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Technical Report

**UMTS Terrestrial Radio Access Network (UTRAN);
UTRA User Equipment (UE) physical layer capability classes
(UMTS XX.21 version 1.0.1)**

UMTS

Universal Mobile
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ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
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Foreword

This Technical Report (TR) has been produced by the Special Mobile Group (SMG) of the European Telecommunications Standards Institute (ETSI).

This TR describes the UTRA User Equipment (UE) physical layer capability classes‘.

The contents of this TR are subject to continuing work within SMG2 and SMG2 UMTS layer 1 expert group and may change following approval by either of these two groups

Introduction

The purpose of this document is to identify the capabilities of different types of UTRA User equipment (UE). The aim is to allow a range of UTRA User equipment (UE) types with differing complexity, without limiting the overall performance of the UTRA network.

The general principle is to identify User equipment (UE) ‘‘Capability Classes’’ which must be defined in order to preserve the efficiency of UMTS while allowing manufacturers to develop a range of user equipment types of varying complexity and functionality. The only exception to this will be any cases where the lack of a specific functionality will have a major impact on other users of UMTS.

This document will list all the parameters and options of UTRA FDD and TDD modes which have an impact on the user equipment (UE) and network, i.e. where there is a potential trade-off between UE and network in terms of complexity and/or performance.

1 Scope

This Technical Report (TR) describes the UTRA User Equipment (UE) physical layer capability classes. The scope of this document is strictly limited to the physical layer parameters that have a direct effect on the classification of User equipment (UE) types. Any User equipment (UE) features which do not have an impact on the UTRA physical layer are beyond the scope of this document.

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] UMTS 22.01, "Service aspects; Service principles", v3.2.1, January 1998
 - [2] UMTS 22.07, "Terminal and smart card concepts", v3.0.0, March 1998
 - [3] UMTS XX.06, "UTRA FDD; Radio transmission and reception", v0.2.0, Nov 1998
 - [4] UMTS XX.03, "UTRA FDD, spreading and modulation description", v0.3.0, Nov 1998
 - [5] UMTS XX.11, "UTRA TDD, spreading and modulation description", v0.3.0, Nov 1998
 - [6] UMTS XX.04, "UTRA FDD, multiplexing, channel coding and interleaving description", v0.6.1, Nov 1998
 - [7] UMTS XX.10, "UTRA TDD, multiplexing, channel coding and interleaving description", v0.4.1, Nov 1998
 - [8]
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3 Definitions and Abbreviations

3.1 Definitions

See [1] for definition of fundamental concepts and vocabulary

3.2 Abbreviations

4 General

UMTS 22.01 [1] states that limits to the possible types of UTRA UE should be avoided as much as possible and that a mechanism by which the capabilities of the user equipment can be indicated to the network shall be provided. This is further defined in UMTS 22.07 [2] which also defines other mandatory functions that an user equipment shall support (e.g. support for originating and receiving a connection oriented or connectionless service).

It is important there are no limitations for building terminals for any applications. This is also stated by SMG1 in UMTS 22.01, "Service Aspects, Service Principles" [1].

The basic principle of this document is that the user equipment capabilities for handling different types of services should be optional. Only the control channels required for setting up a connection, like BCCH, RACH, PCH, FACH and a dedicated control channel used for service negotiation need to be mandatory, all other types of services should be optional. **However, this document does not describe the services themselves only the physical parameters required for those services.**

5 Terminal classification

All the parameters and their values within this section are FFS.

5.1 Classification of common parameters in both UTRA-FDD and UTRA-TDD

To simplify the design of dual mode FDD and TDD terminals the following parameters must have common classification for both modes.

5.1.1 Output power & spectral mask

A UTRA UE shall support one of the defined user equipment power capability classes which defines the maximum output power and the permitted RF emissions. *{RF emissions and power capability are not defined in this document}*. See “UTRA FDD; Radio transmission and reception” [3] & “UTRA TDD; Radio transmission and reception” [N/A].

5.1.2 Multi-code

Support for transmitting or receiving more than one channelisation code is optional. The use of multi-code is independent for up-links and down-links so that it should be possible to have different combinations of multi-code for up-link and down-links, e.g. an UE that transmits only one code but can receive in multi-code. See “UTRA FDD, spreading and modulation description” [4] & “UTRA TDD, spreading and modulation description” [5].

5.1.3 Transport channel multiplexing

Transport channel multiplexing by time multiplexing of transport channels shall be mandatory, but multi-code service multiplexing should be optional. By multi-code service multiplexing is here meant two or more DPDCHs with one DPCCCH each and thereby independent power control loops.

Also the maximum number of simultaneously multiplexed transport channels must be classified. The number of transport channels that is mandatory for a receiver to handle is to be determined. There must also be some optional classes with different number of transport channels that can be handled, these classes are to be determined. See “UTRA FDD, multiplexing, channel coding and interleaving description” [6] and “UTRA TDD, multiplexing, channel coding and interleaving description” [7].

5.1.4 Carrier Raster

[The carrier raster should extend beyond the current core UMTS frequency band, to allow future re-farming of other frequency bands. A common carrier raster of 200 kHz should be used for both UTRA-FDD and UTRA-TDD. See [3] & [N/A]. *{TBD}*]

5.1.5 Frequency bands

A UTRA UE shall support the core UMTS frequency band with a 200kHz carrier raster. The classification of frequency bands should extend beyond the current core UMTS frequency to allow re-farming of frequency and roaming terminal between regions with different frequency allocations. See [3] & [N/A].

5.2 Classification of UTRA-FDD parameters

This sub-section only applies to FDD operation of a UTRA UE.

5.2.1 Variable duplex distance

See [3].

5.2.2 Chip rate

A UTRA UE shall support at least the basic FDD chip rate (4.096 Mcps), but additional support for other rates is optional. See [4].

5.2.3 Spreading factor

A UTRA UE shall support all defined spreading factors in the range [16] to [256]. Support for spreading factors lower than [16] shall be optional. There shall be parameters setting spreading factors in down-link and up-link independently. See [4].

5.2.4 Channel coding and interleaving

A UTRA UE shall support a minimum sub-set of channel coding scheme. The coding and interleaving schemes used by the common transport channels must be mandatory. Support for other service-specific channel coding (such as Turbo coding) is optional. See [6].

5.3 Classification of UTRA-TDD parameters

This sub-section only applies to TDD operation of a UMTS UE.

Parameters - *{TBD}*

5.4 Classification of UTRA / GSM multi-mode mobile terminals

UMTS 22.01 [1] requires that the UMTS and GSM systems support hand-over in both directions, the standard must define the capabilities that a dual-mode UMTS/GSM handset must support to perform this hand-over.

As an alternative, this could be defined as a more generic set of UTRA capabilities that a dual-mode UMTS/2G terminal must support which would allow calls to be handed over between UMTS and other pre-UMTS systems in both directions.

6 User Equipment (UE) capability classes

The physical parameters shall be collected into a limited number of UE physical layer capability classes. This does not prevent other combinations of physical layer parameters. If a terminal does not correspond to a default class it can also be classified by a list of parameters. The classes shall define the terminals used for optimising the network. The classes should also reflect the most common sets of physical parameters. The exact definitions are FFS.

History

Document History		
Issue	Date	Description of changes
0.0.1	19/8/1998	Document creation, basic scope and document template
0.0.2	22/9/98	Update from L1#6 working group (for information at SMG#27)
0.0.3	3/11/98	Change of title from 'Mobile station capability classes - for the UTRA air-interface' to 'UTRA mobile station capability classes - for the air-interface'
0.0.4	??/12/98	Update from comments received on v0.0.3
0.0.5	19/1/99	Changes request during the ETSI STC SMG2 UMTS layer 1 expert group meeting #10 in Espoo, Finland ('mobile station' has changed to UE, also see Tdoc SMG2 UMTS L1 68/99)
0.1.0	20/1/99	Update of version number after approved of the SMG2 UMTS layer 1 expert group
1.0.0	28/1/99	Removal of text in §4.2.1. Note added on status of §4. Version number raised for forwarding to 3GPP via SMG.
1.0.1	30/1/99	Reformatted in line with ETSI & 3GPP Style for SMG#28
<p>Editor of document 'UTRA User Equipment (UE) physical layer capability classes'</p> <p>Stephen Truelove NEC Technologies (UK) Ltd. Imperium Imperial Way Reading Berks. RG17 0LL</p> <p>Tel No. : +44 (0)1189 65 4583 Fax No. : +44 (0)1189 257 191 Email : stephen.truelove@nectech.co.uk</p> <p>This document is written in Microsoft Word 95 - version 7</p>		