

ETSI TS 144 060 V12.5.0 (2015-07)



TECHNICAL SPECIFICATION

**Digital cellular telecommunications system (Phase 2+);
General Packet Radio Service (GPRS);
Mobile Station (MS) - Base Station System (BSS) interface;
Radio Link Control / Medium Access Control (RLC/MAC)
protocol
(3GPP TS 44.060 version 12.5.0 Release 12)**



ReferenceRTS/TSGG-0244060vc50

KeywordsGSM

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - 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

Important notice

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2015.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	18
1 Scope	19
1.1 General	19
1.2 Related documents	19
1.3 Use of logical control channels	19
1.4 Use of logical traffic channels.....	20
1.5 Conventions.....	20
1.6 Restrictions.....	21
2 References	21
3 Definitions, abbreviations and symbols	23
3.1 Definitions	23
3.2 Abbreviations	28
3.3 Symbols.....	30
4 Layered overview of radio interface.....	30
4.1 Layer services.....	31
4.2 Layer functions.....	31
4.3 Service primitives.....	32
4.4 Services required from lower layers.....	32
5 Introduction to the Medium Access Control (MAC) procedures	32
5.1 General	32
5.2 Multiplexing principles	33
5.2.1 Temporary Block Flow	33
5.2.2 Temporary Flow Identity	34
5.2.3 Uplink State Flag	35
5.2.4 Medium Access modes	35
5.2.4a Multiplexing of GPRS, EGPRS and EGPRS2 capable mobile stations.....	35
5.3 Packet idle mode	36
5.3.1 Broadcast/multicast receive mode	36
5.4 Packet transfer mode	37
5.4a Dual transfer mode	37
5.5 General procedures in packet idle and packet transfer modes	38
5.5.1 Mobile station side.....	38
5.5.0.1 Indication of a selected PLMN.....	38
5.5.1.1 Cell reselection.....	38
5.5.1.1a Network Assisted Cell Change	40
5.5.1.1a.1 Neighbour Cell System Information Distribution	40
5.5.1.1a.2 CCN Mode	40
5.5.1.1b Release of RR connection	40
5.5.1.1b.1 General	40
5.5.1.1b.2 Continuation of PBCCH information	40
5.5.1.1b.3 Continuation of BCCH information	41
5.5.1.1b.4 Receipt of PSI14 message in dual transfer mode	41
5.5.1.1b.5 Acquisition of system information for enhanced DTM CS release procedure in dual transfer mode	41
5.5.1.1c Inter-RAT cell re-selection based on priority information.....	42
5.5.1.1c.1 General	42
5.5.1.1c.2 Common priorities information.....	43
5.5.1.1c.3 Provision of individual priorities information	43
5.5.1.1d (void)	43

5.5.1.2	System information on PBCCH	43
5.5.1.2.1	Supervision of PBCCH_CHANGE_MARK and update of PBCCH information	44
5.5.1.2.2	Replacement of PBCCH	44
5.5.1.2.3	PSII reception failure	45
5.5.1.3	System information on BCCH	45
5.5.1.3.1	Supervision of BCCH_CHANGE_MARK and update of BCCH information	45
5.5.1.3.2	Establishment of PBCCH	46
5.5.1.3.3	SI13 reception failure	46
5.5.1.4	Acquisition of system information on the broadcast channel	46
5.5.1.4.1	Consistent sets of system information messages	47
5.5.1.4.2	Suspension of operation to receive system information	47
5.5.1.4.3	Request for acquisition of system information	47
5.5.1.5	Discontinuous reception (DRX)	49
5.5.1.6	Page mode procedures on PCCCH	50
5.5.1.7	Frequency Parameters	50
5.5.1.8	TLLI management	53
5.5.1.9	Packet Flow Context (PFC)	53
5.5.1.10	Acquisition of E-UTRAN Information on the PACCH	54
5.5.2	Network side	55
5.5.2.1	System Information broadcasting	55
5.5.2.1.1	System information on PBCCH	55
5.5.2.1.2	System information on BCCH	55
5.5.2.1.3	System information on PACCH (and other logical channels)	56
5.5.2.1.3a	Rules for (P)SI distribution within Packet Serving Cell Data messages	57
5.5.2.1.3b	Rules for (P)SI distribution on PACCH of an MBMS radio bearer	57
5.5.2.1.4	Consistent sets of system information messages	57
5.5.2.2	Paging	58
5.5.2.3	Network Assisted Cell Change	59
5.5.2.4	Packet Switched Handover	59
5.6	Measurement reports	59
5.6.0	General	59
5.6.1	Network Control (NC) measurement reporting	60
5.6.2	(void)	61
5.6.3	Additional measurement and reporting parameters	61
5.6.3.1	Deriving the 3G Neighbour Cell list from the 3G Neighbour Cell description	61
5.6.3.1a	Deriving the E-UTRAN Neighbour Cell list from the Repeated E-UTRAN Neighbour Cell information	62
5.6.3.2	Deriving BA(GPRS) and the GSM Neighbour Cell list	63
5.6.3.3	Deriving the Neighbour Cell list from the GSM Neighbour Cell list and the 3G Neighbour Cell list	64
5.6.3.4	GPRS Real Time Differences	64
5.6.3.5	GPRS Report Priority Descriptions	65
5.6.3.6	GPRS Measurement Parameters and GPRS 3G Measurement Parameters	65
5.6.3.6a	GPRS E-UTRAN Measurement Parameters	65
5.6.3.7	The GPRS 3G Cell Reselection list	66
5.6.3.7a	(void)	66
5.6.3.7b	The 3G Frequency list	66
5.6.3.8	Closed Subscriber Group Information	66
5.6.3.9	Reporting of CSG Cells and Hybrid Cells	67
5.6.4	Measurement reporting in broadcast/multicast receive mode	68
5.7	Dual transfer mode enhancements	69
5.8	DTM Handover	69
5.9	Downlink Dual Carrier	69
5.10	ETWS Primary Notification	69
5.11	Enhanced Multiplexing for Single TBF	69
5.12	Enhanced Multiplexing for a Single RLC Entity	70
5.13	Downlink Multi Carrier	71
6	Paging procedures	72
6.1	Paging procedure for RR connection establishment	72
6.1.1	Paging initiation using paging subchannel on CCCH	72
6.1.2	Paging initiation using paging subchannel on PCCCH	72

6.1.3	Paging initiation using PACCH	72
6.1.4	Paging response	73
6.2	Paging procedure for downlink packet transfer	73
6.2.1	Paging procedure using paging subchannel on CCCH	74
6.2.2	Paging using paging subchannel on PCCCH	74
6.2.3	Paging response	74
6.3	Paging Procedures for MBMS Notification	74
6.3.1	Notification to mobile station in packet idle mode	74
6.3.1.1	General	74
6.3.1.2	Paging procedure for MBMS notification using paging subchannel on CCCH	74
6.3.1.3	Paging procedure for MBMS notification using paging subchannel on PCCCH	74
6.3.1.3.1	General	74
6.3.1.3.2	MBMS pre-notification	75
6.3.1.3.3	MBMS notification	75
6.3.1.3a	Paging procedure for MBMS notification using PACCH	76
6.3.1.4	Response to MBMS Notification	76
6.3.2	Notification to mobile station in packet transfer mode or in dual transfer mode	77
6.3.2.1	General	77
6.3.2.2	MBMS Notification using the PACCH	77
6.3.2.3	Response to MBMS Notification received on PACCH	77
6.4	Paging Procedure for ETWS Primary Notification delivery	78
6.4.1	General	78
6.4.2	ETWS Primary Notification delivery using paging subchannel on CCCH	78
6.4.3	ETWS Primary Notification delivery using paging subchannel on PCCCH	78
6.4.4	Reception of ETWS Primary Notification message	78
7	Medium Access Control (MAC) procedures on PCCCH	79
7.0	General	79
7.0a	Support of multiple TBF procedures	79
7.0b	(void)	79
7.1	TBF establishment initiated by the mobile station on PCCCH	79
7.1.1	Permission to access the network	80
7.1.2	Initiation of a TBF establishment	80
7.1.2.1	Initiation of the packet access procedure	80
7.1.2.1.1	Access persistence control on PRACH	82
7.1.2.2	Packet assignment procedure	83
7.1.2.2.1	On receipt of a PACKET CHANNEL REQUEST or EGPRS PACKET CHANNEL REQUEST message	83
7.1.2.2.1a	Acquisition of MS Radio Access Capability information within EGPRS TBF establishment procedure	85
7.1.2.2.2	Packet access queuing notification procedure	85
7.1.2.2.3	Packet polling procedure	86
7.1.2.2.4	Packet access reject procedure	86
7.1.2.3	Contention resolution at one phase access	87
7.1.2.3a	RLC/MAC procedures during contention resolution	87
7.1.2.4	One phase packet access completion	88
7.1.2.5	Timing Advance	88
7.1.2.6	PFC procedure at one phase access	88
7.1.3	TBF establishment using two phase access	89
7.1.3.1	Initiation of the Packet resource request procedure	89
7.1.3.2	Packet resource assignment for uplink procedure	90
7.1.3.2.1	On receipt of a PACKET RESOURCE REQUEST message	90
7.1.3.3	Contention resolution at two phase access	92
7.1.3.4	Two phase packet access completion	92
7.1.3.5	Timing Advance	92
7.1.3.6	RTTI Assignments	93
7.1.3.7	MTTI Configurations	93
7.1.4	Abnormal cases	94
7.2	TBF establishment initiated by the network on PCCCH	95
7.2.1	Entering the packet transfer mode	95
7.2.1.1	Packet downlink assignment procedure	95
7.2.1.2	Packet downlink assignment procedure completion	96

7.2.1.3	Packet polling procedure.....	97
7.2.2	Abnormal cases.....	97
7.3	Procedure for measurement report sending in packet idle mode.....	97
7.3.1	Measurement report sending procedure initiated on PCCCH.....	97
7.3.1.1	On receipt of a PACKET CHANNEL REQUEST message.....	97
7.3.1.2	On receipt of a PACKET UPLINK ASSIGNMENT message.....	98
7.3.1.3	On receipt of a PACKET ACCESS REJECT message.....	98
7.3.1.4	Abnormal cases.....	98
7.3.2	Measurement report sending procedure initiated on CCCH.....	98
7.4	Cell Change Order procedures in Packet Idle mode.....	99
7.4.1	Cell Change Order procedure initiated on PCCCH.....	99
7.4.2	Cell Change Order procedure initiated on CCCH.....	100
7.5	Measurement Order procedures in Packet Idle mode.....	100
7.5.1	Measurement Order procedures initiated on PCCCH.....	100
7.5.2	Measurement Order procedures initiated on CCCH.....	101
7.6	Packet Pause procedure.....	101
7.6.1	Packet pause procedure initiated on PCCCH.....	101
7.6.1.1	On receipt of a PACKET CHANNEL REQUEST message.....	101
7.6.1.2	On receipt of a PACKET UPLINK ASSIGNMENT message.....	102
7.6.1.3	On receipt of a PACKET ACCESS REJECT message.....	102
7.6.1.4	Abnormal cases.....	102
7.6.2	Packet pause procedure initiated on CCCH.....	102
7.7	MBMS packet access and establishment procedures.....	102
7.7.1	MBMS packet access procedure.....	102
7.7.1.1	General.....	102
7.7.1.2	MBMS packet access procedure on PCCCH.....	103
7.7.1.2.0	Initiation of the MBMS packet access procedure.....	103
7.7.1.2.1	On receipt of a PACKET CHANNEL REQUEST message.....	103
7.7.1.2.2	On receipt of a PACKET UPLINK ASSIGNMENT message.....	103
7.7.1.2.3	On receipt of a PACKET ACCESS REJECT message.....	103
7.7.1.2.4	On receipt of an MBMS ASSIGNMENT message.....	103
7.7.1.2.5	Abnormal cases.....	103
7.7.1.3	MBMS packet access procedure on CCCH.....	104
7.7.1.4	MBMS packet access procedure on MPRACH.....	104
7.7.1.4.1	Initiation of the MBMS packet access procedure on MPRACH.....	104
7.7.1.4.1.1	Access persistence control on MPRACH.....	104
7.7.1.4.2	On receipt of an MPRACH PACKET CHANNEL REQUEST.....	105
7.7.1.4.3	On receipt of a PACKET ACCESS REJECT message.....	105
7.7.1.4.4	On receipt of a PACKET UPLINK ASSIGNMENT message.....	106
7.7.1.4.5	On receipt of an MBMS ASSIGNMENT message.....	106
7.7.2	Establishment of MBMS bearer.....	106
7.7.2.1	General.....	106
7.7.2.2	On receipt of an MBMS ASSIGNMENT message.....	107
7.7.2.3	Abnormal cases.....	108
7.7.2.4	MBMS address assignment procedure.....	108
7.7.3	MBMS Neighbour Cell Information Distribution.....	109
8	Medium Access Control (MAC) Procedures in Packet Transfer Mode.....	110
8.0	General.....	110
8.1	Transfer of RLC data blocks.....	110
8.1.0	Medium access mode.....	110
8.1.1	Uplink RLC data block transfer.....	110
8.1.1.1	Dynamic allocation uplink RLC data block transfer.....	117
8.1.1.1.1	PACCH operation.....	118
8.1.1.1.2	Resource Reallocation for Uplink.....	119
8.1.1.1.2.1	Abnormal cases.....	121
8.1.1.1.3	Establishment of Downlink TBF.....	122
8.1.1.1.3.1	Abnormal cases.....	124
8.1.1.2	Extended Dynamic Allocation uplink RLC data block transfer.....	125
8.1.1.2.1	Uplink PDCH Allocation.....	126
8.1.1.2.2	PACCH operation.....	128
8.1.1.2.3	Neighbour cell power measurements.....	129

8.1.1.2.4	Shifted USF operation	129
8.1.1.3	(void).....	130
8.1.1.3a	Exclusive allocation RLC data block transfer	130
8.1.1.3a.1	General	130
8.1.1.3a.2	Radio link failure.....	130
8.1.1.3a.3	(void)	131
8.1.1.3a.4	PACCH operation.....	131
8.1.1.3a.5	Resource Reallocation for Uplink	131
8.1.1.3a.5.1	General.....	131
8.1.1.3a.5.2	Change of service demand	131
8.1.1.3a.5.3	Reallocation of radio resources for an uplink TBF	132
8.1.1.3a.5.4	Rejection of new service demand	132
8.1.1.3a.5.5	Abnormal cases.....	132
8.1.1.3a.6	Establishment of Downlink TBF	133
8.1.1.3a.6.1	General.....	133
8.1.1.3a.6.2	Abnormal cases.....	133
8.1.1.4	Network initiated release of uplink TBF.....	134
8.1.1.5	Abnormal cases	134
8.1.1.6	Change of RLC mode in extended uplink TBF mode.....	135
8.1.1.6.1	General	135
8.1.1.6.2	Change of RLC mode	135
8.1.1.6.3	Abnormal cases	135
8.1.1.7	Change of EGPRS level	135
8.1.1.7.1	Change of EGPRS level for downlink TBFs.....	135
8.1.1.7.2	Change of EGPRS level for uplink TBFs.....	135
8.1.2	Downlink RLC data block transfer	139
8.1.2.1	Downlink RLC data block transfer	140
8.1.2.1.1	Abnormal cases	141
8.1.2.2	Polling for Packet Downlink Ack/Nack.....	143
8.1.2.3	(void).....	144
8.1.2.4	Resource Reassignment for Downlink	144
8.1.2.4.1	Abnormal cases.....	145
8.1.2.5	Establishment of uplink TBF	146
8.1.2.5.1	Abnormal cases	148
8.1.2.6	(void).....	149
8.1.2.7	(void).....	149
8.1.2.8	Network initiated abnormal release of downlink TBF	149
8.1.3	(void)	150
8.1.4	RLC data block transfer during an MBMS radio bearer.....	150
8.1.4.0	General	150
8.1.4.1	RLC data block transfer during an MBMS radio bearer	150
8.1.4.2	Polling for MBMS Downlink Ack/Nack.....	150
8.1.4.3	Reconfiguration of an MBMS radio bearer.....	151
8.1.4.3.1	Individual reassignment of an MS_ID.....	151
8.1.4.3.2	Reassignment of the MBMS Bearer Identity.....	151
8.1.4.3.3	Resource reassignment for an MBMS radio bearer.....	153
8.1.4.4	Network initiated release of an MBMS radio bearer.....	154
8.1.4.5	Suspension/Resumption of the reception of an MBMS radio bearer	154
8.1.5	Multiple MBMS radio bearers.....	155
8.1.5.1	Transmission of multiple MBMS radio bearers	155
8.1.5.2	Reception of multiple MBMS radio bearers	155
8.1.5.2.1	General	155
8.1.5.2.2	Reception of notification of lower priority MBMS session whilst receiving higher priority MBMS session(s)	155
8.1.5.2.3	Reception of assignment of lower priority MBMS session whilst receiving higher priority MBMS session(s)	155
8.1.5.2.4	Reception of notification of higher priority MBMS session whilst receiving lower priority MBMS session(s)	156
8.1.5.2.5	Reception of assignment of higher priority MBMS session whilst receiving lower priority MBMS session(s)	156
8.1.5.2.6	Cell change whilst receiving multiple MBMS sessions (with MBMS supported by the network in the target cell).....	156

8.1.5.2.7	Resource reassignment for at least one of the received MBMS radio bearers.....	156
8.1.6	MBMS reception resumption after cell reselection	157
8.1.6.1	Default behaviour.....	157
8.1.6.2	Fast reception resumption	157
8.1.7	Packet Application Information.....	158
8.1.7.1	General.....	158
8.1.7.2	Earthquake and Tsunami Warning System (ETWS).....	158
8.1.8	Dynamic Timeslot Reduction	158
8.1.8.1	General.....	158
8.1.8.2	DTR Activation.....	158
8.1.8.3	Resumption to normal operation	159
8.2	Packet PDCH Release	160
8.3	Procedure for measurement report sending in Packet Transfer mode	160
8.4	Network controlled cell reselection procedure.....	160
8.4.1	Network controlled cell reselection completion	161
8.4.1b	(void)	161
8.4.2	Abnormal cases.....	161
8.5	Measurement Order procedures in Packet Transfer mode.....	162
8.6	PACKET CONTROL ACKNOWLEDGEMENT	163
8.7	Abnormal cases	163
8.7.0	General.....	163
8.7.1	Abnormal release without retry	164
8.7.2	Abnormal release with access retry	164
8.7.3	Abnormal release with system information	164
8.7.4	Abnormal release with RR connection establishment retry	165
8.8	Network Assisted Cell Change procedures	165
8.8.1	Neighbour Cell System Information.....	165
8.8.2	CCN setting procedure.....	166
8.8.2a	CCN support description	167
8.8.3	Cell Change Notification procedure.....	167
8.9	RR connection establishment in packet transfer mode.....	169
8.9.0	General.....	169
8.9.1	Initiation.....	170
8.9.1.1	Initiation by the mobile station.....	170
8.9.1.1.1	Transmission of the PACKET CS REQUEST message.....	170
8.9.1.1.2	Answer from the network.....	170
8.9.1.2	Initiation by the network.....	170
8.9.2	Assignment	171
8.9.2.1	Assignment of both dedicated and packet resource	171
8.9.2.2	Assignment of dedicated resource only.....	171
8.9.2.3	Rejection of the mobile station request	171
8.9.3	(void)	172
8.9.4	Abnormal cases.....	172
8.9.4.1	RR connection establishment initiated by the mobile station.....	172
8.9.4.2	RR connection establishment initiated by the network	172
8.10	Packet Switched Handover procedure.....	173
8.10.1	General.....	173
8.10.2	Neighbour Cell System Information Distribution.....	173
8.10.3	PS Handover at the network side	174
8.10.3.1	Initiation of PS Handover Procedure.....	174
8.10.3.2	A/Gb to A/Gb PS Handover.....	174
8.10.3.3	GERAN A/Gb to Iu/E-UTRAN PS Handover	175
8.10.3.4	Iu/E-UTRAN to GERAN A/Gb PS Handover	176
8.10.3.5	A/Gb to GAN PS Handover	176
8.10.3.6	GAN to A/Gb PS Handover	176
8.10.4	PS Handover at the mobile station side	176
8.10.4.1	A/Gb to A/Gb PS Handover.....	176
8.10.4.2	A/Gb to Iu/E-UTRAN PS Handover.....	177
8.10.4.3	Iu/E-UTRAN to A/Gb PS Handover.....	177
8.10.4.4	Physical channel establishment.....	178
8.10.4.4.1	General	178
8.10.4.4.2	Synchronized cell case	178

8.10.4.4.3	Pre-synchronized cell case.....	178
8.10.4.4.4	Non synchronized cell case	179
8.10.4.5	A/Gb to GAN PS Handover	179
8.10.4.6	GAN to A/Gb PS Handover	179
8.10.5	Abnormal Cases	180
8.10.5.1	MS Behaviour for A/Gb to A/Gb PS Handover.....	180
8.10.5.2	MS Behaviour for A/Gb to Iu/E-UTRAN PS Handover.....	181
8.10.5.3	MS Behaviour for Iu/E-UTRAN to A/Gb PS Handover.....	181
8.10.5.4	BSS Behaviour for PS Handover from A/Gb.....	181
8.10.5.5	BSS Behaviour for PS Handover to A/Gb	182
8.10.5.6	MS Behaviour for A/Gb to GAN PS Handover.....	182
8.10.5.7	MS Behaviour for GAN to A/Gb PS Handover.....	182
9	Radio Link Control (RLC) procedures in packet transfer mode	182
9.0	General	182
9.1	Procedures and parameters for peer-to-peer operation.....	183
9.1.1	Send state variable V(S)	184
9.1.1a	Control send state variable V(CS)	184
9.1.2	Acknowledge state variable V(A).....	184
9.1.3	Acknowledge state array V(B).....	185
9.1.3.1	Acknowledge state array V(B) for GPRS TBF Mode.....	185
9.1.3.2	Acknowledge State Array V(B) for EGPRS TBF Mode.....	185
9.1.3.2.1	EGPRS TBF running in RLC acknowledged mode	185
9.1.3.2.2	EGPRS TBF running in RLC non-persistent mode.....	186
9.1.3.3	Acknowledge State Array V(B) for MBMS Bearers	187
9.1.4	Block sequence number BSN	187
9.1.4.1	Block sequence number BSN for GPRS TBF.....	187
9.1.4.2	Block sequence number BSN for EGPRS TBF	187
9.1.4a	Reduced Block Sequence Number RBSN.....	187
9.1.4b	Reduced Block Sequence Number extension RBSNe.....	188
9.1.5	Receive state variable V(R).....	188
9.1.6	Receive window state variable V(Q).....	188
9.1.6.1	General	188
9.1.6.2	RLC acknowledged mode	188
9.1.6.3	RLC unacknowledged mode	188
9.1.6.4	RLC non-persistent mode	188
9.1.7	Receive state array V(N).....	189
9.1.7.1	Receive state array V(N) in GPRS TBF.....	189
9.1.7.2	Receive state array V(N) in EGPRS TBF	189
9.1.7.3	Receive state array V(N) in TBF with FANR activated.....	189
9.1.8	Starting sequence number (SSN) and received block bitmap (RBB)	190
9.1.8.1	Starting sequence number (SSN) and received block bitmap (RBB) in GPRS TBF.....	190
9.1.8.2	Starting sequence number (SSN) and received block bitmap (RBB) in EGPRS TBF	191
9.1.8.2.1	Extended Polling	191
9.1.8.2.2	Determination of SSN	194
9.1.8.2.2a	Determination of ShortSSN and SSN in the Piggy-backed Ack/Nack field.....	196
9.1.8.2.3	Generation of the bitmap	196
9.1.8.2.4	Interpretation of the bitmap.....	198
9.1.9	Window Size.....	199
9.1.9.1	GPRS.....	199
9.1.9.2	EGPRS	199
9.1.9.3	RLC buffer	201
9.1.10	Compression	201
9.1.11	Segmentation of upper layer PDUs into RLC data units	204
9.1.12	Re-assembly of upper layer PDUs from RLC data units	204
9.1.12a	Segmentation of RLC/MAC control messages into RLC/MAC control blocks	207
9.1.12b	Re-assembly of RLC/MAC control messages from RLC/MAC control blocks	207
9.1.13	Priority of upper layer PDUs	208
9.1.14	Fast Ack/Nack Reporting.....	208
9.1.14.1	General	208
9.1.14.2	Polled Fast Ack/Nack Reporting.....	209
9.1.14.3	Event-based Fast Ack/Nack Reporting	209

9.1.15	Time-based encoding of the Piggy-backed Ack/Nack field.....	210
9.1.15.1	Generation of the bitmap.....	210
9.1.15.2	Interpretation of the bitmap.....	211
9.2	Operation during RLC/MAC control message transfer.....	211
9.3	Operation during RLC data block transfer.....	212
9.3.0	General.....	212
9.3.1	Countdown procedure.....	212
9.3.1.1	General.....	212
9.3.1.2	Non-extended uplink TBF mode.....	213
9.3.1.3	Extended uplink TBF mode.....	214
9.3.1a	Delayed release of downlink Temporary Block Flow.....	214
9.3.1b	Extended uplink TBF mode.....	214
9.3.1b.1	Application.....	214
9.3.1b.2	Operation of uplink TBF in extended uplink TBF mode.....	215
9.3.2	Acknowledged mode operation.....	215
9.3.2.0	General.....	215
9.3.2.1	Additional functionality in acknowledged EGPRS TBF Mode.....	216
9.3.2.2	Establishment of Temporary Block Flow.....	217
9.3.2.3	Operation of uplink Temporary Block Flow.....	217
9.3.2.4	Release of uplink Temporary Block Flow.....	218
9.3.2.4.1	General.....	218
9.3.2.4.2	Non-extended uplink TBF mode.....	218
9.3.2.5	Operation of downlink Temporary Block Flow.....	219
9.3.2.6	Release of downlink Temporary Block Flow.....	220
9.3.3	Unacknowledged mode operation.....	221
9.3.3.0	General.....	221
9.3.3.1	Establishment of Temporary Block Flow.....	221
9.3.3.2	Operation of uplink Temporary Block Flow.....	221
9.3.3.3	Release of uplink Temporary Block Flow.....	222
9.3.3.3.1	General.....	222
9.3.3.3.2	Non-extended uplink TBF mode.....	222
9.3.3.4	Operation of downlink Temporary Block Flow.....	223
9.3.3.5	Release of downlink Temporary Block Flow.....	223
9.3.4	Non-persistent mode operation.....	225
9.3.4.0	General.....	225
9.3.4.1	Operation during an MBMS bearer.....	225
9.3.4.2	Release of an MBMS radio bearer.....	225
9.3.4.3	Operation during an EGPRS TBF.....	225
9.4	Abnormal release cases.....	225
9.4.1	Abnormal release with access retry.....	225
9.4.2	Abnormal release with cell reselection.....	225
9.5	Uplink TBF release in extended uplink TBF mode.....	226
10	RLC/MAC block structure.....	227
10.0a	RLC/MAC block structure.....	227
10.0a.1	GPRS RLC/MAC block for data transfer.....	227
10.0a.2	EGPRS RLC/MAC block for data transfer.....	227
10.0a.3	RLC/MAC block for control message transfer.....	229
10.0b	RLC/MAC block format conventions.....	229
10.0b.1	Numbering convention.....	229
10.0b.2	Assembling conventions.....	229
10.0b.2.1	Assembling convention for GPRS RLC data blocks and RLC/MAC control blocks, 11-bit and 8-bit control messages.....	230
10.0b.2.2	Assembling convention for EGPRS RLC data blocks.....	230
10.0b.3	Field mapping conventions.....	230
10.0b.3.1	Field mapping convention for GPRS RLC data blocks, CS-1 or CS-3 encoded RLC/MAC control blocks, 11-bit and 8-bit control messages.....	230
10.0b.3.2	Field mapping convention for EGPRS RLC data blocks and MCS-0 encoded RLC/MAC control blocks.....	230
10.1	Spare bits.....	231
10.2	GPRS RLC data blocks.....	231
10.2.1	Downlink RLC data block.....	231

10.2.2	Uplink RLC data block	232
10.3	RLC/MAC control blocks	232
10.3.1	Downlink RLC/MAC control block	233
10.3.1.1	Blocks encoded using CS-1	233
10.3.1.2	Blocks encoded using MCS-0	233
10.3.2	Uplink RLC/MAC control block	234
10.3a	EGPRS RLC data blocks and RLC/MAC headers	234
10.3a.0	General	234
10.3a.1	EGPRS downlink RLC data block	237
10.3a.2	EGPRS Uplink RLC data block	238
10.3a.3	EGPRS Downlink RLC/MAC header	238
10.3a.3.1	Header type 1: header for MCS-7, MCS-8 and MCS-9	238
10.3a.3.2	Header type 2: header for MCS-6, MCS-5, DAS-5, DAS-6 and DAS-7	239
10.3a.3.3	Header type 3: header for MCS-4, MCS-3, MCS-2, MCS-1 and MCS-0 case	240
10.3a.3.4	Header type 4: header for DAS-8 and DAS-9	242
10.3a.3.5	Header type 5: header for DAS-11 and DAS-12	242
10.3a.3.6	Header type 6: header for DBS-5 and DBS-6	243
10.3a.3.7	Header type 7: header for DBS-7 and DBS-8	243
10.3a.3.8	Header type 8: header for DBS-9 and DBS-10	243
10.3a.3.9	Header type 9: header for DBS-11 and DBS-12	244
10.3a.3.10	Header type 10: header for DAS-10	244
10.3a.4	EGPRS Uplink RLC/MAC header	245
10.3a.4.1	Header type 1: header for MCS-7, MCS-8 and MCS-9	245
10.3a.4.2	Header type 2: header for MCS-6 and MCS-5	245
10.3a.4.3	Header type 3: header for MCS-4, MCS-3, MCS-2 and MCS-1	246
10.3a.4.4	Header type 4: header for UAS-7, UAS-8 and UAS-9	246
10.3a.4.5	Header type 5: header for UAS-10 and UAS-11	247
10.3a.4.6	Header type 6: header for UBS-5 and UBS-6	247
10.3a.4.7	Header type 7: header for UBS-7 and UBS-8	247
10.3a.4.8	Header type 8: header for UBS-9 and UBS-10	247
10.3a.4.9	Header type 9: header for UBS-11 and UBS-12	248
10.3a.5	Piggy-backed Ack/Nack field (SSN-based)	248
10.3a.6	Piggy-backed Ack/Nack field (Time-based)	249
10.4	Header fields	249
10.4.1	Uplink state flag (USF) field	249
10.4.2	Retry (R) bit	249
10.4.3	Stall indicator (SI) bit	249
10.4.4	Supplementary/Polling (S/P) Bit	250
10.4.4a	EGPRS Supplementary/Polling (ES/P) Field	250
10.4.4b	Combined EGPRS Supplementary/Polling (CES/P) Field	250
10.4.5	Relative Reserved Block Period (RRBP) field	251
10.4.5.1	Special requirements in dual transfer mode	254
10.4.6	Countdown Value (CV) field	254
10.4.7	Payload Type field	254
10.4.8	Final block indicator (FBI) bit	255
10.4.8a	Coding and Puncturing Scheme indicator field (CPS)	255
10.4.8a.1	Header type 1	256
10.4.8a.2	Header type 2	256
10.4.8a.3	Header type 3	258
10.4.8a.4	Header type 4	258
10.4.8a.5	Header type 5	259
10.4.8a.6	Header type 6	260
10.4.8a.7	Header type 7	261
10.4.8a.8	Header type 8	262
10.4.8a.9	Header type 9	264
10.4.8a.10	Header type 10	266
10.4.8b	Split Block indicator field (SPB)	267
10.4.9	TLLI Indicator (TI) bit	267
10.4.9a	Address Control (AC) bit	267
10.4.9b	Final Segment (FS) bit	268
10.4.9c	Radio Transaction Identifier (RTI) field	268
10.4.9d	Direction (D) bit	268

10.4.9e	Final Segment extension (FSe) bit.....	268
10.4.10	Temporary Flow Identity (TFI) field	269
10.4.10a	Power Reduction (PR) field.....	269
10.4.11	Extension (E) Bit	269
10.4.12	Block Sequence Number (BSN) field.....	270
10.4.12a	Reduced Block Sequence Number (RBSN) bit	271
10.4.12b	Reduced Block Sequence Number extension (RBSNe) field	271
10.4.13	More (M) bit	271
10.4.14	Length Indicator (LI) field in GPRS TBF mode and DCCH TBF mode (<i>Iu mode</i>)	271
10.4.14a	Length Indicator (LI) field in EGPRS TBF mode and TCH TBF mode (<i>Iu mode</i>)	272
10.4.15	TLLI field	274
10.4.16	RLC data field.....	275
10.4.17	Control message contents field	275
10.4.18	Resent Block Bit (RSB).....	275
10.4.19	PFI Indicator (PI) bit.....	275
10.4.20	Packet Flow Identifier (PFI) field.....	275
10.4.21	PAN Indication (PANI) field.....	275
10.4.22	Beginning of Window (BOW) field	276
10.4.23	Short Starting Sequence Number (ShortSSN) field	276
10.4.24	Carrier ID (CI) field.....	276
10.4.25	TN/PDCH-pair field	276
10.4.26	DTR Blks.....	276
10.4.27	Selected PLMN Index field	276
11	Message functional definitions and contents.....	277
11.1	Handling of erroneous protocol data	278
11.1.1	Message classification	278
11.1.1.1	Distribution messages	278
11.1.1.2	Non-distribution messages	279
11.1.1.2.1	Format of the address information.....	279
11.1.1.3	DBPSCH message (<i>Iu mode</i> only).....	279
11.1.2	Error detection mechanism.....	280
11.1.3	Error labels.....	280
11.1.3.1	Generic error labels.....	280
11.1.3.2	'Ignore' error label	280
11.1.3.3	'Message escape' error label	281
11.1.4	Error detection and order of precedence	281
11.1.4.1	Unknown message type.....	281
11.1.4.2	Message not compatible with current protocol state	282
11.1.4.3	Syntactically incorrect message	282
11.1.4.3.1	Messages with error label: 'Distribution part error'	282
11.1.4.3.2	Messages with error label: 'Address information part error'.....	282
11.1.4.3.3	Messages with error label: 'Non-distribution part error'.....	282
11.1.4.3.4	Messages with error label: 'Message escape'.....	282
11.1.4.3.5	Messages with error label: 'Ignore'	283
11.1.4.3.6	Messages with error label: "DBPSCH message part error".....	283
11.1.4.4	Syntactic error in truncated concatenation	283
11.1.4.5	(void).....	284
11.2	RLC/MAC control messages.....	284
11.2.0	Message format.....	285
11.2.0.1	Downlink RLC/MAC messages.....	286
11.2.0.2	Uplink RLC/MAC messages.....	287
11.2.1	Packet Access Reject	287
11.2.2	Packet Control Acknowledgement	290
11.2.2a	Packet Cell Change Continue	292
11.2.3	Packet Cell Change Failure.....	293
11.2.3a	Packet Cell Change Notification.....	295
11.2.4	Packet Cell Change Order.....	298
11.2.5	Packet Channel Request.....	307
11.2.5a	EGPRS Packet Channel Request	309
11.2.5b	Packet DBPSCH Assignment	311
11.2.5c	MPRACH Packet Channel Request.....	315