3GPP TR 23.8de V0.1.0 (2005-07)

Technical Report

3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Feasibility Study of enhancement of radio performances for VoIMS; Report on Technical Options and Conclusions (Release 7)

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Keywords
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Contents

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.
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Introduction

There is interest on future usage of VoIMS compared to CS service. Operators are interested in optimising the current VoIMS bearer performances.

During the WI on RAB support enhancements and the study of VoIMS bearer performances , it has been shown that voice over PS domain in Release 6 on a dedicated channel, with ROHC compression and without Unequal Error Protection (UEP), will remain 20% to 30% less efficient compared to circuit-switched voice with UEP.

UEP is one of the methods which can be used to enhance radio performances. Header Removal (HR) is also in the scope of this study.

For Voice over IMS service, the introduction of such enhancement may bring architectural changes that have to be studied, in particular the way to provide the RAN with information allowing it to apply UEP.

1 Scope

The present document describes architecture changes for Voice over IMS service to allow enhancement of radio performances in RAN. This work focuses on the PS domain with the assumption that voice services are supported in this domain.

Two radio optimization methods have been identified to provide radio optimisation for VoIMS: Unequal Error Protection (UEP) and Header Removal (HR). With the information currently available in RNC, RNC cannot use these optimisation methods. More study is then needed to describe which additional information are needed by RNC and how these information can be provided to RNC.

Radio optimisations for the SIP signalling are out of the scope of this TR. The study will focus on the bearer optimisation for user data.

Radio optimisations with no architecture impact outside the UTRAN are out of the scope of this TR.

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 TR 41.001: "GSM Release specifications".

3 Definitions, symbols and abbreviations

Delete from the above heading those words which are not applicable.

Subclause numbering depends on applicability and should be renumbered accordingly.

3.1 Definitions

For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.

Definition format

***<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 format

<symbol> <Explanation>

3.3 Abbreviations

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

HR	Header Removal
UEP	Unequal Error Protection

4 Architecture Baseline

[Editors Note: This clause describes the starting point for the architecture enhancement]

For 3GPP IMS voice service, user data stream can consists of:

- IMS signalling stream
- RTCP stream
- RTP speech stream

All these streams can be transported over the same UMTS bearer (the same PDP Context/RAB) or over different ones. The TR study should consider the different possibilities.

As described in 3GPP TS 26.236, for 3GPP IMS voice service, the RTP payload carries the speech data coded with AMR or AMR-WB codec with following RTP limitations:

- the bandwidth efficient operation shall be used,
- only one speech frame shall be encapsulated in each RTP packet,
- the multi-channel session shall not be used,
- interleaving shall not be used,
- internal CRC shall not be used.

3GPP may introduce codecs other than AMR and WB-AMR in the future.

5 UEP Solutions

Unequal Error Protection consists in the following actions:

- Differentiate and separate the most and the least important speech bits of the AMR codec frame (set of Class A, B and C bits of the received AMR frames in the RTP payload). For voice over CS Domain, this is done in the Core Network (the Media Gateway).
- Apply different protection level for each of these subflows (and for the packet header) and send them over the radio interface. This is done by the UTRAN.

5.1 Which entity differentiates and separates speech bits of the AMR frame

Either one entity in the PS Core Network differentiates and separates the most and the least important speech bits of the AMR codec frame and provides this information to the RNC (similar to CS RAB subflows information but for PS

RABs) or the RNC itself differentiates and separates the most and the least important speech bits of the AMR codec frame.

5.1.1 An entity in the Core Network differentiates and separates speech bits

One entity in the PS Core Network differentiates and separates the most and the least important speech bits of the AMR codec frame and provides this information to the RNC (similar RAB subflows information for PS RABs with voice):

- During an IMS multimedia session establishment, the end-points negotiate codecs and codec modes to be used during the IMS multimedia session (AMR and WB-AMR).
- At the end of the IMS multimedia session negotiation, one entity in CN gets information indicating the expected speech frame payload structures and provide RAB subflows information to the RNC in a way similar to CS voice.
- During the VoIP session life, the RNC differentiates set of bits in the received packet in a similar way to what it does for CS voice RABs.
- The UTRAN applies different error protection level on the radio to each identified part of the speech frame.

5.1.2 RNC differentiates and separates speech bits

The RNC differentiates and separates the most and the least important speech bits of the AMR codec frame.

- During an IMS multimedia session establishment, the end-points negotiate codecs and codec modes to be used during the IMS multimedia session (AMR and WB-AMR).
- At the end of the IMS multimedia session negotiation, the RNC gets information indicating the expected speech frame payload structures (while keeping the RNC agnostic of Codec negotiated).
- During the VoIP session life, the RNC differentiates each set of bits in the received packet and separates the speech bits by using this information.
- The UTRAN applies different error protection level to each identified part of the speech frame.

6 HR Solutions

7 Conclusion

Annex A:
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
2005 07	SA2#47				TR skeleton	-	0.0.0
2005-07	SA2#47				Agreed Tdoc implemented: S2-051841 on architecture baseline and S2-051842 onwhich entity differentiates and separates speech bits of the AMR frame	0.0.0	0.1.0