3GPP TSG-RAN2 Meeting #48bis ***R2-052499***
Cannes, France, 10th –14th October 2005

Agenda Item: 8

WI: TEI

Source: Siemens

Title: Introduction of high bit rate SRBs

Document for: Discussion and Agreement

1. Introduction

Currently there is an ongoing discussion in Ran2 to improve the call setup delays for Rel99 and higher releases.
The set up of a call requires a multitude of signalling messages between UE, NodeB, RNC and CN. This amount of messages, the available bandwidth and timing parameters e.g. for retransmissions of messages contribute to the overall call set up delay, experienced by the user.

At one of the last RAN2 meetings it was agreed to introduce a 27.2 kbps SRB to enable faster call setup times if operators consider the trade off against capacity worthwhile.

2. Proposal

A complete call establishment requires the establishment of an RRC connection, core network signalling and a RAB assignment. After the RRC connection setup message a DCH is available for the SRB which is used then for all subsequent messages originated by or destined for the UE. Increasing the data rate of this SRB could therefore reduce the signalling delay for all these messages.

So far SRBs up to 13.6 kbps on DCH have been defined, but higher bandwidth, e.g. 27.2kbps, could be envisaged for this improvement. After the RB becomes active the SRB will be reconfigured to 3.4 kbps.

Higher data rate SRBs can be seen as an easy solution that can be specified and implemented very fast. The drawback of a higher data rate SRB on DCH is that it reduces the cell capacity and puts higher requirements on NodeB processing and the Iub interface when it is used.

In addition to call setups starting from idle mode a call setup in parallel to an ongoing I/B service could be speed up by higher data rate SRBs. In order to save codes it is proposed not to allow for both the highest TF of the SRB and the highest TF of the I/B RB.

In the same way call setups in parallel to realtime services could be handled. However, the reduced TFCS would possibly lead to a degredation of the realtime service when SRBs need to be transmitted with high bit rate.

For this reason we propose the introduction of a stand alone SRB with 27.2kbps, as well as an example combination of Interactive or Background / UL:16 DL: 16 kbps / PS RAB + UL:27.2 DL:27.2 kbps SRBs for DCCH. This example combination in the attached CR shows the benefit of the reduced TFCS since a SF 64 can be applied in DL while the complete TFCS would require a SF 32.

If this solution is considered beneficial by the group it would be easy to define additional RB - high bit rate SRB combinations.

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Tdoc ⌘R2-052499

CR-Form-v7

CHANGE REQUEST

⌘ **25.993** **CR** **xxx** ⌘**rev** **-** ⌘ Current version: **6.b.0** ⌘

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

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

Title:	⌘	Proposed CR to 25.993 [R'99 affected, Rel-6 version] on Introduction of high bit rate SRB
Source:	⌘	Siemens
Work item code:	⌘	TEI
Date:	⌘	10/10/2005
Category:	⌘	**F**
Release:	⌘	Rel-99

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:	⌘	The call setup delays in Rel99 and higher releases turned out to be not acceptable. High Bit rate SRBs can reduce the call setup delay. Since the highest SRB bit rate is currently 13.6 kbps it is proposed to add a 27.2kbps SRB. Furthermore a combination of the 27.2kbps SRB with an Interactive/Background RAB is proposed. In order to avoid the allocation of resources for the full SRB bit rate for this combination the highest TFC in the TFCS shall not be the combination of the highest TFs of both SRB and I/B RB.
Summary of change:	⌘	Following SRB is included: Stand-alone UL:27.2 DL:27.2 kbps SRBs for DCCH Following RAB / SRB combination is included: Interactive or background / UL:16 DL: 16 kbps / PS RAB + UL:27.2 DL:27.2 kbps SRBs for DCCH.
Consequences if not approved:	⌘	Call setup delay and reconfiguration delay will be unnecessarely high.

Clauses affected:	⌘	5, 7

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.

<START OF MODIFIED SECTION>

5.4 Signalling Radio Bearers (Control Plane)

Table 5.2 provides examples of Signalling Radio Bearers (SRBs) which can use configurations as defined in clauses 7, 8 and 9.

Table 5.8: Signalling Radio Bearers (SRBs)

#	Maximum rate, kbps	Logical channel	PhyCh onto which SRBs are mapped
1	UL:1.7 DL:1.7	DCCH	DPCH
2	UL:3.4 DL:3.4	DCCH	DPCH
3	UL:13.6 DL:13.6	DCCH	DPCH
4	DL:27.2 (alt. 40.8)	DCCH	SCCPCH
5	UL:16.6	CCCH	PRACH
6	DL:30.4 (alt. 45.6)	CCCH	SCCPCH
7	DL:33.2 (alt. 49.8)	BCCH:	SCCPCH
8	DL:24 (alt. 6.4)	PCCH	SCCPCH
9	UL:16.8 (TDD)	SHCCH	PRACH
10	UL:16.8 (TDD)	SHCCH	PRACH or PUSCH
11	DL:16 (TDD)	SHCCH	SCCPCH
12	DL:16 (TDD)	SHCCH	SCCPCH or PUSCH
13	DL: 0.15	DCCH	DPCH
14	UL:27.2 DL:27.2	DCCH	DPCH

<NEXT MODIFIED SECTION>

7.1.3a Stand-alone UL:27.2 DL:27.2 kbps SRBs for DCCH

7.1.3a.1 Uplink

7.1.3a.1.1 Transport channel parameters

7.1.3a.1.1.1 Transport channel parameters for UL:27.2 kbps SRBs for DCCH

Higher layer	RAB/signalling RB	**SRB#1**	**SRB#2**	**SRB#3**	**SRB#4**
	User of Radio Bearer	RRC	RRC	NAS_DT High prio	NAS_DT Low prio
RLC	Logical channel type	DCCH	DCCH	DCCH	DCCH
	RLC mode	UM	AM	AM	AM
	Payload sizes, bit	136	128	128	128
	Max data rate, bps	13600	12800	12800	12800
	AMD/UMD PDU header, bit	8	16	16	16
MAC	MAC header, bit	4	4	4	4
	MAC multiplexing	4 logical channel multiplexing			
Layer 1	TrCH type	DCH			
	TB sizes, bit	148 (alt 0, 148)			
	TFS TF0, bits	0x148 (alt 1x0)			

		TF1, bits	1x148
		TF2, bits	2x148
	TTI, ms		10
	Coding type		CC 1/3
	CRC, bit		16
	Max number of bits/TTI before rate matching		1008
	Uplink: Max number of bits/radio frame before rate matching		1008
	RM attribute		155 to 185

7.1.3a.1.1.2 TFCS

TFCS size	3
TFCS	SRBs for DCCH = TF0, TF1, TF2

7.1.3a.1.2 Physical channel parameters

DPCH Uplink	Min spreading factor	32
	Max number of DPDCH data bits/radio frame	1200
	Puncturing Limit	1

7.1.3a.2 Downlink

7.1.3a.2.1 Transport channel parameters

7.1.3a.2.1.1 Transport channel parameters for DL:27.2 kbps SRBs for DCCH

			SRB#1	**SRB#2**	**SRB#3**	**SRB#4**
Higher layer	RAB/signalling RB					
	User of Radio Bearer		RRC	RRC	NAS_DT High prio	NAS_DT Low prio
RLC	Logical channel type		DCCH	DCCH	DCCH	DCCH
	RLC mode		UM	AM	AM	AM
	Payload sizes, bit		136	128	128	128
	Max data rate, bps		13600	12800	12800	12800
	AMD/UMD PDU header, bit		8	16	16	16
MAC	MAC header, bit		4	4	4	4
	MAC multiplexing		4 logical channel multiplexing			
Layer 1	TrCH type		DCH			
	TB sizes, bit		148 (alt 0, 148) (note)			
	TFS	TF0, bits	0x148 (alt 1x0) (note)			
		TF1, bits	1x148			
		TF2, bits	2x148			
	TTI, ms		10			
	Coding type		CC 1/3			
	CRC, bit		16			
	Max number of bits/TTI before rate matching		1008			
	RM attribute		155 to 230			
NOTE: alternative parameters enable the measurement "transport channel BLER" in the UE.						

7.1.3a.2.1.2 TFCS

TFCS size	3
TFCS	SRBs for DCCH = TF0, TF1, TF2

7.1.3a.2.2 Physical channel parameters

DPCH Downlink	DTX position		N/A (SingleTrCH)
	Spreading factor		64
	DPCCH	Number of TFCI bits/slot	8
		Number of TPC bits/slot	4
		Number of Pilot bits/slot	8
	DPDCH	Number of data bits/slot	60
		Number of data bits/frame	900

The minimum UE classes supporting this combination are UL: 12 kbps plus support for 'Maximum number of DPDCH bits transmitted per 10 ms' = 1200, DL: 12 kbps.

This is supported in Release '99.

<NEXT MODIFIED SECTION>

7.1.x Interactive or background / UL:16 DL:16 kbps / PS RAB + UL:27.2 DL:27.2 kbps SRBs for DCCH

7.1.x.1 Uplink

7.1.x.1.1 Transport channel parameters

7.1.x.1.1.1 Transport channel parameters for Interactive or background / UL:16 kbps / PS RAB

See subclause 6.10.2.4.1.23b.1.1.1 of [1].

7.1.x.1.1.2 Transport channel parameters for UL:27.2 kbps SRBs for DCCH

See subclause 7.1.3a.1.1.1

7.1.x.1.1.3 TFCS

TFCS size	8
TFCS	(16 kbps RAB, DCCH)= (TF0,TF0), (TF1,TF0), (TF2,TF0), (TF0,TF1), (TF1,TF1), (TF2,TF1), (TF0,TF2), (TF1,TF2)

7.1.x.1.2 Physical channel parameters

DPCH Uplink	Min spreading factor	32
	Max number of DPDCH data bits/radio frame	1200
	Puncturing Limit	0.72

7.1.x.2 Downlink

7.1.x.2.1 Transport channel parameters

7.1.x.2.1.1 Transport channel parameters for Interactive or background / DL:16 kbps / PS RAB

See subclause 6.10.2.4.1.23b.2.1.1 of [1].

7.1.x.2.1.2 Transport channel parameters for DL:27.2 kbps SRBs for DCCH

See subclause 7.1.3a.2.1.1

7.1.x.2.1.3 TFCS

TFCS size	8
TFCS	(16 kbps RAB, DCCH)= (TF0,TF0), (TF1,TF0), (TF2,TF0), (TF0,TF1), (TF1,TF1), (TF2,TF1), (TF0,TF2), (TF1,TF2)

7.1.x.2.2 Physical channel parameters

DPCH Downlink	DTX position		N/A (SingleTrCH)
	Spreading factor		64
	DPCCH	Number of TFCI bits/slot	8
		Number of TPC bits/slot	4
		Number of Pilot bits/slot	8
	DPDCH	Number of data bits/slot	60
		Number of data bits/frame	900

The minimum UE classes supporting this combination are UL: 64 kbps, DL: 32 kbps.

This is supported in Release '99.