

ETSI TS 100 392-2 V3.9.1 (2019-01)



Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)

iTeh STANDARDS PREVIEW
(standardsite.com)
Full standard/catalog/standards/129639c-b38c-46e9-8189-56e47f8ee69/etsi-ts-100-392-2-v3.9.1-2019-01
<https://standards.iteh.ai/catalog/standards/129639c-b38c-46e9-8189-56e47f8ee69/etsi-ts-100-392-2-v3.9.1-2019-01>

ReferenceRTS/TCCE-03249

Keywordsair interface, radio, TETRA, V+D

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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

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 2019.

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 a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

GSM® and the GSM logo are trademarks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	45
Foreword.....	45
Modal verbs terminology.....	46
1 Scope	47
2 References	48
2.1 Normative references	48
2.2 Informative references.....	50
3 Definition of terms, symbols and abbreviations.....	51
3.1 Terms.....	51
3.2 Symbols.....	59
3.3 Abbreviations	59
4 Radio aspects.....	66
4.1 Introduction	66
4.2 Set of logical channels.....	66
4.3 Reference configuration	66
4.4 Error control schemes.....	67
4.5 Multiple access and timeslot structure.....	67
4.5.1 General.....	67
4.5.2 Hyperframes, multiframes and frames.....	68
4.5.3 Timeslots and bursts	68
4.5.4 Mapping of logical channels onto physical channels.....	69
4.6 Coding, interleaving and scrambling.....	69
4.7 Modulation	69
4.8 Transmission and reception.....	69
4.9 Other radio-related functions.....	69
4.10 Performance	70
4.11 TETRA modes of operation	70
4.11.0 General.....	70
4.11.1 Main control channel modes of operation.....	71
4.11.1.1 Conventional Access (CA) mode.....	71
4.11.1.2 Direct Access (DA) mode.....	71
4.11.2 Transmission modes	71
4.11.2.1 Downlink-Continuous Transmission (D-CT) mode.....	71
4.11.2.2 Downlink-Carrier Timesharing Transmission (D-CTT) mode.....	71
4.11.2.3 Downlink-Main Control Channel Timesharing Transmission (D-MCCTT) mode.....	71
4.11.2.4 Multiple Slot Transmission (MST) mode	71
4.11.3 Control modes.....	71
4.11.3.1 Normal Control Mode (NCM)	71
4.11.3.2 Minimum Control Mode (MCM).....	72
5 Modulation	73
5.1 Introduction	73
5.2 Modulation type	73
5.3 Modulation rate	73
5.4 Modulation symbol definition	73
5.5 Modulated signal definition.....	75
5.6 Modulation filter definition	75
5.7 Modulation block diagram	76
5.8 Introduction to QAM channels.....	76
5.9 Modulation type	76
5.10 Use of sub-carriers in QAM carriers	76
5.11 Modulation rate	76
5.12 Modulation symbol definition	77
5.13 Bit to symbol mapping	77
5.14 Data, synchronization and pilot symbol multiplexing	80

5.15	Sub-carrier frequency domain multiplexing	81
5.16	Modulated signal definition	81
5.17	Modulation filter definition	82
5.18	Modulation block diagram	83
6	Radio transmission and reception	84
6.1	Introduction	84
6.2	Frequency bands and channel arrangement	84
6.3	Reference test planes	84
6.4	Transmitter characteristics	85
6.4.1	Output power for phase modulation	85
6.4.1.0	General	85
6.4.1.1	Base Station (BS)	85
6.4.1.2	Mobile Station (MS)	86
6.4.2	Unwanted conducted emissions for phase modulation	86
6.4.2.1	Definitions	86
6.4.2.2	Unwanted emissions close to the carrier	87
6.4.2.2.0	General	87
6.4.2.2.1	Emission during the useful part of the burst	87
6.4.2.2.2	Emission during the switching transients	87
6.4.2.3	Unwanted emissions far from the carrier	88
6.4.2.4	Unwanted emissions during the CLCH and BLCH	88
6.4.2.5	Unwanted emissions in the non-transmit state	89
6.4.3	Unwanted radiated emissions for phase modulation	89
6.4.4	RF tolerance for phase modulation	89
6.4.5	RF Output power time mask for phase modulation	89
6.4.5.0	General	89
6.4.5.1	BS	90
6.4.5.2	MS	90
6.4.6	Transmitter intermodulation attenuation for phase modulation	90
6.4.6.1	Definition	90
6.4.6.2	BS	91
6.4.6.3	MS	91
6.4.7	Intra-BS intermodulation requirements	91
6.4.8	Output power for QAM	91
6.4.8.0	General	91
6.4.8.1	BS	92
6.4.8.2	MS	92
6.4.9	Unwanted conducted emissions for QAM	93
6.4.9.1	Definitions	93
6.4.9.2	Unwanted emissions close to the carrier	93
6.4.9.2.0	General	93
6.4.9.2.1	Emission during the useful part of the burst	93
6.4.9.2.2	Emission during the switching transients	94
6.4.9.3	Unwanted emissions far from the carrier	94
6.4.9.4	Unwanted emissions during the CLCH-Q and BLCH-Q	95
6.4.9.5	Unwanted emissions in the non-transmit state	96
6.4.10	RF Output power time mask for QAM	96
6.4.10.0	General	96
6.4.10.1	BS	97
6.4.10.2	MS	97
6.4.11	Transmitter intermodulation attenuation	97
6.4.12	Intra-BS intermodulation requirements	97
6.5	Receiver characteristics	97
6.5.0	General	97
6.5.1	Blocking characteristics	97
6.5.1.1	Definition	97
6.5.1.2	Specification for Phase Modulation	98
6.5.1.3	Specification for QAM	98
6.5.2	Spurious response rejection	99
6.5.2.1	Definition	99
6.5.2.2	Specification for phase modulation	99

6.5.2.3	Specification for QAM.....	99
6.5.3	Intermodulation response rejection.....	100
6.5.3.1	Definition	100
6.5.3.2	Specification for Phase Modulation	100
6.5.3.3	Specification for QAM.....	100
6.5.4	Unwanted conducted emissions.....	101
6.5.4.1	Definition	101
6.5.4.2	Specification.....	101
6.5.5	Unwanted radiated emissions	101
6.6	Transmitter/receiver performance for phase modulation.....	101
6.6.0	General.....	101
6.6.1	Transmitter performance for phase modulation.....	101
6.6.1.1	Modulation accuracy for phase modulation	101
6.6.1.2	Vector error magnitude requirement at symbol time for phase modulation.....	102
6.6.2	Receiver performance for phase modulation	103
6.6.2.0	General	103
6.6.2.1	Nominal error rates for phase modulation.....	103
6.6.2.1.1	Nominal error rates for $\pi/4$ -DQPSK modulation	103
6.6.2.1.2	Nominal error rates for $\pi/8$ -D8PSK modulation	103
6.6.2.2	Dynamic reference sensitivity performance for phase modulation	104
6.6.2.2.0	General	104
6.6.2.2.1	BS receiver performance	104
6.6.2.2.2	MS receiver performance	106
6.6.2.3	Receiver performance at reference interference ratios for Phase Modulation.....	107
6.6.2.3.0	General	107
6.6.2.3.1	BS receiver performance	108
6.6.2.3.2	MS receiver performance	109
6.6.2.4	Static reference sensitivity performance for phase modulation.....	110
6.6.2.4.0	General	110
6.6.2.4.1	BS receiver performance	110
6.6.2.4.2	MS receiver performance	111
6.6.2.5	MS receiver performance for synchronization burst acquisition.....	112
6.7	Transmitter/receiver performance for QAM	112
6.7.0	General.....	112
6.7.1	Transmitter performance for QAM.....	112
6.7.1.1	Modulation accuracy for QAM.....	112
6.7.1.2	Vector error magnitude requirement at symbol time for QAM.....	113
6.7.2	Receiver performance for QAM.....	114
6.7.2.0	General.....	114
6.7.2.1	Nominal error rates for QAM.....	114
6.7.2.2	Dynamic reference sensitivity performance for QAM.....	114
6.7.2.3	Receiver performance at reference interference ratios for QAM.....	117
6.7.2.3.1	Adjacent channel interference	117
6.7.2.3.2	Co-channel interference.....	117
6.7.2.4	Static reference sensitivity performance for QAM	118
6.7.2.5	MS receiver performance for frequency correction burst acquisition on a DA cell.....	118
6.8	Propagation conditions	118
6.8.0	General.....	118
6.8.1	Propagation conditions - introduction.....	118
6.8.2	Tap-gain process types.....	119
6.8.3	Propagation models.....	119
7	Radio sub-system synchronization.....	121
7.1	Introduction	121
7.2	General description of synchronization system.....	121
7.3	Timebase counters for phase modulation	121
7.3.1	Timing counters for phase modulation	121
7.3.2	Values of the counters for phase modulation.....	121
7.4	Timing of phase modulation signals.....	122
7.5	Timebase counters for QAM.....	122
7.5.1	Timing counters for QAM.....	122
7.5.2	Values of the counters for QAM.....	122

7.6	Timing of QAM signals	123
7.7	BS requirements for synchronization	123
7.8	MS requirements for synchronization	124
8	Channel coding and scrambling	125
8.1	Introduction	125
8.2	General	125
8.2.1	Interfaces in the error control structure	125
8.2.1.1	Interfaces for phase modulation	125
8.2.1.2	Interfaces for QAM	127
8.2.2	Notation	128
8.2.3	Definition of error control codes	128
8.2.3.1	16-state Rate-Compatible Punctured Convolutional (RCPC) codes	128
8.2.3.1.0	General	128
8.2.3.1.1	Encoding by the 16-state mother code of rate 1/4	128
8.2.3.1.2	Puncturing of the mother code	129
8.2.3.1.3	Puncturing scheme of the RCPC code of rate 2/3	129
8.2.3.1.4	Puncturing scheme of the RCPC code of rate 1/3	129
8.2.3.1.5	Puncturing scheme of the RCPC code of rate 292/432	129
8.2.3.1.6	Puncturing scheme of the RCPC code of rate 148/432	129
8.2.3.2	Shortened (30,14) Reed-Muller (RM) code	130
8.2.3.3	$(K_I + 16, K_I)$ block code	130
8.2.3.4	8-state Parallel Concatenated Convolutional Code (PCCC) for QAM	131
8.2.3.4.0	General	131
8.2.3.4.1	Encoding by the upper 8-state RSC encoder of rate 1/2	131
8.2.3.4.2	Interleaving by the quadratic-congruence interleaver	132
8.2.3.4.3	Encoding the interleaved bits by the lower 8-state RSC encoder of rate 1/2	133
8.2.3.4.4	Merging the systematic and parity bits for the PCCC encoder	133
8.2.3.4.5	Puncturing scheme for the PCCC encoder	134
8.2.3.4.6	Puncturing scheme for the PCCC encoder with coding rate 2/3	134
8.2.3.4.7	Puncturing scheme for the PCCC encoder with coding rate 1/2	134
8.2.3.5	(16,5) Reed-Muller (RM) code for QAM	134
8.2.4	Definition of interleaving schemes	134
8.2.4.1	Block interleaving for phase modulation	134
8.2.4.2	Interleaving over N blocks	135
8.2.4.3	Block interleaving for QAM	135
8.2.5	Definition of scrambling	136
8.2.5.1	Scrambling method	136
8.2.5.2	Scrambling sequence	136
8.3	Error control schemes	137
8.3.1	Error control schemes for phase modulation	137
8.3.1.0	General	137
8.3.1.1	Access Assignment Channel (AACH)	139
8.3.1.2	Broadcast Synchronization Channel (BSCH)	139
8.3.1.3	Traffic channels in circuit switched mode	140
8.3.1.3.1	Frame stealing and multi-slot transmission	140
8.3.1.3.2	Traffic CHannel, net rate = 4,8 kbit/s (TCH/4,8)	140
8.3.1.3.3	Traffic CHannel, net rate = 2,4 kbit/s (TCH/2,4)	141
8.3.1.3.4	Traffic CHannel, net rate = 7,2 kbit/s (TCH/7,2)	141
8.3.1.3.5	Traffic Channel-P8, net rate = 10,8 kbit/s (TCH-P8/10,8)	142
8.3.1.3.6	Speech Traffic Channel, full slot (TCH/S)	142
8.3.1.3.7	Speech Traffic Channel, half slot (TCH/S)	142
8.3.1.4	Signalling channels for signalling and packet mode data	143
8.3.1.4.1	Signalling CHannel for mapping onto Half-bursts on the Downlink (SCH/HD), Broadcast Network CHannel (BNCH), and STEaling CHannel (STCH)	143
8.3.1.4.2	Signalling CHannel for mapping onto Half-bursts on the Downlink (SCH-P8/HD)	143
8.3.1.4.3	Signalling CHannel for mapping onto Half-bursts on the Uplink (SCH/HU)	144
8.3.1.4.4	Signalling CHannel for mapping onto Half-bursts on the Uplink (SCH-P8/HU)	144
8.3.1.4.5	Signalling CHannel for mapping onto Full bursts (SCH/F)	144
8.3.1.4.6	Signalling CHannel for mapping onto Full bursts (SCH-P8/F)	145
8.3.2	Error control schemes for QAM	146
8.3.2.0	General	146

8.3.2.1	Slot Information Channel - QAM/Uplink (SICH-Q/U)	146
8.3.2.2	Slot Information Channel - QAM/Downlink (SICH-Q/D).....	147
8.3.2.3	Access Assignment Channel - QAM (AACH-Q)	147
8.3.2.4	Signalling Channel - QAM/Half slot Uplink (SCH-Q/HU)	148
8.3.2.5	Signalling Channel - QAM/Uplink (SCH-Q/U).....	148
8.3.2.6	Signalling Channel - QAM/Downlink (SCH-Q/D) and Broadcast Network Channel - QAM (BNCH-Q).....	149
8.3.2.7	Signalling Channel - QAM/Random Access (SCH-Q/RA)	150
8.3.2.8	Broadcast Synchronization Channel - QAM (BSCH-Q).....	150
8.3.2.9	Signalling Channel Data set B - QAM (SCH-Q/B).....	151
9	Channel multiplexing	152
9.1	Introduction	152
9.2	Logical channels.....	152
9.2.0	General.....	152
9.2.1	Logical channels hierarchy	152
9.2.2	Traffic channels for $\pi/4$ -DQPSK	152
9.2.2a	Traffic channels for $\pi/8$ -D8PSK	152
9.2.3	Control CHannels (CCH) for phase modulation.....	153
9.2.3.1	General	153
9.2.3.2	BCCH.....	153
9.2.3.3	LCH.....	153
9.2.3.4	SCH for $\pi/4$ -DQPSK.....	153
9.2.3.4a	SCH for $\pi/8$ -D8PSK	154
9.2.3.5	AACH	154
9.2.3.6	STCH	154
9.2.4	QAM Control CHannels (CCH-Q)	154
9.2.4.1	General	154
9.2.4.2	BCCH-Q	154
9.2.4.3	LCH-Q	155
9.2.4.4	SCH-Q	155
9.2.4.4a	SCH-Q/B	156
9.2.4.5	AACH-Q	156
9.2.4.6	SICH-Q	156
9.3	The physical resource	157
9.3.1	General.....	157
9.3.2	RF channels for phase modulation.....	157
9.3.2a	RF channels for QAM.....	158
9.3.2b	Random access RF channels for QAM	158
9.3.3	Timeslots	158
9.3.4	TDMA frame	159
9.3.5	Timeslot numbering	159
9.3.6	Subslot	159
9.3.6a	Random access uplink RF channel subslots for QAM.....	159
9.3.7	Multiframe	159
9.3.8	Hyperframe	159
9.3.9	Frame alignment	159
9.4	Physical channels	159
9.4.1	General.....	159
9.4.2	Types of physical channels for phase modulation	160
9.4.2.0	General	160
9.4.2.1	CP channel for phase modulation.....	160
9.4.2.2	TP channel.....	160
9.4.2.3	UP channel	160
9.4.3	Bursts for phase modulation	160
9.4.3.1	General	160
9.4.3.2	Phase modulation symbol numbering	161
9.4.3.3	Phase modulation bit numbering.....	161
9.4.3.4	Burst timing.....	161
9.4.4	Type of bursts for phase modulation	162
9.4.4.1	General	162
9.4.4.2	Modulation bits allocation.....	164

9.4.4.2.0	General	164
9.4.4.2.1	Control uplink Burst (CB)	165
9.4.4.2.2	Linearization uplink Burst (LB)	165
9.4.4.2.3	Linearization downlink burst	165
9.4.4.2.4	Normal Uplink Burst (NUB)	165
9.4.4.2.5	Normal continuous downlink burst	166
9.4.4.2.6	Synchronization continuous downlink burst	167
9.4.4.2.7	Normal discontinuous downlink burst	167
9.4.4.2.8	Synchronization discontinuous downlink burst	168
9.4.4.3	Burst fields	168
9.4.4.3.1	Frequency correction field	168
9.4.4.3.2	Normal training sequence	168
9.4.4.3.3	Extended training sequence	169
9.4.4.3.4	Synchronization training sequence	169
9.4.4.3.5	Tail bits	170
9.4.4.3.6	Phase adjustment bits	170
9.4.5	Transmission modes for phase modulation	171
9.4.5.1	BS continuous transmission	171
9.4.5.2	BS timesharing transmission	171
9.4.5.3	MS multiple slot transmission	172
9.4.6	Types of physical channels for QAM	173
9.4.6.0	General	173
9.4.6.1	CP channel for QAM	173
9.4.6.2	UP channel	173
9.4.7	Bursts for QAM	173
9.4.7.1	General	173
9.4.7.2	Modulation symbol numbering	173
9.4.7.3	Modulation bit numbering	174
9.4.7.4	Burst timing	174
9.4.8	Type of bursts for QAM	175
9.4.8.1	General	175
9.4.8.2	Modulation symbols allocation	176
9.4.8.3	Burst sub-carrier symbol sets	176
9.4.8.3.1	General on burst sub-carrier symbol sets	176
9.4.8.3.2	Uplink sync sequence set	176
9.4.8.3.3	Downlink sync sequence set	177
9.4.8.3.3a	Secondary sync sequence set	177
9.4.8.3.4	Half-slot uplink pilots set	177
9.4.8.3.5	Full-slot uplink pilots set	177
9.4.8.3.6	Full-slot downlink pilots set	178
9.4.8.3.7	Filler sets	178
9.4.8.3.8	Linearization downlink zeroed set	178
9.4.8.3.9	Frequency correction set	178
9.4.8.3.10	Frequency correction data set A	178
9.4.8.3.11	Frequency correction data set B	179
9.4.9	Transmission modes for QAM	179
9.4.9.1	BS transmission	179
9.4.9.2	MS multiple slot transmission	179
9.5	Mapping of logical channels into physical channels	179
9.5.0	General	179
9.5.1	General mapping of logical channels into $\pi/4$ -DQPSK physical channels	180
9.5.1a	General mapping of logical channels into D8PSK physical channels	181
9.5.1b	General mapping of logical channels into unallocated physical channels for phase modulation	182
9.5.2	Mapping of BCCH and CLCH for phase modulation	182
9.5.3	Mapping of SCH for $\pi/4$ -DQPSK physical channels	183
9.5.3a	Mapping of SCH for $\pi/8$ -D8PSK physical channels	183
9.5.4	Mapping of TCH and STCH for phase modulation	184
9.5.5	Mapping of AACH for phase modulation	184
9.5.6	General mapping of logical channels for QAM	184
9.5.7	General mapping of logical channels into unallocated physical channels for QAM	185
9.5.8	Mapping of BCCH-Q and CLCH-Q for QAM	185

9.5.9	Mapping of SCH-Q for QAM.....	186
9.5.10	Mapping of SICH-Q and AACH-Q for QAM	186
9.6	Monitoring pattern for transmitting MSs.....	187
9.7	BS timesharing transmission	187
9.7.1	Carrier sharing for Phase Modulation.....	187
9.7.2	MCCH sharing for Phase Modulation	187
9.7.3	BS timesharing transmission for QAM.....	188
9.8	Modes of control	188
9.8.0	General.....	188
9.8.1	Normal Control Mode.....	188
9.8.2	Minimum Control Mode.....	189
10	Radio subsystem link control	190
10.1	Introduction	190
10.2	RF power control.....	190
10.3	Radio link measurements	190
10.3.0	General.....	190
10.3.1	Received signal strength	190
10.3.1.1	Signal strength measurement	190
10.3.1.2	Sample duration for signal strength measurement	190
10.3.2	Signal quality	190
10.3.3	Round-trip MS-BS path delay	190
10.4	Link adaptation.....	191
11	Call Control (CC) service description	192
11.1	Introduction	192
11.2	Services offered.....	192
11.3	CC service	193
11.3.1	CC primitives exchanged through the TNCC-SAP	193
11.3.2	Service primitives at the TNCC-SAP	193
11.3.3	Primitive description.....	194
11.3.3.0	General	194
11.3.3.1	TNCC-ALERT primitive	194
11.3.3.2	TNCC-COMPLETE primitive	195
11.3.3.3	TNCC-DTMF primitive	195
11.3.3.4	TNCC-MODIFY primitive	196
11.3.3.5	TNCC-NOTIFY primitive	196
11.3.3.6	TNCC-PROCEED primitive	197
11.3.3.7	TNCC-RELEASE primitive	197
11.3.3.8	TNCC-SETUP primitive	197
11.3.3.9	TNCC-TX primitive	199
11.3.4	Parameter description	199
11.4	States for CC SAP	207
12	Supplementary Service (SS) service description.....	208
12.1	Introduction	208
12.2	Services offered.....	208
12.3	SS service	208
12.3.1	Primitives exchanged through TNSS-SAP	208
12.3.2	Parameter description	209
13	Short Data Service (SDS) service description.....	209
13.1	Introduction	209
13.2	Services offered.....	209
13.3	SDS	209
13.3.1	SDS primitives exchanged through the TNSDS-SAP	209
13.3.2	Service primitives at the TNSDS-SAP	210
13.3.2.0	General	210
13.3.2.1	TNSDS-STATUS primitive	210
13.3.2.2	TNSDS-REPORT primitive.....	211
13.3.2.3	TNSDS-UNITDATA primitive.....	211
13.3.2.4	TNSDS-CANCEL primitive	212
13.3.3	Parameter description	212

13.3.4	State description.....	215
13.3.4.1	NULL state.....	215
13.3.4.2	SHORT DATA INITIATED state	215
13.3.5	Service state diagram for the TNSDS-SAP	215
14	CMCE protocol	216
14.1	Introduction	216
14.2	Overview of CMCE.....	216
14.2.0	General.....	216
14.2.1	Communication routes of the CMCE model.....	217
14.2.2	Protocol structure and protocol stack.....	217
14.2.3	Addressing rules	219
14.2.4	CC, SS and SDS sub-entities	219
14.2.4.0	General	219
14.2.4.1	CC sub-entity	220
14.2.4.2	SS sub-entity	220
14.2.4.3	SDS sub-entity	220
14.2.5	PC sub-entity	220
14.2.6	Internal routes	221
14.2.7	Intra-CMCE primitive summary	223
14.2.7.0	General	223
14.2.7.1	Down link CC PDU parameters	223
14.2.7.2	Uplink CC PDU parameters.....	223
14.2.7.3	Downlink SS PDU parameters.....	224
14.2.7.4	Uplink SS PDU parameters.....	224
14.2.7.5	Down link SDS PDU parameters.....	224
14.2.7.6	Uplink SDS PDU parameters.....	224
14.2.7.7	CMCE management primitives.....	225
14.2.7.7.0	ACTIVITY request.....	225
14.2.7.7.1	BREAK indication.....	225
14.2.7.7.1a	BUSY indication	225
14.2.7.7.2	CANCEL request.....	225
14.2.7.7.3	CLOSE indication.....	225
14.2.7.7.4	CONFIGURE indication	225
14.2.7.7.5	CONFIGURE request.....	226
14.2.7.7.6	IDENTITIES request.....	226
14.2.7.7.6a	IDLE indication	226
14.2.7.7.6b	INFO indication.....	226
14.2.7.7.7	OPEN indication.....	226
14.2.7.7.8	REOPEN indication.....	226
14.2.7.7.9	REPORT indication.....	226
14.2.7.7.10	RESUME indication.....	227
14.3	Overview of services required by the CMCE.....	227
14.4	CMCE protocol states	227
14.4.0	General.....	227
14.4.1	States for PC	227
14.4.1.0	General	227
14.4.1.1	CLOSED	227
14.4.1.2	OPEN	227
14.4.2	States for CC.....	228
14.4.2.0	General	228
14.4.2.1	IDLE	230
14.4.2.2	MO-CALL-SETUP	230
14.4.2.3	MT-CALL-SETUP	230
14.4.2.4	CALL ACTIVE.....	231
14.4.2.5	CALL DISCONNECT	231
14.4.2.6	WAIT	231
14.4.3	States for SS.....	231
14.4.4	States for SDS.....	232
14.5	Procedures	232
14.5.0	General.....	232
14.5.1	Individual CC procedures	233

14.5.1.0	General	233
14.5.1.1	Call set-up procedures.....	233
14.5.1.1.0	General	233
14.5.1.1.1	Incoming call	234
14.5.1.1.2	Outgoing call	236
14.5.1.1.3	Colliding calls.....	237
14.5.1.1.4	Unsuccessful call set-up	237
14.5.1.1.5	Call rejection	238
14.5.1.2	Call maintenance procedures	238
14.5.1.2.0	General	238
14.5.1.2.1	Transmission control procedures.....	239
14.5.1.2.2	Call status information procedures	243
14.5.1.2.3	Call modification procedures.....	244
14.5.1.2.4	Call restoration procedures.....	245
14.5.1.2.5	DTMF procedures	247
14.5.1.2.6	Calls to and from external subscribers.....	249
14.5.1.3	Call disconnection procedures	249
14.5.1.3.0	General	249
14.5.1.3.1	User initiated disconnection	249
14.5.1.3.2	Network initiated disconnection.....	250
14.5.1.3.3	Reception of disconnection request	250
14.5.1.3.4	Expiry of timers.....	250
14.5.1.3.5	Colliding disconnection.....	251
14.5.1.4	U-Plane switching	251
14.5.1.4.0	General	251
14.5.1.4.1	End of call set-up phase.....	252
14.5.1.4.2	During call maintenance phase.....	252
14.5.1.4.3	Call disconnection phase	253
14.5.2	Group CC procedures	253
14.5.2.0	General	253
14.5.2.1	Call set-up procedures.....	253
14.5.2.1.0	General	253
14.5.2.1.1	Incoming call.....	255
14.5.2.1.2	Outgoing call	255
14.5.2.1.3	Colliding calls.....	256
14.5.2.1.4	Unsuccessful call set-up	257
14.5.2.1.5	Call rejection	257
14.5.2.2	Call maintenance procedures	257
14.5.2.2.0	General	257
14.5.2.2.1	Transmission control procedures.....	258
14.5.2.2.2	Call status information procedures	262
14.5.2.2.3	Call modification procedures.....	263
14.5.2.2.4	Call restoration procedures.....	264
14.5.2.2.5	DTMF procedures	267
14.5.2.2.6	Temporary address handling procedures.....	267
14.5.2.2.7	Calls to and from external subscribers.....	268
14.5.2.3	Call disconnection procedures	268
14.5.2.3.0	General	268
14.5.2.3.1	User initiated disconnection	269
14.5.2.3.2	Network initiated disconnection.....	270
14.5.2.3.3	Reception of disconnection request	270
14.5.2.3.4	Colliding disconnection.....	270
14.5.2.3.5	Expiry of timers.....	270
14.5.2.4	U-Plane switching.....	271
14.5.2.4.0	General	271
14.5.2.4.1	End of call set-up phase.....	271
14.5.2.4.2	During call maintenance phase.....	272
14.5.2.4.3	Call disconnection phase	273
14.5.2.5	Void.....	273
14.5.2.6	Acknowledged group call procedures	273
14.5.2.7	Call ownership	274
14.5.3	Traffic channel assignment procedures.....	274

14.5.3.1	SwMI related procedures	274
14.5.3.2	MS related procedures.....	275
14.5.3.2.1	General procedures.....	275
14.5.3.2.2	Procedures for acceptance of individually-addressed channel allocation.....	276
14.5.3.2.3	Procedures for acceptance of group-addressed channel allocation.....	277
14.5.4	SS procedures	278
14.5.5	SDS procedures	278
14.5.5.0	General	278
14.5.5.1	Incoming short data message	278
14.5.5.2	Outgoing short data messages.....	279
14.5.6	PC procedures.....	279
14.5.6.0	General.....	279
14.5.6.1	Access to the communication resources.....	279
14.5.6.2	Access priority handling	279
14.5.6.2.0	General	279
14.5.6.2.1	Cancel.....	280
14.5.6.3	CMCE PDU exchange	281
14.5.6.3.0	General	281
14.5.6.3.1	Choice of layer 2 service	281
14.5.6.4	Control information exchange.....	281
14.5.6.5	PC protocol error conditions	281
14.5.6.5.1	PDU type error	281
14.5.6.5.2	Invalid call identifier	282
14.5.6.5.3	MS busy.....	282
14.5.6.6	Temporary Disablement.....	282
14.5.7	Subscriber class	282
14.5.8	Activity handling	283
14.5.9	Not-permitted cells	283
14.6	Protocol timers	283
14.7	PDU descriptions.....	284
14.7.0	General.....	284
14.7.1	PDU description tables - downlink.....	285
14.7.1.1	D-ALERT.....	285
14.7.1.2	D-CALL PROCEEDING.....	286
14.7.1.3	D-CALL RESTORE	286
14.7.1.4	D-CONNECT.....	287
14.7.1.5	D-CONNECT ACKNOWLEDGE.....	287
14.7.1.6	D-DISCONNECT	288
14.7.1.7	D-FACILITY	288
14.7.1.8	D-INFO	289
14.7.1.9	D-RELEASE.....	289
14.7.1.10	D-SDS-DATA.....	290
14.7.1.11	D-STATUS	290
14.7.1.12	D-SETUP	291
14.7.1.13	D-TX CEASED.....	291
14.7.1.14	D-TX CONTINUE.....	292
14.7.1.15	D-TX GRANTED	292
14.7.1.16	D-TX INTERRUPT	293
14.7.1.17	D-TX WAIT.....	293
14.7.2	PDU description tables - uplink.....	294
14.7.2.1	U-ALERT.....	294
14.7.2.2	U-CALL RESTORE	294
14.7.2.3	U-CONNECT.....	295
14.7.2.4	U-DISCONNECT	295
14.7.2.5	U-FACILITY	295
14.7.2.6	U-INFO	296
14.7.2.7	U-STATUS	296
14.7.2.8	U-SDS-DATA.....	297
14.7.2.9	U-RELEASE.....	298
14.7.2.10	U-SETUP	298
14.7.2.11	U-TX CEASED.....	299
14.7.2.12	U-TX DEMAND.....	299

14.7.3	PDU description tables - downlink and uplink	299
14.7.3.1	General rules for function not supported.....	299
14.7.3.2	CMCE FUNCTION NOT SUPPORTED	299
14.8	Information elements coding	300
14.8.0	General.....	300
14.8.1	Area Selection.....	300
14.8.2	Basic service information	301
14.8.3	Call identifier	301
14.8.3a	Call identifier present.....	301
14.8.4	Call ownership	301
14.8.5	Called party type identifier	302
14.8.6	Called party SNA.....	302
14.8.7	Called party extension	302
14.8.8	Called party SSI.....	302
14.8.9	Calling party type identifier	303
14.8.10	Calling party extension	303
14.8.11	Calling party SSI.....	303
14.8.12	Call priority.....	303
14.8.13	Call status	304
14.8.14	Call queued	304
14.8.15	Continue.....	304
14.8.16	Call time-out	305
14.8.17	Call time-out, set-up phase	305
14.8.17a	Circuit mode type	306
14.8.17b	CLIR control.....	306
14.8.17c	Communication type.....	306
14.8.18	Disconnect cause	307
14.8.18a	DM-MS address.....	307
14.8.19	DTMF	307
14.8.19a	DTMF digit.....	308
14.8.19b	DTMF type	308
14.8.20	External subscriber number	309
14.8.21	Encryption control	309
14.8.21a	Encryption flag	309
14.8.22	Facility	310
14.8.23	Hook method selection	310
14.8.24	Length indicator.....	310
14.8.25	New call identifier	310
14.8.26	Modify	310
14.8.27	Notification indicator.....	311
14.8.27a	Other party type identifier.....	311
14.8.27b	Other party SNA	311
14.8.27c	Other party extension.....	311
14.8.27d	Other party SSI	311
14.8.28	PDU type	312
14.8.29	Poll request	312
14.8.30	Poll response	312
14.8.31	Poll response addresses.....	313
14.8.32	Poll response number.....	313
14.8.33	Poll response percentage.....	313
14.8.34	Pre-coded status	314
14.8.35	Proprietary	314
14.8.36	Request to transmit/send data	314
14.8.37	Reset call time-out timer (T310).....	315
14.8.38	Short data type identifier.....	315
14.8.39	Simplex/duplex selection.....	315
14.8.39a	Slots per frame	315
14.8.40	Speech service	315
14.8.41	Temporary address.....	316
14.8.42	Transmission grant.....	316
14.8.43	Transmission request permission.....	316
14.8.44	Transmitting party type identifier	316