

ETSI TS 144 060 V12.6.0 (2017-10)



**Digital cellular telecommunications system (Phase 2+) (GSM);
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 12.6.0 Release 12)**



ReferenceRTS/TSGR-0644060vc60

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

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

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

<https://portal.etsi.org/People/CommiteeSupportStaff.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.

© ETSI 2017.

All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

3GPP™ and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

oneM2M logo is protected for the benefit of its Members.

GSM® and the GSM logo are trademarks 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 (<https://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 |
| 5.5.0.1.1 Cell reselection..... | 38 |
| 5.5.0.1.1a Network Assisted Cell Change | 40 |
| 5.5.0.1.1a.1 Neighbour Cell System Information Distribution | 40 |
| 5.5.0.1.1a.2 CCN Mode | 40 |
| 5.5.0.1.1b Release of RR connection | 40 |
| 5.5.0.1.1b.1 General | 40 |
| 5.5.0.1.1b.2 Continuation of PBCCH information | 40 |
| 5.5.0.1.1b.3 Continuation of BCCH information | 41 |
| 5.5.0.1.1b.4 Receipt of PSI14 message in dual transfer mode | 41 |
| 5.5.0.1.1b.5 Acquisition of system information for enhanced DTM CS release procedure in dual transfer mode | 41 |
| 5.5.0.1.1c Inter-RAT cell re-selection based on priority information..... | 42 |
| 5.5.0.1.1c.1 General | 42 |
| 5.5.0.1.1c.2 Common priorities information..... | 43 |
| 5.5.0.1.1c.3 Provision of individual priorities information | 43 |
| 5.5.0.1.1d (void) | 43 |
| 5.5.0.1.2 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 | PSI1 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)..... | 129 |
| 8.1.1.3a | Exclusive allocation RLC data block transfer..... | 129 |
| 8.1.1.3a.1 | General..... | 129 |
| 8.1.1.3a.2 | Radio link failure..... | 130 |
| 8.1.1.3a.3 | (void)..... | 130 |
| 8.1.1.3a.4 | PACCH operation..... | 130 |
| 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..... | 131 |
| 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..... | 132 |
| 8.1.1.3a.6.1 | General..... | 132 |
| 8.1.1.3a.6.2 | Abnormal cases..... | 133 |
| 8.1.1.4 | Network initiated release of uplink TBF..... | 133 |
| 8.1.1.5 | Abnormal cases..... | 134 |
| 8.1.1.6 | Change of RLC mode in extended uplink TBF mode..... | 134 |
| 8.1.1.6.1 | General..... | 134 |
| 8.1.1.6.2 | Change of RLC mode..... | 134 |
| 8.1.1.6.3 | Abnormal cases..... | 134 |
| 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..... | 138 |
| 8.1.2.1 | Downlink RLC data block transfer..... | 140 |
| 8.1.2.1.1 | Abnormal cases..... | 140 |
| 8.1.2.2 | Polling for Packet Downlink Ack/Nack..... | 142 |
| 8.1.2.3 | (void)..... | 144 |
| 8.1.2.4 | Resource Reassignment for Downlink..... | 144 |
| 8.1.2.4.1 | Abnormal cases..... | 144 |
| 8.1.2.5 | Establishment of uplink TBF..... | 145 |
| 8.1.2.5.1 | Abnormal cases..... | 147 |
| 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)..... | 149 |
| 8.1.4 | RLC data block transfer during an MBMS radio bearer..... | 149 |
| 8.1.4.0 | General..... | 149 |
| 8.1.4.1 | RLC data block transfer during an MBMS radio bearer..... | 149 |
| 8.1.4.2 | Polling for MBMS Downlink Ack/Nack..... | 149 |
| 8.1.4.3 | Reconfiguration of an MBMS radio bearer..... | 150 |
| 8.1.4.3.1 | Individual reassignment of an MS_ID..... | 150 |
| 8.1.4.3.2 | Reassignment of the MBMS Bearer Identity..... | 151 |
| 8.1.4.3.3 | Resource reassignment for an MBMS radio bearer..... | 152 |
| 8.1.4.4 | Network initiated release of an MBMS radio bearer..... | 153 |
| 8.1.4.5 | Suspension/Resumption of the reception of an MBMS radio bearer..... | 153 |
| 8.1.5 | Multiple MBMS radio bearers..... | 154 |
| 8.1.5.1 | Transmission of multiple MBMS radio bearers..... | 154 |
| 8.1.5.2 | Reception of multiple MBMS radio bearers..... | 154 |
| 8.1.5.2.1 | General..... | 154 |
| 8.1.5.2.2 | Reception of notification of lower priority MBMS session whilst receiving higher priority MBMS session(s)..... | 154 |
| 8.1.5.2.3 | Reception of assignment of lower priority MBMS session whilst receiving higher priority MBMS session(s)..... | 154 |
| 8.1.5.2.4 | Reception of notification of higher priority MBMS session whilst receiving lower priority MBMS session(s)..... | 155 |
| 8.1.5.2.5 | Reception of assignment of higher priority MBMS session whilst receiving lower priority MBMS session(s)..... | 155 |
| 8.1.5.2.6 | Cell change whilst receiving multiple MBMS sessions (with MBMS supported by the network in the target cell)..... | 155 |
| 8.1.5.2.7 | Resource reassignment for at least one of the received MBMS radio bearers..... | 155 |

| | | |
|------------|--|-----|
| 8.1.6 | MBMS reception resumption after cell reselection | 156 |
| 8.1.6.1 | Default behaviour | 156 |
| 8.1.6.2 | Fast reception resumption | 156 |
| 8.1.7 | Packet Application Information | 157 |
| 8.1.7.1 | General | 157 |
| 8.1.7.2 | Earthquake and Tsunami Warning System (ETWS) | 157 |
| 8.1.8 | Dynamic Timeslot Reduction | 157 |
| 8.1.8.1 | General | 157 |
| 8.1.8.2 | DTR Activation | 157 |
| 8.1.8.3 | Resumption to normal operation | 158 |
| 8.2 | Packet PDCH Release | 159 |
| 8.3 | Procedure for measurement report sending in Packet Transfer mode | 159 |
| 8.4 | Network controlled cell reselection procedure | 159 |
| 8.4.1 | Network controlled cell reselection completion | 160 |
| 8.4.1b | (void) | 160 |
| 8.4.2 | Abnormal cases | 160 |
| 8.5 | Measurement Order procedures in Packet Transfer mode | 161 |
| 8.6 | PACKET CONTROL ACKNOWLEDGEMENT | 162 |
| 8.7 | Abnormal cases | 162 |
| 8.7.0 | General | 162 |
| 8.7.1 | Abnormal release without retry | 163 |
| 8.7.2 | Abnormal release with access retry | 163 |
| 8.7.3 | Abnormal release with system information | 163 |
| 8.7.4 | Abnormal release with RR connection establishment retry | 164 |
| 8.8 | Network Assisted Cell Change procedures | 164 |
| 8.8.1 | Neighbour Cell System Information Distribution | 164 |
| 8.8.2 | CCN setting procedure | 165 |
| 8.8.2a | CCN support description | 166 |
| 8.8.3 | Cell Change Notification procedure | 166 |
| 8.9 | RR connection establishment in packet transfer mode | 168 |
| 8.9.0 | General | 168 |
| 8.9.1 | Initiation | 169 |
| 8.9.1.1 | Initiation by the mobile station | 169 |
| 8.9.1.1.1 | Transmission of the PACKET CS REQUEST message | 169 |
| 8.9.1.1.2 | Answer from the network | 169 |
| 8.9.1.2 | Initiation by the network | 169 |
| 8.9.2 | Assignment | 170 |
| 8.9.2.1 | Assignment of both dedicated and packet resource | 170 |
| 8.9.2.2 | Assignment of dedicated resource only | 170 |
| 8.9.2.3 | Rejection of the mobile station request | 170 |
| 8.9.3 | (void) | 171 |
| 8.9.4 | Abnormal cases | 171 |
| 8.9.4.1 | RR connection establishment initiated by the mobile station | 171 |
| 8.9.4.2 | RR connection establishment initiated by the network | 171 |
| 8.10 | Packet Switched Handover procedure | 172 |
| 8.10.1 | General | 172 |
| 8.10.2 | Neighbour Cell System Information Distribution | 172 |
| 8.10.3 | PS Handover at the network side | 173 |
| 8.10.3.1 | Initiation of PS Handover Procedure | 173 |
| 8.10.3.2 | A/Gb to A/Gb PS Handover | 173 |
| 8.10.3.3 | GERAN A/Gb to Iu/E-UTRAN PS Handover | 174 |
| 8.10.3.4 | Iu/E-UTRAN to GERAN A/Gb PS Handover | 175 |
| 8.10.3.5 | A/Gb to GAN PS Handover | 175 |
| 8.10.3.6 | GAN to A/Gb PS Handover | 175 |
| 8.10.4 | PS Handover at the mobile station side | 175 |
| 8.10.4.1 | A/Gb to A/Gb PS Handover | 175 |
| 8.10.4.2 | A/Gb to Iu/E-UTRAN PS Handover | 176 |
| 8.10.4.3 | Iu/E-UTRAN to A/Gb PS Handover | 176 |
| 8.10.4.4 | Physical channel establishment | 177 |
| 8.10.4.4.1 | General | 177 |
| 8.10.4.4.2 | Synchronized cell case | 177 |
| 8.10.4.4.3 | Pre-synchronized cell case | 177 |

| | | |
|------------|---|-----|
| 8.10.4.4.4 | Non synchronized cell case | 178 |
| 8.10.4.5 | A/Gb to GAN PS Handover | 178 |
| 8.10.4.6 | GAN to A/Gb PS Handover | 178 |
| 8.10.5 | Abnormal Cases | 179 |
| 8.10.5.1 | MS Behaviour for A/Gb to A/Gb PS Handover | 179 |
| 8.10.5.2 | MS Behaviour for A/Gb to Iu/E-UTRAN PS Handover | 180 |
| 8.10.5.3 | MS Behaviour for Iu/E-UTRAN to A/Gb PS Handover | 180 |
| 8.10.5.4 | BSS Behaviour for PS Handover from A/Gb | 180 |
| 8.10.5.5 | BSS Behaviour for PS Handover to A/Gb | 181 |
| 8.10.5.6 | MS Behaviour for A/Gb to GAN PS Handover | 181 |
| 8.10.5.7 | MS Behaviour for GAN to A/Gb PS Handover | 181 |
| 9 | Radio Link Control (RLC) procedures in packet transfer mode | 181 |
| 9.0 | General | 181 |
| 9.1 | Procedures and parameters for peer-to-peer operation | 182 |
| 9.1.1 | Send state variable V(S) | 183 |
| 9.1.1a | Control send state variable V(CS) | 183 |
| 9.1.2 | Acknowledge state variable V(A) | 183 |
| 9.1.3 | Acknowledge state array V(B) | 184 |
| 9.1.3.1 | Acknowledge state array V(B) for GPRS TBF Mode | 184 |
| 9.1.3.2 | Acknowledge State Array V(B) for EGPRS TBF Mode | 184 |
| 9.1.3.2.1 | EGPRS TBF running in RLC acknowledged mode | 184 |
| 9.1.3.2.2 | EGPRS TBF running in RLC non-persistent mode | 185 |
| 9.1.3.3 | Acknowledge State Array V(B) for MBMS Bearers | 186 |
| 9.1.4 | Block sequence number BSN | 186 |
| 9.1.4.1 | Block sequence number BSN for GPRS TBF | 186 |
| 9.1.4.2 | Block sequence number BSN for EGPRS TBF | 186 |
| 9.1.4a | Reduced Block Sequence Number RBSN | 186 |
| 9.1.4b | Reduced Block Sequence Number extension RBSNe | 187 |
| 9.1.5 | Receive state variable V(R) | 187 |
| 9.1.6 | Receive window state variable V(Q) | 187 |
| 9.1.6.1 | General | 187 |
| 9.1.6.2 | RLC acknowledged mode | 187 |
| 9.1.6.3 | RLC unacknowledged mode | 187 |
| 9.1.6.4 | RLC non-persistent mode | 187 |
| 9.1.7 | Receive state array V(N) | 188 |
| 9.1.7.1 | Receive state array V(N) in GPRS TBF | 188 |
| 9.1.7.2 | Receive state array V(N) in EGPRS TBF | 188 |
| 9.1.7.3 | Receive state array V(N) in TBF with FANR activated | 188 |
| 9.1.8 | Starting sequence number (SSN) and received block bitmap (RBB) | 189 |
| 9.1.8.1 | Starting sequence number (SSN) and received block bitmap (RBB) in GPRS TBF | 189 |
| 9.1.8.2 | Starting sequence number (SSN) and received block bitmap (RBB) in EGPRS TBF | 190 |
| 9.1.8.2.1 | Extended Polling | 190 |
| 9.1.8.2.2 | Determination of SSN | 193 |
| 9.1.8.2.2a | Determination of ShortSSN and SSN in the Piggy-backed Ack/Nack field | 195 |
| 9.1.8.2.3 | Generation of the bitmap | 195 |
| 9.1.8.2.4 | Interpretation of the bitmap | 197 |
| 9.1.9 | Window Size | 198 |
| 9.1.9.1 | GPRS | 198 |
| 9.1.9.2 | EGPRS | 198 |
| 9.1.9.3 | RLC buffer | 200 |
| 9.1.10 | Compression | 200 |
| 9.1.11 | Segmentation of upper layer PDUs into RLC data units | 203 |
| 9.1.12 | Re-assembly of upper layer PDUs from RLC data units | 203 |
| 9.1.12a | Segmentation of RLC/MAC control messages into RLC/MAC control blocks | 206 |
| 9.1.12b | Re-assembly of RLC/MAC control messages from RLC/MAC control blocks | 206 |
| 9.1.13 | Priority of upper layer PDUs | 207 |
| 9.1.14 | Fast Ack/Nack Reporting | 207 |
| 9.1.14.1 | General | 207 |
| 9.1.14.2 | Polled Fast Ack/Nack Reporting | 208 |
| 9.1.14.3 | Event-based Fast Ack/Nack Reporting | 208 |
| 9.1.15 | Time-based encoding of the Piggy-backed Ack/Nack field | 209 |

| | | |
|-----------|--|-----|
| 9.1.15.1 | Generation of the bitmap..... | 209 |
| 9.1.15.2 | Interpretation of the bitmap..... | 210 |
| 9.2 | Operation during RLC/MAC control message transfer..... | 210 |
| 9.3 | Operation during RLC data block transfer..... | 211 |
| 9.3.0 | General..... | 211 |
| 9.3.1 | Countdown procedure..... | 211 |
| 9.3.1.1 | General..... | 211 |
| 9.3.1.2 | Non-extended uplink TBF mode..... | 212 |
| 9.3.1.3 | Extended uplink TBF mode..... | 213 |
| 9.3.1a | Delayed release of downlink Temporary Block Flow..... | 213 |
| 9.3.1b | Extended uplink TBF mode..... | 213 |
| 9.3.1b.1 | Application..... | 213 |
| 9.3.1b.2 | Operation of uplink TBF in extended uplink TBF mode..... | 214 |
| 9.3.2 | Acknowledged mode operation..... | 214 |
| 9.3.2.0 | General..... | 214 |
| 9.3.2.1 | Additional functionality in acknowledged EGPRS TBF Mode..... | 215 |
| 9.3.2.2 | Establishment of Temporary Block Flow..... | 216 |
| 9.3.2.3 | Operation of uplink Temporary Block Flow..... | 216 |
| 9.3.2.4 | Release of uplink Temporary Block Flow..... | 217 |
| 9.3.2.4.1 | General..... | 217 |
| 9.3.2.4.2 | Non-extended uplink TBF mode..... | 217 |
| 9.3.2.5 | Operation of downlink Temporary Block Flow..... | 218 |
| 9.3.2.6 | Release of downlink Temporary Block Flow..... | 218 |
| 9.3.3 | Unacknowledged mode operation..... | 220 |
| 9.3.3.0 | General..... | 220 |
| 9.3.3.1 | Establishment of Temporary Block Flow..... | 220 |
| 9.3.3.2 | Operation of uplink Temporary Block Flow..... | 220 |
| 9.3.3.3 | Release of uplink Temporary Block Flow..... | 221 |
| 9.3.3.3.1 | General..... | 221 |
| 9.3.3.3.2 | Non-extended uplink TBF mode..... | 221 |
| 9.3.3.4 | Operation of downlink Temporary Block Flow..... | 222 |
| 9.3.3.5 | Release of downlink Temporary Block Flow..... | 222 |
| 9.3.4 | Non-persistent mode operation..... | 224 |
| 9.3.4.0 | General..... | 224 |
| 9.3.4.1 | Operation during an MBMS bearer..... | 224 |
| 9.3.4.2 | Release of an MBMS radio bearer..... | 224 |
| 9.3.4.3 | Operation during an EGPRS TBF..... | 224 |
| 9.4 | Abnormal release cases..... | 224 |
| 9.4.1 | Abnormal release with access retry..... | 224 |
| 9.4.2 | Abnormal release with cell reselection..... | 224 |
| 9.5 | Uplink TBF release in extended uplink TBF mode..... | 225 |
| 10 | RLC/MAC block structure..... | 226 |
| 10.0a | RLC/MAC block structure..... | 226 |
| 10.0a.1 | GPRS RLC/MAC block for data transfer..... | 226 |
| 10.0a.2 | EGPRS RLC/MAC block for data transfer..... | 226 |
| 10.0a.3 | RLC/MAC block for control message transfer..... | 228 |
| 10.0b | RLC/MAC block format conventions..... | 228 |
| 10.0b.1 | Numbering convention..... | 228 |
| 10.0b.2 | Assembling conventions..... | 228 |
| 10.0b.2.1 | Assembling convention for GPRS RLC data blocks and RLC/MAC control blocks, 11-bit and 8-bit control messages..... | 229 |
| 10.0b.2.2 | Assembling convention for EGPRS RLC data blocks..... | 229 |
| 10.0b.3 | Field mapping conventions..... | 229 |
| 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..... | 229 |
| 10.0b.3.2 | Field mapping convention for EGPRS RLC data blocks and MCS-0 encoded RLC/MAC control blocks..... | 229 |
| 10.1 | Spare bits..... | 230 |
| 10.2 | GPRS RLC data blocks..... | 230 |
| 10.2.1 | Downlink RLC data block..... | 230 |
| 10.2.2 | Uplink RLC data block..... | 231 |

| | | |
|------------|---|-----|
| 10.3 | RLC/MAC control blocks | 231 |
| 10.3.1 | Downlink RLC/MAC control block | 232 |
| 10.3.1.1 | Blocks encoded using CS-1 | 232 |
| 10.3.1.2 | Blocks encoded using MCS-0 | 232 |
| 10.3.2 | Uplink RLC/MAC control block | 233 |
| 10.3a | EGPRS RLC data blocks and RLC/MAC headers | 233 |
| 10.3a.0 | General..... | 233 |
| 10.3a.1 | EGPRS downlink RLC data block..... | 236 |
| 10.3a.2 | EGPRS Uplink RLC data block..... | 237 |
| 10.3a.3 | EGPRS Downlink RLC/MAC header | 237 |
| 10.3a.3.1 | Header type 1: header for MCS-7, MCS-8 and MCS-9 | 237 |
| 10.3a.3.2 | Header type 2: header for MCS-6, MCS-5, DAS-5, DAS-6 and DAS-7 | 238 |
| 10.3a.3.3 | Header type 3: header for MCS-4, MCS-3, MCS-2, MCS-1 and MCS-0 case | 239 |
| 10.3a.3.4 | Header type 4: header for DAS-8 and DAS-9..... | 241 |
| 10.3a.3.5 | Header type 5: header for DAS-11 and DAS-12..... | 241 |
| 10.3a.3.6 | Header type 6: header for DBS-5 and DBS-6 | 242 |
| 10.3a.3.7 | Header type 7: header for DBS-7 and DBS-8 | 242 |
| 10.3a.3.8 | Header type 8: header for DBS-9 and DBS-10 | 242 |
| 10.3a.3.9 | Header type 9: header for DBS-11 and DBS-12 | 243 |
| 10.3a.3.10 | Header type 10: header for DAS-10..... | 243 |
| 10.3a.4 | EGPRS Uplink RLC/MAC header | 244 |
| 10.3a.4.1 | Header type 1: header for MCS-7, MCS-8 and MCS-9 | 244 |
| 10.3a.4.2 | Header type 2: header for MCS-6 and MCS-5..... | 244 |
| 10.3a.4.3 | Header type 3: header for MCS-4, MCS-3, MCS-2 and MCS-1 | 245 |
| 10.3a.4.4 | Header type 4: header for UAS-7, UAS-8 and UAS-9 | 245 |
| 10.3a.4.5 | Header type 5: header for UAS-10 and UAS-11..... | 246 |
| 10.3a.4.6 | Header type 6: header for UBS-5 and UBS-6..... | 246 |
| 10.3a.4.7 | Header type 7: header for UBS-7 and UBS-8 | 246 |
| 10.3a.4.8 | Header type 8: header for UBS-9 and UBS-10 | 246 |
| 10.3a.4.9 | Header type 9: header for UBS-11 and UBS-12 | 247 |
| 10.3a.5 | Piggy-backed Ack/Nack field (SSN-based) | 247 |
| 10.3a.6 | Piggy-backed Ack/Nack field (Time-based) | 248 |
| 10.4 | Header fields | 248 |
| 10.4.1 | Uplink state flag (USF) field..... | 248 |
| 10.4.2 | Retry (R) bit..... | 248 |
| 10.4.3 | Stall indicator (SI) bit | 248 |
| 10.4.4 | Supplementary/Polling (S/P) Bit..... | 249 |
| 10.4.4a | EGPRS Supplementary/Polling (ES/P) Field | 249 |
| 10.4.4b | Combined EGPRS Supplementary/Polling (CES/P) Field | 249 |
| 10.4.5 | Relative Reserved Block Period (RRBP) field | 250 |
| 10.4.5.1 | Special requirements in dual transfer mode | 253 |
| 10.4.6 | Countdown Value (CV) field..... | 253 |
| 10.4.7 | Payload Type field..... | 253 |
| 10.4.8 | Final block indicator (FBI) bit..... | 254 |
| 10.4.8a | Coding and Puncturing Scheme indicator field (CPS)..... | 254 |
| 10.4.8a.1 | Header type 1 | 255 |
| 10.4.8a.2 | Header type 2 | 255 |
| 10.4.8a.3 | Header type 3 | 257 |
| 10.4.8a.4 | Header type 4 | 257 |
| 10.4.8a.5 | Header type 5 | 258 |
| 10.4.8a.6 | Header type 6 | 259 |
| 10.4.8a.7 | Header type 7 | 260 |
| 10.4.8a.8 | Header type 8 | 261 |
| 10.4.8a.9 | Header type 9 | 263 |
| 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 | 275 |
| 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 only</i>) | 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 | 286 |
| 11.2.0.1 | Downlink RLC/MAC messages | 287 |
| 11.2.0.2 | Uplink RLC/MAC messages | 288 |
| 11.2.1 | Packet Access Reject | 288 |
| 11.2.2 | Packet Control Acknowledgement | 291 |
| 11.2.2a | Packet Cell Change Continue | 293 |
| 11.2.3 | Packet Cell Change Failure | 294 |
| 11.2.3a | Packet Cell Change Notification | 296 |
| 11.2.4 | Packet Cell Change Order | 300 |
| 11.2.5 | Packet Channel Request | 309 |
| 11.2.5a | EGPRS Packet Channel Request | 311 |
| 11.2.5b | Packet DBPSCH Assignment | 313 |
| 11.2.5c | MPRACH Packet Channel Request | 317 |
| 11.2.6 | Packet Downlink Ack/Nack | 317 |