TSG-RAN Meeting #22 **RP-030627**
Maui, USA, 09-12 December 2003

Title: **25.922 Rel-5 CR**

Source: **TSG-RAN WG2**

Agenda item: **7.3.5**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.922	027	-	Rel-5	Radio Resource handling of streaming traffic class PDP contexts	F	5.1.0	5.2.0	R2-032615	TEI5

3GPP TSG-RAN2 Meeting #39
San Diego, USA, 17-21 November 2003

Tdoc R2-032615

CR-Form-v7

CHANGE REQUEST

⌘ **25.922** **CR** **027** ⌘ **rev** **-** ⌘ Current version: **5.1.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Radio Resource handling of streaming traffic class PDP contexts
Source:	⌘	RAN WG2
Work item code:	⌘	TEI5
Date:	⌘	11/11/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

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

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

Reason for change:	⌘	RRM for Streaming RABs is unclear.
Summary of change:	⌘	It is clarified that the use of traffic volume measurements and/or inactivity timers is necessary in Interactive, Background and Streaming traffic classes.
Consequences if not approved:	⌘	Waste of system resources and increased UE battery consumption.

Clauses affected:	⌘	7.1

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

Other comments: ⌘

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

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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 subclause explains how the system works with respect to these procedures and how e.g. traffic volume measurements and/or inactivity timers could trigger these procedures. In order to optimize the system resources and the UE battery consumption, UTRAN may use the traffic volume measurements and/or inactivity timers in Streaming, Interactive and Background traffic classes.

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.

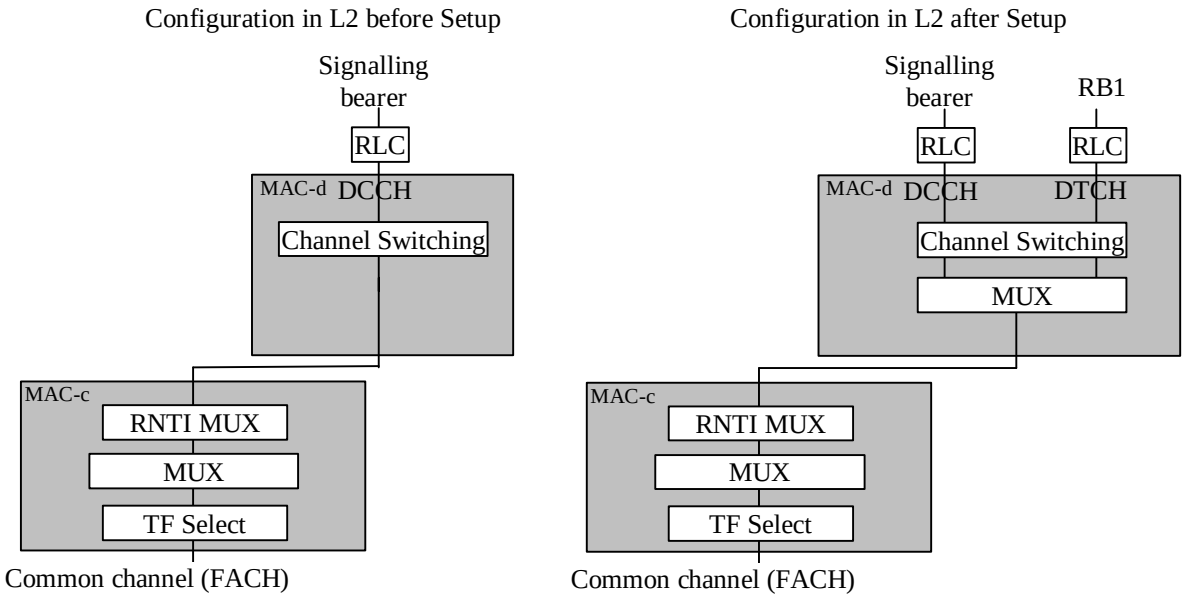

Figure 7-1: Configuration of L2 in the UTRAN DL before and after the RB setup

Detailed examples of messages exchange and parameters used are reported in Annex B, Subclause 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 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.

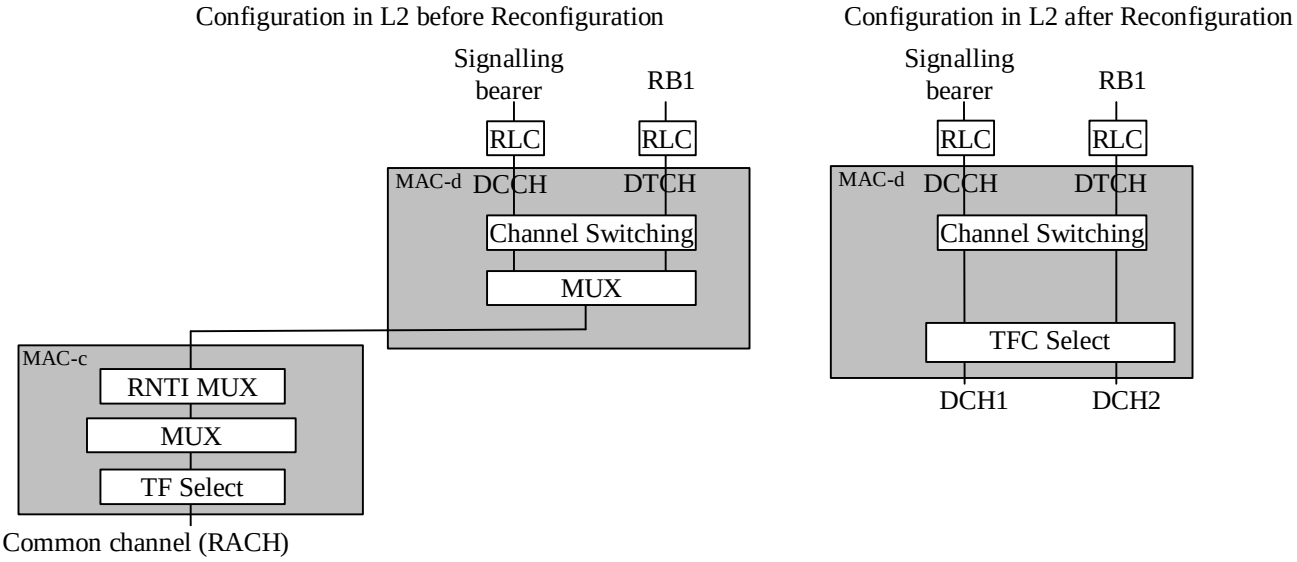

Figure 7-2: Configuration in the UTRAN UL before and after the Physical channel reconfiguration

Detailed examples of messages exchange and parameters used is reported in Annex B, Subclause B.2.1.

7.1.2.2 Increased DL data, no Transport channel type switching

If the Transport Channel Traffic Volume 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 Annex B, Subclause 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 and some inactivity timer, i.e. that the 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 Annex B, Subclause 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.

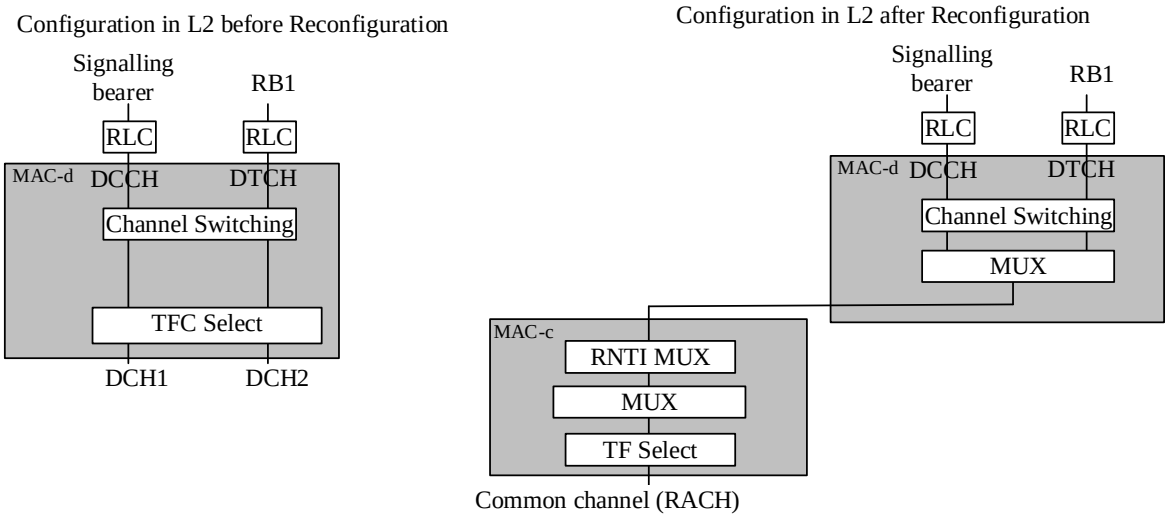

Figure 7-3: Configuration in the UTRAN UL before and after the Physical channel reconfiguration

Detailed examples of messages exchange and parameters used is reported in Annex B, Subclause 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 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 Annex B, Subclause 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.

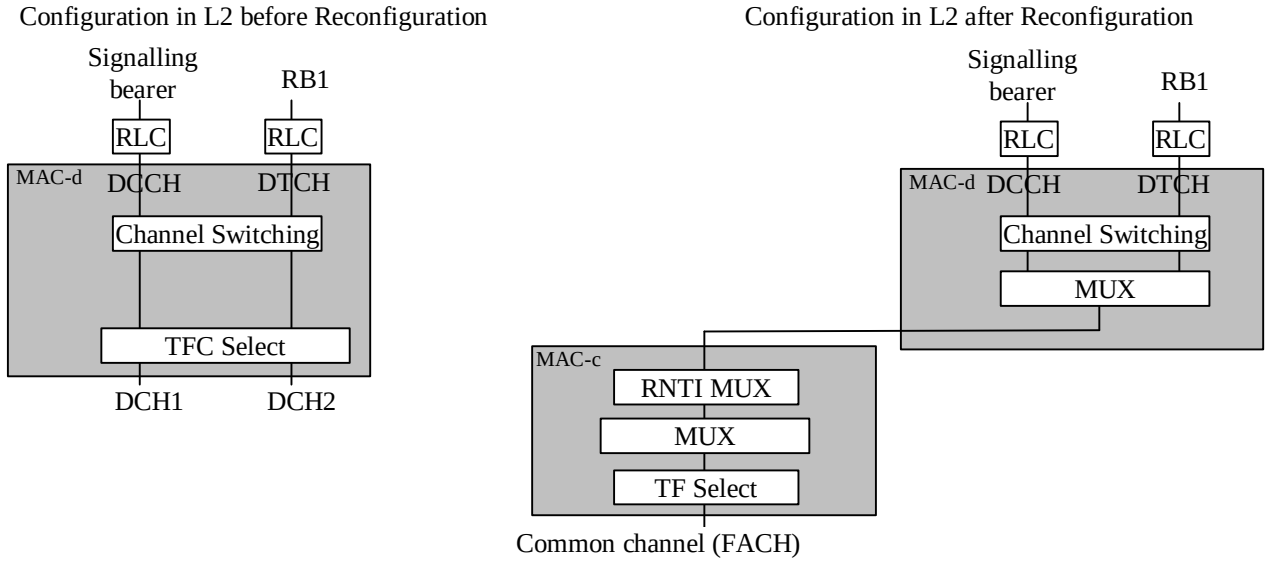

Figure 7-4: Configuration in the UTRAN DL before and after the Transport channel reconfiguration

Detailed examples of messages exchange and parameters used is reported in Annex B, Subclause 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.

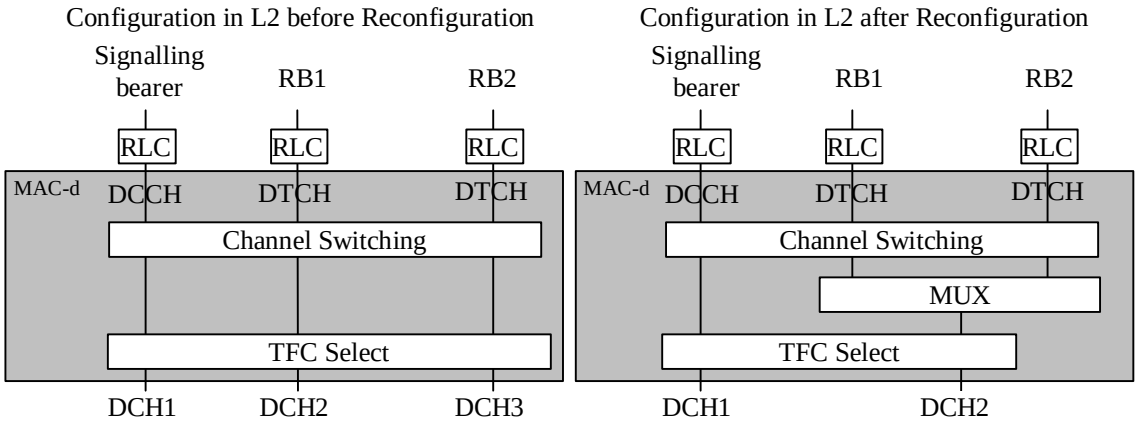

Figure 7-5: Configuration in the UTRAN DL before and after the RB reconfiguration

Detailed examples of messages exchange and parameters used is reported in Annex B, Subclause B.4.