

**3rd Generation Partnership Project;
Technical Specification Group Radio Access Network;
Evolved Universal Terrestrial Radio Access (E-UTRA)
Medium Access Control (MAC) protocol specification
(Release 8)**



The present document has been developed within the 3rd 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 Organizational Partners and shall not be implemented.
This Specification is provided for future development work within 3GPP only. The Organizational Partners accept no liability for any use of this Specification.

Keywords
UMTS, radio

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.

© 2008, 3GPP Organizational Partners (ARIB, ATIS, CCSA, ETSI, TTA, TTC).
All rights reserved.

Contents

Foreword	5
1 Scope	6
2 References	6
3 Definitions and abbreviations	6
3.1 Definitions	6
3.2 Abbreviations	7
4 General	8
4.1 Introduction	8
4.2 MAC architecture	8
4.2.1 MAC Entities	8
4.3 Services	8
4.3.1 Services provided to upper layers	8
4.3.2 Services expected from physical layer	8
4.4 Functions	9
4.5 Channel structure	9
4.5.1 Transport Channels	9
4.5.2 Logical Channels	10
4.5.3 Mapping of Transport Channels to Logical Channels	10
4.5.3.1 Uplink mapping	10
4.5.3.2 Downlink mapping	11
5 MAC procedures	11
5.1 Random Access procedure	11
5.1.1 Random Access Procedure initialization	11
5.1.2 Random Access Resource selection	12
5.1.3 Random Access Preamble transmission	12
5.1.4 Random Access Response reception	13
5.1.5 Contention Resolution	14
5.1.6 Completion of the Random Access procedure	15
5.2 Maintenance of Uplink Time Alignment	15
5.3 DL-SCH data transfer	16
5.3.1 DL Assignment reception	16
5.3.2 HARQ operation	16
5.3.2.1 HARQ Entity	16
5.3.2.2 HARQ process	17
5.3.3 Disassembly and demultiplexing	17
5.4 UL-SCH data transfer	18
5.4.1 UL Grant reception	18
5.4.2 HARQ operation	18
5.4.2.1 HARQ entity	18
5.4.2.2 HARQ process	19
5.4.3 Multiplexing and assembly	20
5.4.3.1 Logical channel prioritization	20
5.4.3.2 Multiplexing of MAC SDUs	21
5.4.4 Scheduling Request	21
5.4.5 Buffer Status Reporting	21
5.4.6 Power Headroom Reporting	22
5.5 PCH reception	22
5.6 BCH reception	23
5.7 Discontinuous Reception (DRX)	23
5.8 MAC reconfiguration	24
5.9 MAC Reset	24
5.X Handling of unknown, unforeseen and erroneous protocol data	24

6	Protocol Data Units, formats and parameters.....	24
6.1	Protocol Data Units.....	24
6.1.1	General	24
6.1.2	MAC PDU (DL-SCH and UL-SCH).....	24
6.1.3	MAC Control Elements.....	26
6.1.3.1	Buffer Status Report MAC Control Elements	26
6.1.3.2	C-RNTI MAC Control Element	26
6.1.3.3	DRX Command MAC Control Element.....	26
6.1.3.4	UE Contention Resolution Identity MAC Control Element	27
6.1.3.5	Timing Advance MAC Control Element.....	27
6.1.3.6	Power Headroom MAC Control Element.....	27
6.1.4	MAC PDU (transparent MAC)	28
6.1.5	MAC PDU (Random Access Response)	28
6.2	Formats and parameters	29
6.2.1	MAC header for DL-SCH and UL-SCH	29
6.2.2	MAC header for Random Access Response	30
6.2.3	MAC payload for Random Access Response	30
7	Variables and constants	31
7.1	RNTI values.....	32
7.2	Backoff Parameter values	32

Annex A (informative): Change history33

Foreword

This Technical Specification 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.

Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.