



# SLOVENSKI STANDARD

## SIST EN 300 940 V6.3.1:2005

01-februar-2005

---

8 [[ [HJb]`W] b]`h`Y`\_ca i b]\_UW`g\_]`g]ghYa `fZuU&ZL!`Ja Ygb]\_`nUa cV]b]`fUX]c`!  
GdYWZ]\_UW]UfYhY`d`Ugh]f] GA `\$( '\$, žfUh`] ]W]\* " `"%ž]nXUU% - +Ł

Digital cellular telecommunications system (Phase 2+) (GSM); Mobile radio interface layer 3 specification (GSM 04.08 version 6.3.1 Release 1997)

**iteh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Ta slovenski standard je istoveten z: **EN 300 940 Version 6.3.1**

SIST EN 300 940 V6.3.1:2005  
<https://standards.iteh.ai/catalog/standards/sist/225379ff-8651-4684-a80c-0d1fd448fbc/sist-en-300-940-v6-3-1-2005>

---

**ICS:**

33.070.01      Mobilni servisi na splošno      Mobile services in general

**SIST EN 300 940 V6.3.1:2005**                      en

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 300 940 V6.3.1:2005](https://standards.iteh.ai/catalog/standards/sist/225379f1-8b3f-4684-a80c-0d1f1a48fb/sist-en-300-940-v6-3-1-2005)

<https://standards.iteh.ai/catalog/standards/sist/225379f1-8b3f-4684-a80c-0d1f1a48fb/sist-en-300-940-v6-3-1-2005>

# EN 300 940 V6.3.1 (1999-08)

*European Standard (Telecommunications series)*

## **Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (GSM 04.08 version 6.3.1 Release 1997)**

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

**GSM**®  
GLOBAL SYSTEM FOR  
MOBILE COMMUNICATIONS

[SIST EN 300 940 V6.3.1:2005](https://standards.iteh.ai/catalog/standards/sist/225379f1-8b3f-4684-a80c-0d1f1fa48fbc/sist-en-300-940-v6-3-1-2005)

<https://standards.iteh.ai/catalog/standards/sist/225379f1-8b3f-4684-a80c-0d1f1fa48fbc/sist-en-300-940-v6-3-1-2005>



---

**Reference**

REN/SMG-030408Q6R1 (8pc0310o.PDF)

---

**Keywords**

Digital cellular telecommunications system,  
Global System for Mobile communications (GSM)

**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-Prefecture de Grasse (06) N° 7803/88

---

**Internet**

secretariat@etsi.fr

Individual copies of this ETSI deliverable  
can be downloaded from

<http://www.etsi.org>

If you find errors in the present document, send your  
comment to: editor@etsi.fr

---

**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.

© European Telecommunications Standards Institute 1999.  
All rights reserved.

# Contents

Intellectual Property Rights.....	26
Foreword .....	26
Introduction .....	26
0 Scope .....	28
0.1 Scope of the Technical Specification.....	28
0.2 Application to the interface structures .....	28
0.3 Structure of layer 3 procedures .....	28
0.4 Test procedures.....	28
0.5 Use of logical channels .....	28
0.6 Overview of control procedures.....	29
0.6.1 List of procedures.....	29
0.7 Applicability of implementations.....	31
0.7.1 Voice Group Call Service (VGCS) and Voice Broadcast Service (VBS).....	31
0.7.2 General Packet Radio Service (GPRS) .....	32
1 References.....	32
2 Definitions and abbreviations .....	36
2.1 Random values.....	36
2.2 Vocabulary.....	36
3 Radio Resource management procedures .....	37
3.1 Overview/General.....	37
3.1.1 General.....	37
3.1.2 Services provided to upper layers .....	38
3.1.2.1 Idle mode.....	38
3.1.2.2 Dedicated mode.....	38
3.1.2.3 Group receive mode.....	39
3.1.2.4 Group transmit mode .....	39
3.1.2.5 Packet idle mode.....	39
3.1.2.6 Packet transfer mode .....	39
3.1.3 Services required from data link and physical layers .....	40
3.1.4 Change of dedicated channels .....	40
3.1.4.1 Change of dedicated channels using SAPI = 0 .....	40
3.1.4.2 Change of dedicated channels using other SAPIs than 0 .....	40
3.1.4.3 Sequenced message transfer operation .....	40
3.1.4.3.1 Variables and sequence numbers .....	41
3.1.4.3.1.2 Send sequence number N(SD) .....	41
3.1.4.3.2 Procedures for the initiation, transfer execution and termination of the sequenced message transfer operation .....	41
3.1.4.3.2.2 Transfer Execution.....	41
3.1.5 Procedure for Service Request and Contention Resolution.....	41
3.2 Idle mode procedures and general procedures in packet idle and packet transfer modes .....	42
3.2.1 Mobile Station side .....	42
3.2.2 Network side .....	42
3.2.2.1 System information broadcasting.....	42
3.2.2.2 Paging.....	43
3.3 RR connection establishment.....	44
3.3.1 RR connection establishment initiated by the mobile station .....	44
3.3.1.1 Entering the dedicated mode : immediate assignment procedure .....	44
3.3.1.1.1 Permission to access the network.....	44
3.3.1.1.2 Initiation of the immediate assignment procedure.....	44
3.3.1.1.3 Answer from the network.....	45
3.3.1.1.3.1 On receipt of a CHANNEL REQUEST message.....	45
3.3.1.1.3.2 Assignment rejection.....	46

3.3.1.1.4	Assignment completion .....	46
3.3.1.1.4.1	Early classmark sending .....	47
3.3.1.1.4.2	GPRS suspension procedure .....	47
3.3.1.1.5	Abnormal cases .....	47
3.3.1.2	Entering the group transmit mode: uplink access procedure .....	48
3.3.1.2.1	Mobile station side .....	48
3.3.1.2.1.1	Uplink investigation procedure .....	48
3.3.1.2.1.2	Uplink access procedure .....	48
3.3.1.2.2	Network side .....	49
3.3.1.2.3	Abnormal cases .....	49
3.3.1.3	Dedicated mode and GPRS .....	49
3.3.2	Paging procedure for RR connection establishment .....	50
3.3.2.1	Paging initiation by the network .....	50
3.3.2.1.1	Paging initiation using paging subchannel on CCCH .....	50
3.3.2.1.2	Paging initiation using paging subchannel on PCCCH .....	51
3.3.2.1.3	Paging initiation using PACCH .....	51
3.3.2.2	Paging response .....	52
3.3.2.3	Abnormal cases .....	52
3.3.3	Notification procedure .....	52
3.3.3.1	Notification of a call .....	52
3.3.3.2	Joining a VGCS or VBS call .....	53
3.3.3.3	Reduced NCH monitoring mechanism .....	53
3.4	Procedures in dedicated mode and in group transmit mode .....	54
3.4.1	SACCH procedures .....	54
3.4.1.1	General .....	54
3.4.1.2	Measurement report .....	55
3.4.1.3	Extended measurement report \$(MAFA)\$ .....	55
3.4.2	Transfer of messages and link layer service provision .....	56
3.4.3	Channel assignment procedure .....	56
3.4.3.1	Channel assignment initiation .....	56
3.4.3.2	Assignment completion .....	57
3.4.3.3	Abnormal cases .....	58
3.4.4	Handover procedure .....	58
3.4.4.1	Handover initiation .....	59
3.4.4.2	Physical channel establishment .....	60
3.4.4.2.1	Finely synchronized cell case .....	60
3.4.4.2.2	Non synchronized cell case .....	60
3.4.4.2.3	Pseudo-synchronized cell case .....	61
3.4.4.2.4	Pre-synchronized cell case .....	61
3.4.4.3	Handover completion .....	62
3.4.4.4	Abnormal cases .....	62
3.4.5	Frequency redefinition procedure .....	63
3.4.5.1	Abnormal cases .....	63
3.4.6	Channel mode modify procedure .....	63
3.4.6.1	Normal channel mode modify procedure .....	64
3.4.6.1.1	Initiation of the channel mode modify procedure .....	64
3.4.6.1.2	Completion of channel mode modify procedure .....	64
3.4.6.1.3	Abnormal cases .....	64
3.4.6.2	Channel mode modify procedure for a voice group call talker .....	64
3.4.6.2.1	Initiation of the channel mode modify procedure .....	64
3.4.6.2.2	Completion of mode change procedure .....	65
3.4.6.2.3	Abnormal cases .....	65
3.4.7	Ciphering mode setting procedure .....	65
3.4.7.1	Ciphering mode setting initiation .....	65
3.4.7.2	Ciphering mode setting completion .....	65
3.4.8	Additional channel assignment procedure .....	66
3.4.8.1	Additional assignment procedure initiation .....	66
3.4.8.2	Additional assignment procedure completion .....	66
3.4.8.3	Abnormal cases .....	66
3.4.9	Partial channel release procedure .....	66

3.4.9.1	Partial release procedure initiation .....	67
3.4.9.2	Abnormal cases.....	67
3.4.10	Classmark change procedure.....	67
3.4.11	Classmark interrogation procedure.....	67
3.4.11.1	Classmark interrogation initiation.....	67
3.4.11.2	Classmark interrogation completion .....	67
3.4.12	Indication of notifications and paging information .....	68
3.4.13	RR connection release procedure .....	68
3.4.13.1	Normal release procedure .....	68
3.4.13.1.1	Channel release procedure initiation in dedicated mode and in group transmit mode .....	68
3.4.13.1.2	Abnormal cases.....	69
3.4.13.2	Radio link failure in dedicated mode .....	69
3.4.13.2.1	Mobile side .....	70
3.4.13.2.2	Network side .....	70
3.4.13.3	RR connection abortion in dedicated mode.....	70
3.4.13.4	Uplink release procedure in group transmit mode.....	70
3.4.13.5	Radio link failure in group transmit mode.....	70
3.4.13.5.1	Mobile side .....	71
3.4.13.5.2	Network side .....	71
3.4.14	Receiving a RR STATUS message by a RR entity. ....	71
3.4.15	Group receive mode procedures.....	71
3.4.15.1	Mobile station side .....	71
3.4.15.1.1	Reception of the VGCS or VBS channel .....	71
3.4.15.1.2	Monitoring of downlink messages and related procedures .....	72
3.4.15.1.2.1	Spare.....	72
3.4.15.1.2.2	Spare.....	72
3.4.15.1.2.3	Channel mode modify procedure.....	72
3.4.15.1.2.4	Notification and paging information.....	72
3.4.15.1.2.4.1	Use of Reduced NCH monitoring.....	72
3.4.15.1.2.5	Uplink status messages.....	73
3.4.15.1.2.6	Channel release message.....	73
3.4.15.1.2.7	Information on paging channel restructuring.....	73
3.4.15.1.3	Uplink reply procedure.....	73
3.4.15.1.4	Leaving the group receive mode .....	73
3.4.15.2	Network side.....	74
3.4.15.2.1	Provision of messages on the VGCS or VBS channel downlink.....	74
3.4.15.2.2	Release of the VGCS or VBS Channels.....	75
3.4.15.3	Failure cases .....	75
3.4.16	Configuration change procedure .....	75
3.4.16.1	Configuration change initiation .....	75
3.4.16.2	Configuration change completion.....	75
3.4.16.3	Abnormal cases.....	75
3.4.17	Mapping of user data substreams onto timeslots in a multislot configuration.....	76
3.4.18	Handling of classmark information at band change.....	76
3.4.19	Assignment to a Packet Data channel.....	76
3.4.19.1	Assignment to PDCH initiation .....	77
3.4.19.2	Completion of the Assignment to PDCH procedure.....	78
3.4.19.3	Abnormal cases.....	78
3.4.20	RR-Network Commanded Cell Change Order .....	78
3.4.20.1	RR-network commanded cell change order initiation.....	79
3.4.20.2	Network controlled cell reselection completion .....	79
3.4.20.3	Abnormal cases.....	79
3.5	RR procedures on CCCH related to temporary block flow establishment .....	80
3.5.1	Packet paging procedure using CCCH.....	80
3.5.1.1	Packet paging initiation by the network.....	80
3.5.1.2	On receipt of a packet paging request.....	81
3.5.2	Packet access procedure using CCCH.....	81
3.5.2.1	Entering the packet transfer mode: packet access procedure.....	81
3.5.2.1.1	Permission to access the network.....	81
3.5.2.1.2	Initiation of the packet access procedure: channel request.....	81

3.5.2.1.3	Packet immediate assignment .....	82
3.5.2.1.4	Packet access completion.....	85
3.5.2.1.5	Abnormal cases.....	85
3.5.2.2	Sending an RLC/MAC control message: single block packet access procedure .....	85
3.5.3	Packet downlink assignment procedure using CCCH .....	85
3.5.3.1	Entering the packet transfer mode: packet downlink assignment procedure.....	85
3.5.3.1.2	Initiation of the packet downlink assignment procedure .....	86
3.5.3.1.3	Packet downlink assignment completion .....	87
3.5.3.1.4	Abnormal cases.....	87
3.5.3.2	Sending an RLC/MAC control message: single block packet downlink assignment procedure .....	88
4	Elementary procedures for Mobility Management .....	88
4.1	General.....	88
4.1.1	Type of MM and GMM procedures.....	89
4.1.2	MM sublayer states .....	90
4.1.2.1	MM sublayer states in the mobile station .....	90
4.1.2.1.1	Main states .....	90
4.1.2.1.2	Substates of the MM IDLE state.....	94
4.1.2.2	The update Status .....	95
4.1.2.3	MM sublayer states on the network side.....	96
4.1.3	GPRS mobility management (GMM) sublayer states.....	97
4.1.3.1	GMM states in the MS.....	97
4.1.3.1.1	Main states .....	97
4.1.3.1.1.1	GMM-NULL.....	97
4.1.3.1.1.2	GMM-DEREGISTERED.....	97
4.1.3.1.1.3	GMM-REGISTERED-INITIATED .....	97
4.1.3.1.1.4	GMM-REGISTERED.....	98
4.1.3.1.1.5	GMM-DEREGISTERED-INITIATED.....	98
4.1.3.1.2.5	GMM-DEREGISTERED.NO-IMSI.....	98
4.1.3.1.2.6	GMM-DEREGISTERED.NO-CELL-AVAILABLE .....	98
4.1.3.1.2.7	GMM-DEREGISTERED.PLMN-SEARCH.....	98
4.1.3.1.3	Substates of state GMM-REGISTERED.....	99
4.1.3.1.3.1	GMM-REGISTERED.NORMAL-SERVICE.....	99
4.1.3.1.3.2	GMM-REGISTERED.SUSPENDED.....	99
4.1.3.1.3.3	GMM-REGISTERED.UPDATE-NEEDED .....	99
4.1.3.1.3.4	GMM-REGISTERED.ATTEMPTING-TO-UPDATE .....	99
4.1.3.1.3.5	GMM-REGISTERED.NO-CELL-AVAILABLE.....	99
4.1.3.2	GPRS update status .....	100
4.1.3.3	GMM mobility management states on the network side.....	101
4.1.3.3.1	Main States .....	101
4.1.3.3.1.1	GMM-DEREGISTERED.....	101
4.1.3.3.1.2	GMM-COMMON-PROCEDURE-INITIATED .....	101
4.1.3.3.1.3	GMM-REGISTERED .....	101
4.1.3.3.1.4	GMM-DEREGISTERED-INITIATED.....	101
4.1.3.3.2	Substates of state GMM-REGISTERED .....	102
4.1.3.3.2.1	GMM-REGISTERED.NORMAL-SERVICE .....	102
4.1.3.3.2.2	GMM-REGISTERED.SUSPENDED .....	102
4.2	Behaviour of the MS in MM Idle state, GMM-DEREGISTERED state and GMM-REGISTERED state....	102
4.2.1	Primary Service State selection .....	103
4.2.1.1	Selection of the Service State after Power On .....	103
4.2.1.2	Other Cases.....	103
4.2.2	Detailed Description of the MS behaviour in MM IDLE State.....	104
4.2.2.1	Service State, NORMAL SERVICE.....	104
4.2.2.2	Service State, ATTEMPTING TO UPDATE.....	104
4.2.2.3	Service State, LIMITED SERVICE .....	105
4.2.2.4	Service State, NO IMSI.....	105
4.2.2.5	Service State, SEARCH FOR PLMN, NORMAL SERVICE .....	106
4.2.2.6	Service State, SEARCH FOR PLMN.....	106
4.2.2.7	Service State, RECEIVING GROUP CALL (NORMAL SERVICE).....	106
4.2.2.8	Service State, RECEIVING GROUP CALL (LIMITED SERVICE).....	107
4.2.3	Service state when back to state MM IDLE from another state .....	107



4.2.4	Behaviour in state GMM-DEREGISTERED .....	108
4.2.4.1	Primary substate selection .....	108
4.2.4.1.1	Selection of the substate after power on or enabling the MS's GPRS capability .....	108
4.2.4.1.2	Other Cases .....	109
4.2.4.2	Detailed description of the MS behaviour in state GMM-DEREGISTERED .....	109
4.2.4.2.1	Substate, NORMAL-SERVICE .....	109
4.2.4.2.2	Substate, ATTEMPTING-TO-ATTACH .....	109
4.2.4.2.3	Substate, LIMITED-SERVICE .....	109
4.2.4.2.4	Substate, NO-IMSI .....	109
4.2.4.2.5	Substate, NO-CELL .....	109
4.2.4.2.6	Substate, PLMN-SEARCH .....	110
4.2.4.2.7	Substate, ATTACH-NEEDED .....	110
4.2.4.3	Substate when back to state GMM-DEREGISTERED from another GMM state .....	110
4.2.5	Behaviour in state GMM-REGISTERED .....	110
4.2.5.1	Detailed description of the MS behaviour in state GMM-REGISTERED .....	110
4.2.5.1.1	Substate, NORMAL-SERVICE .....	110
4.2.5.1.2	Substate, SUSPENDED .....	111
4.2.5.1.3	Substate, UPDATE-NEEDED .....	111
4.2.5.1.4	Substate, ATTEMPTING-TO-UPDATE .....	111
4.2.5.1.5	Substate, NO-CELL-AVAILABLE .....	111
4.2.5.1.6	Substate, LIMITED-SERVICE .....	111
4.3	MM common procedures .....	111
4.3.1	TMSI reallocation procedure .....	112
4.3.1.1	TMSI reallocation initiation by the network .....	112
4.3.1.2	TMSI reallocation completion by the mobile station .....	112
4.3.1.3	TMSI reallocation completion in the network .....	112
4.3.1.4	Abnormal cases .....	112
4.3.2	Authentication procedure .....	113
4.3.2.1	Authentication request by the network .....	113
4.3.2.2	Authentication response by the mobile station .....	113
4.3.2.3	Authentication processing in the network .....	114
4.3.2.4	Ciphering key sequence number .....	114
4.3.2.5	Unsuccessful authentication .....	114
4.3.2.6	Abnormal cases .....	115
4.3.3	Identification procedure .....	115
4.3.3.1	Identity request by the network .....	115
4.3.3.2	Identification response by the mobile station .....	115
4.3.3.3	Abnormal cases .....	115
4.3.4	IMSI detach procedure .....	116
4.3.4.1	IMSI detach initiation by the mobile station .....	116
4.3.4.2	IMSI detach procedure in the network .....	116
4.3.4.3	IMSI detach completion by the mobile station .....	116
4.3.4.4	Abnormal cases .....	117
4.3.5	Abort procedure .....	117
4.3.5.1	Abort procedure initiation by the network .....	117
4.3.5.2	Abort procedure in the mobile station .....	117
4.3.6	MM information procedure .....	117
4.3.6.1	MM information procedure initiation by the network .....	117
4.3.6.2	MM information procedure in the mobile station .....	117
4.4	MM specific procedures .....	118
4.4.1	Location updating procedure .....	118
4.4.2	Periodic updating .....	119
4.4.3	IMSI attach procedure .....	120
4.4.4	Generic Location Updating procedure .....	120
4.4.4.1	Location updating initiation by the mobile station .....	120
4.4.4.1a	Network Request for Additional mobile station Capability Information .....	120
4.4.4.2	Identification request from the network .....	120
4.4.4.3	Authentication by the network .....	120
4.4.4.4	Ciphering mode setting by the network .....	120
4.4.4.5	Attempt Counter .....	120

4.4.4.6	Location updating accepted by the network.....	121
4.4.4.7	Location updating not accepted by the network .....	121
4.4.4.8	Release of RR connection after location updating .....	122
4.4.4.9	Abnormal cases on the mobile station side .....	122
4.4.4.10	Abnormal cases on the network side.....	123
4.5	Connection management sublayer service provision .....	124
4.5.1	MM connection establishment .....	124
4.5.1.1	MM connection establishment initiated by the mobile station.....	124
4.5.1.2	Abnormal cases.....	127
4.5.1.3	MM connection establishment initiated by the network .....	128
4.5.1.3.1	Mobile Terminating CM Activity .....	128
4.5.1.3.2	Mobile Originating CM Activity \$(CCBS)\$.....	128
4.5.1.4	Abnormal cases.....	129
4.5.1.5	MM connection establishment for emergency calls.....	129
4.5.1.6	Call re-establishment .....	130
4.5.1.6.1	Call re-establishment, initiation by the mobile station .....	130
4.5.1.6.2	Abnormal cases.....	131
4.5.1.7	Forced release during MO MM connection establishment .....	132
4.5.2	MM connection information transfer phase .....	133
4.5.2.1	Sending CM messages.....	133
4.5.2.2	Receiving CM messages.....	133
4.5.2.3	Abnormal cases.....	133
4.5.3	MM connection release .....	133
4.5.3.1	Release of associated RR connection .....	133
4.5.3.2	Uplink release in a voice group call.....	134
4.6	Receiving a MM STATUS message by a MM entity.....	134
4.7	Elementary mobility management procedures for GPRS services.....	134
4.7.1	General.....	134
4.7.1.1	Lower layer failure .....	134
4.7.1.2	Ciphering of messages.....	134
4.7.1.3	P-TMSI signature .....	135
4.7.1.4	Radio resource sublayer address handling.....	135
4.7.2	GPRS Mobility management timers.....	135
4.7.2.1	READY timer behaviour .....	135
4.7.2.2	Periodic routing area updating.....	136
4.7.3	GPRS attach procedure .....	137
4.7.3.1	GPRS attach procedure for GPRS services .....	138
4.7.3.1.1	GPRS attach procedure initiation.....	138
4.7.3.1.2	GMM common procedure initiation .....	138
4.7.3.1.3	GPRS attach accepted by the network .....	138
4.7.3.1.4	GPRS attach not accepted by the network .....	139
4.7.3.1.5	Abnormal cases in the MS .....	139
4.7.3.1.6	Abnormal cases on the network side.....	140
4.7.3.2	Combined GPRS attach procedure for GPRS and non-GPRS services .....	142
4.7.3.2.1	Combined GPRS attach procedure initiation .....	142
4.7.3.2.2	GMM Common procedure initiation.....	142
4.7.3.2.3	Combined GPRS attach accepted by the network.....	142
4.7.3.2.3.1	Combined attach successful for GPRS and non-GPRS services.....	143
4.7.3.2.3.2	Combined attach successful for GPRS services only .....	143
4.7.3.2.4	Combined GPRS attach not accepted by the network.....	143
4.7.3.2.5	Abnormal cases in the MS .....	144
4.7.3.2.6	Abnormal cases on the network side.....	144
4.7.4	GPRS detach procedure .....	145
4.7.4.1	MS initiated GPRS detach procedure.....	145
4.7.4.1.1	MS initiated GPRS detach procedure initiation .....	145
4.7.4.1.2	MS initiated GPRS detach procedure completion for GPRS services only .....	145
4.7.4.1.3	MS initiated combined GPRS detach procedure completion .....	146
4.7.4.1.4	Abnormal cases in the MS .....	146
4.7.4.2	Network initiated GPRS detach procedure.....	147
4.7.4.2.1	Network initiated GPRS detach procedure initiation .....	147

4.7.4.2.2	Network initiated GPRS detach procedure completion by the MS .....	147
4.7.4.2.3	Network initiated GPRS detach procedure completion by the network .....	148
4.7.4.2.4	Abnormal cases on the network side .....	148
4.7.5	Routing area updating procedure .....	149
4.7.5.1	Normal and periodic routing area updating procedure .....	150
4.7.5.1.1	Normal and periodic routing area updating procedure initiation .....	150
4.7.5.1.2	GMM Common procedure initiation.....	150
4.7.5.1.3	Normal and periodic routing area updating procedure accepted by the network .....	151
4.7.5.1.4	Normal and periodic routing area updating procedure not accepted by the network .....	151
4.7.5.1.5	Abnormal cases in the MS .....	152
4.7.5.1.6	Abnormal cases on the network side .....	153
4.7.5.2	Combined routing area updating procedure.....	154
4.7.5.2.1	Combined routing area updating procedure initiation .....	154
4.7.5.2.2	GMM Common procedure initiation.....	155
4.7.5.2.3	Combined routing area updating procedure accepted by the network.....	155
4.7.5.2.3.1	Combined routing area updating successful .....	155
4.7.5.2.3.2	Combined routing area updating successful for GPRS services only.....	155
4.7.5.2.4	Combined routing area updating not accepted by the network .....	156
4.7.5.2.5	Abnormal cases in the MS .....	157
4.7.5.2.6	Abnormal cases on the network side .....	157
4.7.6	P-TMSI reallocation procedure.....	157
4.7.6.1	P-TMSI reallocation initiation by the network .....	157
4.7.6.2	P-TMSI reallocation completion by the MS .....	157
4.7.6.3	P-TMSI reallocation completion by the network.....	158
4.7.6.4	Abnormal cases in the MS .....	158
4.7.6.5	Abnormal cases on the network side.....	158
4.7.7	Authentication and ciphering procedure.....	159
4.7.7.1	Authentication and ciphering initiation by the network .....	159
4.7.7.2	Authentication and ciphering response by the MS.....	159
4.7.7.3	Authentication and ciphering completion by the network.....	160
4.7.7.4	GPRS ciphering key sequence number.....	160
4.7.7.5	Unsuccessful authentication and ciphering.....	160
4.7.7.6	Abnormal cases on the network side.....	160
4.7.8	Identification procedure .....	161
4.7.8.1	Identification initiation by the network.....	161
4.7.8.2	Identification response by the MS .....	162
4.7.8.3	Identification completion by the network .....	162
4.7.8.4	Abnormal cases on the network side.....	162
4.7.9	Paging procedure.....	163
4.7.9.1	Paging for GPRS services.....	163
4.7.9.2	Paging for non-GPRS services .....	163
4.7.10	Receiving a GMM STATUS message by a GMM entity .....	163
4.7.11	GMM support for anonymous access.....	163
4.7.11.1	MS side.....	163
4.7.11.2	Network side.....	164
4.7.12	GMM Information procedure.....	164
4.7.12.1	GMM information procedure initiation by the network.....	164
4.7.12.2	GMM information procedure in the mobile station .....	164
5	Elementary procedures for circuit-switched Call Control .....	164
5.1	Overview.....	164
5.1.1	General.....	164
5.1.2	Call Control States .....	169
5.1.2.1	Call states at the mobile station side of the interface .....	169
5.1.2.1.1	Null (State U0).....	169
5.1.2.1.2	MM Connection pending (U0.1).....	169
5.1.2.1.2a	CC prompt present (U0.2) \$(CCBS)\$.....	170
5.1.2.1.2b	Wait for network information (U0.3) \$(CCBS)\$ .....	170
5.1.2.1.2c	CC-Establishment present (U0.4) \$(CCBS)\$.....	170
5.1.2.1.2d	CC-Establishment confirmed (U0.5) \$(CCBS)\$.....	170
5.1.2.1.2e	Recall present (U0.6) \$(CCBS)\$ .....	170

5.1.2.1.3	Call initiated (U1) .....	170
5.1.2.1.4	Mobile originating call proceeding (U3).....	170
5.1.2.1.5	Call delivered (U4) .....	170
5.1.2.1.6	Call present (U6).....	170
5.1.2.1.7	Call received (U7).....	170
5.1.2.1.8	Connect Request (U8).....	170
5.1.2.1.9	Mobile terminating call confirmed (U9) .....	171
5.1.2.1.10	Active (U10) .....	171
5.1.2.1.11	Disconnect request (U11).....	171
5.1.2.1.12	Disconnect indication (U12) .....	171
5.1.2.1.13	Release request (U19).....	171
5.1.2.1.14	Mobile originating modify (U26).....	171
5.1.2.1.15	Mobile terminating modify (U27).....	171
5.1.2.2	Network call states.....	171
5.1.2.2.1	Null (State N0).....	171
5.1.2.2.2	MM connection pending (N0.1).....	171
5.1.2.2.2a	CC connection pending (N0.2) \$(CCBS)\$.....	171
5.1.2.2.2b	Network answer pending (N0.3) \$(CCBS)\$ .....	171
5.1.2.2.2c	CC-Establishment present (N0.4) \$(CCBS)\$.....	172
5.1.2.2.2d	CC-Establishment confirmed (N0.5) \$(CCBS)\$.....	172
5.1.2.2.3	Call initiated (N1) .....	172
5.1.2.2.4	Mobile originating call proceeding (N3).....	172
5.1.2.2.5	Call delivered (N4) .....	172
5.1.2.2.6	Call present (N6).....	172
5.1.2.2.7	Call received (N7).....	172
5.1.2.2.8	Connect request (N8).....	172
5.1.2.2.9	Mobile terminating call confirmed (N9).....	172
5.1.2.2.10	Active (N10) .....	172
5.1.2.2.11	Not used .....	172
5.1.2.2.12	Disconnect indication (N12) .....	172
5.1.2.2.13	Release request (N19) .....	173
5.1.2.2.14	Mobile originating modify (N26).....	173
5.1.2.2.15	Mobile terminating modify (N27).....	173
5.1.2.2.16	Connect Indication (N28).....	173
5.2	Call establishment procedures .....	173
5.2.1	Mobile originating call establishment .....	173
5.2.1.1	Call initiation .....	174
5.2.1.2	Receipt of a setup message .....	174
5.2.1.3	Receipt of a CALL PROCEEDING message .....	175
5.2.1.4	Notification of progressing mobile originated call .....	176
5.2.1.4.1	Notification of interworking in connection with mobile originated call establishment.....	176
5.2.1.4.2	Call progress in the PLMN/ISDN environment .....	176
5.2.1.5	Alerting.....	176
5.2.1.6	Call connected .....	177
5.2.1.7	Call rejection .....	178
5.2.1.8	Transit network selection.....	178
5.2.1.9	Traffic channel assignment at mobile originating call establishment.....	178
5.2.1.10	Call queuing at mobile originating call establishment .....	178
5.2.2	Mobile terminating call establishment.....	178
5.2.2.1	Call indication .....	178
5.2.2.2	Compatibility checking.....	179
5.2.2.3	Call confirmation.....	179
5.2.2.3.1	Response to SETUP.....	179
5.2.2.3.2	Receipt of CALL CONFIRMED and ALERTING by the network .....	180
5.2.2.3.3	Call failure procedures .....	180
5.2.2.3.4	Called mobile station clearing during mobile terminating call establishment.....	180
5.2.2.4	Notification of interworking in connection with mobile terminating call establishment.....	180
5.2.2.5	Call accept .....	181
5.2.2.6	Active indication.....	181
5.2.2.7	Traffic channel assignment at mobile terminating call establishment.....	181

5.2.2.8	Call queuing at mobile terminating call establishment .....	181
5.2.2.9	User connection attachment during a mobile terminating call .....	182
5.2.3	Network initiated MO call \$(CCBS)\$ .....	182
5.2.3.1	Initiation .....	182
5.2.3.2	CC-Establishment present .....	182
5.2.3.2.1	Recall Alignment Procedure .....	183
5.2.3.3	CC-Establishment confirmation .....	184
5.2.3.4	Recall present .....	184
5.2.3.5	Traffic channel assignment during network initiated mobile originating call establishment .....	185
5.3	Signalling procedures during the "active" state .....	185
5.3.1	User notification procedure .....	185
5.3.2	Call rearrangements .....	185
5.3.3	Not used .....	186
5.3.4	Support of Dual Services .....	186
5.3.4.1	Service Description .....	186
5.3.4.2	Call establishment .....	186
5.3.4.2.1	Mobile Originating Establishment .....	186
5.3.4.2.2	Mobile Terminating Establishment .....	187
5.3.4.3	Changing the Call Mode .....	187
5.3.4.3.1	Initiation of in-call modification .....	188
5.3.4.3.2	Successful completion of in-call modification .....	188
5.3.4.3.3	Change of the channel configuration .....	188
5.3.4.3.4	Failure of in-call modification .....	188
5.3.4.3.4.1	Network rejection of in-call modification .....	188
5.3.4.3.4.2	Mobile station rejection of in-call modification .....	189
5.3.4.3.4.3	Time-out recovery .....	189
5.3.4.4	Abnormal procedures .....	189
5.3.5	User initiated service level up- and downgrading .....	189
5.3.5.1	Initiation of service level up- and downgrading .....	190
5.3.5.2	Successful completion of service level up- and downgrading .....	190
5.3.5.3	Rejection of service level up- and downgrading .....	190
5.3.5.4	Time-out recovery .....	190
5.4	Call clearing .....	190
5.4.1	Terminology .....	190
5.4.2	Exception conditions .....	191
5.4.3	Clearing initiated by the mobile station .....	191
5.4.3.1	Initiation of call clearing .....	191
5.4.3.2	Receipt of a DISCONNECT message from the mobile station .....	191
5.4.3.3	Receipt of a RELEASE message from the network .....	192
5.4.3.4	Receipt of a RELEASE COMPLETE message from the mobile station .....	192
5.4.3.5	Abnormal cases .....	192
5.4.4	Clearing initiated by the network .....	192
5.4.4.1	Clearing initiated by the network: mobile does not support "Prolonged Clearing Procedure" .....	192
5.4.4.1.1	Clearing when tones/announcements provided .....	192
5.4.4.1.2	Clearing when tones/announcements not provided .....	193
5.4.4.1.3	Completion of clearing .....	193
5.4.4.2	Clearing initiated by the network: mobile supports "Prolonged Clearing Procedure" .....	194
5.4.4.2.1	Clearing when tones/announcements provided and the network does not indicate that "CCBS activation is possible" .....	194
5.4.4.2.2	Clearing when the network indicates that "CCBS activation is possible" .....	194
5.4.4.2.3	Clearing when tones/announcements are not provided and the network does not indicate that "CCBS activation is possible" .....	195
5.4.4.2.4	Receipt of a RELEASE message from the mobile station .....	196
5.4.4.2.5	Completion of clearing .....	196
5.4.5	Clear collision .....	197
5.5	Miscellaneous procedures .....	197
5.5.1	In-band tones and announcements .....	197
5.5.2	Call collisions .....	197
5.5.3	Status procedures .....	198
5.5.3.1	Status enquiry procedure .....	198

5.5.3.2	Reception of a STATUS message by a CC entity.....	198
5.5.3.2.1	STATUS message with incompatible state .....	198
5.5.3.2.2	STATUS message with compatible state .....	198
5.5.4	Call re-establishment, mobile station side .....	198
5.5.4.1	Indication from the mobility management sublayer.....	199
5.5.4.2	Reaction of call control.....	199
5.5.4.3	Completion of re-establishment.....	199
5.5.4.4	Unsuccessful outcome .....	199
5.5.5	Call re-establishment, network side.....	199
5.5.5.1	State alignment .....	199
5.5.6	Progress.....	199
5.5.7	DTMF protocol control procedure .....	200
5.5.7.1	Start DTMF request by the mobile station.....	200
5.5.7.2	Start DTMF response by the network.....	200
5.5.7.3	Stop DTMF request by the mobile station.....	200
5.5.7.4	Stop DTMF response by the network.....	200
5.5.7.5	Sequencing of subsequent start DTMF requests by the mobile station.....	200
6	Support for packet services .....	201
6.1	GPRS Session management .....	201
6.1.1	General.....	201
6.1.1.1	Radio resource sublayer address handling for anonymous access .....	202
6.1.2	Session management states.....	202
6.1.2.1	Session management states in the MS .....	202
6.1.2.1.1	PDP-INACTIVE.....	202
6.1.2.1.2	PDP-ACTIVE-PENDING .....	202
6.1.2.1.3	PDP-INACTIVE-PENDING.....	202
6.1.2.1.4	PDP-ACTIVE.....	202
6.1.2.2	Session management states on the network side.....	203
6.1.2.2.1	PDP-INACTIVE.....	203
6.1.2.2.2	PDP-ACTIVE-PENDING.....	203
6.1.2.2.3	PDP-INACTIVE-PENDING.....	203
6.1.2.2.4	PDP-ACTIVE.....	203
6.1.2.2.5	PDP-MODIFY-PENDING.....	203
6.1.3	Session Management procedures .....	204
6.1.3.1	PDP context activation .....	204
6.1.3.1.1	Successful PDP context activation initiated by the mobile station.....	204
6.1.3.1.2	Successful PDP context activation requested by the network .....	205
6.1.3.1.3	Unsuccessful PDP context activation initiated by the MS .....	205
6.1.3.1.4	Unsuccessful PDP context activation requested by the network.....	205
6.1.3.1.5	Abnormal cases.....	205
6.1.3.2	PDP context modification procedure.....	207
6.1.3.2.1	Abnormal cases.....	207
6.1.3.3	PDP context deactivation procedure.....	208
6.1.3.3.1	PDP context deactivation initiated by the MS.....	208
6.1.3.3.2	PDP context deactivation initiated by the network .....	208
6.1.3.3.3	Abnormal cases.....	208
6.1.3.4	AA PDP context activation.....	209
6.1.3.4.1	Successful AA PDP context activation initiated by the mobile station .....	209
6.1.3.4.2	Unsuccessful AA PDP context activation .....	210
6.1.3.4.3	Abnormal cases.....	210
6.1.3.5	AA PDP context deactivation.....	210
6.1.3.5.1	Implicit AA PDP context deactivation.....	210
6.1.3.5.2	Explicit AA PDP context deactivation.....	211
6.1.3.5.3	Abnormal cases.....	211
6.1.3.6	Receiving a SM STATUS message by a SM entity.....	211
7	Examples of structured procedures .....	211
7.1	General.....	212
7.1.1	Paging request .....	212
7.1.2	Immediate assignment .....	212

7.1.3	Service request and contention resolution .....	213
7.1.4	Authentication .....	213
7.1.5	Ciphering mode setting .....	213
7.1.6	Transaction phase .....	214
7.1.6.1	Channel mode modify .....	214
7.1.7	Channel release .....	214
7.2	Abnormal cases .....	214
7.3	Selected examples .....	214
7.3.1	Location updating .....	215
7.3.2	Mobile originating call establishment .....	216
7.3.3	Mobile terminating call establishment .....	220
7.3.4	Call clearing .....	222
7.3.5	DTMF protocol control .....	223
7.3.6	Handover .....	224
7.3.7	In-call modification .....	225
7.3.8	Call re-establishment .....	226
7.3.9	Network initiated mobile originating call \$(CCBS)\$ .....	227
8	Handling of unknown, unforeseen, and erroneous protocol data .....	232
8.1	General .....	232
8.2	Message too short .....	232
8.3	Unknown or unforeseen transaction identifier .....	233
8.3.1	Call Control .....	233
8.3.2	Session Management .....	233
8.4	Unknown or unforeseen message type .....	234
8.5	Non-semantic mandatory information element errors .....	234
8.5.1	Radio resource management .....	235
8.5.2	Mobility management .....	235
8.5.3	Call control .....	235
8.6	Unknown and unforeseen IEs in the non-imperative message part .....	235
8.6.1	IEs unknown in the message .....	235
8.6.2	Out of sequence IEs .....	236
8.6.3	Repeated IEs .....	236
8.7	Non-imperative message part errors .....	236
8.7.1	Syntactically incorrect optional IEs .....	236
8.7.2	Conditional IE errors .....	236
8.8	Messages with semantically incorrect contents .....	236
9	Message functional definitions and contents .....	237
9.1	Messages for Radio Resources management .....	237
9.1.1	Additional assignment .....	239
9.1.1.1	Mobile Allocation .....	240
9.1.1.2	Starting Time .....	240
9.1.2	Assignment command .....	240
9.1.2.1	Mode of the First Channel (Channel Set 1) and Mode of Channel Set "X" (2=<X=<8) .....	241
9.1.2.2	Description of the Second Channel .....	242
9.1.2.3	Mode of the Second Channel .....	242
9.1.2.4	Mobile Allocation and Frequency List, after the starting time .....	242
9.1.2.5	Starting Time .....	242
9.1.2.6	Reference cell frequency list .....	243
9.1.2.7	Cell Channel Description .....	243
9.1.2.8	Cipher Mode Setting .....	243
9.1.2.9	VGCS target mode Indication .....	243
9.1.2.10	Description of the multislot allocation .....	243
9.1.3	Assignment complete .....	244
9.1.4	Assignment failure .....	244
9.1.5	Channel mode modify .....	244
9.1.5.1	Channel Description .....	245
9.1.5.2	VGCS target mode Indication .....	245
9.1.6	Channel mode modify acknowledge .....	246
9.1.7	Channel release .....	246