

**TSG-RAN Meeting #8**  
**Düsseldorf, Germany, 21 - 23 June 2000**

***RP-000301***

**Source: TSG-RAN WG2**

**To: TSG-RAN**

**Title: Proposed TR on "UTRA High Speed Downlink Packet Access"**


At the RAN#7 plenary meeting it was agreed to initiate a feasibility study item on "High Speed Downlink Packet Access". The attached document is a proposal for the TR to be issued on this topic. TSG-RAN WG2 also proposes Ravi Kuchibhotla (Motorola) to be the rapporteur of this document, if approved.

# 3G TR ab.cde v0.0.0(2000-05)

---

*Technical Report*

---



**3rd Generation Partnership  
Technical Specification Group Radio Access network,  
UTRA High Speed Downlink Packet Access  
(Release 2000)**

The present document has been developed within the 3<sup>rd</sup> Generation Partnership Project (3GPP™) and may be further elaborated for the purposes of 3GPP.

The present document has not been subject to any approval process by the 3GPP Organisational Partners and shall not be implemented. This Specification is provided for future development work within 3GPP only. The Organisational Partners accept no liability for any use of this Specification. Specifications and reports for implementation of the 3GPP™ system should be obtained via the 3GPP Organisational Partners' Publications Offices.

---

Keywords

---

<keyword[, keyword]>

**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>

---

**Copyright Notification**

---

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© 2000, 3GPP Organizational Partners (ARIB, CWTS, ETSI, T1, TTA, TTC).  
All rights reserved.

# Contents

Foreword .....	6
1 Scope.....	7
2 References.....	7
3 Definitions, symbols and abbreviations .....	7
3.1 Definitions .....	7
3.2 Symbols .....	7
3.3 Abbreviations.....	7
4 Background and Introduction .....	8
5 Basic structure of Enhanced DSCH.....	8
5.1 Architectural issues.....	8
5.2 Protocol structure.....	8
5.3 Basic physical structure .....	8
6 Overview of Technologies considered for Enhanced DSCH to support UTRA High Speed Downlink Packet Access .....	8
6.1 Adaptive modulation and Coding Schemes .....	9
6.2 Hybrid ARQ Methods.....	9
6.3 Fast Cell Site Selection (SSDT Modifications) .....	9
6.4 Other Technologies.....	9
7 Adaptive Modulation and Coding Schemes (AMCS) .....	9
7.1 Technical Details .....	9
7.2 Frame Size .....	9
7.3 Evaluation of different AMCS.....	9
7.3.1 Link Assumptions and results .....	9
7.3.2 Performance of Different Modulation and Coding Schemes .....	9
7.4 Conclusions and Recommendations .....	9
8 Hybrid ARQ.....	9
8.1 Technical Details .....	9
8.2 Enablers for Hybrid ARQ .....	9
8.3 Architectural Alternatives and Impact on Current Specifications.....	9
8.3.1 Existing Architecture.....	9
8.3.2 Distributed Architecture.....	9
8.3.3 MAC-sh.....	9
8.4 Evaluation of different schemes.....	9
8.4.1 Chase Combining .....	10
8.4.1.1 Link Assumptions and results.....	10
8.4.2 Incremental Redundancy .....	10
8.4.2.1 Link Assumptions and results.....	10
8.4.3 Other Schemes .....	10
8.5 Conclusions and Recommendations .....	10
9 Associated signalling needed for Enhanced DSCH operation for High Speed Downlink Packet Access .....	10
9.1 Associated Uplink signalling .....	10
9.2 Associated Downlink signalling .....	10
9.3 Conclusions and recommendations.....	10
10 Fast Cell Site Selection .....	10
10.1 Architecture .....	10
10.2 Impact on current specification.....	10
10.3 Evaluation of different schemes.....	10
10.4 Conclusions and recommendations.....	10

11	Impacts on Interfaces .....	11
11.1	Iub Impacts .....	11
11.2	Iur Impacts .....	11
12	Simulation Criteria.....	11
12.1	Traffic Models .....	11
12.2	Propagation Model, Antenna Pattern, UE Speed Distribution.....	11
12.3	Channel Models .....	11
12.4	Measurement and Run Criteria .....	11
12.5	Packet Scheduler.....	11
12.6	Link Adaptation Schemes .....	11
13	System Simulation Results .....	11
14	UE and RNS Impacts .....	11
14.1	UE Impacts .....	11
14.1.1	Memory Requirements for different architectures .....	11
14.1.2	Implementation details .....	11
14.1.3	Equalization.....	11
14.2	Node B Impacts .....	11
14.2.1	Modulation Accuracy .....	11
14.2.2	Peak-to-Average.....	11
15	Release 99 Specification Impacts .....	12
16	Recommendations.....	12
	History.....	12

---

# Foreword

This Technical Specification has been produced by the 3<sup>rd</sup> 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 Technical Report describes several techniques, which facilitate high-speed downlink packet access. Furthermore, it describes how these concepts should be integrated into the overall architecture of UTRA.

---

# 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.

[<seq>]            <doctype> <#> [ ([up to and including]{yyyy[-mm]|V<a[b.c]>}[onwards])]: "<Title>".

[1]                3G TS 25.123: "Example 1, using sequence field".

[2]                3G TR 29.456 (V3.1.0): "Example 2, using fixed text".

---

# 3 Definitions, symbols and abbreviations

## 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:

*Abbreviation format*

<ACRONYM>    <Explanation>

---

## 4 Background and Introduction

In RAN#7 plenary meeting a work item was approved for “Feasibility study for high speed downlink packet access”. The work item is a feasibility study, where the current DSCH is proposed to be modified to support higher peak rates using techniques like adaptive modulation and coding, hybrid ARQ and other advanced features.

---

## 5 Basic structure of Enhanced DSCH

{This section should discuss and describe the basic structural properties of enhanced DSCH, with focus on possible differences to current DSCH.}

### 5.1 Architectural issues

### 5.2 Protocol structure

### 5.3 Basic physical structure

---

## 6 Overview of Technologies considered for Enhanced DSCH to support UTRA High Speed Downlink Packet Access

{This section gives a brief overview of some of the technologies being considered to enhance the current DSCH. It may be noted that more technologies may be added during the course of the study as deemed appropriate.}



- 6.1 Adaptive modulation and Coding Schemes
- 6.2 Hybrid ARQ Methods
- 6.3 Fast Cell Site Selection (SSDT Modifications)
- 6.4 Other Technologies

---

## 7 Adaptive Modulation and Coding Schemes (AMCS)

- 7.1 Technical Details
- 7.2 Frame Size
- 7.3 Evaluation of different AMCS
  - 7.3.1 Link Assumptions and results
  - 7.3.2 Performance of Different Modulation and Coding Schemes
- 7.4 Conclusions and Recommendations

---

## 8 Hybrid ARQ

- 8.1 Technical Details
- 8.2 Enablers for Hybrid ARQ
- 8.3 Architectural Alternatives and Impact on Current Specifications
  - 8.3.1 Existing Architecture
  - 8.3.2 Distributed Architecture
  - 8.3.3 MAC-sh
- 8.4 Evaluation of different schemes

## 8.4.1 Chase Combining

### 8.4.1.1 Link Assumptions and results

## 8.4.2 Incremental Redundancy

### 8.4.2.1 Link Assumptions and results

## 8.4.3 Other Schemes

## 8.5 Conclusions and Recommendations

---

# 9 Associated signalling needed for Enhanced DSCH operation for High Speed Downlink Packet Access

## 9.1 Associated Uplink signalling

{This section should discuss the uplink signalling needed for operation of Enhanced DSCH, e.g. signalling for AMCS and fast site selection and acknowledgements for Hybrid ARQ.}

## 9.2 Associated Downlink signalling

{This section should discuss the downlink signalling needed for operation of Enhanced DSCH, e.g. AMCS and sequence number for Hybrid ARQ.}

## 9.3 Conclusions and recommendations

---

# 10 Fast Cell Site Selection

## 10.1 Architecture

## 10.2 Impact on current specification

## 10.3 Evaluation of different schemes

## 10.4 Conclusions and recommendations

{Additional section may be added later to accommodate additional technologies.}

---

## 11 Impacts on Interfaces

### 11.1 Iub Impacts

### 11.2 Iur Impacts

---

## 12 Simulation Criteria

### 12.1 Traffic Models

### 12.2 Propagation Model, Antenna Pattern, UE Speed Distribution

### 12.3 Channel Models

### 12.4 Measurement and Run Criteria

### 12.5 Packet Scheduler

### 12.6 Link Adaptation Schemes

---

## 13 System Simulation Results

## 14 UE and RNS Impacts

### 14.1 UE Impacts

#### 14.1.1 Memory Requirements for different architectures

#### 14.1.2 Implementation details

#### 14.1.3 Equalization

### 14.2 Node B Impacts

#### 14.2.1 Modulation Accuracy

#### 14.2.2 Peak-to-Average

---

## 15 Release 99 Specification Impacts

## 16 Recommendations

## History

<b>Document history</b>		
<b>Date</b>	<b>Version</b>	<b>Comment</b>
May 26, 2000	0.0.0	Proposed outline
Rapporteur for 3G TR xx.xxx is: Ravi Kuchibhotla		
Email : Ravi.Kuchibhotla@motorola.com		
This document is written in Microsoft Word version 97.		