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In this document the marked changes on version 0.2.0 of ETSI SMG2 UMTS L23 Tdoc 65/99 have been accepted. The changes marked in this document are with reference to the above agreed ETSI document. This document reflects the merging of text from TTC document: ('UE-UTRAN L3 RRC signalling protocol', Vol 9, Ver 1.0.0, January 14, 1999, Tdoc RAN WG2 010/99) and the ETSI document referenced above.

Note the layout of this document will be changed when a template for the 3GPP documents becomes available. The template should provide information about the issuing organisation, IPR etc (which is not currently given in this document).

3GPP S2.31 V0.0.1 1999-01

RRC protocol specification

Contents

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Foreword

This specification document has been produced by 3GPP.

This specifcation describes the Radio Resource Control Protocol

The contents of this specification are subject to continuing work within 3GPP and may change.

1 Scope

The scope of this specification is to describe the Radio Resource Control protocol for the 3GPP radio system.

2 References

[1~~1~~] ETSI SMG2 UMTS 25.XX, Vocabulary used in the UMTS L2/3 Expert group~~, Ver 0.1.0~~

[2~~2~~] 3GPP S2.01 V0.0.1 1999-01, 'Radio Interface Protocol Architecture'

[3~~3~~] 3GPP S2.03 V0.0.1 1999-01, 'Description of UE states and procedures in connected mode'

3 Definitions and Abbreviations

3.1 Definitions

See [11~~[1~~] for definition of fundamental concepts and vocabulary

3.2 Abbreviations

ACK	Acknowledgement
AS	Access Stratum
BCCH	Broadcast Control Channel
BCFE	Broadcast Control Functional Entity
CCCH	Common Control Channel
CN	Core Network
DCA	Dynamic Channel Allocation
DCCH	Dedicated Control Channel
DCFE	Dedicated Control Functional Entity
DCH	Dedicated Channel
DTCH	Dedicated Traffic Channel
FACH	Forward Access Channel
FAUSCH	Fast Uplink Signalling Channel
FDD	Frequency Division Duplex

FFS	For Further Study
ID	Identifier
L1	Layer 1
MAC	Media Access Control
MS	Mobile Station
NAS	Non Access Stratum
NW	Network
ODMA	Opportunity Driven Multiple Access
PCCH	Paging Control Channel
PCH	Paging Channel
PNFE	Paging and Notification Control Functional Entity
QoS	Quality of Service
RAB	Radio access bearer
RLC	Radio Link Control
RNTI	Radio Network Temporary Identifier
RFE	Routing Functional Entity
RNC	Radio Network Controller
RRC	Radio Resource Control
SAP	Service Access Point
TDD	Time Division Duplex
TF	Transport Format
TFCS	Transport Format Combination Set
TFS	Transport Format Set
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UNACK	Unacknowledgement
UTRAN	UMTS Terrestrial Radio Access Network

4 General

The functional entities of the RRC layer are described below:

- Routing of higher layer messages to different MM/CM entities (UE side) or different core network domains (UTRAN side) is handled by the Routing Function Entity (**RFE**)

- Broadcast functions are handled in the broadcast control function entity (**BCFE**). BCFE offers RRC services by the GC-SAP and uses the lower layer services provided by Tr-SAP.

- Paging of idle mode UE(s) is controlled by the paging and notification control function entity (**PNFE**). PNFE offers RRC services by the Nt-SAP and uses the lower layer services provided by Tr-SAP.

- The Dedicated Control Function Entity (**DCFE**) handles all functions specific to one UE. The DCFE offers RRC services by the DC-SAP and can use lower layer services of UM/AM-SAP and Tr-SAP depending on the message to be sent and on the current UE service state.

Logical information exchange is necessary also between the RRC sublayer functional entities. Most of that is implementation dependent and not necessary to present in detail in a specification.

Figure 11Figure 1Figure 1shows the RRC model for the UE side and Figure 232Figure 3Figure 2 shows the RRC model for the UTRAN side.

*[Editors note: Some further clarification in the diagrams may be beneficial to acknowledge the fact that a DC-SAP for example might be offered over a dedicated channel (with RRC terminated in SRNC) whereas GC-SAP and Nt-SAP may be offered over BCCH, PCH respectively in which cases RRC is located in Node B. It could be concluded from the figure that these channels use the same SAP offered by RLC (Tr-SAP, UM-SAP, AM-SAP) whereas in fact they will use different SAP's, though the SAP **type** might be the same]*

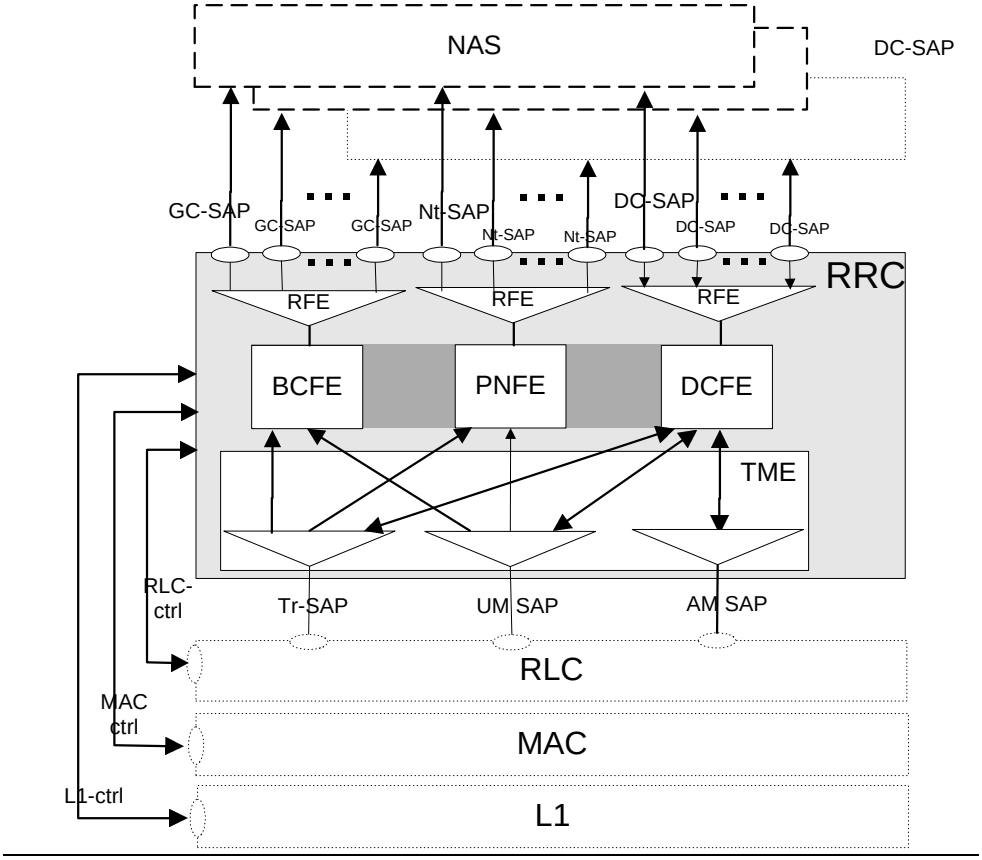

Figure 1~~1~~) UE side model of RRC

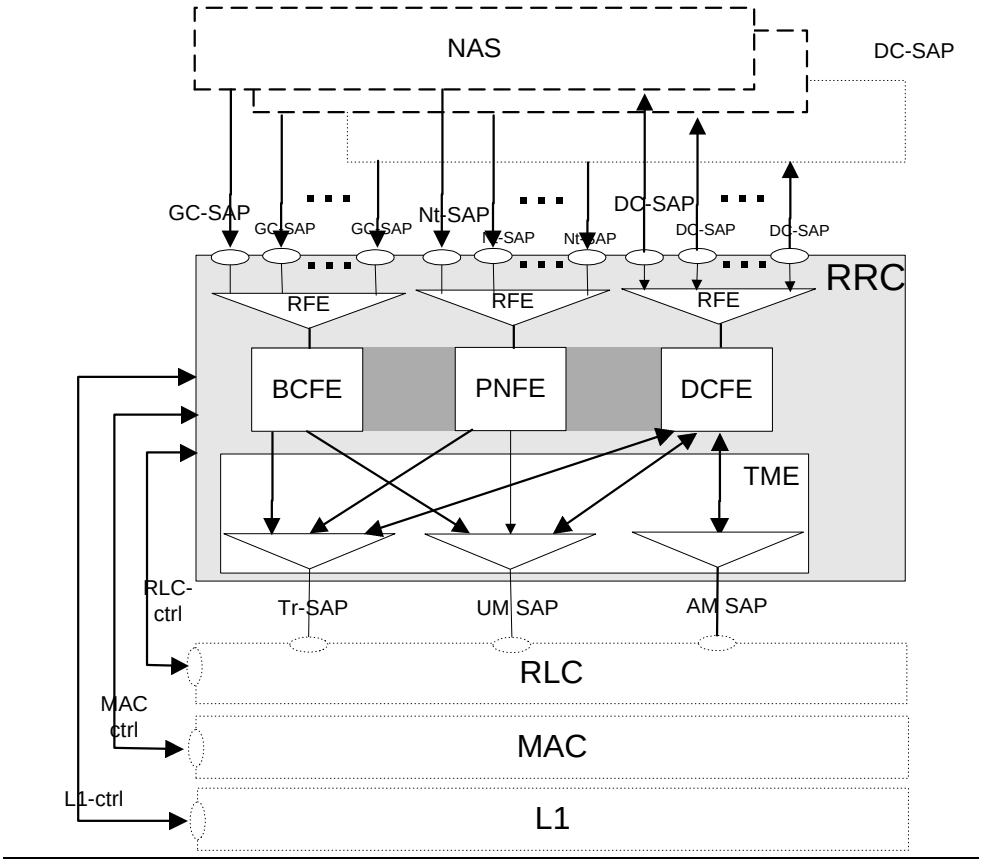

Figure 2~~3~~2) UTRAN side RRC model

5 RRC Services provided to upper layers

The RRC offers the following services to upper layers, a description of these services is provided in [22[~~2~~]].

- **General Control**
- **Notification**
- **Dedicated control**

6 Services expected from lower layers

6.1 Services expected from Layer 2

6.2 Services expected from Layer 1

7 Functions of RRC

The RRC performs the functions listed below, a more detailed description of these functions is provided in YY.01:

- **Broadcast of information provided by the non-access stratum (Core Network).**
- **Broadcast of information related to the access stratum.**
- **Establishment, maintenance and release of an RRC connection between the UE and UTRAN.**
- **Establishment, reconfiguration and release of Radio Access Bearers**
- **Assignment, reconfiguration and release of radio resources for the RRC connection.**
- **RRC connection mobility functions.**
- **Arbitration of the radio resource allocation between the cells**.
- **Control of requested QoS**.
- **UE measurement reporting and control of the reporting.**
- **Outer loop power control.**
- **Control of ciphering.**
- **Slow DCA**.
- **Broadcast of ODMA relay node neighbour information**
- **Collation of ODMA relay nodes neighbour lists and gradient information**
- **Maintenance of number of ODMA relay node neighbours**
- **Establishment, maintenance and release of a route between ODMA relay nodes**
- **Interworking between the Gateway ODMA relay node and the UTRAN**
- **Contention resolution (TDD mode)**
- **Paging/notification.**

The following functions are regarded as further study items:

- **Initial cell selection and re-selection in idle mode.**
- **Congestion control.**
- **Routing of higher layer PDU's (in UE side to correct higher layer entity and in UTRAN side to correct RANAP entity). The requirement for this function will be dependent on the decision made by SMG12.**

8 Elementary RRC procedures

This section describes elementary RRC procedures used in the idle mode and in the connected mode. More description on the different UE modes is provided in [22[2]].This section also describes procedures for establishing and releasing an RRC connection.

8.1 Idle mode procedures

8.1.1 Broadcast of system information

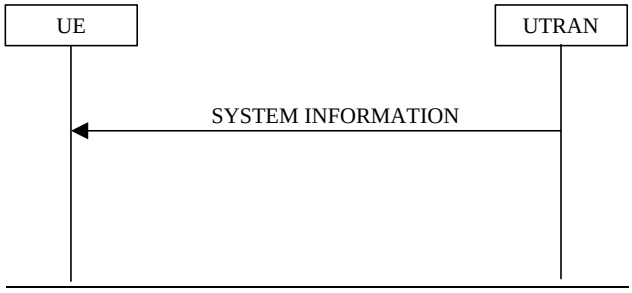

Figure 3~~3~~) Procedure for broadcast of system information

This procedure is used for broadcasting system information from the network to all UEs in a cell. Only UEs that listen to the logical channel BCCH can be reached by this procedure. The system information is repeated on a regular basis and it includes information from both the access stratum and the non-access stratum. The initiative to change the system information can come from both the access stratum and non-access stratum.

The SYSTEM INFORMATION message is regularly broadcast on the BCH by the UTRAN. Based on this information the mobile station is able to decide whether and how it may gain access to the system via the current cell.

The contents of the SYSTEM INFORMATION messages can come from RRC and from the physical layer measurements of each cell *[Editors note: Other sources for the system information are also allowed]*.

The information may be grouped into the following classes:

- information giving unique identification of the current network, location area, UTRAN registration area and cell
- information used for candidate cell measurements for handover and cell selection procedures
- information describing the current control channel structure
- information controlling the random access channel utilization
- information defining different options supported within the cell
- protocol information

[Note: The set of messages that forms the system information is FFS. However, basically the same elementary procedure can be applied for all messages.]

8.1.2 Paging ~~request~~

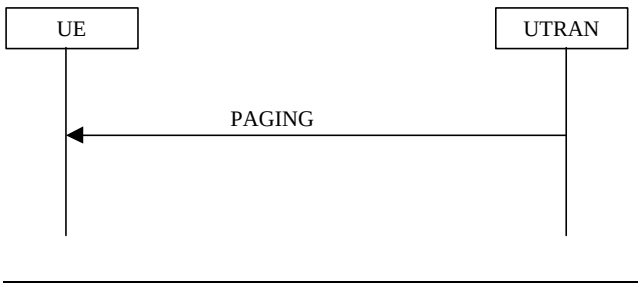

Figure 4~~3~~) Paging ~~request~~ procedure

This procedure is used to broadcast a PAGING ~~REQUEST~~ message from the network to selected UEs in a cell. Only UEs which listen to the correct paging group can be reached by this procedure. A PAGING ~~REQUEST~~ message can be sent to either one or many UEs at the same time.

[Note, the following is FFS]: PAGING message includes BCCH Modification Information, which indicates the modification of the System Information on BCCH. The coding of BCCH Modification Information is FFS.

[Note: The addresses which are to be used in the paging message (eg IMUI etc) are still to be defined]

[Note: The number of addresses to be used in the paging message needs to be defined]

[Note: the requirement to have different paging messages for UTRAN originated and CN originated RRC connected mode paging needs to be confirmed]

8.1.3 Notification ~~request~~

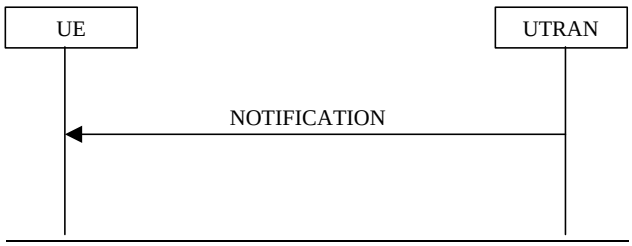

Figure 5~~75~~) Notification ~~request~~ procedure

This procedure is used for broadcast of notification information to selected UEs in a cell. Only UEs that listen to the correct notification group can be reached by this procedure. The initiative to send a NOTIFICATION ~~REQUEST~~ can come from both the access stratum and the non-access stratum. NOTIFICATION ~~REQUEST~~ can be sent to either one or many UEs at the same time.

[Note: Notification may be cell specific]

[Note: The usage of this procedure is FFS.]

8.2 RRC connection establishment and release procedures

8.2.1 RRC Connection Establishment

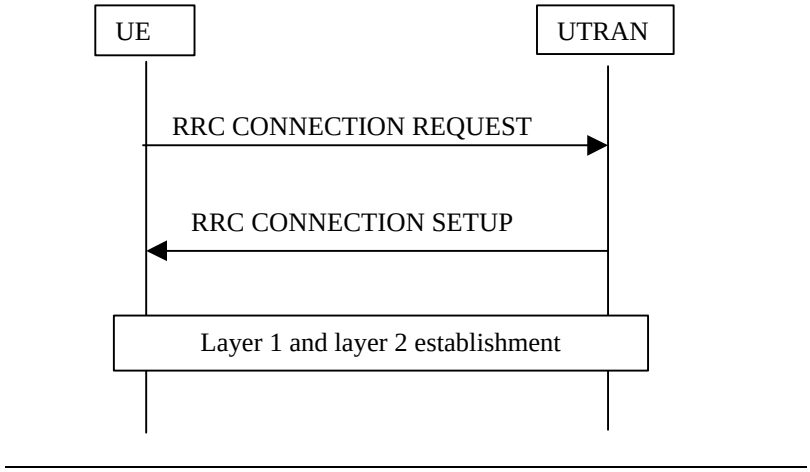

Figure 6~~86~~) Procedure for RRC connection establishment

This procedure is initiated from the UE side to establish an RRC connection, as a result of either:

(1) A request from the non-access stratum to establish the first signalling connection for the UE *[Note: For a GSM-based Core Network some examples of reasons are: CM Establishment Request and Location Update Request.],* or

(2) A received paging request. [*Note: Whether the RRC connection is established with or without an explicit request from UE non-access stratum in this case is FFS.]*

The RRC connection establishment is initiated by the UE, which leaves the idle mode and sends an RRC CONNECTION REQUEST message using unassured mode on the uplink CCCH. *[Note: The initial identification of the UE is FFS.]*

The UTRAN makes an assignment of radio resources and the Radio Network Temporary Identity (RNTI) to be used by the UE.The UTRAN sends an RRC CONNECTION SETUP message to the UE using unassured mode on the downlink CCCH. The message includes radio resource parameters and the RNTI.

The UE configures the layer 2 and layer 1 processing for the DCCH using the radio resource parameters. The procedure successfully ends when the layer 2 signalling link is established on the DCCH.

[Note: The necessity of an explicit RRC CONNECTION SETUP COMPLETE MESSAGE from the UE to the UTRAN on layer 3 is FFS. One assumption is, that there is an explicit layer 2 peer-to-peer signalling to establish the signalling link, making an explicit RRC CONNECTION SETUP COMPLETE message on layer 3 unnecessary.]

Note also that on receipt of an RRC CONNECTION REQUEST message, the RNC can allocate a FAUSCH channel for the UE for the particular cell, in which the UE is camping on, or FAUSCH channels for a number of cells of the URA, in which the UE is currently staying depending on the type of UE. The FAUSCH channels allocated are conveyed to the UE in the RRC CONNECTION SETUP message.The following procedure which could be used during RRC connection establishment is for further study:

On receipt of an RRC CONNECTION REQUEST message, the RNC may allocate a dedicated channel to the mobile station. It is also possible to setup macrodiversity at this point. To do so means that the RRC CONNECTION REQUEST message must contain a measurement report. In this case, the RNC executes branch addition (physical channel activation) to each cell (/NodeB) that will be included in the active set. After the physical channel(s) are setup on the UTRAN side, the RRC CONNECTION SETUP message is sent to the UE on the FACH channel.

8.2.2 RRC Connection Release

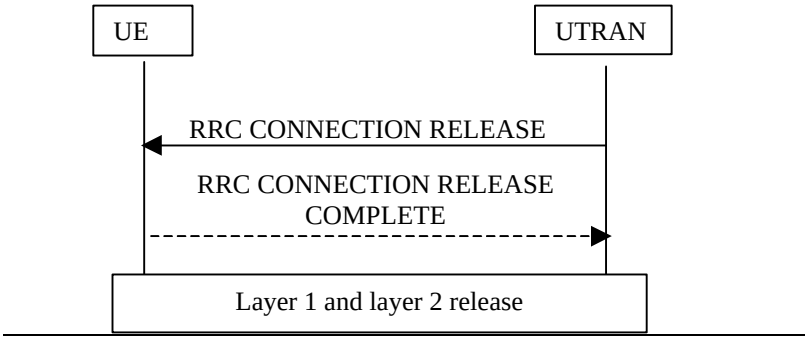

Figure 7~~9~~7) RRC Connection release procedure

A normal RRC connection release procedure is initiated from the UTRAN, e.g. when the last Signaling Connection is released. *[Note: Release in case of RRC connection failure is FFS.] [Note: Possibility for UE initiated RRC connection release is FFS.]*

Two variants of this procedure have been identified:

a) RRC connection release from state where dedicated physical channel is available

b) RRC connection release from state where there is no dedicated physical channel

In the former case (a) the UTRAN sends an RRC CONNECTION RELEASE message to the UE using acknowledged mode on the DCCH. The UE then leaves the Connected Mode and initiates release of the layer 2 signalling link. The RRC Connection Release procedure ends when all UE dedicated resources (such as radio resources and radio access bearers) tied to the RRC connection are released and the RRC layer is transferred to idle mode.

In the latter case (b) the RRC layer entity in the network issues an RRC CONNECTION RELEASE message using unacknowledged mode on the DCCH. Upon reception of this message the UE-RRC sends an RRC CONNECTION RELEASE COMPLETE message to UTRAN using acknowledged mode on the DCCH. *[Note: Depending on RLC design, the acknowledgement to RRC CONNECTION RELEASE could be piggybacked to the RRC CONNECTION*

RELEASE COMPLETE MESSAGE, resulting in no additional messages. Therefore acked / unacked transmission is considered FFS.]. After receiving the RRC CONNECTION RELEASE COMPLETE message the network RRC layer releases L2 resources and the RRC entity dedicated to this UE goes to Idle Mode.On receipt of the RRC CONNECTION RELEASE COMPLETE message the network releases the FAUSCH channels allocated for the UE going to idle mode if FAUSCH channels have been allocated during RRC connection establishment.

8.2.3 RRC Connection re-establishment

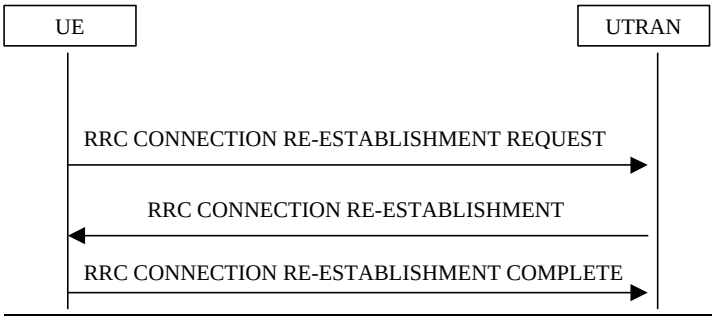

Figure 8108) RRC Connection re-establishment

RRC connection re-establishment is needed, when a UE loses radio connection due to e.g. radio link failure. After having selected a new cell, the UE RRC sends the NW RRC an RRC CONNECTION RE-ESTABLISHMENT REQUEST message. The NW RRC configures the NW and acknowledges the connection re-establishment to the UE RRC with an RRC CONNECTION RE-ESTABLISHMENT message. This message may contain the FAUSCH channel(s) valid for this cell, and possibly other cells of the same URA, if FAUSCH channels have been allocated earlier. The UE RRC configures the UE L1 to activate the new radio link(s). After the UE has synchronised to at least one radio link, the MAC and RLC layers can be configured (if necessary). ~~*When the procedure is completed on the UE side, an RRC CONNECTION RE-ESTABLISHMENT COMPLETE message is sent*~~

[Note: The necessity of an explicit RRC CONNECTION REESTABLISHMENT COMPLETE message to be sent from the UE to the UTRAN on layer 3 is FFS. One assumption is, that there is an explicit layer 2 peer-to-peer signalling to establish the signalling link, making an explicit RRC CONNECTION REESTABLISHMENT COMPLETE message on layer 3 unnecessary].

8.3 RRC connected mode procedures

8.3.1 Radio Access Bearer Related Procedures

8.3.1.1 Radio Access Bearer Establishment

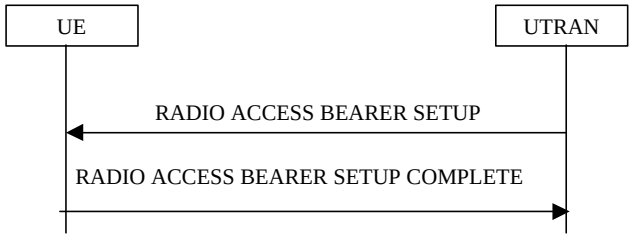

Figure 9119) Radio Access Bearer Establishment Procedure

This procedure establishes a new radio access bearer. The establishment includes, based on QoS, assignment of RLC parameters, multiplexing priority for the DTCH, scheduling priority for DCH, TFS for DCH and update of TFCS. It may also include assignment of a physical channel(s) and change of the used transport channel types / RRC state.

There are a number of alternative methods by which radio access bearers may be established:

a) Radio Access Bearer Establishment with Dedicated Physical Channel Activation
b) Radio Access Bearer Establishment with Unsynchronised Dedicated Physical Channel Modification
c) Radio Access Bearer Establishment with Synchronised Dedicated Physical Channel Modification
d) Radio Access Bearer Establishment without Dedicated Physical Channel

A Radio Access Bearer Establishment is initiated when the RRC layer in the network sends a RADIO ACCESS BEARER SETUP message to its peer entity. This message contains L1, MAC and RLC parameters and in the synchronised case an activation time. RRC on the UE side then configures L1 and MAC and creates a new RLC entity associated with the new radio access bearer. A similar reconfiguration is also done on the network side. The UE then sends a RADIO ACCESS BEARER SETUP COMPLETE message back to the network.

[Note: The possibility of establishing multiple radio access bearers within one message is FFS]

8.3.1.2 Radio Access Bearer Release

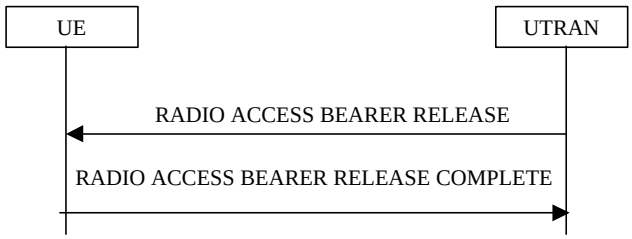

Figure 10~~12~~1~~0~~) Radio Access Bearer Release Procedure

This procedure releases a radio access bearer. The RLC entity for the radio access bearer is released. The procedure may also release a DCH, which affects the TFCS. It may include release of physical channel(s) and change of the used transport channel types / RRC state.

The Radio Access Bearer Release procedure is initiated by the RRC layer on the NW side. A RADIO ACCESS BEARER RELEASE message is sent from the RRC layer in the network to its peer entity in the UE. This message includes possible new L1, MAC and RLC parameters for remaining radio access bearers and indentification of the radio access bearer to be released. *[Note: In synchronised case a specific activation time would be needed for the change of L1 and L2 configuration to avoid data loss.]*

The RRC on the UE side configures L1 and MAC, and releases the RLC entity associated to the released radio access bearer . A similar reconfiguration is also done on the network side.

Finally, RRC on the UE side sends a RADIO ACCESS BEARER RELEASE COMPLETE message to the network.

Currently the following alternative methods have been identified by which Radio Access Bearers may be released:

a) Radio Access Bearer Release with unsynchronised dedicated physical channel modification
b) Radio Access Bearer Release with synchronised dedicated physical channel modification
c) Radio Access Bearer Release without dedicated physical channel modification

[Note: When a radio access bearer carried on a DCH is released, it is FFS, whether the UE should acknowledge the RADIO ACCESS BEARER RELEASE message before making the reconfiguration (on the DCH) or after making the reconfiguration (on the RACH)]

[Note: The possibility of releasing multiple radio access bearers within one message is FFS]

8.3.1.3 Radio Access Bearer and signalling link Reconfiguration

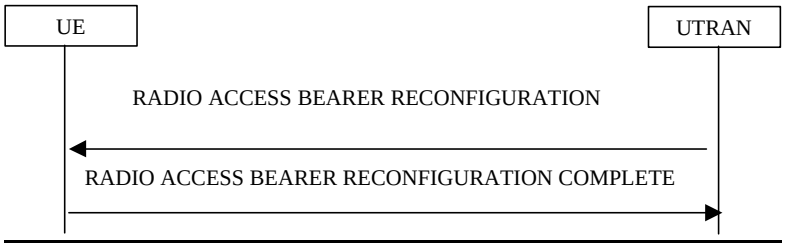

Figure 1113) Radio Access Bearer and signalling link Reconfiguration Procedure

This procedure reconfigures parameters for a radio access bearer or the signalling link to reflect a change in QoS. It may include change of RLC parameters, change of multiplexing priority for DTCH/DCCH, change of DCH scheduling priority, change of TFS for DCH, change of TFCS, assignment or release of physical channel(s) and change of used transport channel types. *[Note: The necessity of this procedure is FFS.]*

Currently identified options by which Radio Access Bearers may be reconfigured:

a) Synchronised Radio Access Bearer reconfiguration
b) Unsynchronised Radio Access Bearer reconfiguration

[Note: When the reconfiguration involves a change of transport channel (eg. from DCH/DCH to RACH/FACH), it is FFS, whether the UE should acknowledge the RADIO ACCESS BEARER RECONFIGURATION message before making the reconfiguration (eg. on the DCH) or after making the reconfiguration (eg. on the RACH)]

[Note: The possibility of reconfiguring multiple radio access bearers and signalling links within one message is FFS]

8.3.2 Transport Channel Reconfiguration

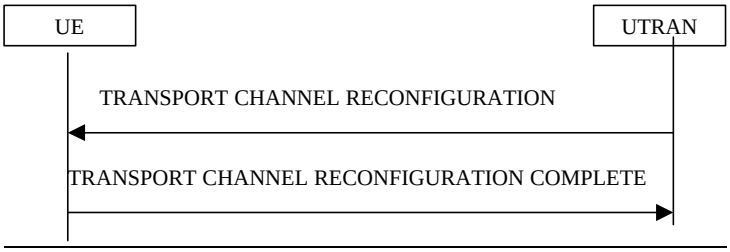

Figure 1214) Procedure for transport channel reconfiguration

This procedure configures parameters related to a transport channel such as the TFS. The procedure also assigns a TFCS and may change physical channel parameters to reflect a reconfiguration of a transport channel in use.

A change of the transport format set for a transport channel is triggered in the RRC layer in the network. A TRANSPORT CHANNEL RECONFIGURATION message is then sent from the RRC layer in the network to its peer entity. This message contains the new transport format set, a new transport format combination Set and may include physical channel parameters, i.e. new parameters for L1 and MAC. *[Note1: In a synchronised procedure a specific activation time is needed for the change of L1 and L2 configuration to avoid data loss.]* When this message is received in the UE a reconfiguration of L1 and MAC is done. A similar reconfiguration is also done on the network side. Finally, a TRANSPORT CHANNEL RECONFIGURATION COMPLETE message is returned to the network.

Currently identified options by which transport channels may be reconfigured:

a) Synchronised transport format set reconfiguration
b) Unsynchronised transport format set reconfiguration
c) Pre-configuration of TFS/TFCS for a transport channel not yet in use *[Note: the exact usage of this procedure is FFS]*

[Note: When the reconfiguration involves a change of transport channel it is FFS, on what channel the UE should acknowledge the TRANSPORT CHANNEL RECONFIGURATION message, ie. whether it should acknowledge before making the reconfiguration (eg. on the DCH) or after making the reconfiguration (eg. on the RACH)]

[Note: The possibility of reconfiguring multiple transport channels within one message is FFS]

8.3.3 Transport Format Combination Control

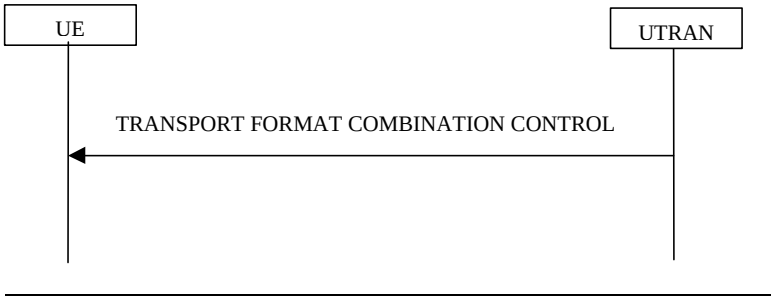

Figure 131~~5~~13) Transport Format Combination Control Procedure

The network uses this procedure to control which transport format combinations (within the transport format combination set) can be used by the UE in the uplink. An example of when this procedure might be used is when a congestion situation occurs such that it is desirable to temporarily restrict the TFC's in use.

This procedure is initiated with a TRANSPORT FORMAT COMBINATION CONTROL message sent from the network to the UE. This message defines the subset of the complete Transport Format Combination Set which the UE is allowed to use, or in case of relieving a temporary restriction, a TFCS which is identical to the complete original set. The UE then reconfigures MAC which thereafter uses the new TFC set. The TRANSPORT FORMAT COMBINATION CONTROL message may be sent as unacknowledged data transfer (FFS) since it is assumed that it does not matter if one UE out of many misses this information and stays with the old TFCS.

8.3.4 Physical Channel Reconfiguration

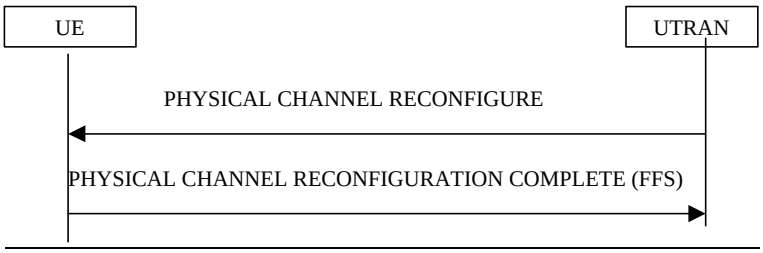

Figure 141~~6~~14) Physical Channel Reconfiguration procedure

This procedure may assign, replace or release a set of physical channels used by an UE. As a result of this, it may also change the used transport channel type (and RRC state). For example, when the first physical channel is assigned the UE enters the DCH/DCH state. When the last physical channel is released the UE leaves the DCH/DCH state and enters a state (and transport channel type) indicated by the network. A special case of using this procedure is to change the DL channelization code of a dedicated physical channel. *[Note: The procedure does not change the active set, in the downlink the same number of physical channels are added or replaced for each radio link.]*

Currently identified motivations for using this procedure (methods by which physical channels may be reconfigured):

a) Assignment of dedicated physical channel (switch from common channels to dedicated physical channel)
b) Synchronised replacement (modification) of dedicated physical channel (eg. for D/L code tree re-organisation)
c) Release dedicated physical channel (switch from dedicated physical channel to common channels).
d) This procedure can also be used to add further FAUSCH channels (e.g. for use in other cells of the URA, to which a UE might move in the future when the UE already has an RRC connection.)

8.3.5 Mobility Related Procedures

8.3.5.1 Modification of the active set when in Soft hand-over

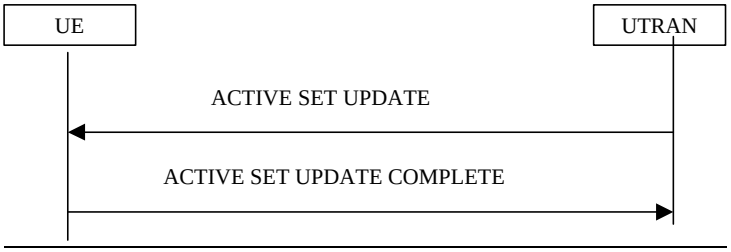

Figure 151715) Procedure for modifying the active set when in soft hand-over

There are three alternative ways of modifying the active set which have been identified:

a) Radio link addition
b) Radio link removal
c) Combined radio link addition and removal

Radio link addition is triggered in the network RRC layer. The NW RRC first configures the new radio link. Transmission and reception begin immediately. The NW RRC then sends an ACTIVE SET UPDATE message to the UE RRC. The UE RRC configures layer 1 to begin reception. After confirmation from the physical layer in UE an ACTIVE SET UPDATE COMPLETE message is sent to the NW RRC

Radio link removal is triggered by the network RRC layer. The radio link is first deactivated by the UE and then in the NW. The NW RRC sends an ACTIVE SET UPDATE message to the UE RRC. The UE RRC requests UE L1 to terminate reception of the radio link(s) to be removed. After this the UE RRC acknowledges radio link removal with an ACTIVE SET UPDATE COMPLETE message to the NW RRC. The NW RRC proceeds to request the NW L1 to release the radio link.

The NW RRC determines the need for radio link replacement. When radio links are to be replaced, the NW RRC first configures the NW L1 to activate the radio link(s) that are being added. The NW RRC then sends an ACTIVE SET UPDATE message to the UE RRC, which configures the UE L1 to terminate reception on the removed radio link(s) and begin reception on the added radio link(s). If the UE active set is full, an old radio link has to be removed before a new one can be added. If the UE has only one radio link, then the replacement must be done in reverse order (first add, then remove). *Note: The present assumption is that the order of the replacement can be left to the UE.* The UE RRC acknowledges the replacement with an ACTIVE SET UPDATE COMPLETE message. The NW RRC then configures the NW L1 to terminate reception and transmission on the removed radio link.

[Editors note: Presumably the radio link replacement procedure can be used for intra-frequency(make before break) hard hand-off]

[Editor's note: TDD active set update will also be supported if the L1 group identifies the requirement]

8.3.5.2 Hard handover (FDD and TDD hard)

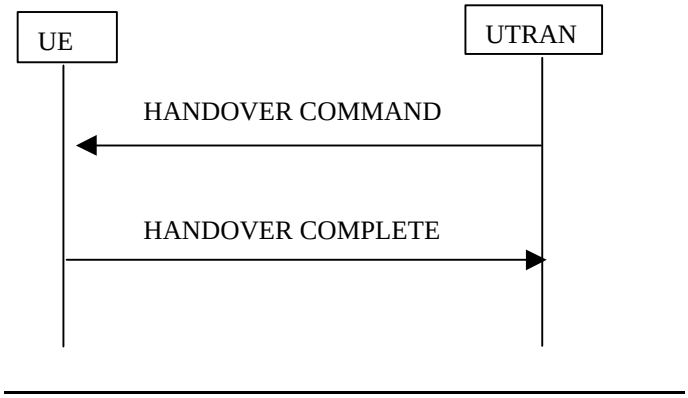

Figure 16~~18~~16) Inter-frequency hard handover

The NW RRC determines the need for inter-frequency hard handover and then configures the NW L1 to activate the new radio links. The NW L1 begins transmission and reception on the new links immediately. The NW RRC then sends the UE RRC a HANDOVER COMMAND message. The message indicates the radio resources that should be used for the new radio link, and can include a FAUSCH channel for the new cell, if the UE has not already been assigned a valid FAUSCH channel for the new cell.The UE RRC configures the UE L1 to terminate reception on the old radio link and begin reception on the new radio link.

After the UE L1 has achieved downlink synchronisation on the new frequency, a L2 link is established and the UE RRC sends a HANDOVER COMPLETE message to the NW RRC. After the L3 acknowledgement has been received, the NW RRC configures the NW L1 to terminate reception and transmission on the old radio link.

[Note 1: Whether it should be possible to setup several radio links immediately on the new frequency is FFS.]

[Note 2: The suspension and resuming of the CC and MM signalling during handover is FFS.]

8.3.5.5 Inter system hard hand-over (GSM/BSS to UTRAN)

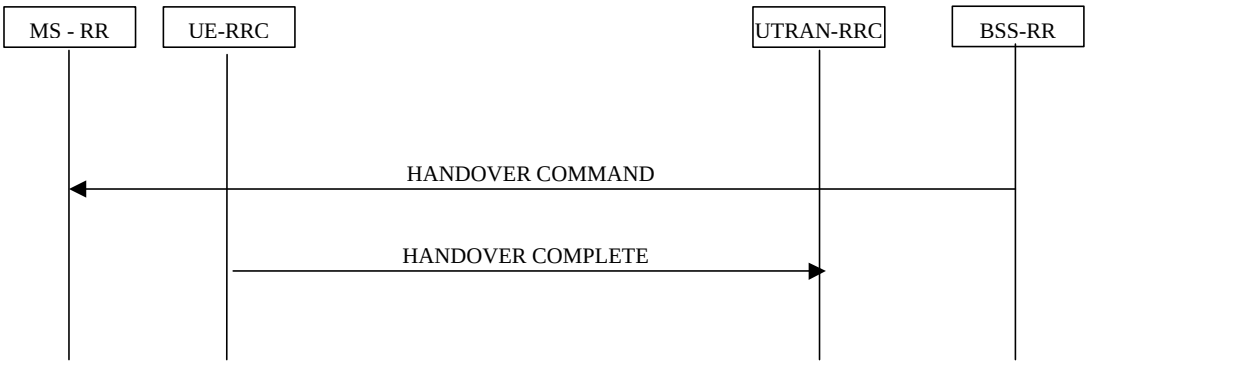

Figure 17~~19~~17) Procedure for Inter-system hard hand-over - GSM to UTRAN

The handover from GSM/BSS to UTRAN for a dual-mode GSM MS / UMTS UE is described.

On the network side, the RRC layer performs admission control and radio resource allocation, assigning an RNTI for the RRC connection and selecting radio resource parameters (such as transport channel type, transport format sets, etc).

The selected parameters including the RNTI, aretransmitted to the UE via the upgraded GSM RR message HANDOVER COMMAND. Upon reception of the HANDOVER COMMAND message, the UE RRC configures L1 and L2 using these parameters to locally establish the DCCH logical channel . Layer 1 indicates to RRC when it has reached synchronisation. An RLC signalling link establishment is then initiated by the UE. A HANDOVER COMPLETE message is finally sent by the UE RRC.

8.3.5.6 Inter system hard hand-off (UTRAN to GSM/BSS, PSTN/ISDN domain services)

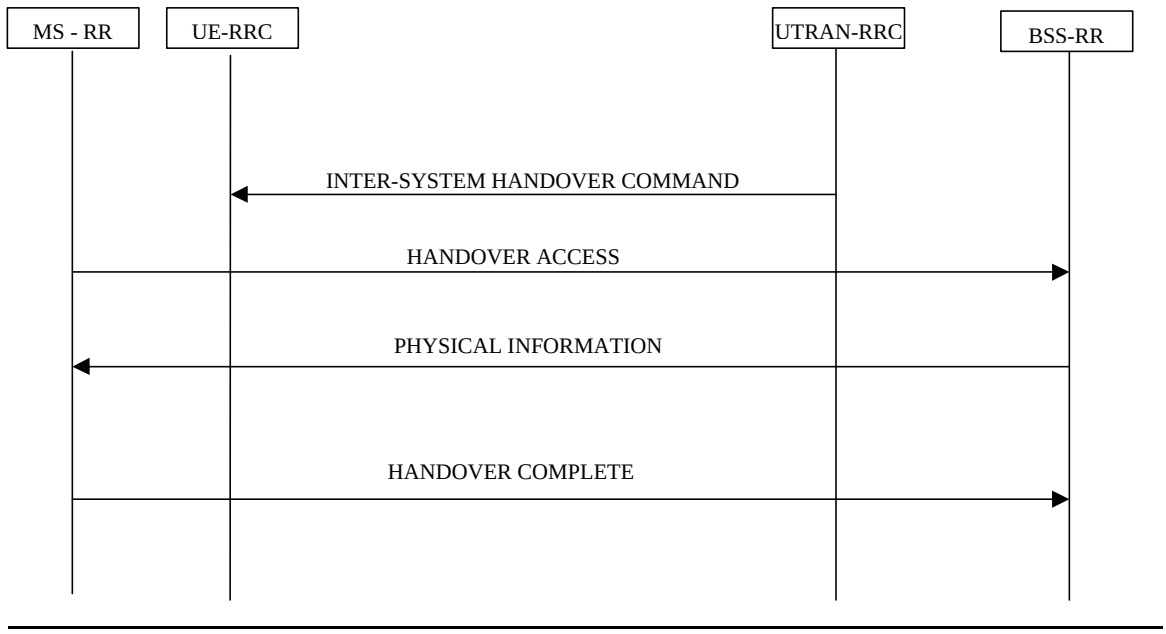

Figure 18~~20~~~~18~~) Inter system hard hand-off (UTRAN to GSM/BSS), PSTN/ISDN services

[Note: The scope of this description is restricted to a UE having a connection only to PSTN/ISDN services, i.e. no simultaneous IP connection]

For PSTN/ISDN domain services UTRAN Inter-System Handover procedure is initiated from the UTRAN.
The UTRAN RRC sends an INTER-SYSTEM HANDOVER COMMAND (type UTRAN-to-BSS HARD HANDOVER) to the UE to start the execution of the handover. This message contains all the information needed for the UE to be able to switch to the GSM cell and perform a GSM handover.

Upon reception of the HANDOVER COMMAND message, the UE RRC layer can then locally release the resources on the RLC, MAC and physical layers of the UE.

After having switched to the assigned GSM channel specified in the INTER-SYSTEM HANDOVER COMMAND, the MS RR sends a HANDOVER ACCESS message in successive layer 1 frames, just as it typically would have done for a conventional GSM handover initiation.

When the BSS-RR has received the HANDOVER ACCESS it indicates this to the CN/AS by sending a HANDOVER DETECT message. The BSS-RR sends a PHYSICAL INFORMATION message to the GSM MS in unacknowledged mode that contains various fields of physical layer -related information allowing a proper transmission by the MS. After layer 1 and layer 2 connections are successfully established, the GSM MS returns the HANDOVER COMPLETE message.

The UTRAN is then able to release the resources that were used by the UE in UTRAN Connected Mode.

8.3.5.7 URA update~~ing~~

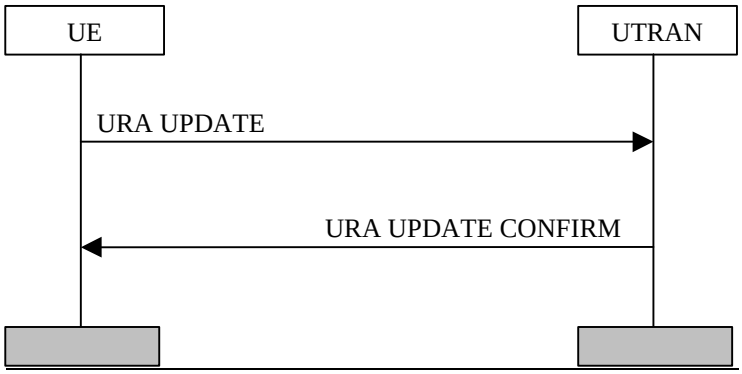

Figure 19~~21~~19) URA update procedure.

The URA update procedure is used by the UE to inform the UTRAN that the UE has switched to a new URA. Normally the procedure is triggered after change of cell and after the UE have read information broadcasted by UTRAN indicating change of URA.

The UE establishes a radio link to a cell in the new URA. After that the UE sends a URA UPDATE ~~REQUEST~~ message to the UTRAN. Upon reception of the message the UTRAN registers the change of URA, and sends a URA UPDATE CONFIRM message to the UE. The URA UPDATE CONFIRM message may include a new RNTI.

[Note1: Whether it should be possible for the UTRAN to trigger a URA update request from the UE is FFS.]

[Note 2: The need for a completing message, sent from the UE to finalize the procedure, is FFS.]

8.3.5.8 Cell update~~ing~~

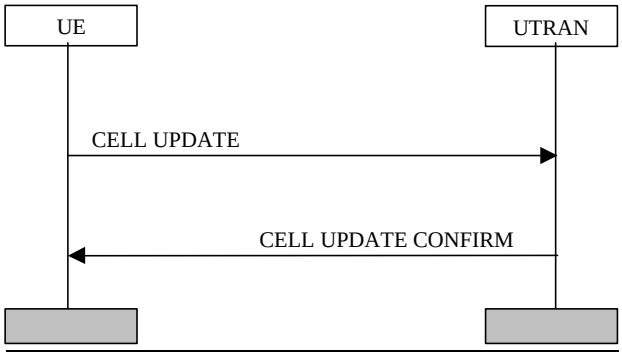

Figure 20~~22~~20) Cell update procedure.

The cell update procedure is used by the UE to inform the UTRAN that the UE has switched to a new cell. The procedure is a forward handover procedure. Normally the procedure is triggered after change of cell and after the UE has read information broadcasted by UTRAN.

The UE abandons the radio link to the old cell and establishes a radio link to the new cell. After that the UE sends a CELL UPDATE REQUEST message to the UTRAN. Upon reception of the message the UTRAN registers the change of cell, and sends a CELL UPDATE CONFIRM message to the UE. The CELL UPDATE CONFIRM message may include a new RNTI.

The cell update procedure can also include the updating of which FAUSCH channel should be used in the new cell.

[Note1: Whether it should be possible for the UTRAN to trigger a cell update request from the UE is FFS.]

[Note 2: The need for a completing message, sent from the UE to finalize the procedure, is FFS.]

8.3.6 RRC Connected mode procedures which use Paging

8.3.6.1 Core network originated paging

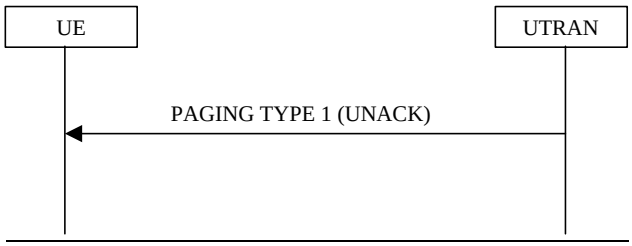

Figure 21~~23~~~~21~~) Core network originated paging procedure in connected mode

So far only one example of this procedure has been identified (two others are FFS):

a) UTRAN co-ordinates, UE is on DCCH
b) UTRAN co-ordinates, UE is on PCCH (FFS)
c) UE co-ordinates (FFS)

Consider case (a): This procedure enables the CN to request paging of a UE. Since the UE can be reached on the DCCH, the RRC layer formats a Paging ~~Request~~ Type 1 message containing the UE paging identity and the NAS information, and the message is transmitted directly to the UE using unacknowledged data transfer.

[Note: It is FFS whether only only one paging message is required (as used for idle mode paging) or whether Type 1 and Type 2 paging messages are also required]

8.3.6.2 UTRAN originated paging

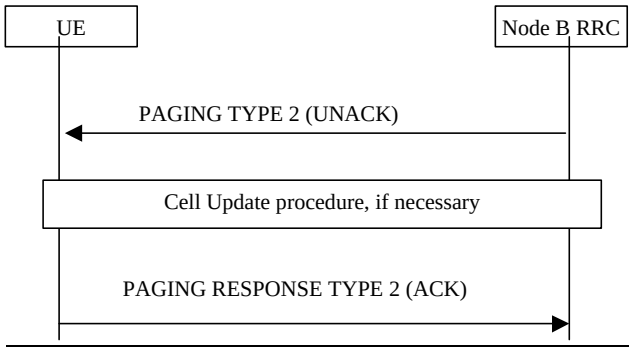

Figure 22~~24~~~~22~~) UTRAN originated paging procedure in connected mode

The RRC layer in the network can use this procedure to trigger a switch from PCH or URA connected state to RACH/FACH or RACH+FAUSCH/FACH state. A Paging ~~Request~~ Type 2 message, containing the UTRAN UE identity (e.g. RNTI) is sent on the PCCH.

In the UE, the RRC layer continuously monitors the paging group on the PCH and compares the UE identities in the received paging ~~request~~ messages with its own identities. When a match occurs, the RRC layer may optionally use the cell update procedure to obtain a new RNTI, before using the DCCH.

The UE then prepares a Paging Response Type 2 message, which is sent on the DCCH. *[Note: The content of the Paging Response Type 2 message is FFS. It could for example contain measurements.]* When the network receives the Paging Response Type 2 message, the DCCH/DTCH logical channels can also be used in the downlink.

[Note: It is FFS whether only only one paging message is required (as used for idle mode paging) or whether Type 1 and Type 2 paging messages are also required]

8.3.7 Procedures related to measurement and monitoring

[Note: The following text needs to be reviewed at the next 3GPP WG2 meeting]

In idle mode, the UE monitors and measures neighboring cells according to information received on BCH.

After sending the initial random access message, the UE may continue measurements using the 'idle' mode parameters until a MEASUREMENT_CONTROL message is received from the serving RNS. This message indicates the parameters to be used for monitoring in ´connected` state.

Monitored cells are grouped in the UE into three different categories:

1. Cells that belong to the active **set.** User information is sent from all these cells and they are simultaneously demodulated and coherently combined. These cells are involved in soft handover.

2. Cells that are identified as feasible for handover belong to the **candidate set.** The UE may request that a cell in the candidate set is moved to the active set in a MEASUREMENT REPORT message.

3. Other cells that are known, but not currently feasible for handover, belong to the **neighbour set.** The UE does not notify the serving RNS when it moves a cell from the candidate set to the neighbour set or from the neighbour set to the candidate set.

From an RRC point of view, the mobile station measurements can be grouped with respect to the type of measurement performed in the mobile station, i.e., what and how the mobile station shall measure. Examples are:

- Radio link measurements: measurements on downlink radio links in the active set.

- Intra-frequency measurements: measurements on downlink physical channels that do not belong to the active set, but have the same frequency as the active set.

- Inter-frequency measurements: measurements on downlink physical channels with frequencies that differ from the frequency of the active set.

- Inter-system measurements: measurements on downlink physical channels belonging to another radio access system than WCDMA, e.g. PDC or GSM.

- Traffic volume measurements: measurements on uplink traffic volume.

A radio link measurement in the mobile station can be used for handover, power control or operation and maintenance purposes in the network. However, it should be possible to have a number of mobile station measurements running in parallel, where each measurement is controlled and reported independently of each other.

Each type of mobile station measurement is associated with a standardised measurement method that can be described with a limited number of parameters (threshold levels, triggering conditions etc) in the measurement control message from the network.

The measurement control message to the mobile station can be sent using either acknowledged or unacknowledged data transfer (L2 LAC-C) on the DCCH. The acknowledged mode would be employed for critical control messages, e.g. inter-frequency measurements intended for handover. The unacknowledged mode may be used for less critical measurements, e.g. mobile station measurements intended for operation and maintenance purposes.

The measurement report to the network can likewise be sent by either acknowledged or unacknowledged data transfer on the DCCH. The acknowledged mode may be employed for e.g. event-triggered measurement reports, while the unacknowledged mode may be used for e.g. periodical reporting with small periodicity. The network can indicate (report in the mobile station measurement control message) which reporting alternative the mobile station should use for the corresponding measurement.

Elementary RRC procedures that are required for UE measurements, and UE measurement reporting to the UTRAN, are identified and described below. The procedures are used in connected mode.

8.3.7.1 Measurement control

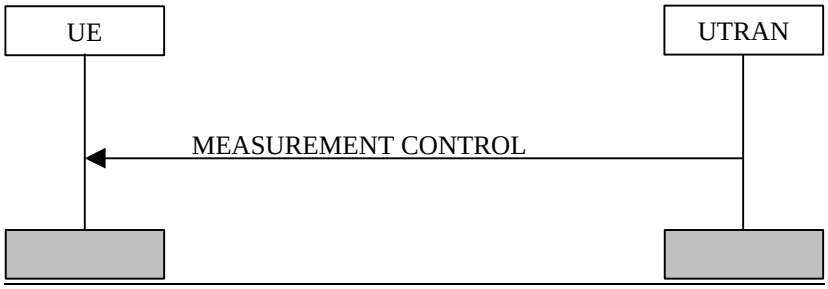

Figure 23~~25~~~~23~~) Measurement Control procedure

This procedure is initiated from the UTRAN side to control a measurement in a specific UE. The UTRAN sends a MEASUREMENT CONTROL message to the UE on the DCCH. The message includes the information that controls the UE measurement. Examples of such information are:

1. **Measurement type**: One of the types from a predefined list where each type describes what the UE shall measure.
2. **Measurement identity number**: A reference number that is used by the UTRAN at modification of the measurement and by the UE in the measurement report.
3. **Measurement command**: One out of three different measurement commands
   - Setup: Setup a new measurement.
   - Modify: Modify a previously specified measurement, e.g. change the reporting criteria.
   - Release: Stop a measurement and clear all information in the UE that are related to that measurement.
4. **Measurement objects:** The objects the UE shall measure on, and corresponding object information.
5. **Measurement quantity:** The quantity the UE shall measure. This also includes the filtering of the measurements.
6. **Measurement reporting criteria**: The triggering of the measurement report, e.g. periodical, event-triggered or immediate reporting. Here is also specified if the measurement report should be transmitted using either acknowledged or unacknowledged data transfer on the DCCH.

[Editor's note: Details of how this procedure can make use of slotted mode operation is still under investigation~~]~~

8.3.7.2Measurement reporting

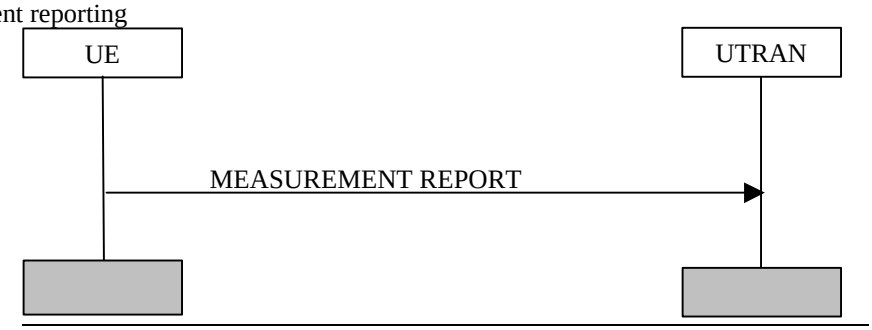

Figure 2426) Measurement Report procedure

The Measurement Report procedure is initiated from the UE side when the reporting criteria are met. The message is sent using either acknowledged or unacknowledged data transfer on the DCCH. The UE sends a MEASUREMENT REPORT message to the UTRAN that includes the measurement identity and the measured values of the requested measurement objects.

[Note: UE measurement reports can be sent without prior Measurement Control message, e.g. reports of measurements that are predefined in the standard or defined via system information.]

8.3.8 Other procedures in connected mode

8.3.8.1 Transmission of UE capability information

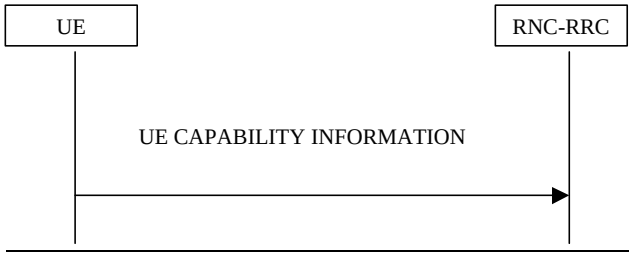

Figure 2527) Procedure for transmission of UE capability information

The UE transfers its capability information to the network by transmitting the UE CAPABILITY INFORMATION message using acknowledged mode on the DCCH. This procedure can (optionally) be performed after RRC Connection Setup procedure and also during the lifetime of the RRC Connection if the UE capability information changes (e.g. due to change in UE power class). UE capability information can also explicitly be requested by UTRAN.

8.3.8.2 Sending of system information in RRC connected mode

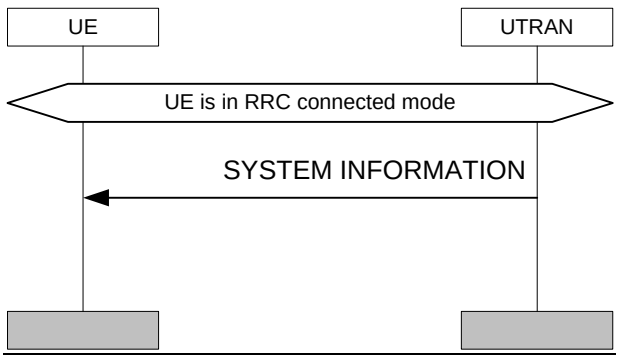

Figure 2628) Sending of system information to UE in RRC connected mode

The UTRAN may send dedicated system information messages to the UE in RRC connected mode in order to update e.g. neighbouring cell and MM information. The UE RRC forwards received MM information to the UE MM sublayer. The system information messages transmitted in connected mode include different combinations of parameters than system information messages for idle mode MSs. The grouping of of system information messages is FFS.

Two ways have been identified by which this signalling can be conveyed:

- On DCCH
- On BCCH *[Editors note,the BCCH may be used to convey information to a UE even when a DCCH exists, and the current assumption is that where DCH exists BCCH is not used]*

8.3.8.3 Direct transfer

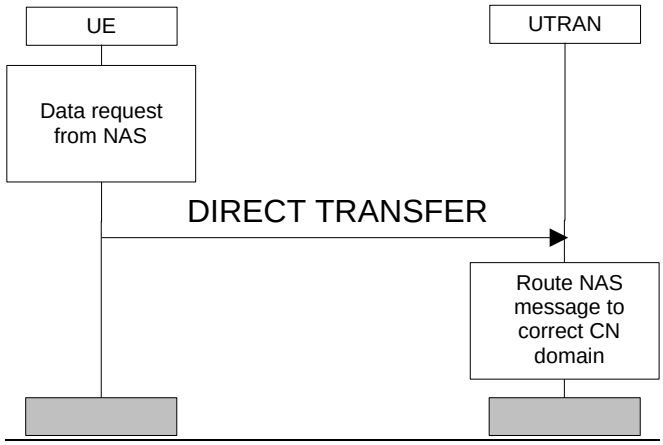

Figure 27~~29~~~~27~~) Direct Transfer procedure in uplink

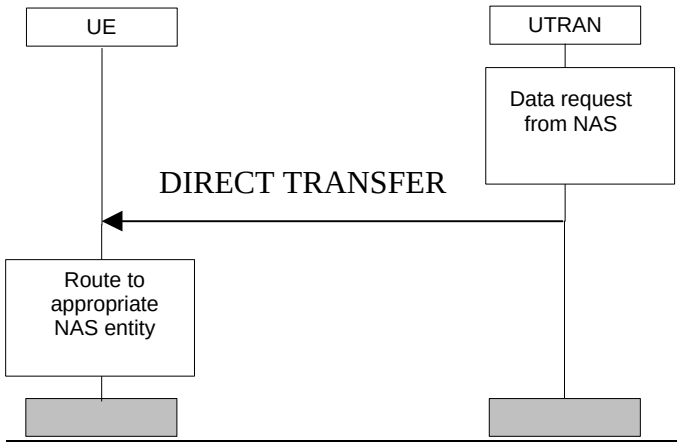

Figure 28~~30~~~~28~~) Direct Transfer procedure in downlink

The direct transfer procedure is used to carry all higher layer (NAS) messages over the radio interface. The DIRECT TRANSFER message includes the higher layer (NAS) message as payload and a CN domain identifier of the destination (in uplink) or originating (in downlink) core network node.

The DIRECT TRANSFER message is used both in uplink and in downlink.

Upon reception of the DIRECT TRANSFER message the higher layer PDU is routed – using the CN domain identifier parameter – in UE side to correct higher layer entity and in UTRAN side to correct CN domain.

9 Primitives between RRC and upper layers

10 Elements for peer-to-peer communication

10.1 Message functional definition and content

Below is a list of parameters identified so far to be used in RRC elementary procedure messages. Some of these parameters are mandatory and some are not.
[Note1: The need of subdividing some of these identified parameters into several separate parameters is FFS.]

Radio Access Bearer Parameters
Radio access bearer parameters are associated with each RAB.
For multiple RAB control, a “number of RABs” parameter is needed. For each RAB there is a set of radio access bearer parameters.

Transport CH Parameters
Transport CH parameters are associated with each transport CH.
For multiple DCH control, “number of DCHs” is also needed (there will be transport channel parameters for each of them).

Physical CH Parameters
Physical CH parameters define the physical channels which should be used.

UE Parameters
UE parameters are used to characterize the UE behavior.

Radio Access Bearer parameters

- RAB ID
  An identification number for the RAB affected by a certain message.
- NAS Info
  A field with Non Access Stratum information to bind a RAB to the Non Access Sratum. This information is transparent to RRC.
- RLC Mode
  Indicates if the RLC entity for a certain RAB should use Acknowledged, Non Acknowledged or Transparent mode data transfer.
- RLC PDU Size
  Size of RLC Packet Data Units. *[Note: RLC PDU size may be derived from transport block size and not explicitly transfered across the radio interface]*
- RLC Transmission Window Size
  A flow control parameter used to set the maximum number of RLC PDUs sent without getting them acknowledged.
- RLC Retransmission Info
  This could be the number of attempts to retransmit a RLC PDU before it is discarded, or different timer values.
- RLC In-sequence delivery
  Indication if RLC should preserve the order of higher layer PDUs that were transmitted through RLC.
- MAC Logical Channel Priority
  This includes both priority between different users traffic when using a common or shared channel, and between different RABs (or logical channels) traffic for a certain user. Different priorities for one users´ RABs are mapped (through the MAC´s T and C/T MUXes) to the TFC selection algorithm. *[Editors note: added shared channel to Ericsson's original text]*
- Logical channel ID
  This parameter is used to distinguish logical channels which are multiplexed in MAC.

Transport channel parameters

- TF Set
  Dynamic part attributes (Transport block size(s), Transport Block Set Size(s)) and Semi-static attributes (Transmission time interval, Type of channel coding, Rate matching) for the RAB effected by a certain message.
- TFC Set
  Indicates only the allowed combinations of already defined Transport Formats.
- TFC Subset
  Indicates which TFCs in the already defined TFC set that are allowed.
- Transport Channel ID
  This parameter is used to distinguish transport channels.
- List of radio links in active set for each transport channel

Physical Channel parameters

Frequency parameters

- Radio frequency
  This parameter indicates the frequency used by the UE

Uplink radio resources

- Uplink I branch code

  I-branch channelization code for the uplink.

- Uplink Q branch code

  Q-branch channelization code for the uplink.

- Uplink scrambling code

  What short or long uplink scrambling code a certain UE should use.

- Timselot (TDD)

  Identifies timeslot assigned

- FAUSCH spreading code+timing offset

  Identifies code and timing offset which UE can use for signalling on FAUSCH

Downlink radio resources

- Downlink channelisation code
- Downlink scrambling code

  This parameter indicates which D/L scrambling code should be used

- Timeslot (TDD)

  Identifies timeslot assigned

UE parameters

- Activation Time
  A timestamp e.g. frame number for simultaneous change of parameters in the network and the UE.
- RNTI
  Radio Network Temporary Identity used to identify a UE having a RRC connection , when the UE uses common channels.

10.2 Message format and information element coding

10.3 Protocol states

10.4 Timers

10.5 Protocol Parameters (if applicable)

10.6 Specific functions (if applicable)

11 Handling of unknown, unforeseen and erroneous protocol data

12 History

Document history		
Date	**Version**	**Comment**
22nd January 1999	0.0.1	Created following the first 3GPP WG2 meeting . Text from two documents were merged. These documents were: ETSI SMG2 UMTS L23 EG document: 'Description of the RRC protocol, YY.31, v0.2.0, ETSI L23EG Tdoc 065/99, January 19, 1999. and TTC/ARIB document: 'Draft UE-UTRAN L3 RRC signalling protocol', Vol. 9, Ver 1.0.0, January 14, 1999, ETSI L23 EG Tdoc 010/99 The ETSI document was taken as the baseline document and change marks are given in v 0.0.1 of S2.31with respect to the ETSI document.

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13 Appendices: Examples of operation

14 ANNEX 1: RRC Parameters List

[Note: The contents of this annex will be reviewed at the next 3GPP WG2 meeting and therefore is still under study]

RRC parameters which are used as Information Elements in RRC messages are as follows.

Parameter Category	RRC Parameters	Explanation
Radio Access Bearer Parameters	RAB ID	Set RAB ID for each logical CH(DCCH and DTCH)
	NAS info (Bearer ID)	Relationship between Bearer and RAB
	LAC parameters **(Detail FFS)**	-
	LAC Mode	Acknowledged, Non Acknowledged or Transparent mode for RAB
	LAC PDU Size	-
	LAC Transmission Window Size	Maximum number of LAC PDUs sent without getting acknowledgement.
	LAC Retransmission Info	(i) Number of attempts to retransmit a LAC PDU before it is discarded, or, (ii) different timer values
	LAC In-sequence delivery **(FFS)**	Preserve the order of higher layer PDUs that were transmitted through LAC or not.
	RAB multiplexing priority **(FFS)**	Priority between different users traffic on a common channel
	RAB Sub ID in DCH **(FFS)**	Relationship between logical CH and DCH
Transport Channel Parameters	DCH ID	DCH ID or each DCH (pre-configuration)
	TFS (for DCH)	[Transport Format Set]
	Transport block size(s)	-
	Transport Block Set Size(s)	-
	Transmission time interval	-
	Type of channel coding	-
	Rate matching	-
	DCH scheduling priority **(FFS)**	Priority between traffic from different RABs for a certain user
	TFCS (for DCHs)	[Transport Format Combinations Set] Allowed combinations of previously defined Transport Formats
	TFC Subset	[Transport Format Combinations Subset] Allowed TFCs in previously defined TFCS. The purpose of this parameter is for Flow Control.
	TFS (for RACH/FACH)	Same as TFS(for DCH)
Physical Channel Parameters	Radio Frequency	Set Radio Frequency per UE
	UL Interference level	For UL Initial Power Setting
	UL scrambling code	Set UL Scrambling Code per UE
	UL spreading code type	-
	UL I-branch spreading code type	-
	UL Q-branch spreading code type	-
	UL spreading code id	-
	UL I-branch spreading code id	-
	UL Q-branch spreading code id	-
	DL spreading code type	Same code type for all Radio Links

	Radio Link ID	-
	Cell ID	-
	DL scrambling code	-
	DL spreading code id	-

Parameter Category	RRC Parameters	Explanation
UE Parameters	Paged UE Identity	Identifier for IMUI or TMUI or P-TMSI or RNTI
	IMUI	[International Mobile User Identity]
	TMUI	[Temporary Mobile User Identity]
	P-TMSI	[Packet Temporary Mobile Subscriber Identity]
	RNTI	[Radio Network Temporary Identity]
	RNTI Long	RNTI Long include “RNC ID” (FFS)
	Unique (CN level) UE Identifier **(FFS)**	Unique identifier for the UE to be used in initial random access
	CN node identifier	Identifier for CS NAS or PS NAS routing
	UE state transition indicator **(FFS)**	Indicate transition to RA/FACH state
	UE Capability	-
	Execution Time	Frame number for simultaneous change of parameters in network and UE
BCCH Modification Parameters	BCCH Modification In Execution **(FFS)**	Indicate modification of the System Information on BCCH
	Execution Timing **(FFS)**	Timing for modification of the System Information on BCCH
URA ID	URA ID	-
Cause	Cause	-
DL Power Control Information	BCH Reception Level / Interference Level	-

1. Relationship between RRC messages and RRC parameters

This section shows the relationship between RRC messages and RRC parameters. This description of the relationship is corresponding to “Chapter 8 Elementary RRC procedures”

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Broadcast of system information (8.1.1) (FFS)

Paging (8.1.2)

Parameter Category	RRC Parameter	RRC Message Paging	Note
UE Parameters	No. of Paged UE	m	
	Length	m	
	Paged UE Identify	m	
	IMUI or TMUI or P-TMSI or RNTI	m	For IMUI, CN node identifier is needed.
	.	.	
	Length	o	
	Paged UE Identify	o	
	IMUI or TMUI or P-TMSI or RNTI	o	For IMUI, CN node identifier is needed.
BCCH Modification Parameters	BCCH Modification In Execution	o	**(FFS)**
	Execution Timing	o	**(FFS)**

m: mandatory, o: optional

Notification (8.1.3) (FFS)

RRC connection establishment (8.2.1)

Parameter Category	RRC Parameters	RRC Message						Note
		IDLE to RA/FACH			IDLE to DCH			
		RRC Connection Setup Request	RRC Connection Setup	RRC Connection Setup Complete	RRC Connection Setup Request	RRC Connection Setup	RRC Connection Setup Complete	
UE Parameters	Random Number or Unique UE Identifier (FFS) (in MAC header)	m	m	-	m	m	-	For UE identification(CCCH)
	RNTI (in MAC header)	-	-	m	-	-	-	For UE identification(DCCH)
	RNTI	-	m	-	-	m	-	
	UE state transition indicator	-	m	-	-	m	-	
	UE Capability	-	-	m	-		m	
	Execution Time	-	-	-	-	-	-	
Radio Access Bearer Parameters	RAB ID	-	m	-	-	m	-	
	Nas Info (Bearer ID)	-	-	-	-	-	-	
	LAC parameters	-	m	-	-	m	-	
	RAB multiplexing priority	-	m	-	-	m	-	
	RAB Sub ID in DCH	-	m	-	-	m	-	
Transport Channel Parameters	DCH ID	-	m	-	-	m	-	
	TFS (for DCH)	-	m	-	-	m	-	
	DCH scheduling priority	-	m	-	-	m	-	
	TFCS (for DCHs)	-	m	-	-	m	-	
	TFC Subset	-	-	-	-	-	-	
	TFS (for RACH/FACH)	-	m	-	-	m	-	
Physical Channel Parameters	Radio Frequency	-	o	-	-	o	-	
	UL Interference level	-	o	-	-	o	-	
	UL scrambling code	-	m	-	-	m	-	
	UL spreading code type	-	-	-	-	m	-	
	No. of UL spreading code	-	-	-	-	m	-	
	UL spreading code id(s)	-	-	-	-	m	-	

	DL spreading code type	-	-	-	-	m	-	
	No. of Radio Links	-	-	-	-	-	-	
	Radio Link ID	-	-	-	-	m	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	-	-	m	-	
	No. of DL spreading code	-	-	-	-	m	-	
	DL spreading code id(s)	-	-	-	-	m	-	
	___:						-	
	Radio Link ID	-	-	-	-	-	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	-	-	-	-	
	No. of DL spreading code	-	-	-	-	-	-	
	DL spreading code id(s)	-	-	-	-	-	-	
URA ID	URA ID	-	m	-	-	m	-	
Cause	Cause	m	-	-	m	-	-	
DL Power Control Information	BCH Reception Level / Interference Level	m	-	-	m	-	-	

Radio Access Bearer Establishment (8.3.1.1)

Parameter Category	RRC Parameters	RRC Message						Note
		RA/FACH to RA/FACH		RA/FACH to DCH		DCH to DCH		
		Radio Access Bearer Setup	Radio Access Bearer Setup Complete	Radio Access Bearer Setup	Radio Access Bearer Setup Complete	Radio Access Bearer Setup	Radio Access Bearer Setup Complete	
UE Parameters	Random Number or RNTI Long (FFS) (in MAC header)	-	-	-	-	-	-	For UE identification(CCCH)
	RNTI (in MAC header)	m	m	m	-	-	-	For UE identification(DCCH)
	RNTI	-	-	-	-	-	-	
	UE state transition indicator	m	-	m	-	m	-	
	Execution Time	-	-	-	-	m	-	
Radio Access Bearer Parameters	RAB ID	m	-	m	-	m	-	
	NAS Info(Bearer ID)	m	-	m	-	m	-	
	LAC parameters	m	-	m	-	m	-	
	RAB multiplexing priority	m	-	m	-	m	-	
	RAB Sub ID in DCH	m	-	m	-	m	-	
Transport Channel Parameters	DCH ID	m	-	m	-	m	-	
	TFS (for DCH)	m	-	m	-	m	-	
	DCH scheduling priority	m	-	m	-	m	-	
	TFCS (for DCHs)	m	-	m	-	m	-	
	TFC Subset	-	-	-	-	-	-	
	TFS (for RACH/FACH)	m	-	m	-	m	-	
Physical Channel Parameters	Radio Frequency	-	-	-	-	-	-	
	UL Interference level	-	-	-	-	-	-	
	UL scrambling code	-	-	-	-	-	-	
	UL spreading code type	-	-	m	-	m	-	
	No. of UL spreading code	-	-	m	-	m	-	
	UL spreading code id(s)	-	-	m	-	m	-	
	DL spreading code type	-	-	m	-	m	-	

	No. of Radio Links	-	-	-	-	m	-	
	Radio Link ID	-	-	m	-	m	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	m	-	m	-	
	No. of DL spreading code	-	-	m	-	m	-	
	DL spreading code id(s)	-	-	m	-	m	-	
	___:							
	Radio Link ID	-	-	-	-	o	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	-	-	o	-	
	No. of DL spreading code	-	-	-	-	o	-	
	DL spreading code id(s)	-	-	-	-	o	-	
URA ID	URA ID	-	-	-	-	-	-	

Radio Access Bearer Reconfiguration (8.3.1.3) *[Editors note: new name for this procedure is Radio Access Bearer and signalling link reconfiguration]*

Parameter Category	RRC Parameters	RRC Message								Note
		RA/FACH to RA/FACH		RA/FACH to DCH		DCH to DCH		DCH to RA/FACH		
		Radio Access Bearer Reconfigure	Radio Access Bearer Reconfiguration Complete	Radio Access Bearer Reconfigure	Radio Access Bearer Reconfiguration Complete	Radio Access Bearer Reconfigure	Radio Access Bearer Reconfiguration Complete	Radio Access Bearer Reconfigure	Radio Access Bearer Reconfiguration Complete	
UE Parameters	Random Number or RNTI Long (FFS) (in MAC header)	-	-	-	-	-	-	-	m(FFS)	For UE identification(CCCH)
	RNTI (in MAC header)	m	m	m	-	-	-	-	-	For UE identification(DCCH)
	RNTI	-	-	-	-	-	-	-	-	
	UE state transition indicator	m	-	m	-	m	-	m	-	
	Execution Time	-	-	-	-	m	-	-	-	
Radio Access Bearer Parameters	RAB ID	m	-	m	-	m	-	m	-	
	NAS Info(Bearer ID)	-	-	-	-	-	-	-	-	
	LAC parameters	m	-	m	-	m	-	m	-	
	RAB multiplexing priority	m	-	m	-	m	-	m	-	
	RAB Sub ID in DCH	-	-	-	-	-	-	-	-	
Transport Channel Parameters	DCH ID	m	-	m	-	m	-	m	-	
	TFS (for DCH)	m	-	m	-	m	-	m	-	
	DCH scheduling priority	m	-	m	-	m	-	m	-	
	TFCS (for DCHs)	m	-	m	-	m	-	m	-	
	TFC Subset	-	-	-	-	-	-	-	-	
	TFS (for RACH/FACH)	m	-	m	-	m	-	m	-	
Physical Channel Parameters	Radio Frequency	-	-	-	-	-	-	-	-	
	UL Interference level	-	-	-	-	-	-	-	-	
	UL scrambling code	-	-	-	-	-	-	-	-	
	UL spreading code type	-	-	m	-	m	-	-	-	
	No. of UL spreading code	-	-	m	-	m	-	-	-	

	UL spreading code id(s)	-	-	m	-	m	-	-	-	
	DL spreading code type	-	-	m	-	m	-	-	-	
	No. of Radio Links	-	-	-	-	m	-	-	-	
	Radio Link ID	-	-	m	-	m	-	-	-	
	Cell ID	-	-	-	-	-	-	-	-	
	DL scrambling code	-	-	m	-	m	-	-	-	
	No. of DL spreading code	-	-	m	-	m	-	-	-	
	DL spreading code id(s)	-	-	m	-	m	-	-	-	
	:									
	Radio Link ID	-	-	-	-	o	-	-	-	
	Cell ID	-	-	-	-	-	-	-	-	
	DL scrambling code	-	-	-	-	o	-	-	-	
	No. of DL spreading code	-	-	-	-	o	-	-	-	
	DL spreading code id(s)	-	-	-	-	o	-	-	-	
URA ID	URA ID	-	-	-	-	-	-	-	-	

Radio Access Bearer Release (8.3.1.2)

Parameter Category	RRC Parameters	RRC Message						Note
		RA/FACH to RA/FACH		DCH to DCH		DCH to RA/FACH		
		Radio Access Bearer Release	Radio Access Bearer Release Complete	Radio Access Bearer Release	Radio Access Bearer Release Complete	Radio Access Bearer Release	Radio Access Bearer Release Complete	
UE Parameters	Random Number or RNTI Long (FFS) (in MAC header)	-	-	-	-	-	m(FFS)	For UE identification(CCCH)
	RNTI (in MAC header)	m	m	-	-	-		For UE identification(DCCH)
	RNTI	-	-	-	-		-	
	UE state transition indicator	m	-	m	-	m	-	
	Execution Time	-	-	m	-	-	-	
Radio Access Bearer Parameters	RAB ID	m	-	m	-	m	-	
	NAS Info(Bearer ID)	-	-	-	-	-	-	
	LAC parameters	-	-	-	-	-	-	
	RAB multiplexing priority	-	-	-	-	-	-	
	RAB Sub ID in DCH	-	-	-	-	-	-	
Transport Channel Parameters	DCH ID	m	-	m	-	m	-	
	TFS (for DCH)	o	-	o	-	o	-	
	DCH scheduling priority	o	-	o	-	o	-	
	TFCS (for DCHs)	m	-	m	-	m	-	
	TFC Subset	-	-	-	-	-	-	
	TFS (for RACH/FACH)	m	-	m	-	m	-	
Physical Channel Parameters	Radio Frequency	-	-	-	-	-	-	
	UL Interference level	-	-	-	-	-	-	
	UL scrambling code	-	-	-	-	-	-	
	UL spreading code type	-	-	m	-	-	-	
	No. of UL spreading code	-	-	m	-	-	-	
	UL spreading code id(s)	-	-	m	-	-	-	
	DL spreading code type	-	-	m	-	-	-	

	No. of Radio Links	-	-	m	-	-	-	
	Radio Link ID	-	-	m	-	-	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	m	-	-	-	
	No. of DL spreading code	-	-	m	-	-	-	
	DL spreading code id(s)	-	-	m	-	-	-	
	___:							
	Radio Link ID	-	-	o	-	-	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	o	-	-	-	
	No. of DL spreading code	-	-	o	-	-	-	
	DL spreading code id(s)	-	-	o	-	-	-	
URA ID	URA ID	-	-	-	-	-	-	

RRC Connection release (8.2.2)

Parameter Category	RRC Parameters	RRC Message		Note
		DCH to IDLE	RA/FACH to IDLE	
		RRC Connection Release	RRC Connection Release Complete (FFS)	
UE Parameters	Random Number or RNTI Long (FFS) (in MAC header)	-	-	For UE identification(CCCH)
	RNTI (in MAC header)	-	m	For UE identification(DCCH)
	RNTI	-	-	
	UE state transition indicator	-	-	
	Execution Time	-	-	
Radio Access Bearer Parameters	RAB ID	-	-	
	NAS Info(Bearer ID)	-	-	
	LAC parameters	-	-	
	RAB multiplexing priority	-	-	
	RAB Sub ID in DCH	-	-	
Transport Channel Parameters	DCH ID	-	-	
	TFS (for DCH)	-	-	
	DCH scheduling priority	-	-	
	TFCS (for DCHs)	-	-	
	TFC subset	-	-	
	TFS (for RACH/FACH)	-	-	
Physical Channel Parameters	Radio Frequency	-	-	
	UL Interference level	-	-	
	UL scrambling code	-	-	
	UL spreading code type	-	-	
	No. of UL spreading code	-	-	
	UL spreading code id(s)	-	-	

	DL spreading code type	-	-	
	No. of Radio Links	-	-	
	Radio Link ID	-	-	
	Cell ID	-	-	
	DL scrambling code	-	-	
	No. of DL spreading code	-	-	
	DL spreading code id(s)	-	-	
	:			
	Radio Link ID	-	-	
	Cell ID	-	-	
	DL scrambling code	-	-	
	No. of DL spreading code	-	-	
	DL spreading code id(s)	-	-	
URA ID	URA ID	-	-	
Cause	Cause	m	m	

RRC Connection Re-establishment (8.2.3) (FFS)

Transport Channel Reconfiguration (8.3.2)

Parameter Category	RRC Parameters	RRC Message								Note
		RA/FACH to RA/FACH		RA/FACH to DCH		DCH to DCH		DCH to RA/FACH		
		Transport Channel Reconfigure	Transport Channel Reconfiguration Complete	Transport Channel Reconfigure	Transport Channel Reconfiguration Complete	Transport Channel Reconfigure	Transport Channel Reconfiguration Complete	Transport Channel Reconfigure	Transport Channel Reconfiguration Complete	
UE Parameters	Random Number or RNTI Long (FFS) (in MAC header)	-	-	-	-	-	-	-	m(FFS)	For UE identification(CCCH)
	RNTI (in MAC header)	m	m	m	-	-	-	-	-	For UE identification(DCCH)
	RNTI	-	-	-	-	-	-	-	-	
	UE state transition indicator	m	-	m	-	m	-	m	-	
	Execution Time	-	-	-	-	m	-	-	-	
Radio Access Bearer Parameters	RAB ID	-	-	-	-	-	-	-	-	
	NAS Info(Bearer ID)	-	-	-	-	-	-	-	-	
	LAC parameters	-	-	-	-	-	-	-	-	
	RAB multiplexing priority	-	-	-	-	-	-	-	-	
	RAB Sub ID in DCH	-	-	-	-	-	-	-	-	
Transport Channel Parameters	DCH ID	m	-	m	-	m	-	m	-	
	TFS (for DCH)	m	-	m	-	m	-	m	-	
	DCH scheduling priority	m	-	m	-	m	-	m	-	
	TFCS (for DCHs)	m	-	m	-	m	-	m	-	
	TFC Subset	-	-	-	-	-	-	-	-	
	TFS (for RACH/FACH)	m	-	m	-	m	-	m	-	
Physical Channel Parameters	Radio Frequency	-	-	-	-	-	-	-	-	
	UL Interference level	-	-	-	-	-	-	-	-	
	UL scrambling code	-	-	-	-	-	-	-	-	
	UL spreading code type	-	-	m	-	m	-	-	-	

	No. of UL spreading code	-	-	m	-	m	-	-	-	
	UL spreading code id(s)	-	-	m	-	m	-	-	-	
	DL spreading code type	-	-	m	-	m	-	-	-	
	No. of Radio Links	-	-	-	-	m	-	-	-	
	Radio Link ID	-	-	m	-	m	-	-	-	
	Cell ID	-	-	-	-	-	-	-	-	
	DL scrambling code	-	-	m	-	m	-	-	-	
	No. of DL spreading code	-	-	m	-	m	-	-	-	
	DL spreading code id(s)	-	-	m	-	m	-	-	-	
	:									
	Radio Link ID	-	-	-	-	o	-	-	-	
	Cell ID	-	-	-	-	-	-	-	-	
	DL scrambling code	-	-	-	-	o	-	-	-	
	No. of DL spreading code	-	-	-	-	o	-	-	-	
	DL spreading code id(s)	-	-	-	-	o	-	-	-	
URA ID	URA ID	-	-	-	-	-	-	-	-	

Physical Channel Reconfiguration (8.3.4)

Parameter Category	RRC Parameters	RRC Message						Note
		RA/FACH to DCH		DCH to DCH		DCH to RA/FACH		
		Physical Channel Reconfigure	Physical Channel Reconfiguration Complete	Physical Channel Reconfigure	Physical Channel Reconfiguration Complete	Physical Channel Reconfigure	Physical Channel Reconfiguration Complete	
UE Parameters	Random Number or RNTI Long (FFS) (in MAC header)	-	-	-	-	-	m(FFS)	For UE identification(CCCH)
	RNTI (in MAC header)	m	m	-	-	-	-	For UE identification(DCCH)
	RNTI	-	-	-	-	-	-	
	UE state transition indicator	m	-	m	-	m	-	
	Execution Time	-	-	m	-	-	-	
Radio Access Bearer Parameters	RAB ID	-	-	-	-	-	-	
	NAS Info(Bearer ID)	-	-	-	-	-	-	
	LAC parameters	-	-	-	-	-	-	
	RAB multiplexing priority	-	-	-	-	-	-	
	RAB Sub ID in DCH	-	-	-	-	-	-	
Transport Channel Parameters	DCH ID	-	-	-	-	-	-	
	TFS (for DCH)	-	-	-	-	-	-	
	DCH scheduling priority	-	-	-	-	-	-	
	TFCS (for DCHs)	-	-	-	-	-	-	
	TFC Subset	-	-	-	-	-	-	
	TFS (for RACH/FACH)	-	-	-	-	-	-	
Physical Channel Parameters	Radio Frequency	-	-	-	-	-	-	
	UL Interference level	-	-	-	-	-	-	
	UL scrambling code	-	-	-	-	-	-	
	UL spreading code type	m	-	m	-	-	-	
	No. of UL spreading code	m	-	m	-	-	-	
	UL spreading code id(s)	m	-	m	-	-	-	
	DL spreading code type	m	-	m	-	-	-	

	No. of Radio Links	-	-	m	-	-	-	1 Radio Lnk in case of RA/FACH to DCH
	Radio Link ID	m	-	m	-	-	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	m	-	m	-	-	-	
	No. of DL spreading code	m	-	m	-	-	-	
	DL spreading code id(s)	m	-	m	-	-	-	
	___:							
	Radio Link ID	-	-	o	-	-	-	
	Cell ID	-	-	-	-	-	-	
	DL scrambling code	-	-	o	-	-	-	
	No. of DL spreading code	-	-	o	-	-	-	
	DL spreading code id(s)	-	-	o	-	-	-	
URA ID	URA ID	-	-	-	-	-	-	

Transport Format Combination Control (8.3.3)

Parameter Category	RRC Parameters	RRC Message: Transport Format Combination Control	Note
UE Parameters	Random Number (in MAC header)	-	For UE identification(CCCH)
	RNTI (in MAC header)	-	For UE identification(DCCH)
	RNTI	-	
	UE state transition indicator	-	
	Execution Time	-	
Radio Access Bearer Parameters	-	-	
Transport Channel Parameters	DCH ID	-	
	TFS (for DCH)	-	
	DCH scheduling priority	-	
	TFCS (for DCHs)	-	
	TFC Subset	m	
	TFS (for RACH/FACH)	-	
Physical Channel Parameters	-	-	
URA ID	URA ID	-	

Cell Update (8.3.5.8)

Parameter Category	RRC Parameters	RRC Message			Note
		Cell Update Request	Cell Update	Cell Update Complete (FFS)	
UE Parameters	Random Number (in MAC header)	-	-	-	For UE identification (CCCH)
	RNTI Long (in MAC header)	m(FFS)	m(FFS)	-	For UE identification (CCCH)
	RNTI (in MAC header)	-	-	m	For UE identification (DCCH)
	RNTI Long (in Target Cell)	-	m	-	Used In Target Cell

UTRAN Registration Area Update (8.3.5.7)

Parameter Category	RRC Parameters	RRC Message			Note
		URA Update Request	URA Update	URA Update Complete (FFS)	
UE Parameters	Random Number (in MAC header)	-	-	-	For UE identification (CCCH)
	RNTI Long (in MAC header)	m(FFS)	m(FFS)	-	For UE identification (CCCH)
	RNTI (in MAC header)	-	-	m	For UE identification (DCCH)
	RNTI Long (in Target Cell)	-	m	-	

Direct Transfer (8.3.8.3) (FFS)

Soft Handover (for case of DCH to DCH) *[Editors note: There is no procedure of this name in the current 3GPP documentation, however, there is a procedure called 'Modification of the active set when in soft handover', 8.3.5.1]*

Parameter Category	RRC Parameters	RRC Message		Note
		Active Set Update	Active Set Update Complete	
UE Parameters	RNTI	-	-	
	UE state transition indicator	-	-	
	Execution Time	-	-	
Radio Access Bearer Parameters	RAB ID	-	-	
	Call Reference	-	-	
	LAC parameters	-	-	
	RAB multiplexing priority	-	-	
	RAB Sub ID in Transport CH	-	-	
Transport Channel Parameters	DCH ID	-	-	
	TFS (for DCH)	-	-	
	DCH scheduling priority	-	-	
	TFCS (for DCHs)	-	-	
	TFC Subset	-	-	
	TFS (for RACH/FACH)	-	-	
Physical Channel Parameters	Radio Frequency	-	-	
	UL Interference level	-	-	
	UL scrambling code	-	-	
	UL spreading code type	-	-	
	No. of UL spreading code	-	-	
	UL spreading code id(s)	-	-	
	DL spreading code type	-	-	(RL addition)
	No. of Radio Links to add	m	-	
	Radio Link ID to add	m	-	
	Cell ID	m	-	
	DL scrambling code	m	-	

	No. of DL spreading code	m	-	
	DL spreading code id(s)	m	-	
	:			
	Radio Link ID to add	o	-	
	Cell ID	o	-	
	DL scrambling code	o	-	
	No. of DL spreading code	o	-	
	DL spreading code id(s)	o	-	
	DL spreading code type	-	-	(RL deletion)
	No. of Radio Links to delete	m	-	
	Radio Link ID to delete	m	-	
	Cell ID	m	-	
	DL scrambling code	-	-	
	No. of DL spreading code	-	-	
	DL spreading code id(s)	-	-	
	:			
	Radio Link ID to delete	o	-	
	Cell ID	o	-	
	DL scrambling code	-	-	
	No. of DL spreading code	-	-	
	DL spreading code id(s)	-	-	
URA ID	URA ID	-	-	

Hard Handover (for case of DCH to DCH) *[Editors note: There is no procedure of this name in the current 3GPP documentation, however, there is a procedure called 'Hard handover (FDD and TDD hard)', 8.3.5.2]*

Parameter Category	RRC Parameters	RRC Message		Note
		Handover Command	Handover Complete	
UE Parameters	RNTI	-	-	
	UE state transition indicator	-	-	
	Execution Time	-	-	
Radio Access Bearer Parameters	RAB ID	-	-	
	NAS Info(Bearer ID)	-	-	
	LAC parameters	-	-	
	RAB_multiplexing priority	-	-	
	RAB Sub ID in Transport CH	-	-	
Transport Channel Parameters	DCH ID	-	-	
	TFS (for DCH)	-	-	
	DCH scheduling priority	-	-	
	TFCS (for DCHs)	-	-	
	TFC subset	-	-	
	TFS (for RACH/FACH)	-	-	
Physical Channel Parameters	Radio Frequency	m	-	
	UL Interference level	m	-	
	UL scrambling code	-	-	
	UL spreading code type	m	-	
	No. of UL spreading code	m	-	
	UL spreading code id(s)	m	-	
	DL spreading code type	m	-	
	No. of Radio Links	m	-	
	Radio Link ID	m	-	
	Cell ID	m	-	
	DL scrambling code	m	-	
	No. of DL spreading code	m	-	
	DL spreading code id(s)	m	-	
	___:			

	Radio Link ID	o	-	
	Cell ID	o	-	
	DL scrambling code	o	-	
	No. of DL spreading code	o	-	
	DL spreading code id(s)	o	-	
URA ID	URA ID	-	-	

Measurement Control (8.3.7.1) (FFS)

Measurement Report (8.3.7.2) (FFS)