> store the values of the IE "*MS Timers and Constants in Connected Mode*" in the variable TIMERS_AND_CONSTANTS, replacing any previously stored value; and

2> for each updated timer value:

3> start using the new value next time the timer is started;

NOTE: If a new value of timer T305 is included in the IE "*MS Timers and constants in connected mode*", and the old value of timer T305 is "infinity", the MS will not use the new value of the timer T305 until the next cell reselection.

1> set the IE "RRC Transaction Identifier" in the GERAN MOBILITY INFORMATION CONFIRM message to the value of "RRC transaction identifier" in the entry for the GERAN MOBILITY INFORMATION message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> if the GERAN MOBILITY INFORMATION message contained the IE "*Ciphering Mode Info*" or contained the IE "*Integrity Protection Mode Info*":

    2> set the IE "*Status*" in the variable SECURITY_MODIFICATION for all the CN domains in the variable SECURITY_MODIFICATION to "Affected";

1> if the GERAN MOBILITY INFORMATION message contained the IE "Ciphering Mode Info":

    2> include the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" in the GERAN MOBILITY INFORMATION CONFIRM message and set to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

1> if the variable PDCP_SN_INFO is non-empty:

    2> include the IE "*RB with PDCP Information List*" in the GERAN MOBILITY INFORMATION CONFIRM message and set it to the value of the variable PDCP_SN_INFO;

1> if the received GERAN MOBILITY INFORMATION message included the structure "Downlink Counter Synchronisation Info":

    2> if the variable PDCP_SN_INFO is empty:

        3> configure the corresponding RLC entity for all AM and UM radio bearers and AM and UM signalling radio bearers except SRB2 to "stop";

    2> else:

        3> configure the RLC entity for signalling radio bearers SRB1, SRB3 and SRB4 to "stop";

        3> configure the RLC entity for UM and AM radio bearers for which the IE "*PDCP SN Info*" is not included to "stop";

    2> re-establish SRB2;

    2> for the downlink and the uplink, apply the ciphering configuration as follows:

        3> if the received re-configuation message included the IE "*Ciphering Mode Info*":

            4> use the ciphering configuration in the received message when transmitting the response message;

        3> if the ciphering configuration for SRB2 from a previously received SECURITY MODE COMMAND has not yet been applied because of the activation times not having been reached:

            4> if the previous SECURITY MODE COMMAND was received due to new keys being received:

                5> consider the new ciphering configuration to include the received new keys;

            4> if the ciphering configuration for SRB2 from a previously received SECURITY MODE COMMAND has not yet been applied because of the corresponding activation times not having been reached and the previous SECURITY MODE COMMAND caused a change in LATEST_CONFIGURED_CN_DOMAIN:

                5> consider the new ciphering configuration to include the keys associated with the LATEST_CONFIGURED_CN_DOMAIN;

            4> apply the new ciphering configuration immediately following RLC re-establishment.

        3> else:

            4> continue using the current ciphering configuration;

    2> set the new uplink and downlink HFN of SRB2 to MAX (uplink HFN of SRB2, downlink HFN of SRB2) + 1;

    2> increment by one the downlink and uplink HFN values for SRB2;

    2> calculate the START value according to sub-clause 7.18;

    2> include the calculated START values for each CN domain in the IE "START List" in the structure "Uplink Counter Synchronisation Info" in the GERAN MOBILITY INFORMATION CONFIRM message;

1> transmit a GERAN MOBILITY INFORMATION CONFIRM message on the uplink SRB2;

1> if the IE "*Integrity Protection Mode Info*" was present in the GERAN MOBILITY INFORMATION message:

    2> start applying the new integrity protection configuration in the uplink for signalling radio bearer SRB2 from and including the transmitted GERAN MOBILITY INFORMATION CONFIRM message;

1> if the structure "*Downlink Counter Synchronisation Info*" was included in the received GERAN MOBILITY INFORMATION message:

    2> when RLC has confirmed the successful transmission of the response message:

        3> if the variable PDCP_SN_INFO is empty:

            4> configure the RLC entity for all AM and UM radio bearers and AM and UM signalling radio bearers except SRB2 to "continue";

        3> else:

            4> configure the RLC entity for signalling radio bearers SRB1, SRB3 and SRB4 to "continue";

            4> configure the RLC entity for UM and AM radio bearers for which the IE "*PDCP SN Info*" is not included to "continue";

        3> re-establish all AM and UM RLC entities with RB identities larger than 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the corresponding CN domain;

        3> re-establish the RLC entities with RB identities 1, 3 and 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;

        3> set the remaining bits of the HFN component of the COUNT-C values of all UM RLC entities to zero;

        3> set the remaining bits of the HFN component of the COUNT-C values of all AM RLC entities to zero, for those bearers to which RLC entitie where re-established;

        3> if the IE "*PDCP Context Relocation Info*" is not present:

            4> re-initialise the PDCP header compression entities of each radio bearer in the variable ESTABLISHED_RABS as specified in 3GPP TS 25.323;

        3> if the IE "*PDCP Context Relocation Info"* is present:

            4> perform the actions as specified in 7.19.

1> if the variable PDCP_SN_INFO is empty; and

    2> if the GERAN MOBILITY INFORMATION message contained the IE "*Ciphering Mode Info*":

        3> when RLC has confirmed the successful transmission of the GERAN MOBILITY INFORMATION CONFIRM message, perform the actions below;

    2> if the GERAN MOBILITY INFORMATION message did not contain the IE "*Ciphering Mode Info*":

        3> when RLC has been requested to transmit the GERAN MOBILITY INFORMATION CONFIRM message, perform the actions below;

1> if the variable PDCP_SN_INFO is non-empty:

    2> when RLC has confirmed the successful transmission of the GERAN MOBILITY INFORMATION CONFIRM message:

        3> for each radio bearer in the variable PDCP_SN_INFO:

4> if the IE "*RB Started*" in the variable ESTABLISHED_RABS is set to "started":

4> configure the RLC entity for that radio bearer to "continue";

3> clear the variable PDCP_SN_INFO;

1> if the GERAN MOBILITY INFORMATION message contained the IE " *Ciphering Mode Info* ":

2> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

1> if the GERAN MOBILITY INFORMATION message contained the IE "*Integrity Protection Mode Info*":

2> allow the transmission of RRC messages on all signalling radio bearers with any RRC SN;

2> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

2> clear the variable SECURITY_MODIFICATION.

The procedure ends.

7.8.3.4 Reception of an GERAN MOBILITY INFORMATION CONFIRM message by the GERAN

When the network receives GERAN MOBILITY INFORMATION CONFIRM message, GERAN may delete any old G-RNTI. The procedure ends.

7.8.3.5 Cell re-selection

If the MS performs cell re-selection, the MS shall:

1> initiate a Cell Update procedure according to sub-clause 7.8.1;

1> if the MS has not yet submitted the GERAN MOBILITY INFORMATION CONFIRM message to lower layers for transmission;

2> transmit a GERAN MOBILITY INFORMATION FAILURE message on the uplink SRB2;

2> set the IE "*RRC Transaction Identifier*" in the GERAN MOBILITY INFORMATION FAILURE message to the value of "RRC transaction identifier" in the entry for the GERAN MOBILITY INFORMATION message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry.

2> set the IE "*Failure Cause*" to the cause value "cell reselection";

2> when the GERAN MOBILITY INFORMATION FAILURE message has been submitted to lower layers for transmission:

3> continue with any ongoing processes and procedures as if the invalid GERAN MOBILITY INFORMATION message has not been received and the procedure ends.

1> otherwise:

2> continue the procedure normally.

7.8.3.6 Incompatible simultaneous security reconfiguration

If the variable INCOMPATIBLE_SECURITY_RECONFIGURATION becomes set to TRUE because of the received GERAN MOBILITY INFORMATION message, the MS shall:

1> transmit a GERAN MOBILITY INFORMATION FAILURE message on the uplink SRB2;

1> set the IE "*RRC Transaction Identifier*" in the GERAN MOBILITY INFORMATION FAILURE message to the value of "RRC transaction identifier" in the entry for the GERAN MOBILITY INFORMATION message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> set the IE "*Failure Cause*" to the cause value "incompatible simultaneous reconfiguration";

1> when the GERAN MOBILITY INFORMATION FAILURE message has been delivered to lower layers for transmission:

>> 2> set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;

>> 2> continue with any ongoing processes and procedures as if the GERAN MOBILITY INFORMATION message has not been received;

>> 2> and the procedure ends.

7.8.3.7 Invalid GERAN MOBILITY INFORMATION message

If the GERAN MOBILITY INFORMATION message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows. The MS shall:

1> transmit a GERAN MOBILITY INFORMATION FAILURE message on the uplink SRB2;

>> 1> set the IE "*RRC Transaction Identifier* RRC" in the GERAN MOBILITY INFORMATION FAILURE message to the value of "RRC transaction identifier" in the entry for the GERAN MOBILITY INFORMATION message in the table "Rejected transactions" in the variable TRANSACTIONS, and;

1> clear that entry.

1> set the IE "*Failure Cause*" to the cause value "protocol error";

1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> when the GERAN MOBILITY INFORMATION FAILURE message has been submitted to lower layers for transmission:

>> 2> continue with any ongoing processes and procedures as if the invalid GERAN MOBILITY INFORMATION message has not been received;

1> and the procedure ends.

7.8.4 Inter-mode handover from GERAN Iu mode

7.8.4.1 General
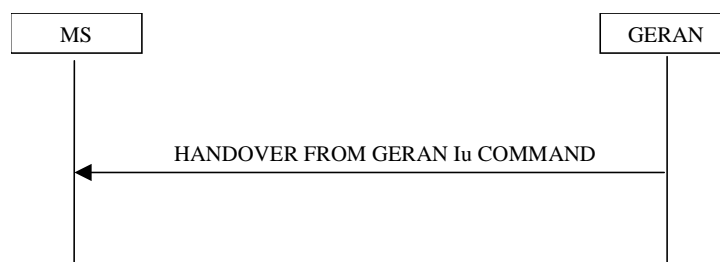
Figure 7.8.4.1.1: Inter-mode handover from GERAN, successful case
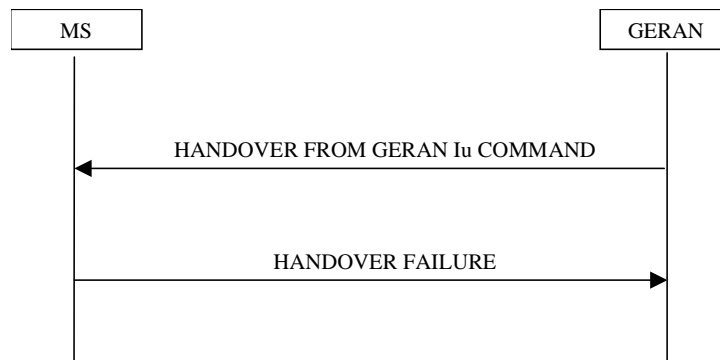
Figure 7.8.4.1.2: Inter-mode handover from GERAN Iu mode, failure case

The purpose of the Inter-Mode Handover from GERAN Iu procedure is to, under the control of the network, transfer a connection between the MS and GERAN *Iu mode* to GERAN *A/Gb mode*.This procedure may be used to request an intercell or intracell change of channel(s) by the network, in RRC-Cell_Dedicated state.

NOTE: This procedure is applicable to CS domain service.

7.8.4.2 Initiation

The procedure is initiated when GERAN *Iu mode* orders a MS in RRC-Cell_Dedicated state, to make a handover to GERAN *A/Gb mode*.

To initiate the procedure, GERAN sends a HANDOVER FROM GERAN Iu COMMAND message.

Upon the receipt of HANDOVER FROM GERAN Iu COMMAND message, the mobile station shall:

1> initiate reconfiguration of the layer 2 and disconnection of the DBPSCHs;

1> switch to the assigned cell(s) and establish the physical channels as described in 3GPP TS 44.018.

7.8.4.3 Reception of a HANDOVER FROM GERAN Iu COMMAND message by the MS

The MS shall be able to receive a HANDOVER FROM GERAN Iu COMMAND message and perform an inter-mode handover, even if no prior MS measurements have been performed on the target cell. The connection is established in GERAN *A/Gb mode* by using the contents of encapsulated message HANDOVER COMMAND message (see 3GPP TS 44.018)

If the IE "*RAB information List*" is included in the HANDOVER FROM GERAN Iu COMMAND message:

1> if the IE "RAB information List" includes one IE "RAB Info" with the IE "*CN domain Identity*" set to "CS domain":

2> connect upper layer entities corresponding to the indicated CS domain RAB to the radio resources indicated in the encapsulated HANDOVER COMMAND message.

2> and act upon received information element as specified 3GPP TS 44.018.

NOTE: In this version of the specification the maximum number of CS domain RABs which may be included in the IE "RAB information List" is limited to 1.

7.8.4.4 Successful completion of the inter-mode handover

Upon successfully completing the handover, GERAN shall:

1> release the radio connection;

Upon successfully completing the handover, the MS shall:

1> if inter-mode handover is performed and if there are any NAS messages with the IE "*CN domain identity*" set to "CS domain" for which the successful delivery of the INITIAL DIRECT TRANSFER message or UPLINK DIRECT TRANSFER message on signalling radio bearer SRB3 or signalling radio bearer SRB4 has not yet been confirmed by RLC:

2> retransmit those NAS messages to the network on the newly established radio connection to the system.

3> clear or set variables upon leaving GERAN RRC-Connected mode as specified in sub-clauses 7.19 and 10.4.

7.8.4.5 Unsuccesful completion of the inter-mode handover at the MS side

If the MS does not succeed in establishing the connection to the target, it shall:

1> revert back to the GERAN configuration;

1> establish the GERAN physical channel(s) used at the time for reception of HANDOVER FROM GERAN Iu COMMAND;

1> if the MS does not succeed to establish the GERAN physical channel(s):

2> select a suitable GERAN cell according to 3GPP TS 45.008.

2> perform a Cell Update procedure according to sub-clause 7.8 with cause "radio link failure";

2> when the Cell Update procedure has completed successfully:

3> proceed as below;

1> transmit the HANDOVER FAILURE message setting the information elements as specified below:

2> include the IE "RRC Transaction Identifier"; and

2> set it to the value of "RRC Transaction Identifier" in the entry for the HANDOVER FROM GERAN Iu COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry;

2> set the IE "Failure Cause" to "physical channel failure";

1> when the HANDOVER FAILURE message has been submitted to lower layer for transmission:

2> the procedure ends.

7.8.4.6 Invalid HANDOVER FROM GERAN Iu COMMAND message

If the received HANDOVER FROM GERAN Iu COMMAND message does not include a valid encapsulated HANDOVER COMMAND message (see 3GPP TS 44.018), the MS shall perform procedure specific error handling as follows. The MS shall:

1> set the IE "*Failure Cause*" to the cause value "Inter-mode Protocol Error";

1> transmit a HANDOVER FAILURE message on the uplink SRB2;

1> when the transmission of the HANDOVER FAILURE message has been confirmed by RLC:

2> continue with any ongoing processes and procedures as if the invalid HANDOVER FROM GERAN Iu COMMAND message has not been received;

2> and the procedure ends.

If the HANDOVER FROM GERAN Iu COMMAND message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows. The MS shall:

1> set the IE "*RRC Transaction Identifier*" in the HANDOVER FAILURE message to the value of "RRC transaction identifier" in the entry for the HANDOVER FROM GERAN Iu COMMAND message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> set the IE "Failure Cause" to the cause value "protocol error";

1> include the IE "Protocol Error Information" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> transmit a HANDOVER FAILURE message on the uplink SRB2;

1> when the HANDOVER FAILURE message has been submitted to lower layers for transmission:

   2> continue with any ongoing processes and procedures as if the invalid HANDOVER FROM GERAN Iu COMMAND message has not been received;

   2> and the procedure ends.

7.8.4.7 Reception of an HANDOVER FAILURE message by GERAN in Iu mode

Upon receiving an HANDOVER FAILURE message, GERAN may initiate the release of the resources in the GERAN A/Gb mode (see 3GPP TS 44.018 and 3GPP TS 25.413).

7.8.4.8 Unsupported configuration in HANDOVER FROM GERAN Iu COMMAND message

If:

- the GERAN instructs the MS to perform a non-supported handover scenario; or

- the GERAN instructs the MS to use a non-supported configuration; or

- the IE "*RAB Information List*" is included in the HANDOVER FROM GERAN Iu mode COMMAND message and this IE does not include any IE "RAB Info" with the IE "CN domain Identity" set to "CS domain":

the MS shall:

1> transmit a HANDOVER FAILURE message, setting the information elements as specified below:

   2> include the IE "RRC Transaction Identifier"; and

   2> set it to the value of "RRC Transaction Identifier" in the entry for the HANDOVER FROM GERAN Iu COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

   2> clear that entry;

   2> set the IE "Failure Cause" to "configuration unsupported";

   2> when the HANDOVER FAILURE message has been submitted to lower layers for transmission:

      3> resume normal operation as if the invalid HANDOVER FROM GERAN Iu COMMAND message has not been received;

      3> and the procedure ends.

7.8.4.9 Reception of HANDOVER FROM GERAN Iu COMMAND message by MS in RRC-Cell_Shared state

If the MS receives HANDOVER FROM GERAN Iu COMMAND while in RRC-Cell_Shared state, the MS shall:

1> transmit a HANDOVER FAILURE message, setting the information elements as specified below:

   2> include the IE "RRC Transaction Identifier"; and

2> set it to the value of "RRC Transaction Identifier" in the entry for the HANDOVER FROM GERAN Iu COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry;

2> set the IE "Failure Cause" to "protocol error";

3> include IE "Protocol Error Information";

3> set the value of IE "Protocol Error Cause" to "Message not compatible with receiver state"; and

2> when the HANDOVER FAILURE message has been submitted to lower layers for transmission:

3> resume normal operation as if the invalid HANDOVER FROM GERAN Iu COMMAND message has not been received;

3> and the procedure ends.

7.9 Procedures for System Information transmission and Measurement reporting in RRC-Cell_Dedicated state

NOTE: Any modification to this sub-clause may have impact on 3GPP TS 44.018.

7.9.1 General

In RRC-Cell_Dedicated state, the mobile station sends measurement report messages and receives system information on SRB1.

In the uplink direction, measurement report messages are sent using SRB1 at each possible occasion when no other RRC message has to be sent (see sub-clause 7.9.2). Similarly, in the downlink direction, SYSTEM INFORMATION TYPE 5, 6 and optionally 5bis and 5ter messages are sent on SRB1 when no other RRC message has to be sent. The network may, in addition, send MEASUREMENT INFORMATION messages on SRB1 to a mobile station in RRC-Cell_Dedicated state. This message may order the MS to use the enhanced measurement reporting. The mapping of SRB1 onto logical channels is specified in 3GPP TS 44.160.

A mobile station with extended measurement capabilities, which receives EXTENDED MEASUREMENT ORDER messages on SRB1, shall perform and report extended measurements, see sub-clause 7.9.3.

The SYSTEM INFORMATION TYPE 5bis message shall be sent if and only if the EXT IND bit in the *Neighbour Cell Description* information element in both the SYSTEM INFORMATION TYPE 5 and TYPE 5bis messages indicates that each information element only carries part of the BA.

A GSM 900 mobile station which only supports the primary GSM band P-GSM 900 (cf. 3GPP TS 45.005) may consider the EXT-IND bit in the *Neighbour Cell Description* IE in the SYSTEM INFORMATION TYPE 5 message bit as a spare bit, assume that the information element carries the complete BA, and ignore any SYSTEM INFORMATION TYPE 5bis messages.

NOTE: The network should take into account limitations of certain mobile stations to understand SYSTEM INFORMATION TYPE 5ter and TYPE 5bis messages, the EXT-IND bit in the *Neighbour Cell Description* IE, and formats used in the *Neighbour Cell Description* information element and *Cell Channel Description* information element used in system information messages, see 3GPP TS 44.018.

Problems occurring in the reception of SACCH frames are interpreted as a loss of communication means and appropriate procedures are then triggered as specified in 3GPP TS 45.008.

7.9.2   Measurement Report and Enhanced Measurement Report

7.9.2.2   Parameters for Measurements and Reporting

7.9.2.2.1   General

Some parameters from the MEASUREMENT INFORMATION or PSI3quater messages allow an MS to build lists which are used for Measurement reporting and Enhanced Measurement reporting.

Full sets of MEASUREMENT INFORMATION messages and PSI3quater messages are defined by a number of different instances indicated respectively by the parameters MI_COUNT and PSI3_QUATER_COUNT. Two different instances of MEASUREMENT INFORMATION) messages and PSI3quater messages are respectively distinguished by different MI_INDEX and PSI3_QUATER_INDEX parameter values.

If the MP_CHANGE_MARK parameter or the PSI3_CHANGE_MARK parameter is changed, the MS shall re-read the Real Time differences, REP_PRIORITY, CCN_SUPPORTED, Measurement Parameters and 3G Measurement Parameters in all instances of respectively MEASUREMENT INFORMATION messages or PSI3quater messages. The MS shall start using the parameters as soon as they have been received. In the case that not all the parameters have been received in a full set of instances, then the default values shall be used. If different values occur for the same parameter in different instances of a MEASUREMENT INFORMATION message or PSI3quater message, the instance with the highest index shall be used.

7.9.2.2.2   Deriving the 3G Neighbour Cell list from the 3G Neighbour Cell Description

A multi-RAT MS shall form a 3G Neighbour Cell list.

In RRC-Idle mode, the MS obtains the 3G Neighbour Cell Description information on PBCCH by one or more instances of the PSI3quater message as specified in 3GPP TS 44.160 sub-clause 5.5.3. When the PSI3_CHANGE_MARK parameter is changed in a PSI3quater message, the MS shall re-read all instances and rebuild the 3G Neighbour Cell list. This 3G neighbour cell list shall then be used for measurement reporting when the MS enters RRC-Cell_Dedicated state, until the MS has received a given number of instances of MEASUREMENT INFORMATION messages that contain 3G Neighbour Cell Description. This number of instances is defined by the 3G-WAIT parameter.

In RRC-Cell_Dedicated state, the MS obtains the 3G Neighbour Cell Description information on SRB1 by one or more instances of the MEASUREMENT INFORMATION message with the same 3G_BA_IND value as defined in this sub-clause. When the 3G_BA_IND parameter in the MEASUREMENT INFORMATION message is changed, the MS shall also re-read all instances of MEASUREMENT INFORMATION messages, rebuild the 3G Neighbour Cell list, and use the new list for measurement reporting based on the parameter 3G-WAIT.

The 3G Neighbour Cell list may contain up to 96 3G Neighbour Cells.

Each *3G Neighbour Cell Description* received is added to the 3G Neighbour Cell list, starting with the index equal to the parameter Index_Start_3G. If this parameter is not present then the value 0 shall be used.

For each 3G Neighbour Cell Description, the cells are indexed in the following order:

1) UTRAN FDD cells: FDD ARFCNs are indexed in the order of occurrence in the 3G Neighbour Cell description. Then for each FDD ARFCN, the cells are indexed in the order of increasing values of the decoded FDD_CELL_INFORMATION parameters.

2) UTRAN TDD cells: TDD ARFCNs are indexed in the order of occurrence in the 3G Neighbour Cell description. Then for each TDD ARFCN, the cells are indexed in the order of increasing values of the decoded TDD_CELL_INFORMATION parameters.

3) CDMA 2000 cells: the cells are indexed in the order of occurrence in the 3G Neighbour Cell description.

If a *3G Neighbour Cell Description* includes non-supported frequencies or Radio Access Technologies, this shall not be considered as an error; indices in the 3G Neighbour Cell list shall be incremented accordingly.

If more than one cell with the same index in the 3G Neighbour Cell list are provided by different instances of *3G Neighbour Cell Descriptions*, the cell from the message instance with the highest index shall be used. In case the same

3G Cell occurs more than once in the resulting 3G Neighbour Cell list, each occurrence shall be assigned an index but only the cell with the highest index in the 3G Neighbour Cell list shall be referred to in measurement reports.

If a cell is provided for an index higher than 95 in the 3G Neighbour Cell list, this shall not be considered as an error; the cell shall not be included in the 3G Neighbour Cell list.

7.9.2.2.3 Deriving the GSM Neighbour Cell list from the BSICs and the BCCH Allocation

In RRC-Idle mode, the MS shall derive the GSM Neighbour Cell from information received on PBCCH, by one or more instances of the PSI3 or PSI3bis message as specified in 3GPP TS 44.160. In RRC-Cell_Dedicated state, the GSM Neighbour Cell list shall be derived from information received, on SRB1, by one or more instances of the MEASUREMENT INFORMATION message as defined in this sub-clause. The GSM Neighbour Cell list may contain up to 96 Neighbour Cells.

To obtain the GSM neighbour cell list, the MS shall combine the BA (list) received in SI5/SI5bis/SI5ter with the BSIC list received in one or more instances of the MEASUREMENT INFORMATION message with the same BA_IND value as the BA (list). The BSICs may be received before the corresponding BA (list). The first BSIC in each instance applies to the frequency in the BA (list) referenced by the parameter BA_Index_Start_BSIC. For each successive BSIC, one bit indicates if the BSIC applies to the same frequency as the previous BSIC or to the next frequency in the BA (list), as defined in 3GPP TS 44.018. When the BA_IND is changed the MS shall rebuild the combined list and the BSIC list shall also be rebuilt.

7.9.2.2.4 Deriving the Neighbour Cell list from the GSM Neighbour Cell list and the 3G Neighbour Cell list

For report with the ENHANCED MEASUREMENT REPORT message, the Neighbour Cell list is the concatenation of the GSM Neighbour Cell list and the 3G Neighbour Cell list (if any). In this concatenation the value of the parameter Absolute_Index_Start_EMR is added to the 3G Neighbour Cell list indices. The Neighbour Cell list may contain up to 96 Neighbour Cells. If the same index occurs for a GSM Cell and a 3G Cell, the GSM Cell shall be used.

NOTE: For report with the MEASUREMENT REPORT message, the concatenated list is not used. Instead, the two lists are used separately, as defined in 3GPP TS 44.018.

7.9.2.2.5 Real Time Differences

To obtain the Real Time Differences, the MS shall combine the BA (list) with the Real Time Differences parameters received in the MEASUREMENT INFORMATION message with the same BA_IND value as the BA (list). The Real Time Difference list may contain up to 96 Real Time Difference parameters. Each frequency in the BA (list) may be associated to 0, 1 or more Real Time Difference parameters. The Real Time Difference parameters may be received before the corresponding BA (list). The parameter BA_Index_Start_RTD in each structure indicates the index of the frequency in the BA (list) to be taken as a starting reference. A sub-structure is included for each frequency referenced. Each of those sub-structures indicates if 0, 1 or more RTD parameters are present for this frequency. If a frequency in the BA (list) is not provided with Real Time Difference information by any of the message instances with correct BA_IND, it shall be assumed that no information is available for that frequency, see 3GPP TS 44.018. When the BA_IND is changed the MS shall re-read the Real Time Differences parameters in all instances.

The Real Time Difference may be received from the PSI3ter message in the GPRS Real Time Difference Description (see 3GPP TS 44.160).

7.9.2.2.6 Report Priority Description

Report Priority information can be received in one instance of the MEASUREMENT INFORMATION message. The Report Priority information is associated with the Neighbour Cell list (see 7.9.2.2.4) having the same BA_IND value and 3G_BA_IND value. Each REP_PRIORITY bit of this field relates to indices of the Neighbour Cell list, starting with index 0. The Report Priority information may be received before the corresponding Neighbour Cell list. When the BA_IND or 3G_BA_IND are changed the MS shall re-read the REP_PRIORITY parameters in all instances.

Indices exceeding the value 95 shall be ignored. If there are fewer indices than the number of Neighbour Cells, the value 0 shall be assumed for the missing bits.

Report Priority Description for GSM cells may also be received from the PSI3ter message and Report Priority Description for 3G cells from the PSI3quarter message(see 3GPP TS 44.160).

7.9.2.2.7 The 3G Cell Reselection list

This applies only to a multi-RAT MS. The 3G Cell Reselection list is defined in 3GPP TS 44.160.

7.9.2.2.8 CCN Support description

The CCN Support description may be received from the PSI3 message or any instance of the PSI3bis or PSI3quater messages(see 3GPP TS 44.160).

7.9.3 Extended measurement report

Only applicable to mobile stations which support extended measurement.

When in RRC-Cell_Dedicated state, a mobile station may receive an EXTENDED MEASUREMENT ORDER message from the network. As defined in 3GPP TS 45.008, the mobile station shall then perform measurements on the frequencies specified by this EXTENDED MEASUREMENT ORDER message for one reporting period. The mobile station shall thereafter send an EXTENDED MEASUREMENT REPORT message. This message contains the measurement results as defined in 3GPP TS 45.008.

If the mobile station has not started to send its EXTENDED MEASUREMENT REPORT message within 10 seconds after the reception of the EXTENDED MEASUREMENT ORDER message, no EXTENDED MEASUREMENT REPORT message shall be sent. The mobile station shall after a successful channel change abort any pending measurements or reporting related to an EXTENDED MEASUREMENT ORDER message received on the old channel.

If a mobile station receives an EXTENDED MEASUREMENT ORDER message indicating the same value of the sequence code as an EXTENDED MEASUREMENT ORDER message received earlier on the same channel without having received any EXTENDED MEASUREMENT ORDER message indicating a different value of the sequence code in between, that EXTENDED MEASUREMENT ORDER message shall be ignored. If the mobile station, before the reporting related to an EXTENDED MEASUREMENT ORDER message has started, receives a new EXTENDED MEASUREMENT ORDER message with a different value of the sequence code, any pending measurements or reporting related to the earlier EXTENDED MEASUREMENT ORDER message shall be aborted and the new message treated.

The EXTENDED MEASUREMENT ORDER message and the EXTENDED MEASUREMENT REPORT message are sent on SRB1.

7.10 Handover to UTRAN procedure

7.10.1 General

This procedure is only valid for UTRAN capable MSs. A change to UTRAN channel(s) can be requested by the network RRC sublayer in RRC-Cell_Dedicated state.

The handover to UTRAN procedure includes:

   1> the reconfiguration of the layer 2 established for the DBPSCHs;

   1> the disconnection and the deactivation of physical channels and their release (layer 1).

   1> the establishment of UTRAN channel(s), see 3GPP TS 25.331.

7.10.2 Initiation

The network initiates the handover to UTRAN procedure by sending an INTER SYSTEM TO UTRAN HANDOVER COMMAND message to the mobile station on the SRB2 in GERAN in *Iu mode*. The INTER SYSTEM TO UTRAN HANDOVER COMMAND message shall contain encapsulated the RADIO BEARER RECONFIGURATION message. If the INTER SYSTEM TO UTRAN HANDOVER COMMAND refers to a not known cell (see 3GPP TS 25.133 and 3GPP TS 25.123), this shall not be considered as an error.

7.10.3 Reception of INTER SYSTEM TO UTRAN HANDOVER COMMAND message by the MS

Upon the receipt of INTER SYSTEM TO UTRAN HANDOVER COMMAND message, the mobile station shall:

1> initiate reconfiguration of the layer 2 and disconnection of the DBPSCHs;

1> switch to the assigned cell(s) and establish the physical channels as described in 3GPP TS 25.331.

1> establish the connection to the UTRA cell, by using the contents of encapsulated RADIO BEARER RECONFIGURATION message.

7.10.4 Successful completion of the inter-RAT handover

When inter-RAT handover to UTRAN is performed, the MS shall:

1> perform the actions on reception of RADIO BEARER RECONFIGURATION message as specified in 3GPP TS 25.331;

1> keep the ciphering and integrity keys that are stored in the USIM/SIM for that CN domain.

1> if inter-RAT handover to UTRAN is performed and if there are any NAS messages for which the successful delivery of the INITIAL DIRECT TRANSFER message or UPLINK DIRECT TRANSFER message on signalling radio bearer SRB3 or signalling radio bearer SRB4 has not yet been confirmed by RLC:

2> retransmit those NAS messages to the network on the newly established radio connection to the target radio access technology.

1> clear or set variables upon leaving GERAN RRC connected mode as specified in sub-clause 10.4.

After lower layer connections are successfully established, the mobile station returns a RADIO BEARER RECONFIGURATION COMPLETE message on UTRAN channels(s), see 3GPP TS 25.331.

When receiving the RADIO BEARER RECONFIGURATION COMPLETE message (see 3GPP TS 25.331), the network shall release the old channels (see 3GPP TS 25.413).

7.10.5 Unsuccessful inter-rat handover at the MS side

If the MS does not succeed in establishing the connection to the UTRA cell, it shall:

1> revert back to the old configuration;

1> establish the GERAN physical channel(s) used at the time of reception of the INTERSYSTEM HANDOVER TO UTRAN COMMAND message;

1> if the lower layer failure happens while attempting to connect back to the old channels;

2> the PROTOCOL_ERROR_REJECT variable is set TRUE;

1> if the MS does not succeed to establish the GERAN physical channel(s):

2> perform a Cell Update procedure according to sub-clause 7.8 with cause "radio link failure";

2> when the Cell Update procedure has been completed successfully:

3> proceed as below.

1> transmit the HANDOVER FAILURE message setting the information elements as specified below:

2> include the IE "*RRC Transaction Identifier*"; and

2> set it to the value of "RRC transaction identifier" in the entry for the INTER SYSTEM HANDOVER TO UTRAN COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry;

2> set the IE "*Failure Cause*" to "physical channel failure".

1> when the HANDOVER FAILURE message has been submitted to lower layer for transmission the procedure ends.

If the INTER SYSTEM TO UTRAN HANDOVER COMMAND instructs the mobile to use a predefined configuration not implemented or if the INTER SYSTEM TO UTRAN HANDOVER COMMAND instructs the mobile to use a default configuration not supported by the MS, the MS shall:

1> set the variable PROTOCOL_ERROR_REJECT to TRUE; and

1> if allowed by the source RAT:

2> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> then stay on the current channel(s) and return a HANDOVER FAILURE message on SRB2 with cause "UTRAN configuration unknown";

1> clear all the UTRAN predefined configurations.

When sending a HANDOVER FAILURE message in response to an INTERSYSTEM TO UTRAN HANDOVER COMMAND message, the mobile station shall erase all the UTRAN predefined configurations.

If the INTER SYSTEM TO UTRAN HANDOVER COMMAND message instructs the mobile station to use a frequency that it is not capable of, then the mobile station shall:

1> stay on the current channel(s) and return a HANDOVER FAILURE message on SRB2 with cause "frequency not implemented".

7.10.6 Reception of an HANDOVER FAILURE message by GERAN in Iu mode

When HANDOVER FAILURE has been received, the network shall

1> release the UTRAN channel(s), if they were dedicated channels;

1> if a HANDOVER FAILURE message is received on the old channels on SRB2; or

1> if the GERAN has received CELL UPDATE message with the cause "Radio link failure" then:

2> the old channels shall be released if they were DBPSCHs and all contexts related to the connections with that mobile station are cleared.

7.11 Handover to CDMA2000 procedure

7.11.1 General

This procedure is only valid for CDMA2000 capable MSs. A change to CDMA2000 channel(s) can be requested by the network RRC sublayer in RRC-Cell_Dedicated state.

The handover to CDMA2000 procedure includes:

- the disconnection and the deactivation of physical channels and their release (layer 1).

- the establishment of CDMA2000 channel(s), see TIA/EIA/IS-833 and TIA/EIA/IS-2000-5.

7.11.2 Initiation

The network initiates the handover to CDMA2000 procedure by sending an INTER SYSTEM TO CDMA2000 HANDOVER COMMAND message to the mobile station on the SRB2 in GERAN in *Iu mode*. The INTER SYSTEM TO CDMA2000 HANDOVER COMMAND message shall contain encapsulated the HANDOVER TO CDMA2000

COMMAND. If the INTER SYSTEM TO CDMA2000 HANDOVER COMMAND refers to a not known base station (see TIA/EIA/IS-98), this shall not be considered as an error.

7.11.3 Reception of INTERSYSTEM TO CDMA2000 HANDOVER COMMAND message by the MS

Upon the receipt of INTER SYSTEM TO CDMA2000 HANDOVER COMMAND message, the mobile station shall:

1> switch to the assigned cell(s) and establish the physical channels as described in TIA/EIA/IS-833 and TIA/EIA/IS-2000-5.

1> establish the connection to the CDMA cell, by using the contents of encapsulated message HANDOVER TO CDMA2000 COMMAND.

1> in case one or more IEs "*RAB Info*" is included in the INTER SYSTEM TO CDMA2000 HANDOVER COMMAND message:

2> connect upper layer entities corresponding to indicated RABs to the radio resources indicated in the inter-RAT message.

2> and act upon received information element as specified in sub-clauses 7.18 and 7.19.

7.11.4 Successful completion of the inter-RAT handover

NOTE: After lower layer connections are successfully established, the mobile station returns a Handoff Completion message on CDMA2000 channels(s), see TIA/EIA/IS-833.

When receiving the Handoff Completion message (see TIA/EIA/IS-833 and 3GPP TS 25.413), the network shall release the old channels.

7.11.5 Unsuccesful inter-rat handover at the MS side

If the MS does not succeed in establishing the connection to the CDMA2000 cell (see TIA/EIA/IS-2000-5), it shall:

1> revert back to the old configuration;

1> establish the GERAN physical channel(s) used at the time of reception of the INTER SYSTEM HANDOVER TO CDMA2000 COMMAND;

1> if the lower layer failure happens while attempting to connect back to the old channels;

2> the PROTOCOL_ERROR_REJECT variable is set TRUE;

1> if the MS does not succeed to establish the GERAN physical channel(s):

2> perform a Cell Update procedure according to sub-clause 7.8 with cause "radio link failure";

2> when the Cell Update procedure has been completed successfully:

3> proceed as below.

1> transmit the HANDOVER FAILURE message setting the information elements as specified below:

2> include the IE "*RRC Transaction Identifier*"; and

2> set it to the value of "RRC transaction identifier" in the entry for the INTER SYSTEM HANDOVER TO CDMA2000 COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

2> clear that entry;

2> set the IE "*Failure Cause*" to "physical channel failure".

1> when the HANDOVER FAILURE message has been submitted to lower layer for transmission the procedure ends.

If the INTER SYSTEM TO CDMA2000 HANDOVER COMMAND message instructs the mobile station to use a frequency that it is not capable of, then the mobile station shall:

1> stay on the current channel(s) and return a HANDOVER FAILURE message on SRB2 with cause "frequency not implemented".

7.11.6 Reception of an HANDOVER FAILURE message by GERAN in Iu mode

When HANDOVER FAILURE has been received, the network shall

1> release the CDMA2000 channel(s);

1> if a HANDOVER FAILURE message is received on the old channels on SRB2; or

1> the mobile station has received CELL UPDATE with the cause "radio link failure" then:

2> the old channels shall be released and all contexts related to the connections with that mobile station are cleared.

7.12 Mapping of user data substreams onto timeslots in a multislot configuration

For multislot configurations the following rules for mapping of the user data substreams onto timeslots shall apply for each channel set:

1> at initial assignment, the lowest numbered user data substream shall be mapped to the lowest numbered timeslot etc. in ascending order (the user data substreams are numbered 0 to (n-1), where n is the number of substreams)

1> at channel changes using handover procedure or radio bearer procedures, the lowest numbered user data substream shall be mapped to the lowest numbered timeslot etc. in ascending order (the user data substreams are numbered 0 to (n-1), where n is the number of substreams)

1> at channel changes using radio bearer procedures:

2> user data substream(s) mapped to timeslot(s) that are present in both the old and the new configuration shall continue to be mapped to the same timeslot(s) as before the channel change; and

2> possibly added timeslot(s) shall carry the lowest numbered available user data substream so that the lowest numbered data substream among the added is mapped to the lowest numbered added timeslot and so on in ascending order.

NOTE: The user data substream number is a number that need not be the same as the inband number used for transparent services. The user data substream number is only used as a point of reference to a specific user data substream.

7.13 Application Procedures

7.13.1 LCS transfer
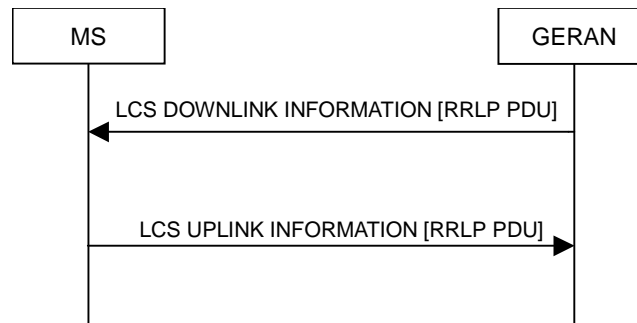
Figure 7.13.1.1: LCS transfer

7.13.1.1 General

The LCS Transfer procedure enables the SMLC on the network side and the MS to exchange RRLP Protocol Data Units (PDUs). Only the GERAN may initiate the exchange of RRLP PDU's (initiated by the SMLC). The MS only sends RRLP PDU's in the uplink direction in response to RRLP PDU's sent by the GERAN (SMLC).

The maximum size of the RRLP PDU in the LCS DOWNLINK INFORMATION and LCS UPLINK INFORMATION messages is 242 octets. Since RRLP pseudo segmentation limits the length of RRLP PDUs, segmentation is not defined for the LCS Transfer procedure.

7.13.1.2 Intiation of LCS transfer procedure in the GERAN

In the GERAN, the LCS transfer procedure is initiated when the the SMLC requests the transfer of an RRLP PDU after the initial signaling connection is established. The GERAN may also initiate the LCS transfer procedure when another RRC procedure is ongoing, and in that case the state of the latter procedure shall not be affected. The RRLP PDU in the LCS DOWNLINK INFORMATION message shall contain a complete RRLP PDU according to the RRLP protocol 3GPP TS 44.031. The GERAN shall transmit the LCS DOWNLINK INFORMATION message on the downlink using AM RLC on signalling radio bearer SRB3.

The SMLC may be a "stand alone SMLC" (and therefore not tightly integrated to the GERAN). This can lead to message loss or truncation during the Handover procedure (during change of BPSCH).

7.13.1.3 Reception of LCS DOWNLINK INFORMATION message by the MS

When the MS has received an LCS DOWNLINK INFORMATION message, the MS shall deliver the RRLP PDU to the LCS local application.

The MS shall detect RRLP PDU truncation if an LCS DOWNLINK INFORMATION message is received carrying an RRLP PDU that is shorter than the indicated length. If a truncated RRLP PDU is received, RRLP PDU shall be discarded.

7.13.1.4   Transmission of a response message by the MS

When the LCS local application has received and processed an RRLP PDU from the LCS DOWNLINK INFORMATION message, one or two RRLP PDU's shall be returned to the GERAN. The MS shall

1> encapsulate the RRLP PDU received from the LCS local application in the LCS UPLINK INFORMATION message;

1> transmit the LCS UPLINK INFORMATION message on the uplink using AM RLC on signalling radio bearer SRB3;

1> if a second RRLP PDU is received from the LCS local application, repeat the previous two steps;

Suspend/Resume functions of lower layers will prevent message loss on the uplink. If the BPSCH is changed before the RLC ACK is received in the MS, message duplication is possible in the uplink after change of the physical channel.

7.13.1.5   Reception of a response message by the GERAN

When the GERAN has received an LCS UPLINK INFORMATION message, the GERAN shall deliver the RRLP PDU to the SMLC.

The GERAN shall detect RRLP PDU truncation if an LCS UPLINK INFORMATION message is received carrying an RRLP PDU that is shorter than the indicated length. If a trucated RRLP PDU is received, the RRLP PDU shall be discarded.

7.13.1.6   Invalid LCS DOWNLINK INFORMATION message

If the MS receives a LCS DOWNLINK INFORMATION message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows. The MS shall:

1> transmit an RRC STATUS message on the SRB2;

1> include the IE "*Identification of Received Message*";

1> set the IE "*Received Message Type*" to LCS DOWNLINK INFORMATION message;

1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the LCS DOWNLINK INFORMATION message in the table "Rejected transactions" in the variable TRANSACTIONS;

1> clear that entry;

1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

1> when the RRC STATUS message has been submitted to lower layers for transmission;

2> continue with any ongoing processes and procedures as if the invalid LCS DOWNLINK INFORMATION message has not been received.

7.14 Radio Bearer control procedures

7.14.1 Reconfiguration procedures
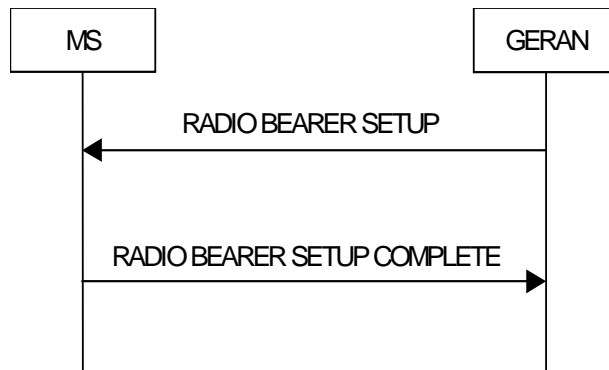
Figure 7.14.1.1: Radio Bearer Establishment, normal case
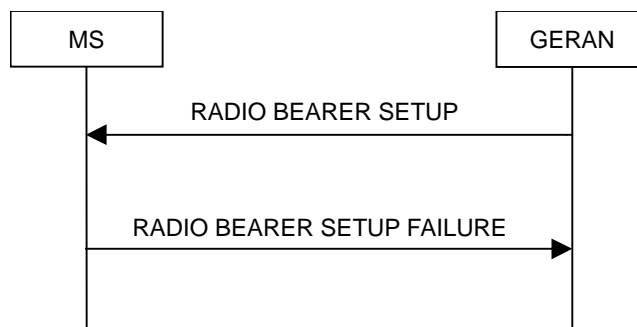
Figure 7.14.1.2: Radio Bearer Establishment, MS reverts to old configuration
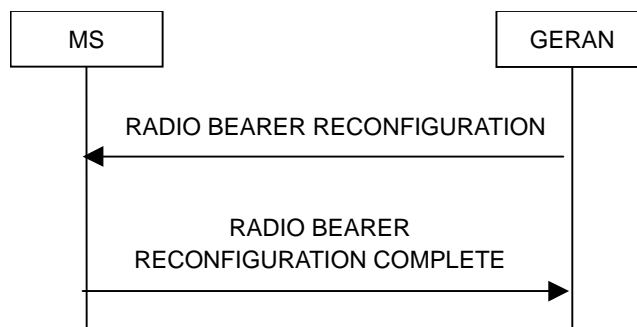
Figure 7.14.1.3: Radio Bearer Reconfiguration, normal flow
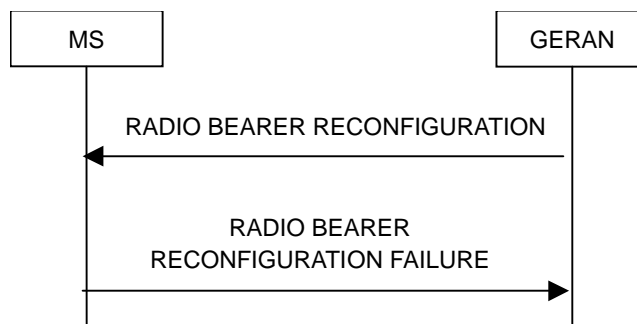
Figure 7.14.1.4: Radio Bearer Reconfiguration, failure case
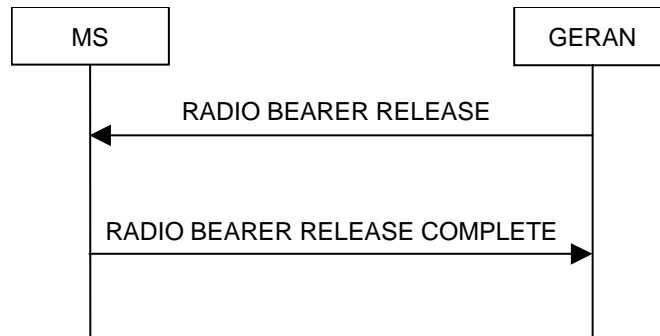
Figure 7.14.1.5: Radio Bearer Release, normal case
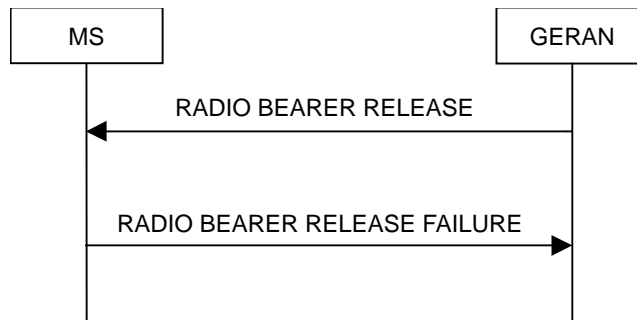
Figure 7.14.1.6: Radio Bearer Release, MS reverts to old configuration

7.14.1.1   General

The reconfiguration procedures include the following procedures:

- the Radio Bearer Establishment procedure;

- the Radio Bearer Reconfiguration procedure;

- the Radio Bearer Release procedure;

The Radio Bearer Establishment procedure is used to establish new radio bearer(s).

The Radio Bearer Reconfiguration procedure is used to reconfigure parameters for a radio bearer.

The Radio Bearer Release procedure is used to release radio bearer(s).

7.14.1.2   Initiation

To initiate any one of the reconfiguration procedures, the GERAN shall:

1> configure new radio links in any new physical channel;

1> start transmission and reception on the new radio links;

1> for a Radio Bearer Establishment procedure:

    2> transmit a RADIO BEARER SETUP message on the SRB2;

    2> if signaling radio bearer SRB4 is setup with this procedure and signaling radio bearers SRB1-SRB3 were already established prior to the procedure:

        3> if the variable "LATEST_CONFIGURED_CN_DOMAIN" has been initialised:

            4> any radio bearers setup by the same message as signalling radio bearer SRB4 shall be connected to the CN domain indicated in the variable "LATEST CONFIGURED CN DOMAIN";

1> for a Radio Bearer Reconfiguration procedure:

2> transmit a RADIO BEARER RECONFIGURATION message on the SRB2;

    1> for a Radio Bearer Release procedure:

2> transmit a RADIO BEARER RELEASE message on the SRB2;

The RADIO BEARER RECONFIGURATION message shall include in case of SBSS relocation procedure the structure "*Downlink Counter Synchronisation Info*"and

    1> if ciphering and/or integrity protection are activated:

2> include new ciphering and/or integrity protection configuration information to be used after reconfiguration.

If one of the reconfiguration messages is transmited then the IE "*New G-RNTI*" may be present.

    NOTE 1: The RADIO BEARER RECONFIGURATION message always includes the IE "*RB Information to Reconfigure*", even if GERAN does not require the reconfiguration of any RB. In these cases, GERAN may include only the IE "*RB Identity*" within the IE "*RB Information to Reconfigure*".

GERAN shall take the MS capabilities into account when setting the new configuration. If the message is used to initiate a transition from RRC-Cell_Dedicated state to RRC-Cell_Shared state, the RRC may allocate the new physical resources.

7.14.1.3 Reception of RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message by the MS

If the MS receives the one of the following reconfiguration messages:

- RADIO BEARER SETUP; or

- RADIO BEARER RECONFIGURATION; or

- RADIO BEARER RELEASE;

it shall:

    1> set the variable ORDERED_RECONFIGURATION to TRUE;

    1> act upon all received information elements as specified in sub-clause 7.18 and 7.19, unless specified in the following and perform the actions below.

The MS may first release the physical channel used at reception of the reconfiguration message (i.e a RADIO BEARER SETUP message, a RADIO BEARER RECONFIGURATION message or a RADIO BEARER RELEASE message). The MS shall:

    1> then stop the RLC operation for the duration of the reconfiguration procedure;

    1> establish a new physical channel and act upon all received information elements as specified in sub-clause 7.19;

    1> enter a state according to sub-clause 7.19;

    1> continue the RLC operation, if applicable.

    NOTE: The RADIO BEARER RECONFIGURATION message always includes the IE "*RB Information to Reconfigure*". GERAN has to include it even if it does not require the reconfiguration of any RB.

If the MS is in RRC-Cell_Dedicated state upon reception of the reconfiguration message and remains in RRC-Cell_Dedicated state after that, the MS shall:

    1> stop the RLC operation for the duration of the reconfiguration procedure;

    1> then establish a new physical channel and act upon all received information elements as specified in sub-clause 7.19;

    1> if RADIO BEARER RECONFIGURATION message has been received; and if the IE "*DBPSCH Description*" is present and:

    2> if the following IEs are present IE "*Handover Reference*", IE "*Power Command and Access Type*", IE "*Cell Description*" and IE "*Description of the First Channel After Time*", the MS shall:

        3> if the IE "*Synchronization Indication*" is not present, establish new physical channel using non-synchronized method as specified in sub-clause 7.18.6 and act upon all received information elements and 7.19.

        3> if the IE "*Synchronization Indication*" is present, establish new physical channel using one of the synchronized methods as specified below:

            4> if IE "*Timing Advance*" is present and if the IE "*Synchronization Indication*" indicates pre-synchronized type of physical channel establishment, the MS shall:

                5> establish new physical channel using the pre-synchronized method as specified in sub-clause 7.18.6 and act upon all received information elements and 7.19.

            4> if IE "*Real Time Difference*" is present and if the IE "*Synchronization Indication*" indicates pseudo-synchronized type of physical channel establishment, the MS shall:

                5> establish new physical channel using the pseudo-synchronized method as specified in sub-clause 7.18.6 and act upon all received information elements and 7.19;

            4> if the IE "*Synchronization Indication*" is present and if it indicates finely synchronized type of physical channel establishment, the MS shall:

                5> establish new physical channel using the finely synchronized method as specified in sub-clause 7.18.6 and act upon all received information elements and 7.19;

    2> if the following IEs, IE "*Handover Reference*", IE "*Power Command and Access Type*", IE "*Cell Description*" are not present, the MS shall:

        3> not use the procedures specified in sub-clause 7.18.6;

    2> if at least one of the following IEs, IE "*Handover Reference*", IE "*Power Command and Access Type*" and IE "*Cell Description*" and IE "*Description of the First Channel After Time*" is not present, the MS shall:

        3> act as specified in sub-clause 7.14.1.14.

  1> if RADIO BEARER RELEASE message has been received and is indicating the release of one or more channels, then:

    2> deactivate the physical channel to be released.

If the RADIO BEARER RECONFIGURATION message refers to a cell to which the mobile station is not synchronised to (see 3GPP TS 45.008), this shall not be considered as an error.

    NOTE: The network takes into account limitations of certain mobile stations to understand formats used in the IE "*Frequency List*", IE "*Frequency Short List*", and IE "*Cell Channel Description*" used in the RADIO BEARER RECONFIGURATION message, see sub-clause 7.19.

If the MS is in RRC-Cell_Dedicated state when receives the one of the reconfiguration messages (i.e RADIO BEARER SETUP message, a RADIO BEARER RECONFIGURATION message or RADIO BEARER RELEASE message) and enters in RRC-Cell_Shared state after state transition, the MS shall:

  1> release the dedicated basic physical resources;

  1> act upon all received information elements as specified in sub-clause 7.19;

  1> if RADIO BEARER RELEASE message has been received and is indicating the release of one or more channels, then:

    2> deactivate the physical channel to be released.

If after state transition the MS enters RRC-Cell_Shared state, the MS shall:

  1> if timer T305 is not running and if periodical update in the IE "*MS Timers and Constants In Connected Mode*" has been set to any other value than "infinity" in PACKET SYSTEM INFORMATION TYPE16 message;

2> start timer T305 using its initial value;

1> if the IE "*GERAN DRX Cycle Length Coefficient*" is included in the received message:

2> store this IE and apply this coefficient as specified in 3GPP TS 44.160.

If the MS is in RRC-Cell_Shared state when receives the one of the reconfiguration messages (i.e RADIO BEARER SETUP message or RADIO BEARER RECONFIGURATION message or RADIO BEARER RELEASE message) and enters in RRC-Cell_Dedicated state after state transition, the MS shall:

1> establish the dedicated basic physical resources as specified in 7.19.6.1;

1> act upon all received information elements as specified in sub-clause 7.19.6.1;

1> if RADIO BEARER RELEASE message has been received and is indicating the release of one or more channels, then:

2> deactivate the physical channel to be released.

If the MS is in RRC-Cell_Shared state upon reception of the reconfiguration message and remains in RRC-Cell_Shared state after that, the MS shall:

1> if IE "*SBPSCH Description*" is included then:

2> establish new physical channels for each RB identity included in the IE "*RB Information to Reconfigure*" and act upon all received information elements as specified in sub-clause 7.19.

If after state transition the MS enters RRC-GRA_PCH state, the MS shall:

1> if timer T305 is not running and if periodical update in the IE "*MS Timers And Constants In Connected Mode*" has been set to any other value than "infinity" in PACKET SYSTEM INFORMATION TYPE 16 message;

2> start timer T305 using its initial value;

1> if the IE "*GERAN DRX Cycle Length Coefficient*" is included in the message:

2> use the value in the IE "*GERAN DRX Cycle Length Coefficient*" for calculating Paging occasion as specified in sub-clauses 7.18 and 7.19;

1> if the IE "*GERAN DRX Cycle Length Coefficient*" is not included in the same message:

2> set the variable INVALID_CONFIGURATION to TRUE.

The MS shall transmit a response message as specified in 7.14.1.4, setting the information elements as specified below. The MS shall:

1> if the received reconfiguration message includes the structure "Downlink Counter Synchronisation Info"; or

1> if the received reconfiguration message includes the IE "*New G-RNTI*":

2> if the variable PDCP_SN_INFO is empty:

3> configure the corresponding RLC entity for all AM and UM radio bearers and AM and UM signalling radio bearers except SRB2 to "stop";

2> else:

3> configure the RLC entity for signalling radio bearers SRB1, SRB3 and SRB4 to "stop";

3> configure the RLC entity for UM and AM radio bearers for which the IE "*PDCP SN Info*" is not included to "stop";

2> re-establish SRB2;

2> for the downlink and the uplink, apply the ciphering configuration as follows:

3> if the received re-configuation message included the IE "*Ciphering Mode Info*":

4> use the ciphering configuration in the received message when transmitting the response message;

3> if the ciphering configuration for SRB2 from a previously received SECURITY MODE COMMAND has not yet been applied because of the activation times not having been reached:

4> if the previous SECURITY MODE COMMAND was received due to new keys being received:

5> consider the new ciphering configuration to include the received new keys;

4> if the ciphering configuration for SRB2 from a previously received SECURITY MODE COMMAND has not yet been applied because of the corresponding activation times not having been reached and the previous SECURITY MODE COMMAND caused a change in LATEST_CONFIGURED_CN_DOMAIN:

5> consider the new ciphering configuration to include the keys associated with the LATEST_CONFIGURED_CN_DOMAIN;

4> apply the new ciphering configuration immediately following RLC re-establishment.

3> else:

4> continue using the current ciphering configuration;

2> set the new uplink and downlink HFN of SRB2 to MAX(uplink HFN of SRB2, downlink HFN of SRB2);

2> increment by one of the downlink and uplink HFN values for SRB2;

2> calculate the START value according to sub-clause 7.18.4;

2> include the calculated START values for each CN domain in the IE "*START List*" in the structure "*Uplink Counter Synchronisation Info*";

1> if the handover is performed from UTRAN and RADIO BEARER RECONFIGURATION message is received*:*

2> set the 20 most significant bits of the uplink and downlink HFN component of COUNT-C of SRB2 to MAX (uplink HFN_U, downlink HFN_U) where HFN_U is the HFN component of COUNT-C of SRB2 in UTRAN;

2> set the remaining bits of the uplink and downlink HFN component of COUNT-C of SRB2 equal to zero;

2> increment by one the downlink and uplink values of the HFN component of COUNT-C for SRB2;

2> calculate the START value according to sub-clause 7.18;

2> include the calculated START values for each CN domain in the IE "*START list*" in the RADIO BEARER RECONFIGURATION COMPLETE message;

2> set the variable LATEST_CONFIGURED_CN_DOMAIN equal to the corresponding UTRAN variable*;*

2> set the variable MS_CAPABILITY_TRANSFERRED equal to the corresponding UTRAN variable *;*

2> set the variable ESTABLISHED_RABS equal to the corresponding UTRAN variable *;*

2> set the variable ESTABLISHED_SIGNALLING_CONNECTIONS equal to the corresponding UTRAN variable *;*

2> set the variable CIPHERING_STATUS equal to the corresponding UTRAN variable *;*

2> set the variable START_THRESHOLD equal to the corresponding UTRAN variable *;*

2> set the variable START_VALUE_TO_TRANSMIT equal to the corresponding UTRAN variable *;*

2> set IE "*Status*" for the ciphering status in the the variable SECURITY_MODIFICATION equal to the corresponding UTRAN variable;

2> set IE "*Status*" for the integrity protection in the the variable INTEGRITY_PROTECTION_INFO equal to the corresponding UTRAN variable;

1> if inter-mode handover is performed from A/Gb *mode* and RADIO BEARER RECONFIGURATION message is received:

    2> store G-RNTI value (32 bits), which is derived by the IEs "*SRNC identity*" (12 bits) and "S-RNTI" (20 bits) shall be derived by padding the IE "S-RNTI " with 10 zero bits in the most significant positions; and

    2> initialise the variable ESTABLISHED_SIGNALLING_CONNECTIONS with the signalling connections that remains after the handover according to the specifications of the source;

    2> initialise the variable MS_CAPABILITIES_TRANSFERRED with the MS capabilities that have been transferred to the network up to the point prior to the handover, if any;

    2> initialise the variable TIMERS_AND_CONSTANTS to the default values and start to use values;

    2> set the IE "*START*" for each CN domain, in the IE "*START list*" in the RADIO BEARER RECONFIGURATION COMPLETE message equal to the START value for each CN domain stored in the USIM if the USIM is present, or as stored in the MS for each CN domain if the SIM is present; and then;

    2> set the value of "THRESHOLD" in the variable START_THRESHOLD to the 20 MSBs of the value stored in the USIM (see 3GPP TS 31.102) for the maximum value of START for each CN Domain, or to the default value in 3GPP TS 33.102 if the SIM is present.

    Keys received while in A/Gb *mode* shall not be regarded as "new" (i.e not trigger the actions in 7.16.1.2.3.1) in a subsequent security control procedure in GERAN (*Iu mode*), irrespective of whether the keys are already being used in *A/Gb mode* or not. If the MS has received new keys in A/Gb *mode* before handover, then the START values in the USIM (sent in the RADIO BEARER RECONFIGURATION COMPLETE message to BSS) will not reflect the receipt of these new keys. At a subsequent Security Mode Control procedure in GERAN *Iu mode*, the MS shall activate ciphering and/or integrity protection using the key set stored in USIM/SIM.

    2> if ciphering has been activated and ongoing in *A/Gb mode* when the handover is performed:

        3> for the CN domain included in the IE "*CN Domain Identity*" which is included in the IE "*RAB Information to Reconfigure*", or the CS domain when these IEs are not present:

            4> set the variable LATEST_CONFIGURED_CN_DOMAIN to the value indicated in the IE "*CN Domain Identity*", or to the CS domain when this IE is not present;

            4> set the 20 MSB of the HFN component of the COUNT-C variable for all radio bearers using RLC-TM and all signalling radio bearers to the "START" value included in the IE " *GERAN A/Gb Security Info* ";

            4> set the remaining LSBs of the HFN component of COUNT-C for all radio bearers using RLC-TM and all signalling radio bearers to zero;

            4> not increment the HFN component of COUNT-C for radio bearers using RLC-TM;

            4> set the IE "*Status*" in the variable CIPHERING_STATUS to "Started";

            4> apply the algorithm according to IE "*Ciphering Algorithm*" with the ciphering key set stored in the USIM/SIM and apply ciphering immediately upon reception of the RADIO BEARER RECONFIGURATION message.

            If ciphering has been activated and ongoing in the A/Gb *mode* from which inter mode handover is performed, GERAN Iu *mode* should not include the IE "*Ciphering Mode Info*" in the SECURITY MODE COMMAND message that starts Integrity protection, and should not send a SECURITY MODE COMMAND including IE "*Ciphering Mode Info*" and IE "*CN Domain Identity*" set to the same value as MS variable LATEST_CONFIGURED_CN_DOMAIN until all pending ciphering activation times have been reached for the radio bearers using RLC-TM.

    2> if ciphering has not been activated and ongoing in the source BSS:

        3> for the CN domain included in the IE "*CN Domain Identity*" which is included in the IE "*RAB Information To Reconfigure*", or the CS domain when these IEs are not present:

            4> set the IE "*Status*" in the variable CIPHERING_STATUS to "*Not Started*".

2> if the MS has successfully connected to GERAN *Iu mode* then

3> Set the START value stored in the USIM (see 3GPP TS 31.102) if present, and as stored in the MS if the SIM is present for any CN domain to the value "THRESHOLD" of the variable START_THRESHOLD;

1> if the received reconfiguration message did not include the structure "*Downlink Counter Synchronisation Info*":

2> if the variable START_VALUE_TO_TRANSMIT is set:

3> include and set the IE "*START*" to the value of that variable;

2> if the variable START_VALUE_TO_TRANSMIT is not set and the IE "*New G-RNTI*" is included:

3> calculate the START value according to sub-clause 7.18.4;

3> include the calculated START values for each CN domain in the IE "*START List*" in the structure "Uplink Counter Synchronisation Info";

2> if the received reconfiguration message caused a change in the RLC size for any RB using RLC-AM:

3> calculate the START value according to sub-clause 7.18.4;

3> include the calculated START values for the CN domain associated with the corresponding RB identity in the IE "*START List*" in the structure "Uplink Counter Synchronisation Info".

1> if the received reconfiguration message contained the IE "*Ciphering Mode Info*" or contained the IE "*Integrity Protection Mode Info*":

2> set the IE "*Status*" in the variable SECURITY_MODIFICATION for all the CN domains in the variable SECURITY_MODIFICATION to "Affected";

1> if the received reconfiguration message (contained the IE "*Ciphering Mode Info*":

2> include and set the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

1> if the received reconfiguration message did not contain the IE "*Ciphering Activation Time for DBPSCH*" in the IE "*Ciphering Mode Info*":

2> if prior to this procedure there exist no transparent mode RLC radio bearers for the CN domain indicated in the IE "*CN Domain Identity*" in the IE "*RAB info*":

3> if, at the conclusion of this procedure, the MS will be in RRC-Cell_Dedicated state; and

3> if, at the conclusion of this procedure, at least one transparent mode RLC radio bearer exists for the CN domain indicated in the IE "*CN Domain Identity*" in the IE "*RAB info*":

4> include the IE "*COUNT-C Activation Time*" and specify a TDMA frame number for this IE.

NOTE: GERAN does not include the IE "*Ciphering Mode Info*" in any reconfiguration messages unless it is also used to perform an SBSS relocation with change of ciphering algorithm.

1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> if the variable PDCP_SN_INFO is not empty:

2> include the IE "*RB with PDCP Information List*" and set it to the value of the variable PDCP_SN_INFO;

1> if the IE "*Integrity Protection Mode Info*" was present in the received reconfiguration message

2> start applying the new integrity protection configuration in the uplink for SRB2 from and including the transmitted response message.

If after state transition the MS enters RRC-GRA_PCH state, the MS shall, after the transmission of the response message:

> 1> if the criteria for GRA Update caused by "GRA reselection" according to sub-clause 7.8 is fulfilled:

> > 2> initiate a GRA Update procedure according to sub-clause 7.8 using the cause "GRA reselection";

> > 2> when the GRA Update procedure completed:

> > > 3> the procedure ends.

7.14.1.4 Transmission of a response message by the MS, normal case

In case the procedure was triggered by reception of a RADIO BEARER SETUP message, the MS shall:

> 1> transmit a RADIO BEARER SETUP COMPLETE as response message on the uplink SRB2

In case the procedure was triggered by reception of a RADIO BEARER RECONFIGURATION message, the MS shall:

> 1> transmit a RADIO BEARER RECONFIGURATION COMPLETE as response message on the uplink SRB2 ;

In case the procedure was triggered by reception of a RADIO BEARER RELEASE message, the MS shall:

> 1> transmit a RADIO BEARER RELEASE COMPLETE as response message on the uplink SRB2;

If the new RRC state is RRC-Cell_Dedicated state or RRC-Cell_Shared state, the response message shall be transmitted using the new configuration after the state transition, and the MS shall:

> 1> if the structure "Downlink Counter Synchronization Info" was included in the reconfiguration message; or

> 1> if the received reconfiguration message is a RADIO BEARER RECONFIGURATION and the IE "*New G-RNTI*" is included:

> > 2> when RLC sub-layer has confirmed the successful transmission of the response message:

> > > 3> if the variable PDCP_SN_INFO is empty:

> > > > 4> configure the RLC entity for all AM and UM radio bearers and AM and UM signalling radio bearers except SRB2 to "continue";

> > > 3> else:

> > > > 4> configure the RLC entity for signalling radio bearers SRB1, SRB3 and SRB4 to "continue";

> > > > 4> configure the RLC entity for UM and AM radio bearers for which the IE "*PDCP SN Info*" is not included to "continue";

> > > 3> re-establish all AM and UM RLC entities with RB identities larger than 4 and set the first 20 bits of all the HFN component of the respective COUNT-C values to the START value included in the response message for the corresponding CN domain;

> > > 3> re-establish the RLC entities with RB identities 1, 3 and 4 and set the first 20 bits of all their HFN component of the respective COUNT-C values to the START value included in the response message for the CN domain stored in the variable LATEST_CONFIGURED_CN_DOMAIN;

> > > 3> set the remaining bits of the HFN component of COUNT-C values of all UM RLC entities to zero;

> > > 3> set the remaining bits of the HFN component of the COUNT-C values of all AM RLC entities to zero, for those bearers to which RLC entitie where re-established;

> > > 3> if the IE "*PDCP Context Relocation Info*" is not present:

> > > > 4> re-initialise the PDCP header compression entities of each radio bearer in the variable ESTABLISHED_RABS as specified in 3GPP TS 25.323.

> > > 3> if the IE "*PDCP Context Relocation Info*" is present:

   4> perform the actions as specified in 7.19.

 1> if the variable PDCP_SN_INFO is empty:

  2> if the received reconfiguration message contained the IE "*Ciphering Mode Info*":

   3> when RLC sub-layer has confirmed the successful transmission of the response message:

    4> notify upper layers upon change of the security configuration;

    4> perform the actions below;

  2> if the received reconfiguration message did not contain the IE "*Ciphering Mode Info*":

   3> when RLC sub-layer has been requested to transmit the response message:

    4> perform the actions below;

 1> if the variable PDCP_SN_INFO is non-empty:

  2> when RLC sub-layer has confirmed the successful transmission of the response message:

   3> for each radio bearer in the variable PDCP_SN_INFO:

    4> if the IE "*RB Started*" in the variable ESTABLISHED_RABS is set to "started":

     5> configure the RLC entity for that radio bearer to "continue";

   3> perform the actions below.

If the IE "*Synchronization Indication*" is present in the RADIO BEARER RECONFIGURATION and if requested in the IE "*Synchronization Indication*", the mobile station shall:

 1> include the observed time difference which it has measured when performing reconfiguration of the physical channels, corrected by half the timing advance received in the IE "*Timing Advance*" in the RADIO BEARER RECONFIGURATION COMPLETE message (detailed specifications are given in 3GPP TS 45.010).

If the new RRC state is RRC-GRA_PCH state, the response message shall be transmitted using the old configuration before the state transition and the MS shall:

 1> when RLC sub-layer has confirmed the successful transmission of the response message:

  2> for each radio bearer in the variable PDCP_SN_INFO:

   3> if the IE "*RB Started*" in the variable ESTABLISHED_RABS is set to "started":

    4> configure the RLC entity for that radio bearer to "continue";

  2> enter the new RRC state (RRC-Cell_Shared state or RRC-GRA_PCH state, respectively);

  2> perform the actions below.

The MS shall:

 1> set the variable ORDERED_RECONFIGURATION to FALSE;

 1> if the received reconfiguration message contained the IE *"Ciphering Mode Info"*:

  2> resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;

  2> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

  2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

 1> if the received reconfiguration message contained the IE *"Integrity Protection Mode Info"*:

  2> allow the transmission of RRC messages on all signalling radio bearers with any RRC SN;

2> set the IE "Reconfiguration" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

1> clear the variable PDCP_SN_INFO;

1> clear the variable START_VALUE_TO_TRANSMIT;

1> clear the variable SECURITY_MODIFICATION;

1> continue RLC operation.

7.14.1.5   Reception of a response message by the GERAN, normal case

When GERAN has received one of the following reconfiguration response messages:

- RADIO BEARER SETUP COMPLETE message; or

- RADIO BEARER RECONFIGURATION COMPLETE message; or

- RADIO BEARER RELEASE COMPLETE message;

GERAN shall delete the old configuration.

If the IE "*START*" or the IE "*START List*" is included in reconfiguration response message, the GERAN shall:

1> set the START value for each CN domain with the corresponding values as received in this response message;

1> consequently, then use the START values to initialise the hyper frame numbers, in the same way as specified for the MS in sub-clause 7.14.1.3, for any new radio bearers that are established.

If GERAN has ordered a ciphering reconfiguration by including the IE "*Ciphering Mode Info*", GERAN shall:

1> For radio bearers using RLC-AM or RLC-UM:

2> use the old ciphering configuration for received RLC PDUs with RLC sequence number less than the RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" sent by the MS;

2> use the new ciphering configuration for received RLC PDUs with RLC sequence number greater than or equal to the RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" sent by the MS;

2> if an RLC reset or re-establishment occurs after the reconfiguration response message has been received by the GERAN before the activation time for the new ciphering configuration has been reached:

3> ignore the activation time; and

3> apply the new ciphering configuration immediately after the RLC reset or RLC re-establishment.

1> For radio bearers using RLC-TM:

2> use the new ciphering configuration and only begin incrementing the COUNT-C at the TDMA FRAME NUMBER as indicated in:

3> the IE "*Ciphering Activation Time for DBPSCH*" in the IE "*Ciphering Mode Info*", if included in the message that triggered the radio bearer control procedure; or

3> the IE "*COUNT-C Activation Time*", if included in the response message for this procedure.

1> the procedure ends on the GERAN side

7.14.1.6   Unsupported configuration in the MS

If the GERAN instructs the MS to use a configuration, which it does not support and/or if the received message causes the variable UNSUPPORTED_CONFIGURATION to be set to TRUE, the MS shall:

    1> transmit a failure response as specified in sub-clause 7.14.1.9, setting the information elements as specified below:

        2> include the IE "*RRC Transaction Identifier*"; and

        2> set it to the value of "RRC Transaction Identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and

        2> clear that entry;

        2> set the IE "*Failure Cause*" to "configuration unsupported";

    1> set the variable UNSUPPORTED_CONFIGURATION to FALSE;

    1> continue with any ongoing processes and procedures as if the reconfiguration message was not received.

The procedure ends.

7.14.1.7 Physical channel failure

A physical channel failure occurs in case the criteria defined in 7.18 are not fulfilled.

If the received message (a RADIO BEARER SETUP message, a RADIO BEARER RECONFIGURATION message or a RADIO BEARER RELEASE message) causes the MS to enter in RRC-Cell_Dedicated state and the MS fails to establish the basic physical subchannel(s) indicated in the received message the MS shall:

    1> revert to the configuration prior to the reception of the message (old configuration);

    1> if the old configuration includes dedicated physical channels (RRC-Cell_Dedicated state) and the MS is unable to revert to the old configuration:

        2> initiate a Cell Update procedure according to sub-clause 7.8, using the cause "radio link failure";

        2> after the Cell Update procedure has completed successfully:

            3> proceed as below;

    1> if the old configuration does not include dedicated physical channels (RRC-Cell_Shared state):

        2> select a suitable GRA cell according to 7.8;

        2> if the MS selects another cell than the cell the MS camped on upon reception of the reconfiguration message :

            3> initiate a Cell Update procedure according to sub-clause 7.8, using the cause "cell reselection";

            3> after the Cell Update procedure has completed successfully:

                4> proceed as below;

    1> transmit a failure response message as specified in sub-clause 7.14.1.9, setting the information elements as specified below:

        2> include the IE "*RRC Transaction Identifier*"; and

        2> set it to the value of "RRC transaction identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and

        2> clear that entry;

        2> set the IE "*Failure Cause*" to "physical channel failure";

    1> set the variable ORDERED_RECONFURATION to FALSE;

    1> continue with any ongoing processes and procedures as if the reconfiguration message was not received;

The procedure ends.

If the criteria for radio link failure is met in the old configuration during the reconfiguration procedure as specified in sub-clause 7.18.8 the MS shall:

> 1> if MS would have entered in RRC-GRA_PCH state as a successful completion of this reconfiguration procedure and MS has already submitted a response message to lower layers:

>> 2> initiate a Cell Update procedure according to sub-clause 7.8.1.3, using the cause "radio link failure";

> 2> the procedure ends.If the criteria for radio link failure is met in the new configuration during the reconfiguration procedure (i.e. while MS is waiting for RLC acknowledgement for a response message.) the MS shall act as specified in sub-clause 7.18.8 and in addition it shall:

> 1> if the received reconfiguration causes:

>> - the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to be set to TRUE; or

>> - the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE

>> 2> perform the actions specified in sub-clause 7.14.1.12.2.

7.14.1.8   Cell re-selection

If the MS performs cell re-selection during the reconfiguration procedure, the MS shall:

> 1> initiate a Cell Update procedure, as specified in sub-clause 7.8;

> 1> continue with the Reconfiguration procedure.

7.14.1.9   Transmission of a response message by the MS, failure case

The MS shall:

> 1> in case of reception of a RADIO BEARER SETUP message:

>> 2> if the Radio Bearer Establishment procedure affects several radio bearers:

>>> 3> (may) include the identities of the radio bearers for which the procedure would have been successful into the RADIO BEARER SETUP FAILURE message;

>> 2> transmit a RADIO BEARER SETUP FAILURE as response message on the SRB2;

> 1> in case of reception of a RADIO BEARER RECONFIGURATION message:

>> 2> if the Radio Bearer Reconfiguration procedure affects several radio bearers:

>>> 3> (may) include the identities of the radio bearers for which the procedure would have been successful into the RADIO BEARER RECONFIGURATION FAILURE message;

>> 2> transmit a RADIO BEARER RECONFIGURATION FAILURE as response message on the SRB2;

> 1> in case of reception of a RADIO BEARER RELEASE message:

>> 2> if the Radio Bearer Release procedure affects several radio bearers:

>>> 3> (may) include the identities of the radio bearers for which the procedure would have been successful into the RADIO BEARER RELEASE FAILURE message;

>> 2> transmit a RADIO BEARER RELEASE FAILURE as response message on the SRB2;

> 1> when the response message has been submitted to lower layers for transmission:

>> 2> continue with any ongoing processes and procedures as if no reconfiguration attempt had occurred;

>> 2> if a lower layer failure happens while attempting to connect back to the old channels, the standard rules are applied according to 7.19.4.5.

7.14.1.10   Reception of a response message by the GERAN, failure case

When the GERAN has received:

- the RADIO BEARER SETUP FAILURE message; or

- the RADIO BEARER RECONFIGURATION FAILURE message; or

- the RADIO BEARER RELEASE FAILURE message

the GERAN may restore the old and delete the new configuration. Upper layers shall be notified of the failure.

The procedure ends on the GERAN side.

7.14.1.11   Invalid configuration

If the variable INVALID_CONFIGURATION is set to TRUE the MS shall:

1> keep the configuration existing before the reception of the message;

1> transmit a failure response message as specified in sub-clause 7.14.1.9, setting the information elements as specified below:

2> include the IE "*RRC Transaction Identifier*"; and

3> set it to the value of "RRC transaction identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and

3> clear that entry;

2> set the IE "*Failure Cause*" to "invalid configuration";

1> set the variable INVALID_CONFIGURATION to FALSE;

1> continue with any ongoing processes and procedures as if the reconfiguration message was not received;

The procedure ends.

7.14.1.12   Incompatible simultaneous reconfiguration

If the table "Rejected transactions" in the variable TRANSACTIONS is set due to the received message and the variable PROTOCOL_ERROR_REJECT is set to FALSE, the MS shall:

1> not apply the configuration contained in the received reconfiguration message;

1> transmit a failure response message as specified in sub-clause 7.14.1.9, setting the information elements as specified below:

2> include the IE "*RRC Transaction Identifier*"; and

2> set it to the value of "RRC transaction identifier" in the entry for the received message in the table "Rejected transactions" in the variable TRANSACTIONS; and

2> clear that entry;

2> set the IE "*Failure Cause*" to "incompatible simultaneous reconfiguration";

1> continue with any ongoing processes and procedures as if the reconfiguration message was not received;

The procedure ends.

7.14.1.12.1   Incompatible simultaneous security reconfiguration

If the variable INCOMPATIBLE_SECURITY_RECONFIGURATION is set to TRUE due to the received reconfiguration message, the MS shall:

- 1> transmit a failure response message as specified in sub-clause 7.14.1.9, setting the information elements as specified below:

    - 2> include the IE "*RRC Transaction Identifier*"; and

    - 2> set it to the value of "RRC transaction identifier" in the entry for the received message in the table "Accepted transactions" in the variable TRANSACTIONS; and

    - 2> clear that entry;

    - 2> set the IE "*Failure Cause*" to the cause value "incompatible simultaneous reconfiguration";

- 1> set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;

- 1> continue with any ongoing processes and procedures as if the reconfiguration message was not received.

The procedure ends.

7.14.1.12.2   Cell Update procedure during security reconfiguration

If:

- a Cell Update procedure according to sub-clause 7.8.1 is initiated; and

- the received reconfiguration message causes either,

- the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to be set to TRUE; and/or

- the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE;

the MS shall:

- 1> release all radio resources;

- 1> indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers; and

- 1> clear any entry for the RRC CONNECTION RELEASE message in the tables "Accepted transactions" and "Rejected transactions" in the variable TRANSACTIONS;

- 1> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

- 1> clear the variable ESTABLISHED_RABS;

- 1> if the received reconfiguration message contained the IE "*Ciphering Mode Info*":

    - 2> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

    - 2> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;2> clear the variable SECURITY_MODIFICATION.

    - 1> if the received reconfiguration message contained the IE "*Integrity Protection Mode Info*":

    - 2> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

    - 2> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

- 1> enter RRC-Idle mode;

- 1> perform the actions specified in clause 6 and sub-clause 7.18 when entering RRC- Idle mode from RRC-Connected mode;

1> the procedure ends.

NOTE: The GERAN shall use radio bearer control messages to perform an SBSS relocation only in case of state transitions from RRC-CELL_Dedicated to RRC-Cell-CELL_Dedicated state.

7.14.1.13   Invalid received message

If the received reconfiguration message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MSshall perform procedure specific error handling as follows. The MS shall:

1> transmit a failure response message as specified in sub-clause 7.14.1.9, setting the information elements as specified below:

2> include the IE "*RRC Transaction Identifier*"; and

2> set it to the value of "RRC transaction identifier" in the entry for the received message in the table "Rejected transactions" in the variable TRANSACTIONS; and

2> clear that entry;

2> set the IE "*Failure Cause*" to the cause value "protocol error";

2> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.

1> continue with any ongoing processes and procedures as if the reconfiguration message was not received.

7.14.1.14   Abnormal cases

If the mobile station has no current CA and if it needs a CA to analyse one of the messages RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION, or RADIO BEARER RELEASE the MS shall:

1> stay on the current channel(s); and

1> send the failure message according to sub-clause 7.14.1.9 with cause "no cell allocation available"; and

1> act and set the variables according with the sub-clauses 7.19 and 10.4.

If the RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message instructs the MS to use a Channel Description or Channel Mode that it does not support, or if the Channel Mode to use is not defined for all channel sets, then the mobile station shall:

1> send the failure message according to sub-clause 7.14.1.9 with cause "channel mode unacceptable"; and

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s) and use the old Channel Description or Channel Mode(s).

If the mobile station receives the RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message containing an inconsistent IE "*MultiRate Configuration*", then the mobile station shall:

1> send the failure message according to sub-clause 7.14.1.9 with cause "channel mode unacceptable"; and

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s) and use the old Channel Description or Channel Mode(s).

If during the initial assignment of the multirate speech the mobile station receives RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message and the IE "*MultiRate Configuration*" is not present, then the mobile station shall:

1> send the failure message according to sub-clause 7.14.1.9 with cause "channel mode unacceptable"; and

1> act and set the variables according with the sub-clause 7.19.; and

1> remain on the current channel(s) and use the old Channel Description or Channel Mode(s).

If the RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message instructs the mobile station to use a frequency that it is not capable of, then the mobile station shall:

1> send the failure message according to sub-clause 7.14.1.9 with cause "frequency not implemented"; and

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s).

If MS receives the RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message with a IE "*Frequency List*" indicating frequencies that are not all in one band, then the mobile station shall:

1> send the failure message according to sub-clause 7.14.1.9 with cause "frequency not implemented"; and

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s).

If the mobile station receives the RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or READIO BEARER RELEASE message with a IE *Mobile Allocation* indexing frequencies that are not all in one band, then the mobile station shall:

1> send the failure message according to sub-clause 7.14.1.9 with cause "frequency not implemented"; and

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s).

NOTE: A RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message sent to a multi band mobile station shall not be considered invalid because it indicates frequencies that are all in a different frequency band to that of the current channel.

If the mobile station receives RADIO BEARER RECONFIGURATION message with a IE *Mobile Allocation* indexing frequencies that are not all in one band and a IE *Starting Time* indicating a time that has not elapsed then the mobile station shall:

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s).

1> send a RRC STATUS message with cause "frequency not implemented".

If the mobile station receives a RADIO BEARER RECONFIGURATION message with a IE "*Mobile Allocation*" indexing frequencies that are not all in one band and a IE "*Starting Time*" indicating a time that has elapsed, then the mobile station shall act and set the variables according with the sub-clause 7.19.

If the mobile station receives a RADIO BEARER RECONFIGURATION message with the IE "*Synchronization Indication*" and the IE "*Timing Advance* " included; and

If synchronous or pseudo-synchronous (see sub-clause 7.18.6) physical channel establishment is performed, when using Radio Bearer Reconfiguration procedure; and

If the mobile station knows that the timing advance with the new cell is out of range, i.e. is bigger than the maximum timing advance that can be coded as specified in 3GPP TS 44.004; and

If the new cell does not accept out of range timing advance as indicated in the RADIO BEARER RECONFIGURATION message, the mobile station shall:

1> send a a failure message according with sub-clause 7.14.1.9 on the SRB2 and does not attempt that reconfiguration as defined in sublcause 7.14.1.3;

1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

1> remain on the current channel(s).

If the mobile station receives a RADIO BEARER RECONFIGURATION message with IE "*Frequency Short List*" indicating frequencies that are not all in one band, then the mobile station shall:

> 1> send the failure message according to sub-clause 7.14.1.9 with cause "frequency not implemented"; and

> 1> act and set the variables according with the sub-clauses 7.19 and 10.4.; and

> 1> remain on the current channel(s).

If "*Synchronization Indication*" IE is present in RADIO BEARER RECONFIGURATION message and if it indicates non- synchronized type of physical channel establishment (see sub-clause 7.18.6), and if timer T3124 times out or if a lower layer failure happens on the new channel before the RADIO BEARER RECONFIGURATION COMPLETE message has been sent, the mobile station shall:

> 1> deactivate the new channels, reactivates the old channels;

> 1> reconnect the DBPSCHs if any;

> 1> then send a failure message as specified in sub-clause 7.14.1.9; and

> 1> resume normal operation as if no physical channel establishment (see sub-clause 7.18.6) attempt had occurred. The operational parameters (e.g. ciphering mode) when returning on the old channel are those applied before the RADIO BEARER RECONFIGURATION message was received.

If the mobile station receives a RADIO BEARER RECONFIGURATION message and if at least one of the following IEs, IE "*Handover Reference*", IE "*Power Command and Access Type*", IE "*Cell Description*" and IE "*Description of the first channel after time*" is not present, the MS shall:

> 1> send a a failure message according with sublcause 7.14.1.9 on the SRB2 and does not attempt that reconfiguration as defined in sublcause 7.14.3;

> 1> act and set the variables according with the sub-clauses 7.19 and 10.4; and

> 1> remain on the current channel(s).

If the mobile station receives a RADIO BEARER RECONFIGURATION message and if only IE "*Power Command*" is present, the MS shall:

> 1> send a a failure message according with sublcause 7.14.1.9 on the SRB2 and does not attempt that reconfiguration as defined in sublcause 7.14.3 and 10.4;

> 1> act and set the variables according with the sub-clause 7.19 and 10.4.

If IE "*SBPSCH Description*" is present in the reconfiguration messages and if RLC data blocks are not received in the T3190 seconds(as specified in TS 44.060), the mobile station shall:

> 1> deactivate the new channels, reactivates the old channels;

> 1> reconnect the SBPSCHs if any;

> 1> then send a failure message as specified in sub-clause 7.14.1.9 with a cause "protocol error unspecified"; and

> 1> resume normal operation as if no physical channel establishment (see sub-clause 7.18.6) attempt had occurred. The operational parameters (e.g. ciphering mode) when returning on the old channel are those applied before the reconfiguration message was received.

If IE "*SBPSCH Description*" is present in the reconfiguration messages and if the mobile station has been assigned more PDCHs than it supports according to its MS multislot class or if the mobile station has been assigned a TBF in EGPRS TBF mode and the MS does not support EGPRS, or if the MS has been assigned an MCS (e.g. 8-PSK in the uplink) that the MS does not support or if the failure is due to any other reason, return to MAC-Idle state and cell reselection continues.

The MS shall:

> 1> then send a failure message as specified in sub-clause 7.14.1.9 with a cause "protocol error unspecified"

7.14.2 MS initiated DTM procedures while in RRC-Cell_Dedicated-MAC-Dedicated state

7.14.2.1 General

While in RRC-Cell_Dedicated-MAC-Dedicated state, the establishment of one or more SBPSCHs may be initiated by the RRC entity of the mobile station using the DTM Request procedure. The procedure is used only for existing radio bearers and is triggered by a request from upper layers to transfer an upper layer PDU.

7.14.2.2 Initiation of the DTM Request procedure by the MS

The mobile station initiates the DTM Request procedure by sending a GERAN Iu mode DTM REQUEST message on the SRB2.

The MS shall set the IEs in the GERAN Iu mode DTM REQUEST message as follows:

1> calculate the START according to sub-clause 7.19.4 for the CN domain as set in the IE "*CN Domain Identity*"; and

2> include the calculated START value for that CN domain in the IE "*START*";

1> include IE "*Iu mode RRC Channel RequestDescription*" to indicate the establishment cause, as applicable, a request to send user data, page response or a mobility management message;

1> may include "*Integrity Check Info*" IE. If the IE is included, act as is specified in sub-clause 7.19.4.6;

The MS shall:

1> transmit the GERAN Iu mode DTM REQUEST message on the uplink SRB 2;

1> start timer T3148.

7.14.2.3 Reception of a GERAN Iu mode DTM REQUEST message by the GERAN

7.14.2.3.1 General

Upon receiving a GERAN Iu mode DTM REQUEST message, GERAN shall either:

1> transmit the RADIO BEARER RECONFIGURATION message on the downlink SRB 2 as specified in sub-clause 7.14.2.3.2; or

1> transmit the GERAN Iu mode DTM REJECT message on the downlink SRB 2 as specified in sub-clause 7.14.2.3.3.

7.14.2.3.2 SBPSCH assignment

On receipt of a GERAN Iu mode DTM REQUEST message the network may allocate one or more uplink SBPSCH(s) for the mobile station. The SBPSCH(s) are assigned to the mobile station in the RADIO BEARER RECONFIGURATION message.

The RADIO BEARER RECONFIGURATION is sent on SRB2 as specified in sub-clause 7.14.1. If frequency hopping is applied, the mobile station shall use the cell allocation defined for the cell to decode the mobile allocation.

The allocation of the uplink SBPSCH(s) may imply the reallocation of the DBPSCH(s). The RADIO BEARER RECONFIGURATION message shall not be used to change to a dependent configuration.

On receipt of a RADIO BEARER RECONFIGURATION message the mobile station shall stop T3148.

If the received RADIO BEARER RECONFIGURATION message includes uplink SBPSCH(s), the mobile station shall proceed as specified in sub-clause 7.14.1.3. If the received RADIO BEARER RECONFIGURATION message includes downlink SBPSCH(s) and no uplink SBPSCH(s), the mobile station shall stop T3148, abort the DTM request procedure

and proceed as specified in sub-clause 7.14.1.3, and then attempt an establishment of uplink TBF, using the applicable procedure specified in 3GPP TS 44.160.

If the RADIO BEARER RECONFIGURATION includes allocation of one or more uplink SBPSCHs but the resources can not be allocated for all RBs requested by the mobile station, then failure is triggered for the radio bearers to which resources where not granted and T3148 is stopped. Request of resources for failed RBs is then done as specified in 3GPP TS 44.160.

7.14.2.3.3 DTM Request rejection

If the network cannot allocate the requested SBPSCH(s) it may send to the mobile station a GERAN Iu mode DTM REJECT message on the SRB2. This message shall contain

1> the "*Wait Indication*" IE;

1> the "*RB Identity*" IE set to the RB_IDENTITY;

1> the "*RRC transaction identifier*" IE set to the the value of "RRC transaction identifier" in the entry for the GERAN Iu mode DTM REJECT message in the table "Rejected transactions" in the variable TRANSACTIONS;

1> the "*Failure Cause*" IE set to the cause value "protocol error";

1> the "*Protocol Error Information*" IE with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.

7.14.2.3.4 Reception of a GERAN Iu mode DTM REJECT message by the MS, normal case

On receipt of the GERAN Iu mode DTM REJECT message, the mobile station shall:

1> stop T3148;

1> notify upper layers of a SBPSCH establishment failure;

1> start timer T3142 with the value given in the "*Wait Indication*" information element.

The mobile station is not allowed to make a new attempt for a DTM request procedure in the same cell until T3142 expires. The value of the wait indication (i.e. T3142) relates to the cell from which it was received.

After sending GERAN Iu mode DTM REQUEST message the MS shall wait for the response from the network or expiry of timer T3148 before it may initiate new DTM Request procedure.

The GERAN Iu mode DTM Reject procedure rejects all pending requests that were sent in the previous GERAN Iu mode DTM Request message.

7.14.2.3.5 Invalid GERAN Iu mode DTM REJECT message

If the MS receives an GERAN Iu mode DTM REJECT message which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows:

The MS shall:

1> set the variable PROTOCOL_ERROR_INDICATOR to TRUE;

1> set the IEs in the GERAN Iu mode DTM REQUEST message as specified in sub-clause 7.14.2.2;

1> transmit the GERAN Iu mode DTM REQUEST message on the uplink SRB 2;

1> start timer T3148.

7.14.2.4 Abnormal cases

Abnormal cases related to radio bearer reconfiguration procedures are defined in sub-clause 7.14.1.14.

In the following cases a GERAN Iu mode DTM Request failure has occurred:

- At expiry of T3148;

- If a RADIO BEARER RECONFIGURATION message indicates resources in a non-supported frequency band. The cause value is "frequency not implemented". The actions are defined in sub-clause 7.14.1.14.

- If the information available in the mobile station after the reception of a RADIO BEARER RECONFIGURATION message does not satisfactorily define uplink packet resources. The cause value is "protocol error unspecified". The actions are defined in sub-clause 7.14.1.14.

- If a RADIO BEARER RECONFIGURATION message includes a mobile allocation or a frequency list that indexes frequencies in more than one frequency band. The cause value is "frequency not implemented". The actions are defined in sub-clause 7.14.1.14.

- If a RADIO BEARER RECONFIGURATION message assigns resources not compliant with the multislot capabilities of the mobile station. The cause value is "channel mode unacceptable". The actions are defined in sub-clause 7.14.1.14.

- If the mobile station has no current CA and if it needs a CA to analyse the RADIO BEARER RECONFIGURATION message. The cause value is "no cell allocation available". The actions are defined in sub-clause 7.14.1.14.

- If the RADIO BEARER RECONFIGURATION message instructs the mobile station to use a channel description or mode that it does not support. The cause value is "channel mode unacceptable". The actions are defined in sub-clause 7.14.1.14.

- If the RADIO BEARER RECONFIGURATION message does not include any uplink or downlink packet resources. The cause value is "protocol error unspecified ". The actions are defined in sub-clause 7.14.1.4.

7.14.2.5   T3148 expiry

On expiry of timer T3148 DTM Request procedure has failed on the mobile station side. The mobile station shall then reinitiate DTM Request procedure unless it has already been reinitiated 4 times. In that case DTM Request procedure shall be aborted.

7.15   Signalling flow procedures

7.15.1   Signalling connection release procedure

7.15.1.1   General

Figure 7.15.1.1.1: Signalling Connection Release procedure, normal case

The Signalling Connection Release procedure is used to notify to the MS that one of its ongoing signalling connections has been released. The procedure does not initiate the release of the RRC connection.

7.15.1.2   Initiation of SIGNALLING CONNECTION RELEASE by the GERAN

To initiate the procedure, the GERAN transmits a SIGNALLING CONNECTION RELEASE message on SRB 2 .

7.15.1.3 Reception of SIGNALLING CONNECTION RELEASE by the MS

Upon reception of a SIGNALLING CONNECTION RELEASE message, the MS shall:

> 1> indicate the release of the signalling connection and pass the value of the IE "*CN Domain Identity*" to upper layers;

> 1> remove the signalling connection with the identity indicated by the IE "*CN Domain Identity*" from the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

> 1> clear the entry for the SIGNALLING CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS;

> 1> the procedure ends.

7.15.1.4 Invalid SIGNALLING CONNECTION RELEASE message

If the MS receives a SIGNALLING CONNECTION RELEASE message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause 8, the MS shall perform procedure specific error handling as follows:

> 1> include the IE "*Identification of Received Message*"; and

>> 2> set the IE "*Received Message Type*" to SIGNALLING CONNECTION RELEASE;

>> 2> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the SIGNALLING CONNECTION RELEASE message in the table "Rejected transactions" in the variable TRANSACTIONS; and

>> 2> clear that entry;

> 1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION;

> 1> transmit an RRC STATUS message on SRB 2 uplink;

> 1> when the RRC STATUS message has been submitted to lower layers for transmission:

>> 2> continue with any ongoing processes and procedures as if the invalid SIGNALLING CONNECTION RELEASE message has not been received.

7.15.1.5 Invalid configuration

If radio access bearers for the CN domain indicated by the IE "CN domain identity" exist in the variable ESTABLISHED_RABS, the MS shall:

> 1> transmit an RRC STATUS message on SRB 2 uplink using AM RLC;

> 1> include the IE "*Identification of Received Message*"; and

> 1> set the IE "*Received Message Type*" to SIGNALLING CONNECTION RELEASE; and

> 1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the SIGNALLING CONNECTION RELEASE message in the table "Accepted transactions" in the variable TRANSACTIONS and clear that entry;

> 1> include the IE "*Protocol Error Information*" with contents set to the value "Message not compatible with receiver state";

> 1> when the RRC STATUS message has been submitted to lower layers for transmission:

>> 2> continue with any ongoing processes and procedures as if the invalid SIGNALLING CONNECTION RELEASE message has not been received.

7.15.2 Signalling connection release indication procedure

7.15.2.1 General
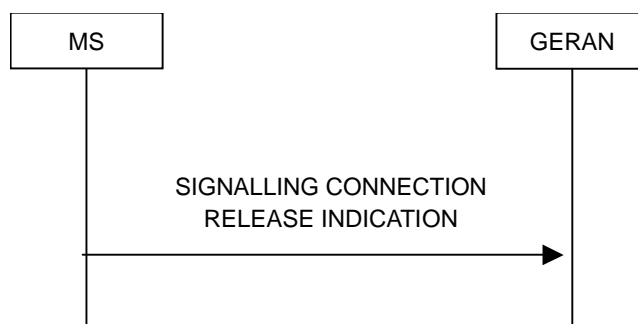
Figure 7.15.2.1.1: Signalling Connection Release Indication procedure, normal case

The Signalling Connection Release Indication procedure is used by the MS to indicate to the GERAN that one of its signalling connections has been released. The procedure may in turn initiate the RRC connection release procedure.

7.15.2.2 Initiation

The MS shall, on receiving a request to release (abort) the signalling connection from upper layers:

> 1> if a signalling connection in the variable ESTABLISHED_SIGNALLING_CONNECTIONS for the specific CN domain identified with the IE "*CN domain identity*" exists:

>> 2> initiate the signalling connection release indication procedure.

> 1> otherwise:

>> 2> abort any ongoing establishment of signalling connection for that specific CN domain as specified in 7.15.2.2a.

Upon Initiation of the Signalling Connection Release Indication procedure in RRC-GRA_PCH state, the MS shall:

> 1> perform a Cell Update procedure, according to sub-clause 7.8, using the cause "uplink data transmission";

> 1> when the Cell Update procedure completed successfully:

>> 2> continue with the signalling connection release indication procedure as described below;

The MS shall:

> 1> set the IE "*CN Domain Identity*" to the value indicated by the upper layers. The value of the IE indicates the CN domain whose associated signalling connection the upper layers are indicating to be released;

> 1> remove the signalling connection with the identity indicated by upper layers from the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

> 1> transmit a SIGNALLING CONNECTION RELEASE INDICATION message on SRB 2.

When the successful delivery of the SIGNALLING CONNECTION RELEASE INDICATION message has been confirmed by RLC sub-layer the procedure ends.

7.15.2.2a RLC re-establishment, inter-mode handover or inter-RAT change

If a re-establishment of RLC on signalling radio bearer SRB2 occurs before the successful delivery of the SIGNALLING CONNECTION RELEASE INDICATION message has been confirmed by RLC sublayer, the MS shall:

> 1> retransmit the SIGNALLING CONNECTION RELEASE INDICATION message on the uplink using signalling radio bearer SRB2.

If an inter-RAT handover from GERAN procedure occurs before the successful delivery of the SIGNALLING CONNECTION RELEASE INDICATION message has been confirmed by RLC sublayer, the MS shall:

> 1> abort the signalling connection while in the new RAT.

If an inter-mode handover procedure occurs before the successful delivery of the SIGNALLING CONNECTION RELEASE INDICATION message has been confirmed by RLC sublayer, the MS shall:

> 1> abort the signalling connection while in A/Gb mode.

7.15.2.3 Reception of SIGNALLING CONNECTION RELEASE INDICATION by the GERAN

Upon reception of a SIGNALLING CONNECTION RELEASE INDICATION message, the GERAN requests the release of the signalling connection from upper layers. Upper layers may then initiate the release of the signalling connection.

7.16 Security mode control

7.16.1 Security mode control
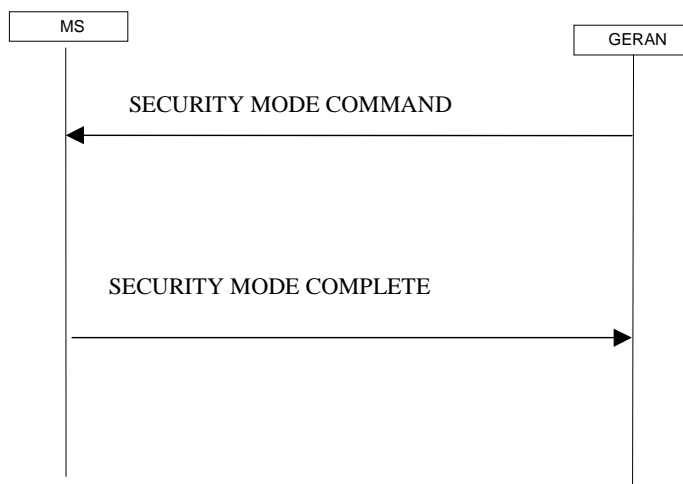
Figure 7.16.1.1: Security mode control procedure

7.16.1.1 General

The purpose of this procedure is to trigger the start of ciphering or to command the restart of the ciphering with a new ciphering configuration, for the radio bearers of one CN domain and for all signalling radio bearers.

It is also used to start integrity protection or to modify the integrity protection configuration for all signalling radio bearers.

7.16.1.2 Initiation

7.16.1.2.1 Ciphering configuration change

To start/restart ciphering, GERAN sends a SECURITY MODE COMMAND message on one downlink SRB2 using the most recent ciphering configuration. If no such ciphering configuration exists then the SECURITY MODE COMMAND message is not ciphered. The GERAN shall not transmit a SECURITY MODE COMMAND message to signal a change in ciphering algorithm.

When configuring ciphering, GERAN shall ensure that the MS needs to store at most two different ciphering configurations (keyset and algorithm) per CN domain, in total over all radio bearers at any given time. For signalling radio bearers the total number of ciphering configurations that need to be stored is at most three.

Prior to sending the SECURITY MODE COMMAND message, for the CN domain indicated in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND message, the GERAN shall:

> 1> suspend all radio bearers using RLC-AM or RLC-UM and suspend all signalling radio bearers using RLC-AM or RLC-UM, except the signalling radio bearer used to send the SECURITY MODE COMMAND message on the downlink SRB2 according to the following:

>> 2> send an indication to lower layers:

>>> 3> not to transmit RLC PDUs with sequence number greater than or equal to the number in IE "*RB Downlink Ciphering Activation Time Info*" in the IE "*Ciphering Mode Info*" on all suspended radio bearers and all suspended signalling radio bearers;

>>> 3> set, for the signalling radio bearer used to send the SECURITY MODE COMMAND message, the "RLC sequence number" in IE "*RB Downlink Ciphering Activation Time Info*" in the IE "*Ciphering Mode Info*", at which time the new ciphering configuration shall be applied;

> 1> if a transparent mode radio bearer for this CN domain exists

>> 2> include the "Ciphering Activation Time for DBPSCH" in IE "*Ciphering Mode Info*", at which time the new ciphering configuration shall be applied;

> 1> consider an ciphering activation time in downlink to be pending until the RLC sequence number of the next RLC PDU to be transmitted for the first time is equal to or larger than the selected activation time;

> 1> set, for each suspended radio bearer and signalling radio bearer that has no pending ciphering activation time set by a previous security mode control procedure, an "RLC sequence number" in IE "*RB Downlink Ciphering Activation Time Info*" in the IE "*Ciphering Mode Info*", at which time the new ciphering configuration shall be applied;

> 1> set, for each suspended radio bearer and signalling radio bearer that has a pending ciphering activation time set by a previous security mode control procedure, the "RLC sequence number" in IE "*RB Downlink Ciphering Activation Time Info*" in the IE "*Ciphering Mode Info*" to the value used in the previous security mode control procedure, at which time the latest ciphering configuration shall be applied.

> 1> if Integrity protection has already been started for the MS; and

>> 2> if for the CN domain indicated in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND message, a new security key set (new ciphering and integrity protection keys) has been received from upper layers since the transmission of the last SECURITY MODE COMMAND message for that CN domain:

>>> 3> include the IE "*Integrity Protection Mode Info*" in the SECURITY MODE COMMAND message

> 1> if integrity protection has already been started for the MS; and

>> 2> if the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND message is different from the IE "*CN Domain Identity*" that was sent in the previous SECURITY MODE COMMAND message to the MS:

>>> 3> include the IE "*Integrity Protection Mode Info*" in the SECURITY MODE COMMAND message

> 1> transmit the SECURITY MODE COMMAND message on the downlink SRB2.

7.16.1.2.2   Integrity protection configuration change

To start or modify integrity protection, the GERAN sends a SECURITY MODE COMMAND message on the downlink SRB2 using the new integrity protection configuration. The GERAN shall not modify integrity protection for a CN domain for which a SECURITY MODE COMMAND message configuring integrity protection has been previously sent for an ongoing signalling connection unless the application of new integrity keys needs to be signalled to the MS. The GERAN shall not transmit a SECURITY MODE COMMAND message to signal a change in integrity protection algorithm.

When configuring Integrity protection, the GERAN shall:

1> ensure that the MS needs to store at most three different Integrity protection configurations (keysets) at any given time. This includes the total number of Integrity protection configurations for all signalling radio bearers.

1> if Ciphering has already been started for the MS for the CN domain to be set in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND message; and

   2> if for the CN domain indicated in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND message, a new security key set (new ciphering and integrity protection keys) has been received from upper layers since the transmission of the last SECURITY MODE COMMAND message for that CN domain:

      3> include the IE "*Ciphering Mode Info*" in the SECURITY MODE COMMAND message;

1> if Ciphering has already been configured for the MS for a CN domain different from the CN domain to be set in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND;

   2> include the IE "*Ciphering Mode Info*" in the SECURITY MODE COMMAND message;

Prior to sending the SECURITY MODE COMMAND message, for the CN domain indicated in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND message, the GERAN shall:

1> if this is the first SECURITY MODE COMMAND message sent for this RRC connection:

   2> if new keys have been received:

      3> initialise the hyper frame numbers as follows:

         4> set all bits of the hyper frame numbers of the COUNT-I values for all signalling radio bearers to zero;

   2> else (if new keys have not been received):

      3> use the value "START" in the most recently received IE "*START List*" or IE "*START*" that belongs to the CN domain indicated in the IE "*CN Domain Identity*" to initialise all hyper frame numbers of COUNT-I for all the signalling radio bearers; by:

         4> setting the 20 most significant bits of the hyper frame numbers for all signalling radio bearers to the value "START" in the most recently received IE "*START List*" or IE "*START*" for that CN domain;

         4> setting the remaining bits of the hyper frame numbers equal to zero;

1> else (this is not the first SECURITY MODE COMMAND message sent for this RRC connection):

   2> if new keys have been received;

      3> initialise the hyper frame number for COUNT-I for SRB2 as follows:

         4> set all bits of the HFN of the COUNT-I value for SRB2 to zero;

   2> if new keys have not been received;

      3> initialize the hyper frame number for COUNT-I for SRB2 as follows:

         4> set the 20 most significant bits of the HFN of the downlink and uplink COUNT-I to the value of the most recently received IE "*START*" or IE "*START List*" for the CN domain to be set in the the IE "*CN Domain Identity*";

         4> set the remaining bits of the HFN of the downlink and uplink COUNT-I to zero;

1> if the IE "*Integrity Protection Mode Command*" has the value "Start":

   2> prohibit the transmission of signalling messages with any RRC SN on all signalling radio bearers, except SRB2;

   2> set the FRESH value in the IE "*Integrity Protection Initialisation Number*", included in the IE "*Integrity Protection Mode Info*";

1> if the IE "*Integrity Protection Mode Command*" has the value "Modify":

    2> for each signalling radio bearer SRBn, except SRB2:

        3> prohibit the transmission of signalling messages with RRC SN greater or equal to the RRC sequence number in entry for signalling radio bearer n in the "RRC message sequence number list" in the IE "*Downlink Integrity Protection Activation Info*", included in the IE "*Integrity Protection Mode Info*";

    2> consider an integrity protection activation time in downlink to be pending until the selected activation time is equal to the next RRC sequence number to be used, which means that the last RRC message using the old integrity protection configuration has been transmitted to lower layers;

    2> set, for each signalling radio bearer SRBn, that has no pending integrity protection activation time set by a previous security mode control procedure, an RRC sequence number in entry for signalling radio bearer n in the "RRC message sequence number list" in the IE "*Downlink Integrity Protection Activation Info*", included in the IE "*Integrity Protection Mode Info*", at which time the new integrity protection configuration shall be applied;

    2> set, for each signalling radio bearer SRBn, that has a pending integrity protection activation time set by a previous security mode control procedure, the RRC sequence number in entry for signalling radio bearer n in the "RRC message sequence number list" in the IE "*Downlink Integrity Protection Activation Info*", included in the IE "*Integrity Protection Mode Info*", to the value used in the previous security mode control procedure, at which time the latest integrity protection configuration shall be applied;

1> transmit the SECURITY MODE COMMAND message on SRB2 using the new integrity protection configuration.

NOTE: In the case of re-initialisation of Integrity Protection at HFN wrap around, the network takes into account the MS actions as described in sub-clauses 7.18.5.1 and 7.18.5.2

7.16.1.2.3 Reception of SECURITY MODE COMMAND message by the MS

Upon reception of the SECURITY MODE COMMAND message, the MS shall :

1> if neither IE "*Ciphering Mode Info*" nor IE "*Integrity Protection Mode Info*" is included in the SECURITY MODE COMMAND:

    2> set the variable INVALID_CONFIGURATION to TRUE.

1> if the IE "*Security Capability*" is the same as indicated by variable MS_CAPABILITY_TRANSFERRED, and the IE "*GSM MS Security Capability*" (if included in the SECURITY MODE COMMAND message) is the same as indicated by the variable MS_CAPABILITY_TRANSFERRED:

    2> set the variable LATEST_CONFIGURED_CN_DOMAIN equal to the IE "*CN Domain Identity*";

    2> set the IE "*Status*" in the variable SECURITY_MODIFICATION message for the CN domain indicated in the IE "CN domain identity" in the received SECURITY MODE COMMAND message to the value "Affected";

    2> set the IE "*Status*" in the variable SECURITY_MODIFICATION for all CN domains other than the CN domain indicated in the IE "*CN Domain Identity*" to "Not affected";

    2> set the IE "*RRC Transaction Identifier*" in the SECURITY MODE COMPLETE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

    2> clear that entry;

    2> if the SECURITY MODE COMMAND message contained the IE "*Ciphering Mode Info*":

        3> perform the actions as specified in sub-clause 7.19.4.4 "Ciphering mode info".

    2> if the SECURITY MODE COMMAND message contained the IE "*Integrity Protection Mode Info*":

        3> perform the actions as specified in sub-clause 7.19.4.5 "*Integrity Protection Mode Info*".

1> Prior to sending the SECURITY MODE COMPLETE message the MS shall:

  2> use the old ciphering configuration for this message;

  2> if the SECURITY MODE COMMAND message containes the IE "*Ciphering Mode Info*":

    3> include and set the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" to the value of the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO.

    3> for each radio bearer and signalling radio bearer that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN:

      4> start or continue incrementing the COUNT-C values for all RLC-AM and RLC-UM signalling radio bearers at the ciphering activation time as specified in the Ciphering mode info procedure (see sub-clause 7.19.4.4);

      4> start or continue incrementing the COUNT-C values common for all transparent mode radio bearers for this CN domain at the ciphering activation time as specified in the Ciphering mode info procedure (see sub-clause 7.19.4.4);

      4> continue incrementing the COUNT-C values for all RLC-AM and RLC-UM radio bearers;

    3> if no new security key set (new ciphering and integrity protection keys) has been received from the upper layers (see 3GPP TS 33.102) for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN:

      4> for ciphering on signalling radio bearers using RLC-AM and RLC-UM in the downlink, at the RLC sequence number indicated in IE "*RB Downlink Ciphering Activation Time Info*" in the IE "*Ciphering Mode Info*" included in the SECURITY MODE COMMAND message, for each signalling radio bearer:

        5> set the 20 most significant bits of the HFN component of the downlink COUNT-C to the value "START" in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

        5> set the remaining bits of the hyper frame numbers to zero;

    3> if new keys have been received perform the actions in sub-clause 7.16.1.2.3.1.

  2> if the SECURITY MODE COMMAND message contained the IE "*Integrity Protection Mode Info*";

    3> include and set the IE "*Uplink Integrity Protection Activation Info*" to the value of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO for each signalling radio bearer;

    3> if no new security key set (new ciphering and integrity protection keys) has been received from the upper layers (see 3GPP TS 33.102) for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, for SRB2:

      4> in the downlink, for the received SECURITY MODE COMMAND message :

        5> set the 20 most significant bits of the IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to the value "START" in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

        5> set the remaining bits of the IE "*Downlink RRC HFN*" to zero;

      4> in the uplink, for the transmitted response message, SECURITY MODE COMPLETE message:

        5> set the 20 most significant bits of the IE "*Uplink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to the value "START" in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

5> set the remaining bits of the IE "*Uplink RRC HFN*" to zero;

3> if no new security key set (new ciphering and integrity protection keys) has been received from the upper layers (3GPP TS 33.102) for the CN domain indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, the MS shall for each signalling radio bearer other than SRB2:

4> if the IE "*Integrity Protection Mode Command*" has the value "start":

5> in the downlink, for this signalling radio bearer, set the 20 most significant bits of IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to the value START transmitted in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

5> set the remaining bits of the IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to zero;

4> else:

5> in the downlink, for the first message for which the RRC sequence number in a received RRC message for this signalling radio bearer is equal to or greater than the activation time as indicated in IE "*Downlink Integrity Protection Activation Info*" as included in the IE "*Integrity Protection Mode Info*":

6> for this signalling radio bearer, set the 20 most significant bits of the IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to the value "START" in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

6> set the remaining bits of the IE "*Downlink RRC HFN*" to zero;

3> if new keys have been received perform the actions in sub-clause 7.16.1.2.3.1;

2> start applying the new integrity protection configuration in the uplink for signalling radio bearer SRB2 from and including the transmitted SECURITY MODE COMPLETE message;

2> transmit the SECURITY MODE COMPLETE message on the uplink SRB2.

After submission of the SECURITY MODE COMPLETE message to the lower layers, the MS shall accept messages received in the DL which require the new security configuration to be applied on them. If a received message is successfully integrity checked, the MS shall not discard the message due to lack of completion of the security procedure caused by the successful delivery of the SECURITY MODE COMPLETE message not having been confirmed by lower layers yet, unless the security configuration to be applied has been aborted and the message received requires integrity protection (see 3GPP TS 24.008).

1> when the successful delivery of the SECURITY MODE COMPLETE message has been confirmed by RLC:

2> if the SECURITY MODE COMMAND message contained the IE "*Ciphering Mode Info*":

3> if no new security key set (new ciphering and integrity protection keys) has been received from the upper layers (see3GPP TS 33.102) for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN:

4> for ciphering on signalling radio bearers using RLC-AM and RLC-UM in the uplink, at the RLC sequence number indicated in IE "*Radio Bearer Uplink Ciphering Activation Time Info*" included in the SECURITY MODE COMPLETE message, for each signalling radio bearer:

5> set the HFN component of the uplink COUNT-C to the value "START" in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN.

5> set the remaining bits of the hyper frame numbers to zero;

3> if new keys have been received perform the actions in sub-clause 7.16.1.2.3.1.

3> resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;

3> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

3> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO.

2> if the SECURITY MODE COMMAND message containes the IE "*Integrity protection mode info*":

3> if no new security key set (new ciphering and integrity protection keys) has been received from the upper layers (see3GPP TS 33.102) for the CN domain indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, the MS shall for each signalling radio bearer other than SRB2:

4> if the IE "*Integrity Protection Mode Command*" has the value "start":

5> in the uplink, for this signalling radio bearer, set the 20 most significant bits of IE "*Uplink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to the value START transmitted in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

5> set the remaining bits of the IE "*Uplink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to zero;

4> else:

5> in the uplink, for the first transmitted RRC message for this signalling radio bearer with RRC sequence number equal to the activation time as indicated in IE "*Uplink Integrity Protection Activation Info*" included in the transmitted SECURITY MODE COMPLETE message:

6> for this signalling radio bearer, set the 20 most significant bits of the IE "*Uplink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to the value "START" in the most recently transmitted IE "*START List*" or IE "*START*", at the reception of the SECURITY MODE COMMAND message, that belongs to the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN;

6> set the remaining bits of the IE "*Uplink RRC HFN*" to zero;

3> if new keys have been received perform the actions in sub-clause 7.16.1.2.3.1;

3> allow the transmission of RRC messages on all signalling radio bearers with any RRC SN;

3> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

3> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO.

2> clear the variable SECURITY_MODIFICATION;

2> notify upper layers upon change of the security configuration;

2> and the procedure ends.

1> if the IE "*Security Capability*" is not the same as indicated by the variable MS_CAPABILITY_TRANSFERRED, or the IE "*GSM MS Security Capability*" (if included in the SECURITY MODE COMMAND message) is not the same as indicated by the variable MS_CAPABILITY_TRANSFERRED, or if the IE "*GSM MS Security Capability*" is not included in the SECURITY MODE COMMAND message and is included in the variable MS_CAPABILITY_TRANSFERRED:

2> release all its radio resources;

2> indicate the release of the established signalling connections (as stored in the variable ESTABLISHED_SIGNALLING_CONNECTIONS) and established radio access bearers (as stored in the variable ESTABLISHED_RABS) to upper layers;

2> clear the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

2> clear the variable ESTABLISHED_RABS;

2> clear the variable SECURITY_MODIFICATION;

2> enter RRC-Idle mode;

2> perform actions when entering RRC-Idle mode as specified in sub-clause 7.18 "Actions when entering RRC-Idle mode from RRC-Connected mode";

2> and the procedure ends.

7.16.1.2.3.1 New ciphering and integrity protection keys

The actions in this sub-clause are to be performed only if the new keys were received for an on-going signalling connection while in GERAN *Iu mode*.

If a new security keyset (new ciphering and integrity protection keys) has been received from the upper layers (see 3GPP TS 33.102) for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN, the MS shall:

1> set the START value for the CN domain indicated in the variable LATEST_CONFIGURED_CN_DOMAIN to zero;

1> if the SECURITY MODE COMMAND message contained the IE "*Integrity Protection Mode Info*":

2> for integrity protection in the downlink on each signalling radio bearer except SRB2:

3> if IE "*Integrity Protection Mode Command*" has the value "start":

4> for the first received message on this signalling radio bearer:

5> start using the new integrity key;

5> for this signalling radio bearer, set the IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to zero.

3> else:

4> for the first message for which the RRC sequence number in a received RRC message for this signalling radio bearer is equal to or greater than the activation time as indicated in IE "*Downlink Integrity Protection Activation Info*" as included in the IE "*Integrity Protection Mode Info*":

5> start using the new integrity key;

5> for this signalling radio bearer, set the IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT_I to zero.

2> for integrity protection in the uplink on each signalling radio bearer except SRB2:

3> for the first message for which the RRC sequence number in a to be transmitted RRC message for this signalling radio bearer is equal to the activation time as indicated in IE "*Uplink Integrity Protection Activation Info*" included in the transmitted SECURITY MODE COMPLETE message:

4> start using the new integrity key;

4> for this signalling radio bearer, set the IE "*Uplink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to zero.

2> for integrity protection in the downlink on signalling radio bearer SRB2:

3> at the received SECURITY MODECOMMAND:

4> start using the new integrity key;

   4> set the IE "*Downlink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the downlink COUNT-I to zero;

  2> for integrity protection in the uplink on signalling radio bearer SRB2 :

   3> at the transmitted SECURITY MODE COMPLETE:

    4> start using the new integrity key;

    4> set the IE "*Uplink RRC HFN*" in the variable INTEGRITY_PROTECTION_INFO of the uplink COUNT-I to zero;

1> if the SECURITY MODE COMMAND message contained the IE "*Ciphering Mode Info*":

  2> for each signalling radio bearer and for each radio bearer for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN:

   3> if the IE "*Status*" in the variable CIPHERING_STATUS has the value "Started" for this CN domain, then for ciphering on the radio bearer using RLC-TM:

    4> at the TDMA frame number as indicated in the IE "*Ciphering Activation Time for DBPSCH*" in the IE "*Ciphering Mode Info*";

     5> start using the new key in uplink and downlink;

     5> set the HFN component of the COUNT-C to zero.

   3> if the IE "*Status*" in the variable CIPHERING_STATUS has the value "Started" for this CN domain, then for ciphering on the radio bearers and signalling radio bearers using RLC-AM and RLC-UM:

    4> in the downlink, at the RLC sequence number indicated in IE "*RB Downlink Ciphering Activation Time Info*" in the IE "*Ciphering Mode Info*":

     5> start using the new key;

     5> set the HFN component of the downlink COUNT-C to zero.

    4> in the uplink, at and after the RLC sequence number indicated in IE "*Radio Bearer Uplink Ciphering Activation Time Info*":

     5> start using the new key;

     5> set the HFN component of the uplink COUNT-C to zero.

1> consider the value of the latest transmitted START value to be zero.

7.16.1.2.4   Incompatible simultaneous security reconfiguration

If the variable INCOMPATIBLE_SECURITY_RECONFIGURATION becomes set to TRUE of the received SECURITY MODE COMMAND message, the MS shall:

1> transmit a SECURITY MODE FAILURE message on the uplink SRB2, using the ciphering and integrity protection configurations prior to the reception of this SECURITY MODE COMMAND;

1> set the IE "*RRC Transaction Identifier*" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> set the IE "*Failure Cause*" to the cause value "incompatible simultaneous reconfiguration";

1> when the response message has been submitted to lower layers for transmission:

  2> set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to FALSE;

> 2> continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;

> 1> and the procedure ends.

7.16.1.2.5 Cell Update procedure during security reconfiguration

If:

- a cell update procedure according to sub-clause 7.6.1 is initiated; and

- the received SECURITY MODE COMMAND message causes,

- the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to be set to TRUE; and/or

- the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to be set to TRUE:

the MS shall:

> 1> abort the ongoing integrity and/or ciphering reconfiguration;

> 1> resume data transmission on any suspended radio bearer and signalling radio bearer mapped on RLC-AM or RLC-UM;

> 1> allow the transmission of RRC messages on all signalling radio bearers with any RRC SN;

> 1> when the CELL UPDATE message has been submitted to lower layers for transmission:

>> 2> if the SECURITY MODE COMMAND message contained the IE "*Ciphering Mode Info*":

>>> 3> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE; and

>>> 3> clear the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

>> 2> if the SECURITY MODE COMMAND message contained the IE "*Integrity Protection Mode Info*":

>>> 3> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to FALSE; and

>>> 3> clear the variable INTEGRITY_PROTECTION_ACTIVATION_INFO.

>> 2> continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received; and

>> 2> clear the variable SECURITY_MODIFICATION;

>> 2> the procedure ends.

7.16.1.2.6 Invalid configuration

If the variable INVALID_CONFIGURATION is set to TRUE due to the received SECURITY MODE COMMAND message, the MS shall:

> 1> transmit a SECURITY MODE FAILURE message on the uplink SRB2 after setting the IEs as specified below;

> 1> set the IE "*RRC Transaction Identifier*" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Accepted transactions" in the variable TRANSACTIONS; and

> 1> clear that entry;

> 1> set the IE "*Failure Cause*" to the cause value "invalid configuration".

> 1> when the response message has been submitted to lower layers for transmission:

>> 2> set the variable INVALID_CONFIGURATION to FALSE;

>> 2> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to FALSE

2> continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;

1> and the procedure ends.

7.16.1.2.7 Reception of SECURITY MODE COMPLETE message by the GERAN

The GERAN shall apply integrity protection on the received SECURITY MODE COMPLETE message and all subsequent messages with the new integrity protection configuration, if changed. When GERAN has received a SECURITY MODE COMPLETE message and the integrity protection has successfully been applied, GERAN shall:

1> if the IE "*Ciphering Mode Info*" was included in the SECURITY MODE COMMAND message:

2> if new keys were received for the CN domain set in the IE "*CN Domain Identity*" in the SECURITY MODE COMMAND:

3> at the downlink and uplink activation time set all the bits of the hyper frame numbers of the downlink and uplink COUNT-C values respectively for all radio bearers for this CN domain and all signalling radio bearers to zero;

2> else (if new keys were not received)

3> at the downlink and uplink activation time use the value "START" in the most recently received IE "*START List*" or IE "*START*" that belongs to the CN domain as indicated in the IE "*CN Domain Identity*" to initialise all hyper frame numbers of the downlink and uplink COUNT-C values respectively for all the signalling radio bearers by:

4> setting the 20 most significant bits of the hyper frame numbers of the COUNT-C for all signalling radio bearers to the value "START" in the most recently received IE "*START List*" or IE "*START*" for that CN domain;

4> setting the remaining bits of the hyper frame numbers equal to zero.

1> if the IE "*Integrity Protection Mode Info*" was included in the SECURITY MODE COMMAND message:

2> if this was not the first SECURITY MODE COMMAND message for this RRC connection:

3> if new keys have been received for the CN domain set in the IE "*CN Domain Identity*" included in the transmitted SECURITY MODE COMMAND message:

4> at the downlink and uplink activation time initialise all hyper frame numbers of the downlink and uplink COUNT-I values respectively for all the signalling radio bearers other than SRB2 as follows:

5> set all bits of the hyper frame numbers of the uplink and downlink COUNT-I to zero;

3> if no new keys have been received for the CN domain set in the IE "*CN Domain Identity*" included in the transmitted SECURITY MODE COMMAND message:

4> at the downlink and uplink activation time use the value "START" in the most recently received IE "*START List*" or IE "*START*" that belongs to the CN domain as indicated in the IE "*CN Domain Identity*" to initialise all hyper frame numbers of the downlink and uplink COUNT-I values respectively for all the signalling radio bearers other than SRB2 by:

5> setting the 20 most significant bits of the hyper frame numbers of the downlink and uplink COUNT-I respectively for all signalling radio bearers to the value "START" in the most recently received IE "*START List*" or IE "*START*" for that CN domain;

5> setting the remaining bits of the hyper frame numbers equal to zero.

1> send an indication to upper layers that the new integrity protection configuration has been activated;

1> resume in the downlink, all suspended radio bearers and all signalling radio bearers;

1> allow the transmission of RRC messages on all signalling radio bearers with any RRC SN;

1> if the IE "*Integrity Protection Mode Command*" included in the SECURITY MODE COMMAND had the value "Start":

    2> start applying integrity protection in the downlink for all signalling radio bearers;

1> if the IE " *Integrity Protection Mode Command* " included in the SECURITY MODE COMMAND had the value "Modify":

    2> start applying the new integrity protection configuration in the downlink at the RRC sequence number, for each signalling radio bearers SRBn, except for signalling radio bearer SRB2, indicated by the entry for signalling radio bearer n in the "RRC message sequence number list" in the IE "*Downlink Integrity Protection Activation Info*";

    2> continue applying the new integrity configuration for signalling radio bearer SRB2;

    2> apply the new integrity protection configuration on the received signalling messages with RRC SN greater than or equal to the number associated with the signalling radio bearer in IE "*Uplink Integrity Protection Activation Info*";

1> apply the old ciphering configuration for the transmission of RLC PDUs with RLC sequence number less than the number indicated in the IE "*RB Downlink Ciphering Activation Time Info*" included in the IE "*Ciphering Mode Info*";

1> apply the new ciphering configuration for the transmission of RLC PDUs with RLC sequence number greater than or equal to the number indicated in IE "*Radio Bearer Downlink Ciphering Activation Time Info*" included in the IE "*Ciphering Mode Info*";

1> apply the old integrity protection configuration on the received signalling messages with RRC SN smaller than the number associated with the signalling radio bearer in IE "*Uplink Integrity Protection Activation Info*";

1> for radio bearers and signalling radio bearers using RLC-AM or RLC-UM:

    2> send an indication to lower layers:

    2> use the old ciphering configuration for received RLC PDUs with RLC sequence number less than the RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" sent by the MS;

    2> use the new ciphering configuration for received RLC PDUs with RLC sequence number greater than or equal to the RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" sent by the MS;

    2> if an RLC reset or re-establishment occurs after the SECURITY MODE COMPLETE message has been received by GERAN before the activation time for the new ciphering configuration has been reached, ignore the activation time and apply the new ciphering configuration immediately after the RLC reset or RLC re-establishment;

1> for radio bearers using RLC-TM:

    2> send an indication to lower layers:

    2> use the old ciphering configuration for the received RLC PDUs before the TDMA frame number as indicated in the IE "*Ciphering Activation Time for DBPSCH*" in the IE "*Ciphering Mode Info*" as included in the SECURITY MODE COMMAND;

    2> use the new ciphering configuration for the received RLC PDUs at the TDMA frame number as indicated in the IE "*Ciphering Activation Time for DBPSCH*" in the IE "*Ciphering Mode Info*" as included in the SECURITY MODE COMMAND;

1> and the procedure ends.

7.16.1.2.8 Invalid SECURITY MODE COMMAND message

If the SECURITY MODE COMMAND message contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to sub-clause "General error handling", the MS shall perform procedure specific error handling as follows:

1> transmit a SECURITY MODE FAILURE message on the uplink SRB2;

1> set the IE "*RRC Transaction Identifier*" in the SECURITY MODE FAILURE message to the value of "RRC transaction identifier" in the entry for the SECURITY MODE COMMAND message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> set the IE "*Failure Cause*" to the cause value "protocol error";

1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.

1> when the response message has been submitted to lower layers for transmission:

   2> continue with any ongoing processes and procedures as if the invalid SECURITY MODE COMMAND message has not been received;

1> and the procedure ends.

7.17 Delivery of Non-Access stratum messages

7.17.1 Initial Direct transfer
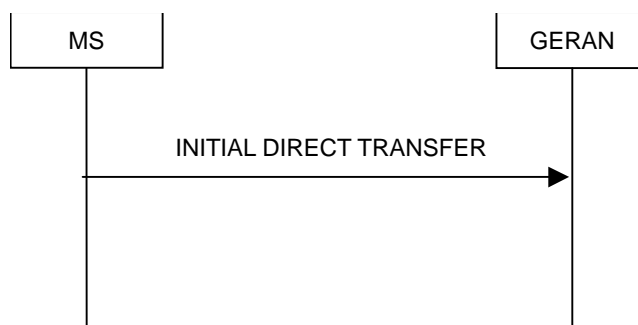
Figure 7.17.1.1: Initial Direct transfer in the uplink, normal flow

7.17.1.1 General

The Initial Direct Transfer procedure is used in the uplink to establish a signalling connection. It is also used to carry an initial upper layer (NAS) messages over the radio interface.

7.17.1.2 Initiation of Initial direct transfer procedure in the MS

In the MS, the Initial Direct Transfer procedure shall be initiated, when the upper layers request establishment of a signalling connection. This request also includes a request for the transfer of a NAS message.

Upon initiation of the Initial Direct Transfer procedure when the MS is in RRC-Idle mode, the MS shall:

1> set the variable ESTABLISHMENT_CAUSE to the cause for establishment indicated by upper layers;

1> perform an RRC Connection Establishment procedure, according to sub-clause 7.5;

1> if the RRC Connection Establishment procedure was not successful:

   2> indicate failure to establish the signalling connection to upper layers and end the procedure;

1> when the RRC Connection Establishment procedure is completed successfully:

   2> continue with the Initial Direct Transfer procedure as below;

Upon initiation of the Initial Direct Transfer procedure when the MS is in RRC-GRA_PCH state, the MS shall:

1> perform a Cell Update procedure, according to sub-clause 7.8, using the cause "uplink data transmission";

1> when the Cell Update procedure completed successfully:

2> continue with the Initial Direct Transfer procedure as below.

The MS shall, in the INITIAL DIRECT TRANSFER message:

1> set the IE "*NAS Message*" as received from upper layers; and

1> set the IE "*CN Domain Identity*" as indicated by the upper layers; and

2> set the IE "*Intra Domain NAS Node Selector*" as follows:

2> derive the IE "*Intra Domain NAS Node Selector*" from TMSI/PMTSI, IMSI, or IMEI; and

2> provide the coding of the IE "*Intra Domain NAS Node Selector*" according to the following priorities:

1. derive the routing parameter for IDNNS from TMSI (CS domain) or PTMSI (PS domain) whenever a valid TMSI/PTMSI is available;

2. base the routing parameter for IDNNS on IMSI when no valid TMSI/PTMSI is available;

3. base the routing parameter for IDNNS on IMEI only if no (U)SIM is inserted in the MS.

1> calculate the START according to sub-clause 7.18.4 for the CN domain as set in the IE "*CN Domain Identity*"; and

2> include the calculated START value for that CN domain in the IE "*START*";

The MS shall:

1> transmit the INITIAL DIRECT TRANSFER message on the uplink using AM RLC on signalling radio bearer SRB 3;

1> when the INITIAL DIRECT TRANSFER message has been submitted to lower layers for transmission:

2> confirm the establishment of a signalling connection to upper layers; and

2> add the signalling connection with the identity indicated by the IE "*CN Domain Identity*" in the variable ESTABLISHED_SIGNALLING_CONNECTIONS; and

1> when the successful delivery of the INITIAL DIRECT TRANSFER message has been confirmed by RLC sub-layer:

2> the procedure ends.

When not stated otherwise elsewhere, the MS may also initiate the initial direct transfer procedure when another procedure is ongoing, and in that case the state of the latter procedure shall not be affected.

A new signalling connection request may be received from upper layers subsequent to the indication of the release of a previously established signalling connection to upper layers. From the time of the indication of release to upper layers until the MS has entered RRC-Idle mode, any such upper layer request to establish a new signalling connection shall be queued. This request shall be processed after the MS has entered RRC-Idle mode.

7.17.1.3 RLC re-establishment, inter-mode handover or inter-RAT change

If a re-establishment of RLC on SRB3 occurs before the successful delivery of the INITIAL DIRECT TRANSFER message has been confirmed by RLC, the MS shall:

1> retransmit the INITIAL DIRECT TRANSFER message on the uplink using SRB3.

If inter-mode handover occurs before the successful delivery of the INITIAL DIRECT TRANSFER message has been confirmed by RLC, for messages with the IE "*CN Domain Identity*" set to "CS domain", the MS shall:

1> retransmit the NAS message as specified in sub-clause 7.8.4.4

If inter-RAT handover occurs before the successful delivery of the INITIAL DIRECT TRANSFER message has been confirmed by RLC, the MS shall:

> 1> retransmit the NAS message as specified in sub-clause 7.10.4.

7.17.1.4 Abortion of signalling connection establishment

If the MS receives a request from upper layers to release (abort) the signalling connection for the CN domain for which the initial direct transfer procedure is ongoing, the MS shall:

> 1> if the MS has not yet entered GERAN RRC-Connected mode:
>
> > 2> abort the RRC Connection Establishment procedure as specified in sub-clause 7.5.1.6;

the procedure ends.

7.17.1.5 Reception of INITIAL DIRECT TRANSFER message by the GERAN

On reception of the INITIAL DIRECT TRANSFER message the NAS message should be routed using the IE "*CN Domain Identity*". GERAN may also use the IE "*Intra Domain NAS Node Selector*" for routing among the CN nodes for the addressed CN domain.

If no signalling connection exists towards the chosen node, then a signalling connection is established.

When the GERAN receives an INITIAL DIRECT TRANSFER message, it shall not affect the state of any other ongoing RRC procedures, when not stated otherwise elsewhere.

The GERAN should:

> 1> set the START value for the CN domain indicated in the IE "*CN Domain Identity*" to the value of the IE "*START*".

7.17.2 Downlink Direct transfer

Figure 7.17.2.1: Downlink Direct transfer, normal flow

7.17.2.1 General

The Downlink Direct Transfer procedure is used in the downlink direction to carry upper layer (NAS) messages over the radio interface.

7.17.2.2 Initiation of downlink direct transfer procedure in the GERAN

In the GERAN, the Direct Transfer procedure is initiated when the upper layers request the transfer of a NAS message after the initial signalling connection is established. The GERAN may also initiate the Downlink Direct Transfer procedure when another RRC procedure is ongoing, and in that case the state of the latter procedure shall not be affected. The GERAN shall transmit the DOWNLINK DIRECT TRANSFER message on the downlink using AM RLC on signalling radio bearer SRB 3 or signalling radio bearer SRB 4. The GERAN should:

> 1> if upper layers indicate "low priority" for this message:

> 2> select signalling radio bearer SRB4, if available. Specifically, for a GSM-MAP based CN, signalling radio SRB4 should, if available, be selected when "SAPI 3" is requested;

> 2> select signalling radio SRB3 when signalling radio SRB 4 is not available;

> 1> if upper layers indicate "high priority" for this message:

> 2> select signalling radio SRB3. Specifically, for a GSM-MAP based CN, signalling radio bearer RB3 should be selected when "SAPI 0" is requested.

The GERAN sets the IE "*CN Domain Identity*" to indicate, which CN domain the NAS message is originated from.

7.17.2.3   Reception of a DOWNLINK DIRECT TRANSFER message by the MS

Upon reception of the DOWNLINK DIRECT TRANSFER message, the MS RRC shall, using the IE "*CN Domain Identity*", route the contents of the IE "*NAS Message*" and the value of the IE "*CN Domain Identity*" to the upper layers.

The MS shall clear the entry for the DOWNLINK DIRECT TRANSFER message in the table "Accepted transactions" in the variable TRANSACTIONS.

When the MS receives a DOWNLINK DIRECT TRANSFER message, it shall not affect the state of any other ongoing RRC procedures when not stated otherwise elsewhere.

7.17.2.4   No signalling connection exists

If the MS receives a DOWNLINK DIRECT TRANSFER message, and the signalling connection identified with the IE "*CN Domain Identity*" does not exist according to the variable ESTABLISHED_SIGNALLING_CONNECTIONS, the MS shall:

> 1> ignore the content of the DOWNLINK DIRECT TRANSFER message;

> 1> transmit an RRC STATUS message on the uplink SRB2;

> 1> include the IE "*Identification of Received Message*"; and

> 1> set the IE "*Received Message Type*" to DOWNLINK DIRECT TRANSFER message; and

> 1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the DOWNLINK DIRECT TRANSFER message in the table "Accepted transactions" in the variable TRANSACTIONS; and

> 1> clear that entry;

> 1> include the IE "*Protocol Error Information*" with the IE "*Protocol Error Cause*" set to "Message not compatible with receiver state".

When the RRC STATUS message has been submitted to lower layers for transmission, the MS shall:

> 1> continue with any ongoing processes and procedures as if the DOWNLINK DIRECT TRANSFER message has not been received.

7.17.2.5   Invalid DOWNLINK DIRECT TRANSFER message

If the MS receives a DOWNLINK DIRECT TRANSFER message, which contains a protocol error causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE according to clause 8 the MS shall perform procedure specific error handling as follows:

> 1> transmit an RRC STATUS message on the uplink SRB2;

> 1> include the IE "*Identification of Received Message*"; and

> 1> set the IE "*Received Message Type*" to DOWNLINK DIRECT TRANSFER; and

1> set the IE "*RRC Transaction Identifier*" to the value of "RRC transaction identifier" in the entry for the DOWNLINK DIRECT TRANSFER message in the table "Rejected transactions" in the variable TRANSACTIONS; and

1> clear that entry;

1> include the IE "*Protocol Error Information*" with contents set to the value of the variable PROTOCOL_ERROR_INFORMATION.

When the RRC STATUS message has been submitted to lower layers for transmission, the MS shall:

1> continue with any ongoing processes and procedures as if the invalid DOWNLINK DIRECT TRANSFER message has not been received.

7.17.3   Uplink Direct transfer
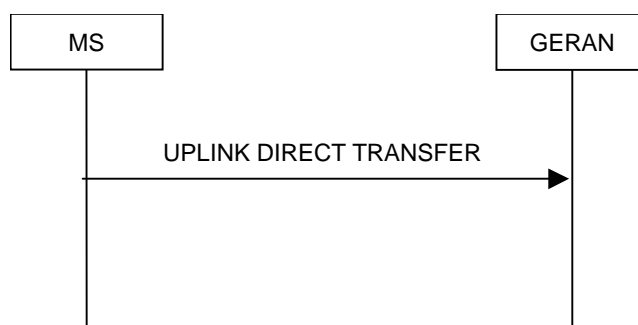
Figure 7.17.3.1: Uplink Direct transfer, normal flow

7.17.3.1   General

The Uplink Direct Transfer procedure is used in the uplink direction to carry all subsequent upper layer (NAS) messages over the radio interface belonging to a signalling connection.

7.17.3.2   Initiation of uplink direct transfer procedure in the MS

In the MS, the Uplink Direct Transfer procedure shall be initiated when the upper layers request a transfer of a NAS message on an existing signalling connection. When not stated otherwise elsewhere, the MS may initiate the Uplink Direct Transfer procedure when another procedure is ongoing, and in that case the state of the latter procedure shall not be affected.

Upon initiation of the Uplink Direct Transfer procedure in RRC-GRA_PCH state, the MS shall:

1> perform a Cell Update procedure, according to sub-clause 7.8, using the cause "uplink data transmission";

1> when the Cell Update procedure has been completed successfully:

2> continue with the Uplink Direct Transfer procedure as below.

The MS shall transmit the UPLINK DIRECT TRANSFER message on the uplink using AM RLC on signalling radio bearer SRB3 or signalling radio bearer SRB4. The MS shall:

1> if upper layers indicates "low priority" for this message:

2> select signalling radio SRB4, if available. Specifically, for a GSM-MAP based CN, signalling radio bearer SRB4 shall, if available, be selected when "SAPI 3" is requested;

2> select signalling radio bearer SRB3 when signalling radio bearer SRB4 is not available;

1> if upper layers indicates "high priority" for this message:

2> select signalling radio bearer SRB3. Specifically, for a GSM-MAP based CN, signalling radio bearer SRB3 shall be selected when "SAPI 0" is requested.

The MS shall set the IE "*NAS Message*" as received from upper layers and set the IE "*CN Domain Identity*" as indicated by the upper layers.

When the sucessful delivery of the UPLINK DIRECT TRANSFER message has been confirmed by RLC sub-layer the procedure ends.

7.17.3.3   RLC re-establishment, inter-mode handover or inter-RAT change

If SRB n (where n equals to 3 or 4) was used when transmitting the UPLINK DIRECT TRANSFER message and a re-establishment of RLC on the same SRB n occurs before the successful delivery of the UPLINK DIRECT TRANSFER message has been confirmed by RLC, the MS shall:

1> retransmit the UPLINK DIRECT TRANSFER message on the uplink SRB n.

If inter-mode handover occurs before the successful delivery of the UPLINK DIRECT TRANSFER message has been confirmed by RLC, for messages with the IE "CN Domain Identity" set to "CS domain", the MS shall:

1> retransmit the NAS message as specified in sub-clause 7.8.4.4

If inter-RAT handover occurs before the successful delivery of the UPLINK DIRECT TRANSFER message has been confirmed by RLC, the MS shall:

1> retransmit the NAS message as specified in sub-clause 7.10.4.

7.17.3.4   Reception of UPLINK DIRECT TRANSFER message by the GERAN

On reception of the UPLINK DIRECT TRANSFER message the NAS message should be routed using the value indicated in the IE "*CN Domain Identity*".

When the GERAN receives an UPLINK DIRECT TRANSFER message, it shall not affect the state of any other ongoing RRC procedures, when not stated otherwise elsewhere.

7.18   General procedures

7.18.1   Selection of initial MS identity

The purpose of the IE "*Initial MS Identity*" is to provide a unique MS identification at the establishment of an RRC connection. The MS shall choose "MS id type" in the IE "*Initial MS Identity*" with the following priority:

1. TMSI (GSM-MAP): The TMSI (GSM-MAP) shall be chosen if available. The IE "*LAI*" in the IE "*Initial MS Identity*" shall also be present when TMSI (GSM-MAP) is used.

2. P-TMSI (GSM-MAP): The P-TMSI (GSM-MAP) shall be chosen if available and no TMSI (GSM-MAP) is available. The IE "*RAI*" in the IE "*Initial MS Identity*" shall in this case also be present when P-TMSI (GSM-MAP) is used.

3. IMSI (GSM-MAP): The IMSI (GSM-MAP) shall be chosen if no TMSI (GSM-MAP) or P-TMSI is available.

4. IMEI: The IMEI shall be chosen when none of the above three conditions are fulfilled.

When being used, the IEs "*TMSI (GSM-MAP)*", "*P-TMSI (GSM-MAP)*", "*IMSI (GSM-MAP)*", "*LAI*" and "*RAI*" shall be set equal to the values of the corresponding identities stored in the USIM.

If the variable SELECTED_PLMN in the MS indicates "ANSI-41", the MS shall choose "*MS Id Type*" in the IE "*Initial MS Identity*" according to the procedure specified in the 3GPP2 document "3GPP2 C.P0004-A".

7.18.2   Actions when entering RRC-Idle mode from RRC-Connected mode

When entering RRC-Idle mode from RRC-Connected mode, the MS shall:

1> clear or set variables upon leaving GERAN RRC-Connected mode as specified in sub-clause 10.4;

1> attempt to select a suitable cell to camp on.

When leaving the RRC-Connected mode according to 3GPP TS 45.010, the MS shall:

1> perform cell selection.

While camping on a cell, the MS shall:

1> acquire system information according to the system information procedure in sub-clause 7.3;

1> perform measurements according to the measurement control procedure specified in sub-clause 7.9; and

1> if the MS is registered:

2> be prepared to receive paging messages according to the Paging procedure in sub-clause 7.4.

If IE "*PLMN Identity*" within variable SELECTED_PLMN has the value "GSM-MAP", the MS shall:

1> delete any NAS system information received in RRC-Connected Mode;

1> acquire the NAS system information in packet system information 16; and

1> proceed according to sub-clause 7.19.

When entering RRC-Idle mode, the MS shall:

1> if the USIM is present, for each CN domain:

2> if a new security key set was received for this CN domain but was not used either for integrity protection or ciphering during this RRC connection:

3> set the "START" value for this domain to zero; and

3> store this "START" value for this domain in the USIM.

2> else:

3> if the current "START" value, according to sub-clause 7.18 for a CN domain, is greater than or equal to the value "THRESHOLD" of the variable START_THRESHOLD:

4> delete the ciphering and integrity keys that are stored in the USIM for that CN domain;

4> inform the deletion of these keys to upper layers.

3> else:

4> store the current "START" value for this CN domain on the USIM.

1> else:

2> if the SIM is present, for each CN domain:

3> if a new security key set was received for this CN domain but was not used either for integrity protection or ciphering during this RRC connection:

4> set the "START" value for this domain to zero; and

4> store this "START" value for this domain in the MS.

3> else, the MS shall:

4> if the current "START" value, according to sub-clause 7.18 for this CN domain, is greater than or equal to the value "THRESHOLD" of the variable START_THRESHOLD:

5> delete the Kc key for this CN domain;

5> delete the ciphering and integrity keys that are stored in the MS for that CN domain;

5> set the "START" value for this CN domain to zero and store it in the MS;

5> inform the deletion of the key to upper layers.

    4> else:

        4> store the current "START" value for this CN domain in the MS.

7.18.2a Actions when entering GERAN *A/Gb mode* or CDMA2000 from GERAN *Iu mode*, RRC- Connected mode

When entering GERAN *A/Gb mode* or CDMA2000 from GERAN *Iu mode*, RRC- Connected mode (due to Inter-mode handover from GERAN or Inter-system handover to CDMA2000), after successful completion of the procedure causing the transition to the GERAN *A/Gb mode* or CDMA2000 from GERAN *Iu mode*, the MS shall:

    1> if the USIM is present, for each CN domain:

        2> if a new security key set was received for this CN domain but was not used either for integrity protection or ciphering during this RRC connection:

            3> set the "START" value for this domain to zero and;

            3> store this "START" value for this domain in the USIM;

        2> else

            3> after calculating the "START" value according to sub-clause 7.18.4, store the current "START" value for every CN domain in the USIM;

    1> if the SIM is present, for each CN domain:

        2> if a new security key was received for this CN domain but was not used either for integrity protection or ciphering during this RRC connection:

            3> set the "START" value for this domain to zero and;

            3> store this "START" value for this domain in the MS;

        2> else

            3> after calculating the "START" value according to sub-clause 7.18.4, store the current "START" value for this CN domain in the MS.

7.18.3 Maintenance of Hyper Frame Numbers

The MSBs of both the ciphering sequence numbers (COUNT-C) and integrity sequence numbers (COUNT-I), for the ciphering and integrity protection algorithms, respectively (see 3GPP TS 33.102), are called the Hyper Frame Numbers (HFN). For TM RLC bearers an extended TDMA frame number is used, which is built by an HFN plus part of a TDMA frame number.

For integrity protection, the MS shall:

    1> maintain COUNT-I as specified in sub-clause 7.18.5;

The following hyper frame numbers types are defined:

    1> MAC HFN:
    11 MSB of COUNT-C for data sent over RLC TM

    1> RLC HFN:

        2> if the RLC sequence number is of length 7 bits(GPRS TBF mode, see 3GPP TS 44.160), then the HFN

            3> defines the 24 MSB of the COUNT-C parameter for data sent over RLC UM, and

            3> defines the 24 MSB of the COUNT-C parameter for data sent over RLC AM.

2> if the RLC sequence number is of length 11bits (EGPRS TBF mode, see 3GPP TS 44.160), then the HFN

3> defines the 20 MSB of the COUNT-C parameter for data sent over RLC UM, and

3> defines the 20 MSB of the COUNT-C parameter for data sent over RLC AM.

2> if the RLC sequence number is of length 4 bits (DCCH TBF mode, see 3GPP TS 44.160), then the HFN

3> defines the 27 MSB of the COUNT-C parameter for data sent over RLC UM, and

3> defines the 27 MSB of the COUNT-C parameter for data sent over RLC AM.

2> if the RLC sequence number is of length 8 bits (TCH TBF mode, see 3GPP TS 44.160), then the HFN

3> defines the 23 MSB of the COUNT-C parameter for data sent over RLC UM, and

3> defines the 23 MSB of the COUNT-C parameter for data sent over RLC AM.

1> RRC HFN:
28 MSB of COUNT-I.

For non-transparent mode RLC radio bearers, the MS shall:

1> maintain one uplink and one downlink COUNT-C per radio bearer and one uplink and one downlink COUNT-I per signalling radio bearer.

For all transparent mode RLC signalling radio bearers and radio bearers of the same CN domain, the MS shall:

1> maintain one COUNT-C, common for all signalling radio bearers and radio bearers in uplink and downlink;

1> if the activation time for a new ciphering configuration set by an RRC procedure is equal to zero:

2> apply the configured MAC HFN at this activation time, i.e. the configured HFN is not incremented;

1> maintain one uplink and one downlink COUNT-I per signalling radio bearer.

7.18.4 START value calculation

In RRC connected mode, if a Security Mode Command procedure has been successfully completed for a CN domain during the current RRC connection, the "START" value for that CN domain is calculated as

Let $START_X$ = the "START" value for CN domain 'X' prior to the calculation below:

$START_X'$ = MSB_{20} (MAX {COUNT-C, COUNT-I | radio bearers and signalling radio bearers using CK_X and IK_X}) + 2.

- if $START_X'$= the maximum value = 20^2 –1 = 1048575 then $START_X$ = $START_X'$;

- if the current $START_X$ < $START_X'$ then $START_X$ = $START_X'$, otherwise $START_X$ is unchanged.

NOTE: Here, "most recently configured" means that if there are more than one key in use for a CN domain, due to non expiry of the ciphering and/or integrity protection activation time for any signalling radio bearers and/or radio bearers, do not include the COUNT-I/COUNT-C for these signalling radio bearers and/or radio bearers in the calculation of the $START_X'$.

COUNT-C corresponding to non-ciphered radio bearers (i.e. RBs with ciphering status set to "not started") shall not be included in the calculation of the $START_X'$. If a radio bearer is released and the radio bearer was ciphered, the values of the COUNT-C at the time the radio bearer is released shall be taken into account in the calculation of the $START_X'$.

If a Security Mode Command procedure has not been successfully completed for a CN domain during the current RRC connection, the MS shall use the latest transmitted "START" value for this CN domain.

7.18.5   Integrity protection

7.18.5.0   General

If the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" then the MS and the GERAN shall:

> 1> perform integrity protection (and integrity checking) on all RRC messages, with the following exceptions:

> RRC CONNECTION REJECT

> RRC CONNECTION SETUP

> RRC CONNECTION REQUEST

> RRC CONNECTION SETUP COMPLETE

> SYSTEM INFORMATION TYPE 5, 5bis, 5ter, 6

> SYNCHRONIZATION CHANNEL INFORMATION

> RRC STATUS

> EXTENDED MEASUREMENT ORDER

> EXTENDED MEASUREMENT REPORT

> MEASURMENT REPORT

> MEASUREMENT INFORMATION

> ENHANCED MEASUREMENT REPORT

If the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Not started" then integrity protection (and integrity checking) shall not be performed on any RRC message.

For each signalling radio bearer, the MS shall use two RRC hyper frame numbers:

> 1> "Uplink RRC HFN";

> 1> "Downlink RRC HFN".

and two message sequence numbers:

> 1> "Uplink RRC Message sequence number";

> 1> "Downlink RRC Message sequence number".

The above information is stored in the variable INTEGRITY_PROTECTION_INFO per signalling radio bearer (RB1-RB4).

Upon the first activation of integrity protection for an RRC connection, MS and GERAN initialise the "Uplink RRC Message sequence number" and "Downlink RRC Message sequence number" for all signalling radio bearers as specified in sub-clauses 7.18.5.2 and 7.18.5.1.

The RRC message sequence number (RRC SN) is incremented for every integrity protected RRC message.

If the IE "*Integrity Protection Mode Info*" is present in a received message, the MS shall:

> 1> perform the actions in sub-clause 7.19.4.5 before proceeding with the integrity check of the received message.

7.18.5.1   Integrity protection in downlink

If the MS receives an RRC message on signalling radio bearer with RB identity n, the "Status" in the variable INTEGRITY_ PROTECTION_INFO has the value "Started" and the IE *'Integrity Check Info'* is present the MS shall:

1> check the value of the IE "*RRC Message Sequence Number*" included in the IE "*Integrity Check Info*";

    2> if the "Downlink RRC Message sequence number" for signalling radio bearer RBn is not present in the variable INTEGRITY_PROTECTION_INFO:

        3> initialise the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with the value of the IE "*RRC Message Sequence Number*" included in the IE "*Integrity Check Info*" of the received message;

    2> if the "Downlink RRC Message sequence number" is present in the variable INTEGRITY_PROTECTION_INFO:

        3> if the RRC message sequence number is lower than the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO:

            4> increment "Downlink RRC HFN" for signalling radio bearer SRBn in the variable INTEGRITY_PROTECTION_INFO with one.

NOTE: The actions above imply that also for the case the "Downlink RRC HFN" is re-initialised by a security mode control procedure, this "Downlink RRC HFN" value is incremented by one before it is applied for the integrity protection of any received message if the conditions above are fulfilled.

        3> if the RRC message sequence number is equal to the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO:

            4> discard the message;

1> calculate an expected message authentication code in accordance with sub-clause 7.18.5.3;

1> compare the expected message authentication code with the value of the received IE "*Message Authentication Code*" contained in the IE "*Integrity Check Info*";

    2> if the expected message authentication code and the received message authentication code are the same, the integrity check is successful:

        3> update the "Downlink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with the value of the IE "*RRC Message Sequence Number*" included in the IE "*Integrity Check Info*" of the received RRC message;

    2> if the calculated expected message authentication code and the received message authentication code differ:

        3> act as though the message was not received.

If the MS receives an RRC message on signalling radio bearer with identity n, the "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Started" and the IE '*Integrity Check Info*' is not present the MS shall:

    1> discard the message.

7.18.5.2   Integrity protection in uplink

Prior to sending an RRC message using the signalling radio bearer with radio bearer identity n, and the "Status" in the variable INTEGRITY_PROTECTION_INFO has the value "Started" the MS shall:

    1> increment "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO with 1, even if the message is a retransmission of a previously transmitted message.

    1> if the "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO equals zero :

        2> the MS shall increment "Uplink RRC HFN" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO by one;

NOTE: The actions above imply that also for the case the "Uplink RRC HFN" is re-initialised by a security mode control procedure, this "Uplink RRC HFN" is incremented before it is applied in the integrity protection of any transmitted message if the conditions above are fulfilled.

1> calculate the message authentication code in accordance with sub-clause 7.18.5.3;

1> replace the "Message authentication code" in the IE "*Integrity Check Info*" in the message with the calculated message authentication code;

1> replace the "RRC Message sequence number" in the IE "*Integrity Check Info*" in the message with contents set to the new value of the "Uplink RRC Message sequence number" for signalling radio bearer RBn in the variable INTEGRITY_PROTECTION_INFO;

In the response message for the procedure ordering the security reconfiguration, the MS indicates the activation time, for each signalling radio bearer. When the new integrity configuration is to be applied in uplink, GERAN should then start to apply the new integrity protection configuration according to the activation time for each signalling radio bearer (except for the signalling radio bearer which is used to send the message that is reconfiguring the security configuration) where the new configuration is to be applied starting from and including reception of the response message.

7.18.5.3   Calculation of message authentication code

The MS shall calculate the message authentication code in accordance with 3GPP TS 33.102. The construction of the input parameter MESSAGE (see 3GPP TS 33.102) for the integrity algorithm is FFS.

For usage on an RRC message transmitted or received on the radio bearer with identity n, the MS shall:

1> construct the input parameter COUNT-I (see 3GPP TS 33.102) by appending the following IEs from the IE "*Signalling Radio Bearer Specific Integrity Protection Information*" for radio bearer n in the variable INTEGRITY_PROTECTION_INFO:

2> for uplink:

3> "Uplink RRC HFN", as the MSB, and "Uplink RRC Message sequence number", as LSB;

2> for downlink:

3> "Downlink RRC HFN", as the MSB, and the IE "*RRC Message Sequence Number*" included in the IE "*Integrity Check Info*", as LSB.

7.18.6   Physical channel establishment

7.18.6.0   General
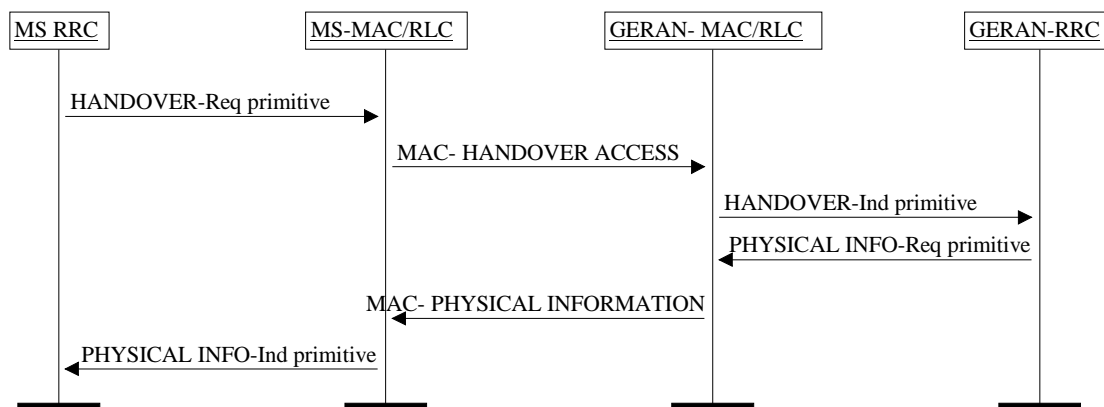
Figure 7.18.6.0.1: Handover Access procedure

The Handover Access procedure initiation in RRC-Cell_Dedicated state is done by sending a HANDOVER-Req primitive to the MS MAC layer as described in 3GPP TS 44.160. The MS MAC uses this procedure to initiate access in

the new cell. The reception of a HANDOVER ACCESS message at GERAN MAC is indicated to GERAN RRC by sending the HANDOVER-Ind primitive as specified in 3GPP TS 44.160.

The Physical Information procedure initiation is done by sending a PHYSICAL INFO-Req primitive to the GERAN MAC layer as specified in 3GPP TS 44.160 upon receipt of a HANDOVER-Ind primitive from the GERAN MAC layer. When the network has the necessary mobile station's RF characteristics it sends PHYSICAL INFORMATION message as specified in sub-clause 7.18.6.2. The reception of a PHYSICAL INFORMATION message at MS MAC is indicated to the MS RRC by sending the PHYSICAL INFO-Ind primitive.

Four procedures are defined: Finely synchronized cell, Non-synchronized cell, Pseudo-synchronized cell and Pre-synchronized cell. The support of all of them except the pseudo-synchronized cell case is mandatory in the mobile station. A pseudo-synchronized establishment can be commanded only to a mobile station that can support it, as indicated in the classmark.

7.18.6.1   Finely synchronized cell case

When MS receives the RADIO BEARER RECONFIGURATION message and

> 1> if the IE "*Timing Advance*"with the new cell is not out of range, i.e. smaller than or equal to the maximum timing advance that can be coded as specified in 3GPP TS 44.004, or

> 1> if the new cell does accept out of range timing advance as indicated in the RADIO BEARER RECONFIGURATION message, the mobile station shall:

>> 2> after having switched to the assigned channels, send the HANDOVER ACCESS message as specified in 3GPP TS 44.160 The transmission of this message is optional if so indicated by the network in the RADIO BEARER RECONFIGURATION message.

The MS shall not transmit the HANDOVER ACCESS message in those cells that support extended TA values if TA value in the new cell is greater than 63 and the RADIO BEARER RECONFIGURATION message indicates that the transmission of the HANDOVER ACCESS messages is optional.

Then the MS shall:

> 1> activate the channels in sending and receiving mode.

If applicable, ciphering is immediately started.

7.18.6.2   Non synchronized cell case

Upon reception of the RADIO BEARER RECONFIGURATION message and after having switched to the assigned channels, the mobile station shall:

> 1> send repeatedly the HANDOVER ACCESS message as specified in 3GPP TS 44.160;

> 1> start timer T3124 at the start point of the timeslot in which the HANDOVER ACCESS message is sent the first time;

1> then, activate the channels in receiving mode; If applicable, deciphering is then immediately started.

Upon receipt of a HANDOVER-ind primitive the GERAN RRC shall:

> 1> set the value of the Timing Advance Value parameter in the PHYSICAL INFO-Req primitive to the timing advance value received from the GERAN MAC layer.

> 1> initiate the transmission of PHYSICAL INFORMATION message by transmitting a PHYSICAL INFO-Req service primitive to the GERAN MAC sublayer.

When the network has the necessary mobile station's RF characteristics it shall send aPHYSICAL INFORMATION message to the mobile station as specified in 3GPP TS 44.160. If applicable, ciphering and deciphering is immediately started

The network shall start timer T3143 immediately after having sent the PHYSICAL INFORMATION message. If this timer times out before the reception of the RADIO BEARER RECONFIGURATION COMPLETE message from the mobile station, the network shall send the PHYSICAL INFORMATION message once more and shall restart timer

T3143. The network shall not send the PHYSICAL INFORMATION message more than N3143 times. The value of T3143 and N3143 is an implementation issue.

At the mobile side, when the MAC layer indicates the reception of a PHYSICAL INFORMATION message, the MS shall:

> 1> stop timer T3124;

> 1> stop sending HANDOVER ACCESS messages;

> 1> activate the physical channels in sending and receiving mode;

If the allocated channel is a DBPSCH/S, the performance of the mobile station must enable the mobile station toaccept a correct PHYSICAL INFORMATION message sent by the network in any block while T3124 is running.

7.18.6.3   Pseudo-synchronized cell case

The details of the use of this procedure are described in 3GPP TS 45.010.

If the RADIO BEARER RECONFIGURATION message is received by the MS and if the IE "*Timing Advance*" and the IE "*Real Time Difference*" are included in the message, then MS shall:

> 1> compute the timing advance to be used with the new cell from the real time difference value given in the RADIO BEARER RECONFIGURATION message.

The mobile station shall switch to the new physical channel and proceed as follows:

> 1> if the "*Timing Advance*" IE is received in the RADIO BEARER RECONFIGURATION; and

> 1> if the mobile station knows that the timing advance with the new cell is not out of range, i.e. smaller or equal to the maximum timing advance that can be coded as specified in 3GPP TS 44.004; or

> 1> if the new cell accepts an out of range timing advance as indicated in the RADIO BEARER RECONFIGURATION message after having switched to the assigned channels, the mobile station shall:

> > 2> send the HANDOVER ACCESS message as specified in 3GPP TS 44.160. The transmission of this message is optional if so indicated by the network in the RADIO BEARER RECONFIGURATION message.

The MS shall not transmit the HANDOVER ACCESS message in those cells that support extended TA values if TA value in new cell is greater than 63 and the RADIO BEARER RECONFIGURATION message indicates that the transmission of the HANDOVER ACCESS messages is optional.Then MS shall:

> 1> activate the channels in sending and receiving mode while sending the HANDOVER ACCESS message.

If applicable, ciphering is immediately started.

7.18.6.4   Pre-synchronized cell case

The details of the use of this procedure are described in 3GPP TS 45.010.

Upon reception of the RADIO BEARER RECONFIGURATION message, the mobile station shall:

> 1> switch to the new channel; and

> 1> send the HANDOVER ACCESS message as specified in 3GPP TS 44.160. The transmission of this message is optional if so indicated by the network in the RADIO BEARER RECONFIGURATION message.

The MS shall not transmit the HANDOVER ACCESS message in those cells that support extended TA values if TA value in new cell is greater than 63 and the RADIO BEARER RECONFIGURATION message indicates that the transmission of the HANDOVER ACCESS messages is optional.Then MS shall activate the channels in sending and receiving mode during the transmission of the HANDOVER ACCESS message.The timing advance value to be used with the new cell is:

> 1> either the value contained in the RADIO BEARER RECONFIGURATION message if the timing advance information element is present; or

1> the default value for pre-synchronized handover as defined in 3GPP TS 45.010, if the timing advance information element is not included in the RADIO BEARER RECONFIGURATION message. The MS may activate the channels in receiving mode while sendingHANDOVER ACCESS message.

If applicable, ciphering is immediately started.

7.18.7   (void)

7.18.8   Link failure and Radio link failure criteria and actions upon link or radio link failure

When a radio link failure is detected at L2, it is notified to RRC as specified in 3GPP TS 44.160.

When a link failure is reported by a given RLC entity to RRC, RRC shall:

1> stop the RLC entity

When a radio link failure occurs signalled by the MAC sublayer or the physical layer (see 3GPP TS 45.008), the MS shall:

1> clear the dedicated physical channel configuration;

1> perform actions as specified for the ongoing procedure;

1> if no procedure is ongoing or no actions are specified for the ongoing procedure:

2> perform a Cell Update procedure according to sub-clause 7.8 using the cause "radio link failure".

7.18.9   Unsupported configuration

The MS should set the variable UNSUPPORTED_CONFIGURATION to TRUE if the received message is not according to the MS capabilities.

7.18.10   Invalid RLC/MAC control message notification

When notification is received of the reception of an invalid RLC/MAC acknowledgement message on DBPSCH, the MS shall:

1> re-establish all RLC entities for the radio bearers currently established on the DBPSCH(s);

1> clear the dedicated physical channel configuration;

1> perform actions as specified for the ongoing procedure;

1> if no procedure is ongoing or no actions are specified for the ongoing procedure:

2> perform a Cell Update procedure according to sub-clause 7.8 using the cause "Invalid RLC/MAC control message"

7.19   Generic actions on receipt and absence of an information element

7.19.1   CN information info

If the IE "*CN Information Info*" is present in a message, the MS shall:

1> if present, forward the content of the IE "*PLMN Identity*" to upper layers;

1> if present, forward the content of the IE "*CN Common GSM-MAP NAS System Information*" to upper layers;

1> if the IE "*CN Domain Related Information*" is present:

    2> forward each occurrence of the IE "*CN Domain Specific GSM-MAP NAS System Info*" together with the IE "*CN Domain Identity*" to upper layers;

    2> if an IE "*CN Domain Specific GSM-MAP NAS System Info*" is not present for a particular CN domain:

        3> indicate to upper layers that no CN system information is available for that CN domain.

7.19.2 Signalling connection release indication

If the IE "*Signalling Connection Release Indication*" is present in a message, the MS shall:

1> if all radio access bearers for the CN domain identified with the value of the IE "*Signalling Connection Release Indication*" would have been released in the variable ESTABLISHED_RABS after processing of the received message:

    2> indicate release of the signalling connection identified with the value of the IE "*Signalling Connection Release Indication*" to the upper layers;

    2> remove the signalling connection identified with the value of the IE "*Signalling Connection Release Indication*" from the variable ESTABLISHED_SIGNALLING_CONNECTIONS;

1> if radio access bearers for the CN domain identified with the value of the IE "*Signalling Connection Release Indication*" would remain in the variable ESTABLISHED_RABS after processing of the received message:

    2> set the variable INVALID_CONFIGURATION to TRUE.

7.19.3 GERAN mobility information elements

7.19.3.1 GRA identity

The MS shall:

1> if the IE "*GRA Identity*" is included in a received message:

    2> if the IE "*RRC State Indicator*" is included and set to "GRA_PCH":

        3> store this GRA identity in the variable GRA_IDENTITY;

        3> after sending a possible message to GERAN and entering GRA_PCH state as specified elsewhere, read packet system information 16 in the selected cell;

        3> if the stored GRA identity in the variable GRA_IDENTITY is not included in the list of GRA identities in System Information 16 in the selected cell, the list of GRA identities in system information 16 is empty or if the packet system information 16 can not be found, a confirmation error of GRA identity list has occurred:

            4> if no GRA Update procedure is ongoing:

                5> initiate a GRA Update procedure after entering GRA_PCH state; see sub-clause 7.8;

            4> if a GRA Update procedure is ongoing:

                5> take actions as specified in sub-clause 7.8;

1> if the IE "*GRA Identity*" is not included in a received message:

    2> the IE "*RRC State Indicator*" is included and set to " GRA_PCH":

        3> after sending a possible message to GERAN and entering GRA_PCH state as specified elsewhere, read System Information 16 in the selected cell;

        3> if System Information 16 in the selected cell contains a single GRA identity:

4> store this GRA identity in the variable GRA_IDENTITY;

3> if Packet system information 16 of the selected cell contains more than one GRA identity, the list of GRA identities in packet system information 16 is empty or if the system information 16 can not be found, a confirmation error of GRA identity list has occurred:

4> if no GRA Update procedure is ongoing:

5> initiate a GRA Update procedure after entering RRC-GRA_PCH state see sublsub-clause 7.8;

4> if a GRA Update procedure is ongoing:

5> take actions as specified in sub-clause 7.8.

7.19.3.2 Mapping info

If the IE "*Mapping Info*" is received, the MS shall in this version of the specification:

1> ignore the contents of this IE.

7.19.4 MS information elements

7.19.4.1 Activation time

If the MS receives a message containing the IE "*Activation time*" with a value other than 0, the MS shall:

1> select the beginning of the FN (TDMA Frame Number) indicated by the IE "*Activation Time*" as the activation time T.

1> at the activation time T:

2> for a physical channel reconfiguration caused by the received message:

3> release the physical channel configuration, which was present before T;

3> initiate the establishment of the physical channel configuration as specified for the physical channel information elements in the received message as specified elsewhere.

2> for actions, other than a physical channel reconfiguration, caused by the received message:

3> perform the actions for the information elements in the received message as specified elsewhere.

If the MS receives a message containing the IE "*Activation time*" with the value 0 meaning "Now", the MS shall:

1> as an immediate reaction to the reception of the message (see 3GPP TS 45.010 for timing constraints):

2> perform the actions for the information elements in the received message as specified elsewhere,

NOTE: If the MS was in RRC-Idle mode or RRC- CELL_Shared state upon reception of the message, and the value of the IE "*Activation Time*" in the received message is different from "Now", regardless of the state the MS enters after reception of the message the MS behaviour is unspecified.

7.19.4.2 DRX parameters

7.19.4.2.1 CN domain specific DRX cycle length coefficients

The GERAN shall broadcast the CN domain specific DRX cycle length coefficients parameter on PBCCH. The MS may be attached to different CN domains with different CN domain specific DRX cycle lengths. The MS shall store each CN domain specific DRX cycle length for each CN domain the MS is attached to.

For the CS CN domain, the CS CN specific DRX cycle length coefficient shall be updated locally in the MS using information given in system information.

For the PS CN domain, the PS CN specific DRX cycle length coefficient may be updated after indication by the MS to the PS CN in NAS procedure. If no specific value is indicated, the MS and PS CN shall use the DRX cycle length given for PS CN domain in system information.

NOTE: Broadcast of CN domain specific DRX cycle length coefficients shall be introduced with System Information broadcasting for GERAN *Iu mode*.

7.19.4.2.2   GERAN DRX cycle length coefficient

In RRC-Connected mode, GERAN shall determine and it may send its GERAN specific DRX cycle length coefficients parameter to a given MS in the following RRC messages:

- CELL UPDATE CONFIRM

- GRA UPDATE CONFIRM

- RADIO BEARER RECONFIGURATION

- RADIO BEARER RELEASE

- RADIO BEARER SETUP

- RRC CONNECTION SETUP

7.19.4.2.3   Paging Group

In DRX mode, the MS shall compute its paging group and the GERAN shall compute a paging group listened by the MS (see 3GPP TS 23.122) using the SPLIT_PG_CYCLE parameter obtained with the following equation:

$$\text{SPLIT\_PG\_CYCLE} = 3 \times 2^{(9-\text{"main DRX cycle length coefficient"})}$$

In RRC-Idle mode, the "main DRX cycle length coefficient" is:

1> for the MS, the smallest of the stored CN domain specific DRX cycle length coefficients corresponding to the CN domains to which the MS is attached;

1> for the GERAN, the smallest of:

2> the broadcast CN domain specific DRX cycle length coefficients corresponding to the CN domains to which the MS is attached, and

2> the DRX cycle length coefficient, if indicated in the PAGING message received via RANAP.

In RRC-Connected mode, the "main DRX cycle length coefficient" is:

1> for the MS, the smallest of:

2> the stored CN domain specific DRX cycle length coefficients corresponding to the CN domains to which the MS is attached, and,

2> the GERAN DRX cycle length coefficient, if previously received.

1> for the GERAN, the smallest of:

2> the broadcast CN domain specific DRX cycle length coefficients corresponding to the CN domains to which the MS is attached,

2> the GERAN DRX cycle length coefficient, if previously received, and

2> the DRX cycle length coefficient, if indicated in the PAGING message received via RANAP.

The paging group is indicated to lower layers via primitives.

NOTE: Primitives between RLC/MAC and RRC shall be described in 3GPP TS 44.160.

7.19.4.3 Generic state transition rules depending on received information elements

The IE "*RRC State Indicator*" indicates the state the MS shall enter. The MS shall enter the state indicated by the IE "*RRC State Indicator*" even if the received message includes other IEs relevant only for states other than indicated by the IE "*RRC State Indicator*". E.g. if the RRC state indicator is set to "RRC-Cell_Shared" while other IEs provide information about a configuration including dedicated channels, the MS shall enter RRC-Cell_Shared state. If however the MS has no information about the configuration corresponding to the state indicated by the IE "*RRC State Indicator*", it shall consider the requested configuration as invalid.

The MS shall, if the IE "*RRC State Indicator*" in the received message has the value:

   1> "RRC-Cell_Shared":

      2> enter RRC-Cell_Shared state as dictated by the procedure governing the message received;

   1> "RRC-CELL_Dedicated":

      2> if neither DBPSCH is assigned in the message nor is the MS is RRCRRC-CELL_Dedicated state:

         3> set the variable INVALID_CONFIGURATION to TRUE;

      2> else:

         3> enter RRC-Cell_Dedicated state as dictated by the procedure governing the message received;

   1> "RRC-GRA_PCH":

      2> if the received message is RRC CONNECTION SETUP and IE "*RRC State Indicator*" is set to RRC-GRA_PCH:

         3> set the variable INVALID_CONFIGURATION to TRUE;

      2> else:

         3> enter RRC-GRA_PCH state as dictated by the procedure governing the message received.

7.19.4.4 Ciphering mode info

The IE "*Ciphering Mode Info*" defines the new ciphering configuration. At any given time, the MS needs to store at most two different ciphering configurations (keyset and algorithm) per CN domain at any given time in total for all radio bearers, and three configurations in total for all signalling radio bearers.

If the IE "*Ciphering Mode Info*" is present and if the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to TRUE, the MS shall:

   1> ignore this attempt to change the ciphering configuration; and

   1> set the variable INCOMPATIBLE_SECURITY_CONFIGURATION to TRUE.

If the IE "*Ciphering Mode Info*" is present and if the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to FALSE, the MS shall:

   1> if none of the IE "*Status*" in the variable CIPHERING STATUS has the value "Started", and this IE "*Ciphering Mode Info*" was included in a message that is not the message SECURITY MODE COMMAND message; or

   1> if the IE "*Ciphering Mode Info*" was received in the message SECURITY MODE COMMAND message and there does not exist exactly one ciphering activation time in the IE "*Radio Bearer Downlink Ciphering Activation Time Info*" for each established RLC-AM and RLC-UM radio bearers included in the IE "*RB Information*" in the ESTABLISHED_RABS for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN; or

   1> if the IE "*Ciphering Mode Info*" was received in the message SECURITY MODE COMMAND message and the IE "*Ciphering Activation Time for DBPSCH*" is not included in the message, and there exist radio bearers using RLC-TM according to the IE "*RB Information*" in the IE "ESTABLISHED_RABS" for the CN domain as indicated in the variable LATEST_CONFIGURED_CN_DOMAIN; or

1> if the IE "*Ciphering Mode Info*" was received in the message SECURITY MODE COMMAND message and there does not exist excactly one ciphering activation time in the IE "*Radio Bearer Downlink Ciphering Activation Time Info*" for each established signalling radio bearer included in the IE "*Signalling Radio Bearer Information*" in the ESTABLISHED-RABS;

2> ignore this attempt to change the ciphering configuration;

2> set the variable INVALID_CONFIGURATION to TRUE;

2> perform the actions as specified in sub-clause 7.16.1.2.6;

If the IE "*Ciphering Mode Info*" is present and if the IE "*Reconfiguration*" in the variable CIPHERING_STATUS is set to FALSE, the MS shall:

1> set the IE "*Reconfiguration*" in the variable CIPHERING_STATUS to TRUE;

1> set the IE "*Status*" in the variable CIPHERING_STATUS of the the CN domains for which the IE "*Status*" of the variable SECURITY_MODIFICATION is set to "Affected" to "Started";

1> apply the new ciphering configuration in the lower layers for all RBs that belong to a CN domain for which the IE "*Status*" of the variable SECURITY_MODIFICATION is set to "Affected" and all signalling radio bearers:

2> using the ciphering algorithm (UEA (see 3GPP TS 33.102)) indicated by the IE "*Ciphering Algorithm*" as part of the new ciphering configuration;

2> for each radio bearer that belongs to a CN domain for which the IE "*Status*" of the variable SECURITY_MODIFICATION is set to "Affected" and all signalling radio bearers:

3> use the value of the IE "*RB Identity*" in the variable ESTABLISHED_RABS minus one as the value of BEARER (see 3GPP TS 33.102) in the ciphering algorithm;

1> for the downlink and the uplink, the new ciphering configuration shall be applied as follows:

2> if the ciphering configuration for a radio bearer or signalling radio bearer from a previously received SECURITY MODE COMMAND message has not yet been applied because of the corresponding activaton times not having been reached and the current received message includes the IE "*Downlink Counter Synchronization Info*" or the current received message is a RADIO BEARER RECONFIGURATION message and includes the IE "*New G-RNTI*":

3> if the previous SECURITY MODE COMMAND message was received due to new keys being received:

4> consider the new ciphering configuration to include the received new keys;

3> else if the previous SECURITY MODE COMMAND caused a change in LATEST_CONFIGURED_CN_DOMAIN

4> consider the new ciphering configuration to include the keys associated with the LATEST_CONFIGURED_CN_DOMAIN;

2> apply the new ciphering configuration in uplink and downlink immediately following RLC re-establishment.

2> if the IE "*Ciphering Activation Time for DBPSCH*" is present in the IE "*Ciphering Mode Info*" and the MS was in Cell_Dedicated state prior to this procedure:

3> for radio bearers using RLC-TM:

4> apply the old ciphering configuration for the TDMA frame number less than the number indicated by the IE "*COUNT-C activation time*" in the IE "*Ciphering Activation Time for DBPSCH*";

4> apply the new ciphering configuration for the TDMA frame number greater than or equal to the number indicated in IE "*Ciphering Activation Time for DBPSCH*";

2> if the IE "*Radio Bearer Downlink Ciphering Activation Time Info*" is present:

3> apply the following procedure for each radio bearer and signalling radio bearers using RLC-AM or RLC-UM indicated by the IE "*RB Identity*":

4> suspend uplink transmission on the radio bearer or the signalling radio bearer (except for the SRB where the response message is transmitted) according to the following:

5> do not transmit RLC PDUs with sequence number greater than or equal to the uplink activation time, where the uplink activation time is seclected according to the rules below;

4> select an "RLC sequence number" at which (activation) time the new ciphering configuration shall be applied in uplink for that radio bearer according to the following:

5> consider an ciphering activation time in uplink to be pending until the RLC sequence number of the next RLC PDU to be transmitted for the first time is equal to or larger than the selected activation time;

5> for each radio bearer and signalling radio bearer that has no pending ciphering activation time in the uplink as set by a previous procedure changing the security configuration:

6> set a suitable value that would ensure a minimised delay in the change to the latest ciphering configuration;

5> for each radio bearer and signalling radio bearer that has a pending ciphering activation time in uplink as set by a previous procedure changing the security configuration:

6> for radio bearers and signalling radio bearers except SRB2, set the same value as the pending ciphering activation time;

4> store the selected "RLC send sequence number" for that radio bearer in the entry for the radio bearer in the variable RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO;

4> switch to the new ciphering configuration according to the following:

5> use the old ciphering configuration for the transmitted and received RLC PDUs with RLC sequence number smaller than the corresponding RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" sent to GERAN and the received IE "*Radio Bearer Downlink Ciphering Activation Time Info*" received from GERAN, respectively;

5> use the new ciphering configuration for the transmitted and received RLC PDUs with RLC sequence numbers greater than or equal to the corresponding RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" sent to GERAN and in the received IE "*Radio Bearer Downlink Ciphering Activation Time Info*" received from GERAN, respectively;

5> for a radio bearer using RLC-AM, when the RLC sequence number indicated in the IE "*Radio Bearer Downlink Ciphering Activation Time Info*" falls below the RLC receiving window and the RLC sequence number indicated in the IE "*Radio Bearer Uplink Ciphering Activation Time Info*" falls below the RLC transmission window, the MS may release the old ciphering configuration for that radio bearer;

5> if an RLC reset or re-establishment occurs before the activation time for the new ciphering configuration has been reached, ignore the activation time and apply the new ciphering configuration both in uplink and downlink immediately after the RLC reset or RLC re-establishment.

If the IE "*Ciphering Mode Info*" is not present, the MS shall:

1> for the downlink and the uplink, apply the ciphering configuration as follows:

2> if the ciphering configuration for a AM or UM radio bearer or signalling radio bearer from a previously received SECURITY MODE COMMAND has not yet been applied because of the corresponding activation times not having been reached and the current received message includes the IE "*DL Counter Synch Info*" or the current received message is a RADIO BEARER RECONFIGURATION message and includes the IE "*New G-RNTI*":

3> if the previous SECURITY MODE COMMAND was received due to new keys being received:

4> consider the ciphering configuration to include the received new keys;

> > 3> else if the previous SECURITY MODE COMMAND caused a change in LATEST_CONFIGURED_CN_DOMAIN:

> > > 4> consider the ciphering configuration to include the keys associated with the LATEST_CONFIGURED_CN_DOMAIN;

> > 3> apply the ciphering configuration in uplink and downlink immediately following RLC re-establishment;

> 2> else:

> > 3> not change the ciphering configuration.

7.19.4.5 Integrity protection mode info

7.19.4.5.1 General

The IE "*Integrity Protection Mode Info"* defines the new integrity protection configuration. At any given time, the MS needs to store at most three different integrity protection configurations (keysets) in total for all signalling radio bearers for all CN domains.

If the IE "*Integrity Protection Mode Info*" is present and if the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to TRUE, the MS shall:

> 1> ignore this second attempt to change the integrity protection configuration; and

> 1> set the variable INCOMPATIBLE_SECURITY_RECONFIGURATION to TRUE.

If IE "*Integrity Protection Mode Command*" has the value "Start" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Not started", and the IE "*Integrity Protection Mode Command Info*" was not included in the message SECURITY MODE COMMAND message; or

If IE "*Integrity Protection Mode Command*" has the value "Start" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Not started", and the IE "*Integrity Protection Mode Info*" was included in the message SECURITY MODE COMMAND message, and the IE "*Integrity Protection Algorithm*" is not included; or

If the IE "*Integrity Protection Mode Command*" has the value "Modify" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Not Started"; or

If IE "*Integrity Protection Mode Command*" has the value "Start" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Started", and the IE "Integrity protection mode command info" was included in the message SECURITY MODE COMMAND message; or

If the IE "*Integrity Protection Mode Command*" has the value "Modify" and there does not exist exactly one integrity protection activation time in the IE "*Downlink Integrity Protection Activation Info*" for each established signalling radio bearer included in the IE "*Signalling Radio Bearer Information*" in the variable ESTABLISHED_RABS; or

If IE "*Integrity Protection Mode Command*" has the value "Modify" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Started", and the IE "*Integrity Protection Mode Info*" was not included in the message SECURITY MODE COMMAND message:

the MS shall:

> 1> ignore this attempt to change the integrity protection configuration; and

> 1> set the variable INVALID_CONFIGURATION to TRUE.

If the IE "Integrity protection mode info" is not present, the MS shall:

1> not change the integrity protection configuration.If the IE "*Integrity Protection Mode Info*" is present and if the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO is set to FALSE, the MS shall:

> 1> set the IE "*Reconfiguration*" in the variable INTEGRITY_PROTECTION_INFO to TRUE;

> 1> perform the actions in accordance with sub-clauses 7.19.4.5.2, 7.19.4.5.3 and 7.19.4.5.4.;

7.19.4.5.2 Initialization of Integrity ProtectionThe MS shall:

1> if IE "*Integrity Protection Mode Command*" has the value "start" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Not started", and this IE was included in the message SECURITY_MODE_COMMAND:

> 2> initialise the information for all signalling radio bearers in the variable INTEGRITY_PROTECTION_INFO according to the following:

>> 3> set the IE "*Uplink RRC Message Sequence Number*" in the variable INTEGRITY_PROTECTION_INFO to zero;

>> 3> do not set the IE "*Downlink RRC Message Sequence Number*" in the variable INTEGRITY_PROTECTION_INFO;

>> 3> set the variable INTEGRITY_PROTECTION_ACTIVATION_INFO to zero for each signalling radio berer in the variable ESTABLISHED_RABS .

NOTE: The IE "*Integrity Protection Activation Info*" and "*RRC Message Sequence Number*"included in the IE "*Integrity Check Info*" in the transmitted message do not have identical values, but integrity protection is applied from the first transmitted message.

> 2> set the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO to the value "Started";

> 2> perform integrity protection on the received message, applying the new integrity protection configuration, as described in sub-clause 7.18.5 by:

>> 3> using the algorithm (UIA (see 3GPP TS 33.102)) indicated by the IE "*Integrity Protection Algorithm*" contained in the IE "*Integrity Protection Mode Info*";

>> 3> using the IE "*Integrity Protection Initialisation Number*", contained in the IE "*Integrity Protection Mode Info*" as the value of FRESH (see 3GPP TS 33.102);

> 2> start applying the new integrity protection configuration in the downlink for each signalling radio bearer in the IE "*Established RABS*" except SRB2 at the next received RRC message;

> 2> start applying the new integrity protection configuration in the downlink for signalling radio bearer SRB2 from and including the received SECURITY MODE COMMAND message;

> 2> start applying the new integrity protection configuration in the uplink for signalling radio bearer SRB2 from and including the transmitted SECURITY MODE COMPLETE message;

> 2> start applying the new integrity protection configuration in the uplink for signalling radio bearers other than SRB2 at the uplink activation time included in the IE "*Uplink Integrity Protection Activation Info*".

7.19.4.5.3 Integrity Protection Re-configuration for SBSS Relocation

The MS shall:

1> if IE "*Integrity Protection Mode Command*" has the value "start" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Started" and this IE was not included SECURITY MODE COMMAND:

NOTE: This case is used in SBSS relocation

> 2> perform integrity protection on the received message, applying the new integrity protection configuration, as described in sub-clause 7.18.5 by:

>> 3> using the algorithm (UIA (see 3GPP TS 33.102)) indicated by the IE "*Integrity Protection Algorithm*" contained in the IE "*Integrity Protection Mode Info*";

>> 3> using the IE "*Integrity Protection Initialisation Number*", contained in the IE "*Integrity Protection Mode Info*" as the value of FRESH (see 3GPP TS 33.102);

> 2> let SRBm be the signalling radio bearer where the reconfiguration message was received and let SRBn be the signalling radio bearer where the response message is transmitted;

2> for the downlink, for each signalling radio bearer, if for the signalling radio bearer, a security configuration triggered by a previous SECURITY MODE COMMAND message has not yet been applied, due to the activation time for the signalling radio bearer not having been reached:

3> set "Down link RRC Message sequence number" for this signalling radio bearer in the variable INTEGRITY_PROTECTION_INFO to (activation time - 1), where the activation time is the corresponding activation time for this signalling radio bearer;:

3> if the previous SECURITY MODE COMMAND message was received due to new keys being received:

4> consider the new integrity protectioon configuration to include the received new keys;

3> else if the previous SECURITY MODE COMMAND caused a change in LATEST_CONFIGURED_CN_DOMAIN:

4> consider the new Integrity Protection configuration to include the keys associated with the LATEST_CONFIGURED_CN_DOMAIN associated with the previously received SECURITY MODE COMMAND message;

2> start applying the new integrity protection configuration in the downlink for each signalling radio bearer in the variable ESTABLISHED_RABS except RBm at the next received RRC message for the corresponding signalling radio bearer;

2> start applying the new integrity protection configuration in the downlink for signalling radio bearer RBm from and including the received configuration message;

2> start applying the new integrity protection configuration in the uplink for signalling radio bearer RBn from and including the transmitted response message;

2> start applying the new integrity protection configuration in the uplink for signalling radio bearers other than RBn from the first message onwards.

7.19.4.5.4 Integrity Protection modification in case of new keys or initialisation of signalling connection

The MS shall:

1> if IE "*Integrity Protection Mode Command*" has the value "modify" and the IE "*Status*" in the variable INTEGRITY_PROTECTION_INFO has the value "Started" and this IE was included SECURITY_MODE_COMMAND:

2> store the (oldest currently used) integrity protection configuration until activation times have elapsed for the new integrity protection configuration to be applied on all signalling radio bearers;

2> start applying the new integrity protection configuration in the downlink at the RRC sequence number, for each radio bearer n, indicated by the entry for radio bearer n in the "RRC message sequence number list" in the IE "*Downlink Integrity Protection Activation Info*", included in the IE "*Integrity Protection Mode Info*";

2> perform integrity protection on the received message, applying the new integrity protection configuration, as described in sub-clause 7.18.5;

3> if present, use the algorithm indicated by the IE "*Integrity Protection Algorithm*" (UIA (see 3GPP TS 33.102));

2> set the content of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO according to the following:

3> for each established signalling radio bearer, stored in the variable ESTABLISHED_RABS:

4> select a value of the RRC sequence number at which (activation) time the new integrity protection configuration shall be applied in uplink for that signalling radio bearer according to the following:

5> for each signalling radio bearer:

6> set the activation time for the new integrity protection configuration to the next RRC SN;

> 4> prohibit the transmission of RRC messages on all signalling radio bearers, except for SRB2, with RRC SN greater than or equal to the value in the "RRC message sequence number list" for the signalling radio bearer in the IE "*Uplink Integrity Protection Activation Info*" of the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

> 2> start applying the new integrity protection configuration in the uplink at the RRC sequence number, for each SRBn, except for signalling radio bearer SRB2, indicated by the entry for radio bearer n in the "RRC message sequence number list" in the IE "*Uplink Integrity Protection Activation Info*", included in the variable INTEGRITY_PROTECTION_ACTIVATION_INFO;

> 2> start applying the new integrity protection configuration in the uplink at the RRC sequence number for signalling radio bearer SRB2, as specified for the procedure initiating the integrity protection reconfiguration;

> 2> start applying the new integrity protection configuration in the downlink at the RRC sequence number, for each SRBn, except for signalling radio bearer SRB2, indicated by the entry for signalling radio bearer n in the "*RRC Message Sequence Number List*" in the IE "*Downlink Integrity Protection Activation Info*".

> NOTE: For signalling radio bearers that have a pending activation time as set for integrity protection by a previous procedure changing the integrity protection configuration, the GERAN shall set this value in IE "*Downlink Integrity Protection Activation Info*".

> 2> start applying the new integrity protection configuration in the downlink at the RRC sequence number for signalling radio bearer SRB2, as specified for the procedure initiating the integrity protection reconfiguration.

7.19.4.6 Integrity check info

If the IE "Integrity check info" is present the MS shall:

> 1> act as described in sub-clause 7.18.4.1 .

7.19.4.7 New G-RNTI

If the IE "*New G-RNTI*" is included in a received message, the MS shall:

> 1> store the value in the variable G_RNTI, replacing any old stored value.

7.19.4.8 RRC Transaction Identifier

The IE "*RRC Transaction Identifier*" may be used, together with the message type, for identification of an invocation of a downlink procedure (transaction). The MS behaviour for accepting or rejecting transactions based on the message type and the IE "*RRC Transaction Identifier*" is specified below.

If the IE "*RRC Transaction Identifier*" is included in a received message, the MS shall perform the actions below. The MS shall:

If the received message is any of the messages:

> - RADIO BEARER SETUP; or

> - RADIO BEARER RECONFIGURATION; or

> - RADIO BEARER RELEASE;

the MS shall:

> 1> if the variable ORDERED_RECONFIGURATION is set to FALSE; and

> 1> if the variable CELL_UPDATE_STARTED is set to FALSE; and

> 1> if the received message does not contain a protocol error according to clause 8 and the variable PROTOCOL_ERROR_REJECT is set to FALSE:

> > 2> accept the transaction; and

    2> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Accepted transactions" in the variable TRANSACTIONS;

1> else:

    2> if the variable ORDERED_RECONFIGURATION is set to TRUE; or

    2> if the variable CELL_UPDATE_STARTED is set to TRUE; or

    2> if the received message contains a protocol error according to clause 8 causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE:

        3> if the IE "*RRC Transaction Identifier*" of the received message is identical to the "RRC Transaction Identifier" stored for the same "Message Type" as the received message in the table "Accepted transactions" in the variable TRANSACTIONS:

           4> ignore the transaction; and

           4> continue with any ongoing processes and procedures as the message was not received;

           4> and end the procedure;

        3> else:

           4> reject the transaction; and

           4> if the IE "*Message Type*" of the received message is not present in the table "Rejected transactions" in the variable TRANSACTIONS:

               5> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS.

Else:

If the received message is any of the messages:

- RRC CONNECTION SETUP; or

- CELL UPDATE CONFIRM; or

- GRA UPDATE CONFIRM;

the MS shall:

1> if the IE "*Message Type*" of the received message is not present in the table "Accepted transactions" in the variable TRANSACTIONS:

    2> if the received message does not contain a protocol error according to clause 8 and the variable PROTOCOL_ERROR_REJECT is set to FALSE:

        3> accept the transaction; and

        3> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Accepted transactions" in the variable TRANSACTIONS;

    2> else:

    2> if the received message contains a protocol error according to clause 8 causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE:

        3> reject the transaction; and

        3> if the IE "*Message Type*" of the received message is not present in the table "Rejected transactions" in the variable TRANSACTIONS:

        3> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS.

1> else:

1> if the IE "*Message Type*" of the received message is present in the table "Accepted transactions" in the variable TRANSACTIONS:

> 2> if the IE "*RRC Transaction Identifier*" of the received message is identical to the "RRC Transaction Identifier" stored for the "Message Type" in the table "Accepted transactions" in the variable TRANSACTIONS:

> > 3> ignore the transaction; and

> > 3> continue with any ongoing processes and procedures as the message was not received; and

> > 3> end the procedure;

> 2> else:

> 2> if the IE "*RRC Transaction Identifier*" of the received message is different from the "RRC transaction identifier" stored for the "Message Type" in the table "Accepted transactions" in the variable TRANSACTIONS:

> > 3> if the received message does not contain a protocol error according to clause 8 and the variable PROTOCOL_ERROR_REJECT is set to FALSE:

> > > 4> ignore the once accepted transaction and instead accept the new transaction; and

> > > 4> store the IE "*Message Type"* and the IE "*RRC Transaction Identifier*" of the received message in the table "Accepted transactions" in the variable TRANSACTIONS, replacing the previous entry;

> NOTE 1: The MS is expected to process the first RRC CONNECTION SETUP/CELL UPDATE CONFIRM/GRA UPDATE COMFIRM message that it receives after transmitting an RRC CONNECTION REQUEST/CELL UPDATE/GRA UPDATE message. If the MS receives further RRC CONNECTION SETUP/CELL UPDATE CONFIRM/GRA UPDATE COMFIRM messages without having transmitted another RRC CONNECTION REQUEST/CELL UPDATE/GRA UPDATE message, the MS is not required to process these messages.

> > 3> else:

> > 3> if the received message contains a protocol error according to clause 8 causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE:

> > > 4> reject the transaction; and

> > > 4> if the IE "*Message Type*" of the received message is not present in the table "Rejected transactions" in the variable TRANSACTIONS:

> > > > 5> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS.

Else:

If the received message is any other message, the MS shall:

1> if the IE "*Message Type*" of the received message is not present in the table "Accepted transactions" in the variable TRANSACTIONS:

> 2> if the received message does not contain a protocol error according to clause 8 and the variable PROTOCOL_ERROR_REJECT is set to FALSE:

> > 3> accept the transaction; and

> > 3> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Accepted transactions" in the variable TRANSACTIONS;

> 2> else:

2> if the received message contains a protocol error according to clause 8 causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE:

   3> reject the transaction; and

   3> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS.

1> else:

1> if the IE "*Message Type*" of the received message is present in the table "Accepted transactions" in the variable TRANSACTIONS:

  2> if the IE "*RRC Transaction Identifier*" of the received message is identical to the "RRC transaction identifier" stored in any entry for the "Message Type" in the table "Accepted transactions" in the variable TRANSACTIONS:

   3> ignore the transaction; and

   3> continue with any ongoing processes and procedures as the message was not received; and

   3> end the procedure;

  2> else:

  2> if the IE "*RRC Transaction Identifier*" of the received message is different from the "RRC transaction identifier" stored in all entries for the "Message Type" in the table "Accepted transactions" in the variable TRANSACTIONS:

   3> if the received message does not contain a protocol error according to clause 9 and the variable PROTOCOL_ERROR_REJECT is set to FALSE:

    4> accept the additional transaction; and

    4> store the IE "*Message Type*" and the IE "*RRC Transaction Identifier*" of the received message in the table "Accepted transactions" in the variable TRANSACTIONS, in addition to the already existing entries;

   3> else:

   3> if the received message contains a protocol error according to clause 8 causing the variable PROTOCOL_ERROR_REJECT to be set to TRUE:

    4> reject the transaction; and

    4> store the IE "*Message Type"* and the IE "*RRC Transaction Identifier*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS.

7.19.4.9   Capability Update Requirement

If the IE "*Capability Update Requirement*" is included the MS shall:

1> if the IE "*MS GERAN A/Gb mode Radio Acces Capability Update Requirement*" is set to "required":

  2> if the MS supports the GERAN *A/Gb mode*:

   3> include its GERAN *A/Gb mode* radio access capability in the IE "*MS GERAN A/Gb mode Radio Access Capability* " of the variable MS_CAPABILITY_REQUESTED;

1> if one or more of the 3 the IEs "*UE Radio Access FDD Capability Update Requirement*" or "*UE Radio Access 3,84 Mcps TDD Capability Update Requirement*" or "*UE Radio Access 1,28 Mcps TDD Capability Update Requirement*" is set to "required":

  2> include its UE UTRAN Radio Access Capability in the IE "*UE UTRAN Radio Access Capability*" and its UE UTRAN Radio Access Capability Extension if present in the IE "*UE UTRAN Radio Access Capability Extension*" of the variable MS_CAPABILITY_REQUESTED as specified in 3GPP TS 25.331.

1> if the IE "*UE CDMA2000 Radio Acces Capability Update Requirement List*" is set to "required":

    2> if the MS supports the CDMA2000 RAT:

        3> include its UE CDMA2000 radio acces capability in the IE "*UE CDMA2000 Radio Acces Capability*" of the variable MS_CAPABILITY_REQUESTED

If the IE "*Capability Update Requirement*" is not present, the MS shall:

1> assume no capabilities were required and act in accordance with the above.

7.19.5 Radio bearer information elements

7.19.5.1 Signalling RB information to setup list

If the IE "*Signalling RB Information To Setup List*" is included the MS shall:

1> use the same START value to initialise the COUNT-C and COUNT-I variables for all the signalling radio bearers in the list;

1> if the IE "*Signalling RB Information To Setup List*" was included in the RADIO BEARER SETUP message:

    2> if the variable "LATEST_CONFIGURED_CN_DOMAIN" has been initialised:

        3> calculate the START value only once during this procedure according to sub-clause 7.18.4 for the CN domain indicated in the variable "LATEST_CONFIGURED_CN_DOMAIN";

        3> store the calculated START value in the variable START_VALUE_TO_TRANSMIT;

1> for each occurrence of the IE "*Signalling RB Information to Setup*":

    2> use the value of the IE "*RB Identity"* as the identity of the signalling radio bearer to setup;

    2> if the signalling radio bearer identified with the IE "*RB Identity*" does not exist in the variable ESTABLISHED_RABS:

        3> create a new entry for the signalling radio bearer in the variable ESTABLISHED_RABS;

    2> if the variable LATEST_CONFIGURED_CN_DOMAIN has been initialised and the value "Status" of the variable "INTEGRITY_PROTECTION_INFO" of the CN domain stored in this variable is "Started":

        3> initialise the 20 MSB of the hyper frame number component of COUNT-I for this signalling radio bearer with the START value in the variable START_VALUE_TO_TRANSMIT

        3> set the remaining LSB of the hyper frame number component of COUNT-I for this signalling radio bearer to zero;

        3> for this signalling radio bearer, set the IE "*Uplink RRC Message Sequence Number*" in the variable INTEGRITY_PROTECTION_INFO to zero.

        3> start performing integrity protection according to sub-clause 7.18.5.1 and 7.18.5.2;

1> apply a default value of the IE "*RB Identity*" equal to 1 for the first IE "*Signalling RB Information To Setup*"; and

1> increase the default value by 1 for each occurrence.

7.19.5.2 RAB Information for Setup

If the IE "*RAB Information For Setup*" is included, the procedure is used to establish radio bearers belonging to a radio access bearer, and the MS shall:

1> if several IEs "*RAB Information For Setup*" are included and the included IEs "CN domain identity" in the IE "*RAB Info*" does not all have the same value:

    2> set the variable INVALID_CONFIGURATION to TRUE;

1> if the radio access bearer identified with the IE "*RAB Info*" does not exist in the variable ESTABLISHED_RABS:

    2> create a new entry for the radio access bearer in the variable ESTABLISHED_RABS;

    2> store the content of the IE "*RAB Info*" in the entry for the radio access bearer in the variable ESTABLISHED_RABS;

    2> indicate the establishment of the radio access bearer to the upper layer entity using the IE "CN *Domain Identity*", forwarding the content of the IE "*RAB Identity*";

    2> calculate the START value only once during this procedure (the same START value shall be used on all new radio bearers created for this radio access bearer) according to sub-clause 7.18 for the CN domain as indicated in the IE "*CN Domain Identity*" in the IE "*RAB Info*" part of the IE "*RAB Information To Setup*";

    2> store the calculated START value in the variable START_VALUE_TO_TRANSMIT;

1> for each radio bearer in the IE "*RB Information To Setup*":

    2> if the radio bearer identified with the IE "*RB Identity*" does not exist in the variable ESTABLISHED_RABS for another radio access bearer than the one identified with the IE "*RAB Info*":

        3> perform the actions specified in sub-clause 7.19;

        3> store information about the new radio bearer in the entry for the radio access bearer identified by "RAB info" in the variable ESTABLISHED_RABS;

    2> if the radio bearer identified with the IE "*RB Identity*" already exists in the variable ESTABLISHED_RABS for another radio access bearer than the one identified with the IE "*RAB Info*":

        3> set the variable INVALID_CONFIGURATION to TRUE.

7.19.5.3 RAB Information to Reconfigure

If the IE "*RAB Information to Reconfigure*" is included then the MS shall:

1> if the entry for the radio access bearer identified by the IE "*CN Domain Identity*" together with the IE "*RAB Identity*" in the variable ESTABLISHED_RABS already exists:

    2> perform the action for the IE "*NAS Synchronization Indicator*", according to sub-clause 7.19.13;

1> else:

    2> set the variable INVALID_CONFIGURATION to TRUE.

7.19.5.4 RB information to setup

If the IE "*RB Information To Setup*" is included, the MS shall apply the following actions on the radio bearer identified with the value of the IE "RB identity". The MS shall:

1> use the same START value to initialise the hyper frame number components of COUNT-C variables for all the new radio bearers to setup;

1> perform the actions for the IE "*PDCP Info*", if present, according to sub-clause 7.19.5.10, applied for the radio bearer;

1> perform the actions for the IE "*RLC Info*", according to sub-clause 7.19.5.9, applied for the radio bearer;

1> if IE "*Physical Channel Configuration*" is included

    2> perform the actions as specified in sub-clause 7.19.5.14 applied for the radio bearer;

1> if the IE "*Downlink RLC mode*" either in the IE "*RLC info*" or referenced by the RB identity in the IE "*Same as RB*" is set to "TM RLC":

  2> configure delivery of erroneous SDUs in lower layers according to indication from upper layer as in 3GPP TS 24.008.

1> if the IE "*Uplink RLC mode*" or the IE "*Downlink RLC mode*" either in the IE "*RLC info*" or referenced by the RB identity in the IE "*Same as RB*" is set to "AM RLC" or "UM RLC":

  2> initialise the 20 MSB of the hyper frame number component of COUNT-C for this radio bearer with the START value in the variable START_VALUE_TO_TRANSMIT;

  2> set the remaining LSB of the hyper frame number component of COUNT-C for this radio bearer to zero;

  2> start incrementing the COUNT-C values.

1> if the IE "*Uplink RLC mode*" and the IE "*Downlink RLC mode*" either in the IE "*RLC info*" or referenced by the RB identity in the IE "Same as RB" is set to "TM RLC":

  2> if prior to this procedure there exists no transparent mode radio bearer for the CN domain included in the IE "*CN domain identity*" in the IE "*RAB info*" in the variable ESTABLISHED_RABS and at least one transparent mode radio bearer is included in the IE "*RB information to setup*":

   3> if the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain as indicated in the IE "*CN domain identity*" in the IE "*RAB info*" in the variable ESTABLISHED_RABS is set to "Not Started":

    4> at the activation time as specified in the IE "*Ciphering activation time for DBPSCH*" if included in the IE "*Ciphering mode info*" in the command message or, if this IE is not included, as specified in the IE "*COUNT-C activation time*" included in the response message:

     5> initialise the 20 most significant bits of the hyper frame number component of COUNT-C common for all transparent mode radio bearers of this CN domain with the START value in the variable START_VALUE_TO_TRANSMIT;

     5> set the remaining LSB of the hyper frame number component of COUNT-C to zero;

     5> do not increment the COUNT-C value common for all transparent mode radio bearers for this CN domain;

   4> if the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain as indicated in the IE "*CN domain identity*" in the IE "*RAB info*" in the variable ESTABLISHED_RABS is set to "Not Started":

    4> at the activation time as specified in the IE "*Activation Time*" in the RADIO BEARER SETUP message:

     5> initialise the 20 most significant bits of the hyper frame number component of COUNT-C commom for all transparent mode RLC radio bearer to the value of the latest transmitted START for this CN domain, while not incrementing the value of the HFN component of COUNT-C at each TDMA frame number cycle; and;

     5> set the remaining LSB of the hyper frame number component of COUNT-C to zero;

     5> start to perform ciphering on the radio bearer in lower layers while not incrementing the HFN;

    4> at the activation time as specified in the IE "*Ciphering activation time for DBPSCH*" if included in the IE "*Ciphering mode info*" in the command message or, if this IE is not included, as specified in the IE "COUNT-C activation time" included in the response message:

     5> initialise the 20 most significant bits of the hyper frame number component of COUNT-C common for all transparent mode radio bearers of this CN domain with the START value in the variable START_VALUE_TO_TRANSMIT;

     5> set the remaining LSB of the hyper frame number component of COUNT-C to zero;

     5> start incrementing the COUNT-C value common for all transparent mode radio bearers offor this CN domain as normal, at each TDMA frame number cycle value, i.e. the HFN component is no longer fixed in value but incremented at each TDMA frame number cycle.

3> if the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain as indicated in the IE "*CN Domain Identity*" in the IE "RAB info" in the variable ESTABLISHED_RABS is set to "Not Started":

    4> do not increment the COUNT-C value common for all transparent mode radio bearers for this CN domain.

3> if the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain as indicated in the IE "*CN Domain Identity*" in the IE "*RAB Info*" in the variable ESTABLISHED_RABS is set to " Started":

    4> continue incrementing the COUNT-C value common for all transparent mode radio bearers of this CN domain.

1> if the IE "*Status*" in the variable CIPHERING_STATUS of the CN domain as indicated in the IE "*CN Domain Identity*" in the IE "*RAB Info*" in the variable ESTABLISHED_RABS is set to "Started":

    2> start to perform ciphering on the radio bearer in lower layers, using the value of the IE "*RB Identity*" minus one as the value of BEARER in the ciphering algorithm.

NOTE: The GERAN does not use the IE "*RB Information To Setup*" to setup radio bearers with RB identity in the range 1-4.

7.19.5.5 RB information to be affected

If the IE "RB *Information To Be Affected*" is included, the MS shall apply the actions on the radio bearer identified with the value of the IE "RB *Identity*".

7.19.5.6 RB information to reconfigure

If the IE "*RB Information To Reconfigure*" is included, the MS shall apply the following actions on the radio bearer identified with the value of the IE "*RB Identity*". The MS shall:

1> perform the actions for the IE "*PDCP Info*", if present, according to sub-clause 7.19.5.10, applied for the radio bearer;

1> perform the actions for the IE "*RLC Info*", according to sub-clause 7.19.5.9, applied for the radio bearer;

1> if IE "*Physical Channel Configuration*" is included

    2> perform the actions as specified in sub-clause 7.19.5.14 applied for the radio bearer;

1> if the IE "*PDCP SN Info*" is included:

    2> perform the actions as specified in sub-clause 7.19.5.11 applied for the radio bearer;

1> if the IE "*RB Stop/Continue*" is included; and

    2> if the "*RB Identity*" has a value greater than 2; and

        3> if the value of the IE "*RB Stop/Continue*" is "stop":

            4> configure the RLC entity for the radio bearer to stop;

            4> set the IE "*RB Started*" in the variable ESTABLISHED_RABS to "stopped" for that radio bearer;

        3> if the value of the IE "*RB Stop/Continue*" is "continue":

            4> configure the RLC entity for the radio bearer to continue;

            4> set the IE "*RB Started*" in the variable ESTABLISHED_RABS to "started" for that radio bearer;

    2> if the IE "*RB Identity*" is set to a value less than 2:

        3> set the variable INVALID_CONFIGURATION to TRUE.

7.19.5.7 RB Information to Release

If the IE "*RB Information to Release*" is included, the MS shall apply the following actions on the radio bearer identified with the value of the IE "*RB Identity*". The MS shall:

1> release the PDCP and RLC entities dedicated for that radio bearer;

1> if IE "*Physical Channel Configuration*" is included

2> perform the actions as specified in sub-clause 7.19.5.14 applied for the radio bearer;

1> if the information about the radio bearer is stored in the variable ESTABLISHED_RABS:

2> delete the information about the radio bearer from the variable ESTABLISHED_RABS;

2> when all radio bearers belonging to the same radio access bearer have been released:

3> indicate release of the radio access bearer to upper layers providing the "CN domain identity" together with the "*RAB Identity*" stored in the variable ESTABLISHED_RABS;

3> delete all information about the radio access bearer from the variable ESTABLISHED_RABS.

7.19.5.8 RB with PDCP Information

If the IE "*RB with PDCP Information*" is included, the MS shall apply the following actions on the radio bearer identified with the value of the IE "*RB Identity*". The MS shall:

1> for the IE "*PDCP SN Info":*

2> perform the actions as specified in sub-clause 7.19.5.11.

7.19.5.9 (void)

7.19.5.10 RLC Info

If the IE "*RLC Info*" is included, the MS shall:

1> configure the transmitting and receiving RLC entities in the MS for that radio bearer accordingly.

7.19.5.11 PDCP Info

For RFC 3095:

1> the chosen MAX_CID shall not be greater than the value "Maximum Number of ROHC Context Sessions" as indicated in the IE "*PDCP Capability*";

1> the configuration for the PACKET_SIZES_ALLOWED governs which packet sizes RFC 3095 is allowed to use.

If IE "*PDCP Info*" is included, the MS shall:

1> if the radio bearer is connected to a CS domain radio access bearer:

2> set the variable INVALID_CONFIGURATION to TRUE;

1> if the IE "*PDCP PDU Header*" is set to the value "absent":

2> if the IE "*Support for Lossless SBSS Relocation*" is true:

3> set the variable INVALID_CONFIGURATION to TRUE;

1> if the IE "*PDCP PDU Header*" is set to the value "present":

2> if the IE "*Support for Lossless SBSS Relocation*" is false:

3> if the structure "Header Compression Information" is absent:

4> set the variable INVALID_CONFIGURATION to TRUE;

1> if the structure "Header compression information" is absent:

2> not use Header compression after the successful completion of this procedure;

2> remove any stored configuration for the structure "Header compression information".

> if the structure "Header compression information" is present:

2> if RFC 2507 is used:

3> if the MS capability "Maximum header compression context space", as specified in 3GPP TS 25.306, is exceeded with this configuration:

4> set the variable INVALID_CONFIGURATION to TRUE.

1> if the structure "Header compression information" is present in the reconfiguration message:

2> only use header compression algorithms present in the structure "Header compression information" in that message for the configured radio bearer.

2> use the order in which the header compression algorithms are received in the message as the order that shall be used by PDCP for mapping of PID values (see 3GPP TS 25.323)

1> configure the PDCP entity for that radio bearer accordingly;

1> configure the RLC entity for that radio bearer according to the value of the IE "*Support for Lossless SBSS Relocation*".

1> set the PROFILES parameter, used by inband ROHC profile negotiation, for this PDCP entity for both UL and DL equal to the list of ROHC profiles received in the IE "*PDCP info*". A MS complying with this version of the specification shall support ROHC profiles 0x0000 (ROHC uncompressed), 0x0001 (ROHC RTP), 0x0002 (ROHC UDP) and 0x0003 (ROHC ESP) (IANA ROHC profile identifier definition).

7.19.5.11a   PDCP context relocation info

If the IE "PDCP context relocation info" is included, the MS shall, for each radio bearer included in this IE:

1> If the IE "*Downlink RFC3095 Context Relocation Indication*" is set to TRUE:

2> perform the actions as specified in 3GPP TS 25.323 for all RFC3095 contexts associated to that radio bearer in the downlink;

1> If the IE "*Uplink RFC3095 Context Relocation Indication*" is set to TRUE:

2> perform the actions as specified in 3GPP TS 25.323 for all RFC3095 contexts associated to that radio bearer in the uplink.

7.19.5.12   PDCP SN Info

If the IE "*PDCP SN Info*" is included, the MS shall:

1> transfer the sequence number to the PDCP entity for the radio bearer;

1> configure the RLC entity for the radio bearer to stop;

1> include the current PDCP receive sequence number and the radio bearer identity for the radio bearer in the variable PDCP_SN_INFO.

7.19.5.13   NAS Synchronisation Indicator

If the IE "*NAS Synchronisation Indicator*" is present in a message, the MS shall:

1> forward the content to upper layers along with the IE "*CN Domain Identity*" of the associated RAB stored in the variable ESTABLISHED_RABS at the CFN indicated in the IE "*Activation Time*" in order to synchronise actions in NAS and AS.

7.19.5.14 Physical Channel Configuration

If the IE "*Physical Channel Configuration*" is included, the MS shall:

1> if the IE "*SBPSCH Description*" is included;

2> perform the action specified in 7.19.6.2;

2> start timer T3190.

1> if the IE "*DBPSCH Description*" is included;

1> perform the action specified in 7.19.6.1;

7.19.6 Physical channel parameters

7.19.6.1 DBPSCH Description

If the MS receives the one of the messages RADION BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message and if IE "*Power Command*" is present, the MS shall:

1> set the power level accordingly for the initial power on the new channel(s) and it shall not affect the power used on the old channel(s).

else set the INVALID_CONFIGURATION to TRUE, in case that MS enters the RRC-Cell_Dedicate state-MAC-Dedicated state.

If the IE "*Mode of the First Channel*" to be applied corresponds to a multi-rate speech codec in one of the messages RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message shall contain the MultiRate Configuration IE, then the MS shall:

1> expect the IE *MultiRate Configuration* and ;

1> if it is initial establishment the MS shall:

2> use the Initial Codec Mode specified in the IE *MultiRate Configuration*

1> otherwise apply the implicit rule defined in 3GPP TS 45.009.

else:

1> set the INVALID_CONFIGURATION to TRUE and;

1> remain on the current channel(s) and use the old Channel Description or Channel Mode(s).

If the value of IE *MultiRate Configuration* is incosistent the MS shall:

1> set the INVALID_CONFIGURATION to TRUE;

1> remain on the current channel(s) and use the old Channel Description or Channel Mode(s).

The IE *MultiRate Configuration* shall be considered as inconsistent by the MS if:

- the active set does not include any codec mode or the active set includes more than four codec modes; or

- one or more codec modes of the active codec set are not supported by the physical channel; or

- the threshold and hysteresis values are not set according to requirements given in 3GPP TS 45.009.

If the MS receives one of the messages RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE and

1> if the message contains only the description of a channel to be used after the starting time in the IE "*Description of the Channel After Time*", the MS shall:

1> wait until the starting time before accessing the channel:

else:

1> if the starting time already elapsed, the MS shall:

2> access the channel as an immediate reaction to the reception of the message (see 3GPP TS 45.010 for the timing constraints).

1> if the message contains both the description of a channel to be used after the indicated time and the description of a channel to be used before the indicated time, in the IEs "*Description of the Channel, After Time*" and "*Description of the Channel, Before Time*", the MS may:

2> access the channel immediatelly after the reception of the message.

2> if the moment, at which the mobile station is ready to access, is before the time indicated by the IE "*Description of the Channel, After Time*", the mobile station shall:

3> access the channels as described in the IE "*Description of the Chanel, Before The Starting Time*".

3> then change to the channel described for after the starting time at the indicated time. New parameters shall be frequency list, MAIO and HSN. Other parameters describing the allocated channels must be identical to the parameters described in the IE "*Description of the Chanel, Before The Starting Time*". If the moment the mobile station is ready to access is after the starting time, the mobile station accesses the channel described in the IE "*Description of the Chanel, Before The After Time*".

1> if the IE "*Starting Time*" is not present and some of the information elements referring to before the starting time is present, these information elements shall be considered as IEs unnecessary in the message.

1> if the IE "*Description of the Channel, Before Time*" is not present, the MS shall:

2> apply the channel description for before the time, if needed, given by the IE "*Description of the Channel, After Time*".

1> if the IE "*Starting Time*" is present and the IE "*Description of the Channel, before time*" indicates frequency hopping, one and only one of the following information elements may be present and the MS shall apply this before the starting time

- IE "*Mobile Allocation, Before Time*";

- IE "*Frequency List, Before Time*";

- IE "*Frequency Channel Sequence, Before Time*".

1> if the IE "*Starting Time*" is present and the IE "*Channel Description, Before The Starting Time*" indicates frequency hopping, and none of the above mentioned IE is present,

2> the IE "*Frequency List, After Time*" must be present, and this applies also for before the starting time.

2> if frequency hopping is applied, the cell allocation if present in the message is used to decode the mobile allocation. If the cell allocation is not included, the mobile station shall use its current cell allocation.

1> if the RADIO BEARER RECONFIGURATION message contains only the IE "*Description of the Channel, After Time*" and the handover is towards a GERAN cell to which the mobile station is not synchronised for the case of an intersystem handover to GERAN, the mobile station shall:

2> wait up to the starting time before accessing the new channel;

2> if the starting time has already elapsed, the mobile shall:

3> access the new channel as an immediate reaction to the reception of the message (see 3GPP TS 45.010 for the timing constraints). Between the reception of the RADIO BEARER RECONFIGURATION and the starting time there is no requirement for the mobile station to receive or transmit on the old channel.

If MS receives the RADIO BEARER RECONFIGURATION and the IE "*Power Command and Access Type*" is present, the MS shall:

1> set the initial power on the new channel (s) to the the power level defined in this power command (cf 3GPP TS 45.008). It shall not affect the power used on the old channel(s).

else

1> set the variable INVALID_CONFIGURATION to TRUE.

If MS receives the RADIO BEARER RECONFIGURATION and if the IE "*Handover Reference*" is present, the MS shall:

1> use handover reference value used for access identification. The choice of the handover reference by the network is out of the scope of this specification and left to the manufacturers.

else

1> set the variables INVALID_CONFIGURATION to TRUE.

If MS receives the RADIO BEARER RECONFIGURATION and if the IE "*Synchronization Indication*" is not be present then, the MS shall:

1> assume the handover type is non-synchronized.

If MS receives the RADIO BEARER RECONFIGURATION and if the IE "*Timing Advance*" is present then the MS shall:

1> use this in the new cell;

1> if in the case of a synchronous or pseudo-synchronous handover the MS knows that the timing advance with the new cell is out of range, i.e. is bigger than the maximum timing advance that can be coded as specified in 3GPP TS 44.004, and if the new cell does not accept out of range timing advance as indicated in the RADIO BEARER RECONFIGURATION message, the mobile station shall:

2> set the variable INVALID_CONFIGURATION to TRUE.

If the mobile station receives a RADIO BEARER RECONFIGURATION message and if at least one of the following IEs, IE "*Handover Reference*", IE "*Power Command and Access Type*", IE "*Cell Description*" and IE "*Description of the first channel after time*" is not present, the MS shall:

1> set the variable INVALID_CONFIGURATION to TRUE.

If the MS receives RADIO BEARER RECONFIGURATION and the IE "*Starting Time*" may be present, then the MS shall:

1> change the frequency paramters of the channels more or less at the moment a change of channel occurs. In this case a number of parameters can be included.

If the MS receives RADIO BEARER RECONFIGURATION and if the IE "*Starting Time*" is present and none of the information elements referring to before the starting time are present, the mobile station shall:

1> wait and access the channels at the indicated time.

If the MS receives RADIO BEARER RECONFIGURATION and if the IE "*Starting Time*" is present and at least one of the information elements referring to before the starting time is present, the mobile station shall:

1> not wait for the indicated time and access the channel using the frequency parameters for before the starting time.

If the MS receives RADIO BEARER RECONFIGURATION and if the IE "*Starting Time*" is not present and some of the information elements referring to before the starting time are present, these information elements shall be considered as IEs unnecessary in the message.

If the MS receives RADIO BEARER RECONFIGURATION and if the IE "*Description of the First Channel, Before Time*" is not present, the MS shall:

> 1> apply for the channel description the information given for before the time, if needed, in the IE "*Description of tThe First Channel, After Time*".

If the MS receives RADIO BEARER RECONFIGURATION and if the IE "*Description of the Second Channel, After Time*" is present, and if the IE "*Description of the Second Channel, Before Time*" not present, and a description of the configuration for before the time needed, the MS shall:

> 1> use the channel configuration before the starting time, and the channel description to apply to the second channel before the starting time is given by the IE "*Description of the Second Channel, After Time*".

If the MS receives RADIO BEARER RECONFIGURATION and if the IE "*Starting Time*" is present and at least one of the channel descriptions for before the starting time indicates frequency hopping, one and only one of the following information elements may be present and applies before the starting time to all assigned channels:

> - IE "*Mobile Allocation, Before Time*";
> - IE "*Frequency Short List, Before Time*";
> - IE "*Frequency List, Before Time*";
> - IE "*Frequency Channel Sequence, Before Time*".

If the IE "*Starting Time*" is present and at least one of the channel descriptions for before the starting time indicates frequency hopping, and if none of the above mentioned IE is present, the MS shall use:

> 1> a frequency list for after the starting time must be present, and this list applies also for the channels before the starting time.

If MS receives the RADIO BEARER RECONFIGURATION and if at least one of the channel descriptions for after time indicates frequency hopping, one and only one of the following information elements shall be present IE "*Frequency Channel Sequence, After Time*", IE "*Frequency List, After Time*", IE "*Frequency Short List, After Time*", IE "*Mobile Allocation, After Time*".

If MS receives the RADIO BEARER RECONFIGURATION and if neither of the *Channel Description* IEs indicate frequency hopping, and if they are not required for the decoding of *Channel Description* IEs for before time, and if any of the four information elements are present they shall be considered as IEs unnecessary in the message.

The IE "*Frequency Channel Sequence*" element shall not be used unless all the ARFCNs that it indicates are in the P-GSM band.

If the RADIO BEARER RECONFIGURATION message instructs the mobile station to use a frequency that it is not capable of, then the mobile station shall:

> 1> set the variable UNSUPPORTED_CONFIGURATION to TRUE;
> 1> remain on the current channel(s).

If the mobile station receives a RADIO BEARER RECONFIGURATION message with a IE "*Frequency List*" or IE "*Frequency Short List*" indicating frequencies that are not all in one band, then the mobile station shall:

> 1> stay on the current channel(s); and
> 1> set the variable UNSUPPORTED_CONFIGURATION to TRUE.

If MS receives the one of the messages RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message and if the IE "*Frequency List, After Time*" or IE "*Frequency List, Before Time*" is present, then MS shall:

> 1> change the frequency according with the values of the IEs.

If the MS receives the reconfiguration message and if IE "*Cell Channel Description*" is present in the message and if the frequency hopping is applied, the MS may decode the mobile alocation based on the cell allocation, if present in the message.

The network shall include the IE "*Cell Channel Description*" in the RADIO BEARER RECONFIGURATION, RADIO BEARER SETUP or RADIO BEARER RELEASE message if no proper reference cell frequency list (CA) has been sent previously to the mobile station.

If MS receives in the RADIO BEARER RECONFIGURATION message which contains the "*Cell Channel Description*" IE or "*Channel Mode*" IE which instruct the mobile station to use a Channel Description or Mode that it does not support, or the Channel Mode indicated for use is not defined for all channel sets, then the MS shall:

> 1> set the variable UNSUPPORTED_CONFIGURATION to TRUE

> 1> remain on the current channel(s) and use the old Channel Description or Mode(s).

If the cell allocation is not included, the mobile station shall use its current cell allocation, the current CA is the last CA received. If the mobile station receives RADIO BEARER RECONFIGURATION message with a IE "*Mobile Allocation*" indexing frequencies that are not all in one band and a IE *Starting Time* indicating a time that has not elapsed then the mobile station shall:

> 1> remain on the current channel(s).

> 1> send a RRC STATUS message with cause "frequency not implemented";

> 1> set the variable INVALID_CONFIGURATION to TRUE.

If the mobile station receives a RADIO BEARER RECONFIGURATION message with a IE "Mobile Allocation" indexing frequencies that are not all in one band and a "Starting Time" IE indicating a time that has elapsed, then the mobile station shall locally abort the radio connection and, if permitted, attempt Call Re-establishment.

If the MS receives the RADIO BEARER RECONFIGURATION message and if IE "*Cell Description*" is included in the message then MS shall:

> 1> use its pre-knowledge about synchronization acquired by the measurement process (i.e. BSIC + BCCH frequency)

else

> 1> set the variable INVALID_CONFIGURATION to TRUE.

If the MS receives the RADIO BEARER RECONFIGURATION and if the IE "*Real Time Difference*" is included then the MS shall:

> 1> apply the pseudo-synchronous case type of handover.

If the MS receives the RADIO BEARER RECONFIGURATION and if the IE "*Timing Advance*" is included then the MS shall:

> 1> if IE "*Synchronization Indication*" indicates a presynchronized handover, use presynchronous type of handover.

> 1> else

>> 2> if IE "*Synchronization Indication*" not indicates a presynchronized handover, use the default value as defined in 3GPP TS 45.010. The MS shall consider an unnecessary information element for other types of handover.

The "*Dynamic ARFCN*" IE shall only be included if the network supports dynamic ARFCN mapping and there is a need to define new dynamic ARFCN mapping, e.g. at handover to another PLMN or from another RAT to GSM. This information replaces any previously received information about dynamic ARFCN mapping. After returning to idle mode or packet idle mode, the mobile station shall acquire new dynamic ARFCN mapping information, except for the cases specified in 3GPP TS 44.018 (SI15). This mapping shall apply to any ARFCN used in the RADIO BEARER RECONFIGURATION message.

When one of the reconfiguration messages is received and IE "*PDTCH*" is included, the MS shall

> 1> set the structure "Dynamic Allocation" as specified in 3GPP TS 44.160, and

> 1> if the MS is EGPRS capable

>> 2> set the IE *EGPRS Window Size* as specified in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060 for each RB.

7.19.6.2 SBPSCH parameters

The reconfiguration message can contain either the description of the uplink TBF or the downlink TBF. The information on the power to be used on the target TBF shall not affect the power used on the old channel(s). The network may assign a radio resource on one or more PDCHs to be used for the TBF. The amount of radio resource to be reserved is a network dependent choice.

The IE "*SBPSCH Description*" message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions.

If MS receives the one of the messages RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION RADIO BEARER RELEASE message and the message includes either IE "*RRC Packet Uplink Assignment*" or IE"*RRC Packet Downlink Assignment*" the MS shall:

> 1> set the parameters for uplink or downlink TBF. The information on the power to be used on the target TBF shall not affect the power used on the old channel(s).

else

> 1> set the INVALID_CONFIGURATION to TRUE.

The RADIO BEARER SETUP or RADIO BEARER RECONFIGURATION or RADIO BEARER RELEASE message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions. If the MS is in RRC-Cell_Dedicated state, MAC Dedicted or MAC DTM state and if MS receives the reconfiguration message and if the message contains only the description of a TBF to be used after the starting time, the mobile station shall

> 1> wait untill the starting time before using the TBF.

> 1> if the starting time has already elapsed, the mobile shall:

>> 2> use the TBF immediatly after the reception of the message (see 3GPP TS 45.010 for the timing constraints).

> 1> if the message contains both the description of a TBF to be used after the indicated time and of a TBF to be used before, the mobile station shall:

>> 2> use the TBF as an immediate reaction to the reception of the message.

> 1> if the moment the mobile station is ready to access is before the indicated time, the mobile station shall:

>> 2> use the TBF described for before the starting time.

>> 2> the mobile station shall then change to the TBF described for after the starting time at the indicated time. New parameters shall be frequency list, MAIO and HSN. Other parameters describing the allocated channels shall be identical to the parameters described for before the starting time. If the moment the mobile station is ready to access is after the starting time, the mobile station shall the TBF described for after the starting time.

8 Handling of unknown, unforeseen, and erroneous protocol data

8.1 General

This sub-clause specifies procedures for the handling of unknown, unforeseen, and erroneous protocol data by the receiving entity. These procedures are called "error handling procedures", but in addition to provide recovery mechanisms for error situations they define a compatibility mechanism for future extensions of the protocol.

The error handling procedures specified in this sub-clause shall apply to all RRC messages. When there is a different handling for the same message received on different logical channels, this is specified.

For system information, the error handling procedures applied on system information messages are specified below.

When the MS receives an RRC message, it shall set the variable PROTOCOL_ERROR_REJECT to FALSE and then perform the checks in the order as defined below.

The error cases specified in the following include handling upon reception of spare values. This behaviour also applies in case the actual value of the IE results from mapping the originally sent IE value. Moreover, in certain error cases, as specified in the following, default values apply. In this case, the default values specified within the procedure specifications apply.

8.2 CSN.1 violation or encoding error

If the MS receives an RRC message on SRB 2, SRB 3 or SRB 4 for which the encoded message does not result in any valid syntax value (or "encoding error"), it shall perform the following. The MS shall:

1> set the variable PROTOCOL_ERROR_REJECT to TRUE;

1> transmit an RRC STATUS message on SRB2. The IE "*Protocol Error Information*" shall contain an IE "*Protocol Error Cause*" set to "CSN.1 violation or encoding error";

1> when RRC STATUS message has been submitted to lower layers for transmission:

2> continue with any ongoing processes and procedures as if the invalid message had not been received.

If the MS receives an RRC message sent via a radio access technology other than GERAN, for which the encoded message does not result in any valid syntax, the MS shall:

1> set the variable PROTOCOL_ERROR_REJECT to TRUE;

1> set the IE "*Protocol Error Cause*" in the variable PROTOCOL_ERROR_INFORMATION to "CSN.1 violation or encoding error";

1> perform procedure specific error handling according to clause 7.

If a set of system information message received on SRB 1 does not result in any valid syntax value, the MS shall:

1> ignore the set of system information message;

1> treat the other sets of this system information message as if those sets were not present.

If the MS receives an RRC message on SRB 1 for which the encoded message does not result in any valid syntax value, it shall ignore the message.

8.3 Unknown or unforeseen message type

If a MS receives an RRC message on a SRB 2, SRB 3 or SRB 4 with a message type not defined for that SRB it shall:

1> set the variable PROTOCOL_ERROR_REJECT to TRUE;

1> transmit an RRC STATUS message on SRB 2. The IE "*Protocol Error Information*" shall contain an IE "*Protocol Error Cause*" set to "Message type non-existent or not implemented";

1> when the RRC STATUS message has been submitted to lower layers for transmission:

2> continue with any ongoing processes and procedures as if the invalid message had not been received.

If the MS receives an RRC message on SRB 1 with a message type not defined for the logical channel type the message was received on, it shall ignore the message.

8.4 Unsolicited received message

If the MS receives any of the following messages, on SRB 2:

- an RRC CONNECTION SETUP message addressed to the MS; or

- an RRC CONNECTION REJECT message addressed to the MS; or

- a MS CAPABILITY INFORMATION CONFIRM message; or

- a CELL UPDATE CONFIRM message addressed to the MS; or

- a GRA UPDATE CONFIRM message addressed to the MS

and no procedure is ongoing according to clause 7 which expects the message to be received:

the MS shall:

    1> ignore the received message.

8.5 Unexpected critical message extension

If the MS receives an RRC message on SRB 2, SRB 3 or SRB 4, or sent via a radio access technology other than GERAN, containing an undefined critical message extension indicated with the error label: 'Critical extension', the MS shall:

    1> set the variable PROTOCOL_ERROR_REJECT to TRUE;

    1> set the IE "*Protocol Error Cause*" in the variable PROTOCOL_ERROR_INFORMATION to "Message extension not comprehended";

    1> if the IE "*Message Type*" of the received message is not present in the table "Rejected transactions" in the variable TRANSACTIONS:

        2> store the IE "*Message Type*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS; and

        2> set the IE "*RRC Transaction Identifier*" to zero in that table entry.

    1> perform procedure specific error handling according to clause 7.

If the MS receives an RRC message on the SRB 1, containing an undefined critical message extension, the MS shall:

    1> ignore the message.

8.6 Message with error label: 'Content part error'

If the MS receives an RRC message containing the error label: 'Content part error', the MS shall:

    1> set the variable PROTOCOL_ERROR_REJECT to TRUE;

    1> set the IE "*Protocol Error Cause*" in the variable PROTOCOL_ERROR_INFORMATION to "Message content part error";

    1> if the IE "*Message Type*" of the received message is not present in the table "Rejected transactions" in the variable TRANSACTIONS:

        2> store the IE "*Message Type*" of the received message in the table "Rejected transactions" in the variable TRANSACTIONS; and

        2> set the IE "*RRC Transaction Identifier*" to zero in that table entry;

    1> ignore the data corresponding to the description following the error label;

    1> perform procedure specific error handling according to clause 7.

8.7 Unknown or unforeseen information element value, mandatory information element

If the MS receives an RRC message on SRB 2, SRB 3 or SRB 4, or sent via a radio access technology other than GERAN, with a mandatory IE having a value, including choice, reserved for future extension (spare) or a value not used in this version of the specification (e.g. a dummy value), the MS shall:

  1> if a default value of the IE is defined in the procedure:

    2> treat the rest of the message using the default value of the IE.

  1> if no default value of the IE is defined in the procedure:

    2> set the variable PROTOCOL_ERROR_REJECT to TRUE;

    2> set the IE "*Protocol Error Cause*" in the variable PROTOCOL_ERROR_INFORMATION to "Information element value not comprehended";

    2> perform procedure specific error handling according to clause 7.

If the MS receives a system information message on SRB 1 with a mandatory IE having a value reserved for future extension (spare) or a value not used in this version of the specification (e.g. a dummy value), the MS shall:

  1> if a default value of the IE is defined in the procedure:

    2> treat the rest of the system information message using the default value of the IE.

  1> if no default value of the IE is defined in the procedure:

    2> ignore the system information message.

If the MS receives an RRC message on SRB 1 with a mandatory IE having a value reserved for future extension (spare) or a value not used in this version of the specification (e.g. a dummy value), the MS shall:

  1> if a default value of the IE is defined in the procedure:

    2> treat the rest of the message using the default value of the IE.

  1> if no default value of the IE is defined in the procedure:

    2> ignore the message.

8.8 Unexpected non-critical message extension

If the MS receives an RRC message on the SRB 2, SRB 3 or SRB 4, or sent via a radio access technology other than GERAN, containing an undefined non-critical message extension, the MS shall:

  1> ignore the content of the extension and the message contents after the extension, but treat the parts of the message up to the extension normally.

If the MS receives an RRC message on the SRB 1, containing an undefined non-critical message extension, the MS shall:

  1> ignore the content of the extension and the message contents after the extension, but treat the parts of the message up to the extension normally.

8.9 Message with error label: 'Message escape'

If the MS receives an RRC message containing the error label: 'Message escape' where the number of bits of the extension is not defined in clause 9, the MS shall:

  1> ignore the message.

If the MS receives an RRC message containing the error label: 'Message escape' where the number of bits of the extension is defined in clause 9, the MS shall:

> 1> ignore the extension by skiping the number of bits indicated in clause 9;

> 1> treat the rest of the message as if the extension was not present.

8.10 Handling of errors in nested information elements

This sub-clause specifies the handling of errors in mandatory IEs as well as for conditional IEs for which the specified conditions for presence are met, that are nested in another IE.

In case the MS receives an IE (Information Element 1) that includes a mandatory IE (Information Field 1-1) having a value, including reserved for future extension (spare) or a value not used in this version of the specification (e.g. a dummy value), the MS shall:

> 1> consider Information Element 1 to have an undefined value; and

> 1> apply the corresponding generic error handling to Information Element 1.

In case there are many IE nesting levels, in all of which the IE is mandatory while no default value is defined, this treatment may need to be repeated several times. The following example illustrates the general principle.

Table 8.11.1: EXAMPLE MESSAGE information elements

```
< EXAMPLE MESSAGE message content > ::=
    {
        { 0 | 1 < Information Element 1 : < Information Element 1 IE > > }
        < Information Element 2 : < Information Element 2 IE > >
    !   < content part error : bit (*) = < no string > > };
```

Table 8.11.2: Information Element 1 information element

```
< Information Element 1 IE > ::=
    {
        { 0 | 1 < Information Field 1-1 : bit (4) > }
        < Information Element 1-2 : < Information Element 1-2 IE > >
        < Information Element 1-3 : < Information Element 1-3 IE > >
    };
```

Table 8.11.3: Information Element 1 information element details

```
Information Field 1-1 (4 bit field)

4 3 2 1
0 0 0 0    1
0 0 0 1    2
: : : :
1 1 0 0    13
1 1 0 1    reserved for future extension
1 1 1 0    reserved for future extension
1 1 1 1    reserved for future extension

Information Element 1-2
Definition of Information Element 1-2.

Information Element 1-3
Definition of Information Element 1-3.
```

If in the above example, GERAN would include Information Element 1 and set Information Field 1-1 to value 13, the MS experiences an error in a mandatory IE. The guideline outlined in the previous then means that the MS shall not discard the entire message but instead consider " Information Element 1" to have an unknown value. Since Information Element 1 is optional, the generic error handling would be to ignore " Information Element 1".

In case the MS receives an IE (Information Element 1) that includes a list of another IE (Information Field1-1) for which one or more entries in the list have a value, including reserved for future extension (spare) or a value not used in this version of the specification (e.g. a dummy value), the MS shall:

> 1> consider the list as if these entries were not included.

9 Message functional definitions and contents

9.1 General

9.1.1 Introduction

Padding is not needed for RRC messages since RRC is not a transmission protocol.

For harmonization sake, it is assumed that GERAN RRC has to provide the same extension capability as UTRAN RRC. The management of extension for future releases is done at the message level or at Information Element (IE) level when the IE uses the { < Length of content > < Content > } format. The error handling is not defined at the IE level.

An IE can be structured or simple. A structured IE consists of other IEs and/or fields. A simple IE consists of one field. A field defines itself.

It was also agreed as working assumption that IEs in 3GPP TS 44.018 to be used in both modes (e.g. physical channel parameters) will not be copied from 3GPP TS 44.018 into 3GPP TS 44.018. Instead, in 3GPP TS 44.118, two fields will be defined: the length in octets, as bit(8), and a content placeholder with such length and whose definition points to the value part of the IE in 3GPP TS 44.018 should be included in the 3GPP TS 44.118. When the IE in 3GPP TS 44.018 is coded in CSN.1 (e.g. RR PACKET UPLINK ASSIGNMENT) and it already includes the length, a content placeholder with such length and whose definition points to the value part of the IE in 3GPP TS 44.018 should be included in 3GPP TS 44.118.

Bit fields within RRC messages shall have the highest numbered bit of the bit field in the highest numbered bit of the lowest number octet. The mapping of an 11 bit field is illustrated in figure 9.1.1.1.

bit								
8	7	6	5	4	3	2	1	
								Octet N
				bit 11	bit 10	bit 9	bit 8	Octet N+1
bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1		Octet N+2
								Octet N+3
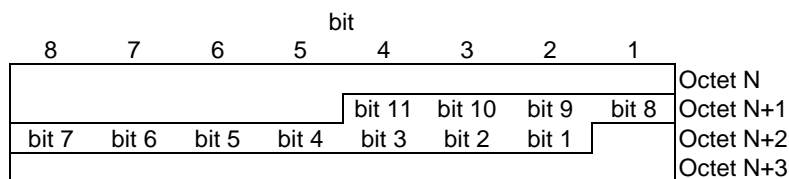
Figure 9.1.1.1: Field mapping within RRC messages

9.1.2   Repetitions of Structure, IE or field:

The following coding shall be used for unbounded repetition:

> { { 1 < **label** : < IE > > } ** 0 } or,
> { { 1 < **field** : bit (integer) > } ** 0 } or,
> { { 1 < repeated struct > } ** 0 }

The following coding shall be used for bounded extension for optional structures, IE's or fields:

> { 0 | 1   < **number of repetition** : bit (integer) >
>   < **label** : < IE > >* (n+val(number of repetition)) }

> or

> { 0 | 1   < **number of repetition** : bit (integer) >
>   < **field**: bit (integer) >* (n+val(number of repetition)) }

> or

> { 0 | 1   < **number of repetition** : bit (integer) >
>   < repeated struct >* (n+val(number of repetition)) }

where n ≥ 1.

The following coding shall be used for bounded extension for mandatory structures, IE's or fields:

> {   < **number of repetition** : bit (integer) >
>   < **label** : < IE > >* (n+val(number of repetition)) }

> or

> {   < **number of repetition** : bit (integer) >
>   < **field** : bit (integer) >* (n+val(number of repetition)) }

> or

> {   < **number of repetition** : bit (integer) >
> < repeated struct >* (n+val(number of repetition)) }

where n ≥ 1.

9.1.3   Message format and error labels

9.1.3.1   General

The general format of messages, including these error labels, is:

```
< General message format > ::=
    < MESSAGE_TYPE : < bit (8) > >
        {   < contents >
        !   < Content part error : bit (*) = < no string > > }
    !   < Unknown message type : bit (8) = < no string > ;
```

Message type shall be coded using 8 bits with separate message type for uplink and downlink, as follow:

```
< Uplink RRC messages > ::=
    < MESSAGE_TYPE : 00000000 > < MESSAGE NAME1 message content > |
    < MESSAGE_TYPE : 00000001 > < MESSAGE NAME2 message content > ;
```

The message content should be presented has follow:

9.2.x   MESSAGE NAME

Explanation of the message use.

Radio Bearer: SRBx

Direction: GERAN→MS and/or MS →GERAN

Table 9.2.x.1: MESSAGE NAME information elements

```
< MESSAGE NAME message content > ::=
        {
                < IE1 : < IE1 > >
                < IE2 : < IE2 > >
        !       < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.x.2: MESSAGE NAME information element details

IE1
Definition of the IE1
IE2
Definition of the IE2

9.1.3.2   Message extension for new protocol version in RRC

Non-Critical message extension and critical message extension mechanism from UTRAN RRC (3GPP TS 25.331) are duplicated in GERAN RRC.

9.1.3.2.1   Non-Critical extension

Non-critical extensions will be achieved by adding in the optional references at the end of the message definition. The new elements introduced to specify the extensions should be grouped together in a structure with a name showing the version of the release.

Table 9.1.3.2.1.1: Coding non-critical extension in CSN.1

```
{ null | 0    bit ** = < no string >        -- Receiver compatible with earlier release
| 1                              -- Additions in Release xx
    < MessageLabel extension for R-XX: < Extension for R-XX struct > > }
```

Table 9.1.3.2.1.2: Example message coding using non-critical extension in CSN.1

```
< MESSAGE NAME message content > ::=
    {
        < IE1 : < IE1 > >
        < IE2 : < IE2 > >
        { null | 0 bit ** = < no string >
        | 1
        < R6 IE1 : < R6 IE1 > >
        < R6 IE2 : < R6 IE2 > >
        { null | 0 bit ** = < no string >
        | 1
        < R7 IE1 : < R7 IE1 > >
        < R7 IE2 : < R7 IE2 > >} }
    !    < Content part error : bit (*) = < no string > >} ;
```

9.1.3.2.2 Critical extension

At the beginning of the message, which may require critical extensions, one bit is added for defining a choice of two branches. All Downlink messages shall enable critical extension with an escape bit at the beginning. One branch would include the message structure, the other branch would be an empty sequence with the comment 'Message escape critical extensions'.

Table 9.1.3.2.2.1: Coding of critical extension in CSN.1

```
0   -- critical extension escape available
    < Content >
!   < Message escape : 1 bit (*) = < no string > >
```

Table 9.1.3.2.2.2: An example message coding containing critical extension bit in CSN.1

```
< MESSAGE NAME message content > ::=
    { 0    -- critical extension escape available
        {
            < IE1 : < IE1 > >
            < IE2 : < IE2 > >        !    < content part error : bit (*) = < no string > > }
    !    < Message escape critical extension: 1 bit (*) = < no string > > };
```

When a new release is introduced, the empty sequence with 'Message escape critical extensions' will be replaced by a new structure that includes a new type containing the message extensions, and the same extension mechanism recursively for further extensions.

Table 9.1.3.2.2.3: An example message coding using critical extension bit in CSN.1

```
< MESSAGE NAME message content > ::=
    { 0    -- critical extension escape available
        {
            < IE1 : < IE1 > >
            < IE2 : < IE2 > >
        !        < Content part error : bit (*) = < no string > > }
    | 1    -- critical extension for R-7
        { 0
            {
                <IE3 : < IE3 > >
                <IE4 : < IE4 > >
            !        < Content part error : bit (*) = < no string > >}
        !        < Message escape critical extension: 1 bit (*) = < no string > > }
    };
```

The critical extension escape should be used as scarcely as possible in order to preserve backward compatibility.

9.1.3.2.3 Extension of IE's

If an IE is expected to be extended, the addition of a fixed length extension length at the start of the IE, and <spare bits >** at the end will allow for future extension of the information element.

Table 9.1.3.2.3.1: Coding of IE extension in CSN.1

```
< IE NAME message content > ::=
    < IE Name Length : bit (n) >
    < IE1 : < IE1 > >
    < IE2 : < IE2 > >
    < spare bit >** ;
```

Table 9.1.3.2.3.2: Example description of IE extension fields

IE Name Length (n bit field)
This field is the binary representation of the length in bits of the IE (excluding the length field) struct. Range 0-2…

9.1.3.2.4 'Message escape' error label

The 'Message escape' error label is used to provide an escape for, e.g. a future modification of the message syntax. The generic description is:

```
0 < Content >
! < Message escape : 1 bit (N) = < no string > >
```

An 'Message escape' error label shall be applied by the receiver of a downlink RRC message when specified in the message description. The description on the left of the error branch needs to be correctly recognised. Otherwise, the error branch 'Message escape' is called. N should be an integer to enable the receiver to skip the exact number of information bits in the message in case of error. N may also be '*' when the number of bits are not defined.

9.2 Messages for Radio Resources management

9.2.1 General

Each definition given in the sub-clause 9.2 includes:

- a brief description of the message direction and use;

- a CSN.1 description of the message, information elements and fields (see CSN.1 Specification, Version 2.0). Definition of information elements may immediately follow the definition of the message. If the definition of an information element immediately follows the message definition, the information element name ends with 'struct'. Otherwise the information element name ends with 'IE' and the definition of the information element is defined in sub-clause 9.3 or in 3GPP TS 44.160. The definition of a 'struct' is valid only within the table in which it is defined. No references shall be made to a 'struct' definition from outside of the table in which it is defined or from outside the present document. The definition of an information element is valid throughout clause 9. ;

- a table follows which contains a definition for each field referenced in the message definition or in an information element struct immediately following the message definition. Presence requirement for information elements or fields may be indicated in this table to define when the information elements shall be included or not, what non-presence of such information elements or fields means, and, for IEs with conditional presence requirement, the static conditions for presence and/or non-presence of the information elements or fields. However, the normative text for the presence requirement for information elements or fields is specified in the appropriate procedure sub-clause;

9.2.1.1 References

Table 9.2.1.1.1 summarizes the messages for Radio Resources management.

NOTE: New messages will be added in this table.

Table 9.2.1.1.1: **Messages for Radio Resources management**

Messages	Reference
RRC connection mobility	
CELL UPDATE	Sub-clause 9.2.2
CELL UPDATE CONFIRM	Sub-clause 9.2.3
GERAN MOBILITY INFORMATION	Sub-clause 9.2.8
GERAN MOBILITY INFORMATION CONFIRM	Sub-clause 9.2.9
GERAN MOBILITY INFORMATION FAILURE	Sub-clause 9.2.10
GRA UPDATE	Sub-clause 9.2.11
GRA UPDATE CONFIRM	Sub-clause 9.2.12
Handover	
HANDOVER COMPLETE	Sub-clause 9.2.14
HANDOVER FAILURE	Sub-clause 9.2.15
HANDOVER FROM GERAN Iu COMMAND	Sub-clause 9.2.16
INTER SYSTEM TO CDMA2000 HANDOVER COMMAND	Sub-clause 9.2.18
INTER SYSTEM TO UTRAN HANDOVER COMMAND	Sub-clause 9.2.19
LCS information	
LCS DOWNLINK INFORMATION	Sub-clause 9.2.20
LCS UPLINK INFORMATION	Sub-clause 9.2.21
MS Capability information	
MS CAPABILITY ENQUIRY	Sub-clause 9.2.24
MS CAPABILITY INFORMATION	Sub-clause 9.2.25
MS CAPABILITY INFORMATION CONFIRM	Sub-clause 9.2.26
Measurement	
EXTENDED MEASUREMENT ORDER	Sub-clause 9.2.6
EXTENDED MEASUREMENT REPORT	Sub-clause 9.2.7
MEASUREMENT INFORMATION	Sub-clause 9.2.22
MEASUREMENT REPORT	Sub-clause 9.2.23
ENHANCED MEASUREMENT REPORT	Sub-clause 9.2.7a
Paging	
DEDICATED PAGING REQUEST	Sub-clause 9.2.4
Radio bearer control	
RADIO BEARER RECONFIGURATION	Sub-clause 9.2.28
RADIO BEARER RECONFIGURATION COMPLETE	Sub-clause 9.2.29
RADIO BEARER RECONFIGURATION FAILURE	Sub-clause 9.2.30
RADIO BEARER RELEASE	Sub-clause 9.2.31
RADIO BEARER RELEASE COMPLETE	Sub-clause 9.2.32
RADIO BEARER RELEASE FAILURE	Sub-clause 9.2.33
RADIO BEARER SETUP	Sub-clause 9.2.34
RADIO BEARER SETUP COMPLETE	Sub-clause 9.2.35
RADIO BEARER SETUP FAILURE	Sub-clause 9.2.36
GERAN Iu mode DTM REQUEST	Sub-clause 9.2.57
GERAN Iu mode DTM REJECT	Sub-clause 9.2.58
RRC Connection Management	
RRC CONNECTION REJECT	Sub-clause 9.2.37
RRC CONNECTION RELEASE	Sub-clause 9.2.38
RRC CONNECTION RELEASE COMPLETE	Sub-clause 9.2.39
RRC CONNECTION REQUEST	Sub-clause 9.2.40
RRC CONNECTION SETUP	Sub-clause 9.2.41
RRC CONNECTION SETUP COMPLETE	Sub-clause 9.2.42
Security mode control	
SECURITY MODE COMMAND	Sub-clause 9.2.45
SECURITY MODE COMPLETE	Sub-clause 9.2.46
SECURITY MODE FAILURE	Sub-clause 9.2.47
Signalling flow	
SIGNALLING CONNECTION RELEASE	Sub-clause 9.2.48
SIGNALLING CONNECTION RELEASE INDICATION	Sub-clause 9.2.49
System information	
SYSTEM INFORMATION 13	3GPP TS 44.108
SYSTEM INFORMATION 3	3GPP TS 44.108
SYSTEM INFORMATION 5	Sub-clause 9.2.51
SYSTEM INFORMATION 5bis	Sub-clause 9.2.52
SYSTEM INFORMATION 5ter	Sub-clause 9.2.53
SYSTEM INFORMATION 6	Sub-clause 9.2.54

Delivery of NAS	
DOWNLINK DIRECT TRANSFER	Sub-clause 9.2.5
INITIAL DIRECT TRANSFER	Sub-clause 9.2.17
UPLINK DIRECT TRANSFER	Sub-clause 9.2.56
Miscellaneous	
RRC STATUS	Sub-clause 9.2.43
RRC FAILURE INFO	Sub-clause 9.2.44
INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES	Sub-clause 11.1.5
SBSS RELOCATION INFO	Sub-clause 11.1.5

9.2.1.2   Downlink RRC messages

The different types of messages are distinguished by the MESSAGE_TYPE field.

```
< Downlink RRC messages > ::=
    {
    < MESSAGE_TYPE : 00000000 > < CELL UPDATE CONFIRM message content > |
    < MESSAGE_TYPE : 00000001 > < DEDICATED PAGING REQUEST message content > |
    < MESSAGE_TYPE : 00000010 > < DOWNLINK DIRECT TRANSFER message content > |
    < MESSAGE_TYPE : 00000011 > < EXTENDED MEASUREMENT ORDER message content > |
    < MESSAGE_TYPE : 00000100 > < GERAN MOBILITY INFORMATION message content > |
    < MESSAGE_TYPE : 00000101 > < GRA UPDATE CONFIRM message content > |
    < MESSAGE_TYPE : 00000111 > < HANDOVER FROM GERAN Iu COMMAND message content > |
    < MESSAGE_TYPE : 00001000 > < INTERSYSTEM HANDOVER TO CDMA2000 message content > |
    < MESSAGE_TYPE : 00001001 > < INTERSYSTEM HANDOVER TO UTRAN message content > |
    < MESSAGE_TYPE : 00001010 > < LCS DOWNLINK INFORMATION message content > |
    < MESSAGE_TYPE : 00001011 > < MEASUREMENT INFORMATION message content > |
    < MESSAGE_TYPE : 00001100 > < MS CAPABILITY ENQUIRY message content > |
    < MESSAGE_TYPE : 00001101 > < MS CAPABILITY INFORMATION CONFIRM message content > |
    < MESSAGE_TYPE : 00001110 > < RADIO BEARER RECONFIGURATION message content > |
    < MESSAGE_TYPE : 00010000 > < RADIO BEARER RELEASE message content > |
    < MESSAGE_TYPE : 00010111 > < RADIO BEARER SETUP message content > |
    < MESSAGE_TYPE : 00010001 > < RRC CONNECTION REJECT message content > |
    < MESSAGE_TYPE : 00010010 > < RRC CONNECTION RELEASE message content > |
    < MESSAGE_TYPE : 00010011 > < RRC CONNECTION SETUP message content > |
    < MESSAGE_TYPE : 00010100 > < RRC STATUS message content > |
    < MESSAGE_TYPE : 00010101 > < SECURITY MODE COMMAND message content > |
    < MESSAGE_TYPE : 00010110 > < SIGNALLING CONNECTION RELEASE message content > |
    < MESSAGE_TYPE : 00010111 > < GERAN Iu mode DTM REJECT message content > |
    < MESSAGE_TYPE : 00011000 > < SYSTEM INFORMATION 5 message content > |
    < MESSAGE_TYPE : 00011001 > < SYSTEM INFORMATION 5bis message content > |
    < MESSAGE_TYPE : 00011010 > < SYSTEM INFORMATION 5ter message content > |
    < MESSAGE_TYPE : 00011011 > < SYSTEM INFORMATION 6 message content >
    < spare bit >** }
    ! < Unknown message type : { bit (8) = < no string > } < Default downlink message content > > ;
```

9.2.1.3 Uplink RRC messages

The different types of messages are distinguished by the MESSAGE_TYPE field.

```
< Uplink RRC messages > ::=
    {
    < MESSAGE_TYPE : 00000000 > < CELL UPDATE message content > |
    < MESSAGE_TYPE : 00000001 > < EXTENDED MEASUREMENT REPORT message content > |
    < MESSAGE_TYPE : 00000010 > < GERAN MOBILITY INFORMATION CONFIRM message content > |
    < MESSAGE_TYPE : 00000011 > < GERAN MOBILITY INFORMATION FAILURE message content > |
    < MESSAGE_TYPE : 00000100 > < GRA UPDATE message content > |
    < MESSAGE_TYPE : 00000110 > < HANDOVER COMPLETE message content > |
    < MESSAGE_TYPE : 00000111 > < HANDOVER FAILURE message content > |
    < MESSAGE_TYPE : 00001000 > < INITIAL DIRECT TRANSFER message content > |
    < MESSAGE_TYPE : 00001001 > < LCS UPLINK INFORMATION message content > |
    < MESSAGE_TYPE : 00001010 > < MEASUREMENT REPORT message content > |
    < MESSAGE_TYPE : 00001011 > < MS CAPABILITY INFORMATION message content > |
    < MESSAGE_TYPE : 00001100 > < RADIO BEARER RECONFIGURATION COMPLETE message content > |
    < MESSAGE_TYPE : 00001101 > < RADIO BEARER RECONFIGURATION FAILURE message content > |
    < MESSAGE_TYPE : 00001110 > < RADIO BEARER RELEASE COMPLETE message content > |
    < MESSAGE_TYPE : 00001111 > < RADIO BEARER RELEASE FAILURE message content > |
    < MESSAGE_TYPE : 00010000 > < RADIO BEARER SETUP COMPLETE message content > |
    < MESSAGE_TYPE : 00010001 > < RADIO BEARER SETUP FAILURE message content > |
    < MESSAGE_TYPE : 00010010 > < RRC CONNECTION RELEASE COMPLETE message content > |
    < MESSAGE_TYPE : 00010011 > < RRC CONNECTION REQUEST message content > |
    < MESSAGE_TYPE : 00010100 > < RRC CONNECTION SETUP COMPLETE message content > |
    < MESSAGE_TYPE : 00010101 > < RRC STATUS message content > |
    < MESSAGE_TYPE : 00010110 > < SECURITY MODE COMPLETE message content > |
    < MESSAGE_TYPE : 00010111 > < SECURITY MODE FAILURE message content > |
    < MESSAGE_TYPE : 00011000 > < SIGNALLING CONNECTION RELEASE INDICATION message content > |
    < MESSAGE_TYPE : 00011001 > < UPLINK DIRECT TRANSFER message content >
    < MESSAGE_TYPE : 00011010 > < ENHANCED MEASUREMENT REPORT message content >
    < MESSAGE_TYPE : 00011011 > < GERAN Iu mode DTM REQUEST message content >
    < spare bits > ** } ;
```

The 'Default downlink message contents' consists an unspecified bit string that expands to the end of the message.

```
< Default downlink message content > ::=
    bit (*) = < no string > ;
```

9.2.2 CELL UPDATE

This message is used by the MS to initiate a cell update procedure.

    Radio Bearer :   SRB2

    Direction :   MS→GERAN

Table 9.2.2.1: CELL UPDATE information elements

```
< CELL UPDATE message content > ::=
    {   < G-RNTI : < G-RNTI IE > >
        { 0 | 1 < Integrity Check Info : <Integrity Check Info IE > > }
        < START list : bit (2) >
        < CN Domain START : < CN Domain START struct > > *(1+val(START List))
        < AM_RLC error indication for c-plane : bit (1) >
        < AM_RLC error indication for u-plane : bit (1) >
        < Cell update cause : < Cell update cause IE > >
        { 0 | 1  < RRC Transaction Identifier : < RRC Transaction Identifer IE > >
              {   < Failure Cause : 0011 >

                    < Protocol Error Information : < Protocol Error Information IE > >
        |     < Failure cause : 0000 | 0001 | 0010 | 01 bit (2) | 1 bit(3) >
              }
        }
        < RB Timer Indicator : < RB Timer Indicator IE > >
   !   < Content part error : bit (*) = < no string > > };

< CN Domain START struct > ::=
    < START : < START IE > >
    < CN Domain Identity : < CN Domain Identity IE > >;
```

Table 9.2.2.2: CELL UPDATE information element details

G-RNTI This IE is defined in sub-clause 9.3.32.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The integrity Check Info IE is included when integrity protection is applied.
START List (2 bit field) This field is the binary representation of the number of CN domain START struct**.** Range : 0 to maxCNdomains-1.
CN Domain START struct This structure may be repeated up to maxCNdomains.
START This IE is defined in sub-clause 9.3.102.
CN Domain Identity This IE is defined in sub-clause 9.3.15.
AM_RLC error indication for c-plane bit 1 0   False - No AM_RLC unrecoverable error occurred on c-plane in the MS; 1   True - AM_RLC unrecoverable error occurred on c-plane in the MS.
AM_RLC error indication for u-plane bit 1 0   False - No AM_RLC unrecoverable error occurred on u-plane in the MS; 1   True - AM_RLC unrecoverable error occurred on u-plane in the MS.
Cell Update Cause The Cell Update Cause IE indicates the cause for peforming a Cell Update. This IE is defined in sub-clause 9.3.8.
Failure Cause The Failure cause IE indicates the cause of the failure in order to perform the required RRC procedure. This IE is defined in sub-clause 9.3.24.

| **RRC Transaction Identifier** |
| This IE is defined in sub-clause 9.3.98. This IE shall be present when the failure cause IE indicates Protocol Error. |

| **Protocol Error Information** |
| This IE is defined in sub-clause 9.3.71. |

| **RB Timer Indicator** |
| This IE is defined in sub-clause 9.3.85. |

9.2.3 CELL UPDATE CONFIRM

This message confirms the cell update procedure and can be used to reallocate new G-RNTI information for the MS valid in the new cell.

Radio Bearer :   SRB2

Direction :   GERAN→MS

Table 9.2.3.1: CELL UPDATE CONFIRM information elements

```
< CELL UPDATE CONFIRM message content > ::=
    { 0 -- Critical extension escape available
        {
        -- MS Information Elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            < Activation Time : < Activation Time IE > >
            < RRC State Indicator : < RRC State Indicator IE > >
            < GERAN DRX Cycle Length Coefficient : < GERAN DRX Cycle Length Coefficient IE > >
            { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1 < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
            { 0 | 1 < Ciphering Mode Info : < Ciphering Mode Info IE > > }
            { 0 | 1 < New G-RNTI : < G-RNTI IE > > }
            < RLC re-establishment indicator SRB2-4 : bit(1) >
            < RLC re-establishment indicator RB5+ : bit(1) >
        -- CN Information Elements
            { 0 | 1 < CN Information Info : < CN Information Info IE > > }
        -- GERAN Information Elements
            { 0 | 1 < GRA Identity : < GRA Identity IE > > }
        -- RB Information Elements
            { 0 | 1 < RB Information to Release list : bit (5) >
                {   < RB Information to Release : < RB Information to Release IE > >
                    { 0 | 1 < DBPSCH Description : < DBPSCH Description IE > > }
                }*(1 + val(RB Information to Release list) ) }
            { 0 | 1 < RB Information to Reconfigure list : bit (5) >
                {   < RB Information to Reconfigure : < RB Information to Reconfigure IE > >
                    { 0 | 1 < DBPSCH Description : < DBPSCH Description IE > > }
                }*(1 + val(RB Information to Reconfigure list) )
            { 0 | 1 < RB Information to Be Affected list : bit (5) >
                {   < RB Information to Be Affected : < RB Information to Be Affected IE > >
                    { 0 | 1 < DBPSCH Description : < DBPSCH Description IE > > }
                }*(1 + val(RB Information to Be Affected list) ) }
            { 0 | 1 < Downlink Counter Synchronisation Info : < Downlink Counter Synchronisation info struct > > }
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > >} ;
< Downlink Counter Synchronisation Info struct> ::=
    < RB with PDCP Information List : bit (5) >
    { { 0 | 1 < RB with PDCP Information : < RB with PDCP Information IE > > }
        { 0 | 1 < PDCP context relocation info : < PDCP context relocation info IE > > } } * (1 + val(RB with PDCP
Information List) );
```

Table 9.2.3.2: CELL UPDATE CONFIRM information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Activation Time This IE is defined in sub-clause 9.3.1.
RRC State Indicator This IE is defined in sub-clause 9.3.97.
GERAN DRX cycle length coefficient This IE is defined in sub-clause 9.3.29.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The integrity Check Info IE is included when integrity protection is applied
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39. The GERAN does not include this IE unless it is performing an SBSS relocation
Ciphering Mode Info This IE is defined in sub-clause 9.3.14. The GERAN does not include this IE unless it is performing an SBSS relocation and a change in ciphering algorithm.
New G-RNTI This IE assigns a new G-RNTI to the MS. This IE is coded as the G-RNTI IE defined in sub-clause 9.3.32.
CN Information Info This IE is defined in sub-clause 9.3.17.
RLC Re-establishment indicator SRB2-4 (1 bit field) This field indicates to the MS to re-establish the RLC instances for SRB2-4 (see 3GPP TS 44.160). bit 1 0   Do not re-establish the RLC instances for SRB2-4 1   Re-esatblish the RLC instances for SRB2-4
RLC Re-establishment indicator RB5+ (1 bit field) This field indicates to the MS to re-establish the RLC instances for RB5+ (see 3GPP TS 44.160). bit 1 0   Do not re-establish the RLC instances for RB5+ 1   Re-esatblish the RLC instances for RB5+
GRA Identity This field is defined in sub-clause 9.3.30.
DBPSCH Description This IE is defined in sub-clause 9.3.19.
RB Information to Release list (5 bit field) This field is used to repeat information on each RB to be released, where 0 enables one RB to be described. Range : 0 to maxRB-1.
RB Information to Release This IE is defined in sub-clause 9.3.83.
RB Information to Reconfigure list (5 bit field) This field is used to repeat information on each RB to be reconfigured, where 0 enables one RB to be described. Range: 0 to maxRB-1.

RB Information to Reconfigure This IE is defined in sub-clause 9.3.82.

RB Information to Be Affected list (5 bit field) This field is used to repeat information on each RB to be affected, where 0 enables one RB to be described. Range: 0 to maxRB-1.

RB Information to Be Affected This IE is defined in sub-clause 9.3.81.

RB with PDCP Information list (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described. . Range: 0 to maxRBallRABs-1.

RB with PDCP Information This IE is defined in sub-clause 9.3.86.

PDCP context relocation info This IE is defined in sub-clause 9.3.116.

Downlink Counter Synchronisation Info struct This structure contains information about PDCP synchronisation.

9.2.4   DEDICATED PAGING REQUEST

In *RRC-Cell_Dedicated state*, GERAN sends this message to signal a core-network-originated page.

    Radio Bearer :   SRB2

    Direction :   GERAN → MS

Table 9.2.4.1: DEDICATED PAGING REQUEST information elements

```
< DEDICATED PAGING REQUEST message content > ::=
    { 0 -- critical extension escape available
        {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
        < Paging Cause : < Paging Cause IE > >
        < CN Domain Identity : < CN Domain Identity IE > >
        < Paging Record Type Identifier : < Paging Record Type Identifier IE> >
        !    < Content part error : bit (*) = < no string > > }
    !    < Message escape critical extension : 1 bit (*) = < no string > >} ;
```

Table 9.2.4.2: DEDICATED PAGING REQUEST information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.

Integrity Check Info This IE is defined in sub-clause 9.3.36.

Paging Cause This IE is defined in sub-clause 9.3.57.

CN Domain Identity This IE is defined in sub-clause 9.3.15.

Paging Record Type Identifier This IE is defined in sub-clause 9.3.58.

9.2.5   DOWNLINK DIRECT TRANSFER

This message is sent by GERAN to transfer higher layer messages.

Radio Bearer :   SRB3 and SRB4

Direction :   GERAN → MS

Table 9.2.5.1: DOWNLINK DIRECT TRANSFER information elements

```
< DOWNLINK DIRECT TRANSFER message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS Information Elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        -- CN Information Elements
            < CN Domain Identity : < CN Domain Identity IE > >
            < NAS Message : < NAS Message IE > >
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > >} ;
```

Table 9.2.5.2: DOWNLINK DIRECT TRANSFER information element details

RRC Transaction Identifier The RRC Transaction Identifier IE is defined in sub-clause 9.3.98.
Integrity Check Info The *Integrity Check Info* IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
CN Domain Identity The *CN Domain Identity* IE is defined in sub-clause 9.3.15.
NAS Message The *NAS Message* IE is defined in sub-clause 9.3.54.

9.2.6   EXTENDED MEASUREMENT ORDER

This message is the same as the EXTENDED MEASUREMENT ORDER message defined in 3GPP TS 44.018 but shall not contain:

- RR management Protocol Discriminator IE.

- Skip Indicator IE.

- L2 pseudo length IE.

- Extended Measurement Order IE.

Radio Bearer :   SRB1

Direction :   GERAN → MS

9.2.7   EXTENDED MEASUREMENT REPORT

This message is the same as the EXTENDED MEASUREMENT REPORT message defined in 3GPP TS 44.018 but shall not contain:

- RR management Protocol Discriminator IE.

- Skip Indicator IE.

- Extended Measurement Report Message Type IE.

Radio Bearer :   SRB1

Direction :   MS → GERAN

9.2.7a   ENHANCED MEASUREMENT REPORT

This message is the same as the ENHANCED MEASUREMENT REPORT message defined in 3GPP TS 44.018 but shall not contain:

- RR short PD field.

- Message type field.

- Short layer 2 header field.

Radio Bearer :   SRB1

Direction :   MS → GERAN

9.2.8   GERAN MOBILITY INFORMATION

This message is used by GERAN to allocate a new G-RNTI and to convey other GERAN mobility related information to a MS.

Radio Bearer :   SRB2

Direction :   GERAN→MS

Table 9.2.8.1: GERAN MOBILITY INFORMATION information elements

```
< GERAN MOBILITY INFORMATION message content > ::=
    { 0      -- Critical extension escape available
       {
       -- MS Information Elements
          < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
          < MS Timers and Constants in Connected Mode : < MS Timers and Constants in Connected Mode IE > >
          { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
          { 0 | 1  < Integrity protection mode info : < Integrity Protection Mode Info IE > > }
          { 0 | 1  < Ciphering Mode Info : < Ciphering Mode Info IE > > }
          { 0 | 1  < New G-RNTI : < G-RNTI IE > > }
       -- CN Information Elements
          { 0 | 1  < CN Information Info : < CN Information Info Full IE > > }
       -- GERAN Information Elements
          { 0 | 1  < GRA Identity : < GRA Identity IE > > }
          { 0 | 1  < Downlink Counter Synchronisation Info : < Downlink Counter Synchronisation Info struct > > }
       !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > >} ;
< Downlink Counter Synchronisation Info struct> ::=
    < RB with PDCP Information List : bit (5) >
    {  { 0 | 1  < RB with PDCP Information : < RB with PDCP Information IE > > }
       { 0 | 1  < PDCP context relocation info : < PDCP context relocation info IE > > } } * (1 + val(RB with PDCP
Information List) );
```

Table 9.2.8.2: GERAN MOBILITY INFORMATION information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

MS Timers and Constants in connected mode
This IE is defined in sub-clause 9.3.51.

Integrity Check Info This IE is defined in sub-clause sub-clause 9.3.36. The *Integrity Check Info IE* is included when integrity protection is applied
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39. The GERAN does not include this IE unless it is performing an SBSS relocation
Ciphering mode info This IE is defined in sub-clause 9.3.14. The GERAN does not include this IE unless it is performing an SBSS relocation and a change in ciphering algorithm
New G-RNTI This IE assigns a new G-RNTI to the MS. The *G-RNTI* IE is defined in sub-clause 9.3.32.
CN Information Info Full This IE is defined in sub-clause 9.3.18.
GRA Identity This IE is defined in sub-clause 9.3.30.
Downlink Counter Synchronisation info This structure contains information about PDCP synchronisation.
RB with PDCP Information List (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described.. Range: 0 to maxRBallRABs-1. Other values are reserved.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.
PDCP context relocation info This IE is defined in sub-clause 9.3.116

9.2.9   GERAN MOBILITY INFORMATION CONFIRM

This message is used to confirm the new GERAN mobility information for the MS.

    Radio Bearer :   SRB2

    Direction :   MS→GERAN

Table 9.2.9.1: GERAN MOBILITY INFORMATION CONFIRM information elements

```
< GERAN MOBILITY INFORMATION CONFIRM message content > ::=
    {
    -- MS Information Elements
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > }
    -- RB Information Elements
        { 0 | 1  < COUNT-C Activation Time : < Activation Time IE > > }
        { 0 | 1  < Radio Bearer Uplink Ciphering Activation Time Info : < RB Activation Time Info IE> >}
        { 0 | 1  < Uplink Counter Synchronisation Info : < Uplink Counter Synchronisation Info struct > > }
        !    < Content part error : bit (*) = < no string > > };

< Uplink Counter Synchronisation Info struct > ::=
        {
        < START List: bit (2) >
        {   < START : < START IE > >
            < CN Domain Identity : < CN Domain Identity IE > > } *(1+val(START list))
        { 0 | 1  < RB with PDCP Information list : bit (5) >
                < RB with PDCP Information : < RB with PDCP Information IE > > *(1 + val(RB with PDCP Information
list) )}
}
```

Table 9.2.9.2: GERAN MOBILITY INFORMATION CONFIRM information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included when integrity protection is applied.
Uplink Integrity Protection Activation Info The *Integrity Protection Activation Info* IE is defined in sub-clause 9.3.37.
COUNT-C Activation Time Thie IE is used for radio bearers mapped on RLC-TM when the MS is moving to RRC-Cell_Dedicated state. The Activation Time IE is defined in sub-clause 9.3.1.
Radio Bearer Activation Time Info The RB Activation Time Info IE is defined in sub-clause 9.3.77.
Uplink Counter Synchronisation info This structure contains information about PDCP synchronisation.
START List (2 bit field) This field is the binary representation of the number of CN domain START struct. Range : 0 to maxCNdomains-1.
START This field is defined in sub-clause 9.3.102.
CN Domain Identity The *CN Domain Identity* IE identifies the type of core network domain. This IE is defined in sub-clause 9.3.15.
RB with PDCP Information List (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described.. Range: 0 to maxRBallRABs-1.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.

9.2.10 GERAN MOBILITY INFORMATION FAILURE

This message is sent to indicate a failure to act on a received GERAN MOBILITY INFORMATION message.

> Radio Bearer : SRB2

> Direction : MS→GERAN

Table 9.2.10.1: GERAN MOBILITY INFORMATION FAILURE information elements

```
< GERAN MOBILITY INFORMATION FAILURE message content > ::=
   {
       < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
       < Failure Cause : < Failure Cause and Error Information IE > >
       { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
   !   < Content part error : bit (*) = < no string > > };
```

Table 9.2.10.2: GERAN MOBILITY INFORMATION FAILURE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Failure Cause and Error Information The *Failure Cause And Error Information* IE is defined in sub-clause 9.3.25.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included when integrity protection is applied.

9.2.11 GRA UPDATE

This message is used by the MS to initiate a GRA Update procedure.

> Radio Bearer : SRB2

> Direction : MS→GERAN

Table 9.2.11.1: GRA UPDATE information elements

```
< GRA UPDATE message content > ::=
     {
         < G-RNTI : < G-RNTI IE > >
         < GRA Update Cause : < GRA Update Cause IE > >
         {   < Protocol Error Indicator : 0 >
         |   < Protocol Error Indicator : 1 >
           {   < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
               < Protocol Error Information : < Protocol Error Information IE > > } }
         { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
     !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.11.2: GRA UPDATE information element details

G-RNTI This IE is defined in sub-clause 9.3.32.
GRA Update Cause This IE is defined in sub-clause 9.3.31.
RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.

Protocol Error Information
This IE is defined in sub-clause 9.3.71.

Integrity Check Info
This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included when integrity protection is applied.

Protocol Error Indicator
This IE is defined in sub-clause 9.3.70

9.2.12   GRA UPDATE CONFIRM

This message confirms the GRA update procedure and can be used to reallocate new G-RNTI information for the MS valid after the GRA update.

    Radio Bearer :   SRB2

    Direction :   GERAN→MS

Table 9.2.12.1: GRA UPDATE CONFIRM information elements

```
< GRA UPDATE CONFIRM message content > ::=
    { 0 -- critical extension escape available
        {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < RRC State Indicator : < RRC State Indicator IE > >
        < GERAN DRX Cycle Length Coefficient : < GERAN DRX Cycle Length Coefficient IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
        { 0 | 1  < Ciphering Mode Info : < Ciphering Mode Info IE > > }
        { 0 | 1  < New G-RNTI : <G-RNTI IE > > }
        { 0 | 1  < CN Information Info : < CN Information Info IE > > }
        { 0 | 1  < GRA Identity : < GRA Identity IE >> }
        { 0 | 1  < Downlink Counter Synchronisation Info : < Downlink Counter Synchronisation Info struct > > }
        !    < Content part error : bit (*) = < no string > > }
    !    < Message escape critical extensions : 1 bit (*) = < no string > >} ;
< Downlink Counter Synchronisation Info struct> ::=
    < RB with PDCP Information List : bit (5) >
    {  { 0 | 1  < RB with PDCP Information : < RB with PDCP Information IE > > }
        { 0 | 1   < PDCP context relocation info : < PDCP context relocation info IE > > } } * (1 + val(RB with PDCP
Information List) );
```

Table 9.2.12.2: GRA UPDATE CONFIRM information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

RRC State Indicator
This IE is defined in sub-clause 9.3.97.

GERAN DRX Cycle Length Coefficient
This IE is defined in sub-clause 9.3.29.

Integrity Check Info
This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.

Integrity Protection Mode Info
This IE is defined in sub-clause 9.3.39. The GERAN does not include this IE unless it is performing an SBSS relocation

Ciphering Mode Info
This IE is defined in sub-clause 9.3.14. The GERAN does not include this IE unless it is performing an SBSS relocation and a change in ciphering algorithm

New G-RNTI
This IE assigns a new G-RNTI to the MS. This IE is coded as the *G-RNTI* IE defined in sub-clause 9.3.32.

CN Information info
This IE is defined in sub-clause 9.3.17.

GRA Identity
This IE is defined in sub-clause 9.3.30.

RB with PDCP Information List (5 bit field)
This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described. Range: 0 to maxRBallRABs-1. Other values are reserved.

RB with PDCP Information
This IE is defined in sub-clause 9.3.86.

PDCP context relocation info
This IE is defined in sub-clause 9.3.116.

9.2.13 (void)

9.2.14 HANDOVER COMPLETE

This message is sent from the MS when a physical channel reconfiguration has been done.

Radio Bearer :   SRB2

Direction :   MS → GERAN

Table 9.2.14.1: HANDOVER COMPLETE information elements

```
< HANDOVER COMPLETE message content > ::=
    {
    -- MS information elements
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < RRC Cause : < RRC Cause IE > >
        { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1 < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > }
        { 0 | 1 < Mobile Observed Time Difference : < Mobile Time Difference IE> > }
    -- RB information elements
        { 0 | 1 < COUNT-C Activation Time : < Activation Time IE > > }
        { 0 | 1 < Radio Bearer Uplink Ciphering Activation Time Info : < RB Activation Time Info IE> > }
        { 0 | 1 < Uplink Counter Synchronisation Info : < Uplink Counter Synchronisation Info struct > > }
    !    < Content part error : bit (*) = < no string > > } ;

< Uplink Counter Synchronisation Info struct > ::=
    {   < START List : bit (2) >
        {   < CN Domain Identity : < CN Domain Identity IE > >
            < START : < START IE > > } * (1+val(START List))
        { 0 | 1 < RB with PDCP Information List : bit (5) >
                < RB with PDCP Information : < RB with PDCP Information IE > > *(1+val(RB with PDCP Information
List)) }
    };
```

Table 9.2.14.2: HANDOVER COMPLETE information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

Integrity Check Info
This IE shall be set to the used signalling radio bearer identity when the encoded RRC message is used as the MESSAGE parameter in the integrity protection algorithm. This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included when integrity protection is applied.

Uplink Integrity Protection Activation Info
This IE contains the time, in terms of RRC sequence numbers, when a new integrity protection configuration shall be activated for the signalling radio bearers. The Integrity protection activation info IE is defined in sub-clause 9.3.36.

COUNT-C Activation Time
The *Activation Time* IE is defined in sub-clause 9.3.1

Radio Bearer Uplink Ciphering Activation Time info
The *RB activation time info* IE is defined in sub-clause 9.3.77

Uplink Counter Synchronisation Info struct
This structure enable to synchronise the Uplink security counters.

START List (2 bit field)
This field is used to repeat information on each RB to be affected, where 0 enables one RB to be described.. Range : 0 to maxCNdomains-1.

CN Domain Identity
This IE is defined in sub-clause 9.3.15.

START
This IE is defined in sub-clause 9.3.102. START value to be used in this CN domain.

RB with PDCP Information List (5 bit field)
This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described.. Range : 0 to maxRBallRABs-1.

RRC Cause
This IE is defined in sub-clause 9.3.94.

RB with PDCP Information
This IE is defined in sub-clause 9.3.86.

9.2.15 HANDOVER FAILURE

Radio Bearer : SRB2

Direction : MS → GERAN

Table 9.2.15.1: HANDOVER FAILURE information elements

```
< HANDOVER FAILURE message content > ::=
    {
        < Failure Cause : < Failure Cause and Error Information IE > >
        < RRC Cause : < RRC Cause IE > >
        { 0 | 1  < RRC Transaction Identifier : < RRC Transaction Identifier IE > > }
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.15.2: HANDOVER FAILURE information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

Integrity Check Info
This IE shall be set to the used signalling radio bearer identity when the encoded RRC message is used as the MESSAGE parameter in the integrity protection algorithm. This IE is defined in sub-clause 9.3.36.

RRC Cause
The *RRC Cause* IE is defined in sub-clause 9.3.94.

Failure Cause
The *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.

9.2.16 HANDOVER FROM GERAN Iu COMMAND

This message is used for handover from GERAN Iu to GERAN A/Gb.

    Radio Bearer : SRB2

    Direction : GERAN→MS

Table 9.2.16.1: HANDOVER FROM GERAN Iu COMMAND information elements

```
< HANDOVER FROM GERAN Iu COMMAND message content > ::=
    { 0 -- critical extension escape available
      {
      -- MS Information Elements
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < Activation Time : < Activation Time IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
      -- RB Information Elements
        { 0 | 1  < RAB Information List : bit (4) >
            < RAB Info : < RAB Info IE > > * (1 + val(RAB Information List) ) }
        < Handover Command : < Handover Command struct > >
      !   < Content part error : bit (*) = < no string > > }
   !   < Message escape critical extension : 1 bit (*) = < no string > >} ;

< Handover Command struct > ::=
   {
       < Handover Command Length : bit (8) >
       < Handover Command : octet(val(Handover Command Length)) >
   };
```

Table 9.2.16.2: HANDOVER FROM GERAN Iu COMMAND information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

Activation Time
This IE is defined in sub-clause 9.3.1.

Integrity Check Info
This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included when integrity protection is applied.

Integrity Protection Mode Info
This IE is defined in sub-clause 9.3.39

RAB Information List (4 bit field)
This field is used to repeat information on each RABto Setup, where 0 enables one RAB to be described.Range : 0 to maxRABsetup-1. Other values are reserved.

RAB Information List
The *RAB Info* IE is defined in sub-clause 9.3.73.

Handover Command struct
This structure contains the message HANDOVER COMMAND and the length of the message. The HANDOVER COMMAND message is defined in 3GPP TS 44.018.

9.2.17   INITIAL DIRECT TRANSFER

This message is used to initiate a signalling connection based on indication from the upper layers, and to transfer a NAS message.

Radio Bearer :   SRB3

Direction :   MS → GERAN

Table 9.2.17.1: INITIAL DIRECT TRANSFER information elements

```
< INITIAL DIRECT TRANSFER message content > ::=
    {
        < CN Domain Identity : < CN Domain Identity IE > >
        < Intra Domain NAS Node Selector : < Intra Domain NAS Node Selector IE > >
        < NAS Message : < NAS Message IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        < Start : < Start IE > >
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.17.2 : INITIAL DIRECT TRANSFER information element details

CN Domain Identity
The CN Domain Identity IE is defined in sub-clause 9.3.15.

Intra Domain NAS Node Selector
The Intra Domain NAS Node Selector IE is defined in sub-clause 9.3.41.

NAS Message
The NAS Message IE is defined in sub-clause 9.3.54.

Integrity Check Info
The Integrity Check Info IE is defined in sub-clause 9.3.36. The Integrity Check Info IE is included if integrity protection is applied.

Start
This IE is defined in sub-clause 9.3.102.

9.2.18   INTER SYSTEM TO CDMA2000 HANDOVER COMMAND

This message is used for handover from GERAN *Iu mode* to another system e.g. CDMA2000. One or several messages from the other system can be included in the Inter-RAT message information element in this message. These messages are structured and coded according to that systems specification.

Radio Bearer :   SRB2

Direction :   GERAN→MS

Table 9.2.18.1: INTER SYSTEM TO CDMA2000 HANDOVER COMMAND information elements

```
< INTER SYSTEM TO CDMA2000 HANDOVER COMMAND message content > ::=
    { 0 --critical extension escape available
        {
        --MS information elements
            < RRC Transaction Identifier : bit (2) >
            < Activation Time : < Activation Time IE > >
            { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1  < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
            -- RB information elements
            { 0 | 1  < RAB Information List : bit (4) >
                < RAB Info : < RAB Info IE > > * (1+val(RAB Information List))}
            < Handover to CDMA2000 Command : < Handover to CDMA2000 Command struct > >
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extension : 1 bit (*) = < no string > > } ;

< Handover to CDMA2000 Command struct > ::=
    {
        < Length of Handover to CDMA2000 Command contents : bit (8) >
        < Handover to CDMA2000 Command : octet(val(Length of Handover to CDMA2000 Command contents)) >
    };
```

Table 9.2.18.2 : INTER SYSTEM TO CDMA2000 HANDOVER COMMAND information element details

RRC Transaction Identifier (2 bit field) This field is defined in sub-clause 9.3.98.
Activation Time This IE is defined in sub-clause 9.3.1.
Integrity Check Info This IE is defined in sub-clause 9.3.36.
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39
RAB Information List (4 bit field) This field is the binary representation of the number of Radio Access Bearers to setup. Range : 0 to maxRABsetup-1. Other values are reserved.
RAB Info The *RAB Info* IE is defined in sub-clause 9.3.73.
Handover to CDMA2000 Command struct This structure contains the message HANDOVER to CDMA2000 COMMAND and the length of the HANDOVER to CDMA2000 COMMAND message. The HANDOVER to CDMA2000 COMMAND message is defined in TIA/EIA/IS-833 and TIA/EIA/IS-2000-5.

NOTE: The MSG_TYPE of the cdma2000 message used for the intersystem handover is included in the first octet of the Handover to CDMA2000 Command struct. It is specified in TIA/EIA/IS-2000 and in TIA/EIA/IS-833. (E.g. MSG_TYPE::= {00010001} if Extended Handoff Direction Message (EHDM) is used, MSG_TYPE::= {00011111} if General Handoff Direction Message is used, etc.). The order of the bits in this octet representing is given by the following example. If MSG_TYPE::={00010001} (EHDM), the bit number 1 of 'cdma2000 MSG_TYPE IEI' is '0', the bit number 2 shall be '0', etc., and the bit number 8 is '1'.

The remaining octets in the Handover to CDMA2000 Command struct is coded as the payload of the message used for the inter system handover, as specified in TIA/EIA/IS-2000-5 and in TIA/EIA/IS-833. The bit ordering is similar to the case described above. The bit number 1 of 'cdma2000 message payload' is coded as the first bit of the first record of the message defined in TIA/EIA/IS-2000-5 and in TIA/EIA/IS-833, reading the records defined in TIA/EIA/IS-2000-5 and in TIA/EIA/IS-833 from left to right.

9.2.19   INTER SYSTEM TO UTRAN HANDOVER COMMAND

This message is used for handover from GERAN *Iu mode* to another system e.g. UTRAN. One or several messages from the other system can be included in the Inter-RAT message information element in this message. These messages are structured and coded according to that systems specification.

Radio Bearer :   SRB2

Direction :   GERAN→MS

Table 9.2.19.1: INTER SYSTEM TO UTRAN HANDOVER COMMAND information elements

```
< INTER SYSTEM TO UTRAN HANDOVER COMMAND message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS information elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            < Activation Time : < Activation Time IE > >
            { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1 < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
        -- RB information elements
            < Handover to UTRAN Command : < Handover to UTRAN Command struct > >
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extension : 1 bit (*) = < no string > > } ;

< Handover to UTRAN Command struct > ::=
    {
        < Radio Bearer Reconfiguration Length : bit (8) >
        < Handover to UTRAN Command : octet(val(Radio Bearer Reconfiguration Length)) >
    };
```

Table 9.2.19.2: INTER SYSTEM TO UTRAN HANDOVER COMMAND information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Activation Time This IE is defined in sub-clause 9.3.1.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The integrity Check Info IE is included when integrity protection is applied.
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39

Handover to UTRAN Command struct
This structure contains the **RADIO BEARER RECONFIGURATION** message and the length of the **RADIO BEARER RECONFIGURATION** message. The **RADIO BEARER RECONFIGURATION** message is defined in 3GPP TS 25.331.

9.2.20 LCS DOWNLINK INFORMATION

This message is used by the GERAN to convey embedded LCS RRLP PDUs between the SMLC and the MS.

Radio Bearer: SRB3

Direction: GERAN → MS

Table 9.2.20.1: LCS DOWNLINK INFORMATION information elements

```
< LCS DOWNLINK INFORMATION message content > ::=
   { 0 -- critical extension escape available
      {
          < RRC Transaction Identifier :< RRC Transaction Identifier IE > >
          { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
          < RRLP PDU Length : bit (8) >
          < RRLP PDU : octet(val(RRLP PDU Length)) >
      !   < Content part error : bit (*) = < no string > > }
   !   < Message escape critical extension : 1 bit (*) = < no string > >} ;
```

Table 9.2.21.2: LCS DOWNLINK INFORMATION information element details

RRC Transaction Identifier
This field is defined in sub-clause 9.3.98.

Integrity Check Info
This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.

RRLP PDU Length (8 bit field)
This field is the binary representation of the length in octets of the following RRLP PDU field. Range: 0 to 241. All other values are reserved.

RRLP PDU (variable length octet string)
This field contains an RRLP PDU as defined in 3GPP TS 44.031.

9.2.21 LCS UPLINK INFORMATION

This message is used by the MS to convey embedded LCS RRLP PDUs between the MS and the GERAN (SMLC).

Radio Bearer: SRB3

Direction: MS → GERAN

Table 9.2.21.1: LCS UPLINK INFORMATION information elements

```
< LCS UPLINK INFORMATION message content > ::=
     {
         < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
         { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
         < RRLP PDU Length : bit (8) >
         < RRLP PDU : octet(val(RRLP PDU Length)) >
     !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.21.2: LCS UPLINK INFORMATION information element details

RRC Transaction Identifier This field is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
RRLP PDU Length (8 bit field) This field is the binary representation of the length in octets of the following RRLP PDU field. Range: 0 to 241. All other values are reserved.
RRLP PDU (variable length octet string) This field contains an RRLP PDU as defined in 3GPP TS 44.031.

9.2.22   MEASUREMENT INFORMATION

This message is the same as the MEASUREMENT INFORMATION message defined in 3GPP TS 44.018 sub-clause 9.1.54, but shall not contain:

- RR short PD field.

- Message type field.

- Short layer 2 header field.

Radio Bearer :   SRB1

Direction :   GERAN → MS

9.2.23   MEASUREMENT REPORT

This message is the same as the MEASUREMENT REPORT message defined in 3GPP TS 44.018 but shall not contain:

- RR management Protocol Discriminator IE.

- Skip Indicator IE.

- Measurement Report Message Type IE.

Radio Bearer :   SRB1

Direction :   MS → GERAN

9.2.24   MS CAPABILITY ENQUIRY

The MS CAPABILITY ENQUIRY is used by the GERAN to enquire GERAN A/Gb mode, UTRAN or CDMA2000 classmarks and UTRAN predefined configurations from the MS.

Radio Bearer: SRB2

Direction: GERAN → MS

Table 9.2.24.1: MS CAPABILITY ENQUIRY information elements

```
< MS CAPABILITY ENQUIRY message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS Information Elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
            < Capability Update Requirement : < Capability Update Requirement IE > >
            { 0 | 1 < UTRAN predefined Configuration Requirement: bit (1) > }
        !   < Content part error: bit(*) = < no string > > }
    !   < Message escape critical extensions: 1 bit (*) = < no string > > } ;
```

Table 9.2.24.2: MS CAPABILITY ENQUIRY information element details

RRC Transaction Identifier This field is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. Integrity check info is included if integrity protection is applied.
UTRAN predefined Configuration Requirement (1 bit field) This field corresponds to the information whether the predefined configurations are requested by the network.. bit 1 0   UTRAN predefined configuration not requested by the network 1   UTRAN predefined configuration requested by the network
Capability Update Requirement This IE is defined in sub-clause 9.3.4.

9.2.25   MS CAPABILITY INFORMATION

This message is sent by the MS to the GERAN to convey MS specific capability information to the GERAN.

Radio Bearer: SRB2

Direction: MS → GERAN

Table 9.2.25.1: MS CAPABILITY INFORMATION information elements

```
< MS CAPABILITY INFORMATION message content > ::=
        {
        -- MS Information Elements
            { 0 | 1  < RRC Transaction Identifier : < RRC Transaction Identifier IE > > }
            { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1  < MS GERAN Iu mode Radio Access Capability : < MS GERAN Iu mode Radio Access Capability IE
> > }
            { 0 | 1  < MS GERAN A/Gb mode Radio Access Capability : < MS GERAN A/Gb mode Radio Access
Capability IE > > }
            { 0 | 1  < UE UTRAN Radio Access Capability : < UE UTRAN Radio Access Capability IE > > }
            { 0 | 1  < UE UTRAN Radio Access Capability Extension : < UE UTRAN Radio Access Capability Extension
IE >> }
            { 0 | 1  < UE UTRAN Predefined Configuration Status Information : < UE UTRAN Predefined Configuration
Status Information IE >> }
            { 0 | 1  < UE CDMA2000 Radio Access Capability : < UE CDMA2000 Radio Access Capability IE > > }
        !   < Content part error: bit (*) = < no string > > } ;
```

Table 9.2.25.2: MS CAPABILITY INFORMATION information element details

RRC Transaction Identifier This field is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. Integrity check info is included if integrity protection is applied.
MS GERAN Iu mode Radio Access Capability This IE is defined in sub-clause 9.3.45.
MS GERAN A/Gb mode Radio Access Capability This IE is defined in sub-clause 9.3.46.
UE UTRAN Radio Access Capability This IE is defined in sub-clause 9.3.108.
UE UTRAN Radio Access Capability Extension This IE is defined in sub-clause 9.3.109.
UE UTRAN Predefined Configuration Status Information This IE is defined in sub-clause 9.3.108a.
UE CDMA2000 Radio Access Capability This IE is defined in sub-clause 9.3.110.

9.2.26 MS CAPABILITY INFORMATION CONFIRM

This message is sent by the GERAN to the MS to confirm that the MS capability information has been received.

Radio Bearer: SRB2

Direction: GERAN → MS

Table 9.2.26.1: MS CAPABILITY INFORMATION CONFIRM information elements

```
< MS CAPABILITY INFORMATION CONFIRM message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS Information Elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions: 1 bit (*) = < no string > >} ;
```

Table 9.2.26.2: MS CAPABILITY INFORMATION CONFIRM information element details

RRC Transaction Identifier This field is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. *Integrity Check Info* IE is included if integrity protection is applied.

9.2.27 (void)

9.2.28 RADIO BEARER RECONFIGURATION

This message is sent from GERAN to reconfigure parameters related to a change of QoS or change of physical channel.

Radio Bearer : SRB2

Direction : GERAN → MS

Table 9.2.28.1: RADIO BEARER RECONFIGURATION information elements

```
< RADIO BEARER RECONFIGURATION message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS information elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            < Activation Time : < Activation Time IE > >
            < RRC State Indicator : < RRC State Indicator IE > >
            < GERAN DRX Cycle Length Coefficient : < GERAN DRX Cycle Length Coefficient IE > >
            { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1 < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
            { 0 | 1 < Ciphering Mode Info : < Ciphering Mode Info IE > > }
            { 0 | 1 < New G-RNTI : < G-RNTI IE > > }
        -- CN information elements
            { 0 | 1 < CN Information Info : < CN Information Info IE > > }
        -- GERAN information elements
            { 0 | 1 < GRA Identity : < GRA Identity IE > > }
        -- RB information elements
            { 0 | 1 < RAB Information to Reconfigure List : bit (4) >
                < RAB Information to Reconfigure : < RAB Information to Reconfigure IE > > * (1+val(RAB
Information to Reconfigure List)) }
            { 0 | 1 < RB Information to Reconfigure List : bit (5) >
                {   < RB Information to Reconfigure : < RB Information to Reconfigure IE > >
                    { 0 | 1 < Physical Information : < Physical Channel Configuration IE > > }
                }* (1+val(RB Information to Reconfigure List))
            }
            { 0 | 1 < Downlink Counter Synchronisation Info : < Downlink Counter Synchronisation info struct > > }
            { 0 | 1 < RB Information to Be Affected List : bit (5) >
                < RB Information to Be Affected : < RB Information to Be Affected IE > > *(1+val(RB Information to
Be Affected List)) }
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extension : 1 bit (*) = < no string > >} ;
< Downlink Counter Synchronisation Info struct> ::=
    < RB with PDCP Information List : bit (5) >
    {   { 0 | 1 < RB with PDCP Information : < RB with PDCP Information IE > > }
        { 0 | 1  < PDCP context relocation info : < PDCP context relocation info IE > > } } * (1 + val(RB with PDCP
Information List) );
```

Table 9.2.28.2: RADIO BEARER RECONFIGURATION information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Activation Time The *Activation Time* IE is defined in sub-clause 9.3.1.
RRC State Indicator This IE is defined in sub-clause 9.3.86.
GERAN DRX Cycle Length Coefficient This IE is defined in sub-clause 9.3.29.

Integrity Check Info This IE is defined in sub-clause 9.3.36. The integrity Check Info IE is included when integrity protection is applied.
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39. The GERAN does not include this IE unless it is performing an SBSS relocation
Ciphering Mode Info This IE is defined in sub-clause 9.3.14. The GERAN does not include this IE unless it is performing an SBSS relocation and a change in ciphering algorithm.
New G-RNTI This IE assigns a new G-RNTI to the MS. This IE is coded as the *G-RNTI* IE defined in sub-clause 9.3.32.
CN Information Info This IE is defined in sub-clause 9.3.17.
GRA Identity This IE is defined in sub-clause 9.3.30.
RAB Information to Reconfigure List (4 bit field) This field is used to repeat information on each RAB to reconfigure. Range: 0 to maxRABsetup-1, where 0 enables one RAB to be described.
RAB Information to Reconfigure This IE is defined in sub-clause 9.3.76.
RB Information to Reconfigure List (5 bit field) This field is used to repeat information on each RB to reconfigure, where 0 enables one RB to be described. Range : 0 to maxRB-1.
RB Information to Reconfigure This IE is defined in sub-clause 9.3.82.
RB Information to Be Affected List (5 bit field) This field is used to repeat information on each RB to be affected, where 0 enables one RB to be described. Range : 0 to maxRB-1.
RB Information to Be Affected This IE is defined in sub-clause 9.3.81.
RB with PDCP Information list (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described. . Range: 0 to maxRBallRABs-1
Downlink Counter Synchronisation Info struct This structure contains information about PDCP synchronisation.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.
PDCP context relocation info This IE is defined in sub-clause 9.3.116.
Physical Information The *Physical Channel Configuration* IE is defined in sub-clause 9.3.62.

9.2.29   RADIO BEARER RECONFIGURATION COMPLETE

This message is sent from the MS when a RB and/or a physical channel reconfiguration has been done.

Radio Bearer :   SRB2

Direction :   MS→ GERAN

Table 9.2.29.1: RADIO BEARER RECONFIGURATION COMPLETE information elements

```
< RADIO BEARER RECONFIGURATION COMPLETE message content > ::=
    {
    -- MS information elements
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > }
        { 0 | 1  < Mobile Observed Time Difference : < Mobile Time Difference IE > > }
    -- RB information elements
        { 0 | 1  < COUNT-C Activation Time : < Activation Time IE > > }
        { 0 | 1  < Radio Bearer Uplink Ciphering Activation Time Info : < RB Activation Time Info IE> > }
        { 0 | 1  < Uplink Counter Synchronisation Info : < Uplink Counter Synchronisation Info struct > > }
    !  < Content part error : bit (*) = < no string > > } ;

< Uplink Counter Synchronisation Info struct > ::=
    {   < START List : bit (2) >
        {   < CN Domain Identity : < CN Domain Identity IE > >
        < START : < START IE > > } * (1+val(START List))
        { 0 | 1  < RB with PDCP Information List : bit (5) >
            < RB with PDCP Information : < RB with PDCP Information IE > > * (1+val(RB with PDCP Information
List)) }
    };
```

Table 9.2.29.2: RADIO BEARER RECONFIGURATION COMPLETE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
Uplink Integrity Protection Activation Info This IE contains the time, in terms of RRC sequence numbers, when a new integrity protection configuration shall be activated for the signalling radio bearers. The *Integrity protection activation info* IE is defined in sub-clause 9.3.37.
COUNT-C Activation Time The *Activation Time* IE is defined in sub-clause 9.3.1.
Radio Bearer Uplink Ciphering Activation Time Info This IE is coded as the *RB activation time info* IE defined in sub-clause 9.3.77.
Mobile Observed Time Difference The *Mobile Time Difference* IE is defined in sub-clause 9.3.43.
Uplink Counter Synchronisation Info struct This structure enable to synchronise the Uplink security counters.
START List (2 bit field) START value to be used in this CN domain. This field is the binary representation of the number of RB to be affected. Range : 0 to maxCNdomains-1.
CN Domain Identity This IE is defined in sub-clause 9.3.15.

START This IE is defined in sub-clause 9.3.102.

RB with PDCP Information List (5 bit field) This field is used to repeat information on each RB to reconfigure, where 0 enables one RB to be described. . Range : 0 to maxRBallRABs-1.

RB with PDCP Information This IE is defined in sub-clause 9.3.86.

9.2.30   RADIO BEARER RECONFIGURATION FAILURE

This message is sent by MS if the configuration given by GERAN is unacceptable or if the MS failed to establish the physical channel(s).

Radio Bearer :   SRB2

Direction :   MS→GERAN

Table 9.2.30.1: RADIO BEARER RECONFIGURATION FAILURE information elements

```
< RADIO BEARER RECONFIGURATION FAILURE message content > ::=
    {
    -- MS information elements
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < RRC Cause : < RRC Cause IE > >
        < Failure Cause : < Failure Cause and Error Information IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
    -- RB information elements
        { 0 | 1  < Potentially Succesful RB List : bit (5) >
                < RB Identity : < RB Identity IE >> *(1 + val(Potentially Succesful RB List) ) }
    !    < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.30.2: RADIO BEARER RECONFIGURATION FAILURE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.

Integrity Check Info This IE is defined in sub-clause 9.3.36. Integrity Check Info is included if integrity protection is applied.

Failure Cause This *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.

RRC Cause This *RRC Cause* IE is defined in sub-clause 9.3.94.

Potentially Succesful RB List (5 bit field) This field is the binary representation of the number of RB for which reconfiguration would have succeeded. Range : 0 to maxRB-1.

RB Identity This IE is defined in sub-clause 9.3.80.

9.2.31   RADIO BEARER RELEASE

This message is used by GERAN to release a radio bearer. It can also include modifications to the configurations of physical channels.

Radio Bearer :   SRB2

Direction :   GERAN → MS

Table 9.2.31.1: RADIO BEARER RELEASE information elements

```
< RADIO BEARER RELEASE message content > ::=
    { 0  -- critical extension escape available
        {
        -- MS information elements
            < RRC Transaction Identifier : < RRC Transaction IdentifierIE > >
            < Activation Time : < Activation Time IE > >
            < RRC State Indicator : < RRC State Indicator IE > >
            < GERAN DRX Cycle Length Coefficient : < GERAN DRX Cycle Length Coefficient IE > >
            { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1 < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
            { 0 | 1 < Ciphering Mode Info : < Ciphering Mode Info IE > > }
            { 0 | 1 < New G-RNTI : < G-RNTI IE > > }
        -- CN information elements
            { 0 | 1 < Signalling Connection Release Indication : < CN Domain Identity IE> > }
            { 0 | 1 < CN Information Info : < CN Information Info IE > > }
        -- GERAN information elements
            { 0 | 1 < GRA Identity : < GRA Identity IE > > }
        -- RB information elements
            { 0 | 1 < RAB Information to Reconfigure List : bit (4) >
                < RAB Information to Reconfigure : < RAB Information to Reconfigure IE > > *(1+val(RAB
Information to Reconfigure List)) }
            { 0 | 1 < RB Information to Release List : bit (5) >
                {   < RB Information to Release : < RB Information to Release IE > >
                    { 0 | 1 < Physical Information : < Physical Channel Configuration IE > > }
                }*(1+val(RB Information to Release List))
            }
            { 0 | 1 < RB Information to Be Affected List : bit (5) >
                < RB Information to Be Affected : < RB Information to Be Affected IE > >*(1+val(RB Information to
Be Affected List)) }
            { 0 | 1 < Downlink Counter Synchronisation Info : < Downlink Counter Synchronisation info struct > > }
    !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extension : 1 bit (*) = < no string > >} ;

< Downlink Counter Synchronisation Info struct> ::=
    < RB with PDCP Information List : bit (5) >
    {   { 0 | 1 < RB with PDCP Information : < RB with PDCP Information IE > > }
        { 0 | 1  < PDCP context relocation info : < PDCP context relocation info IE > > } } * (1 + val(RB with PDCP
Information List) );
```

Table 9.2.31.2: RADIO BEARER RELEASE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Activation Time The *Activation Time* IE is defined in sub-clause 9.3.1.
RRC State Indicator This IE is defined in sub-clause 9.3.97.
GERAN DRX Cycle Length Coefficient This IE is defined in sub-clause 9.3.29.

Integrity Check Info This IE is defined in sub-clause 9.3.36. Integrity Check Info is included if integrity protection is applied.
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39. The GERAN does not include this IE unless it is performing an SBSS relocation
Ciphering Mode Info This IE is defined in sub-clause 9.3.14. The GERAN does not include this IE unless it is performing an SBSS relocation and a change in ciphering algorithm
New G-RNTI This IE assigns a new G-RNTI to the MS. This IE is coded as the G-RNTI IE defined in sub-clause 9.3.33.
Signalling Connection Release Indication The *CN Domain Identity* IE is defined in sub-clause 9.3.15.
CN Information Info This IE is defined in sub-clause 9.3.17.
GRA Identity This IE is defined in sub-clause 9.3.30.
RAB Information to Reconfigure List (4 bit field) This field is used to repeat information on each RAB to reconfigure, where 0 enables one RAB to be described. Range: 0 to maxRABsetup-1.
RAB Information to Reconfigure This IE is defined in sub-clause 9.3.76.
RB Information to Release List (5 bit field) This field is used to repeat information on each RB to reconfigure, where 0 enables one RB to be described. Range: 0 to maxRB-1.
RB Information to Release This IE is defined in sub-clause 9.3.83.
RB Information to Be Affected List (5 bit field) This field is used to repeat information on each RB to be affected, where 0 enables one RB to be described. Range: 0 to maxRB-1.
RB Information to Be Affected This IE is defined in sub-clause 9.3.81.
Downlink Counter Synchronisation Info struct This structure contains information about PDCP synchronisation.
RB with PDCP Information List (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described. Range: 0 to maxRBallRABs-1.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.
PDCP context relocation info This IE is defined in sub-clause 9.3.116.
Physical Information The *Physical Channel Configuration* IE is defined in sub-clause 9.3.62.

9.2.32   RADIO BEARER RELEASE COMPLETE

This message is sent from the MS when radio bearer release has been completed.

   Radio Bearer :   SRB2

   Direction :   MS → GERAN

Table 9.2.32.1: RADIO BEARER RELEASE COMPLETE information elements

```
< RADIO BEARER RELEASE COMPLETE message content > ::=
    {
    -- MS information elements
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > }
    -- RB information elements
        { 0 | 1  < COUNT-C Activation Time : < Activation Time IE > > }
        { 0 | 1  < Radio Bearer Uplink Ciphering Activation Time Info : < RB Activation Time Info IE> > }
        { 0 | 1  < Uplink Counter Synchronisation Info : < Uplink Counter Synchronisation Info struct > > }
    !  < Content part error : bit (*) = < no string > > } ;

< Uplink counter synchronisation Info struct > ::=
    {   < START List : bit (2) >
        {   < CN Domain Identity : < CN Domain Identity IE > >
        < START : < START IE >) > } * (1+val(START List))
        { 0 | 1  < RB with PDCP Information List : bit (5) >
            < RB with PDCP Information : < RB with PDCP Information IE > > * (1+val(RB with PDCP Information
List)) }
    };
```

Table 9.2.32.2: RADIO BEARER RELEASE COMPLETE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
Uplink Integrity Protection Activation Info This IE contains the time, in terms of RRC sequence numbers, when a new integrity protection configuration shall be activated for the signalling radio bearers. The *Integrity Protection Activation Info* IE is defined in sub-clause 9.3.3. 37
COUNT-C Activation Time The *Activation Time* IE is defined in sub-clause 9.3.1.
Radio Bearer Uplink Ciphering Activation Time Info The *RB Activation Time Info* IE is defined in sub-clause 9.3.77.
Uplink Counter Synchronisation Info Struct This structure enable to synchronise the Uplink security counters.
START List (2 bit field) START value to be used in this CN domain. This field is the binary representation of the number of RB to be affected. Range : 0 to maxCNdomains-1.
CN Domain Identity This IE is defined in sub-clause 9.3.15.
START This IE is defined in sub-clause 9.3.102.

RB with PDCP Information List (5 bit field)

This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described.

Range: 0 to maxRBallRABs-1.

RB with PDCP Information

This IE is defined in sub-clause 9.3.86.

9.2.33   RADIO BEARER RELEASE FAILURE

This message is sent by MS if the configuration given by GERAN is unacceptable or if radio bearer can not be released.

Radio Bearer :   SRB2

Direction :   MS→GERAN

Table 9.2.33.1: RADIO BEARER RELEASE FAILURE information elements

```
< RADIO BEARER RELEASE FAILURE message content > ::=
    {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < RRC Cause : < RRC Cause IE > >
        < Failure Cause : < Failure Cause and Error Information IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Potentially Succesful RB List : bit (5) >
            < RB Identity :< RB Identity IE > > *(1 + val(Potentially Succesful RB List) ) }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.33.2: RADIO BEARER RELEASE FAILURE information element details

RRC Transaction Identifier

This IE is defined in sub-clause 9.3.98.

Integrity Check Info

This IE is defined in sub-clause 9.3.36.The *Integrity Check Info* IE is included if integrity protection is applied.

Failure Cause

The *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.

RRC Cause

This *RRC Cause* IE is defined in sub-clause 9.3.94.

Potentially Succesful RB List (5 bit field)

This field is the binary representation of the number of RB for which reconfiguration would have succeeded.

Range : 0 to maxRB-1.

RB Identity

This IE is defined in sub-clause 9.3.80.

9.2.34   RADIO BEARER SETUP

This message is sent by GERAN to the MS to establish new radio bearer(s).

Radio Bearer :   SRB2

Direction :   GERAN → MS

Table 9.2.34.1: RADIO BEARER SETUP information elements

```
< RADIO BEARER SETUP message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS information elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            < Activation Time : < Activation Time IE > >
            < RRC State Indicator : < RRC State Indicator IE > >
            < GERAN DRX Cycle Length Coefficient : < GERAN DRX Cycle Length Coefficient IE > >
            { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
            { 0 | 1 < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
            { 0 | 1 < Ciphering Mode Info : < Ciphering Mode Info IE > > }
            { 0 | 1 < New G-RNTI : < G-RNTI IE > > }
        -- CN information elements
            { 0 | 1 < CN Information Info : < CN Information Info IE > > }
        -- GERAN information elements
            { 0 | 1 < GRA identity : < GRA identity IE > > }
        -- RB information elements
            { 0 | 1 < RB Information to Setup List : bit (3) >
                {   < RB Information to Setup : < Signalling RB Information to Setup IE > >
                    { 0 | 1 < Physical Information : < Physical Channel Configuration IE > > }
                } *(1+val(RB Information to Setup List))
            }
            { 0 | 1 < RAB Information for Setup List : bit (4) >
                < RAB Information for Setup : < RAB Information for Setup IE > > *(1+val(RAB Information for Setup
List)) }
            { 0 | 1 < RB Information to Be Affected List : bit (5) >
                < RB Information to Be Affected : < RB Information to Be Affected IE > > *(1+val(RB Information to
Be Affected List)) }
            { 0 | 1 < Downlink Counter Synchronisation Info : < Downlink Counter Synchronisation info struct > > }
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extension : 1 bit (*) = < no string > >} ;
```

```
< Downlink Counter Synchronisation Info struct> ::=
    < RB with PDCP Information List : bit (5) >
    {   { 0 | 1 < RB with PDCP Information : < RB with PDCP Information IE > > }
        { 0 | 1 < PDCP context relocation info : < PDCP context relocation info IE > > } } * (1 + val(RB with PDCP
Information List));
```

Table 9.2.34.2: RADIO BEARER SETUP information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Activation Time The *Activation Time* IE is defined in sub-clause 9.3.1.
RRC State Indicator (2 bit field) This IE is defined in sub-clause 9.3.97.
GERAN DRX Cycle Length Coefficient (3 bit field) This IE is defined in sub-clause 9.3.29.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
Integrity Protection Mode Info This IE is defined in sub-clause 9.3.39. The GERAN does not include this IE unless it is performing an SBSS relocation
Ciphering Mode Info This IE is defined in sub-clause 9.3.14. The GERAN does not include this IE unless it is performing an SBSS relocation and a change in ciphering algorithm

New G-RNTI This IE assigns a new G-RNTI to the MS. This IE is coded as the G-RNTI IE defined in sub-clause 9.3.32.
CN Information Info This IE is defined in sub-clause 9.3.17.
GRA Identity This IE is defined in sub-clause 9.3.30.
Signalling RB Information to Setup List (3 bit field) This field is the binary representation of the number of SRB to setup. Range : 0 to maxSRBsetup-1.
Signalling RB Information to Setup This IE is present for each SRB to establish. This IE is defined in sub-clause 9.3.101.
RAB Information for Setup List (4 bit field) This field is used to repeat information on each RAB to reconfigure, where 0 enables one RAB to be described. Range: 0 to maxRABsetup-1.
RAB Information for Setup This IE is present for each signalling RAB to establish. This IE is defined in sub-clause 9.3.75.
RB Information to Be Affected List (5 bit field) This field is used to repeat information on each RB to reconfigure, where 0 enables one RB to be described. Range: 0 to maxRB-1.
RB Information to Be Affected This IE is defined in sub-clause 9.3.72.
Downlink Counter Synchronisation Info struct This structure contains information about PDCP synchronisation.
RB with PDCP Information List (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described. Range: 0 to maxRBallRABs-1.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.
PDCP context relocation info This IE is defined in sub-clause 9.3.116.

9.2.35   RADIO BEARER SETUP COMPLETE

This message is sent by MS to confirm the establishment of the radio bearer.

Radio Bearer :   SRB2

Direction :   MS → GERAN

Table 9.2.35.1: RADIO BEARER SETUP COMPLETE information elements

```
< RADIO BEARER SETUP COMPLETE message content > ::=
    {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > }
        { 0 | 1  < COUNT-C Activation Time : < Activation Time : bit (8) > > }
        { 0 | 1  < Radio Bearer Uplink Ciphering Activation Time info : < RB Activation Time info IE > > }
        { 0 | 1  < Uplink Counter Synchronisation Info : < Uplink Counter Synchronisation Info struct > > }
    !   < Content part error : bit (*) = < no string > > } ;

< Uplink Counter Synchronisation Info struct > ::=
    {  < START List : bit (2) >
       {  < CN Domain Identity : < CN Domain Identity IE > >
          < START : < START IE > > } * (1 + val(START List) )
       { 0 | 1  < RB with PDCP Information List : bit (5) >
                < RB with PDCP Information : < RB with PDCP Information IE > > * (1 + val(RB with PDCP Information
List) ) }
    };
```

Table 9.2.35.2: RADIO BEARER SETUP COMPLETE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
Uplink Integrity Protection Activation Info This IE contains the time, in terms of RRC sequence numbers, when a new integrity protection configuration shall be activated for the signalling radio bearers. The Integrity protection activation info IE is defined in sub-clause 9.3.36.
COUNT-C Activation Time The *Activation Time* IE is defined in sub-clause 9.3.1.
Radio bearer uplink ciphering activation time info The *RB Activation Time Info* IE is defined in sub-clause 9.3.77.
Uplink Counter Synchronisation Info struct This structure enables the synchronisation of the Uplink security counters.
START List (2 bit field) START value to be used in this CN domain. This field is the binary representation of the number of RB to be affected. Range : 0 to maxCNdomains-1.
CN Domain Identity This IE is defined in sub-clause 9.3.15.
START This IE is defined in sub-clause 9.3.102.
RB with PDCP Information List (5 bit field) This field is used to repeat information on each RB with PDCP Information, where 0 enables one RB to be described. Range: 0 to maxRBallRABs-1.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.

9.2.36   RADIO BEARER SETUP FAILURE

This message is sent by MS, if it does not support the configuration given by GERAN.

Radio Bearer :   SRB2

Direction :   MS→GERAN

Table 9.2.36.1: RADIO BEARER SETUP FAILURE information elements

```
< RADIO BEARER SETUP FAILURE message content > ::=
    {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < RRC Cause : < RRC Cause IE > >
        < Failure Cause : < Failure Cause and Error Information IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Potentially Succesful RB List : bit (5) >
            < RB Identity : < RB Identity IE > > *(1+val(Potentially Succesful RB List)) }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.36.2: RADIO BEARER SETUP FAILURE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
Failure Cause The *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.
RRC Cause This *RRC Cause* IE is defined in sub-clause 9.3.94.
Potentially Succesful RB List (5 bit field) This field is the binary representation of the number of RB for which setup would have succeeded. Range : 0 to maxRB-1.
RB Identity This IE is defined in sub-clause 9.3.80.

9.2.37   RRC CONNECTION REJECT

The network transmits this message when the requested RRC connection cannot be accepted.

Radio Bearer :   SRB2

Direction :   GERAN → MS

Table 9.2.37.1: RRC CONNECTION REJECT information elements

```
< RRC CONNECTION REJECT message content > ::=
    { 0        -- critical extension escape available
        {
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            < Initial MS Identity : < Initial MS Identity IE > >
            < RRC Rejection Cause : < RRC Rejection Cause IE > >
            < Wait time : < Wait Time IE > >
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > > } ;
```

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Initial MS Identity This IE is defined in sub-clause 9.3.35.
RRC Rejection Cause This IE is defined in sub-clause 9.3.89. In this version of specification, the MS ignores the *Rejection Cause* IE.
Wait Time This IE is defined in sub-clause 9.3.112.

9.2.38   RRC CONNECTION RELEASE

This message is sent by GERAN to release the RRC connection. The message also releases all radio bearers between the MS and GERAN.

Radio Bearer :   SRB 2

Direction :   GERAN→MS

Table 9.2.38.1: RRC CONNECTION RELEASE information elements

```
< RRC CONNECTION RELEASE message content > ::=
    { 0 -- critical extension escape available
      {              < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
          < RRC Release Cause : < Release Cause IE > >
          { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
          { 0 | 1 < N308 : bit (3) > }
          { 0 | 1 < RPLMN Information : < RPLMN Information IE > >}
      !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > >} ;
```

Table 9.2.38.2: RRC CONNECTION RELEASE information element details

RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
N308 (3 bit field) This IE is present when MS is in RRC-CELL_DEDICATED state. N308 indicates the Maximum number of retransmissions of the RRC CONNECTION RELEASE COMPLETE message. bit 3 2 1 0 0 0   1 0 0 1   2 0 1 0   3 0 1 1   4 1 0 0   5 1 0 1   6 1 1 0   7 1 1 1   8

Release cause
This IE is defined in sub-clause 9.3.90.

RPLMN Information
This IE is defined in sub-clause 9.3.93.

9.2.39   RRC CONNECTION RELEASE COMPLETE

This message is sent by MS to confirm that the RRC connection has been released.

   Radio Bearer :   SRB2

   Direction :   MS → GERAN

Table 9.2.39.1: RRC CONNECTION RELEASE COMPLETE information elements

```
< RRC CONNECTION RELEASE COMPLETE message content > ::=
   {
       < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
       { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
       { 0 | 1 < Error Indication : < Failure Cause and Error Information IE > > }
   !    < Content part error : bit (*) = < no string > > }
```

Table 9.2.39.2: RRC CONNECTION RELEASE COMPLETE information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

Integrity Check Info
This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied

Error Indication
The *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.

9.2.40   RRC CONNECTION REQUEST

RRC Connection Request is the first message transmitted by the MS when setting up an RRC Connection to the network.

   Radio Bearer :   SRB2

   Direction :   MS → GERAN

Table 9.2.40.1: RRC CONNECTION REQUEST information elements

```
< RRC CONNECTION REQUEST message content > ::=
   {
       < Initial MS Identity : < Initial MS Identity IE > >
       < Establishment Cause : < Establishment Cause IE > >
       < Protocol Error Indicator : < Protocol Error Indicator IE > >
   !    < Content part error : bit (*) = < no string > > };
```

Table 9.2.40.2: RRC CONNECTION REQUEST information element details

Initial MS Identity
This IE is defined in sub-clause 9.3.35.

Establishment Cause
This IE is defined in sub-clause 9.3.21

Protocol Error Indicator
This IE is defined in sub-clause 9.3.70.

9.2.41 RRC CONNECTION SETUP

This message is used by the network to accept the establishment of an RRC connection for an MS, including assignment of signalling link information and optionally physical channel information.

Radio Bearer :   SRB2

Direction :   GERAN → MS

Table 9.2.41.1: RRC CONNECTION SETUP information elements

```
< RRC CONNECTION SETUP message content > ::=
    { 0 -- critical extension escape available
      {
      -- MS information elements
          < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
          < Initial MS Identity : < Initial MS Identity IE > >
          < Activation Time : < Activation Time IE > >
          < New G-RNTI : < G-RNTI IE > >
          < RRC State Indicator : < RRC State Indicator IE > >
          < GERAN DRX Cycle Length Coefficient : < GERAN DRX Cycle Length Coefficient > >
          < Capability Update Requirement : < Capability Update Requirement IE > >
      -- RB information elements
          { 0 | 1  < Signalling RB Information to Setup list : bit (3) >
              < Signalling RB Information to Setup : < Signalling RB Information to Setup IE > > *(1+val(Signalling
RB Information to Setup list)) }
          !   < Content part error : bit (*) = < no string > > }
      !   < Message escape critical extensions : 1 bit (*) = < no string > >} ;
```

Table 9.2.41.2: RRC CONNECTION SETUP information element details

RRC Transaction Identifier (2 bit field)
This IE is defined in sub-clause 9.3.98.

Activation Time (8 bit field)
This IE is defined in sub-clause 9.3.1.

Initial MS Identity
This IE is defined in sub-clause 9.3.35.

New G-RNTI
This IE assigns a new G-RNTI to the MS. This IE is coded as the *G-RNTI* IE defined in sub-clause 9.3.32.

RRC State Indicator
This IE is defined in sub-clause 9.3.97.

GERAN DRX Cycle Length Coefficient
This IE is defined in sub-clause 9.3.29.

Capability Update Requirement
This IE is defined in sub-clause 9.3.4.

Signalling RB Information to Setup list (3 bit field)
This field is the binary representation of the number of SRB to setup. Range : 0 to maxSRBsetup-1.

Signalling RB Information to Setup
This IE is present for each SRB to establish. This IE is defined in sub-clause 9.3.101.

9.2.42   RRC CONNECTION SETUP COMPLETE

This message confirms the establishment of the RRC Connection by the MS.

 Radio Bearer : SRB2

 Direction :   MS → GERAN

Table 9.2.42.1: RRC CONNECTION SETUP COMPLETE information elements

```
< RRC CONNECTION SETUP COMPLETE message content > ::=
    {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        < START list : bit (2) >
        {   < CN Domain Identity : < CN Domain Identity IE > >
            < START : < START IE > > } *(1+val(START List))
        { 0 | 1  < MS GERAN Iu mode Radio Access Capability : < MS GERAN Iu mode Radio Access Capability IE > >
}
        < Inter-RAT MS Radio Access Capability : < Inter-RAT MS Radio Access Capability struct > > }
        !   < Content part error : bit (*) = < no string > > } ;

< Inter-RAT MS Radio Access Capability struct > ::=

    < Inter-RAT MS Radio Access Capability Length : bit (15) >
    { 0 | 1  < MS GERAN A/Gb mode Radio Access Capability : < MS GERAN A/Gb mode Radio Access Capability IE
> > }
    { 0 | 1  < UE UTRAN Radio Access Capability : < UE UTRAN Radio Access Capability IE > > }
    { 0 | 1  < UE UTRAN Radio Access Capability Extension : < UE UTRAN Radio Access Capability Extension IE > >
}
    { 0 | 1  < UE CDMA2000 Radio Access Capability : < UE CDMA2000 Radio Access Capability IE > > }
    < spare bits >**;
```

 NOTE: Inter-RAT MS radio access capability are currently included in the MS radio access capability from
     24.008. MS radio access capability extension is currently not defined.

Table 9.2.42.2:RRC CONNECTION SETUP COMPLETE information element details

RRC Transaction Identifier
This IE is defined in sub-clause 9.3.98.

START List (2 bit field)
This field is the binary representation of the number of CN domains for which a START value is included.
Range : 0 to maxCNdomains-1.

CN Domain Identity
This field is defined in sub-clause 9.3.15.

START
This field is defined in sub-clause 9.3.102.

Inter-RAT MS Radio Access Capability Length
This field indicates the length of the structure excluding the 15 bits to indicate the length.
Range 0 – 32768.

MS GERAN Iu mode Radio Access Capability This IE is defined in sub-clause 9.3.45.
MS GERAN A/Gb mode Radio Access Capability This IE is defined in sub-clause 9.3.44.
UE UTRAN Radio Access Capability This IE is defined in sub-clause 9.3.108
UE UTRAN Radio Access Capability Extension This IE is defined in sub-clause 9.3.109.
UE CDMA2000 Radio Access Capability This IE is defined in sub-clause 9.3.110.

9.2.43 RRC STATUS

This message is sent to indicate a protocol error.

Radio Bearer :   SRB2

Direction :   MS→GERAN

Table 9.2.43.1: RRC STATUS information elements

```
< RRC STATUS message content > ::=
    {
        < Protocol Error Information : < Protocol Error Information IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        { 0 | 1  < Identification of Received Message : < Identification of Received Message struct > > }
    !    < Content part error : bit (*) = < no string > > } ;

< Identification of Received Message struct > ::=
    < Received Message Type : < Message Type IE > >
    < RRC Transaction Identifier : < RRC Transaction Identifier IE > > ;
```

Table 9.2.43.2: RRC STATUS information element details

Protocol Error Information The *Protocol Error Information* IE is defined in sub-clause 9.3.71.
Integrity Check Info The Integrity Check Info IE is defined in sub-clause 9.3.36. The Integrity Check Info IE is included if integrity protection is applied.
Identification of Received Message struct This structure is present if the *Protocol Error Cause* IE in the *Protocol Error Information* IE has any other value than "CSN.1 violation or encoding error" or "Message type non-existent or not implemented".
Received Message Type The Message Type IE is defined in sub-clause 9.2.1.
RRC Transaction Identifier The RRC Transaction Identifier IE is defined in sub-clause 9.3.98.

9.2.44 RRC FAILURE INFO

This message is sent between network nodes in order to provide information about the cause for failure to perform the requested operation.

Radio Bearer: N/A

Direction: GERAN/UTRAN→ GERAN

Table 9.2.44.1: RRC FAILURE INFO information elements

```
< RRC FAILURE Info message content > ::=
    {   < Failure cause : 0011 >
            < Protocol Error Information : < Protocol Error Information IE > >
    |   < Failure cause : 0000 | 0001 | 0010 | 01 bit (2) | 1 bit(3) > }
    !   < Content part error : bit (*) = < no string > > ;
```

Table 9.2.44.2: RRC FAILURE INFO information element details

Failure Cause The *Failure Cause* IE indicates the cause of the failure in order to perform the required RRC procedure. This IE is defined in sub-clause 9.3.24.
Protocol Error Information This IE is defined in sub-clause 9.3.71.

9.2.45 SECURITY MODE COMMAND

This message is sent by GERAN to start or reconfigure ciphering and/or integrity protection parameters.

Radio Bearer : SRB2

Direction : GERAN→MS

Table 9.2.45.1: SECURITY MODE COMMAND information elements

```
< SECURITY MODE COMMAND message content > ::=
    { 0 -- critical extension escape available
        {
        -- MS information elements
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            < Integrity Check Info : < Integrity Check Info IE > >
            < Security Capability : < Security Capability IE > >
            { 0 | 1  < Ciphering Mode Info : < Ciphering Mode Info IE > > }
            { 0 | 1  < Integrity Protection Mode Info : < Integrity Protection Mode Info IE > > }
        -- CN information elements
            < CN Domain Identity : < CN Domain Identity IE > >
        -- other information elements
            { 0 | 1  < GSM MS Security Capability : < GSM MS Security Capability IE > > }
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > > } ;
```

Table 9.2.45.2: SECURITY MODE COMMAND information element details

RRC Transaction Identifier The *RRC Transaction Identifier* IE is defined in sub-clause 9.3.98.
Integrity Check Info The *Integrity Check Info* IE is defined in sub-clause 9.3.36.
Security Capability The *Security Capability* IE is defined in sub-clause 9.3.100.
Ciphering Mode Info Only present if ciphering shall be controlled. The *Ciphering Mode Info* IE is defined in sub-clause 9.3.14.

Integrity Protection Mode Info
Only present if integrity protection shall be controlled. The *Integrity Protection Mode Info* IE is defined in sub-clause 9.3.39.

CN Domain Identity
Indicates which cipher and integrity protection keys are applicable. The *CN Domain Identity* IE is defined in sub-clause 9.3.15.

GSM MS Security Capability
This IE is defined in sub-clause 9.3.33.

9.2.46   SECURITY MODE COMPLETE

This message is sent by MS to confirm the reconfiguration of ciphering and/or integrity protection.

Radio Bearer :   SRB2

Direction :   MS→GERAN

Table 9.2.46.1: SECURITY MODE COMPLETE information elements

```
< SECURITY MODE COMPLETE message content > ::=
    {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE >>
        < Integrity Check Info : < Integrity Check Info IE > >
        { 0 | 1  < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > }
        { 0 | 1  < Radio Bearer Uplink Ciphering Activation Time Info : < RB Activation Time Info IE > > }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.46.2: SECURITY MODE COMPLETE information element details

RRC Transaction Identifier
The *RRC Transaction Identifier* IE is defined in sub-clause 9.3.98.

Integrity Check Info
Th *Integrity Check Info* IE is defined in sub-clause 9.3.36.

Uplink Integrity Protection Activation Info
The *Integrity Protection Activation Info* IE contains the time, in terms of RRC sequence numbers, when a new integrity protection configuration shall be activated for the signalling radio bearers. The *Integrity Protection Activation Info* IE is defined in sub-clause 9.3.37.

Radio Bearer Uplink Ciphering Activation Time Info
The *RB Activation Time Info* IE is defined in sub-clause 9.3.77.

9.2.47   SECURITY MODE FAILURE

This message is sent to indicate a failure to act on a received SECURITY MODE CONTROL message.

Radio Bearer :   SRB2

Direction :   MS→GERAN

Table 9.2.47.1: SECURITY MODE FAILURE information elements

```
< SECURITY MODE FAILURE message content > ::=
    {
        < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > > }
        < Failure Cause : < Failure Cause and Error Information IE > >
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.47.2: SECURITY MODE COMPLETE information element details

RRC Transaction Identifier The *RRC Transaction Identifier* IE is defined in sub-clause 9.3.98.
Integrity Check Info The *Integrity Check Info* IE is defined in sub-clause 9.3.36. Integrity Check Info is included if integrity protection is applied
Failure Cause The *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25

9.2.48   SIGNALLING CONNECTION RELEASE

This message is used to notify the MS that its ongoing signalling connection to a CN domain has been released.

Radio Bearer :   SRB 2

Direction :   GERAN→ MS

Table 9.2.48.1: SIGNALLING CONNECTION RELEASE information elements

```
< SIGNALLING CONNECTION RELEASE message content > ::=
    { 0 -- critical extension escape available
        {
            < CN Domain Identity : < CN Domain Identity IE > >
            < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
            { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
        !   < Content part error : bit (*) = < no string > > }
    !   < Message escape critical extensions : 1 bit (*) = < no string > > } ;
```

Table 9.2.48.2: SIGNALLING CONNECTION RELEASE information element details

CN Domain Identity The *CN Domain Identity* IE is defined in sub-clause 9.3.15.
RRC Transaction Identifier The *RRC Transaction Identifier* IE is defined in sub-clause 9.3.98.
Integrity Check Info The *Integrity Check Info* IE is defined in sub-clause 9.3.36. Integrity Check Info is included if integrity protection is applied

9.2.49   SIGNALLING CONNECTION RELEASE INDICATION

This message is used by the MS to indicate to GERAN the release of an existing signalling connection.

Radio Bearer :   SRB 2

Direction :   MS→GERAN

Table 9.2.49.1: SIGNALLING CONNECTION RELEASE INDICATION information elements

```
< SIGNALLING CONNECTION RELEASE INDICATION message content > ::=
    {
        < CN Domain Identity : < CN Domain Identity IE > >
        { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.49.2: SIGNALLING CONNECTION RELEASE INDICATION information element details

CN Domain Identity The *CN Domain Identity* IE is defined in sub-clause 9.3.15.
Integrity Check Info The Integrity Check Info IE is defined in sub-clause 9.3.36. *Integrity Check Info* IE is included if integrity protection is applied.

9.2.50   (void)

9.2.51   SYSTEM INFORMATION 5

This message is the same as the SYSTEM INFORMATION 5 message specified in 3GPP TS 44.018 but shall not contain:

-    RR management Protocol Discriminator IE.

-    Skip Indicator IE.

-    L2 pseudo length IE

-    System Information Type 5 Message Type IE.

Radio Bearer :   SRB 1

Direction :   GERAN → MS

9.2.52   SYSTEM INFORMATION 5bis

This message is the same as the SYSTEM INFORMATION 5bis message specified in 3GPP TS 44.018 but shall not contain:

-    RR management Protocol Discriminator IE.

-    Skip Indicator IE.

-    L2 pseudo length IE.

-    System Information Type 5bis Message Type IE.

Radio Bearer :   SRB 1

Direction :   GERAN → MS

9.2.53   SYSTEM INFORMATION 5ter

This message is the same as the SYSTEM INFORMATION 5ter message specified in 3GPP TS 44.018 but shall not contain:

- RR management Protocol Discriminator IE.

- Skip Indicator IE..

- L2 pseudo length IE.

- System Information Type 5ter Message Type IE.

Radio Bearer : SRB 1

Direction : GERAN → MS

9.2.54 SYSTEM INFORMATION 6

This message is the same as the SYSTEM INFORMATION 6 message specified in 3GPP TS 44.018 but shall not contain:

- RR management Protocol Discriminator IE.

- Skip Indicator IE..

- L2 pseudo length IE.

- System Information Type 6 Message Type IE.

Radio Bearer : SRB 1

Direction : GERAN → MS

9.2.55 (void)

9.2.56 UPLINK DIRECT TRANSFER

This message is used to transfer NAS messages for an existing signalling connection.

Radio Bearer : SRB3 and SRB4

Direction : MS → GERAN

Table 9.2.56.1: UPLINK DIRECT TRANSFER information elements

```
< UPLINK DIRECT TRANSFER message content > ::=
    {
        < CN Domain Identity : < CN Domain Identity IE > >
        < NAS Message : < NAS Message IE > >
        { 0 | 1 < Integrity Check Info : < Integrity Check Info IE > > }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.56.2: UPLINK DIRECT TRANSFER information element details

CN Domain Identity The *CN Domain Identity* IE is defined in sub-clause 9.3.15.
NAS Message The *NAS Message* IE is defined in sub-clause 9.3.54.
Integrity Check Info The Integrity Check Info IE is defined in sub-clause 9.3.36. *Integrity Check Info* IE is included if integrity protection is applied.

9.2.57   GERAN Iu mode DTM REQUEST

This message is used by the MS to initiate an allocation of SBPSCH(s) when the MS is in RRC-Cell_Dedicated state-MAC-Dedicated state.

   Radio Bearer :   SRB2

   Direction :   MS→GERAN

Table 9.2.57.1: GERAN Iu mode DTM REQUEST information elements

```
< GERAN Iu mode DTM REQUEST message content > ::=
    {
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > >}
        < START List : bit (2) >
        {   < CN Domain Identity : < CN Domain Identity IE > >
            < START : < START IE > > } * (1+val(START List))
        < Iu mode RRC Channel Request Description : < Iu mode Channel Request Description IE > >
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.57.2: GERAN Iu mode DTM REQUEST information element details

G-RNTI This IE is defined in sub-clause 9.3.32.
Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
START List (2 bit field) START value to be used in this CN domain. This field is the binary representation of the number of RB to be affected. Range : 0 to maxCNdomains-1.
CN Domain Identity This IE is defined in sub-clause 9.3.15.
START This IE is defined in sub-clause 9.3.102.
Iu mode RRC Channel Request Description This IE is defined in sub-clause 9.3.113.

9.2.58   GERAN Iu mode DTM REJECT

This message is used by the GERAN to reject the DTM request when the MS is in RRC-Cell_Dedicated state- MAC-Dedicated state.

   Radio Bearer :   SRB2

   Direction :   GERAN→MS

Table 9.2.58.1: GERAN Iu mode DTM REJECT information elements

```
< GERAN Iu mode DTM REJECT message content > ::=
    {   < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
        { 0 | 1  < Integrity Check Info : < Integrity Check Info IE > >}
        < Failure Cause : < Failure Cause and Error Information IE > >
        < Wait Indication : <Wait Indication IE>>
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 9.2.58.2: GERAN Iu mode DTM REJECT information element details

Integrity Check Info This IE is defined in sub-clause 9.3.36. The *Integrity Check Info* IE is included if integrity protection is applied.
RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.
Failure Cause This *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.
Wait Indication This *Wait Indication* IE is defined in sub-clause 9.3.114.

9.3 Information Elements

9.3.1 Activation Time

The *Activation Time* IE defines the frame number/time at which the operation/changes caused by the related message shall take effect.

Table 9.3.1.1: *Activation Time* information elements

< Activation Time IE > ::=   < **Activation Time** : bit (22) > ;

Table 9.3.1.2: *Activation Time* information element details

Activation Time (22 bit field) The Activation Time field defines the frame number/time at which the operation/changes caused by the related message shall take effect. This field is encoded as a binary number.TDMA Frame Number is defined in 3GPP TS 45.002.

9.3.2 BA List Pref

The purpose of the *BA List Pref* IE is to provide the mobile station with ARFCN information, which can be used in the cell selection/reselection procedure. This IE is defined in 3GPP TS 44.018.

9.3.3 BA Range

The purpose of the *BA Range* IE is to provide the mobile station with ARFCN range information which can be used in the cell selection procedure.

Table 9.3.3.1: *BA Range* information elements

< BA Range IE > ::=   < **BA Range Length** : bit (8) >   < **BA Range Value** : octet(val(BA Range Length)) > > ;

Table 9.3.3.2: *BA Range* information element details

BA Range Length (8 bit field) This field indicates the length of BA Range value in octets as defined in 3GPP TS 44.018.
BA Range Value (octet string)

This IE holds the Value part of the *BA Range* IE defined in 3GPP TS 44.018.

9.3.4 Capability Update Requirement

The *Capability Update Requirement* IE indicates to the MS which specific capabilities to transfer to the network.

Table 9.3.4.1: *Capability Update Requirement* information elements

```
< Capability Update Requirement IE > ::=
    < Capability Update Requirement length : bit (4) >
    < MS GERAN Iu mode radio access capability update requirement : bit (1) >
    < MS GERAN A/Gb mode radio access capability update requirement : bit (1) >
    < UE radio capability FDD capability update requirement : bit (1) >
    < UE radio capability 3,84 McpsTDD capability update requirement : bit(1) >
    < UE radio capability 1,28 Mcps TDD capability update requirement : bit (1) >
    < UE CDMA2000 radio access capability update requirement : bit (1) >
    < spare bits >**;
```

Table 9.3.4.2: *Capability Update Requirement* information element details

Capability Update Requirement length (4 bit field)
This field indicates the number of capability updates requirements included in this IE in bits. It is encoded as the binary representation of the amount of capability udpates included. Its value is 6 ('0110') in this version of the protocol.

MS GERAN Iu mode radio access capability update requirement (1 bit field)
MS GERAN A/Gb mode radio access capability update requirement (1 bit field)
UE radio capability FDD capability update requirement (1 bit field)
UE radio capability 3,84 McpsTDD capability update requirement (1 bit field)
UE radio capability 1,28 Mcps TDD capability update requirement (1 bit field)
UE CDMA2000 radio access capability update requirement (1 bit field)

Each of these fields indicates the update requirement of the associated radio access capability.

bit
1
0   not required
1   required

9.3.5 CDMA2000 MS security capability

The CDMA2000 MS security capability IE indicates the MS security capability for CDMA2000.

9.3.6 Cell Channel Description

The purpose of the *Cell Channel Description* IE is to provide the reference frequency list to be used to decode the mobile allocation information element.

Table 9.3.6.1: *Cell Channel Description* information elements

```
< Cell Channel Description IE > ::=
    < Cell Channel Description Value : octet (17) >;
```

Table 9.3.6.2: *Cell Channel Description* **information element details**

Cell Channel Description Value (17 octet field) The Cell Channel Description Value is coded as the value part of the *Cell Channel Description* IE specified in 3GPP TS 44.018.

9.3.7   Cell Description

The *Cell Description* IE provides a minimum description of a cell, e.g. to allow the mobile station to use its pre-knowledge about synchronization.

Table 9.3.7.1: *Cell Description* **information elements**

< Cell Description IE > ::=   < **Cell Description Value** : octet(2) > > ;

Table 9.3.7.2: *Cell Description* **information element details**

Cell Description Value (2 octet field) This field indicates the Value part of the *Cell Description* IE defined in 3GPP TS 44.018.

9.3.8   Cell Update Cause

The *Cell Update Cause* IE indicates the cause for peforming a Cell Update.

Table 9.3.8.1: *Cell Update Cause* **information elements**

< Cell Update Cause IE > ::=   < **Cell Update Cause** : bit (3) > > ;

Table 9.3.8.2: *Cell Update Cause* **information element details**

Cell Update Cause (3 bit field) bit 3 2 1 0 0 0   cell reselection 0 0 1   periodical cell update 0 1 0   uplink data transmission 0 1 1   paging response 1 0 0   radio link failure 1 0 1   RLC unrecoverable error 1 1 0   Invalid RLC/MAC control message All other values are reserved.

9.3.9   Channel Description

The *Channel Description* IE provides a description of an allocable channel together with its SACCH.

Table 9.3.9.1: *Channel Description* information elements

```
< Channel Description IE > ::=
    < Channel Description Value : octet(3) > >;
```

Table 9.3.9.2: *Channel Description* information element details

Channel Description Value
This IE holds the Value part of the *Channel Description* IE defined in 3GPP TS 44.018.

9.3.10 Channel Description 2

The *Channel Description 2* IE is to provide a description of an allocable channel configuration together.

Table 9.3.10.1: *Channel Description 2* information elements

```
< Channel Description 2 IE > ::=
    < Channel Description 2 Value : octet(3) > >;
```

Table 9.3.10.2: *Channel Description 2* information element details

Channel Description 2 Value
This IE holds the Value part of the *Channel Description 2* IE defined in 3GPP TS 44.018.

9.3.11 Channel Mode

The *Channel Mode* IE gives information of the mode on coding/decoding and transcoding. The exact mode is determined by the contents of this field and the channel type.

Table 9.3.11.1: *Channel Mode* information elements

```
< Channel Mode IE > ::=
    < Channel Mode Value : octet(1) > >;
```

Table 9.3.11.2: *Channel Mode* information element details

Channel Mode Value
This IE holds the Value part of the *Channel Mode* IE defined in 3GPP TS 44.018.

9.3.12 Channel Mode 2

The *Channel Mode 2* field gives information of the mode on coding/decoding and transcoding.

Table 9.3.12.1: *Channel Mode 2* information elements

```
< Channel Mode 2 IE > ::=
    < Channel Mode 2 Value : octet(1) > >;
```

Table 9.3.12.2: *Channel Mode 2* information element details

Channel Mode 2 Value
This IE holds the value part of the *Channel Mode 2* IE defined in 3GPP TS 44.018.

9.3.13 Ciphering Algorithm

The *Ciphering Algorithm* IE indicates which type of ciphering algorithm is used. This field is defined in 3GPP TS 33.102.

Table 9.3.13.1: *Ciphering Algorithm* information elements

```
< Ciphering Algorithm IE > ::=
    < Ciphering Algorithm : bit (4) > > ;
```

Table 9.3.13.2: *Ciphering Algorithm* information element details

Ciphering Algorithm (4 bit field)
bit 4 3 2 1 0 0 0 0   UEA0 -- *see 3GPP TS 33.102* 0 0 0 1   UEA1 -- *see 3GPP TS 33.102* All other values are reserved.

9.3.14 Ciphering Mode Info

The *Ciphering Mode Info* IE contains the ciphering specific security mode control information.

Table 9.3.14.1: *Ciphering Mode Info* information elements

```
< Ciphering Mode Info IE > ::=
    {
        < Ciphering Mode Command : 0 >
    |   < Ciphering Mode Command : 1 >
        {   < Ciphering Algorithm : < Ciphering Algorithm IE > >
            { 0 | 1 < Ciphering Activation Time for DBPSCH : < Activation Time IE > > }
            { 0 | 1 < RB Downlink Ciphering Activation Time Info : < RB Activation Time Info IE > > } }
    } ;
```

Table 9.3.14.2: *Ciphering Mode Info* information element details

Ciphering Mode Command (1 bit field) bit 1 0   stop ciphering mode 1   start/restart ciphering mode
Ciphering Algorithm (4 bit field) The *Ciphering Algorithm* IE is defined in sub-clause 9.3.12
Ciphering Activation Time for DBPSCH The *Activation Time* IE is used for radio bearers mapped on RLC-TM. This IE is defined in sub-clause 9.3.1.
RB Downlink Ciphering Activation Time info The *RB Activation Time Info* IE is used for radio bearers mapped on RLC-AM or RLC-UM. This IE is defiend in sub-clause 9.3.77.

9.3.15   CN Domain Identity

The *CN Domain Identity* IE identifies the type of core network domain.

Table 9.3.15.1: *CN Domain Identity* information elements

```
< CN Domain Identity IE > ::=
    < CN Domain Identity : bit (2) > ;
```

Table 9.3.15.2: *CN Domain Identity* information element details

CN Domain Identity (2 bit field)

```
   bit
   2 1
   0 0          CS domain
   0 1          PS domain
   1 0          Reserved
   1 1          Reserved.
```

9.3.16   CN Domain Specific DRX Cycle Length Coefficient

The *CN Domain Specific DRX Cycle Length Coefficient* IE determines the value of the CN domain specific DRX cycle length coefficient to use in DRX computations. The discontinuous reception computations determine the paging blocks to monitor on PCCCH for a specific MS.

Table 9.3.16.1: *CN Domain Specific DRX Cycle Length Coefficient* information elements

```
< CN Domain Specific DRX Cycle Length Coefficient IE > ::=
    < CN Domain Specific DRX Cycle Length Coefficient : bit (2) >;
```

Table 9.3.16.2: *CN Domain Specific DRX Cycle Length Coefficient* information element details

CN Domain Specific DRX Cycle Length Coefficient (2 bit field)
This field is the binary representation of the CN domain specific DRX cycle length coefficient. Range : 6 to 9.

```
   bit
   2 1
   0 0          CN domain specific DRX cycle length coefficient = 6
   0 1          CN domain specific DRX cycle length coefficient = 7
   1 0          CN domain specific DRX cycle length coefficient = 8
   1 1          CN domain specific DRX cycle length coefficient = 9
```

9.3.17   CN Information Info

The *CN Information Info* IE indicates information about the CN.

Table 9.3.17.1: *CN Information Info* information elements

```
< CN Information info IE > ::=
    { 0 | 1  < PLMN Identity : < PLMN Identity IE > > }
    { 0 | 1  < CN Domain Specific GSM-MAP NAS System Info : < NAS System Information GSM-MAP IE > > }
    { 0 | 1  < Length of CN Domain Related Information : bit (2) >
        {    < CN Domain Identity : < CN Domain Identity IE > >
             < CN Domain Specific GSM-MAP NAS System Info : < NAS System Information GSM-MAP IE > >
        } *( 1 + val ( Length of CN Domain Related Information ) )
    } ;
```

Table 9.3.17.2: *CN Information Info* **information element details**

PLMN Identity This IE is defined in sub-clause 9.3.63. **CN Domain Specific GSM-MAP NAS System Info** The *NAS system information GSM-MAP* IE is defined in sub-clause 9.3.56. **Length of CN Domain Related Information** (2 bit field) This field is used to calculate the number of CN domains included in this IE. Range : 0 to MaxCNdomains-1. **CN Domain Identity** The *CN Domain Identity* IE is defined in sub-clause 9.3.15.

9.3.18   CN Information Info Full

The *CN Information Info Full* IE indicates information about the CN.

Table 9.3.18.1: *CN Information Info Full* **information elements**

```
< CN Information Info Full IE > ::=
    { 0 | 1  < PLMN Identity : < PLMN identity IE > > }
    { 0 | 1  < CN Domain Specific GSM-MAP NAS System Info : < NAS System Information GSM-MAP IE > > }
    { 0 | 1  < Length Of CN Domain Related Information : bit (2) >
            {    < CN Domain Identity : < CN Domain Identity IE > >
                 < CN Common GSM-MAP NAS System Info : < NAS System Information GSM-MAP IE > >
                 < CN Domain Specific DRX Cycle Length Coefficient : < CN Domain Specific DRX Cycle Length
Coefficient IE > >
            } * 1 + val (Length of CN domain related information)
    } ;
```

Table 9.3.18.2: *CN Information Info Full* **information element details**

PLMN Identity This IE is defined in sub-clause 9.3.63.
CN Common GSM-MAP NAS System Info The *NAS System Information GSM-MAP* IE is defined in sub-clause 9.3.56.
CN Domain Specific GSM-MAP NAS System Info The *NAS System Information GSM-MAP* IE is defined in sub-clause 9.3.56.
Length Of CN Domain Related Information (2 bit field) This field is used to calculate the number of CN domains included in this IE. Range : 0 to MaxCNdomains-1.
CN Domain Identity The CN Domain Identity IE is defined in sub-clause 9.3.15.
CN Domain Specific DRX Cycle Length Coefficient The *CN Domain Specific DRX Cycle Length Coefficient* IE is defined in sub-clause 9.3.16.

9.3.19   DBPSCH Description

The *DBPSCH Description* IE describes dedicated physical resources.

Table 9.3.19.1: *DBPSCH Description* **information elements**

```
< DBPSCH Description IE > ::=
    {    -- Common parameters
            { 0 | 1  < Starting Time : < Starting Time IE > > }
            { 0 | 1  -- Conditional on presence of Mobile Allocation after time or before time
                    < Cell Channel Description : < Cell Channel Description IE > > }
            { 0 | 1  -- Conditional on presence of Frequency Hopping in Description of the channel IEs
                { 00 < Frequency Short List after time : < Frequency Short List IE > >
                | 01 < Frequency List after time : < Frequency List IE > >
                | 10 < Frequency Channel Sequence after time : < Frequency Channel Sequence IE > >
                | 11 < Mobile Allocation after time : < Mobile Allocation IE > > }}
            { 0 | 1  -- Conditional on Starting Time and at least one Channel Description before time
                {00 < Frequency Short List before time : < Frequency Short List IE > >
                | 01 < Frequency List before time : < Frequency List IE > >
                | 10 < Frequency Channel Sequence before time : < Frequency Channel Sequence IE > >
                | 11 < Mobile Allocation before time : < Mobile Allocation IE > > }}
            { 0 | 1  -- Conditional, not used for Handover
                < Power Command : < Power Command IE > >}
            { 0 | 1  -- Conditional, used for Handover
                <Handover struct : <Handover struct>>}
        -- Individual parameters
            { 00    < TCH : < TCH struct> >
            | 01    < PDTCH : < PDTCH struct> >

            !       < Message escape : { 11| 10 } bit** = < no string > > }
            -- Reserved for future use
    };

< TCH struct > ::=
    {
            { 0 | 1  < MultiRate Configuration : < MultiRate Configuration IE > > }
            -- Description of the first channel
            < Description of the first channel after time : < Channel Description 2 IE> >
            { 0 | 1  < Description of the First Channel before time : < Channel Description 2 IE> > }
            { 0 | 1  < Mode of the Channel Set 1 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 2 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 3 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 4 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 5 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 6 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 7 : < Channel Mode IE > > }
            { 0 | 1  < Mode of the Channel Set 8 : < Channel Mode IE > > }
            -- Description of the second channel
            { 0 | 1  < Description of the Second Channel before time : < Channel Description IE > > }
            { 0 | 1  < Description of the Second Channel after time : < Channel Description IE > > }
            { 0 | 1  < Mode of the Second Channel : < Channel Mode 2 IE > > }
            -- Conditional on value in Channel Description
            { 0 | 1  -- Conditional on the value of Channel Description IE
                    < Description of the multislot configuration : < Multislot Allocation IE > > }
    };

< PDTCH struct > ::=
    {         < RRC Packet Uplink Assignment 2: < RRC Packet Uplink Assignment 2 IE> >
            < RRC Packet Downlink Assignment 2: < RRC Packet Downlink Assignment 2 IE> >
    };
```

```
< Handover struct > ::=
    {
            < Handover Reference : < Handover Reference IE > >
            < Power Command And Access Type : < Power Command And Access Type IE > >

            { 0 | 1 < Dynamic ARFCN Mapping : < Dynamic ARFCN Mapping IE > >}
            { 0 | 1 < Synchronization Indication : < Synchronization Indication IE > >
                    { 0 | 1 -- Conditional on Synchronization Indication value
                            { 0 < Real Time Difference : < Time Difference IE > >
                            | 1 < Timing Advance : < Timing Advance IE > > } } }
        -- Description of the cell
            < Cell Description : < Cell Description IE > >
    };
```

Table 9.3.19.2: *DBPSCH Description* **information element details**

Handover struct This structure defines the physical parameters when handover is performed.
Cell Description This IE is defined in sub-clause 9.3.7.
Handover Reference This IE is defined in sub-clause 9.3.4
Power Command And Access Type This IE is defined in sub-clause 9.3.65
Synchronization Indication This IE is defined in sub-clause 9.3.104
Frequency Short List after time The *Frequency Short List* IE is defined in sub-clause 9.3.28. This IE is conditional on presence of the frequency hopping in either *Channel Description* IE or *Channel Description 2* IE, as indicated in 3GPP TS 44.018.
Real Time Difference The *Time Difference* IE is defined in sub-clause 9.3.105. This IE is conditional on value of the *Synchronization Indication* IE, as indicated in 3GPP TS 44.018.
Timing Advance This IE is defined in sub-clause 9.3.106. This IE is defined in sub-clause 9.3.93. This IE is conditional on value of the *Synchronization Indication* IE, as indicated in 3GPP TS 44.018.
Frequency Short List before time The *Frequency Short List* IE is defined in sub-clause 9.3.28. This IE is conditional on presence of the *Starting Time* IE, as indicated in 3GPP TS 44.018.
Dynamic ARFCN Mapping This IE is defined in sub-clause 9.3.20
Description of the First Channel after time The *Channel Description 2* IE is defined in sub-clause 9.3.10.
Power Command This IE is defined in sub-clause 9.3.64
Frequency List after time The *Frequency List* IE is defined in sub-clause 9.3.27. This IE is conditional on presence of the frequency hopping in either *Channel Description* IE or *Channel Description 2* IE, as indicated in 3GPP TS 44.018.

Mobile Allocation after time

The *Mobile Allocation* IE is defined in sub-clause 9.3.42. The *Mobile Allocation after time* IE is conditional on presence of the frequency hopping in either *Channel Description* IE or *Channel Description 2* IE, as indicated in 3GPP TS 44.018.

Cell Channel Description

This IE is defined in sub-clause 9.3.6. This IE is conditional on presence of either *Mobile Allocation before time* or *Mobile Allocation after time* IE, as indicated in 3GPP TS 44.018.

Description of the Multislot Configuration

The *Multislot Allocation* IE is defined in sub-clause 9.3.53. .

Mode of the Channel Set X

The *Channel Mode* IE is defined in sub-clause 9.3.11. The channe lmode is defined for the channel set X, where X has a range from 1 to 8.

Description of the Second Channel after time

The *Channel Description* IE is defined in sub-clause 9.3.9.

Mode of the Second Channel

The *Channel Mode2* IE is defined in sub-clause 9.3.12.

Starting Time

This IE is defined in sub-clause 9.3.103.

Frequency List before time

The *Frequency List* IE is defined in sub-clause 9.3.27. The *Frequency List before time* IE is conditional on presence of the *Starting Time* IE, as indicated in 3GPP TS 44.018.

Frequency Channel Sequence before time

The *Frequency Channel Sequence* IE is defined in sub-clause 9.3.26. The *Frequency Channel Sequence before time* IE is conditional on presence of the *Starting Time* IE, as indicated in 3GPP TS 44.018.

Mobile Allocation before time

The *Mobile Allocation* IE is defined in sub-clause 9.3.42. This IE is conditional on presence of the *Starting Time* IE, as indicated in 3GPP TS 44.018.

Description of the First Channel before time

The *Channel Description 2* IE is defined in sub-clause 9.3.10.

Description of the Second Channel before time

The *Channel Description* IE is defined in sub-clause 9.3.9.

MultiRate Configuration

This IE is defined in sub-clause 9.3.52.

RRC Packet Uplink Assignment

This IE is defined in sub-clause 9.3.96

RRC Packet Downlink Assignment

This IE is defined in sub-clause 9.3.95

Description of the Uplink Packet Channel Assignment2

The *RRC Packet Uplink Assignment* IE is defined in sub-clause 9.3.96a.

Description of the Downlink Packet Channel Assignment2

The *RRC Packet Downlink Assignment* IE is defined in sub-clause 9.3.95a.

9.3.20   Dynamic ARFCN Mapping

The purpose of the *Dynamic ARFCN Mapping* IE is to provide information on ARFCN mapping to physical frequencies (see 3GPP TS 45.005). This IE is coded as defined in 3GPP TS 44.018.

9.3.21 Establishment Cause

The *Establishment Cause* IE defines the cause for an RRC connection establishment request.

Table 9.3.21.1: *Establishment Cause* information elements

```
< Establishment Cause IE > ::=
    < Establishment Cause : bit (5) > > ;
```

Table 9.3.21.2: *Establishment Cause* information element details

Establishment Cause (5 bit field)

```
bit
5 4 3 2 1
0 0 0 0 0   Originating Conversational Call
0 0 0 0 1   Originating Streaming Call
0 0 0 1 0   Originating Interactive Call
0 0 0 1 1   Originating Background Call
0 0 1 0 0   Originating Subscriber traffic Call
0 0 1 0 1   Terminating Conversational Call
0 0 1 1 0   Terminating Streaming Call
0 0 1 1 1   Terminating Interactive Call
0 1 0 0 0   Terminating Background Call
0 1 0 0 1   Emergency Call
0 1 0 1 0   Inter-RAT cell re-selection
0 1 0 1 1   Inter-RAT cell change order
0 1 1 0 0   Registration
0 1 1 0 1   Detach
0 1 1 1 0   Originating High Priority Signalling
0 1 1 1 1   Originating Low Priority Signalling
1 0 0 0 0   Call re-establishment
1 0 0 0 1   Terminating High Priority Signalling
1 0 0 1 0   Terminating Low Priority Signalling
1 0 0 1 1   Terminating – cause unknown
1 0 1 0 0   Inter-mode cell re-selection
```

9.3.22 Expiration Time Factor

The *Expiration Time Factor* IE defines the validity of physical channel information.

Table 9.3.22.1: *Expiration Time Factor* information elements

```
< Expiration Time Factor IE > ::=
    < Expiration Time Factor : bit (3) > > ;
```

Table 9.3.22.2: *Expiration Time Factor* information element details

```
Expiration Time Factor (3 bit field)

bit
3 2 1
0 0 0   2 times
0 0 1   4 times
0 1 0   8 times
0 1 1   16 times
1 0 0   32 times
1 0 1   64 times
1 1 0   128 times
1 1 1   256 times
```

9.3.23   Extension

The *Extension* IE indicates possible extension for empty choice branches.

Table 9.3.23.1: *Extension* information elements

```
< Extension IE > ::=
    null;
```

9.3.24   Failure Cause

The *Failure Cause* IE indicates the cause of the failure in order to perform the required RRC procedure.

Table 9.3.24.1: *Failure Cause* information elements

```
< Failure Cause IE > ::=
    < Failure Cause : bit (4) > > ;
```

Table 9.3.24.2: *Failure Cause* information element details

```
Failure Cause (4 bit field)

   bit
   4 3 2 1
   0 0 0 0        configuration unsupported
   0 0 0 1        physical channel failure
   0 0 1 0        incompatible simultaneous reconfiguration
   0 0 1 1        protocol error
   0 1 0 0        compressed mode runtime error
   0 1 0 1        cell reselection
   0 1 1 0        invalid configuration
   0 1 1 1        configuration incomplete
   1 0 0 0        unsupported measurement
   1 0 0 1        Inter-mode Protocol Error
   All others values are reserved
```

9.3.25   Failure Cause and Error Information

The *Failure Cause and Error Information* IE indicates the cause for failure to perform the requested procedure.

Table 9.3.25.1: *Failure Cause and Error Information* **information elements**

```
< Failure Cause and Error Information IE > ::=
    {   < Failure Cause : 0011>
            < Protocol Error Information : < Protocol Error Information IE > >
    |   < Failure cause : 0000 | 0001 | 0010 | 01 bit (2) | 1 bit (3) > } ;
```

Table 9.3.25.2: *Failure Cause and Error Information* **information element details**

Failure Cause The *Failure Cause* IE is defined in sub-clause 9.3.24.
Protocol Error Information The IE indicates information about the protocol error when the IE "*Failure Cause*" has the value "Protocol error". This IE is defined in sub-clause 9.3.71.

9.3.26   Frequency Channel Sequence

The purpose of the *Frequency Channel Sequence* IE is to provide the absolute radio frequency channel numbers used in the mobile hopping sequence. This information element shall only be used for radio frequency channels in the primary GSM band (see 3GPP TS 45.005).

Table 9.3.26.1: *Frequency Channel Sequence* **information elements**

```
< Frequency Channel Sequence IE > ::=
    < Frequency Channel Sequence Value : octet(9) > >;
```

Table 9.3.26.2: *Frequency Channel Sequence* **information element details**

Frequency Channel Sequence Value This IE holds the Value part of the *Frequency Channel Sequence* IE defined in 3GPP TS 44.018.

9.3.27   Frequency List

The purpose of the *Frequency List* IE is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence.

Table 9.3.27.1: *Frequency List* **information elements**

```
< Frequency List IE > ::=
    < Frequency List Length : bit (8) >
    < Frequency List Value : octet (val(Frequency List Length)) >;
```

Table 9.3.27.2: *Frequency List* **information element details**

Frequency List Length (8 bit field) This field indicates the length of the Frequency List Value in octets
Frequency List Value This IE is holds the Value part of *Frequency List* IE as defined in 3GPP TS 44.018.

9.3.28   Frequency Short List

The purpose of the *Frequency Short List* IE is to provide the list of the absolute radio frequency channel numbers used in a frequency hopping sequence, in a small fixed length information element to obtain when possible the HANDOVER COMMAND message in a single block.

Table 9.3.28.1: *Frequency Short List* **information elements**

```
< Frequency Short List IE > ::=
    < Frequency Short List Value : octet(9) > >;
```

Table 9.3.28.2: *Frequency Short List* **information element details**

Frequency Short List Value
This IE holds the Value part of the *Frequency Short List* IE defined in 3GPP TS 44.018.

9.3.29   GERAN DRX Cycle Length Coefficient

The *GERAN DRX Cycle Length Coefficient* IE determines the value of the GERAN DRX cycle length coefficient to use in DRX computations. The dicontinuous reception computations determine the paging blocks to monitor on PCCCH for a specific MS.

Table 9.3.29.1: *GERAN DRX Cycle Length Coefficient* **information elements**

```
< GERAN DRX Cycle Length Coefficient IE > ::=
    < GERAN DRX Cycle Length Coefficient : bit (3) >;
```

Table 9.3.29.2: *GERAN DRX Cycle Length Coefficient* **information element details**

GERAN DRX Cycle Length Coefficient (3 bit field)

```
bit
3 2 1
0 0 0   GERAN DRX cycle length coefficient = 3
0 0 1   GERAN DRX cycle length coefficient = 4
0 1 0   GERAN DRX cycle length coefficient = 5
0 1 1   GERAN DRX cycle length coefficient = 6
1 0 0   GERAN DRX cycle length coefficient = 7
1 0 1   GERAN DRX cycle length coefficient = 8
1 1 0   GERAN DRX cycle length coefficient = 9
1 1 1   Reserved
```

9.3.30   GRA Identity

The *GRA Identity* IE identifies a GERAN Registration Area (GRA). In case of overlapping GRAs in the cell, it can be used to indicate to the MS which GRA it shall use.

Table 9.3.30.1: *GRA Identity* **information elements**

```
< GRA Identity IE > ::=
    < GRA Identity : bit(16) >;
```

Table 9.3.30.2: *GRA Identity* **information element details**

GRA Identity (16 bit field) The GRA identity field is encoded as a binary number. Range 0 to 65535.

9.3.31 GRA Update Cause

The *GRA Update Cause* IE indicates the cause for performing GRA Update.

Table 9.3.31.1: *GRA Update Cause* **information elements**

< GRA Update Cause IE > ::=   < **GRA Update Cause** : bit(2) >;

Table 9.3.31.2: *GRA Update Cause* **information element details**

GRA Update Cause (2 bit field)
 	
    bit
    2 1
    0 0   change of GRA
    0 1   periodic GRA updat
    All others values are reserved

9.3.32 G-RNTI

The *G-RNTI (GERAN Radio Network Temporary Identity)* IE is allocated to an MS having a RRC connection and identifies the MS within GERAN.

Table 9.3.32.1: *G-RNTI* **information elements**

< G-RNTI IE > ::=   < **Serving BSC identity** : bit (12) >   < **S-RNTI** : bit (20) >;

Table 9.3.32.2: *G-RNTI* **information element details**

Serving BSC identity (12 bit field) This field identifies the mobile station's serving BSC in GERAN.
S-RNTI (20 bit field) This field identifies the mobile station in the area of its serving BSC.

9.3.33 GSM MS Security Capability

The *GSM MS Security Capability* IE indicates the MS security capability for *A/Gb mode*.

Table 9.3.33.1: *GSM MS Security Capability* **information elements**

```
< GSM MS Security Capability IE > ::=
    < A5/1 support : bit (1) >
    < A5/2 support : bit (1) >
    < A5/3 support : bit (1) >
    < A5/4 support : bit (1) >
    < A5/5 support : bit (1) >
    < A5/6 support : bit (1) >
    < A5/7 support : bit (1) >
    < spare bit >};      -- Reserved
```

Table 9.3.33.2: *GSM MS Security Capability* **information element details**

A5/1 support (1 bit field)
A5/2 support (1 bit field)
A5/3 support (1 bit field)
A5/4 support (1 bit field)
A5/5 support (1 bit field)
A5/6 support (1 bit field)
A5/7 support (1 bit field)

These field indicates the support of the GSM encryption algorithm A5/X, where X has a range from 1 to 7.

bit
1
0   not supported
1   supported

9.3.34   Handover Reference

The *Handover Reference* IE is to provide a handover reference value used for access identification.

Table 9.3.34.1: *Handover Reference* **information elements**

```
< Handover Reference IE > ::=
    < Handover Reference Value : octet(1) >;
```

Table 9.3.34.2: *Handover Reference* **information element details**

Handover Reference Value (1 octet field)
The Handover Reference content is coded as the value part of the *Handover Reference* IE defined in 3GPP TS 44.018.

9.3.35   Initial MS Identity

The *Initial MS Identity IE* identifies the MS at a request of an RRC connection.

Table 9.3.35.1: *Initial MS Identity* **information elements**

```
< Initial MS Identity IE > ::=
    {   < MS Identity Type : 0000 >                -- GSM-MAP TMSI and LAI
            < TMSI : bit (32) >
            < LAI : octet (5) >
    |   < MS Identity Type : 0001 >                -- GSM-MAP P-TMSI and RAI
            < PTMSI : bit (32) >
            < RAI : octet (6) >
    |   < MS Identity Type : 0010 >                -- GSM-MAP IMSI or IMEI
            < Length of Mobile Identity contents : bit (4) >
            < Mobile Identity : octet (val (Length of Mobile Identity contents)) >
    |   < MS Identity Type : 0011 >                -- ESN (DS-41)
            < ESN : bit (32) >
    |   < MS Identity Type : 0100 >                -- IMSI (DS-41)
            < IMSI length : bit (2) >              -- only allowed 0 - 2
            < IMSI : octet (5+val(IMSI Length)) >
    |   < MS Identity Type : 0101 >                -- reserved for IMSI and ESN (DS-41)
            < IMSI length : bit (2) > -- only allowed 0 - 2
            < IMSI : octet (5+val(IMSI Length)) >
            < ESN : bit (32) >
    |   < MS Identity Type : 0110 >                -- reserved for TMSI (DS-41)
            < TMSI length : bit (4) >
            < TMSI-DS-41 : octet (2+val(length)) >

    |   < Message escape : { 1 bit(3) } bit** = < no string > >       -- reserved
    };
```

Table 9.3.35.2: *Initial MS Identity* **information element details**

GSM-MAP TMSI and LAI structure

TMSI (32 bit field)
The Temporary Mobile Subscriber Identity (TMSI) is associated with the mobile subscriber and defined in 3GPP TS 23.003. This field is coded as a binary number. Range 0 to 4294967295.

LAI (5 octet field)
This field is coded using the V format of the type 3 information element *Location Area Identification* defined in 3GPP TS 44.018.

GSM-MAP P-TMSI and RAI structure

PTMSI (32 bit field)
The Packet Temporary Mobile Station Identity (PTMSI) is associated with the mobile subscriber and defined in 3GPP TS 23.003. This field is encoded as a binary number. Range 0 to 4294967295.

RAI (48 bit field)
This field contains the Routing Area identification. This field is described in 3GPP TS 44.018.

GSM-MAP IMSI or IMEI

Mobile Identity (variable length octet string)
This octet string is the representation of the Mobile Identity. The encoding of this octet string is the value part (starting with octet 3) of the type 4 information element Mobile Identity defined in 3GPP TS 24.008.

Any value other than IMSI and IMEI for the type of identity in this octet string is spare.

9.3.36   Integrity Check Info

The *Integrity Check Info* IE contains the RRC message sequence number needed in the calculation of XMAC-I (see 3GPP TS 33.102) and the calculated MAC-I.

Table 9.3.36.1: *Integrity Check Info* **information elements**

```
< Integrity Check Info IE > ::=
    < Message Authentication Code : bit (32) >  -- see 3GPP TS 33.102
    < RRC Message sequence number : bit (4) >;
```

Table 9.3.36.2: *Integrity Check Info* **information element details**

Message Authentication Code (32 bit field)
This field indicates authentication code of the message. The 27 MSB of the IE shall be set to zero and the 5 LSB of the IE shall be set to the used signalling radio bearer identity when the encoded RRC message is used as the MESSAGE parameter in the integrity protection algorithm.

RRC Message Sequence Number (4 bit field)
This field is the binary representation of the sequence number of the RRC message. Range 0 to 15.
This field shall be set to zero when the encoded RRC message is used as the MESSAGE parameter in the integrity protection algorithm.

9.3.37 Integrity Protection Activation Info

The *Integrity Protection Activation Info* IE contains the time, in terms of RRC sequence numbers, when a new integrity protection configuration shall be activated for the signalling radio bearers.

Table 9.3.37.1: *Integrity Protection Activation Info* **information elements**

```
< Integrity Protection Activation Info IE > ::=
    < RRC message sequence number : bit (4) > * 4;
```

Table 9.3.37.2: *Integrity Protection Activation Info* **information element details**

RRC Message Sequence Number (4 bit field)
These fields are binary representation of the RRC sequence number. Range 0 to 15.
The RRC sequence number shall be applied for the signalling radio bearers in the order SRB4, SRB3, SRB2 and SRB1.

9.3.38 Integrity Protection Algorithm

The *Integrity Protection Algorithm* IE indicates which type of UMTS Integrity Algorithm is used. This field is defined in 3GPP TS 33.102.

Table 9.3.38.1: *Integrity Protection Algorithm* **information elements**

```
< Integrity Protection Algorithm IE > ::=
    < Integrity Protection Algorithm : bit (4) >;
```

Table 9.3.38.2: *Integrity Protection Algorithm* **information element details**

Integrity Protection Algorithm (4 bit field)

```
bit
4 3 2 1
0 0 0 1          UIA1  -- see 3GPP TS 33.102
All other values are reserved.
```

9.3.39   Integrity Protection Mode Info

The *Integrity Protection Mode Info* IE countains information about the integrity protection.

Table 9.3.39.1: *Integrity Protection Mode Info* **information elements**

```
< Integrity Protection Mode Info IE > ::=
    {   < Integrity protection mode command : 0 >
            < Integrity protection initialisation number : bit (32) >
    |   < Integrity protection mode command : 1 >
            < Downlink integrity protection activation info : < Integrity protection activation info IE > >
        { 0 | 1  < Integrity protection algorithm : < Integrity protection algorithm IE > > }
    };
```

Table 9.3.39.2: *Integrity Protection Mode Info* **information element details**

Integrity protection mode command (1 bit field) bit 1 0   start 1   modify
Downlink integrity protection activation info The Integrity protection activation info IE is defined in sub-clause 9.3.37.
Integrity protection initialisation number (32 bit field) This field is the FRESH random value generated by the network side as it is defined in 3GPP TS 33.102.
Integrity protection algorithm This IE is defined in sub-clause 9.3.1.16.

9.3.40   (void)

9.3.41   Intra Domain NAS Node Selector

This IE specifies information for routing a signalling connection to a CN node within a CN domain.

Table 9.3.41.1: *Intra Domain NAS Node Selector* **information elements**

```
< Intra Domain NAS Node Selector IE > ::=
    { 0                          -- release 5
        { 0                      -- GSM-MAP-type PLMN
        -- Routing basis
        { 000  < Routing Parameter TMSI-PTMSI : bit (10) >
                    -- TMSI allocated in current LA or PTMSI allocated in current RA
        | 001  < Routing Parameter TMSI-PTMSI : bit (10) >
                    -- TMSI allocated in another LA of this PLMN or PTMSI allocated in another RA of this PLMN
        | 010  < Routing Parameter TMSI-PTMSI : bit (10) >
                    -- TMSI or PTMSI allocated in another PLMN
        | 011  < Routing Parameter IMSI : bit (10) >
                    -- NAS identity is IMSI (response to IMSI paging)
        | 100  < Routing Parameter IMSI : bit (10) >
                    -- NAS identity is IMSI (MS-inititated event)
        | 101  < Routing Parameter IMEI : bit (10) >
                    -- NAS parameter is IMEI
        !   < Message escape : { 11 bit(1) } bit(10) = < no string > > }        -- Reserved
        < Entered parameter : bit (1) > }
    | 1 (0)*14 }        -- ANSI-41
    !   < Message escape : 1 bit(15) = < no string > > };        -- Reserved
```

Table 9.3.41.2: *Intra Domain NAS Node Selector* **information element details**

Routing parameter TMSI-PTMSI (10 bit field)
This field is the bitstring of bit(14) through bit(23) of the TMSI or PTMSI where bit(14) is the least significant.

Routing parameter IMSI (10 bit field)
This field is the binary representation of [(IMSI div 10) mod 1000]. Range 0 to 999.

Routing parameter IMEI (10 bit field)
This field is the binary representation of [(IMEI div 10) mod 1000]. Range 0 to 999.

Entered parameter (1 bit field)	
bit	
1	
0	the most-significant octet of the current LAI/RAI is not different from the most-significant octet of the LAI/RAI stored on the SIM.
1	the most-significant octet of the current LAI/RAI is different from the most-significant octet of the LAI/RAI stored on the SIM.

9.3.42   Mobile Allocation

This IE specifies the RF channels used in the mobile hopping sequence.

Table 9.3.42.1: *Mobile Allocation* **information elements**

```
< Mobile Allocation IE > ::=
    < Mobile Allocation Length : bit(8) >
    < Mobile Allocation Value : octet (val(Mobile Allocation Length)) >;
```

Table 9.3.42.2: *Mobile Allocation* **information element details**

Mobile Allocation Length (8 bit field)
The Mobile Allocation Length is coded as the length part of the *Mobile Allocation* IE specified in 3GPP TS 44.018.

Mobile Allocation Value (octet string)
The Mobile Allocation Value is coded as the value part of the *Mobile Allocation* IE specified in 3GPP TS 44.018.

9.3.43   Mobile Time Difference

This IE encodes a time related to the synchronization difference between the time bases of two base stations.

Table 9.3.43.1: *Mobile Time Difference* **information elements**

```
< Mobile Allocation IE > ::=
    < Mobile Time Difference Length : bit (8) >
    < Mobile Time Difference Value : octet (val(Mobile Time Difference Length)) >;
```

Table 9.3.43.2: *Mobile Time Difference* **information element details**

Mobile Time Difference Length (8 bit field)
The Mobile Time Difference Length is coded as the length part of the *Mobile Time Difference* IE specified in 3GPP TS 44.018.

Mobile Time Difference Value (octet string)
The Mobile Time Difference Value is coded as the value part of the *Mobile Time Difference* IE specified in 3GPP TS 44.018.

9.3.44 MS GERAN A/Gb mode Radio Access Capability

This Information Element contains the MS GERAN A/Gb mode radio access capability that is structured and coded according to the specification used for the corresponding system type.

This IE contains the Mobile station classmark 2 and 3 of the MS.

Table 9.3.44.1: *MS GERAN A/Gb mode Radio Access Ca*pability information elements

```
< MS GERAN A/Gb mode Radio Access Capability IE > ::=
    {    < Mobile Station Classmark 2 length : bit(3) >
         < Mobile Station Classmark 2: octet(val (Mobile Station Classmark 2 length)) > }
    {    < Mobile Station Classmark 3 length : bit(5) >
         < Mobile Station Classmark 3: octet (val (Mobile Station Classmark 3 length)) > } ;
```

Table 9.3.44.2: *MS GERAN A/Gb mode Radio Access Capability* information element details

Mobile Station Classmark 2 length (3 bit field) This field is the binary representation of the length of the *Mobile Station Classmark 2* IE in octets excluding the bits used for this length field. Range 0 to 7 octets
Mobile Station Classmark 2 This IE is defined in 3GPP TS 24.008
Mobile Station Classmark 3 length (5 bit field) This field is the binary representation of the length of the *Mobile Station Classmark 3* IE in octets excluding the bits used for this length field. Range 0 to 31 octets
Mobile Station Classmark 3 This IE is defined in 3GPP TS 24.008

9.3.45 MS GERAN Iu mode Radio Access Capability

This Information Element contains the MS GERAN Iu mode radio access capability that is structured and coded according to the specification used for the corresponding system type.

Table 9.3.45.1: *MS GERAN Iu mode Radio Access Capability* information elements

```
<MS GERAN Iu mode Radio Access Capability IE > ::=
   {
        < MS GERAN Iu mode Radio Access Capability length : bit (10)>
        < MS RF Capability GSM : < MS RF Capability GSM IE > >
        < MS GERAN Iu mode RLC Capability : < MS GERAN Iu Mode RLC Capability IE > >
        < PDCP Capability : < PDCP Capability IE > >
        < MS Multi-Mode and Multi-RAT Capability : < MS Multi-Mode and Multi-RAT Capability IE > >
        < Security Capability : < Security Capability IE > >
        < MS Positioning Capability : < MS Positioning Capability IE > >
        < MS Measurement Capability : < MS Measurement Capability IE > >
        < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                            -- The receiver shall assume the value zero for any truncated bit
   } ;
```

Table 9.3.45.2: *MS GERAN Iu mode Radio Access Capability* **information element details**

MS GERAN Iu mode Radio Access Capability length (10 bit field) This field is the binary representation of the length of the *MS GERAN Iu Mode Radio Access Capability* IE in bits excluding the bits used for this length field. Range: 0 to 1023.
MS RF Capability GSM This IE is defined in sub-clause 9.3.47.
MS GERAN Iu mode RLC Capability This IE is defined in sub-clause 9.3.46.
PDCP Capability This IE is defined in sub-clause 9.3.59.
MS Multi-Mode and Multi-RAT Capability This IE is defined in sub-clause 9.3.48.
Security Capability This IE is defined in sub-clause 9.3.100.
MS Positioning Capability This IE is defined in sub-clause 9.3.50.
MS Measurement Capability This IE is defined in sub-clause 9.3.49.

9.3.46   MS GERAN Iu mode RLC Capability

The *MS GERAN Iu mode RLC capability* IE describes the capabilities of the RLC layer of the MS in GERAN Iu mode.

Table 9.3.46.1: *MS GERAN Iu mode RLC Capability* **information elements**

```
< MS GERAN Iu mode RLC Capability IE > ::=
    {
        < MS GERAN Iu mode RLC Capability Length : bit (4)>
        < Maximum number of RLC-AM entities : bit (3) >
        < Maximum number of RLC-UM entities : bit (3) >
        < Maximum numer of RLC-T entities : bit (3) >
        < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                            -- The receiver shall assume the value zero for any truncated bit
    };
```

Table 9.3.46.2: *MS GERAN Iu mode RLC Capability* **information element details**

MS GERAN Iu mode RLC Capability Length (4 bit field) This field is the binary representation of the length of the MS GERAN Iu Mode RLC Capability IE in bits excluding the bits used for this length field. Range: 0 to 15.

Maximum number of RLC-AM entities (3 bits field)
This field defines the number of RLC entities operating in acknowledge mode in the MS.

bit
3 2 1
0 0 0   3 RLC-AM entities
0 0 1   4 RLC-AM entities
0 1 0   5 RLC-AM entities
0 1 1   6 RLC-AM entities
1 0 0   8 RLC-AM entities
All other values are reserved.

Maximum number of RLC-UM entities (3 bits field)
This field defines the number of RLC entities operating in unacknowledge mode in the MS.

bit
3 2 1
0 0 0   3 RLC-UM entities
0 0 1   4 RLC-UM entities
0 1 0   5 RLC-UM entities
0 1 1   6 RLC-UM entities
1 0 0   8 RLC-UM entities
All other values are reserved.

Maximum number of RLC-T entities (2 bits field)
This field defines the number of RLC entities operating in transparent mode in the MS.

bit
3 2 1
0 0 0   3 RLC-T entity
0 0 1   4 RLC-T entities
0 1 0   5 RLC-T entities
0 1 1   6 RLC-T entities
1 0 0   8 RLC-T entities
All other values are reserved.

9.3.47   MS RF Capability GSM

The purpose of the *MS RF Capability GSM* information element is to provide the radio part of the network with information concerning radio aspects of the mobile station. The contents might affect the manner in which the network handles the operation of the mobile station.

The *MS RF Capability GSM* information element is coded as shown in table 9.3.47.1.

For the indication of the Access Technology Types the following conditions shall apply:

- Among the three Access Type Technologies GSM 900-P, GSM 900-E and GSM 900-R only one shall be present.

- Due to shared radio frequency channel numbers between GSM 1800 and GSM 1900, the mobile station should provide the relevant radio access capability for either GSM 1800 band OR GSM 1900 band, not both.

- The MS shall indicate its supported Access Technology Types.

For error handling the following shall apply:

- If a received Access Technology Type is unknown to the receiver, it shall ignore all the corresponding fields.

- If within a known Access Technology Type a receiver recognizes an unknown field it shall ignore it.

- For more details about error handling of MS radio access capability see 3GPP TS 48.018.

Table 9.3.47.1: *MS RF Capability GSM* **information elements**

```
< MS RF Capability GSM IE > ::=
    {
        < MS RF Capability GSM Length : bit (8) >
        < RF Capability Group : < RF Capability Group struct > >
        { 1 < Additional RF Capability Group : < RF Capability Group struct > > } ** 0
    } ;

< RF Capability Group struct > ::=
    -- Access Technology using common capabilities
    < Access Technology Type : bit (4) >
    { 1 < Additional Access Technology Type : bit (4) > } ** 0
    < Common Access Capabilities : < Access Capabilities struct > >
    -- Access Technology using individual capcabilities
    { 1 < Additional Access Technology : < Additional Access Technology struct > > } ** 0 ;

< Access Capabilities struct > ::=
    < Access Capabilities length : bit (6)>
    < GMSK Power Capability : bit (3) >
    { 0 | 1 < 8PSK Power Capability : bit (2) > }
    < Pseudo Synchronisation : bit (1) >
    < Multislot capability : < Multislot capability struct > >
    < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                        -- The receiver shall assume the value zero for any truncated bit

< Additional Access Technology struct > ::=
    < Additional Access Technology length : bit (6)>
    < Access Technology Type : bit (4) >
    < GMSK Power Class : bit (3) >
    < 8PSK Power Class : bit (2) >
    < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                        -- The receiver shall assume the value zero for any truncated bit

< Multislot Capability struct > ::=

    { 0 < Combined GMSK and 8-PSK Multislot Class : bit (6) >
    | 1
        < GMSK Multislot Class : bit (6) >
        { 0 | 1 < 8-PSK Multislot Class : bit (6) >}};
```

Table 9.3.47.2: *MS RF Capability GSM* **information element details**

MS RF Capability GSM Length (8 bit field) This field is the binary representation of the length of the MS RF Capability GSM IE in bits exluding the bits used for this length field.

Access Technology Type (4 bit field)
This field indicates the access technology type to be associated with the following access capabilities.
 	
   bit
   4 3 2 1
   0 0 0 0   GSM P
   0 0 0 1   GSM E   *--note that GSM E covers GSM P*
   0 0 1 0   GSM R   *--note that GSM R covers GSM E and GSM P*
   0 0 1 1   GSM 1800
   0 1 0 0   GSM 1900
   0 1 0 1   GSM 450
   0 1 1 0   GSM 480
   0 1 1 1   GSM 850
   1 0 0 0   GSM 700
   All other values are treated as unknown by the receiver.

Common Access Capabilities This structure contains the access capabilities for the indicated access technology type and - if present - for the access technologies indicated by the optional List of additional access technologies.
Access Capabilities length (6 bit field) This field is the binary representation of the length of the Access Capabilities struct in bits excluding the bits used for this length field. Range: 0 to 63.
GMSK Power Capability, GMSK Power Class (3 bit field) This field contains the binary coding of the power class used for GMSK associated with the indicated Access Technology Type (see 3GPP TS 45.005).

8PSK Power Capability (2 bit field)
If 8-PSK modulation is supported for uplink, this field indicates the radio capability for 8-PSK modulation. The following coding is used (see 3GPP TS 45.005):
 	
   bit
   2 1
   0 0   Reserved
   0 1   Power class E1
   1 0   Power class E2
   1 1   Power class E3

8PSK Power Class (2 bit field)
This field indicates the radio capability for 8-PSK modulation. The following coding is used (see 3GPP TS 45.005):
 	
   bit
   2 1
   0 0   8-PSK modulation not supported for uplink
   0 1   Power class E1
   1 0   Power class E2
   1 1   Power class E3

Pseudo Synchronisation (1 bit field)
This field indicates the Pseudo Synchronisation (Handover) capability.
   0   Pseudo Synchronisation capability not present
   1   Pseudo Synchronisation capability present

RF Capability Group This structure contains the Common access capabilities for the indicated access technology type. These access capabilities may be extended by an optional List of additional access technologies.

Additional Access Technologies This structure contains the GMSK Power Class and 8PSK Power Class for additional access technologies. All other capabilities for this indicated access technologies are the same as the capabilities as indicated by the last previously included Common access capabilities.
Additional Access Technology length (6 bit field) This field is the binary representation of the length of the Additional Access Technology struct in bits excluding the bits used for this length field. Range: 0 to 63.
Multislot Capability This structure contains the multislot capability for GMSK and 8-PSK modulations. The multislot class capability for GMSK and 8-PSK modulations can be combined or it can be defined separately for the modulations.
Combined GMSK and 8-PSK Multislot Class (6 bit field) This field indicates common multislot class for both GMSK and 8-PSK modulations. The field is coded as the binary representation of the multislot class defined in 3GPP TS 45.002.
GMSK Multislot Class (6 bit field) This field indicates multislot class for GMSK modulation. The field is coded as the binary representation of the multislot class defined in 3GPP TS 45.002.
8-PSK Multislot Class (6 bit field) This field indicates multislot clas for 8-PSK modulation. The field is coded as the binary representation of the multislot class defined in 3GPP TS 45.002.

9.3.48 MS Multi-Mode and Multi-RAT Capability

The *MS Multi-Mode and Multi-RAT Capability* IE describes the RLCmulti-mode and multi-RAT capabilities of the MS.

Table 9.3.48.1: *MS Multi-Mode and Multi-RAT Capability* **information elements**

< MS Multi-Mode and Multi-RAT Capability IE > ::=   < **Support of GERAN A/Gb** : bit (1) >   < **Support of Multi-Carrier** : bit (1) >   < **Support of UMTS FDD** : bit (1) >   < **Support of UMTS 1.28 Mcps TDD** : bit (1) >   < **Support of UMTS 3.84 Mcps TDD** : bit (1) >   < **Support of CDMA2000** : bit (1) >   < spare bit >*10;

Table 9.3.48.2: *MS Multi-Mode and Multi-RAT Capability* **information element details**

Support of GERAN A/Gb (1 bit field) **Support of Multi-Carrier** (1 bit field) **Support of UMTS FDD** (1 bit field) **Support of UMTS FDD** (1 bit field) **Support of UMTS 1.28 Mcps TDD** (1 bit field) **Support of UMTS 3.84 Mcps TDD** (1 bit field) **Support of CDMA2000** (1 bit field) These fields indicates the support of the associated multi-mode/multi-RAT capability. bit 1 0   not supported 1   supported

9.3.49 MS Measurement Capability

The *MS Measurement Capability* IE describes the measurement capability and SMS value of the MS.

Table 9.3.49.1: *MS Measurement Capability* information elements

```
< MS Measurement Capability IE > ::=
    {
    < MS Measurement Capability Length : bit (4)>
    < Extended Measurement Capability : bit (1) >
    < SMS Value : bit (4) >
    < SM Value : bit (4) >
    < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                        -- The receiver shall assume the value zero for any truncated bit
    } ;
```

Table 9.3.49.2: *MS Measurement Capability* information element details

MS Measurement Capability Length (4 bit field) This field is the binary representation of the length of the MS Measurement Capability IE in bits excluding the bits used for this length field. Range: 0 to 15.
Extended Measurement Capability (1 bit field) These field indicates the support of Extended Measurement. bit 0   Extended Measurement is not supported 1   Extended Measurement is supported

SMS Value (4 bit field)
The SMS Value 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 (4 bit field)
The SM Value 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)

9.3.50 MS Positioning Capability

The *MS Positioning Capability* IE describes the supported positioning methods in GERAN *Iu mode*.

Table 9.3.50.1: *MS Positioning Capability* **information elements**

```
< MS Positioning Capability IE > ::=
    {
    < MS Positioning Capability Length : bit (4)>
    < OTD-A support : bit (1) >
    < OTD-B support : bit (1) >
    < GPS-A support : bit (1) >
    < GPS-B support : bit (1) >
    < GPS-C support : bit (1) >
    < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                        -- The receiver shall assume the value zero for any truncated bit
    } ;
```

Table 9.3.50.2: *MS Positioning Capability* **information element details**

MS Positioning Capability Length (4 bit field) This field is the binary representation of the length of the MS Positioning Capability IE in bits excluding the bits used for this length field. Range: 0 to 15.
OTD-A support (1 bit field) MS assisted E-OTD. **OTD-B support** (1 bit field) MS based E-OTD.t **GPS-A support** (1 bit field) MS assisted GPS. **GPS-B support** (1 bit field) MS based GPS. **GPS-C support** (1 bit field) Conventional GPS. Each of these fields indicates the support of the associated positioning method. bit 1 0   not supported 1   supported

9.3.51   MS Timers and Constants in RRC-Connected mode

This IE specifies timer values and constant values used by the mobile station in RRC-Connected mode.

Table 9.3.51.1: *MS Timers And Constants in RRC-Connected Mode* **information elements**

```
< MS Timers and Constants in RRC-Connected mode IE > ::=
        < MS Timers and Constants Length : bit (4) >
        { 0 | 1  < T305 : GRA AND CELL UPDATE TIMER IE > }
        { 0 | 1  < T314 : bit (3) > }
        { 0 | 1  < T315 : bit (3) > }
         < spare bits >** } ;
```

Table 9.3.51.2: *MS Timers And Constants in RRC-Connected Mode* **information element details**

MS Timers and Constants Length (4 bit field) This field is the binary representation of the length of the *MS Timers and Constants in RRC-Connected Mode* IE in bits excluding the 4 bits used for this length field.
T305 (3 bit field) This field specifies the starting value of timer T305. This IE defined in 3GPP TS 44.160, PACKET SYSTEM INFORMATION 16 message.

T315 (3 bit field)
This field specifies the starting value of timer T315. The following table specifies the coding :

```
bit
3 2 1
0 0 0   0s
0 0 1   10s
0 1 0   30s
0 1 1   60s
1 0 0   180s   --default value
1 0 1   600s
1 1 0   1200s
1 1 1   1800s
```

9.3.52   MultiRate Configuration

This IE specifies all parameters for a multirate speechcodec.

Table 9.3.52.1: *MultiRate Configuration* information elements

```
< MultiRate Configuration IE > ::=
    < MultiRate Configuration Length : bit(8) >
    < MultiRate Configuration Value : octet (val(MultiRate Configuration Length)) >;
```

Table 9.3.52.2: *MultiRate Configuration* information element details

MultiRate Configuration Length (8 bit field)
The MultiRate Configuration Length is coded as the length part of the *MultiRate Configuration* IE specified in
3GPP TS 44.018 § 10.5.2.21aa.

MultiRate Configuration Value (octet string)
The MultiRate Configuration Value is coded as the value part of the *MultiRate Configuration* IE specified in
3GPP TS 44.018 § 10.5.2.21aa.

9.3.53   Multislot Allocation

This IE specifies the downlink and uplink timeslots used in a multislot configuration. It also groups the timeslots into
channel sets.

Table 9.3.53.1: *Multislot Allocation* information elements

```
< Multislot Allocation IE > ::=
    < Multislot Allocation Length : bit(8) >
    < Multislot Allocation Value : octet (val(Multislot Allocation Length)) >;
```

Table 9.3.53.2: *Multislot Allocation* information element details

Multislot Allocation Length (8 bit field)
The Multislot Allocation Length is coded as the length part of the *Multislot Allocation* IE specified in 3GPP TS 44.018.

Multislot Allocation Value (octet string)
The Multislot Allocation Value is coded as the value part of the *Multislot Allocation* IE specified in 3GPP TS 44.018.

9.3.54   NAS Message

The *NAS Message* IE contains a non-access stratum message to be transferred transparently through GERAN.

Table 9.3.54.1: *NAS Message* information elements

```
< NAS Message IE > ::=
      < Length of NAS Message : bit (12) >
      < NAS Message : octet (1+val(Length of NAS Message) ) > ;
```

Table 9.3.54.2: *NAS Message* information element details

Length of NAS Message (12 bit field)
This field is used to calculate the length of the *NAS Message* IE excluding the bits used for this length field. Range : 0 to 4095.
NAS Message (variable length octet string)
The first octet contains octet 1 of the NAS message, the second octet contains octet 2 of the NAS message and so on. See 3GPP TS 24.007.

9.3.55   NAS Synchronization Info

The *NAS Synchronization Info* IE is a container for non-access stratum information to be transferred transparently through GERAN.

Table 9.3.55.1: *NAS Synchronization Info* information elements

```
< NAS Synchronization Info IE > ::=
    < NAS Synchronization Info : bit ( 4 ) > > ;
```

Table 9.3.55.2: *NAS Synchronization Info* information element details

NAS Synchronization Info (4 bit field)
This field contains NAS information to be transferred transparently through GERAN. The bits are numbered b1-b4, where b1 is the least significant bit.

9.3.56   NAS System Information GSM-MAP

This IE contains system information that belongs to the non-access stratum for a GSM-MAP type of PLMN. This information is transparent to RRC. It may contain either information specific to one CN domain (CS or PS) or information common for both CN domains.

Table 9.3.56.1: *NAS System Information GSM-MAP* information elements

```
< NAS System Information GSM-MAP IE > ::=
    < Length of NAS System Information GSM-MAP : bit (3) >
    < NAS System Information GSM-MAP : octet (1+val(Length of NAS System Information GSM-MAP)) >;
```

Table 9.3.56.2: *NAS System Information GSM-MAP* information element details

Length of NAS System Informaion GSM-MAP (3 bit field)
This field is used to calculate the length in octets of the *NAS System Information GSM-MAP* IE excluding the bits used for this length field. Range : 0…7.

NAS System Information GSM_MAP (octet string)
The first octet contains octet 1 of the NAS System Information element, the second octet contains octet 2 of the NAS system information element and so on. See 3GPP TS 24.008.

9.3.57 Paging Cause

The *Paging Cause* IE indicates the cause of the paging request.

Table 9.3.57.1: *Paging Cause* information elements

< Paging Cause IE > ::=
    < **Paging Cause** : bit (3) >;

Table 9.3.57.2: *Paging Cause* information element details

Paging Cause (3 bit field)

bit
3 2 1
0 0 0   Terminating Conversational Call
0 0 1   Terminating Streaming Call
0 1 0   Terminating Interactive Call
0 1 1   Terminating Background Call
1 0 0   Terminating High Priority Signalling
1 0 1   Terminating Low Priority Signalling
1 1 0   Terminating – cause unknown
1 1 1   Reserved

9.3.58 Paging Record Type Identifier

The *Paging Record Type Identifier* IE indicates the identifier used in the Core Network Paging.

Table 9.3.58.1: *Paging Record Type Identifier* information elements

< Paging Record Type Identifier IE > ::=
    < **Paging Record Type Identifier** : bit (3) >;

Table 9.3.58.2: *Paging Record Type Identifier* information element details

Paging Record Type Identifier (3 bit field)

bit
3 2 1
0 0 0   IMSI (GSM-MAP)
0 0 1   TMSI/PTMSI (GSM/MAP)
0 1 0   IMSI (DS-41)
0 1 1   TMSI (DS-41)
1 x x   reserved

9.3.59 PDCP Capability

Indicates which algorithms and which value range of their parameters are supported by the MS.

The *PDCP Capability* IE indicates the algorithms and the value range of parameters supported by the MS PDCP.

Table 9.3.59.1: *PDCP Capability* **information elements**

```
< PDCP Capability IE > ::=
    {
        < PDCP Capability length : bit (8)>
        < Support for lossless serving BSC relocation : bit (1) >
    {   < Support for RFC2507 : 0 >
    |   < Support for RFC2507 : 1 >
        < Max HC context space : bit (4) }
    {   < Support for RFC3095 : 0 >
    |   < Support for RFC3095 : 1 >
            { 0 | 1 < Maximum number of ROHC context sessions : bit (4) > }
            { 0 | 1 < Reverse decompression depth : bit (16) > } }
            { < Support for RFC 3095 context relocation: 0 >
            | < Support for RFC 3095 context relocation: 1 > } }
        < spare bit >**;     -- Extension information may be truncated between released versions of the protocol
                                -- The receiver shall assume the value zero for any truncated bit
    };
```

Table 9.3.59.2: *PDCP Capability* **information element details**

PDCP Capability Length (8 bit field) This field is the binary representation of the length of the *PDCP Capability* IE in bits excluding the 8 bits used for this length field. Range: 0 to 255.
Support for lossless Serving BSC relocation (1 bit field) bit 1 0   Lossless Serving BSC relocation not supported 1   Lossless Serving BSC relocation supported
Support for RFC2507 (1 bit field) **Support for RFC3095** (1 bit field) bit 1 0   not supported 1   supported

Max HC context space (4 bit field)
This field indicates the maximum header compression context space supported by the MS, when RFC2507 is supported and is encoded as follows :
 	
bit
  4 3 2 1
 	
  0 0 0 0   512 bytes
  0 0 0 1   1024 bytes
  0 0 1 0   2048 bytes
  0 0 1 1   4096 bytes
  0 1 0 0   8192 bytes
  0 1 0 1   16384 bytes
  0 1 1 0   32768 bytes
  0 1 1 1   65536 bytes
  1 0 0 0   131072 bytes
 	
All other values are reserved

Maximum number of ROHC context sessions (4 bit field)

This field indicates the maximum number of ROHC context sessions when RFC3095 is supported and is encoded as shown below. If this field is not present, the MS shall use the default value of 16 :

```
   bit
   4 3 2 1
   0 0 0 0        2 sessions
   0 0 0 1        4 sessions
   0 0 1 0        8 sessions
   0 0 1 1        12 sessions
   0 1 0 0        16 sessions
   0 1 0 1        24 sessions
   0 1 1 0        32 sessions
   0 1 1 1        48 sessions
   1 0 0 0        64 sessions
   1 0 0 1        128 sessions
   1 0 1 0        256 sessions
   1 0 1 1        512 sessions
   1 1 0 0        1024 sessions
   1 1 0 1        16384 sessions
   1 1 1 0        reserved
   1 1 1 1        reserved
```

Reverse decompression depth (16 bit field)

This field describes the reverse compression depth as an integer from 0 - 65535. If the IE is not present, the default value of 0 (reverse decompression is not supported) is used.

Support for RFC 3095 context relocation (1 bit field)

```
bit
1
0    Support for RFC 3095 context relocation not supported
1    Support for RFC 3095 context relocation supported
```

9.3.60   PDCP Info

The *PDCP Info* IE contains information about the PDCP protocol.

Table 9.3.60.1: *PDCP Info* **information elements**

```
< PDCP Info IE > ::=
    {
        < PDCP mode : bit (1) >
        {   < Lossless Serving BSS relocation support : 0 >
        |   < Lossless Serving BSS relocation support : 1 >
            < Max PDCP SN : bit (1) > }
        < PDCP PDU header : bit (1) >
        { 0 | 1 < Header compression information List : bit(3) >
        < Header compression information struct : < Header compression information struct > > } } *(1+val(Header
compression information List))
    };

< Header compression information struct > ::=
    < Header Compression Information struct length : bit (14) >
    { 000                        -- Header compression according to IETF standard RFC2507
        < F_MAX_PERIOD : bit (16) >
        < F_MAX_TIME : bit (8) >
        < MAX_HEADER : bit (16) >
        < TCP_SPACE : bit (8) >
        < NON_TCP_SPACE : bit (16) >
        < EXPECT_REORDERING : bit (1) > }
    | 001                        -- Header compression according to IETF standard RFC3095

        < Profiles List : bit (4) >
        < Profile instance : bit (2) > * (1 + val (Profiles List))
        { 0 | 1  < UPLINK: bit (1) >
                < CID inclusion info : bit (1) >
                { 0 | 1 < Max_CID : bit (14) > }
                { 0 | 1 < MRRU : bit (16) > }
                < Packet Sizes Allowed List : bit (4) >
                < PACKET_SIZES_ALLOWED: bit (11) > * (1 + val (Packet Sizes Allowed List)) }
        { 0 | 1 < DOWNLINK: bit (1) >
            < CID inclusion info : bit (1) >
            { 0 | 1 < Max_CID : bit (14) > }
        }
        { 0 | 1 < Reverse_Decompression_Depth : bit (16) > }
    !   < Message escape : { 01 bit(1) | 1 bit (2) } bit** = < no string > > ;
```

Table 9.3.60.2: *PDCP Info* **information element details**

PDCP mode (1 bit field)   bit   1   0   non-transparent   1   transparent
Lossless Serving BSS relocation support (1 bit field)   Lossless Serving BSC relocation is supported when both the RLC is in Acknowledged mode meaning when the IE "RLC mode" is "Acknowledged" bit   1   0   Lossless Serving BSS relocation not supported   1   Lossless Serving BSS relocation supported
Max PDCP SN (1 bit field)   This field indicates the maximim PDCP Sequence Number supported, when the lossless Serving BSC relocation is supported.   bit   1   0   255   1   65535

PDCP PDU header (1 bit field) bit 1 0   not present 1   present
Header compression information List (3 bit field) This field is the binary representaion of the number of header compression information. Range: 0 to maxPDCPAlgoType-1. NOTE: Link with the PDCP instances to be clarified in the procedure.
Header compression information struct The Header compression information struct is repeated up to maxPDCPalgoType times.
Header Compression Information struct length (14 bit field) This field is the binary representaion of the length of the Header Compression Information struct excluding the bits used for this length field. Range: 0 to 4095.
F_MAX_PERIOD (16 bit field) This field is a binary representation of the maximum number of compressed non-TCP headers that may be sent without sending a full header. Range 1 to 65535.
F_MAX_TIME (8 bit field) This field is a binary representation of the maximum time in seconds that a compressed headers may not be sent after sending last full header. Range 1 to 255.
MAX_HEADER (16 bit field) This field is a binary representation of the largest header size in octets that may be compressed. Range 60 to 65535.
TCP_SPACE (8 bit field) This field is a binary representation of the maximum CID value for TCP connections. Range 3 to 255.
NON_TCP_SPACE (16 bit field) This field is a binary representation of the maximum CID value for non-TCP connections. Range 3 to 65535.
EXPECT_REORDERING (1 bit field) bit 1 0   reordering not expected, 1   reordering expected
UPLINK (1 bit field) bit 1 0   does not indicate the necessary information elements for UL 1   indicates the necessary information elements for UL

DOWNLINK (1 bit field) bit 1 0   does not indicate the necessary information elements for DL 1   indicates the necessary information elements for DL
CID inclusion info This field configures which method shall be used to carry RFC3095 CID values : bit 1 0   PDCP Header 1   RFC3095 packet format **Max_CID** This field describes the highest context ID number to be used by the MS compressor. If this field is not present then the default value of 15 is used. This field is encoded as a binary number. Range 0 to 16383. A value of 0 shall be counted as reserved.
Profiles List (4 bit field) This field is a binary representation of the number of ROHC profiles supported by the GERAN decompressor. Range 0 to maxROHC-Profiles-1.
Profile instance This field is a binary representation of the supported profile types. Range 1 to 3. Any other value received shall be treated as reserved.
MRRU This field describes the Maximum Reconstructed Reception Unit. When RLC is configured in non-transparent mode, this field is set to the 0 and the segmentation function of the RFC 3095 shall not be used by the MS. The filed is encoded as a binary number. Range 0 to 65535
Packet Sizes Allowed List (4 bit field) This field is the binary representation of the list of packet sizes that are allowed to be produced by RFC 3095.
PACKET_SIZES_ALLOWED (11 bit field) This field is the binary representation of the packets sizes in octets as defined by MS compressor. Range 2 to 1500. Any other received values shall be treated as reserved.
Reverse decompression depth (16 bit field) This field describes the reverse compression depth as an integer from 0 to 65535. Also it determines whether reverse decompression should be used or not and the maximum number of packets that can be reverse decompressed by the MS decompressor. If the IE is not present, the default value of 0 (reverse decompression shall not be used) is used. Range 0 to 65535

9.3.61   PDCP SN Info

The *PDCP SN Info* IE indicates the PDCP sequence number that the sender of the message is expecting to be received next.

Table 9.3.61.1: *PDCP SN Info* information elements

< PDCP SN Info IE > ::=   < **PDCP SN Info :** bit (16) >;

Table 9.3.61.2: *PDCP SN Info* **information element details**

PDCP SN Info (16 bit field)
The *PDCP SN Info* field is encoded as a binary number. Range 0 to 65535.

9.3.62   Physical Channel Configuration

The *Physical Channel Configuration* IE describes the dedicated and the shared physical resources.

Table 9.3.62.1: *Physical Channel Configuration* **information elements**

```
< Physical Channel Configuration IE > ::=
    { 00      -- no physical resource allocated
    | 01    < DBPSCH : < DBPSCH Description IE > >
    | 10    < SBPSCH : < SBPSCH Description IE > >
    |
    !        < Message escape : { 11 } bit** = < no string > > }
            -- Reserved for future use};
```

Table 9.3.62.2: *Physical Channel Configuration* **information element details**

DBPSCH Description
This IE is defined in sub-clause 9.3.19.

SBPSCH Description
This IE is defined in sub-clause 9.3.99.

9.3.63   PLMN Identity

The *PLMN Identity* IE identifies a Public Land Mobile Network for a GSM-MAP type of PLMN. The PLMN identity digits are defined in 3GPP TS 23.003.

Table 9.3.63.1: *PLMN Identity* **information elements**

```
< PLMN Identity IE > ::=
    < MCC_digit_1 : bit (4) >
    < MCC_digit_2 : bit (4) >
    < MCC_digit_3 : bit (4) >
    < MNC_digit_1 : bit (4) >
    < MNC_digit_2 : bit (4) >
    { 0 | 1  < MNC_digit_3 : bit (4) > } ;
```

Table 9.3.63.2: *PLMN Identity* **information element details**

MCC_digit_1 (4 bit field)
MCC_digit_2 (4 bit field)
MCC_digit_3 (4 bit field)
These fields are the binary representation of the MCC digit number X, where X goes from 1 to 3. Range: 0 to 9.

MNC_digit_1 (4 bit field)
MNC_digit_2 (4 bit field)
MNC_digit_3 (4 bit field)
These fields are the binary representation of the MNC digit number X, where X goes from 1 to 2 or 3. Range: 0 to 9.
The presence of a third MNC digit depends on the value of the MCC.

9.3.64   Power Command

The *Power Command* IE is to provide the power level to be used by the mobile station.

Table 9.3.64.1: *Power Command* **information elements**

```
< Power Command IE > ::=
    < Power Command Value : octet (1) >;
```

Table 9.3.64.2: *Power Command* **information element details**

Power Command Value (1 octet field)
The Power Command Value is coded as the value part of the *Power Command* IE defined in 3GPP TS 44.018.

9.3.65   Power Command and Access Type

The *Power Command and Access Type* IE is to provide the power level to be used by the mobile station.

Table 9.3.65.1: *Power Command and Access Type* **information elements**

```
< Power Command and Access Type IE > ::=
    < Power Command and Access Type Value : octet (1) >;
```

Table 9.3.65.2: *Power Command and Access Type* **information element details**

Power Command and Access Type Value (1 octet field)
The Power Command and Access Type Value is coded as the value part of the *Power Command and Access Type* IE defined in 3GPP TS 44.018.

9.3.66   (void)

9.3.67   (void)

9.3.68   (void)

9.3.69   Protocol Error Cause

The *Protocol Error Cause* IE indicates the cause of the incomprehension of a message or information.

Table 9.3.69.1: *Protocol Error Cause* **information elements**

```
< Protocol Error Cause IE > ::=
    < Protocol Error Cause : bit (3) >;
```

Table 9.3.69.2: *Protocol Error Cause* information element details

```
Protocol Error Cause (3 bit field)
bit
3 2 1
0 0 0    CSN.1 violation or encoding error
0 0 1    Message type non-existent or not implemented
0 1 0    Message not compatible with receiver state
0 1 1    Information element value not comprehended
1 0 0    Message content part error
1 0 1    Message extension not comprehended

All other values are reserved.
```

9.3.70   Protocol Error Indicator

The *Protocol Error Indicator* IE indicates whether a message was transmitted due to a protocol error or not.

Table 9.3.70.1: *Protocol Error Indicator* information elements

```
< Protocol Error Indicator IE > ::=
    < Protocol Error Indicator : bit (1) >;
```

Table 9.3.70.2: *Protocol Error Indicator* information element details

```
Protocol Error Indicator (1 bit field)
bit
1
0    False - no protocol error occurred
1    True - protocol error occurred
```

9.3.71   Protocol Error Information

The *Protocol Error Information* IE contains diagnostic information returned by the receiver of a message that was not completely understood.

Table 9.3.71.1: *Protocol Error Information* information elements

```
< Protocol Error Information IE > ::=
    { 0 < Protocol Error Cause : < Protocol Error Cause IE > >
    | 1 } ;  -- reserved
```

Table 9.3.71.2: *Protocol Error Information* information element details

```
Protocol Error Cause
This IE is defined in sub-clause 9.3.69.
```

9.3.72   RAB Identity

The *RAB Identity* IE uniquely identifies a radio access bearer within a CN domain.

Table 9.3.72.1: *RAB Identity* **information elements**

```
< RAB Identity IE > ::=
    { 0 < RAB_Identity_GSM-MAP : bit (8) >
    | 1 < RAB_Identity_ANSI-41 : bit (8) > } ;
```

Table 9.3.72.2: *RAB Identity* **information element details**

RAB_Identity_GSM-MAP (8 bit field) This field indicates the RAB identity with a GSM-MAP-type PLMN. See 3GPP TS 24.008
RAB_Identity_ANSI-41 (8 bit field) This field indicates the RAB identity with a ANSI-41-type PLMN. See 3GPP TS 24.008

9.3.73   RAB Info

The *RAB Info* IE contains information used to uniquely identify a radio access bearer.

Table 9.3.73.1: *RAB Info* **information elements**

```
< RAB Info IE > ::=
    < RAB Identity : < RAB Identity IE > >
    < CN Domain Identity : < CN Domain Identity IE> >
    { 0 | 1 < NAS Synchronization Indicator : < NAS Synchronization Info IE > > }
    < Re-Establishment Timer : < Re-Establishment Timer IE > >;
```

Table 9.3.73.2: *RAB Info* **information element details**

RAB Identity This IE is defined in sub-clause 9.3.72.
CN Domain Identity This IE is defined in sub-clause 9.3.15.
NAS Synchronization Indicator The *NAS Synchronization Info* IE is defined in sub-clause 9.3.55.
Re-Establishment Timer This IE is defined in sub-clause 9.3.88.

9.3.74   RAB Info Post

The *RAB Info Post* IE contains information used to uniquely identify a radio access bearer.

Table 9.3.74.1: *RAB Info Post* **information elements**

```
< RAB Info Post IE> ::=
    < RAB Identity : < RAB Identity IE > >
    < CN Domain Identity : < CN Domain Identity IE > >
    { 0 | 1 < NAS Synchronization Indicator : < NAS Synchronization Info : bit (4) > > };
```

Table 9.3.74.2: *RAB Info Post* **information element details**

RAB Identity This IE is defined in sub-clause 9.3.72.

CN Domain Identity
This field is defined in sub-clause 9.3.15.

NAS Synchronization Indicator
The *NAS Synchronization Info* field is defined in sub-clause 9.3.55.

9.3.75 RAB Information for Setup

The *RAB Information for Setup* IE indicates the radio access bearer(s) to setup.

Table 9.3.75.1: *RAB Information for Setup* information elements

```
< RAB Information for Setup IE > ::=
    < RAB Info : < RAB info IE > >
    < RB Information to Setup List : bit (3) >
    < RB Information to Setup : < RB Information to Setup IE > > *(1+val(RB Information to Setup List)) };
```

Table 9.3.75.2: *RAB Information for Setup* information element details

RAB Info
This IE is defined in sub-clause 9.3.73.

RB Information to Setup List (3 bit field)
This field is the binary representation of the number of RB to setup in a RAB. Range : 0 to maxRBperRAB-1.

RB Information to Setup
This IE is defined in sub-clause 9.3.84. This IE can be repeated up to maxRBperRAB times within one RAB information for setup IE.

9.3.76 RAB Information to Reconfigure

The *RAB Information to Reconfigure* IE indicates the radio access bearer(s) to reconfigure.

Table 9.3.76.1: *RAB Information to Reconfigure* information elements

```
< RAB Information to Reconfigure IE > ::=
    < RAB Identity : < RAB Identity IE > >
    < CN Domain Identity : < CN Domain Identity IE > >
    < NAS Synchronization Indicator : < NAS synchronization Info : bit (4) > >;
```

Table 9.3.76.2: *RAB Information to Reconfigure* information element details

RAB Identity
This IE is defined in sub-clause 9.3.72.

CN Domain Identity
This IE is defined in sub-clause 9.3.15.

NAS Synchronization Indicator
The *NAS Synchronization Info* IE is defined in sub-clause 9.3.55.

9.3.77 RB Activation Time Info

The *RB Activation Time Info* IE contains the time, in terms of RLC sequence numbers, when a certain configuration shall be activated, for a number of radio bearers.

Table 9.3.77.1: *RB Activation Time Info* **information elements**

```
< RB Activation Time Info IE > ::=
    { 0 | 1 < Repeated Radio Bearer Activation Time list : bit (5) >
            < Repeated Radio Bearer Activation Time : < Radio Bearer Activation Time struct > > } *(1+val(Repeated
Radio Bearer Activation Time list)) } ;
```

```
< Repeated Radio Bearer Activation Time struct > ::=
    {   < RB Identity : < RB Identity IE > >
        { 0 | 1 { 00 < GPRS RLC Sequence Number : bit (7) >
              | 01 < EGPRS RLC Sequence Number : bit (11) >
              | 10 < DCCH TBF mode RLC Sequence Number : bit (4) >
              | 11 < TCH TBF RLC Sequence Number : bit (8) > }
}
    } ;
```

Table 9.3.77.2: *RB Activation Time Info* **information element details**

Repeated radio bearer activation time list (5 bit field) This field is the binary representation of the number of RBs. Range : 0 to maxRB-1.
Repeated radio bearer activation time struct The Repeated radio bearer activation time struct is repeated up to maxRB times.
RB Identity This IE is defined in sub-clause 9.3.80.
GPRS RLC Sequence Number (7 bit field) This field indicates the RLC send state variable for GPRS MS with radio bearers mapped on RLC AM and UM. This field is encoded as a binary number. Range : 0 to 127.
EGPRS RLC Sequence Number (11 bit field) This field indicates the RLC send state variable for EGPRS MS with radio bearers mapped on RLC AM and UM. This field is encoded as a binary number. Range : 0 to 2047.
DCCH TBF RLC Sequence Number (4 bit field) This field indicates the RLC send state variable for DCCH TBF mode MS (see 3GPP TS 44.160) with radio bearers mapped on RLC AM and UM. This field is encoded as a binary number. Range : 0 to 15.
TCH TBF RLC Sequence Number (8 bit field) This field indicates the RLC send state variable for TCH TBF mode MS (see 3GPP TS 44.160) with radio bearers mapped on RLC AM and UM. This field is encoded as a binary number. Range : 0 to 255.

9.3.78   RB COUNT-C Information

The *RB COUNT-C Information* IE indicates RB COUNT-C values for a radio bearer.

Table 9.3.78.1: *RB COUNT-C Information* **information elements**

```
< RB COUNT-C Information IE > ::=
    < RB Identity : < RB Identity IE > >
    < COUNT-C-Uplink : bit (32) >
    < COUNT-C-Downlink : bit (32) >;
```

Table 9.3.78.2: *RB COUNT-C Information* **information element details**

RB Identity This IE is defined in sub-clause 9.3.80.

COUNT-C-Uplink (32 bit field)
This field is the binary representation of the amount of data sent in Uplink. See 3GPP TS 33.102.

COUNT-C-Downlink (32 bit field)
This field is the binary representation of the amount of data sent in Downlink. See 3GPP TS 33.102.

9.3.79 RB COUNT-C MSB Information

The *RB COUNT-C MSB Information* IE indicates the MSB of the COUNT-C values of the radio bearer.

Table 9.3.79.1: *RB COUNT-C MSB Information* information elements

< RB COUNT-C MSB Information IE > ::=
< **RB Identity** : bit (5) >
< **COUNT-C-MSB-Uplink** : bit (25) >
< **COUNT-C-MSB-Downlink** : bit (25) >;

Table 9.3.79.2: *RB COUNT-C MSB Information* information element details

RB Identity
This IE is defined in sub-clause 9.3.80.

COUNT-C-MSB-Uplink (25 bit field)
This field indicates 25 MSBs from the COUNT-C-uplink associated to this RB. See 3GPP TS 33.102.

COUNT-C-MSB-Downlink (25 bit field)
This field indicates 25 MSBs from the COUNT-C-downlink associated to this RB. See 3GPP TS 33.102.

9.3.80 RB Identity

The *RB Identity* IE indicates the identification number for the radio bearer affected by a certain message.

Table 9.3.80.1: *RB Identity* information elements

< RB Identity IE > ::=
< **RB Identity** : bit (5) >;

Table 9.3.80.2: *RB Identity* information element details

RB Identity (5 bit field)
The *RB Identity* field is encoded as a binary number. Range: 0 to 31. Values 0-4 shall only be used for signalling radio bearers.

9.3.81 RB Information to Be Affected

The *RB Information to Be Affected* IE indicates identity of the RB to be affected by the message.

Table 9.3.81.1: *RB Information to Be Affected* information elements

< RB Information to Be Affected IE > ::=
< **RB Identity** : < RB Identity IE > >;

RB Identity (5 bit field) This field is defined in sub-clause 9.3.80.

9.3.82   RB Information to Reconfigure

The *RB Information to Reconfigure* IE indicates the radio bearer to reconfigure.

Table 9.3.82.1: *RB Information to Reconfigure* **information elements**

< RB Information to Reconfigure IE > ::=
    < **RB Identity** : < RB Identity IE > >
    { 0 | 1 < **PDCP Info** : < PDCP Info IE > > }
    { 0 | 1 < **PDCP SN Info** : < PDCP SN Info > > }
    { 0 | 1 < **RLC Info** : < RLC info IE> > }
    { 0 | 1 < **RB Stop/Continue** : bit (1) > } ;

Table 9.3.82.2: *RB Information to Reconfigure* **information element details**

RB Identity This IE is defined in sub-clause 9.3.80.
PDCP Info This IE is defined in sub-clause 9.3.60.
PDCP SN Info This IE is defined in sub-clause 9.3.61. The PDCP sequence number info from the network is present only in case of lossless SRNS relocation.
RLC Info This IE is defined in sub-clause 9.3.91.
RB Stop/Continue (1 bit field) bit 1 0   stop RB 1   continue RB

9.3.83   RB Information to Release

The *RB Information to Release* IE indicates identity of the RB to be released.

Table 9.3.83.1: *RB Information to Release* **information elements**

< RB Information to Release IE > ::=   < **RB Identity :** < RB Identity IE > >;

Table 9.3.83.2: *RB Information to Release* **information element details**

RB Identity This field is defined in sub-clause 9.3.80.

9.3.84 RB Information to Setup

The *RB Information to Setup* IE contains information about the RB to setup.

Table 9.3.84.1: *RB Information to Setup* information elements

```
< RB Information to Setup IE > ::=
    < RB Identity : < RB Identity IE > >
    { 0 | 1 < PDCP Info : < PDCP Info IE > > }
    {0 | 1 < RLC Info : < RLC Info IE > >} ;
```

Table 9.3.84.2: *RB Information to Setup* information element details

RB Identity This IE is defined in sub-clause 9.3.80.
PDCP Info This IE is defined in sub-clause 9.3.60.
RLC Info This IE is defined in sub-clause 9.3.91.

9.3.85 RB Timer Indicator

This *RB Timer Indicator* IE indicates to GERAN if the timers T314 and T315 have expired in the MS.

Table 9.3.85.1: *RB Timer Indicator* information elements

```
< RB Timer Indicator IE > ::=
    < T314 Expired : bit (1) >
    < T315 Expired : bit (1) > ;
```

Table 9.3.85.2: *RB Timer Indicator* information element details

T314 Expired (1 bit field) bit 1 0   False - the timer has not expired 1   True - the timer has expired or the stored value is zero
T315 Expired (1 bit field) bit 1 0   False - the timer has not expired 1   True - the timer has expired or the stored value is zero

9.3.86 RB with PDCP Information

The *RB with PDCP Information* IE identifies the RB and provides the PDCP sequence number info from the sender of the message for lossless Serving BSC relocation.

Table 9.3.86.1: *RB with PDCP Information* information elements

```
< RB with PDCP Information IE > ::=
    < RB Identity : < RB Identity IE > >
    < PDCP SN Info : < PDCP SN Info > >;
```

Table 9.3.86.2: *RB with PDCP Information* **information element details**

RB Identity This IE is defined in sub-clause 9.3.80.
PDCP SN Info This IE is defined in sub-clause 9.3.61. PDCP sequence number info from the sender of the message for lossless Serving BSC relocation.

9.3.87   (void)

9.3.88   Re-Establishment timer

This *Re-Establishment Timer* IE indicates which timer to associate with RAB.

Table 9.3.88.1: *Re-Establishment Timer* **information elements**

```
< Re-Establishment timer IE > ::=
    < Re-Establishment timer : bit (1) >;
```

Table 9.3.88.2: *Re-Establishment Timer* **information element details**

Re-Establishment Timer (1 bit field) bit 1 0   use T314 1   use T315

9.3.89   Rejection Cause

The *Rejection Cause* IE indicates the cause for rejection of RRC connection establishment request.

Table 9.3.89.1: *Rejection Cause* **information elements**

```
< Rejection Cause IE > ::=
    < Rejection Cause : bit (1) >;
```

Table 9.3.89.2: *Rejection Cause* **information element details**

Rejection Cause (1 bit field) bit 1 0   congestion 1   unspecified

9.3.90   Release Cause

The *Release Cause* IE indicates the cause for releasing the RRC connection.

Table 9.3.90.1: *Release Cause* **information elements**

```
< Release Cause IE > ::=
    < Release Cause : bit (3) >;
```

Table 9.3.90.2: *Release Cause* **information element details**

Release Cause (3 bit field)
bit
3 2 1
0 0 0   normal event
0 0 1   unspecified
0 1 0   pre-emptive release
0 1 1   congestion
1 0 0   re-establishment reject
1 0 1   directed signalling connection re-establishment
1 1 0   user inactivity
1 1 1   reserved

9.3.91   RLC Info

The *RLC Info* IE contains information about the RLC protocol.

Table 9.3.91.1: *RLC Info* **information elements**

```
< RLC Info IE > ::=
    < RLC Info length : bit (5) >
    { 00                             -- RLC in Acknowledged mode
        {0|1 < Resegment : bit (1) >}
        { 0 | 1 < Transmission RLC Discard : < Transmission RLC Discard IE > >}
        { 0 | 1 < EGPRS window size : bit (5) > }
    | 01                             -- RLC in Unacknowledged mode
        {0 | 1 < EGPRS Window Size : bit (5) > }
    !   < Message escape : { 1 bit (1) } bit**= < no string > > } ;   -- reserved
```

Table 9.3.91.2: *RLC Info* **information element details**

RLC Info length (5 bit field)
This field is the binary representation of the RLC Info IE excluding the 5 bits used to define this field. Range 0 to 31.

Resegment
bit
1
0   Retransmitted RLC data blocks shall not be resegmented
1   Retransmitted RLC data blocks shall be resegmented according to commanded MCS

Transmission RLC Discard
This IE is defined in sub-clause 9.3.95.

EGPRS Window Size
This information element defines the window size to be used in an EGPRS TBF. The network sets the window size according to the number of timeslots allocated in the direction of the TBF. This Field is coded as defined in 3GPP TS 44.060.

9.3.92   RLC HFN IE

This IE contains the RLC HFN used in ciphering for EGPRS, GPRS or UTRAN in AM or UM RLC.

Table 9.3.92.1: *RLC HFN* **information elements**

```
< RLC HFN IE >::=
    < RLC HFN length : bit (5) >
    {   000    < RLC HFN : bit (20) >         -- Used in the case of EGPRS and UTRAN AM RLC
    |   001    < RLC HFN : bit (24) >         -- Used in the case of GPRS
    |   010    < RLC HFN : bit (25) >         -- Used in the case of UTRAN UM RLC
    |   011    < RLC HFN : bit (27) >         -- Used in the case of GERAN DBPSCH
    !   < Message escape : { 1 bit (1) } bit**= < no string > > } ;
```

Table 9.3.92.2: *RLC HFN* **information element details**

RLC HFN Length This field is the binary representation of the length in bits of the RLC HFN field in this IE. Range: 1+val(RLC HFN length)
RLC HFN (20..25 bit field) This field defines the RLC HFN used in the ciphering procedure at RLC/MAC. See 3GPP TS 44.160

9.3.93   RPLMN Information

Table 9.3.93.1: *RPLMN Information* **information elements**

```
< RPLMN Information IE > ::=
    {
            -- GSM parameters, lower bound and upper bound of GSM BA freqs
        { 0|1   < GSM BA Range : bit (6) >
            {   <GSM Lower Range:bit (14)>
                <GSM Upper Range : bit(14) >
                <UARFCN : bit(14) > } * (1+val(GSM BA Range))}}
            { 0|1   < CDMA2000 UMTS Frequency list : bit (3) >
                {   < BAND_CLASS : bit(5)>
                    < CDMA_FREQ : bit(11)> } * (1+val(CDMA2000 UMTS Frequency list))}}
};
```

Table 9.3.93.2: *RPLMN Information* **information element details**

GSM BA Range (6 bit field) This field is the binary representation of maximum number of GSM Frequency Ranges to store. Range 0 to maxNumGSMFreqRanges-1.
GSM Lower Range (14 bit field) This field is the binary representation of lower bound for range of GSM BA frequencies, lower bound.
GSM Upper Range (14 bit field) This field is the binary representation of lower bound for range of GSM BA frequencies, upper bound.
UARFCN (14 bit field) This field is defined in 3GPP TS 25.102.
CDMA2000 UMTS Frequency list (3 bit field) This field is the binary representation of maximum number of CDMA Frequency Ranges to store. Range 0 to maxNumCDMA2000FreqRanges-1.
BAND_CLASS (5 bit field) This field is the bit string representation of TIA/EIA/IS-2000 BAND_CLASS. The bits are numbered b0 to b4, where b0 is the least significant bit.

CDMA_FREQ (11 bit field)
This field is the bit string representation of CDMA_FREQ TIA/EIA/IS-2000. The CDMA_FREQ bits are numbered b0 to b10, where b0 is the least significant bit.

9.3.94 RRC Cause

The *RRC Cause* IE is to provide the reason for failure of the physical channel setup, reconfiguration, release or the reason for completion of handover.

Table 9.3.94.1: *RRC Cause* information elements

< RRC Cause IE > ::=
    < **RRC Cause** : bit (8) >;

Table 9.3.94.2: *RRC Cause* information element details

RRC Cause (8 field)

Bits
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0   Normal event
0 0 0 0 0 0 0 1   Abnormal release, unspecified
0 0 0 0 0 0 1 0   Abnormal release, channel unacceptable
0 0 0 0 0 0 1 1   Abnormal release, timer expired
0 0 0 0 0 1 0 0   Abnormal release, no activity on the radio path
0 0 0 0 0 1 1 0   UTRAN configuration unknown
0 0 0 0 1 0 0 0   Handover impossible, timing advance out of range
0 0 0 0 1 0 0 1   Channel mode unacceptable
0 0 0 0 1 0 1 0   Frequency not implemented
0 0 0 0 1 1 0 0   Lower layer failure
0 1 0 0 0 0 0 1   Call already cleared
0 1 0 1 1 1 1 1   Semantically incorrect message
0 1 1 0 0 0 0 0   Invalid mandatory information
0 1 1 0 0 0 0 1   Message type non-existent or not implemented
0 1 1 0 0 0 1 0   Message type not compatible with protocol state
0 1 1 0 0 1 0 0   Conditional IE error
0 1 1 0 0 1 0 1   No cell allocation available
0 1 1 0 1 1 1 1   Protocol error unspecified
All other cause values shall be treated as 0000 0000, 'normal event'.

9.3.95 RRC Packet Downlink Assignment

The *RRC Packet Downlink Assignment* IE is sent by the network to the mobile station to indicate the assigned downlink resources. The *RRC Packet Downlink Assignment* IE is coded as shown in 3GPP TS 44.018.

Table 9.3.95.1: *RRC Packet Downlink Assignment* **information elements**

```
< RRC Packet Downlink Assignment IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    < MAC_MODE : bit (2) >
    < RLC_MODE : bit (1) >
    < TIMESLOT_ALLOCATION : bit (8) >
        < Packet Timing Advance : < Packet Timing Advance IE > >
    { 0 | 1 < P0 : bit (4) >
        < BTS_PWR_CTRL_MODE : bit (1) >
        < PR_MODE : bit (1) >}
    { 0 | 1 < Power Control Parameters : < Power Control Parameters IE > > }
    { 0 | 1 < DOWNLINK_TFI_ASSIGNMENT : bit (5) > }
    { 0 | 1 < MEASUREMENT_STARTING_TIME : bit (16) >
        < MEASUREMENT_INTERVAL : bit (5) >
        < MEASUREMENT_BITMAP : bit (8) > }
    { 0 | 1                          -- indicates EGPRS TBF mode, see 3GPP TS 44.060
        < EGPRS Window Size : < EGPRS Window Size IE > >
        < LINK_QUALITY_MEASUREMENT_MODE : bit (2)>}
        { 0 | 1 < BEP_PERIOD2 : bit (4) > } }
    { 0 | 1 <Packet Extended timing Advance : bit (2) > } ;
```

Table 9.3.95.2: *RRC Packet Downlink Assignment* **information element details**

LENGTH_IN_OCTETS (8 bit field) This field encodes (in binary) the number that is equal to one eighth of the number of bits in the *RR Packet Downlink Assignment* information element that follow the end of this field.
MAC_MODE (2 bit field) This field is encoded as the MAC_MODE information field in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
RLC_MODE (1 bit field) This field is encoded as the RLC_MODE field in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
TIMESLOT_ALLOCATION (8 bit field) This field is encoded as the TIMESLOT_ALLOCATION field in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
Packet Timing Advance IE This field is encoded as the *Packet Timing Advance* IE in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
P0, BTS_PWR_CTRL_MODE and PR_MODE fields These fields are optional downlink power control parameters and are encoded as in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
Power Control Parameters IE This field is encoded as the Power Control Parameters IE in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
DOWNLINK_TFI_ASSIGNMENT (5 bit field) If present, this field is encoded as the DOWNLINK_TFI_ASSIGNMENT information element in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
MEASUREMENT_STARTING_TIME (16 bit field) If present, this field is encoded as the 16-bit *value part* of the *Starting Time* IE defined in sub-clause 10.5.2.38 (starting with bit 8 of octet 2 and ending with bit 1 of octet 3 of the *Starting Time* IE).MEASUREMENT_STARTING_TIME field in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060. The frame number shall be aligned to a PDTCH block period according to the requirements defined for the 'Absolute Frame Number Encoding' in the '*Starting Time Frame Number Description*' IE defined in 3GPP TS 44.060.

MEASUREMENT_BITMAP (8 bit field) If present, this field is encoded as the MEASUREMENT BITMAP information field in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
MEASUREMENT_INTERVAL (5 bit field) If present, this field is encoded as the MEASUREMENT_INTERVAL field in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
EGPRS Window Size IE This field is encoded as the *EGPRS Window Size* IE in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
LINK_QUALITY_MEASUREMENT_MODE (2 bit field) This field is encoded as the LINK_QUALITY_MEASUREMENT_MODE in the PACKET DOWNLINNK ASSIGNMENT message in 3GPP TS 44.060.
Packet Extended Timing Advance (2 bit field) This bit field is used for support of Extended Timing Advance. Bit 1   bit 7 of the *Timing Advance* IE defined in sub-clause 10.5.2.40 2   bit 8 of the *Timing Advance* IE defined in sub-clause 10.5.2.40
BEP_PERIOD2 (4 bit field) This field is described in 3GPP TS 44.060.

9.3.95a   RRC Packet Downlink Assignment 2

The *RRC Packet Downlink Assignment 2* IE is sent by the network to the mobile station to indicate the assigned downlink resources. The *RRC Packet Downlink Assignment 2* IE is coded as shown in the table below.

Table 9.3.95a.1: *RRC Packet Downlink Assignment* information elements

```
< RRC Packet Downlink Assignment 2 IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    { 0 | 1                         -- indicates EGPRS TBF mode, see 3GPP TS 44.060
        < EGPRS Window Size : < EGPRS Window Size IE > >
        < LINK_QUALITY_MEASUREMENT_MODE : bit (2)>
        { 0 | 1 < BEP_PERIOD2 : bit (4) > }};
```

Table 9.3.95a.2: *RRC Packet Downlink Assignment 2* information element details

LENGTH_IN_OCTETS (8 bit field) This field encodes (in binary) the number that is equal to one eighth of the number of bits in the *RR Packet Downlink Assignment 2* information element that follow the end of this field.
EGPRS Window Size IE This field is encoded as the *EGPRS Window Size* IE in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
LINK_QUALITY_MEASUREMENT_MODE (2 bit field) This field is encoded as the LINK_QUALITY_MEASUREMENT_MODE in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.

9.3.96   RRC Packet Uplink Assignment

The *RRC Packet Uplink Assignment* IE is sent by the network to the mobile station to indicate the assigned uplink resources. The *RRC Packet Uplink Assignment* IE is coded as shown in 3GPP TS 44.018.

Table 9.3.96.1: *RRC Packet Uplink Assignment* **information elements**

```
< RRC Packet Uplink Assignment IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    < G-RNTI_BLOCK_CHANNEL_CODING : bit (1) >
    < Packet Timing Advance : < Packet Timing Advance IE > >
    < Allocation : < Allocation struct > >
    { 0      -- for MS operating in GPRS
      < CHANNEL_CODING_COMMAND : bit (2) >
    | 1      -- for MS operating in EGPRS
      < EGPRS_MCS_MODE : bit (4) >
      < RESEGMENT : bit (1) >
      < EGPRS Window Size : < EGPRS Window Size IE > >}
    { 0 | 1 < Packet Extended Timing Advance : bit (2) > } ;

< Allocation struct > ::=
    { 00    < Dynamic Allocation : < Dynamic Allocation struct> >
    | 01    < Single Block Allocation : < Single Block Allocation struct > >
    !  < Message escape : { 1 bit (1) } bit**= < no string > > }
< Dynamic Allocation struct > ::=
    < Extended Dynamic Allocation : bit (1) >
    { 0 | 1  < P0 : bit (4) >
            < PR_MODE : bit (1) > }
    < USF_GRANULARITY : bit (1) >
    { 0 | 1 < UPLINK_TFI_ASSIGNMENT : bit (5) > }
    { 0 | 1 < RLC_DATA_BLOCKS_GRANTED : bit (8) > }
        { 0                              -- Timeslot Allocation
        { 0 | 1 < USF_TN0 : bit (3) >}
        { 0 | 1 < USF_TN1 : bit (3) >}
        { 0 | 1 < USF_TN2 : bit (3) >}
        { 0 | 1 < USF_TN3 : bit (3) >}
        { 0 | 1 < USF_TN4 : bit (3) >}
        { 0 | 1 < USF_TN5 : bit (3) >}
        { 0 | 1 < USF_TN6 : bit (3) >}
        { 0 | 1 < USF_TN7 : bit (3) >}
        | 1                              -- Timeslot Allocation with Power Control Parameters
        < ALPHA : bit (4) >
        { 0 | 1 < USF_TN0 : bit (3) >
              < GAMMA_TN0 : bit (5) > }
        { 0 | 1 < USF_TN1 : bit (3) >
              < GAMMA_TN1 : bit (5) > }
        { 0 | 1 < USF_TN2 : bit (3) >
              < GAMMA_TN2 : bit (5) > }
        { 0 | 1 < USF_TN3 : bit (3) >
              < GAMMA_TN3 : bit (5) > }
        { 0 | 1 < USF_TN4 : bit (3) >
              < GAMMA_TN4 : bit (5) > }
        { 0 | 1 < USF_TN5 : bit (3) >
              < GAMMA_TN5 : bit (5) > }
        { 0 | 1 < USF_TN6 : bit (3) >
              < GAMMA_TN6 : bit (5) > }
        { 0 | 1 < USF_TN7 : bit (3) >
              < GAMMA_TN7 : bit (5) > } };

< Single Block Allocation struct > ::=
    < TIMESLOT_NUMBER : bit (3) >
    { 0 | 1  < ALPHA : bit (4) >
          < GAMMA_TN : bit (5) >}
    { 0 | 1  < P0 : bit (4) >
          < BTS_PWR_CTRL_MODE : bit (1) >
          < PR_MODE : bit (1) > };
```

Table 9.3.96.2: *RRC Packet Uplink Assignment* **information element details**

LENGTH_IN_OCTETS (8 bit field) This field is the binary representation of the length of the *RR Packet Uplink Assignment IE* value part in octets. Range: 0 to 255
CHANNEL_CODING_COMMAND (2 bit field) This field is encoded as the CHANNEL_CODING_COMMAND field in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
TLLI_BLOCK_CHANNEL_CODING (1 bit field) This field is encoded as the TLLI_BLOCK_CHANNEL_CODING field in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
Packet Timing Advance IE This field is encoded as the *Packet Timing Advance* IE in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
Allocation struct This structure indicates the type of radio resources allocation used and the parameters necessary to define the radio resources.
EGPRS_MCS_MODE (4 bit field) This field is coded as the EGPRS Modulation and Coding Scheme IE in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
RESEGMENT (1 bit field) This field is coded as the RESEGMENT bit in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
EGPRS Window Size IE This field is encoded as the *EGPRS window size* IE in the PACKET DOWNLINK ASSIGNMENT message in 3GPP TS 44.060.
TIMESLOT_ALLOCATION (8 bit field) This field is encoded as the TIMESLOT_ALLOCATION field in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
Dynamic Allocation struct This structure contains parameters necessary to define the radio resources of a dynamic allocation or an extended dynamic allocation.
Extended Dynamic Allocation (1 bit field) This information field indicates the medium access mode to be used during the TBF. 0 Dynamic Allocation 1 Extended Dynamic Allocation
UPLINK_TFI_ASSIGNMENT (5 bit field) This field is encoded as the UPLINK_TFI_ASSIGNMENT information element in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
Power Control Parameters IE This field is encoded as the *Power Control Parameters* IE in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
RLC_DATA_BLOCKS_GRANTED (8 bit field) This field is encoded as the RLC_DATA_BLOCKS_GRANTED field in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.

USF for Timeslot Number 0 (TN0) (3 bit field)   **USF for Timeslot Number 1 (TN1)** (3 bit field)   **USF for Timeslot Number 2 (TN2)** (3 bit field)   **USF for Timeslot Number 3 (TN3)** (3 bit field)   **USF for Timeslot Number 4 (TN4)** (3 bit field)   **USF for Timeslot Number 5 (TN5)** (3 bit field)   **USF for Timeslot Number 6 (TN6)** (3 bit field)   **USF for Timeslot Number 7 (TN7)** (3 bit field)   These fields are encoded as the USF for Timeslot Number X field (where 0=<X<7) in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
Single Block Allocation struct   This structure contains parameters necessary to define the radio resources of a Single Block allocation. For example for sending of a PACKET RESOURCE REQUEST message in a two phase access or a Measurement report.

ALPHA (4 bit field)
 The ALPHA Power control parameter field is coded according to the following table :
 	
    bit
    4 3 2 1
    0 0 0 0 $\alpha = 0.0$
    0 0 0 1 $\alpha = 0.1$
    : :
    1 0 0 1 $\alpha = 0.9$
    1 0 1 0 $\alpha = 1.0$
    All other values are reserved in this version of the protocol and shall be interpreted by the mobile station as $\alpha = 1.0$.

TIMESLOT_NUMBER (3 bit field)   If present, this field is encoded as the TIMESLOT_NUMBER field in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.
GAMMA_TN (5 bit field)   The GAMMA_TN field is the binary representation of the parameter Γ_{CH} for MS output power control in units of 2 dB, see 3GPP TS 45.008.
P0, BTS_PWR_CTRL_MODE and PR_MODE fields   These fields are optional downlink power control parameters and are encoded as in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.

9.3.96a RRC Packet Uplink Assignment 2

The *RRC Packet Uplink Assignment 2* IE is sent by the network to the mobile station to indicate the assigned uplink PDCTH on DBPSCH. The *RRC Packet Uplink Assignment 2* IE is coded as shown in the table below.

Table 9.3.96a.1: *RRC Packet Uplink Assignment 2* **information elements**

```
< RRC Packet Uplink Assignment 2 IE > ::=
    < LENGTH_IN_OCTETS : bit (8) >
    < Dynamic Allocation : < Dynamic Allocation struct > >
    { 0      -- for MS operating in GPRS
        < CHANNEL_CODING_COMMAND : bit (2) >
    | 1      -- for MS operating in EGPRS
        < EGPRS_MCS_MODE : bit (4) >
        < RESEGMENT : bit (1) >
        < EGPRS Window Size : < EGPRS Window Size IE > >};

< Dynamic Allocation struct > ::=
        < Extended Dynamic Allocation : bit (1) >
        < USF_GRANULARITY : bit (1) >
        { 0 | 1 < USF_TN0 : bit (3) >}
        { 0 | 1 < USF_TN1 : bit (3) >}
        { 0 | 1 < USF_TN2 : bit (3) >}
        { 0 | 1 < USF_TN3 : bit (3) >}
        { 0 | 1 < USF_TN4 : bit (3) >}
        { 0 | 1 < USF_TN5 : bit (3) >}
        { 0 | 1 < USF_TN6 : bit (3) >}
        { 0 | 1 < USF_TN7 : bit (3) >};
```

Table 9.3.96a.2: *RRC Packet Uplink Assignment* **information element details**

LENGTH_IN_OCTETS (8 bit field)
This field is the binary representation of the length of the *RR Packet Uplink Assignment IE* value part in octets. Range:
0 to 255

CHANNEL_CODING_COMMAND (2 bit field)
This field is encoded as the CHANNEL_CODING_COMMAND field in the PACKET UPLINK ASSIGNMENT
message in 3GPP TS 44.060.

EGPRS_MCS_MODE (4 bit field)
This field is coded as the EGPRS Modulation and Coding Scheme IE in the PACKET UPLINK ASSIGNMENT
message in 3GPP TS 44.060.

RESEGMENT (1 bit field)
This field is coded as the RESEGMENT bit in the PACKET UPLINK ASSIGNMENT message in 3GPP TS 44.060.

EGPRS Window Size IE
This field is encoded as the *EGPRS window size* IE in the PACKET DOWNLINK ASSIGNMENT message in
3GPP TS 44.060.

Dynamic Allocation struct
This structure contains parameters necessary to define the radio resources of a dynamic allocation or an extended
dynamic allocation.

Extended Dynamic Allocation (1 bit field)
This information field indicates the medium access mode to be used during the TBF.
0   Dynamic Allocation
1   Extended Dynamic Allocation

USF for Timeslot Number 0 (TN0) (3 bit field)
USF for Timeslot Number 1 (TN1) (3 bit field)
USF for Timeslot Number 2 (TN2) (3 bit field)
USF for Timeslot Number 3 (TN3) (3 bit field)
USF for Timeslot Number 4 (TN4) (3 bit field)
USF for Timeslot Number 5 (TN5) (3 bit field)
USF for Timeslot Number 6 (TN6) (3 bit field)
USF for Timeslot Number 7 (TN7) (3 bit field)
These fields are encoded as the USF for Timeslot Number X field (where 0=<X<7) in the PACKET UPLINK
ASSIGNMENT message in 3GPP TS 44.060.

9.3.97   RRC State Indicator

The *RRC State Indicator* IE is indicates to a MS the RRC state to be entered.

Table 9.3.97.1: *RRC State Indicator* information elements

```
< RRC State Indicator IE > ::=
    < RRC State Indicator : bit (2) >;
```

Table 9.3.97.2: *RRC State Indicator* information element details

RRC State Indicator (2 bit field)

    bit
    2 1
    0 0   RRC-Cell _Dedicated state
    0 1   RRC-Cell_Shared state
    1 0   RRC-GRA_PCH state
    1 1   Reserved

9.3.98   RRC Transaction Identifier

The *RRC Transaction Identifier* IE identifies the RRC procedure transaction for the message this IE was included
within.

Table 9.3.98.1: *RRC Transaction Identifier* information elements

```
< RRC Transaction Identifier IE > ::=
    < RRC Transaction Identifier : bit (2) >;
```

Table 9.3.98.2: *RRC Transaction Identifier* information element details

RRC Transaction Identifier
This field is the binary representation of the RRC Transaction Identifier . Range: 0 to 3

9.3.99   SBPSCH Description

The *SBPSCH Description* IE describes shared physical resources.

Table 9.3.99.1: *SBPSCH Description* **information elements**

```
< SBPSCH Description IE > ::=
    {
        { 0 | 1 < Frequency Parameters : < Frequency Parameters IE > > }
        { 1 < TBF Information: < TBF Information struct > > } ** 0
    };

< TBF Information struct > ::=
    {   < TBF Starting Time : < Starting Time IE > >
        { 0 < Description of the Uplink Packet Channel Assignment : < RRC Packet Uplink Assignment IE> >
        | 1 < Description of the Downlink Packet Channel Assignment : < RRC Packet Downlink Assignment IE> >
            { 0 | 1 < HFN_LSB : bit(1) > } }
    };
```

Table 9.3.99.2: *SBPSCH Description* **information element details**

Frequency Parameters This IE is defined in TS 3GPP 44.060 sub-clause 12.8.
TBF Information struct This structure describe the information for a TBF. This structure may be repeated up to maxTBF times.
TBF Starting Time The *Starting Time* IE is defined in sub-clause 9.3.103.
Description of the Uplink Packet Channel Assignment The *RRC Packet Uplink Assignment* IE is defined in sub-clause 9.3.96.
Description of the Downlink Packet Channel Assignment The *RRC Packet Downlink Assignment* IE is defined in sub-clause 9.3.95.
HFN_LSB (1 bit field) This field contains the least significant bit of the HFN of the radio bearer for which the TBF is assigned, in the direction of the TBF.

9.3.100 Security Capability

The *Security Capability* IE indicates the security capablities of the MS.

Table 9.3.100.1: *Security Capability* **information elements**

```
< Security Capability IE > ::=
    < Security Capability Length : bit (7)>
    < Iu mode Ciphering algorithm capability : < Iu mode Ciphering algorithm capability struct > >
    < Iu mode Integrity protection algorithm capability : < Iu mode Integrity protection algorithm capability struct > >;
    < spare bit >**;    -- Extension information may be truncated between released versions of the protocol
                        -- The receiver shall assume the value zero for any truncated bit

< Iu mode Ciphering algorithm capability struct > ::=
    < UEA0 support : bit (1) >
    < UEA1 support : bit (1) >
    < spare bit > *14;

< Iu mode Integrity protection algorithm capability struct > ::=
    < UIA1 support : bit (1) >
    < spare bit > *15;
```

Table 9.3.100.2: *Security Capability* **information element details**

Security Capability Length (7 bit field) This field is the binary representation of the length of the Security Capability IE in bits excluding the bits used for this length field. Range: 0 to 127.
Iu mode Ciphering algorithm capability struct This structure indicates the ciphering algorithms supported by the MS. **UEA0 support** (1 bit field) **UEA1 support** (1 bit field) These fields indicate the support of the UEA encryption algorithm UEAx, where X has a range from 1 to 2. At least one Ciphering algorithm must be supported. bit 0 Ciphering algorithm is not supported 1 Ciphering algorithm is supported
Iu mode Integrity protection algorithm capability struct This structure indicates the Integrity protection algorithms supported by the MS.
UIA1 support (1 bit field) These field indicates the support of the UIA integrity protection algorithm UIAx, where X has a range from 1 to 1. At least one integrity protection algorithm must be supported. bit 0 Integrity protection algorithm is not supported 1 Integrity protection algorithm is supported

9.3.101 Signalling RB Information To Setup

The *Signalling RB Information To Setup* IE indicates information for setting up SRBs.

Table 9.3.101.1: *Signalling RB Information To Setup* **information elements**

< Signalling RB Information To Setup IE > ::=   < **SRB Identity** : bit (2) >

Table 9.3.101.2: *Signalling RB Information To Setup* **information element details**

SRB Identity (2 bit field)
 	
   bit
   2 1
   0 0   SRB1
   0 1   SRB2
   1 0   SRB3
   1 1   SRB4

9.3.102 START

Ths *START* IE contains the START value used to initialise the 20 most significant bits of all hyper frame numbers (MAC HFN, RLC UM HFN, RLC AM HFN, RRC HFN) for a CN domain. This field is defined in 3GPP TS 33.102.

Table 9.3.102.1: *START* information elements

```
< START IE > ::=
    < START : bit(20) > ;
```

Table 9.3.102.2: *START* information element details

START (20 bit field)
The START bits are numbered b0-b19, where b0 is the least significant bit.

9.3.103   Starting Time

The *Starting Time* IE provides the start TDMA frame number, FN modulo 42432.

Table 9.3.103.1: *Starting Time* information elements

```
< Starting Time IE > ::=
    < Starting Time Value : octet(2) > ;
```

Table 9.3.103.2: *Starting Time* information element details

Starting Time Value
This field is encoded as defined in 3GPP TS 44.018.

9.3.104   Synchronization Indication

The *Synchronization Indication* IE is to indicate which type of handover is to be performed.

Table 9.3.104.1: *Synchronization Indication* information elements

```
< Synchronization Indication IE > ::=
    < Synchronization Indication Value: bit (4) > ;
```

Table 9.3.104.2: *Synchronization Indication* information element details

Synchronization Indication Value
This field is encoded as defined in 3GPP TS 44.018.

9.3.105   Time Difference

The *Time Difference* IE is to provide information about the synchronization difference between the time bases of two Base Stations. This type of information element is used in relation with the pseudo-synchronization scheme, see 3GPP TS 45.010. The *Time Difference* IE is coded as shown in 3GPP TS 44.018.

Table 9.3.105.1: *Time Difference* information elements

```
< Time Difference IE > ::=
    < Time Difference Value : bit (8) >;
```

Table 9.3.105.2: *Time Difference* **information element details**

Time Difference Value (8 bit field)
This field is defined in 3GPP TS 44.018.

9.3.106 Timing Advance

This *Timing Advance* IE is to provide the timing advance value.

The *Timing Advance* IE is coded as shown in Figure 10.5.2.40.1/3GPP TS 44.018 and
Table 10.5.2.40.1/3GPP TS 44.018.

Table 9.3.106.1: *Timing Advance* **information elements**

```
< Timing Advance IE > ::=
    < Timing Advance Value : bit (8) >;
```

Table 9.3.106.2: *Timing Advance* **information element details**

Timing Advance Value (8 bit field)
This field is defined in 3GPP TS 44.018.

9.3.107 Transmission RLC Discard

The *Transmission RLC Discard* IE indicates SDU Discard mode.

Table 9.3.107.1: *Transmission RLC Discard* **information elements**

```
< Transmission RLC Discard IE > ::=
    < Transmission RLC Discard : bit (1) >;
```

Table 9.3.107.2: *Transmission RLC Discard* **information element details**

Transmission RLC Discard (1 bit field)
This field indicates whether the discharge of RLC buffer on the transmitter side can occur. For UM RLC or TM RLC,
RLC discard shall not be used for that radio bearer.

bit
1
0   no discharge of the transmission RLC buffer
1   discharge of the transmission RLC buffer based on timer

9.3.108 UE UTRAN Radio Access Capability

This IE indicates the UTRAN radio access capability of the MS.

Table 9.3.108.1: *UE UTRAN Radio Access Capability* **information elements**

```
< UE UTRAN Radio Access Capability IE > ::=
    {   < UE UTRAN Radio Access Capability length : bit(14) >
        < UE UTRAN Radio Access Capability : bit (1+val( UE UTRAN Radio Access Capability length)) > } ;
```

Table 9.3.108.2: *UE UTRAN Radio Access Capability* **information element details**

UE UTRAN Radio Access Capability length This field indicates the length of the UE Radio Access capability field in bits.
UE UTRAN Radio Access Capability This field is encoded as the UE Radio Access capability IE in 3GPP TS 25.331.

9.3.108a UE UTRAN Predefined Configuration Status Information

This IE is valid only for UTRAN capable mobiles. The IE indicates UTRAN predefined configuration status information /UECapability/UTRANClassmark information. The IE includes the INTER RAT HANDOVER INFO (defined in 3GPP TS 25.331) which may give UTRAN related information to the network (target system) for intersystem handover.The INTER-RAT HANDOVER INFO message contains following information:

- The Pre-defined configuration status information; and/or

- Security information to be used after handover to UTRAN, see 3GPP TS 31.102; and/or

- The UTRAN Capabilities of the MS.

None, one, two or three of these three information may be present. The security information present in the message should be ignored.

Table 9.3.108a.1: *UE UTRAN Predefined Configuration Status Information* **information elements**

< UE UTRAN Predefined configuration status information IE > ::=   {   < **UE UTRAN Predefined Configuration Status Information length** : bit(14) >   < **UE UTRAN Predefined Configuration Status Information** : bit (1+val(UE UTRAN Predefined configuration status information length)) > } ;

Table 9.3.108a.2: *UE UTRAN Predefined Configuration Status Information* **information element details**

UE UTRAN Predefined Configuration Status Information length This field indicates the length of the UE UTRAN Predefined Configuration Status Information field in bits.
UE UTRAN Predefined Configuration Status Information This value part of this field is the INTER RAT HANDOVER INFO message as defined in 3GPP TS 25.331.

9.3.109 UE UTRAN Radio Access Capability Extension

This IE indicates the UTRAN radio access capability extension of the MS.

Table 9.3.109.1: *UE UTRAN Radio Access Capability Extension* **information elements**

< UE UTRAN Radio access capability extension IE > ::= {   < **UE UTRAN Radio Access Capability Extension length** : bit(10) >   < **UE UTRAN Radio Access Capability Extension** : bit (1+val(UE UTRAN Radio Access Capability Extension length)) > };

Table 9.3.109.2: *UE UTRAN Radio Access Capability Extension* **information element details**

UE UTRAN Radio Access Capability length This field indicates the length of the UE UTRAN Radio access capability extension field in bits.

UE UTRAN Radio Access Capability Extension
This IE is defined in 3GPP TS 25.331 as Radio access capability extension.

9.3.110 UE CDMA2000 Radio Access Capability

This Information Element contains the UE CDMA2000 radio access capability that is structured and coded according to the specification used for the corresponding system type.

Table 9.3.110.1: *UE CDMA2000 Radio Access Capability* **information elements**

< UE CDMA2000 Radio Access Capability IE > ::=   < **CDMA2000 Information length** : bit(12) >   < **CDMA2000 Information** : bit(1+val(CDMA2000 Information length)) > ;

Table 9.3.110.2: *UE CDMA2000 Radio Access Capability* **information element details**

CDMA2000 Information length (12 bit field) This field indicates the length of the CDMA2000 Information field in bits.
CDMA2000 Information This field is encoded as the *CDMA2000 Radio Access Capability* IE defined in TIA/EIA/IS-2000 or later, TIA/EIA/IS-833 or later, TIA/EIA/IS-834 or later.

9.3.111 UTRAN Freq List

This variable length IE is coded as defined in 3GPP TS 44.018.

9.3.112 Wait Time

The *Wait Time* IE defines the time period the MS has to wait before repeating the rejected procedure.

Table 9.3.112.1: *Wait Time* **information elements**

< Wait Time IE > ::=   < **Wait Time** : bit (4) >;

Table 9.3.112.2: *Wait Time Capability* **information element details**

Wait Time (4 bit field)
bit 4 3 2 1 0 0 0 0   -- *repetition is not allowed* 0 0 0 1   1s 0 0 1 0   2s : : 1 1 1 0   14s 1 1 1 1   15s

9.3.113 Iu mode Channel Request Description

The *Iu mode Channel Request Description* IE is used by the mobile station to request uplink resources.

Table 9.3.113.1: *Iu mode Channel Request Description* **information elements**

```
< Iu mode Channel Request Description IE > ::=
    < LENGTH_IN_OCTETS : bit(8) >                                    -- Remaining length
    < PACKET_ESTABLISHMENT_CAUSE : bit(2) >
    < Iu mode RRC Channel Request Description : Iu mode Channel Request Description IE >    -- Defined in
3GPP TS 44.060
    { 0 | 1 < HFN_LSB : bit(1) > }
    < spare bit >**;
```

Table 9.3.113.2: *Iu mode Channel Request Description* **information element details**

PACKET_ESTABLISHMENT_CAUSE (2 bit field)
This field indicates the reason for requesting the access.
 	
    Bit
    2 1
    0 0   User Data
    0 1   Page Response
    1 0   Cell Update
    1 1   Mobility Management procedure

Iu mode Channel Request Description This IE is defined in 3GPP TS 44.060.
HFN_LSB (1 bit field) This field contains the least significant bit of the HFN of the radio bearer for which the TBF is established, in the direction of the TBF.

9.3.114 Wait Indication

The *Wait Indication* IE element is used by the network to indicate the time the mobile station shall wait before attempting another channel request after the GERAN Iu mode DTM REJECT message is received.

Table 9.3.106.1: *Wait Indication* **information elements**

```
< Wait Indication IE > ::=
    < Wait Indication : bit (8) >;
```

Table 9.3.106.2: *Wait Indication* **information element details**

Wait Indication Value (8 bit field) This field is coded as the binary representation of the T3142 timeout value in seconds. This IE is defined in 3GPP TS 44.018.

9.3.115 (void)

9.3.116 PDCP Context Relocation Info

The *PDCP Context Relocation Info IE* indicates that the header compression context relocation is to be performed during SBSS relocation for the given radio bearer.

Table 9.3.116.1: *PDCP Context Relocation Info* **elements**

```
< PDCP Context Relocation Info IE > ::=
      < PDCP Context Relocation Info length: bit (2) >
      {   < Downlink RFC3095 Context Relocation Indication: 0 >
      |   < Downlink RFC3095 Context Relocation Indication: 1 > }
      {   < Uplink RFC3095 Context Relocation Indication: 0 >
      |   < Uplink RFC3095 Context Relocation Indication: 1 >}
;
```

Table 9.3.116.2: *PDCP Context Relocation Info* **information elements details**

Downlink RFC3095 Context Relocation Indication (1 bit field)
bit
1
0   RFC3095 context relocation is not performed in downlink
1   RFC3095 context relocation is performed in downlink
Uplink RFC3095 Context Relocation Indication (1 bit field)
bit
1
0   RFC3095 context relocation is not performed in uplink
1   RFC3095 context relocation is performed in uplink

9.4 Multiplicity values and type constraint values

The following table includes constants that are either used as multi bounds (name starting with "max") or as high or low value in a type specification (name starting with "lo" or "hi"). Constants are specified only for values appearing more than once in the RRC specification. In case a constant is related to one or more other constants, an expression is included in the "value" column instead of the actual value.

Table 9.4.1: Multiplicity values and type constraint values

Constant	Explanation	Value
CN information		
maxCNdomains	Maximum number of CN domains	4
MS information		
maxTransactions	Maximum number of parallel RRC transactions in downlink	25
maxPDCPalgoType	Maximum number of PDCP algorithm types	8
maxSystemCapability	Maximum number of system specific capabilities that can be requested in one message.	16
maxTBF	Maximum nuber of TBFs	8
GERAN mobility information		
maxRAT	Maximum number of Radio Access Technologies	maxOtherRAT + 1
maxOtherRAT	Maximum number of other Radio Access Technologies	15
maxGRA	Maximum number of GRAs in a cell	8
maxInterSysMessages	Maximum number of Inter System Messages	4
maxRABsetup	Maximum number of RABs to be established	16
RB information		
maxRB	Maximum number of RBs	32
maxRBallRABs	Maximum number of non signalling RBs	27
maxRBperRAB	Maximum number of RBs per RAB	8
maxSRBsetup	Maximum number of signalling RBs to be established	8
maxRFC3095-CID	Maximum number of available CID values per radio bearer	16384
Other information		
maxNumGSMFreqRanges	Maximum number of GSM Frequency Ranges to store	32
maxNumFDDFreqs	Maximum number of FDD centre frequencies to store	8
maxNumTDDFreqs	Maximum number of TDD centre frequencies to store	8
maxNumCDMA200Freqs	Maximum number of CDMA2000 centre frequencies to store	8

10 Protocol timers, counters, other parameters and default configurations

10.1 Timers for MS

Table 10.1.1: Timers for MS

Timer	Start	Stop	At expiry
T300	Started when the transmission of RRC CONNECTION REQUEST is indicated as successfully delivered by RLC	Reception of RRC CONNECTION SETUP	Retransmit RRC CONNECTION REQUEST if V300 =< N300, else go to Idle mode. Its value is 7s.
T302	Started when the transmission of CELL UPDATE/GRA UPDATE is indicated as successfully delivered by RLC	Reception of CELL UPDATE CONFIRM/URA UPDATE CONFIRM	Retransmit CELL UPDATE/GRA UPDATE if V302 =< N302, else, go to Idle mode. Its value is 7s.
T304	Started when the transmission of MS CAPABILITY INFORMATION is indicated as successfully delivered by RLC	Reception of MS CAPABILITY INFORMATION CONFIRM	Retransmit MS CAPABILITY INFORMATION if V304 =< N304, else initiate a cell update procedure. Its value is 7s.
T305	Entering RRC- CELL_Shared or GRA_PCH Reception of CELL UDPATE CONFIRM/URA UPDATE CONFIRM.	Entering another state.	Transmit CELL UPDATE or GRA UPDATE. See sub-clause 7.8
T314	When the criteria for radio link failure are fulfilled. The timer is started only if radio bearer(s) that are associated with T314 exist.	When the Cell Update procedure has been completed.	See sub-clause 7.8.
T315	When the criteria for radio link failure are fulfilled. The timer is started only if radio bearer(s) that are associated with T315 exist.	When the Cell Update procedure has been completed.	See sub-clause 7.8.
T3124	At the start point of the timeslot in which the HANDOVER ACCESS message is sent the first time	When PHYSICAL INFORMATION message has been received	Its value is set to 675 ms if the channel type of the channel allocated in the RADIO BEARER RECONFIGURATION COMPLETE message is a DBPSCH/S; otherwise its value is set to 320 ms.
T3148	Started after the GERAN Iu mode DTM REQUEST message transmission is indicated as successfully delivered by RLC	When the RADIO BEARER RECONFIGURATION message or GERAN Iu mode DTM REJECT message is received	Its value is 4 seconds. At expiry the mobile station shall reinitiate DTM Request procedure.

10.1a Timers on the network side

Table 10.1a.1: Timers on the network side

Timer	Start	Stop	Action at expiry	Typical Value
T3143	After having sent the sent of PHYSICAL INFORMATION message	Reception of the RADIO BEARER RECONFIGURATION COMPLETE message	Indicate to the RLC sublayer to send once more PHYSICAL INFORMATION message	Its value is network dependent

10.2 Counters for MS

Table 10.2.1: Counters for MS

Counter	Reset	Incremented	When reaching max value
V300	When initiating the procedure RRC connection establishment	Upon expiry of T300.	When V300 > N300, the MS enters on RRC-Idle mode.
V302	When initiating the procedure Cell update or GRA update	Upon expiry of T302	When V302 > N302 the MS enters in RRC-Idle mode.
V304	When sending the first MS CAPABILITY INFORMATION message.	Upon expiry of T304	When V304 > N304 the MS initiates the Cell update procedure

10.3 MS constants and parameters

Table 10.3.1: MS constants and parameters

Constant	Usage
N300	Maximum number of retransmissions of the RRC CONNECTION REQUEST message. Its value is 3.
N302	Maximum number of retransmissions of the CELL UPDATE / URA UPDATE message. Its value is 3.
N304	Maximum number of retransmissions of the MS CAPABILITY INFORMATION message. Its value is 2.

10.3a Network constants and parameters

Table 10.3a.1: Network constants and parameters

Constant	Usage
N3143	Maximum number of retransmissions of the PHYSICAL INFORMATION message

10.4 MS variables

10.4.0 General

Table 10.4.0.1: MS variables

Name of the Variable	Usage
CELL_UPDATE_STARTED	This variable indicates whether a cell update or GRA update procedure is in progress.
CIPHERING_STATUS	This variable contains information about the current status of ciphering in the MS.
ESTABLISHED_SIGNALLING_CONNECTIONS	This variable is used to store information about established signalling connections.
ESTABLISHMENT_CAUSE	This variable is used to store the cause for establishment of a signalling connection received by upper layers, to be used at RRC connection establishment.

ESTABLISHED_RABS	This variable is used to store information about the established radio access bearers and signalling radio bearers in the MS.
FAILURE_CAUSE	This variable contains the cause for failure of a MS initiated procedure, to be reported in a retransmitted message.
FAILURE_INDICATOR	This variable indicates whether the procedure has failed for a MS initiated procedure.
GRA_IDENTITY	This variable stores the assigned GRA identity for this MS when in RRC-GRA_PCH state.
G_RNTI	This variable stores the assigned G-RNTI for this MS.
INITIAL_MS_IDENTITY	In this variable the identity used by the MS when establishing an RRC connection is stored.
INCOMPATIBLE_SECURITY_RECONFIGURATION	This variable indicates whether an incompatible simultaneous reconfiguration of a security function has been received
INTEGRITY_PROTECTION_ACTIVATION_INFO	This variable contains information to be sent to GERAN about when a new integrity protection configuration shall be activated in the uplink for signalling radio bearers in case of modification of integrity protection.
INTEGRITY_PROTECTION_INFO	This variable contains information about the current status of the integrity protection in the MS.
LATEST_CONFIGURED_CN_DOMAIN	This variable stores the CN-domain that was most recently configured to be used for ciphering and integrity protection.
MS_CAPABILITY_REQUESTED	This variable stores information about the MS capabilities that have been requested by GERAN but that have not yet been transferred to GERAN
INVALID_CONFIGURATION	This variable indicates whether a received message contained an invalid configuration, by means of invalid values or invalid combinations of information elements
MS_CAPABILITY_TRANSFERRED	This variable stores information about which UE capabilities that have been transferred to GERAN.
ORDERED_RECONFIGURATION	This variable stores information about an ongoing Reconfiguration procedure.
PDCP_SN_INFO	This variable contains PDCP receive sequence numbers for one or several radio bearers to be included in a response message to GERAN.
PROTOCOL_ERROR_INDICATOR	This variable indicates whether there exist a protocol error that is to be reported to GERAN.
PROTOCOL_ERROR_INFORMATION	This variable contains diagnostics to be reported to GERAN for a message that was not completely understood.
PROTOCOL_ERROR_REJECT	This variable indicates whether there has occurred a severe protocol error causing the ongoing procedure to fail.
RB_TIMER_INDICATOR	This variable contains information to be sent to GERAN if any of the timers T314 or T315 has expired when the MS sends a cell update with cause RL failure.

RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO	This variable contains information to be sent to GERAN about when a new ciphering configuration shall be activated in the uplink for radio bearers using RLC-AM or RLC-UM.
SECURITY_MODIFICATION	This variable contains information on which CN domain is affected by the ongoing security reconfiguration.
START_THRESHOLD	This variable contains information about the maximum allowed value of the START for a CN domain.
START_VALUE_TO_TRANSMIT	This variable contains the value of START for new radio bearer(s) to be transmitted in a response message
TRANSACTIONS	This variable stores the identifications of the ongoing RRC procedure transactions.
TIMERS_AND_CONSTANTS	This variable contains the values for all timers and constants used in RRC-Connected mode.
UNSUPPORTED_CONFIGURATION	This variable indicates whether a received message contained a configuration that is not supported by the MS.

10.4.1 CELL_UPDATE_STARTED

This variable indicates whether a cell update or GRA update procedure is in progress.

Table 10.4.1.1: CELL_UPDATE_STARTED Variable

```
< CELL_UPDATE_STARTED VAR > ::=
    < Cell Update Started : bit (1) > ;
```

Table 10.4.1.2: CELL_UPDATE_STARTED Variable details

```
Cell Update Started (1 bit field)

bit
1
0   False - when leaving or entering the RRC Connected Mode
1   True - a Cell or GRA Update procedure is in progress
```

10.4.2 CIPHERING_STATUS

This variable contains information about the current status of ciphering in the MS. When performing handover or cell reselection to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.2.1: CIPHERING_STATUS Variable

```
< CIPHERING_STATUS VAR > ::=
    < CN Domain Related Information List : bit (2) >
    {   < CN Domain Identity : < CN Domain Identity IE > >
        < Status : bit (1) >
        < Reconfiguration : bit (1) >
    }  * (1+val(CN Domain Related Information List)) ;
```

Table 10.4.2.2: CIPHERING_STATUS Variable details

CN Domain Related Information List (2 bit field)   This field is used to repeat information for each CN Domain. Range : 0 to maxCNdomains-1, where 0 enables one CN domain to be described.
CN Domain Identity   The *CN Domain Identity* IE is defined in sub-clause 9.3.15.
Status (1 bit field)   bit   1   0   Not Started - when leaving the RRC-Connected mode   1   Started - when entering the RRC-Connected mode
Reconfiguration (1 bit field)   bit   1   0   False - when leaving or entering the RRC Connected Mode   1   True - an RRC procedure performing reconfiguration of ciphering is ongoing

10.4.3 ESTABLISHED_SIGNALLING_CONNECTIONS

This variable is used to store information about established signalling connections. This variable is cleared when entering the RRC Connected Mode when not otherwise stated in the procedure or when leaving the RRC Connected Mode. When performing handover or cell reselection to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.3.1: ESTABLISHED_SIGNALLING_CONNECTIONS Variable

```
< ESTABLISHED_SIGNALLING_CONNECTIONS VAR > ::=
    { 0 | 1  < Signalling Connection List : bit (2) >
        < CN Domain Identity : < CN Domain Identity IE > > * (1+ val(Signalling Connection List))
    } ;
```

Table 10.4.3.2: ESTABLISHED_SIGNALLING_CONNECTIONS Variable details

Signalling Connection List (2 bit field)   This field is used to repeat the CN domain identity of CN domains with established signalling connection. Range : 0 to maxCNdomains-1, where 0 enables one CN domain with established signalling connection to be described.
CN Domain Identity   The *CN Domain Identity* IE is defined in sub-clause 9.3.15.

10.4.4 ESTABLISHMENT_CAUSE

This variable is used to store the cause for establishment of a signalling connection received by upper layers, to be used at RRC connection establishment. This variable is cleared when entering or leaving the RRC Connected Mode.

Table 10.4.4.1: ESTABLISHMENT_CAUSE Variable

```
< ESTABLISHMENT_CAUSE VAR > ::=
    { 0 | 1  < Establishment Cause : < Establishment Cause IE > > } ;
```

Establishment Cause
This IE is defined in sub-clause 9.3.21.

10.4.5 ESTABLISHED_RABS

This variable is used to store information about the established radio access bearers and signalling radio bearers in the MS. This variable is cleared when entering or leaving the RRC Connected Mode. When performing handover or cell reselection to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.5.1: ESTABLISHED_RABS Variable

```
< ESTABLISHED_RABS VAR > ::=
    {
        { 0 -- Not present when entering or leaving the RRC-Connected mode when not otherwise stated in the procedure
        | 1 < RAB Information List :bit (4) >
            {   < RAB Info : < RAB Info IE > >
                < RB Information List : bit (3) >
                {   < RB Identity : < RB Identity IE > >
                    < RB Started : bit (1) > } * (1+val(RB Information List))
            } * (1+val (RAB Information List))
        }
        { 0 -- Not present when leaving RRC-Connected mode
        | 1 < Signalling RB Information List : bit (3) >
            < Signalling RB Started : bit (1) >* (1+val(Signalling RB Information List)) }
    } ;
```

Table 10.4.5.2: ESTABLISHED_RABS Variable details

RAB Information List (4 bit field)
This field is used to repeat information for each RAB established. Range : 0 to maxRABsetup-1, where 0 eanbles one established RAB to be described.
RAB Info
The *RAB Info* IE is defined in sub-clause 9.3.73.
RB Information List (3 bit field)
This field is used to repeat information for each RB of the RAB. Range : 0 to maxRBperRAB-1, where 0 enables one RB to be described.
RB Identity
This IE is defined in sub-clause 9.3.80.
RB Started (1 bit field) bit 1 0   Stopped 1   Started – default value
Signalling RB Information List (3 bit field)
This field is used to repeat information for each SRB. Range : 0 to maxSRBsetup-1, where 0 enables one SRB to be described.

Signalling RB Started (1 bit field)
Field repeated in the order of Signalling RB1 and upwards.

bit
1
0   Stopped
1   Started – default value.

10.4.6   FAILURE_CAUSE

This variable contains the cause for failure of a MS initiated procedure, to be reported in a retransmitted message. This variable is cleared when entering or leaving the RRC Connected Mode.

Table 10.4.6.1: FAILURE_CAUSE Variable

< FAILURE_CAUSE VAR > ::=   { 0 | 1 < **Failure Cause** : < Failure Cause IE > > } ;

Table 10.4.6.2: FAILURE_CAUSE Variable details

Failure Cause The *Failure Cause* IE is defined in sub-clause 9.3.24.

10.4.7   FAILURE_INDICATOR

This variable indicates whether the procedure has failed for a MS initiated procedure.

Table 10.4.7.1: FAILURE_INDICATOR Variable

< FAILURE_INDICATOR VAR > ::=   < **Failure Indicator** : bit(1) > ;

Table 10.4.7.2: FAILURE_INDICATOR Variable details

Failure Indicator (1 bit field) bit 1 0   False - when entering or leaving the RRC-Connected mode. 1   True - Procedure has failed.

10.4.8   GRA_IDENTITY

This variable stores the assigned GRA identity for this MS when in RRC-GRA_PCH state. This variable is cleared when entering or leaving the RRC Connected Mode.

Table 10.4.8.1: GRA_IDENTITY Variable

< GRA_IDENTITY VAR > ::=   { 0 | 1 < **GRA Identity** : < GRA Identity IE > > } ;

Table 10.4.8.2: GRA_IDENTITY Variable details

GRA Identity

This IE is defined in sub-clause 9.3.30.

10.4.9   G_RNTI

This variable stores the assigned G-RNTI for this MS. Thie variable is cleared when leaving the RRC-Connected mode.

Table 10.4.9.1: G_RNTI Variable

```
< G_RNTI VAR > ::=
    { 0 | 1  < G-RNTI : < G-RNTI IE > > } ;
```

Table 10.4.9.2: G_RNTI Variable details

G-RNTI
This IE is defined in sub-clause 9.3.32. Not present when leaving the RRC-Connected mode.

10.4.10   INITIAL_MS_IDENTITY

In this variable the identity used by the MS when establishing an RRC connection is stored.

Table 10.4.10.1: INITIAL_MS_IDENTITY Variable

```
< INITIAL_MS_IDENTITY VAR > ::=
    { 0 | 1  < Initial MS Identity : < Initial MS Identity IE > > } ;
```

Table 10.4.10.2: INITIAL_MS_IDENTITY Variable details

Initial MS Identity
This IE is defined in sub-clause 9.3.35. Not present when leaving the RRC-Connected mode.

10.4.11   INCOMPATIBLE_SECURITY_RECONFIGURATION

This variable indicates whether an incompatible simultaneous reconfiguration of a security function has been received.

Table 10.4.11.1: INCOMPATIBLE_SECURITY_RECONFIGURATION Variable

```
< INCOMPATIBLE_SECURITY_RECONFIGURATION VAR > ::=
    < Incompatible Security Reconfiguration : bit(1) > ;
```

Table 10.4.11.2: INCOMPATIBLE_SECURITY_RECONFIGURATION Variable details

Incompatible Security Reconfiguration (1 bit field)

bit
1
0   False - when entering or leaving the RRC-Connected mode.
1   True – when an incompatible simultaneous security reconfiguration has been detected.

10.4.12   INTEGRITY_PROTECTION_ACTIVATION_INFO

This variable contains information to be sent to GERAN about when a new integrity protection configuration shall be activated in the uplink for signalling radio bearers in case of modification of integrity protection. This variable is

cleared when entering or leaving the RRC-Connected mode. When performing handover to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.12.1: INTEGRITY_PROTECTION_ACTIVATION_INFO Variable

```
< INTEGRITY_PROTECTION_ACTIVATION_INFO VAR > ::=
    { 0 | 1  < Uplink Integrity Protection Activation Info : < Integrity Protection Activation Info IE > > } ;
```

Table 10.4.12.2: INTEGRITY_PROTECTION_ACTIVATION_INFO Variable details

Integrity Protection Activation Info This IE is defined in sub-clause 9.3.37.

10.4.13 INTEGRITY_PROTECTION_INFO

This variable contains information about the current status of the integrity protection in the MS. When performing handover or cell reselection to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.13.1: INTEGRITY_PROTECTION_INFO Variable

```
< INTEGRITY_PROTECTION_INFO VAR > ::=
    {
        < Historical Status : bit (1) >
        < Status : bit (1) >
        < Reconfiguration : bit (1) >
        { 0 -- Cleared when entering or leaving the RRC-Connected mode
        | 1 < Signalling RB Specific Integrity Protection Information List : bit (3) >
            {   -- Signalling SRB1 and upwards
                < Uplink RRC HFN : bit (28) >
                < Downlink RRC HFN : bit (28) >
                < Uplink RRC Message Sequence Number : bit (4) >
                { 0 | 1 < Downlink RRC Message Sequence Number : bit (4) > }
            } * (1+val(Signalling RB Specific Integrity Protection Information List))
        }
    } ;
```

Table 10.4.13.2: INTEGRITY_PROTECTION_INFO Variable details

Historical Status (1 bit field) bit 1 0   Never been active – set when entering the RRC-Connected mode 1   Has been active
Status (1 bit field) bit 1 0   Not Started - when leaving the RRC-Connected mode 1   Started - when entering the RRC-Connected mode

Reconfiguration (1 bit field)

bit
1
0   False - when leaving or entering the RRC Connected Mode
1   True - an RRC procedure performing reconfiguration of ciphering is ongoing

Signalling RB Specific Integrity Protection Information List (3 bit field)
This field is used to repeat information for each SRB with specific integrity protection information. Range : 0 to maxSRBsetup-1, where 0 enables one SRB with specific integrity protection informationto be described.

Uplink RRC HFN (28 bit field)
Downlink RRC HFN (28 bit field)
The field indicates the RRC HFN.

Uplink RRC Message Sequence Number (4 bit field)
Downlink RRC Message Sequence Number (4 bit field)
This field is the binary representation of the sequence number of the RRC message. Range 0 to 15.

10.4.14   INVALID_CONFIGURATION

This variable indicates whether a received message contained an invalid configuration, by means of invalid values or invalid combinations of information elements.

Table 10.4.14.1: INVALID_CONFIGURATION Variable

```
< INVALID_CONFIGURATION VAR > ::=
    < Invalid Configuration : bit(1) > ;
```

Table 10.4.14.2: INVALID_CONFIGURATION Variable details

Invalid Configuration (1 bit field)

bit
1
0   False - when entering or leaving the RRC-Connected mode.
1   True – an invalid configuration has been detected

10.4.14a LATEST_CONFIGURED_CN_DOMAIN

This variable stores the CN-domain that was most recently configured to be used for ciphering and integrity protection. When performing handover or cell reselection to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable

Table 10.4.14a.1: LATEST_CONFIGURED_CN_DOMAIN Variable

```
< LATEST_CONFIGURED_CN_DOMAIN VAR > ::=
    { 0 | 1  < Latest configured CN domain : < CN Domain Identity IE > > } ;
```

Table 10.4.14a.2: LATEST_CONFIGURED_CN_DOMAIN Variable details

Latest configured CN domain
The *CN Domain Identity* IE is defined in sub-clause 9.3.15. The variable is cleared when entering GERAN RRC connected mode when not stated otherwise in the procedure or when leaving GERAN RRC connected mode.

10.4.15 MS_CAPABILITY_REQUESTED

This variable stores information about the MS/UE capabilities that have been requested by GERAN but that have not yet been transferred to GERAN. This variable is cleared when entering or leaving the RRC-Connected mode.

Table 10.4.15.1: MS_CAPABILITY_REQUESTED Variable

```
< MS_CAPABILITY_REQUESTED VAR > ::=
    < MS GERAN Iu mode Radio Access Capability : < MS GERAN Iu mode Radio Access Capability IE > >
    { 0 | 1  < MS GERAN A/Gb mode Radio Access Capability : < MS GERAN A/Gb mode Radio Access Capability IE
> >}
    { 0 | 1  < UE UTRAN Radio Access Capability: < UE UTRAN Radio Access Capability IE > >}
    { 0 | 1  < UE UTRAN Radio Access Capability Extension: < UE UTRAN Radio Access Capability Extension IE > >}
    { 0 | 1  < UE CDMA2000 Radio Access Capability : < UE CDMA2000 Radio Access Capability IE > >} ;
```

Table 10.4.15.2: MS_CAPABILITY_REQUESTED Variable details

MS GERAN Iu mode Radio Access Capability This IE is defined in sub-clause 9.3.45.
MS GERAN A/Gb mode Radio Access Capability This IE is defined in sub-clause 9.3.44.
UE UTRAN Radio Access Capability This IE is defined in sub-clause 9.3.108.
UE UTRAN Radio Access Capability Extension This IE is defined in sub-clause 9.3.109.
UE CDMA2000 Radio Access Capability This IE is defined in sub-clause 9.3.110.

10.4.16 MS_CAPABILITY_TRANSFERRED

This variable stores information about which UE/MS capabilities that have been transferred to GERAN. This variable is cleared when entering or leaving the RRC-Connected mode when not stated otherwise in the procedure. When performing handover or cell reselection to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.16.1: MS_CAPABILITY_TRANSFERRED Variable

```
< MS_CAPABILITY_TRANSFERRED VAR > ::=
    < MS GERAN Iu mode Radio Access Capability : < MS GERAN Iu mode Radio Access Capability IE > >
    { 0 | 1  < MS GERAN A/Gb mode Radio Access Capability : < MS GERAN A/Gb mode Radio Access Capability IE
> >}
    { 0 | 1  < UE UTRAN Radio Access Capability: < UE UTRAN Radio Access Capability IE > >}
    { 0 | 1  < UE UTRAN Radio Access Capability Extension: < UE UTRAN Radio Access Capability Extension IE > >}
    { 0 | 1  < UE CDMA2000 Radio Access Capability : < UE CDMA2000 Radio Access Capability IE > >} ;
```

Table 10.4.16.2: MS_CAPABILITY_TRANSFERRED Variable details

MS GERAN Iu mode Radio Access Capability This IE is defined in sub-clause 9.3.45.
MS GERAN A/Gb mode Radio Access Capability This IE is defined in sub-clause 9.3.44.

UE UTRAN Radio Access Capability This IE is defined in sub-clause 9.3.108.
UE UTRAN Radio Access Capability Extension This IE is defined in sub-clause 9.3.109.
UE CDMA2000 Radio Access Capability This IE is defined in sub-clause 9.3.110.

10.4.17 ORDERED_RECONFIGURATION

This variable stores information about an ongoing Reconfiguration procedure.

Table 10.4.17.1: ORDERED_RECONFIGURATION Variable

```
< ORDERED_RECONFIGURATION VAR > ::=
    < Ordered reconfiguration : bit (1) > ;
```

Table 10.4.17.2: ORDERED_RECONFIGURATION Variable details

Ordered reconfiguration (1 bit field) bit 1 0   False - when entering or leaving the RRC-Connected mode. 1   True – reconfiguration procedure is ongoing.

10.4.18 PDCP_SN_INFO

This variable contains PDCP receive sequence numbers for one or several radio bearers to be included in a response message to GERAN. This variable is cleared when entering or leaving the RRC-Connected mode.

Table 10.4.18.1: PDCP_SN_INFO Variable

```
< PDCP_SN_INFO VAR > ::=
    { 0 | 1  < RB with PDCP Information List : bit (5) >
            < RB with PDCP Information : < RB with PDCP Information IE > > * (1 + val(RB with PDCP Information List)
) };
```

Table 10.4.18.2: PDCP_SN_INFO Variable details

RB with PDCP Information List (5 bit field) This field used to repeat information for each RB with PDCP Information. Range : 0 to maxRBallRABs-1, where 0 enables one RB with PDCP Information to be described. Other values are reserved.
RB with PDCP Information This IE is defined in sub-clause 9.3.86.

10.4.19 PROTOCOL_ERROR_INDICATOR

This variable indicates whether there exist a protocol error that is to be reported to GERAN. This variable is cleared when entering or leaving the RRC-Connected mode.

Table 10.4.19.1: PROTOCOL_ERROR_INDICATOR Variable

```
< PROTOCOL_ERROR_INDICATOR VAR > ::=
    < Protocol Error Indicator : < Protocol Error Indicator IE > > ;
```

Table 10.4.19.2: PROTOCOL_ERROR_INDICATOR Variable details

Protocol Error Indicator
This IE is defined in sub-clause 9.3.70.

10.4.20 PROTOCOL_ERROR_INFORMATION

This variable contains diagnostics to be reported to GERAN for a message that was not completely understood. This variable is cleared when entering or leaving the RRC-Connected mode.

Table 10.4.20.1: PROTOCOL_ERROR_INFORMATION Variable

```
< PROTOCOL_ERROR_INFORMATION VAR > ::=
    { 0 | 1 < Protocol Error Information: < Protocol Error Information IE > > } ;
```

Table 10.4.20.2: PROTOCOL_ERROR_INFORMATION Variable details

Protocol Error Information
This IE is defined in sub-clause 9.3.71.

10.4.21 PROTOCOL_ERROR_REJECT

This variable indicates whether there has occurred a severe protocol error causing the ongoing procedure to fail.

Table 10.4.21.1: PROTOCOL_ERROR_REJECT Variable

```
< PROTOCOL_ERROR_REJECT VAR > ::=
    < Protocol Error Reject : bit (1) > ;
```

Table 10.4.21.2: PROTOCOL_ERROR_REJECT Variable details

Protocol Error Reject (1 bit field)

bit
1
0   False - when entering or leaving the RRC-Connected mode.
1   True - a severe protocol error has occurred.

10.4.22 RB_TIMER_INDICATOR

This variable contains information to be sent to GERAN if any of the timers T314 or T315 has expired when the MS sends a cell update with cause RL failure. This variable is cleared when entering or leaving the RRC-Connected mode.

Table 10.4.22.1: RB_TIMER_INDICATOR Variable

```
< RB_TIMER_INDICATOR VAR > ::=
    { 0 | 1  < RB Timer Indicator : < RB Timer Indicator IE > > } ;
```

Table 10.4.22.2: RB_TIMER_INDICATOR Variable details

RB Timer Indicator
This IE is defined in sub-clause 9.3.85.

10.4.23 RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO

This variable contains information to be sent to GERAN about when a new ciphering configuration shall be activated in the uplink for radio bearers using RLC-AM or RLC-UM. This variable is cleared when entering or leaving the RRC-Connected mode.

Table 10.4.23.1: RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO Variable

< RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO VAR > ::=
{ 0 | 1 < **RB Uplink Ciphering Activation Time Info** : < RB Uplink Ciphering Activation Time Info IE > > } ;

Table 10.4.23.2: RB_UPLINK_CIPHERING_ACTIVATION_TIME_INFO Variable details

RB Uplink Ciphering Activation Time Info
This IE is defined in sub-clause 9.3.77.

10.4.24 START_THRESHOLD

This variable contains information about the maximum allowed value of the START for a CN domain. This variable is cleared when entering or leaving the RRC-Connected mode. When performing handover or cell reselction to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselction from UTRAN the value of this variable is transferred from the corresponding UTRAN variable

Table 10.4.24.1: START_THRESHOLD Variable

< START_THRESHOLD VAR > ::=
{ 0 | 1 < **Threshold** : bit (20) > } ;

Table 10.4.24.2: START_THRESHOLD Variable details

Threshold (20 bit field)
This field is the binary representation of maximum allowed value of the START for a CN domain. Range: 0 to 1048575.

10.4.25 START_VALUE_TO_TRANSMIT

This variable contains the value of START for new radio bearer(s) to be transmitted in a response message. This variable is cleared when entering or leaving the RRC-Connected mode. When performing handover or cell reselction to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover or cell reselection from UTRAN the value of this variable is transferred from the corresponding UTRAN variable

Table 10.4.25.1: START_VALUE_TO_TRANSMIT Variable

< START_VALUE_TO_TRANSMIT VAR > ::=
{ 0 | 1 < **START** : < START IE > > } ;

START This IE is defined in sub-clause 9.3.102.

10.4.26 TRANSACTIONS

This variable stores the identifications of the ongoing RRC procedure transactions. This variable is cleared when leaving the RRC Connected mode.

Table 10.4.26.1: TRANSACTIONS Variable

```
< TRANSACTIONS VAR > ::=
    { 0 | 1  < Accepted Transactions List : bit (5) >
           {   < Message Type : < Message Type IE > >
               < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
           } * (1+val(Accepted Transactions List))
    }
    { 0 | 1  < Rejected Transactions List : bit (5) >
           {   < Message Type : < Message Type IE > >
               < RRC Transaction Identifier : < RRC Transaction Identifier IE > >
           } * (1+val(Rejected Transactions List))
    } ;
```

Table 10.4.26.2: TRANSACTIONS Variable details

Accepted Transactions List (5 bit field) **Rejected Transactions List** (5 bit field) These fields are used to repeat information for each accepted or rejected transations respectively. Range: 0 to maxTransactions-1, where 0 enables one transaction to be described.
Message Type This IE is defined in sub-clause 9.2.1.
RRC Transaction Identifier This IE is defined in sub-clause 9.3.98.

10.4.27 TIMERS_AND_CONSTANTS

This variable contains the values for all timers and constants used in RRC-Connected mode.

Table 10.4.27.1: TIMERS_AND_CONSTANTS Variable

```
< TIMERS_AND_CONSTANTS VAR > ::=
    < MS Timers and Constants In Connected Mode : < MS Timers and Constants In Connected Mode IE > > ;
```

Table 10.4.27.2: TIMERS_AND_CONSTANTS Variable details

MS Timers and Constants In Connected Mode This IE is defined in sub-clause 9.3.51. All parameters are set to the default value when leaving the GERAN Iu to another RAT.

10.4.28 UNSUPPORTED_CONFIGURATION

This variable indicates whether a received message contained a configuration that is not supported by the MS.

Table 10.4.27.1: UNSUPPORTED_CONFIGURATION Variable

```
< UNSUPPORTED_CONFIGURATION VAR > ::=
    < Unsupported Configuration : bit (1) > ;
```

Table 10.4.27.2: UNSUPPORTED_CONFIGURATION Variable details

Unsupported Configuration
bit 1 0   False - when entering or leaving the RRC-Connected mode. 1   True - an unsupported configuration has been detected.

10.4.29 SECURITY_MODIFICATION

This variable contains information on which CN domain is affected by the ongoing security reconfiguration.When performing handover to UTRAN the value of this variable is transferred to the corresponding UTRAN variable. When performing handover from UTRAN the value of this variable is transferred from the corresponding UTRAN variable.

Table 10.4.29.1: SECURITY_MODIFICATION Variable

```
< SECURITY_MODIFICATION VAR > ::=
    { 0 | 1  < Status for each CN domain : bit (2) >
            {   < CN Domain Identity: < CN Domain Identity IE > >
                < Status : bit (1) >
            } * (1+val(Status for each CN domain))
    } ;
```

Table 10.4.29.2: SECURITY_MODIFICATION Variable details

Status for each CN domain (2 bit field) This field is used to repeat the status for each CN domain. Range : 0 to maxCNdomains-1, where 0 enables one status of CN domain to be described.
CN Domain Identity This IE is defined in sub-clause 9.3.15.
Status (1 bit field) bit 1 0   Not affected 1   Affected

11 Specific functions

11.1 Provision and reception of RRC information between network nodes

11.1.1 General

In certain cases, e.g., when performing handover to GERAN or when performing SBSS relocation, RRC information may need to be transferred between GERAN nodes, between GERAN and another RAT, between nodes within another RAT or between the MS and another RAT.

The RRC information exchanged between network nodes or between the MS and another RAT is typically transferred by means of RRC information containers. An RRC information container is a self-contained and extensible RRC information unit that may be used to transfer a number of different RRC messages, one at a time. As stated before, RRC information containers may be used to transfer RRC messages across interfaces other than the Um interface. The RRC messages that may be included in RRC information containers have similar characteristics as the RRC messages that are transferred across the Um interface.

The RRC messages tht are sent to/ from the MS, e.g RADIO BEARER RECONFIGURATION, INTER SYSTEM TO UTRAN HANDOVER COMMAND HANDOVER FROM GERAN Iu MODE COMMAND are covered by (sub)clauses 7 and 9 of this specification. The following sub-clauses concern RRC messages exchanged between network nodes.

In future versions of this specification, it is possible to extend the RRC messages transferred across interfaces other than Um. For these RRC messages the same extension mechanism applies as defined for RRC messages transferred across the Um interface, as is specified in sub-clause 9, i.e., both critical and non-critical extensions may be added.

The transfer syntax for RRC information containers and RRC messages transferred between network nodes is derived from the description used in the target node. The resulting bit or octet string is, carried in a container, transferred between the network nodes.

When using a separate RRC information container for each endpoint, the receiving RRC protocol entity is able to interpret the received container; this means that the receiver need not take into account information about the (network interface) message used in transferring the container.

11.1.2 General error handling for RRC messages exchanged between network nodes

The error handling for RRC messages that are exchanged between network nodes applies the same principles as defined for other RRC messages.

Although the same principles apply for network nodes receiving unknown, unforeseen and erroneous RRC messages received in RRC information containers, the notification of the error should be done in a different manner, as specified in the following:

The network node receiving an invalid RRC message from another network node should:

1> if the received RRC message was unknown, unforeseen or erroneous:

2> prepare an RRC FAILURE INFO message, including the IE "*Failure Cause*" set to "Protocol error" and the IE "Protocol error information" including an IE "*Protocol Error Cause*" which should be set as follows:

3> to "CSN.1 violation or encoding error" upon receiving an RRC message for which the encoded message does not result in any valid c syntax value;

3> to "Message type non-existent or not implemented" upon receiving an unknown RRC message type;

3> to "Message extension not comprehended" upon receiving an RRC message including an undefined critical message extension;

> 3> to "Information element value not comprehended" upon receiving an RRC message including an mandatory IE for which no default value is defined and for which either the value is set to spare or for which the encoded IE does not result in a valid transfer syntax. The same applies for conditional IEs, for which the conditions for presence are met, the IE is present but has a value set to spare or for which the encoded IE does not result in a valid transfer syntax;

> 3> to "Information element missing" upon receiving an RRC information container with an absent conditional IE for which the conditions for presence are met.

1> if there was another failure to perform the operation requested by the received RRC message:

> 2> prepare an RRC FAILURE INFO message, including the IE "*Failure Cause*" set to a value that reflects the failure cause.

1> send the RRC FAILURE INFO message to the network node from which the invalid RRC protocol information was received.

NOTE 1:   The appropriate (failure) messages used across the network interfaces may not support the inclusion of a RRC information container. In this case, the information contained in the RRC FAILURE INFO message may need to be transferred otherwise e.g. by mapping to a cause value (e.g. a cause value in the RR-HANDOVER FAILURE message when there is a error associated with the RRC-RADIO BEAERER RECONFIGURATION message).

NOTE 2   In case the RRC procedure used to perform SBSS relocation fails e.g. due to non comprehension, the source BSS may notify the target BSS by including the diagnostics information (IEs "Protocol error" and "Protocol error information") in the "RRC message "SBSS Relocation" Info sent in the RRC information container" used for a subsequent relocation request.

11.1.3   RRC Information to target GERAN Iu mode BSS

The RRC information container "RRC Information to target GERAN Iu mode BSS" may either be sent from source GERAN Iu mode BSS or from another RAT. In case of Handover to GERAN, this information originates from another RAT, while in case of SBSS relocation the RRC information originates from the source BSS. In case of handover to GERAN, the RRC information transferred may provide GERAN specific information, as defined in the INTER RAT HANDOVER INFO WITH INTER RAT CAPABILITIES message, that the target BSS needs when preparing the handover command message. In case of SBSS relocation, the RRC information transferred specifies the configuration of RRC and the lower layers it controls, e.g., including the radio bearer and RLC configuration. It is used by the target BSS to initialise RRC and the lower layer protocols to facilitate SBSS relocation in a manner transparent to the MS.

Table 11.1.3.1: RRC INFORMATION TO TARGET GERAN IU MODE BSS information elements

```
< RRC INFORMATION TO TARGET GERAN IU MODE BSS message content > ::=
    { 0 -- critical extension escape available
        {
            { 00 <Handover to GERAN: < INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES Message
> >
            | 01 < SBSS Relocation : < SBSS RELOCATION INFO > >
            | 10 < RFC3095 Context Info : < RFC3095 CONTEXT INFO >

            ! < Message escape : { 11 } bit** = < no string > > }    -- reserved for future extension
        !   < Content part error : bit (*) = < no string > > }
    !    < Message escape critical extension : 1 bit (*) = < no string > >} ;
```

Table 11.1.3.2: RRC INFORMATION TO TARGET GERAN IU MODE BSS information element details

INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES
This message is defined in sub-clause 11.1.5.
SBSS RELOCATION INFO
This message is defined in sub-clause 11.1.5.
RFC3095 CONTEXT INFO
This message is defined in sub-clause 11.1.5.3

11.1.4 RRC information, target BSS to source BSS

There are 2 possible cases for BSS relocation:

1 The MS is already under control of target BSS; and

2 The SBSS Relocation with Handover (MS still under control of SBSS), but MS is moving to a location controlled by the target BSS (based on measurement information).

In case 1 the relocation is transparent to the MS and there is no "reverse" direction container. The SBSS just assigns the 'serving' function to the target BSS, which then becomes the Serving BSS.

In case 2 the relocation is initiated by SBSS, which also provides the RRC INFORMATION TO TARGET GERAN IU MODE BSS Container to the target BSS. Based upon this information, the target BSS prepares the RADIO BEARER RECONFIGURATION Message.

The source BSS then transmits the Handover Message to the MS, which then performs the handover.

In the successful case, the MS transmits a RADIO BEARER RECONFIGURATION COMPLETE message, using the new configuration, to the target BSS.

In case of failure, the MS transmits an RADIO BEARER RECONFIGURATION FAILURE, using the old configuration, to the source BSS and the RRC context remains unchanged (has to be confirmed and checked with the SBSS relocation procedure).

Table 11.1.4.1: RRC Information Target BSS To Souce BSS information elements

```
< RRC Information Target BSS To Souce BSS message content > ::=
    { 0 -- critical extension escape available
            {    00 < RADIO BEARER RECONFIGURATION : < RADIO BEARER RECONFIGURATION message > > >
            |    01 < RRC FAILURE INFO : < RRC FAILURE INFO message > >
            ! < Message escape : {10 | 11} bit (*) = <no string> > } -- reserved for future extension
        !    < Content part error : bit (*) = < no string > > }
    !    < Message escape critical extension : 1 bit (*) = < no string > >} ;
```

Table 11.1.4.2: RRC Information Target BSS To Souce BSS information element details

RADIO BEARER RECONFIGURATION This message is defined in sub-clause 9.3.28
RRC FAILURE INFO This message is defined in sub-clause 9.3.44

11.1.5 RRC messages exchanged between network nodes

11.1.5.0 RADIO BEARER RECONFIGURATION

This RRC message is sent between network nodes to transfer the actual RADIO BEARER RECONFIGURATION message including the details of the radio configuration to be used upon handover to GERAN as compiled by the target BSS.

Direction: target BSS →source RAT

The message is exactly the same as the RADIO BEARER RECONFIGURATION defined in sub-clause 9.2.29.

11.1.5.1 INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES

This RRC message is sent between network nodes when preparing for an inter RAT handover to GERAN.

Direction: source RAT→target BSS

Table 11.1.5.1.1: INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES elements

```
< INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES message content > ::=
      {
      -- MS Information Elements
          { 0 | 1  < MS GERAN Iu mode Radio Access Capability : < MS GERAN Iu mode radio access capability IE >
> }
          { 0 | 1  < MS GERAN A/Gb mode Radio Access Capability : < MS GERAN A/Gb mode radio access
capability IE > > }
          { 0 | 1  < UE UTRAN Radio Access Capability : < UE UTRAN radio access capability IE > > }
          { 0 | 1  < UE UTRAN Radio Access Capability Extension : < UE UTRAN radio access capability extension
IE >> }
          { 0 | 1  < UE CDMA2000 Radio Access Capability : < UE CDMA2000 radio access capability IE > > }
          { 0 | 1  < Failure Cause and Error Information : < Failure Cause and Error Information IE > > }
          { 0 | 1  < Multirate configuration : < Multirate configuration IE > > }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 11.1.5.1.2: INTER RAT or MODE HANDOVER INFO WITH MS CAPABILITIES element details

MS GERAN Iu mode Radio Access Capability This IE is defined in sub-clause 9.3.45.
MS GERAN A/Gb mode Radio Access Capability This IE is defined in sub-clause 9.3.44.
UE UTRAN Radio Access Capability This IE is defined in sub-clause 9.3.108.
UE UTRAN Radio Access Capability Extension This IE is defined in sub-clause 9.3.109.
UE CDMA2000 Radio Access Capability This IE is defined in sub-clause 9.3.110.
MultiRate configuration IE This IE is defined in sub-clause 9.3.52. If the present speech codec is a multi-rate speech codec, the old BSS may inform the new BSS of the current multi-rate codec configuration by including the MultiRate configuration information element in the RRC INFORMATION TO TARGET GERAN IU MODE BSS message.

11.1.5.2   SBSS RELOCATION INFO

This RRC message is sent between network nodes when preparing for an SBSS relocation or a handover from UTRAN to GERAN *Iu mode*.

Direction: source RAT→target BSS.

Table 11.1.5.2.1: SBSS RELOCATION INFO information elements

```
< SBSS Relocation Information message content > ::=
      {
      -- MS Information Elements
      < RRC State Indicator : < RRC State Indicator IE > >
      < State of RRC procedure : bit (4) >
      -- Ciphering related information
      {    00 < GERAN A/Gb Security Info : < GERAN A/Gb Security Info IE > >
      |    01 < GERAN Iu Security Info : < GERAN Iu Security Info IE > >
      |    10 < Extension : < Extension IE > >
      |    11 < Extension : < Extension IE > >}
      < G-RNTI : < G-RNTI IE > >
      < START : < START IE > >
      { 0 | 1 < MS GERAN Iu mode Radio Access Capability : < MS GERAN Iu mode Radio Access Capability IE > >
}
      { 0 | 1 < MS GERAN A/Gb mode Radio Access Capability : < MS GERAN A/Gb mode Radio Access Capability
IE > > }
      { 0 | 1 < UE UTRAN Radio Access Capability : < UE UTRAN Radio Access Capability IE > > }
      { 0 | 1 < UE UTRAN Radio Access Capability Extension : < UE UTRAN Radio Access Capability Extension IE
>> }
      { 0 | 1 < UE CDMA2000 Radio Access Capability : < UE CDMA2000 Radio Access Capability IE > > }

      < GRA Id : < GRA Id > >
      < CN Common GSM-MAP NAS System Info : < NAS System Information GSM-MAP IE > >
      < Length of CN Domain Related Information : bit (2) >
          {   < CN Domain Identity : < CN Domain Identity IE > >
              < CN Domain Specific GSM-MAP NAS System Info : < NAS System Information GSM-MAP IE > >
              < CN Domain Specific DRX Cycle Length Coefficient : < CN Domain Specific DRX Cycle Length
Coefficient IE > > }
      { 0 | 1 < Signalling RB Information to Setup List : bit (3) >
          < Signalling RB Information to Setup : < Signalling RB Information to Setup IE > > *(1+val(Signalling RB
Information to Setup List))
      { 0 | 1 < RAB Information for Setup List : bit (4) >
              < RAB Information for Setup : < RAB Information for Setup IE > > *(1+val(RAB Information for Setup
List)) }
      { 0 | 1 < RAB Information to Reconfigure List : bit (4) >
              < RAB Information to Reconfigure : < RAB Information to Reconfigure IE > >*(1+val(RAB Information
to Reconfigure List)) }
      { 0 | 1 < RB Information to Reconfigure List : bit (5) >
              < RB Information to Reconfigure : < RB Information to Reconfigure IE > > }*(1+val(RB Information to
Reconfigure List))
      { 0 | 1 < Multirate configuration : < Multirate Configuration IE > > }
      { 0 | 1 < TDMAFN : < bit(22) > }
      { 0 | 1  < Failure Cause and Error Information : < Failure Cause and Error Information IE > > }
   !    < Content part error : bit (*) = < no string > > } ;
```

Table 11.1.5.2.2: SBSS RELOCATION INFO information element details

RRC State Indicator
This IE is defined in sub-clause 9.3.97.

State of RRC procedure (4 bit field)

This IE describes the state of the RRC procedure started in the source cell (i.e. RB reconfiguration) as follows:

```
bit
4 3 2 1
0 0 0 0        Await no RRC message
0 0 0 1        Complete
0 0 1 0        Await RB Setup Complete
0 0 1 1        Await RB Reconfiguration Complete
0 1 0 0        Await RB Release Complete
0 1 0 1        Send Cell Update Confirm
0 1 1 0        Send URA Update Confirm
All other values are reserved
```

GERAN A/Gb Security Info

This IE is defined in sub-clause 11.2.

GERAN Iu or UTRAN Security Info

This IE is defined in sub-clause 11.2.

MS GERAN Iu mode Radio Access Capability

This IE is defined in sub-clause 9.3.45.

MS GERAN A/Gb mode Radio Access Capability

This IE is defined in sub-clause 9.3.44.

UE UTRAN Radio Access Capability

This IE is defined in sub-clause 9.3.108.

UE UTRAN Radio Access Capability Extension

This IE is defined in sub-clause 9.3.109.

UE CDMA2000 Radio Access Capability

This IE is defined in sub-clause 9.3.110.

Ciphering status for each CN domain (2 bit field)

This field is the binary representation of the number of CN domains. Range : 0 to maxCNdomains-1.

Ciphering Status (1 bit field)

This field indicates the status of ciphering for the CN domain
bit
1
1   Ciphering started
0   Ciphering not started.

START

This IE is defined in sub-clause 9.3.102.

TDMAFN (22 bit field)

This field is the binary representation of the TDMA Frame Number. The description of the TDMA Frame Number is in 3GPP TS 45.002.

CN Domain Identity

This IE is defined in sub-clause 9.3.15.

Calculation time for ciphering related information (??? bit field)

This field contains the time when the ciphering information of the message were calculated, relative to the intended target cell of the target BSS

G-RNTI IE

This IE is defined in sub-clause 9.3.32.

GRA Identity
This IE indicates the GRA ID as defined in sub-clause 9.3.30.

CN Common GSM-MAP NAS System Info
The *NAS System Information GSM-MAP* IE is defined in sub-clause 9.3.55.

Length of CN Domain Related Information (2 bit field)
This field is used to calculate the number of CN domains included in this IE. Range : 0 to MaxCNdomains-1.

CN Domain Specific GSM-MAP NAS System Info
The *NAS System Information GSM-MAP* IE is defined in sub-clause 9.3.55.

CN Domain Specific DRX Cycle Length Coefficient
The *CN Domain Specific DRX Cycle Length Coefficient* IE is defined in sub-clause 9.3.16.

Signalling RB Information to Setup List (3 bit field)
This field is the binary representation of the number of SRB to setup. Range : 0 to maxSRBsetup-1.

Signalling RB Information to Setup
This IE is present for each SRB to establish. This IE is defined in sub-clause 9.3.101.

RAB Information for Setup List (4 bit field)
This field is the binary representation of the number of RAB to setup. Range : 0 to maxRABsetup-1.

RAB Information for Setup
This IE is present for each signalling RAB to establish. This IE is defined in sub-clause 9.3.75.

RAB Information to Reconfigure List (4 bit field)
This field is the binary representation of the number of RAB to reconfigure. Range : 0 to maxRABsetup-1.

RAB Information to Reconfigure
This IE is defined in sub-clause 9.3.76.

RB Information to Reconfigure List (5 bit field)
This field is the binary representation of the number of RB to reconfigure. Range : 0 to maxRB-1.

RB Information to Reconfigure
This IE is defined in sub-clause 9.3.82.

MultiRate Configuration IE
This IE is defined in sub-clause 9.3.52. If the present speech codec is a multi-rate speech codec, the old BSS may inform the new BSS of the current multi-rate codec configuration by including the MultiRate configuration information Field Element in the RRC INFORMATION TO TARGET GERAN IU MODE BSS message.

Failure Cause and Error Information
The *Failure Cause and Error Information* IE is defined in sub-clause 9.3.25.

11.1.5.3   RFC 3095 CONTEXT INFO

This RRC message is sent between network nodes in SBSS/SRNS or SBSS/SBSS relocation. It is used to transfer the compressor and decompressor context information of the RFC 3095 protocol.

Direction: source BSS →target BSS/RNC

Table 11.1.5.3.1: RFC 3095 CONTEXT INFO information elements

```
< RFC 3095 Context Info IE > ::=
    < RB with RFC 3095 Context List : bit(5) >
    {   < RB Identity : < RB Identity IE > >
        < RFC 3095 Context List : bit(14) >
        {
            { 0 | 1  -- Downlink RFC 3095 context
                < Downlink RFC 3095 Context Identity: bit(14) >
                < DL_MODE: bit(2) >
                < REF_IR: octet(3000) >
                { 0 | 1  < REF_TIME: bit(32) > }
                { 0 | 1  < SYN_OFFSET_ID : bit(16) > }
                { 0 | 1  < SYN_SLOPE_TS : bit(32) > }
                { < DYN_CHANGED : 0 >
                | < DYN_CHANGED : 1 > }
            }
            { 0 | 1  -- Uplink RFC 3095 context
                < Uplink RFC 3095 Context Identity: bit(14) >
                < UL_MODE: bit(2) >
                < REF_IR: octet(3000) >
                { 0 | 1  < REF_TIME: bit(32) > }
                { 0 | 1  < SYN_OFFSET_ID : bit(16) > }
                { 0 | 1  < SYN_SLOPE_TS : bit(32) > }
                { 0 | 1  < REF_SN_1 : bit(15) > }
            }
        }*(1 + val(RFC 3095 Context List))
    }*(1 + val(RB with RFC 3095 Context List));
```

Table 11.1.5.3.2: RFC 3095 CONTEXT INFO information elements details

RB with RFC 3095 Context List (5 bit field)
This field is the binary representation of the number of Radio Bearers with RFC 3095 context information.

Range: 0 to maxRBallRABs - 1.

RB Identity
This IE is defined in sub-clause 9.3.80.

RFC 3095 Context List (14 bit field)
This field is the binary representation of the number of the RFC 3095 contexts for this Radio Bearer.

Range: 0 to maxRFC3095-CID - 1.

Downlink RFC 3095 Context Identity (14 bit field)
Uplink RFC 3095 Context Identity (14 bit field)
This field represents the identity of the RFC 3095 in respectively Downlink and Uplink.

REF_IR (3000 octet string field**)**
This field corresponds to the RTP IR header (see sub-clause 5.7.7 of RFC3095 for detailed format) corresponding to the oldest header in the compressor sliding window.

RF_TIME (32 bit field)
This field corresponds to the arrival time (at the compressor) of REF_IR in milliseconds. See sub-clauses 4.5.4 and 6.5.1 of IETF RFC3095.

SYN_SLOPE_TS (32 bit field)
This field corresponds to the last synchronized slope of TS. See sub-clauses 5.5.1.2 and 5.7 of IETF RFC3095. In SO state, $TS(n) = TS(m) + (n-m) * SYN\_SLOPE\_TS$, where n and m is the RTP SN of current packet and the reference packet. Note that the unit of SYN_SLOPE_TS depends on whether TS is scaled before compression or not.

DYN_CHANGED (1 bit field)
This field corresponds to the information whether dynamic fields other than RTP SN, RTP TS and IP-ID have changed in the headers that are stored in the sliding window. Set to TRUE if changed and FALSE if not changed.

bit
1
0   DYN_CHANGED not supported
1   DYN_CHANGED supported

SYN_OFFSET_ID (16 bit field)
This field corresponds to the corresponds to the RTP Sequence Number of the predecessor of the latest RTP packet. This could be used to perform local repair of context by decompressor in U or O mode (see "ref - 1" in sub-clause 5.3.2.2.5 in IETF RFC3095 for further explanation).

DL_MODE (2 bit field)
UL_MODE (2 bit field)
This field represents the RFC 3095 mode in respectively Downlink and Uplink before the SBSS relocation. The optimal mode to operate in depends on the characteristics of the environment of the compression protocol, such as feedback abilities, error probabilities and distributions, effects of header size variation, etc.

```
   bit
   1 0
   0 0          U-mode    -- Unidirectional mode
   0 1          O-mode    -- Bidirectional Optimistic mode
   1 0          R-mode    -- Bidirectional Reliable mode
   1 1          reserved
```

11.2 Provision and reception of RRC security information between network nodes

11.2.1 General

In certain cases, e.g., when performing handover or when performing SBSS relocation, RRC security related information shall be transferred between other RATs and GERAN or between GERAN nodes within GERAN.

The lengths of the RLC counters of non-transparent radio bearers are different between GPRS (24bits) and EGPRS (20bits). The BSC shall set the HFN values according the source cell (GPRS or EGPRS) and independent from the target cell (UTRAN, GPRS or EGPRS).

In the following, the RRC security information to be transferred is separated into the three scenarious:

- GERAN *A/Gb mode* to GERAN *Iu mode*.

- GERAN *Iu mode* to GERAN *Iu mode* or UTRAN to GERAN *Iu mode*.

11.2.2 RRC Security Information, from GERAN-A/Gb to GERAN-Iu

The START value is used to initialise the most significant bits of all the HFN counters (MAC HFN, RLC AM HFN, RLC UM HFN, RRC HFN).

Direction: source: GERAN *A/Gb mode* BSC →target GERAN *Iu mode* BSC

Table 11.2.2.1: *GERAN A/Gb Security Info* **information elements**

```
< GERAN A/Gb Security Info IE >::=
    {
        < Start-CS : < START IE > >
        < Start-PS : < START IE > >
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 11.2.2.2: *GERAN A/Gb Security Info* **information element details**

Start-CS
The *START* IE is used to intialise the most significant bits of all the HFN counters (MAC HFN, RLC AM HFN, RLC UM HFN, RRC HFN) for the CS domain. The *START* IE is defined in sub-clause 9.3.102.

Start-PS
The *START* IE is used to intialise the most significant bits of all the HFN counters (MAC HFN, RLC AM HFN, RLC UM HFN, RRC HFN) for the PS domain. The *START* IE is defined in sub-clause 9.3.102.

11.2.3   RRC Security Information, from GERAN Iu mode/UTRAN to GERAN Iu mode

This IE contains security information required for continued communication between the MS and GERAN after a handover or SRNS/SBSS relocation

Direction: source: BSC/RNC →target BSC

Table 11.2.3.1: *GERAN Iu or UTRAN Security Info* **information elements**

```
< GERAN Iu or UTRAN Security Info IE >::=
    {
        < Ciphering status for each CN domain : bit (2) >
        {   < CN domain identity : < CN domain identity > >
            < Ciphering Status : bit (1) > }*(1+val(Ciphering status for each CN domain))
        < Latest configured CN Domain : bit (2) >
        < Ciphering info for transparent RB : bit (2) >
        {   < CN domain identity : < CN domain identity > >
            < MAC-HFN : bit (11) > } *(1+val(Ciphering info for transparent RB))
        < Ciphering info for non-transparent RB : bit (5) >
        {   < RB Id : < RB Identity IE > >
            < DL HFN : < RLC HFN IE > >
            < UL HFN : < RLC HFN IE > > }*(1+val(Ciphering info for non-transparent RB))
        {   < Integrity Protection status : 1 >
            {   < SRB-Id : bit (2) >
                < UL RRC HFN : bit (28) >
                < DL RRC HFN : bit (28) >
                < Uplink RRC Message Sequence number : bit (4) > }*4
                < Downlink RRC Message Sequence number : bit (4) > }*4
        |   < Integrity Protection status : 0 > }
    !   < Content part error : bit (*) = < no string > > } ;
```

Table 11.2.3.2: *GERAN Iu or UTRAN Security Info* **information element details**

Ciphering status for each CN domain (2 bit field)
This field is the binary representation of the number of repeated groups of fields and IEs. Range : 0 to maxCNdomains-1.

CN Domain Identity
This IE is defined in sub-clause 9.3.115.

Ciphering status (1 bit field)

This field indicates the ciphering status of the indicated CN Domain.

Bit

1

0   Ciphering not started

1   Ciphering started

Last Configuered CN Domain (2 bit field)

This field indicates the last configured CN Domain. This field is encoded as the CN Domain Identity in sub-clause 9.3.15

Ciphering info for transparent RB (2 bit field)

This field is the binary representation of the number of instances of ciphering info which is provided for transparent mode RLC RBs. Range : 0 to maxCNDomains-1.

MAC-HFN (11 bit field)

This field contains the MAC-HFN. The MAC-HFN is defined as the 11 MSB of the COUNT-C value.

Ciphering info for non-transparent RB (5 bit field)

This field is the binary representation of the number of non-transparent mode RLC RBs for which ciphering info is provided. Range : 0 to maxRB-1.

DL HFN / UL HFN

The *RLC HFN* IE is defined in 9.3.92.

Integrity Protection status (1 bit field)

This field indicates the status of integrity protection in the current cell. The field is encoded:

Bit

1

0   Integrity Protection not started

1   Integrity Protection started.

SRB-Id (2 bit field)

This field defines the SRB Id for which the following integrity protection information applies:

```
   bit
   2 1
   0 0          SRB1
   0 1          SRB2
   1 0          SRB3
   1 1          SRB4.
```

UL / DL RRC HFN (28 bit field)

This field contains the RRC HFN in the indicated direction. For each SRB, in case the activation times for the next Integrity Protection configuration to be applied on this SRB have already been reached, this IE corresponds to the last value used. Else this value corresponds to the value the source would have initalized the HFN to at the activation time. Increment of HFN due to RRC SN roll over is taken care of by target based on the value sent by the source

---

Uplink RRC Message Sequence Number (4 bit field)

This field is the binary representation of the RRC Sequence number for the indicated SRB. For each SRB, this IE corresponds to the last value received or in case the activation time was not reached for a configuration the value equals (activation time -1). Range 0-15.

Downlink RRC Message Sequence Number (4 bit field)

This field is the binary representation of the RRC Sequence number for the indicated SRB. For each SRB, this IE corresponds to the last value used or in case the activation time was not reached for a configuration, to the value (activation time -1). In particular, for SRB2, this IE should not take into account the RRC message that will trigger the relocation Range 0-15.

11.2.4 RRC Security Information, from GERAN Iu to UTRAN

NOTE: This information should be specified in 25.331 since UTRAN is the target RAT.

11.3 HFN mapping rules for radio bearer using non-transparent mode RLC

The length of RLC counters in UTRAN (RLC-AM 20bits, RLC-UM 25bits) and GERAN-Iu are different. In GERAN-Iu there are additional differences between GPRS (RLC-AM and RLC-UM 24bits) and EGPRS (RLC-AM and RLC-UM 20bits).

The network nodes shall use the following HFN mapping rules when sending or receiving HFN values within the RRC information containers:

1> the source network node shall set the HFN value as used in the source cell,

1> if the target network node receives an HFN value with the same length as used in the target cell;

2> increment this HFN by 1; and

2> use this value as HFN in the target cell;

1> if the target network node receives an HFN which is longer than the one used in the target cell;

2> take the MSBs as needed for the target cell;

2> increment this value by 1; and

2> use this value as HFN in the target cell;

1> if the target network node receives an HFN which is shorter than the one used in the target cell;

2> increment this HFN by 1;

2> add a number of least significant zero bits as needed; and

2> use this value as HFN in the target cell.

Annex A (informative): Change History

Meeting#	Tdoc	CR	Rev	Subject/Comment	New Version
GP-10	-	-	-	First version	5.0.0
GP-11	GP-022588	001	1	Variables and IEs	5.1.0
GP-11	GP-022807	002	3	DTM Request for Iu mode procedures	5.1.0
GP-11	GP-022593	004	1	Correction sub-clause 7.8.1.4	5.1.0
GP-11	GP-022594	005	1	RLC Discard	5.1.0
GP-11	GP-022595	006	1	PDCP Info and RFC 3095 context	5.1.0
GP-11	GP-022786	007	2	Activation time sub-clause 7.19.4.1	5.1.0
GP-11	GP-022787	008	3	Inter-RAT cell reselection between GERAN Iu mode and UTRAN	5.1.0
GP-11	GP-022790	009	3	Handover and inter-RAT cell reselection between GERAN Iu mode and UTRAN	5.1.0
GP-11	GP-022806	010	1	HFN synchronization at TBF establishment on SBPSCH	5.1.0
GP-12	GP-022912	011	1	Cleanup of sub-clause 7.8.1 Cell and GRA Update procedures	5.2.0
GP-12	GP-022928	012	2	Cleanup of sub-clause 7.8.3 GERAN mobility information	5.2.0
GP-12	GP-022913	013	1	Cleanup of sub-clause 7.8.4 Inter-mode Handover from GERAN Iu mode	5.2.0
GP-12	GP-023120	015	1	Inter-mode cell reselection between GERAN Iu mode and GERAN A/Gb mode	5.2.0
GP-12	GP-022914	016	1	Handling of unknown, unforeseen, and erroneous protocol data	5.2.0
GP-12	GP-022915	017	1	Corrections to PDCP info and RFC3095 context relocation	5.2.0
GP-12	GP-022916	018	1	Alignment UTRAN/GERAN on Iu mode procedures	5.2.0
GP-12	GP-022929	019	2	Corrections to Radio Bearer Control procedures	5.2.0
GP-12	GP-022917	020	1	Corrections to Radio Resource Management procedures	5.2.0
GP-12	GP-022930	021	3	Handover Access and Physical Information	5.2.0
GP-12	GP-023053	022		Addition of GERAN Iu Mode Support Indication in SI4, SI7 and SI8	5.2.0
GP-12	GP-023121	023		Clarifications to HFN handling for the Radio Bearer Control Procedures	5.2.0
GP-12	GP-023122	024		Clarification of the security issues for intersytem handover	5.2.0
GP-12	GP-023263	025	1	Corrections to Radio Resource Management procedures	5.2.0
GP-12	GP-023264	026	1	Alignment UTRAN/GERAN on Iu mode procedures	5.2.0
GP-12	GP-023265	027	1	Correction of Multislot Capability Indication	5.2.0
GP-12	GP-023248	031	1	Layer 2 errors	5.2.0
GP-13	GP-030089	032	1	HFN handling in case of handover and cell reselection between GERAN and UTRAN	5.3.0
GP-13	GP-030090	033	2	Alignment UTRAN/GERAN on Iu mode procedures	5.3.0
GP-13	GP-030088	034	1	Correction CR to 44.118vs 5.2.0	5.3.0
GP-13	GP-030410	035	3	Handling of predefined configuration and NAS message retransmission at inter-rat and inter-mode HO in GERAN Iu mode	5.3.0
GP-13	GP-030419	036	2	Correction CR to 44.118vs 5.2.0	5.3.0
GP-14	GP-030630	037	1	Alignment procedures between UTRAN and GERAN Iu mode	5.4.0
GP-14	GP-030628	038		Wrong implementation of CRs to 44.118vs 5.3.0. New sub-clause 7.8.1.10b has been inserted as 7.8.1.10a.	5.4.0
GP-14	GP-030631	039	1	Alignment of Inter-RAT cell reselection and handover procedures between GERAN Iu mode and UTRAN	5.4.0
GP-14	GP-030920	040	1	Correction to RRC Connection management procedures	5.4.0
GP-14	GP-031027	041	1	Correction to RRC Connection mobility procedures	5.4.0
GP-14	GP-030763	042		Correction to Transmission of MS capability information procedures	5.4.0
GP-14	GP-030921	043	1	Corrections to Radio Bearer Control Procedures	5.4.0
GP-14	GP-030765	044		Corrections to Signalling connection release indication procedure	5.4.0
GP-14	GP-030922	045	1	Corrections to Security mode procedure	5.4.0
GP-14	GP-030840	046		Corrections to Handover procedure	5.4.0
GP-14	GP-030873	047		Corrections to Initial Direct Transfer message	5.4.0
GP-15	GP-031170	049	1	Correction to paging procedures	5.5.0
GP-15	GP-031171	050	1	Update of Start values in USIM on inter-mode transitions and transitions to idle mode-alignment UTRAN-GERAN procedures	5.5.0
GP-15	GP-031172	051	2	Correction on RRC integrity protection procedure-alignment UTRAN-GERAN procedures	5.5.0
GP-15	GP-031551	052	2	Corrections to timers T300, T302, T308 and T304	5.5.0
GP-15	GP-031174	053	2	NAS and Integrity procedure interaction- alignment UTRAN-GERAN procedure	5.5.0
GP-15	GP-031175	054	1	Corrections to measurement report messages and SI messages in GERAN Iu mode	5.5.0
GP-15	GP-031437	055		Security actions when SIM is present on RRC Connection Request: UTRAN-GERAN alignment	5.5.0
GP-15	GP-031586	056	1	START values on the inter-mode handover: (security procedures UTRAN-GERAN alignment)	5.5.0
GP-15	GP-031587	057	1	Corrections to security procedures in case of pending security configurations at SBSS Relocation: UTRAN - GERAN alignment	5.5.0
GP-15	GP-031588	058	1	ROHC profile signalling:UTRAN-GERAN alignment	5.5.0
GP-15	GP-031441	059		Stopping of RLC entities at relocation: UTRAN-GERAN alignment	5.5.0
GP-15	GP-031584	060		Essential Corrections to RRC Connection Establishment Procedure	5.5.0
GP-15	GP-031585	061	1	Corrections to timers and counters	5.5.0
GP-16	GP-032002	062		Missing layer 1 criterion for radio link failure	5.6.0

Meeting#	Tdoc	CR	Rev	Subject/Comment	New Version
GP-17	GP-032660	063	1	Handling of key sets at Inter-mode Handover (UTRAN-GERAN alignment)	5.7.0
GP-17	GP-032661	064	2	START calculation in RRC-Connected mode (UTRAN-GERAN alignment)	5.7.0
GP-17	GP-032662	065	1	UTRAN-GERAN Handover	5.7.0
GP-17	GP-032663	066	2	Correction on PDCP Header Compression Configuration (UTRAN-GERAN alignment)	5.7.0
GP-17	GP-032664	067	1	Correction of PDCP Configuration for RFC 2507(GERAN -UTRAN alignment)	5.7.0
GP-17	GP-032665	068	2	Radio link failure during reconfiguration procedure (UTRAN-GERAN alignment)	5.7.0
GP-17	-	-	-	Minor editorials. References to other specs brought in line with drafting rules. Figure and table headings and references given consistent structure.	5.7.0

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History

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V5.0.0	July 2002	Publication
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