

3GPP TR 25.852 V0.1.~~20~~ (2003-~~1008~~)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Iu Enhancements for IMS Support in UTRAN; (Release 6)



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3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

<http://www.3gpp.org>

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Contents

Foreword	4
1 Scope	4
2 References	4
3 Definitions, symbols and abbreviations	5
3.1 Definitions	5
3.2 Symbols	5
3.3 Abbreviations	5
4 Introduction	5
5 Requirements	6
6 Study Areas	6
6.1 Possible Mechanisms to satisfy the requirements 'priority' and 'delay' using the existing 'Signalling Indication'	6
6.1.1 Admission Control	7
6.1.2 Dynamic Scheduling	8
7 Agreements and associated Contributions	8
8 Specification Impact and associated Change Requests	8
9 Project Plan	9
9.1 Schedule	9
9.2 Work Task Status	9
Annex A: Change history	10
Foreword	4
1 Scope	4
2 References	4
3 Definitions, symbols and abbreviations	5
3.1 Definitions	5
3.2 Symbols	5
3.3 Abbreviations	5
4 Introduction	5
5 Requirements	6
6 Study Areas	6
7 Agreements and associated Contributions	6
8 Specification Impact and associated Change Requests	6
9 Project Plan	6
9.1 Schedule	6
9.2 Work Task Status	6
Annex A: Change history	7

Foreword

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

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

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

This present document is for the 3GPP Release 6 Work Item "Iu Enhancements for IMS Support in UTRAN"(see [1]).

Release 5 enables the basic support for IMS in the RAN but evaluation of possible further enhancements was decided in RAN#19.

The purpose of the present document is to aid TSG RAN WG3 to standardise these possible improvements in release 6 by refining the requirements from a RAN thorough perspective and evaluate the associated optimisations in the handling of IMS RAB in the RNC.

This document is intended to gather all this information, assess the proposals of enhancements and agree on some of them in section 7 before integrating them into the Technical Specifications.

This document is a 'living' document, i.e. it is permanently updated and presented to TSG-RAN meetings.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP RP-030191: "Iu Enhancements for IMS Support in the RAN".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

<defined term>: *<definition>*.

example: text used to clarify abstract rules by applying them literally.

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

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

IMS	IP Multimedia Subsystem
QoS	Quality of Service
RAN	Radio Access Network
RANAP	Radio Access Network Application Part
RNC	Radio Network Controller
SIP	Session Initiation Protocol
UMTS	Universal Mobile Telecommunications System
UTRAN	Universal Terrestrial Radio Access Network

4 Introduction

At the 3GPP TSG RAN #19 meeting, the Work Item Description on “Iu Enhancements for IMS Support in the RAN ” was approved [1].

Some requirements for the IMS support have been identified by SA2 and this has led to the introduction of a new release 5 function at RAN3#34: a basic signalling indication on the Iu interface for concerned interactive RABs.

However, this indication enables a basic support for IMS by the RAN but it is believed that room of improvement may be brought e.g. by the introduction of additional QoS specific parameter(s);

This Work Item proposes to refine the requirements provided by SA2 from a RAN thorough perspective and evaluate possible further enhancements for the release 6 allowing some further optimisations of the handling of IMS RAB by an RNC.

5 Requirements

Editor's note: This subsection should contain general requirements

SIP signaling bearer shall meet the following requirements:

- Priority: The RNC should guarantee that the SIP Signalling RAB has a higher priority than any of the RABs carrying user plane traffic but lower priority than system level signalling connections e.g. RRC, NAS signalling etc.
- Delay&Reliability:
 - The suitable reliability should be ensured for the transport of SIP messages in order to avoid retransmission that would increase call set up delay.
- RAB Linking: Means for signalling RAB linking over RANAP should be studied, the need of a 'critical' RAB within a link set of IP Multimedia RABs should be studied, the behaviour required to handle the link set or the critical RAB e.g. such as during relocation, should be studied.
- Radio Resource Utilization: It should allow optimized utilization of radio resources,
 - A flexibility to allow a network to reserve certain amount of resources for the common usage of signalling RABs shall not be precluded in order to make sure previous mentioned requirements are met.
- Error Handling: It should take into account the error handling mechanism defined for pre-Rel 6 specification to ensure that a RAB for SIP is set-up even if the network elements are based on pre-Rel6 specification.

6 Study Areas

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6.1 Possible Mechanisms to satisfy the requirements 'priority' and 'delay' using the existing 'Signalling Indication'

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In TS 23.107, the signalling flag is defined in the following way:

Extracts below:

"Signalling Indication (Yes/No)

Definition: Indicates the signalling nature of the submitted SDUs. This attribute is additional to the other QoS attributes and does not over-ride them.

[Purpose: Signalling traffic can have different characteristics to other interactive traffic, eg higher priority, lower delay and increased peakiness. This attribute permits enhancing the RAN operation accordingly. An example use of the Signalling Indication is for IMS signalling traffic.]"

Signalling Indication is also restricted to the Interactive Traffic Class, and TS 23.107 specifies:

"If the Signalling Indication is set, a statistical multiplexing gain and/or improvements in signalling speed may be obtained within the UTRAN."

So, the use of Signalling Indication is clearly mentioned. IMS signalling should get the highest priority in the interactive class, which means that its QoS will not be impacted by any interactive or background traffic.

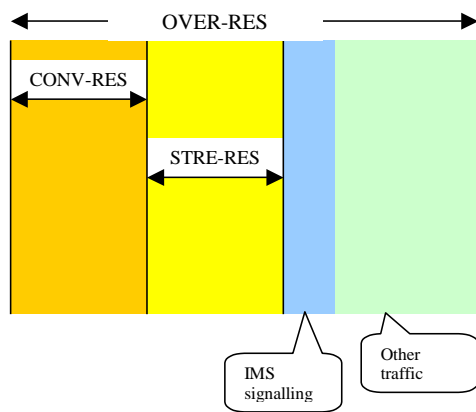
In order to guarantee the QoS of all the connections, we have to:

- guarantee that the QoS of already established connections and especially connections with guaranteed rate (conversational and streaming) is not impacted by a new IMS signalling RAB. This is Admission Control.
- guarantee that the priority of IMS signalling is appropriate with regards to other traffic once the connection is established. This is Dynamic Scheduling.

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6.1.1 Admission Control

Let us call "OVER-RES" the overall resource reserved on any interface. And "CONV-RES" the resource reserved for conversational traffic, "STRE-RES" the resources reserved for streaming traffic, a normal implementation will ALWAYS keep a margin for all the other traffic (signalling, interactive and background). Is IMS signalling has always a better priority than any of these traffics, there will never be any delay issue for IMS signalling with regards to e.g. NAS signalling that should get a similar performance.



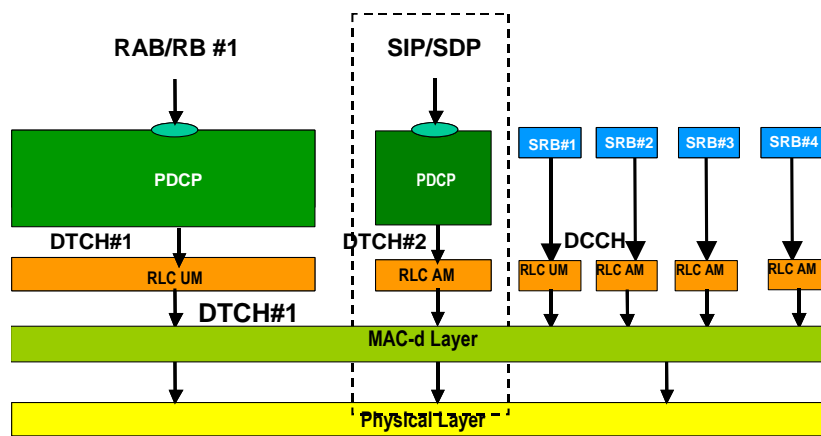
A good implementation would satisfy the recommendation stated in TS 23.107. It is up to the Admission Control of the UTRAN (always proprietary) to restrict the CONV-RES and STRE-RES relatively to the OVER-RES on all the interfaces.

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6.1.2 Dynamic Scheduling

Once the SIP signalling has been accepted, the UTRAN has all the mechanisms to satisfy differential priorities between SIP signalling and User Data plus the various Signalling Radio Bearers (RRC-UM, RRC-AM, NAS-sig-SAP10, NAS-sig-SAP13). MAC-d layer has all the features to cope with any kind of scheduling schemes, e.g.:

- Selection of appropriate Transport Format for each Transport Channel
- Priority handling between data flows of one UE.
- Priority handling between UEs by means of dynamic scheduling.



7 Agreements and associated Contributions

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8 Specification Impact and associated Change Requests

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9 Project Plan

9.1 Schedule

Date	Meeting	Scope	[expected] Input	[expected] Output
Sept 2003	RAN#21	RAN Approval		CRs approved

9.2 Work Task Status

	Planned Date	Milestone	Status

Annex A: Change history

It is usual to include an annex (usually the final annex of the document) for reports under TSG change control which details the change history of the report using a table as follows:

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New