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Technical Report

3rd Generation Partnership Project;
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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.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

In the past few years, a considerable increase in number of users as well as offered traffic per user has been experienced in HSPA networks, both in the downlink and in the uplink.

In response to this, several features have been standardized in 3GPP. These include multi-carrier HSPA, downlink and uplink CELL_FACH state enhancements, and introduction of downlink and uplink MIMO. However, much of the focus has been on improving downlink performance and further enhancements are needed for the uplink to handle increasing traffic load as well as new traffic types.

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 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP RP-122019, "Study on Further EUL Enhancements".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].

<defined term>: <definition>.

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 abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

EUL Enhanced Uplink
RoT Rise over Thermal

4 Objectives of the Further EUL Enhancements Study

The study on Further EUL Enhancements should fulfill the following objective of identifying potential technical solutions for increasing the uplink capacity, coverage and end user performance (e.g. latency, achievable rates, etc.). The improvements should address following scenarios:

- Improvements to uplink user plane cell capacity with high number of users (high priority).

- Improvements to uplink coverage and latency (lower priority).

Currently identified areas include:

1) Enabling high user bitrates in a mixed-traffic scenario by means of, e.g., a more efficient method of confining high-RoT operation to dedicated secondary carriers.

2) Rate Adaptation to support improved power and rate control for high rates.

3) Improvements to handling of dynamic traffic on EUL, e.g. more efficient grant handling, improvements to the handling of scheduled and non-scheduled data and control transmissions during bursty traffic, etc.

4) Improvements to EUL coverage when using single RAB as well as various multi-RAB combinations.

5) Improvements to current access control mechanism to provide efficient approach for UTRAN in case of uplink overload.

6) Reduce UL control channel overhead for HSPA operation.

7) Mechanisms to perform UL data compression between the UE and the RAN

   - Evaluate compression gains and performance benefits for different types of smartphone traffic. At least UL capacity, signalling load, UE battery and latency should be considered.

   - Mechanisms to selectively enable/disable data compression when traffic is compressible/uncompressible.

8) Low-complexity uplink load balancing solutions, e.g. a fast uplink carrier switching in Cell_DCH state, especially for configurations where the downlink is configured in multicarrier operation while the uplink is in single carrier.

5 Study Areas

5.1 Access Control

5.1.1 Background and motivation

Editor's Note: Background and motivation for this study area should be captured here.

5.1.2 Analysis

5.1.2.1 Idle mode

Editor's Note: A detailed description of each Idle mode scenario should be captured here. It was agreed to study:
- The issue of value tag wrap-around for SIB3
- The limitations with "Wait Time" mechanism
  - Lack of domain specific wait timer
  - Duration of the timer (e.g. the timer is not long enough)
  - It is FFS whether an issue with the "Extended wait time" exists

- It is FFS if for access control that Initial Direct Transfer for detach procedure cannot be blocked by current mechanism

5.1.2.2 Connected mode

Editor's Note: A detailed description of each Connected mode scenario should be captured here.

5.1.2.2.1 CELL_PCH/URA_PCH state without seamless transition

Editor's Note: The following messages cannot be blocked with existing mechanism(s):
- Cell Update with cell update cause "uplink data transmission" and Establishment cause not included
- URA Update (only for URA_PCH)
    - URA Update with cause "URA reselection" if a new URA is entered, or cause "periodic URA Update" if T305 expires.
- Cell Update (only for CELL_PCH)
    - Cell Update with cause "cell reselection" if a new cell is entered, or cause "periodic cell update" if T305 expires
- It is FFS which of these messages should be blocked.

5.1.2.2.2 CELL_FACH state and CELL_PCH state with seamless transition

Editor's Note: The following messages cannot be blocked with existing mechanism(s):
- Transmission of UL data on RACH/E-DCH
    - Data sent on DTCH when there is a need
- Cell Update message
- DCCH signaling on SRB2
    - E.g. RB Reconfiguration Complete when UE is switched from DCH to FACH, L2 ACKs for RB Reconfiguration message sent on FACH when UE is switched from FACH to DCH, Measurement Reports
- DCCH signaling on SRB3/4
    - Uplink Direct Transfer (e.g. for PDP context deactivation)
    - Initial Direct Transfer for detach procedure
- It is FFS which of these messages should be blocked.

5.1.2.2.3 CELL_DCH state

Editor's Note: It is FFS whether to study the issue of DSAC/PPAC update in CELL_DCH.

5.1.3 Solutions

Editor's Note: A detailed description of each solution/enhancement should be captured here.

5.1.4 Conclusions

Editor's Note: Overall conclusions for the identified solutions should be captured here.

5.2 UL data compression

5.2.1 Background and motivation

Editor's Note: Background and motivation for this study area should be captured here.

5.2.2 Analysis

Editor's Note: A detailed description of the current limitations should be captured here. RAN2 will study RAN level UL compression mechanisms. As a baseline, RAN2 shall consider UL compression mechanisms between the UE and the RNC.

5.2.3 Solutions

Editor's Note: A detailed description of each solution/enhancement should be captured here.

5.2.3.1 Description of solution

5.2.3.2 Evaluation of solution

5.2.4 Conclusions

Editor's Note: Overall conclusions for the identified solutions should be captured here.

5.3 Improvements to EUL coverage

5.3.1 Background and motivation

Editor's Note: Background and motivation for this study area should be captured here.

5.3.2 Analysis

5.3.2.1 Improvements to UPH measurements

Editor's Note: A detailed description of the current limitations should be captured here. At RAN2#82 we agreed to study:
- UPH event based SI triggers
- RRC UPH measurements
- Other MAC UPH report enhancements

5.3.2.2 Reconfiguration enhancements

Editor's Note: A detailed description of the current limitations should be captured here. At RAN2#82 we agreed to study:
- Node B reconfiguration based mechanisms

- It is FFS whether we will study further enhancements to the RNC reconfiguration mechanisms (e.g. with handshake between UE and Node B)

5.3.3 Solutions

Editor's Note: A detailed description of each solution/enhancement should be captured here.

5.3.4 Conclusions

Editor's Note: Overall conclusions for the identified solutions should be captured here.

5.4 Enabling high bit rates

5.4.1 Background and motivation

Editor's Note: Background and motivation for this study area should be captured here.

5.4.2 Solutions

Editor's Note: A detailed description of each solution/enhancement should be captured here.

5.4.3 Conclusions

Editor's Note: Overall conclusions for the identified solutions should be captured here.

5.5 Study Area "x"

Editor's Note: This section and sub-sections are provided as a template of the layout to be used when other sub-features, from any participating WG, are added to the Technical Report.

5.5.1 Background and motivation

Editor's Note: Background and motivation for this study area should be captured here.

5.5.2 Analysis

Editor's Note: If needed, a detailed description of the current limitations should be captured here.

5.5.3 Solutions

Editor's Note: A detailed description of each solution/enhancement should be captured here. If needed, each solution may be evaluated separately, using the following layout.

5.5.3.1 Description of solution x

5.5.3.2 Evaluation of solution x

5.5.4 Conclusions

Editor's Note: Overall conclusions for the identified solutions should be captured here.

6 Impact on RAN WGs

7 Conclusions

Annex A:
Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2013-01	R2#81	R2-130442	-	-	Initial Draft	-	0.0.1
2013-05	R2#82	R2-131626	-	-	Updated draft to capture some initial agreements made at RAN2#81bis	0.0.1	0.0.2
2013-05	R2#82	R2-132150	-	-	Clean version (Editorial updates)	0.0.2	0.1.0
2013-05	R2#82	R2-132167	-	-	Version collecting agreements of RAN2 #82 in email discussion [82#07]	0.1.0	0.1.1
2013-05	R2#82	R2-132179			RAN2 agreed version following email discussion [82#07]	0.1.1	0.2.0