TSG-RAN Meeting #11 **_RP-010034_**
Palm Springs, CA, USA, 13 - 16 March 2001

Title: **Agreed CRs (Release '99) to TR 25.922**

Source: **TSG-RAN WG2**

Agenda item: **5.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-010191	agreed	25.922	012	1	R99	Principles of RACH/PRACH Configuration in TDD	F	3.4.0	3.5.0
R2-010605	agreed	25.922	013	1	R99	Radio Bearer Control corrections	F	3.4.0	3.5.0
R2-010403	agreed	25.922	014		R99	Correction to idle mode tasks	F	3.4.0	3.5.0

3GPP TSG-RAN WG2 Meeting #18
Edinburgh, United Kingdom, 15-19 January 2001

Tdoc R2-010191

CR-Form-v3

CHANGE REQUEST

⌘	**25.922**	**CR**	**012**	⌘ rev	**r1**	⌘ Current version:	**3.4.0**	⌘

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Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [X] Core Network [ ]

Title: ⌘	Principles of RACH/PRACH Configuration in TDD		
Source: ⌘	TSG-RAN WG2		
Work item code: ⌘		***Date:*** ⌘	2001-01-11
Category: ⌘	**F**	***Release:*** ⌘	R99
	Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	RACH/PRACH configuration, ASC partitioning, and subchannel definition is not specified for TDD.
Summary of change: ⌘	RACH/PRACH configuration, ASC partitioning and subchannel definition is specified for TDD.
Consequences if not approved: ⌘	Specification for TDD RACH/PRACH configuration, ASC partitioning, and subchannel definition is incomplete for TDD mode.

Clauses affected: ⌘	Annex H, H.1	
Other specs affected: ⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications	
Other comments: ⌘		

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

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

Annex H: Examples of ~~FDD~~ RACH/PRACH Configuration

This appendix illustrates examples of RACH/PRACH configurations in a cell ~~in FDD mode~~.

H.1 Principles of RACH/PRACH Configuration

In one cell, several RACHs and PRACHs may be configured by an operator, in order to meet the performance requirements in regard to the expected traffic volume. The model of RACH and PRACH described in TS 25.302 defines a one-to-one mapping between a certain RACH and a PRACH.

The RACHs mapped to the PRACHs may all employ the same Transport Format and Transport Format Combination Sets, respectively. It is however also possible that individual RACH Transport Format Sets are applied on each available RACH/PRACH. The parameters that define pairs of RACH and PRACH are specified in TS 25.331, in the information element "PRACH system information list".

The "PRACH system information list" IE defines sets of "PRACH system information", one for each pair of RACH and PRACH that shall be configured in a cell. The "PRACH system information list" IE is included in SIB 5 and SIB 6. The total number of configured RACH/PRACH pairs corresponds to the sum of PRACH system information multiplicity factors used in both SIB5 and SIB 6.

A PRACH could therefore be defined in a pragmatic way simply as a common uplink physical channel which is indicated in system information. It is straightforward for the UE to count the indicated RACH/PRACH pairs, perform a selection and configure itself for accessing the selected channel. There are however some restrictions on the choice of parameters to be included in PRACH system information. Restrictions are especially due to the requirement that the PRACH receiver in the Node B must be capable to identify unambiguously on which PRACH a random access is received. This is necessary to perform the mapping of the decoded PRACH message part to the correct RACH transport channel associated with the PRACH. For complexity reasons it is furthermore a desired feature that PRACH identification in FDD mode is completed in the preamble transmission phase in order to decode the PRACH message part which follows the preamble, as generally there might be different transport format parameters defined on each RACH.

Taking into account the above requirements, ~~in FDD mode,~~ the RACH/PRACH model allows to configure different PRACHs in the following two ways:

1. For each PRACH indicated in system information a different preamble scrambling code is employed in FDD and a different timeslot is employed in TDD. For each PRACH, sets of "available signatures" in FDD or “available channelisation codes” in TDD, and "available subchannel numbers" are defined in the "PRACH info (for RACH)" Information Element in TS 25.331. Any PRACH with an individual scrambling code in FDD or individual timeslot in TDD may employ the complete or a subset of signatures in FDD or channelisation codes in TDD, and subchannels.

2. Two (or more) PRACHs indicated in system information use a common preamble scrambling code in FDD and common timeslot in TDD. In this case each PRACH shall employ a distinct (non-overlapping) set of "available signatures" in FDD or “available channelisation codes” in TDD, and "available subchannel numbers" in order to enable Node B to identify from the received random access signal which PRACH and respective RACH is used.

Figure H.1 for FDD and H.2 for TDD show~~s~~ examples of suitable ~~FDD~~ RACH/PRACH configurations for one cell. The upper part of the figure illustrates the one-to-one mapping between a RACH and a PRACH. In FDD ~~E~~each RACH is specified via an individual Transport Format Set (TFS). The associated PRACH employs a Transport Format Combination Set (TFCS), with each TFC in the set corresponding to one specific TF of the RACH. In TDD each RACH/PRACH combination supports a single TF with the associated TFS. The maximum number of PRACH per cell is currently limited to 16. The maximum number of RACHs must be the same due to the one-to-one correspondence between a RACH and a PRACH.

With each PRACH, in FDD a scrambling code is associated, and in TDD a single timeslot is associated.. TS 25.331 allows to address 16 different scrambling codes in FDD. Also, to each PRACH a set of "available subchannels" and "available signatures" in FDD or “available channelisation codes” in TDD is assigned.

For each PRACH a set of up to eight "PRACH partitions" can be defined for establishment of Access Service Classes (ASCs). A PRACH partition is defined as the complete or a subset of the "available signatures" in FDD or "available channelisation codes" in TDD, and "available subchannel numbers" defined for one PRACH. An ASC consists of a PRACH partition and a persistence value. PRACH partitions employed for ASC establishment may be overlapping (note that Figure H.1 and H.2 only illustrates cases of non-overlapping PRACH partitions).

PRACH 0 and PRACH 1 in Figure H.1 employ the full set of PRACH subchannels and preamble signatures and are identified by using different preamble scrambling codes. Similarly in figure H.2 PRACH 0 & 1 employ the full set of PRACH subchannels and channelisation codes and are identified by using different timeslots.

PRACH 2 and PRACH 3 illustrate a configuration where a common scrambling code in FDD (figure H.1) and a common timeslot timeslot in TDD (figure H.2) but distinct (non-overlapping) partitions of "available subchannels" and "available signatures" in FDD and "available channelisation codes" in TDD are assigned. This configuration in FDD may e.g. be appropriate for establishment of two RACH/PRACH pairs, one with 10 and the other with 20 ms TTI.

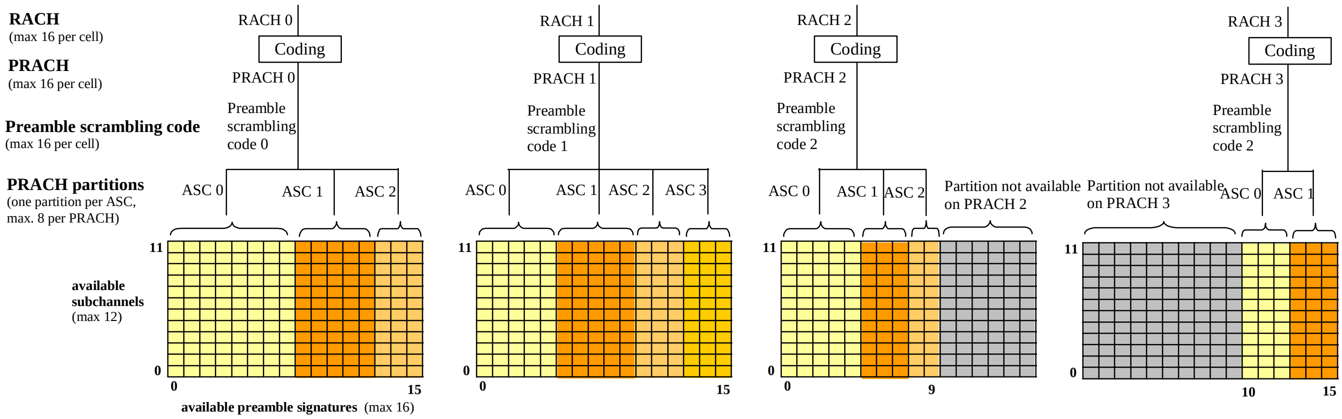

Figure H.1: Examples of FDD RACH/PRACH configurations in a cell

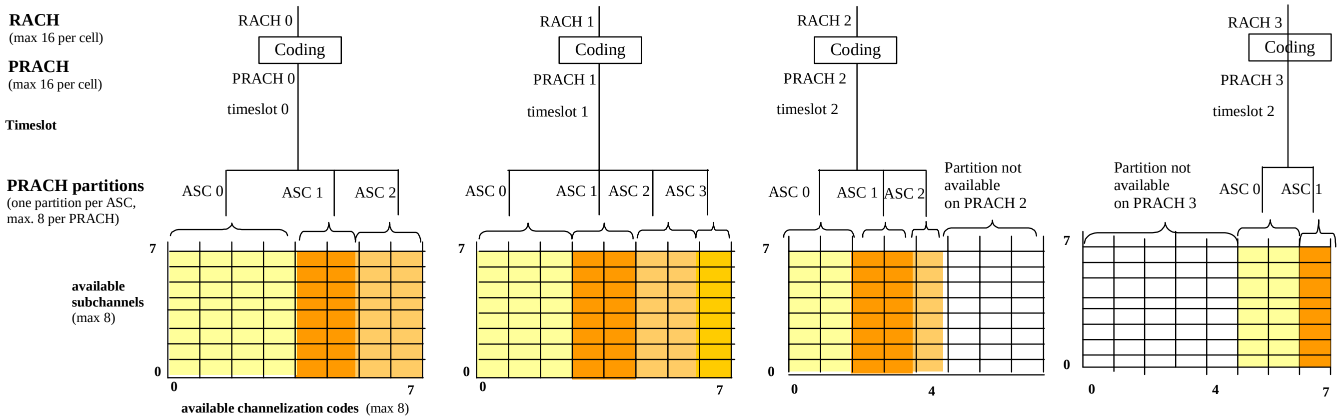

Figure H.2: Examples of TDD RACH/PRACH configurations in a cell

Note 1: ASC partitions by subchannel are possible but not shown

Note 2: TDD example shows 8 subchannels. In TDD 1, 2, and 4 subchannels are also possible. Description of TDD subchannels can be found in 25.224.

3GPP TSG-RAN WG2 Meeting #19
Sophia Antipolis, France, 19 - 23 Feb. 2001

R2-010605

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CHANGE REQUEST

⌘	**25.922**	**CR**	**013**	⌘	rev	**r1**	⌘	Current version:	**3.4.0**	⌘

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Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Radio Bearer Control corrections		
Source:	⌘	TSG-RAN WG2		
Work item code:	⌘		***Date:*** ⌘	22 Feb. 2001
Category:	⌘	**F**	***Release:*** ⌘	R99
		Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	1. The comparison quantity used in Traffic Volume Measurement is not a 'RLC buffer payload' but a 'Transport Channel Traffic Volume'. 2. The parameters stated in the 'Measurement Result' are not correct.
Summary of change:	⌘	1. The term 'RLC buffer payload' is replaced with 'Transport Channel Traffic Volume' in the clauses and figures. 2. The parameters in the 'Measurement Result' are corrected.
Consequences if not approved:	⌘	The Traffic Volume Measurement procedure, and hence the Radio Bearer Control will not work properly.

Clauses affected:	⌘	7.1.2.1, 7.1.2.2, 7.1.2.3, 7.1.3.1, Annex B, B.2.1, B.2.1.1., B.2.2, B.2.3, B.2.4, B.3.1, B.3.1.1, B.3.2, B.4			
Other specs Affected:	⌘	X	Other core specifications	⌘	25.321 25.331
			Test specifications		
			O&M Specifications		
Other comments:	⌘				

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7 Radio Bearer Control

7.1 Usage of Radio Bearer Control procedures

Radio Bearer (RB) Control procedures are used to control the UE and system resources. This section explains how the system works with respect to these procedures and how e.g. traffic volume measurements could trigger these procedures.

7.1.1 Examples of Radio Bearer Setup

In order to set up a new RB, a RRC connection must have been established, and some NAS negotiation has been performed. The RB Setup message comes from UTRAN and depending on the requirement of the service a common or a dedicated transport channel could be used. In the example below the UE is using a common transport channel for the RRC connection and stays on the common transport channel after the RB setup.

However, transport channel parameters such as transport formats and transport format combinations are configured not only for the used common transport channel, but also for dedicated transport channel for future use.

All physical parameters are the same before and after the RB setup in this example.

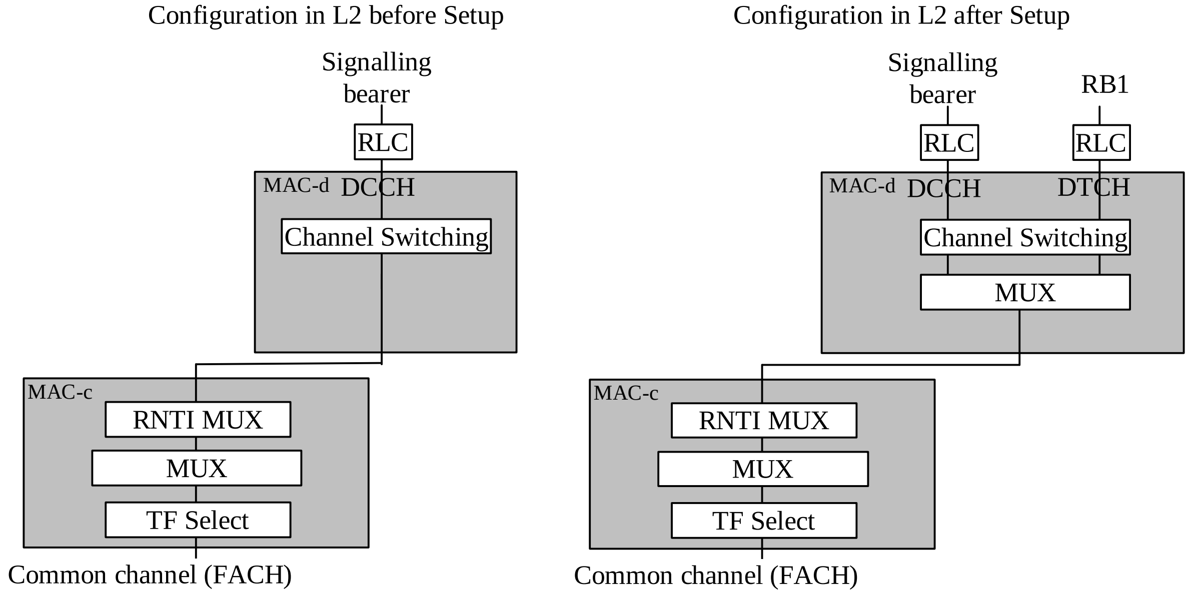


Figure 7-1: Configuration of L2 in the UTRAN DL before and after the RB setup

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.1.

7.1.2 Examples of Physical Channel Reconfiguration

This RRC procedure is used to reconfigure the Physical channel and can by that also trigger Transport channel type switching.

Below several examples of Physical Channel reconfigurations are shown, triggered by different amount of UL or DL data.

7.1.2.1 Increased UL data, with switch from RACH/FACH to DCH/DCH

A UE that is in the RACH/FACH substate can transmit a small amount of user data using the common transport channels. For larger amounts it is more appropriate to use a dedicated transport channel. Since each UE doesn't know the total load situation in the system UTRAN decides if a UE should use common transport channels or a dedicated transport channel.

The monitoring of UL capacity need is handled by a UTRAN configured measurement in the UE. When the ~~amount of data in the RLC buffer to be transmitted~~Transport Channel Traffic Volume (equivalent to the total sum of Buffer Occupancies of logical channels mapped onto the transport channel) in the UL increases over a certain threshold the UE sends a measurement report to UTRAN. This threshold to trigger the report is normally given in System Information, but UTRAN can also control the threshold in a UE dedicated Measurement Control message.

Since, UTRAN has the current status of the total UL need it can decide which UEs that should be switched to a dedicated transport channel. If UTRAN has pre-configured the transport formats and transport format combinations to be used on the dedicated transport channel for the UE, a Physical channel reconfiguration procedure could be used to assign dedicated physical resources.

The spreading factor for the physical channels assigned then give, which transport format combinations that are allowed to use.

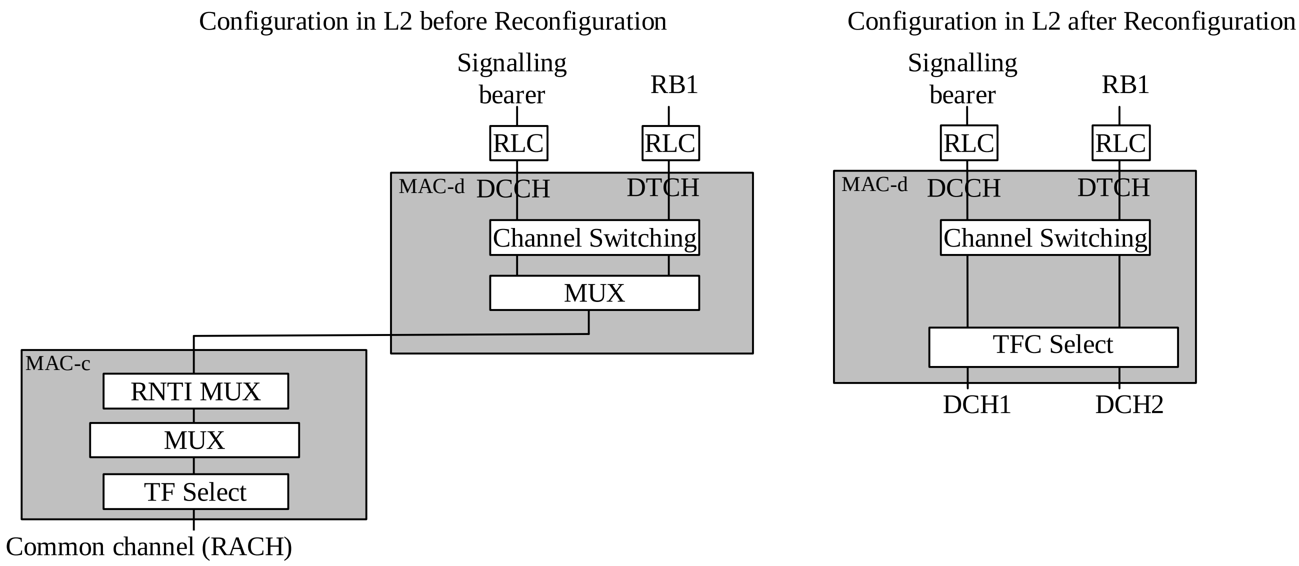


Figure 7-2: Configuration in the UTRAN UL before and after the Physical channel reconfiguration

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.2.1.

7.1.2.2 Increased DL data, no Transport channel type switching

If the Transport Channel Traffic Volume ~~RLC buffer~~ increases above a certain threshold in the network the UTRAN can do a physical channel reconfiguration. Here the UE uses a dedicated transport channel, and this procedure is used to decrease the spreading factor of the physical dedicated channel. This way this variable bitrate service increases the throughput on the downlink.

A variable bitrate service that has large traffic variations should have transport formats and transport format combinations defined for lower spreading factors than currently used on the physical channel. Then after the physical channel reconfiguration that lowers the spreading factors these transport formats and transport format combinations could be used to increase the throughput for this user.

However, if the transport formats and transport format combinations have not been previously defined to support a lower spreading factor, a Transport channel reconfiguration must be used instead in order to get any increased throughput.

Only downlink physical parameters are changed here since the uplink in this scenario doesn't need to increase its capacity.

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.2.2.

7.1.2.3 Decrease DL data, no Transport channel type switching

Since downlink channelisation codes are a scarce resource a UE with a too high, allocated gross bit rate (low spreading factor) must be reconfigured and use a more appropriate channelisation code (with higher spreading factor). This could be triggered by a threshold for the Transport Channel Traffic Volume ~~RLC buffer content~~ and some inactivity timer, i.e. that the ~~buffer content~~Transport Channel Traffic Volume stays a certain time below this threshold.

After the physical channel has been reconfigured, some of the transport formats and transport format combinations that require a low SF can not be used. However, these are stored and could be used if the physical channel is reconfigured later to use a lower spreading factor.

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section B.2.3.

7.1.2.4 Decreased UL data, with switch from DCH/DCH to RACH/FACH

In the network the UE traffic can be evaluated and the network can observe which transport format combinations that are used in the UL. The network could also simply look at how much data the UE transmits or use measurement reports.

If the UE is transmitting a low amount of data in the uplink and there is little traffic in the downlink, this could trigger a switch from a dedicated transport channel to a common transport channel. Depending on if the already defined RACH/FACH configuration is possible/preferred in the cell that the UE will be in after the switch, a Transport channel reconfiguration or a Physical channel reconfiguration procedure is used.

In the example below the UE has stayed in cells with a similar RACH and FACH configuration when using a dedicated transport channel. Therefore, the Physical channel reconfiguration procedure can be used. In 8.1.3.2 this is not the case and a Transport channel reconfiguration is used instead.

After the UE has performed the transport channel type switch to the RACH/FACH substate, all transport channel parameters such as transport formats for the dedicated transport channel are stored. The same configuration of the dedicated transport channels could then be reused if the UE switches back to the DCH/DCH substate.

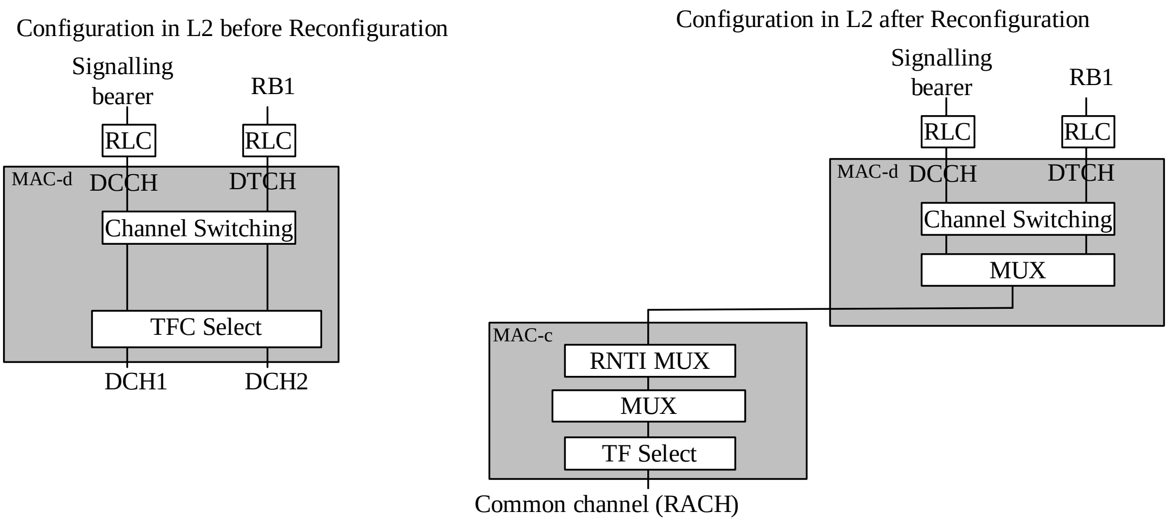


Figure 7-3: Configuration in the UTRAN UL before and after the Physical channel reconfiguration

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.2.4.

7.1.3 Examples of Transport Channel Reconfiguration

This RRC procedure is used to reconfigure the transport channel and the physical channels, and can by that also trigger Transport channel type switching.

Below, several examples of Transport channel reconfiguration are shown, triggered by different amount of UL or DL data.

7.1.3.1 Increased UL data, with no transport channel type switching

When a UE Transport Channel Traffic Volume ~~RLC buffer content~~ increases above a certain threshold, a measurement report is sent to UTRAN. Depending on the overall load situation in the network the UTRAN could decide to increase the uplink capacity for a UE. Since every UE has its "own" code tree, there is no shortage of UL codes with a low spreading factor, and all UEs can have a low spreading factor code allocated.

Therefore, instead of channelisation code assignment as used in the DL, load control in the UL is handled by the allowed transport formats and transport format combinations for each UE. To increase the throughput for a UE in the uplink, UTRAN could send a Transport channel reconfiguration or a TFC Control message.

Here a Transport channel reconfiguration is used. Although, the TFC Control procedure is believed to require less signalling it can only restrict or remove restrictions of the assigned transport format combinations and that may not always be enough. If a reconfiguration of the actual transport formats or transport format combinations is required, the Transport channel reconfiguration procedure must be used instead.

In the example below, the UE is allowed to send more data in the UL when on dedicated transport channel, although the common transport channel configuration is still the same. To make use of the new transport format combinations the physical channel must also be reconfigured to allow a lower spreading factor.

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.3.1.

7.1.3.2 Decreased DL data, with switch from DCH/DCH to RACH/FACH

In the network the downlink traffic to a UE can be evaluated and the network can observe which transport format combinations that are used.

If a low amount of data is sent to the UE in the downlink and there is little traffic in the uplink, this could trigger a switch from a dedicated transport channel to a common transport channel. Depending on if the already defined RACH/FACH configuration is possible/preferred in the cell that the UE will be connected to after the switch, a Transport channel reconfiguration or a Physical channel reconfiguration procedure is used. In this example the UE has moved to cells with a different FACH or RACH configuration when using a dedicated transport channel, so a Transport channel reconfiguration procedure must be used.

When the UE do the switch from a dedicated transport to a common transport channel the RACH and FACH transport channels are reconfigured with new transport formats if the old configuration is not supported in the new cell. What physical common channel to be used is pointed out in the physical channel parameters.

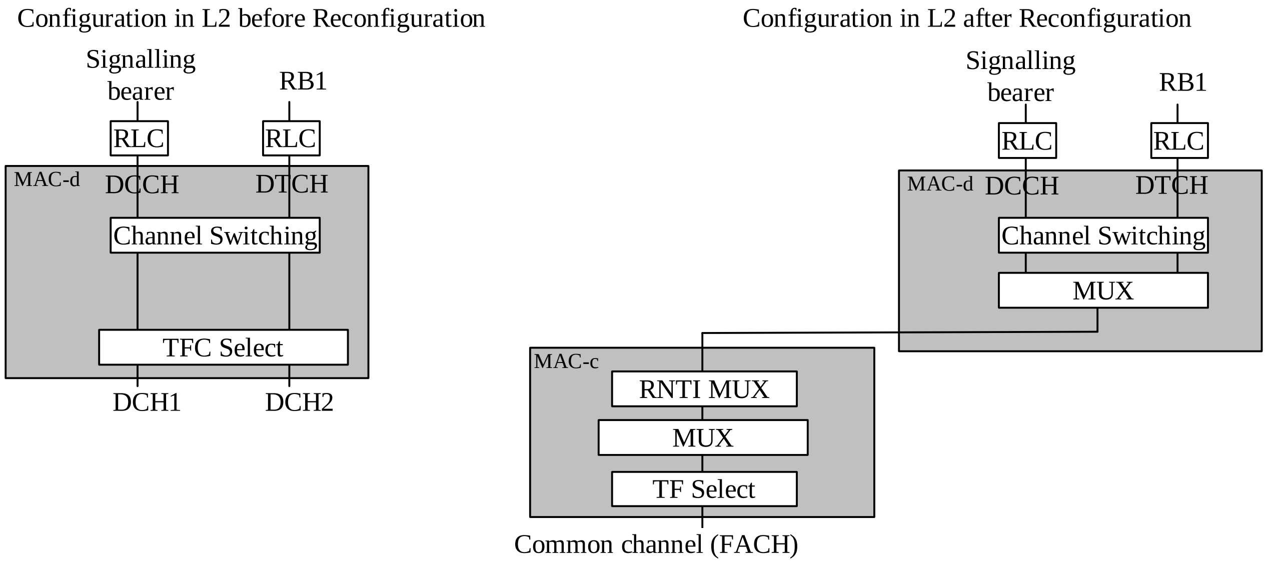


Figure 7-4: Configuration in the UTRAN DL before and after the Transport channel reconfiguration

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.3.2.

7.1.4 Examples of Radio Bearer Reconfiguration

A RB reconfiguration is here used to change how the MUX in MAC of logical channels belonging to different RBs is configured.

The RB Reconfiguration message includes parameters for the new multiplexing configuration in MAC, and a reconfiguration of the Transport channel that both RBs will use. The old obsolete transport channel is also removed (here DCH3 is removed). All other parameters associated with the RBs are unchanged.

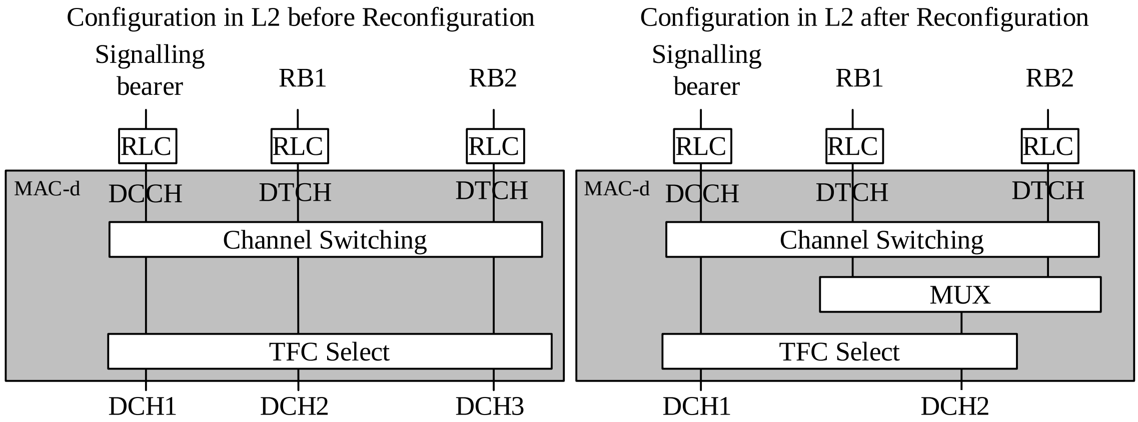


Figure 7-5: Configuration in the UTRAN DL before and after the RB reconfiguration

Detailed examples of messages exchange and parameters used is reported in Appendix B, Section. B.4.

Annex B:
Radio Bearer Control – Overview of Procedures: message exchange and parameters used

B.1 Examples of Radio Bearer Setup

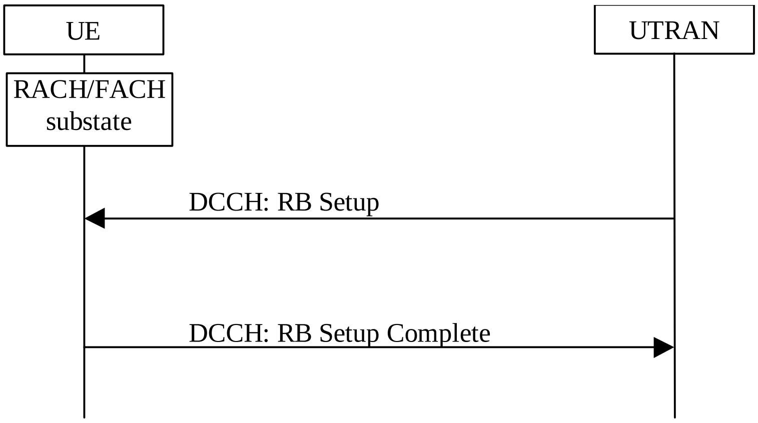


Figure B-1: Radio Bearer setup on common transport channel

B.1.1 RRC Parameters in RB Setup

This message includes **RB identity** for the new RB and **RLC info**. It also includes **two different multiplexing configurations** giving the transport channel this RB could be mapped onto. One configuration to be used on a common transport channel and one for a dedicated transport channel.

For the common transport channel this message includes a new **Transport format set for FACH**, **and a Transport format set for RACH**.

For the dedicated transport channel (pre-configured, not yet used) this message includes the **transport formats for DCH1 and DCH2**, and also the **transport format combinations** used in e.g. B.2.1, after the switch.

B.1.2 RRC Parameters in RB Setup Complete

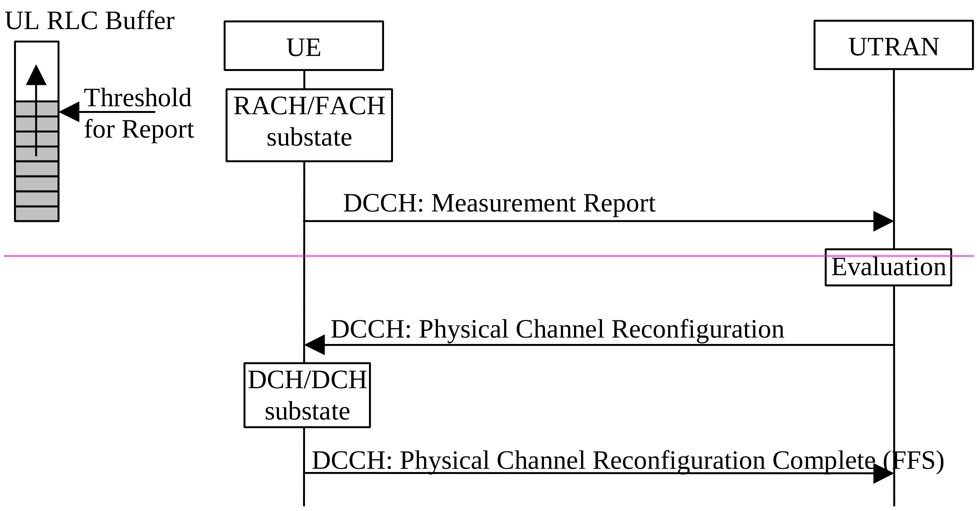
This message only includes the message type.

B.2 Examples of Physical Channel Reconfiguration

This RRC procedure is used to reconfigure the Physical channel and can by that also trigger Transport channel type switching.

Below several examples of Physical Channel reconfigurations are shown, triggered by different amount of UL or DL data.

B.2.1 Increased UL data, with switch from RACH/FACH to DCH/DCH



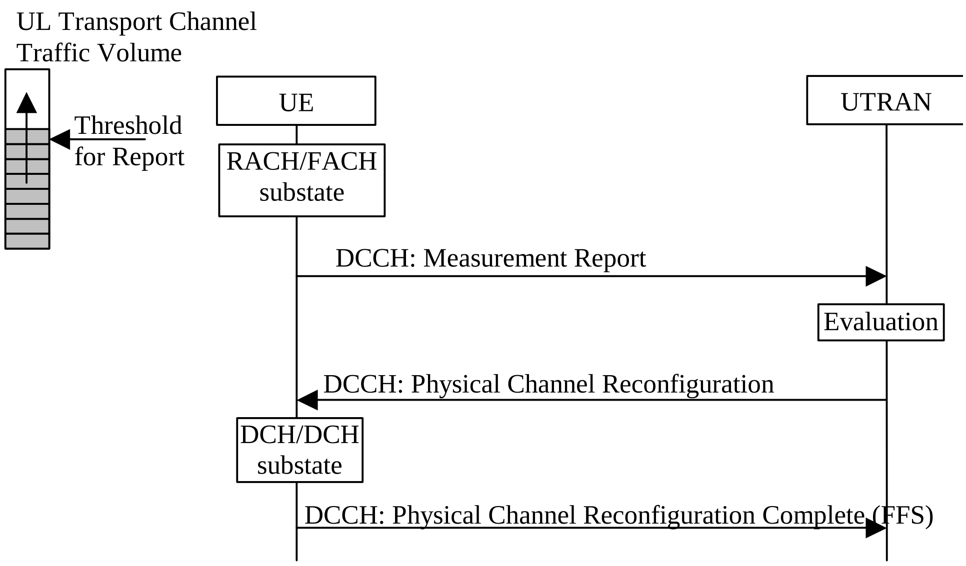


Figure B-2: Physical channel reconfiguration triggered by increased UL data and with a switch from RACH/FACH to DCH/DCH

B.2.1.1 RRC Parameters in Measurement Report

This message includes a **Measurement Identity number** so that UTRAN can associate this report with a Measurement control message. It also includes the **Measurement result** stating RB Identity and optionally Reporting Quantities (i.e. RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload for each RB). what triggered the report and optionally the RLC buffer payload.

B.2.1.2 RRC Parameters in Physical Channel Reconfiguration

This message includes **DL channelisation codes** and **DL scrambling code** for the DPCH. It also includes **UL channelisation codes** and **scrambling code** for the DPCH.

B.2.1.3 RRC Parameters in Physical Channel Reconfiguration Complete

This message only includes the message type.

B.2.2 Increased DL data, no Transport channel type switching

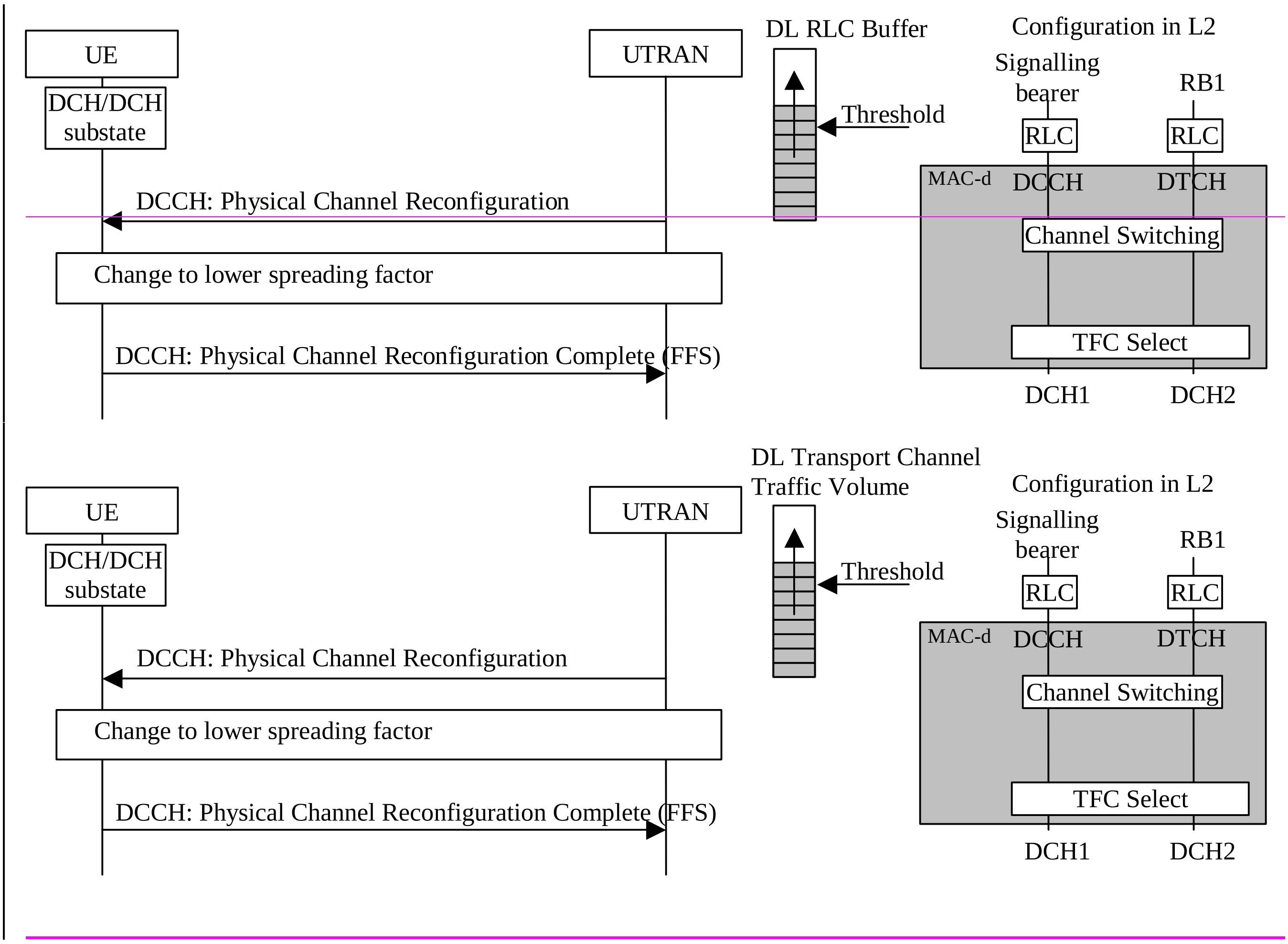


Figure B-3: Physical channel reconfiguration triggered by increased DL data and configuration in UTRAN DL

B.2.2.1 RRC Parameters in Physical Channel Reconfiguration

This message includes **new DL channelisation codes** for the DPCH with lower spreading factor for all cells that the UE is connected to.

B.2.2.2 RRC Parameters in Physical Channel Reconfiguration Complete

No identified parameters

B.2.3 Decrease DL data, no Transport channel type switching

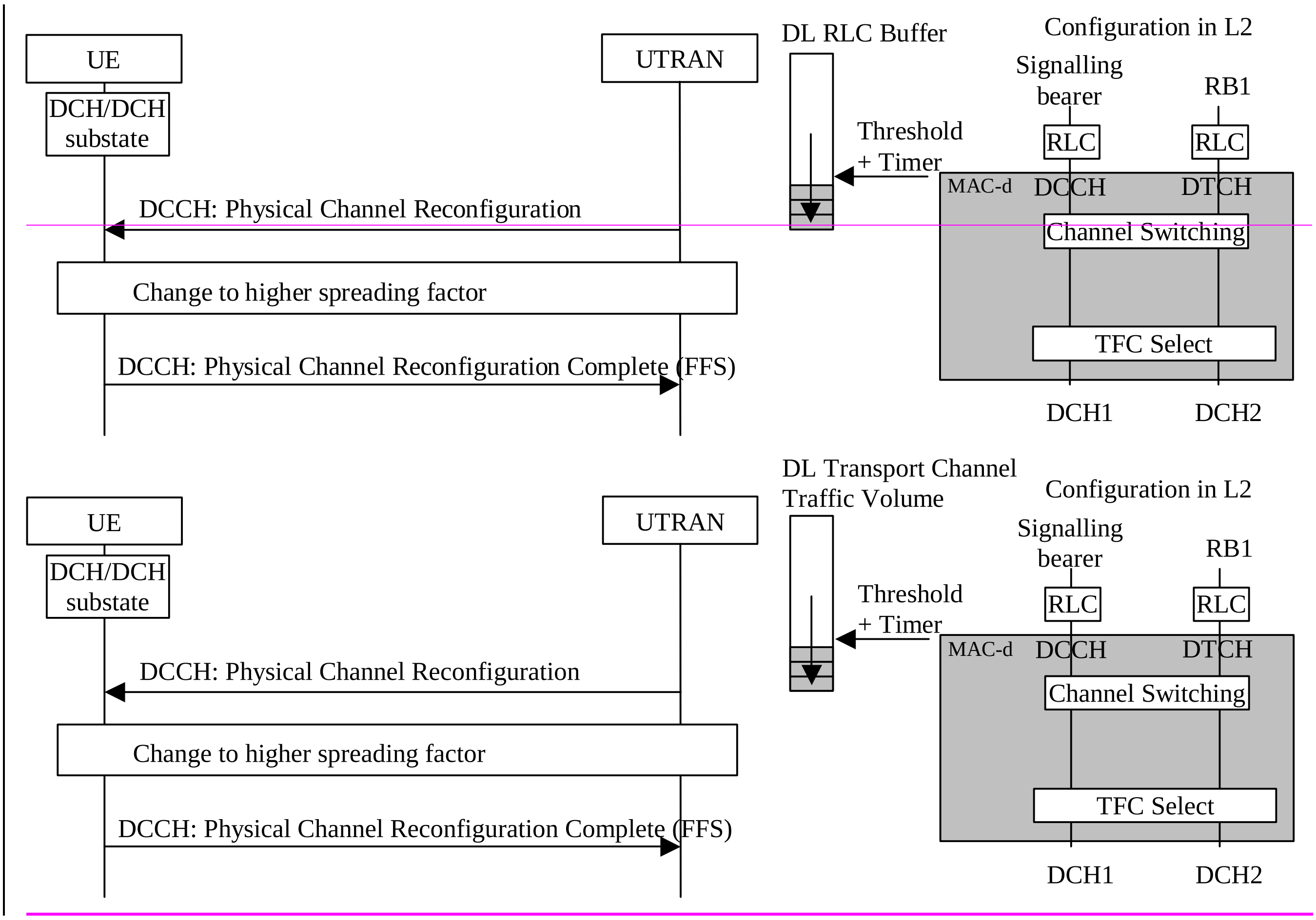


Figure B-4: Physical channel reconfiguration triggered by decreased DL data and configuration in UTRAN DL

B.2.3.1 RRC Parameters in Physical Channel Reconfiguration

This message includes new **DL channelisation codes** for DPCH with higher spreading factor for all cells that the UE is connected to.

B.2.3.2 RRC Parameters in Physical Channel Reconfiguration Complete

This message only includes the message type.

B.2.4 Decreased UL data, with switch from DCH/DCH to RACH/FACH

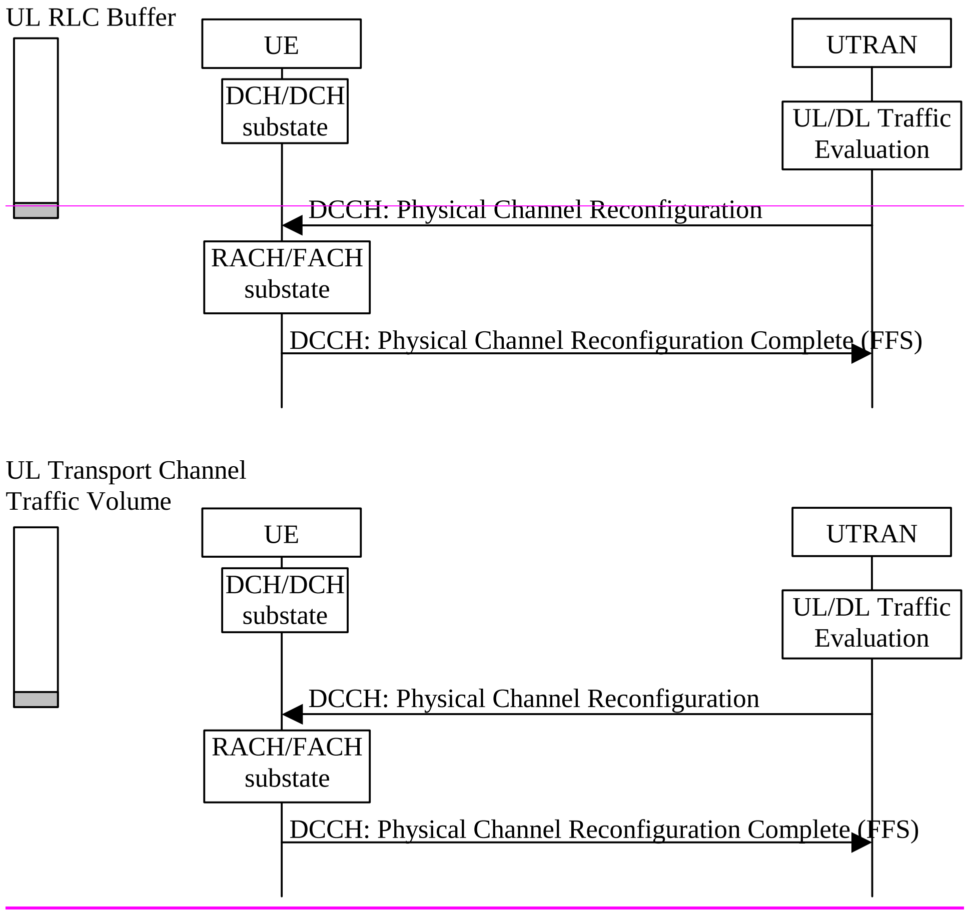


Figure B-5: Physical channel reconfiguration triggered by decreased UL data and with a switch from DCH/DCH to RACH/FACH

B.2.4.1 RRC Parameters in Physical Channel Reconfiguration

This message includes a **PRACH spreading factor** for the UL i.e. stating the minimum spreading factor to be used, and the **preamble signatures** that are allowed. Further, for the PRACH which **access slots** that are allowed and the **preamble spreading code** is included.

For the DL the message includes **scrambling code**, i.e. indicating to which cells FACH the UE should be connected to, and a **channelisation code** for the secondary CCPCH.

NOTE: The common channel parameters are the same that is transmitted on the BCCH. The reason to send it in this message is to remove the necessity for the UE to read BCCH at this switch.

B.2.4.2 RRC Parameters in Physical Channel Reconfiguration Complete

This message only includes the message type.

B.3 Examples of Transport Channel Reconfiguration

B.3.1 Increased UL data, with no transport channel type switching

In the example below, the UE is allowed to send more data in the UL when on dedicated transport channel, although the common transport channel configuration is still the same. To make use of the new transport format combinations the physical channel must also be reconfigured to allow a lower spreading factor.

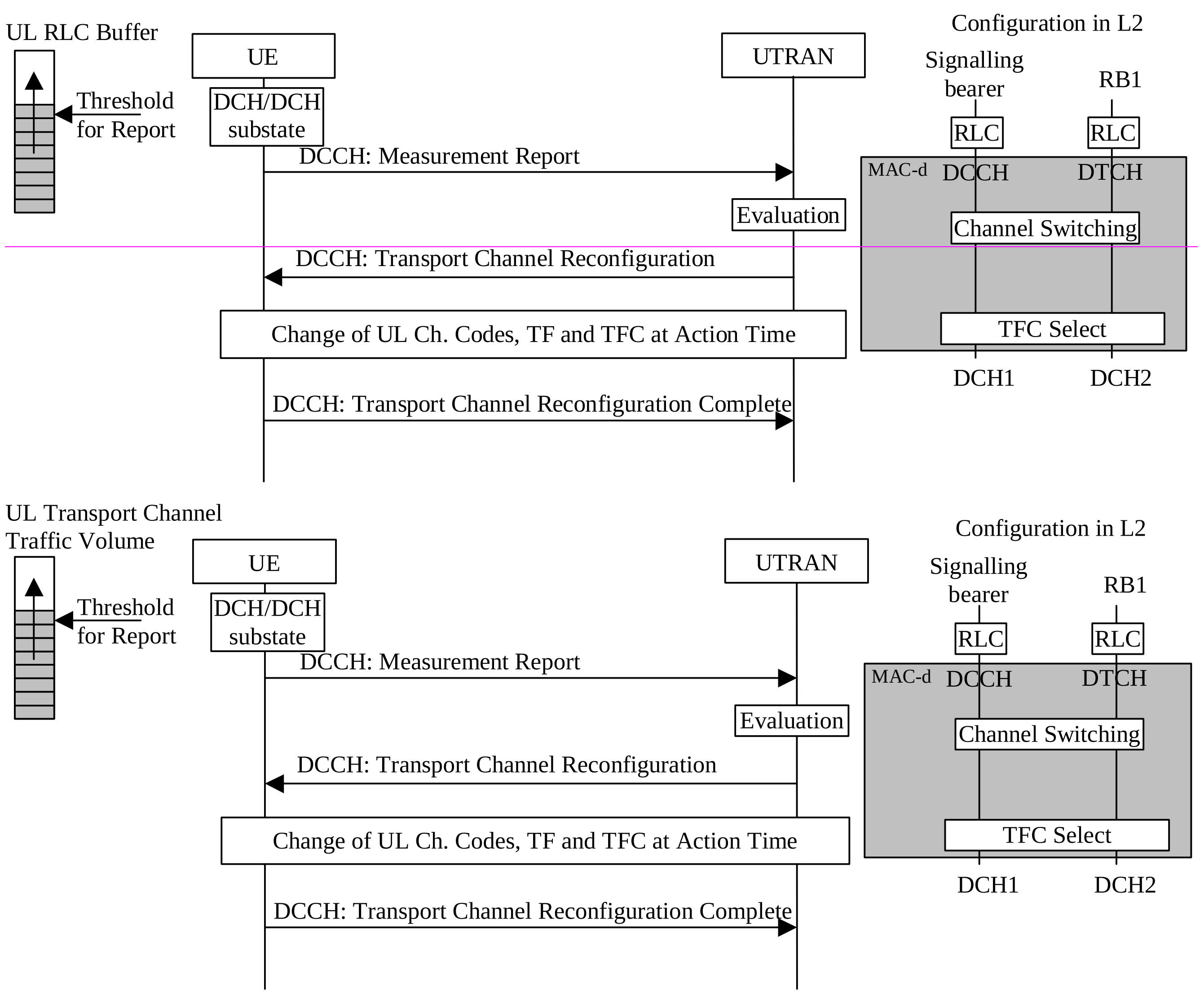


Figure B-6: Transport channel reconfiguration triggered by increased UL data and configuration in UTRAN DL

B.3.1.1 RRC Parameters in Measurement Report

This message includes a **Measurement Identity number** so that UTRAN can associate this report with a Measurement control message. It also includes the **Measurement result** stating RB Identity and optionally Reporting Quantities (i.e. RLC Buffer Payload, Average of RLC Buffer Payload, and Variance of RLC Buffer Payload for each RB). ~~what triggered the report and optionally the RLC buffer payload.~~

B.3.1.2 RRC Parameters in Transport Channel Reconfiguration

This message includes a new **Transport format set** for DCH2 and a new **Transport format combination set**. An **Activation time** must also be included if the different TFCIs can not coexist during the reconfiguration.

It also includes **UL channelisation codes** for the DPCH.

B.3.1.3 RRC Parameters in Transport Channel Reconfiguration Complete

This message only includes the message type.

B.3.2 Decreased DL data, with switch from DCH/DCH to RACH/FACH

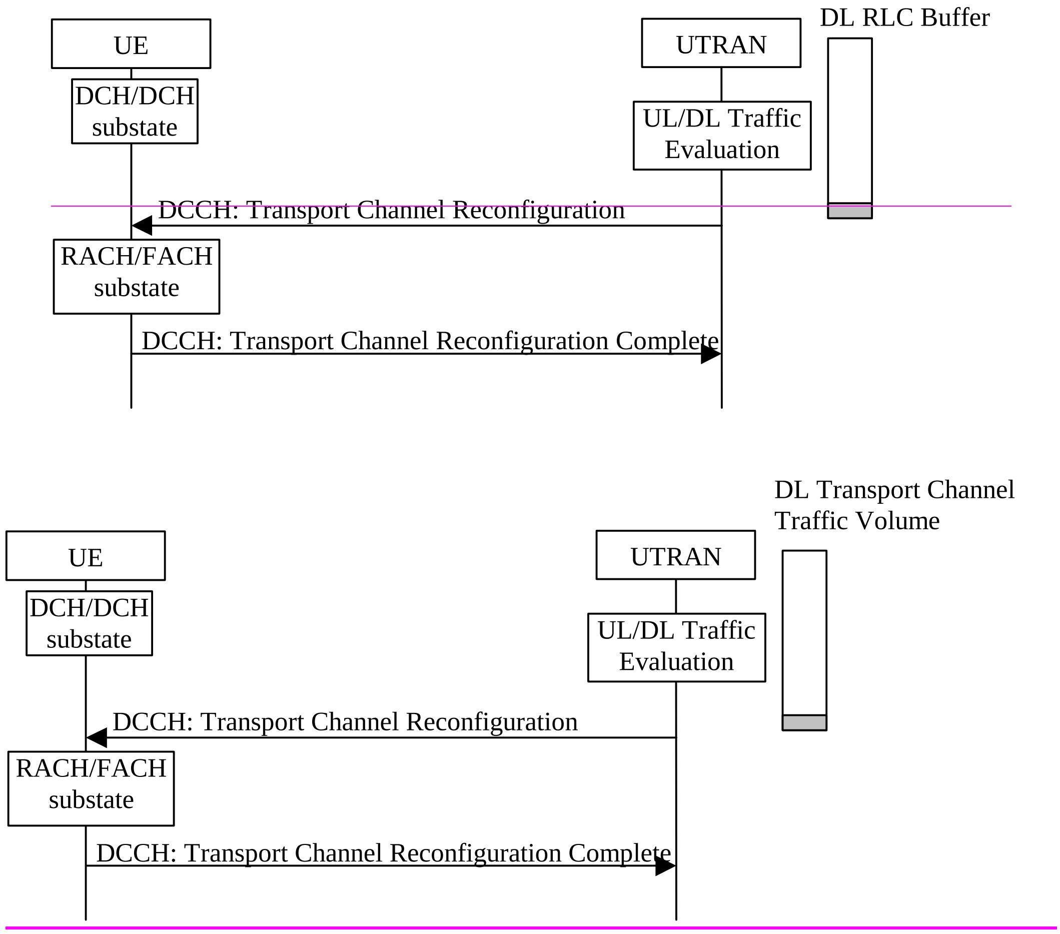


Figure B-7: Transport channel reconfiguration triggered by decreased DL data and with a switch from DCH/DCH to RACH/FACH

B.3.2.1 RRC Parameters in Transport Channel Reconfiguration

This message includes new **Transport format set for RACH**, a **PRACH spreading factor** i.e. stating the minimum spreading factor to be used, and the **preamble signatures** that are allowed. Further, for the PRACH which **access slots** that are allowed and the **preamble spreading code** is included.

For the DL the message includes a new **Transport format set for FACH**, the **scrambling code**, i.e. indicating to which cells FACH the UE should be connected to, and a **channelisation code** for the secondary CCPCH.

NOTE: The common channel parameters are the same that is transmitted at the BCCH. The reason to send it in this message is to remove the necessity for the UE to read BCCH at this switch.

B.3.2.2 RRC Parameters in Transport Channel Reconfiguration Complete

This message only includes the message type.

B.4 Examples of RB Reconfiguration

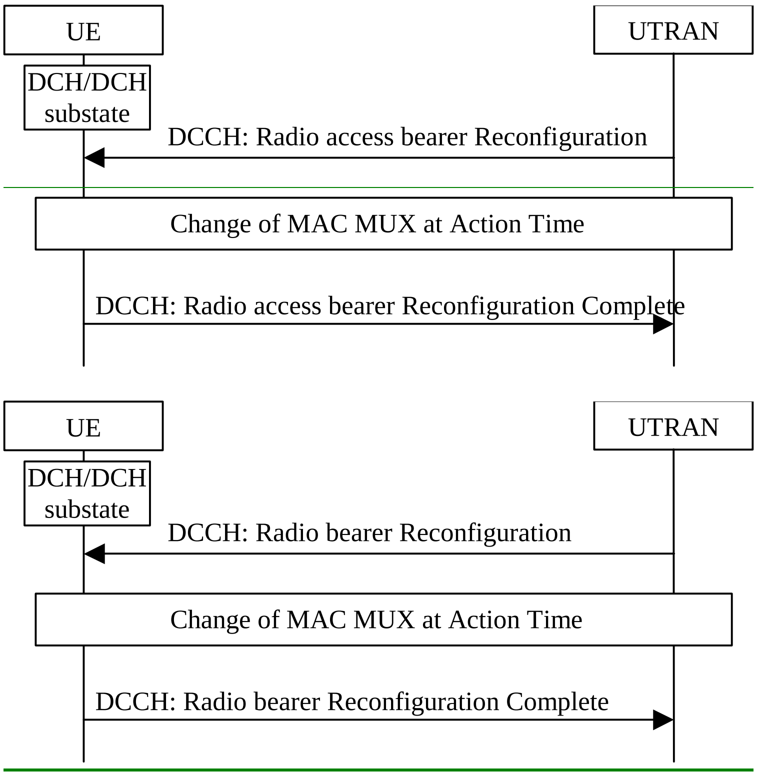


Figure B-8: RB Reconfiguration

B.4.1 RRC Parameters in Radio Bearer Reconfiguration

This message includes a multiplexing option with Transport channel identity DCH2 for both RB1 and RB2, stating that both these RBs should use the same transport channel. For each of these two RBs a **Logical channel identity value** and a **priority** must be given to define the MAC MUX.

Also included is a new **Transport format set** for DCH2 and a new **Transport format combination set** (both for UL and DL if the multiplexing is changed both in UL and DL).

It is also possible to reconfigure the physical channel and include new **channelisation codes** for the DPCH with different spreading factor for all cells that the UE is connected to.

B.4.2 RRC Parameters in Radio Bearer Reconfiguration Complete

This message only includes the message type.

3GPP TSG-RAN WG2 Meeting #19 **_R2-010403_**
Sophia Antipolis, France, 19-23 Feb 2001

CR-Form-v3

CHANGE REQUEST

⌘	**25.922**	**CR**	**014**	⌘	rev	**-**	⌘	Current version:	**3.4.0**	⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Correction to Idle mode tasks		
Source:	⌘	TSG-RAN WG2		
Work item code:	⌘		***Date:*** ⌘	14-02-2001
Category:	⌘	**F**	***Release:*** ⌘	R99
		Use one of the following categories: ***F** (essential correction)* ***A** (corresponds to a correction in an earlier release)* ***B** (Addition of feature),* ***C** (Functional modification of feature)* ***D** (Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	Alignment with core specifications 25.304, 25.331
Summary of change:	⌘	The section 4 describing the idle mode tasks has been updated according to the core specifications (25.304, 25.331). The following concepts has been included: • Multi RAT • Cell selection and re-selection with HCS • Measurement for cell re-selection • Mapping functions • Cell access restriction The immediate cell evaluation has been removed
Consequences if not approved:	⌘	The description of the Idle mode tasks will not reflect the system behaviour described in the core specifications

Clauses affected:	⌘	2, 4, 4.1, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.3		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
Other comments:	⌘			

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

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

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

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.

[1] 3GPP Homepage: www.3GPP.org.

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

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

[4] 3GPP TS 25.301: "Radio Interface Protocol Architecture".

[5] 3GPP TS 25.302: "Services provided by the Physical Layer".

[6] 3GPP TS 25.303: "Interlayer Procedures in Connected Mode".

[7] 3GPP TS 25.304: "UE procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode".

[8] 3GPP TS 25.322: "RLC Protocol Specification".

[9] 3GPP TS 25.331: "RRC Protocol Specification".

[10] 3GPP TS 25.921: "Guidelines and Principles for protocol description and error handling".

[11] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[12] 3GPP TS 26.010: "Mandatory Speech Codec speech processing functions AMR Speech Codec General Description".

[13] 3GPP TS 23.122: "Non-Access-Stratum functions related to Mobile Station (MS) in idle mode ".

[14] 3GPP TS 33.102: "3G Security; Security Architecture".

[15] 3GPP TS 25.123: "Requirements for support of radio resource management (TDD)".

[16] 3GPP TS 25.133: "Requirements for support of radio resource management (FDD)".

4 Idle Mode Tasks

4.1 Overview

When a UE is switched on, a public land mobile network (PLMN) is selected and the UE searches for a suitable cell of this PLMN to camp on. The PLMN selection procedures are specified in [13].

A PLMN may rely on several radio access technologies (RAT), e.g. UTRA and GSM. The non-access stratum can control the radio access technology(ies) in which the cell selection should be performed, for instance by indicating radio access technology(ies) associated with the selected PLMN [13]. The UE shall select a suitable cell and the radio access mode based on idle mode measurements and cell selection criteria.

The UE will then register its presence, by means of a NAS registration procedure, in the registration area of the chosen cell, if necessary.

When camped on a cell, the UE shall regularly search for a better cell according to the cell re-selection criteria. If a better cell is found, that cell is selected.

Different types of measurements are used in different radio access technologies and modes for the cell selection and re-selection. Whenever a direct comparison of these measurements is required, mapping functions will be applied. The performance requirements for the measurements are specified in [15][16].

The description of cell selection and re-selection reported below applies to a multi-RAT UE with at least UTRA technology.

4.2 Service type in Idle mode

Services are distinguished into categories defined in [7]; also the categorisation of cells according to services they can offer is provided in [7].

In the following, some typical examples of the use of the different types of cells are provided:

- Cell Barred. In some cases (e.g. due to traffic load or maintenance reasons) it may be necessary to temporarily prevent the normal access in a cell. An UE shall not camp on a barred cell for normal services, but may camp on this cell for limited service if no other suitable cell is available.
- Cell Reserved for operator use. The aim of this type of cell is to allow the operator using and test newly deployed cells without being disturbed by normal traffic. For normal users, the UE shall behave as for the Cell Barred

The cell type is indicated in the system information [9].

4.3 Criteria for Cell Selection and Re-selection

4.3.1 Cell Selection

The goal of the cell selection procedures is to fast find a cell to camp on. To speed up this process, when switched on or when returning from "out of coverage", the UE shall start with the stored information from previous network contacts. If the UE is unable to find any of those cells the Initial cell search will be initiated.

The UE shall measure CPICH Ec/No or CPICH RSCP for FDD cells and P-CCPCH RSCP for TDD cells. The quantity to be used for a given cell is indicated in the system information.

If it is not possible to find a cell from a valid PLMN the UE will choose a cell in a forbidden PLMN and enter a "limited service state". In this state the UE regularly attempt to find a suitable cell on a valid PLMN. If a better cell is found the UE has to read the system information for that cell.

A cell is suitable if it fulfils the cell selection criterion S specified in [7]:

In order to define a minimum quality level for camping on the cell, a quality threshold different for each cell can be used. The quality threshold for cell selection is indicated in the system information.

4.3.2 Cell Re-selection

The goal of the cell re-selection procedure is to always camp on a cell with good enough quality even if it is not the optimal cell all the time. When camped normally, the UE shall monitor relevant System Information and perform necessary measurements for the cell reselection evaluation procedure.

The cell reselection evaluation process, i.e. the process to find whether a better cell exist, is performed on a UE internal trigger [15][16] or when the system information relevant for cell re-selection are changed.

4.3.2.1 Hierarchical Cell Structures

The radio access network may be designed using hierarchical cell structures. An example of hierarchical cell structure is shown below. Numbers in the picture describe different layers in the hierarchy. The highest hierarchical layer, i.e. typically smallest cell size, has the higher priority (number 1 in the figure).

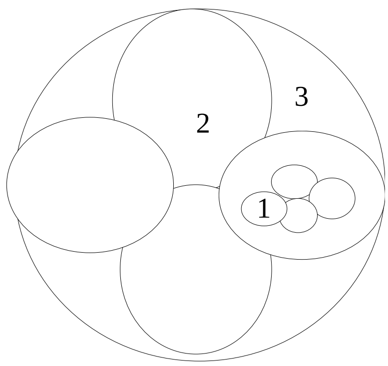


Figure 4-1: Example of Hierarchical Cell Structure

Different layers can be created using different frequencies. However, different frequencies can also be used on the same hierarchical layer e.g. in order to cope with high load in the system.

The operator can control the transitions between two layers or between any two cells, regardless of whether the two cells have equal or different priority. The control is performed both in terms of measurements on target cells and in terms of parameter settings in order to achieve hysteresis and cell border offset effects.

In order to cope with UEs travelling fast through smaller cells (e.g. through micro or pico cells), the cell reselection procedure can be performed towards bigger cells on lower layers e.g. to macro cells so as to avoid unnecessary cell reselections.

4.3.2.2 Measurements for cell re-selection

The quality measurements to be performed on the cells canditate for cell re-selection are controlled by the UTRAN. According to the quality level of the serving cell and the threshold indicated in the system information, the UE measurements are triggered fulfilling different requirements for intra-frequency, inter-frequency or inter-RAT quality estimation.

When HCS is used, it is also possible to further restrict the range of the measured cells, considering only the cells at higher priority level HCS_PRIO. Moreover the UE speed may be taken into account. When a the number of reselections during a time period T_{CRmax} exceeds the value N_{CR} given in the system information, the UE is considered in high-mobility state. In this case the measurements are performed on the cells that have equal or lower HCS_PRIO than the serving cell. If the number of reselection during T_{CRmax} no longer exceeds N_{CR}, the UE leaves the high-mobility state after a time period $T_{CRmaxHyst}$. Parameters for measurement control are indicated in the system information [9]

4.3.2.3 Cell re-selection criteria

The cells on which the UE has performed the measurement and that fulfil the S criterion specified for cell selection are candidates for cell reselection.

These cells are ranked according to the criterion R [7]. The quality of the target cells is evaluated and compared with the serving cell by mean of relative offsets.

When the serving cell belongs to a HCS (i.e. HCS is indicated in the system information), a temporary offset applies for a given penalty time to the cells on the same priority level as the serving cell.

When HCS is used, an additional criterion H is used to identify target cells on a different layer. During the quality estimation of those cells, a temporary offset applies for a given penalty time. If the quality requirement H is fulfilled, the cells belonging to the higher priority level are included for cell re-selection and ranked according to the criterion R. However, if the UE is in the high-mobility state, this rule does not apply and the ranking is performed on the candidate cells according to the measurements performed.

The cell with higher value R in the ranking list is chosen as new cell if all the criteria described above are fulfilled during a time interval Treselection.

All the counters, timers, offsets and thresholds used to control the re-selection evaluation process are indicated in the system information [9]. These parameters are unique on a cell to neighbour cell relation basis. This implies that the UE does not need to read the system information in the neighbouring cells before the cell reselection procedure finds a neighbouring cell with better quality

4.3.3 Measurement quantities and mapping functions

Mapping functions are used for mapping a certain range of measurement values Qmeas_LEV (e.g. CPICH_Ec/N0 and CPICH_RSCP_LEV for UTRA FDD cells, P-CCPCH_RSCP_LEV for UTRA TDD cells, RXLEV for GSM cells) to a representing quality value Qmap.

For each radio access technology and mode (i.e. FDD or TDD), one mapping function is defined. It may be defined over one or several consecutive intervals of the measurement values Qmeas_LEV, as specified in [7]

If no mapping functionality is needed (e.g. in FDD- or TDD-only networks), an implicit mapping is used: Qmap= Qmeas_LEV. This is specified as default case.

4.3.4 Restricted cells

When cell status "barred" is indicated or when the cell status "Operator only" is indicated and the Access class in the UE is 1-9, the UE is not permitted to select/re-select this cell, except for emergency call when no other acceptable cell can be found and the cell is not barred for emergency call.

In any other case, the criteria for selection of another cell should take into account the effects of the interference generated towards the restricted cell. For this reason, the reselection of any cell on the same frequency as the restricted cell is prohibited and the UE enters a limited service state. In this state, every period of T_{barred} seconds, in order to detect a change of the restriction status, the UE shall perform a periodic check every T_{barred} seconds.

When the neighbour cells use only the same frequency, the only way to provide the service in the area is to allow the UE to camp on another cell on the same frequency, regardless of the interference generated on the restricted cell. This is done by setting the "Intra-frequency cell re-selection indicator" IE to "allowed".

When the UE still detect the restricted cell as the "best" one, it will read the system information and evaluate again the availability of that cell, increasing the power consumption in the UE. The unnecessary evaluation may be avoided excluding the restricted cell from the neighbouring cell list for a time interval of T_{barred} seconds.

"Intra-frequency cell re-selection indicator" and " T_{barred}" are indicated together with the cell access restriction in the system information [9].

4.4 Location Registration

The location registration procedure is defined in [13]. The strategy used for the update of the location registration has to be set by the operator and, for instance, can be done regularly and when entering a new registration area. The same would apply for the update of the NAS defined service area which can be performed regularly and when entering a new NAS defined service area.