



**Digital Enhanced Cordless Telecommunications (DECT);
Common Interface (CI);
Part 3: Medium Access Control (MAC) layer**

*ITeH STANDARD PREVIEW
(standards.iteh.ai)
Full standard/standards/etsi-en-300-175-3-40-5580-
https://standards.iteh.ai/catalog/standards/etsi-en-300-175-3-40-5580-457f-8feb-1eb632d90e0c/etsi-en-300-175-3-40-5580-457f-8feb-1eb632d90e0c/etsi-en-300-175-3-40-5580-457f-8feb-1eb632d90e0c*

Reference

REN/DECT-00323

KeywordsDECT, IMT-2000, MAC, mobility, radio, TDD,
TDMA**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	17
Foreword.....	17
Modal verbs terminology.....	17
1 Scope	18
2 References	18
2.1 Normative references	18
2.2 Informative references.....	19
3 Definition of terms, symbols and abbreviations.....	20
3.1 Terms.....	20
3.2 Symbols.....	20
3.3 Abbreviations	21
4 Description of the MAC layer	23
4.1 MAC layer reference model	23
4.1.1 General.....	23
4.1.2 Cluster Control Function (CCF)	24
4.1.3 Cell Site Functions (CSF).....	24
4.1.4 Relationship to physical layer elements.....	24
4.2 Frame and multiframe structures.....	25
4.2.1 General.....	25
4.2.2 Frame structure	25
4.2.3 Multiframe structure	26
4.3 State definitions.....	27
4.3.1 PP states	27
4.3.2 RFP states	28
5 Overview of MAC layer services.....	29
5.1 General	29
5.1.0 Service groupings	29
5.1.1 Broadcast Message Control (BMC).....	29
5.1.2 Connectionless Message Control (CMC)	29
5.1.3 Multi-Bearer Control	29
5.2 Service descriptions.....	29
5.2.1 Common functions.....	29
5.2.2 BMC service	30
5.2.3 CMC service	30
5.2.4 MBC services.....	30
5.3 Logical channels.....	31
5.3.0 Overview	31
5.3.1 MBC connection endpoints (MC-SAP logical channels)	31
5.3.1.1 The higher layer C-plane channels, C	31
5.3.1.2 The higher layer U-Plane channels, I	32
5.3.1.3 The higher layer U-Plane control channels, G _F and G _{FA}	32
5.3.1.4 The higher layer U-Plane channel in E+U type slots, I _{PF}	32
5.3.2 CMC endpoints (MB-SAP logical channels).....	33
5.3.2.1 The connectionless C-Plane channels, CL	33
5.3.2.2 The connectionless U-Plane channels, SI _N and SI _P	33
5.3.2.3 The connectionless U-Plane channel in E+U type slots, SI _{PF}	33
5.3.3 BMC endpoint (MA-SAP logical channel).....	34
5.3.3.1 The slow broadcast channel, B _S	34
5.3.3.2 The ULE broadcast channel, B _U	34
5.3.4 Internal MAC control channels.....	34
5.3.4.1 The system information channel, Q	34
5.3.4.2 Identities channel, N.....	34
5.3.4.3 The MAC control channel, M	34

5.3.4.4	MAC paging channel, P	35
5.3.4.5	The Compound System Information Channel, Q _C	35
5.3.4.6	The Split Identities Channel, N _S	35
5.3.4.7	The ULE MAC Control Channel, M _U	35
5.3.4.8	The ULE Paging Channel, P _U	35
5.4	SAP definitions	36
5.4.0	General	36
5.4.1	MA SAP	36
5.4.2	MB SAP	36
5.4.3	MC SAP	36
5.4.4	ME SAP	37
5.4.5	Order of transmission	37
5.5	Bearer	37
5.5.0	General	37
5.5.1	Bearer types	38
5.5.2	Bearer operation	38
5.6	Connection oriented services	38
5.6.0	General	38
5.6.1	Connection types	39
5.6.1.0	General	39
5.6.1.1	Basic connections	39
5.6.1.2	Advanced connections	39
5.6.1.2.0	General	39
5.6.1.2.1	Rules for ECN selection in advanced connections	40
5.6.1.2.2	Expedited operations in advanced connections	40
5.6.1.3	Connection identifiers	40
5.6.1.4	Complementary connections	40
5.6.2	Symmetric and asymmetric connections	41
5.6.2.0	General	41
5.6.2.1	Symmetric connections	41
5.6.2.2	Asymmetric connections	47
5.7	Broadcast and connectionless services	57
5.7.0	General	57
5.7.1	The broadcast services	57
5.7.1.0	General	57
5.7.1.1	The continuous broadcast service	57
5.7.1.2	The non-continuous broadcast service	58
5.7.2	The connectionless services	58
5.7.2.0	General	58
5.7.2.1	Connectionless downlink services	58
5.7.2.1.0	General	58
5.7.2.1.1	Coding of TA and BA bits in connectionless downlink services	59
5.7.2.2	Connectionless uplink services	59
5.8	ULE Broadcast services	60
5.8.0	General	60
5.8.1	The continuous ULE broadcast service	60
6	Multiplexing	60
6.0	General	60
6.1	CCF multiplexing functions	60
6.2	CSF multiplexing functions	61
6.2.0	General	61
6.2.1	Bit Mappings (MAP)	66
6.2.1.0	General	66
6.2.1.1	D-field mapping (D-MAP)	66
6.2.1.1.0	General	66
6.2.1.1.1	D-field mapping for the double slot structure (physical packet P80)	67
6.2.1.1.2	D-field mapping for the full slot structure (physical packet P32)	67
6.2.1.1.3	D-field mapping for the short slot structure (physical packet P00)	68
6.2.1.1.4	D-field mapping for the variable slot structure (physical packet P00j)	69
6.2.1.2	A-field Mapping (A-MAP)	70
6.2.1.3	B-field Mapping (B-MAP)	71

6.2.1.3.0	General	71
6.2.1.3.1	Unprotected format.....	71
6.2.1.3.2	Encoded protected format.....	73
6.2.1.3.3	Multisubfield protected format.....	73
6.2.1.3.4	Singlesubfield protected format switches.....	76
6.2.1.3.5	Constant-size subfield protected format	77
6.2.2	Time multiplexers	80
6.2.2.0	General	80
6.2.2.1	Tail MULTipleXer (T-MUX).....	80
6.2.2.1.0	General	80
6.2.2.1.1	T-MUX algorithm for RFP transmissions	81
6.2.2.1.2	T-MUX algorithm for PT transmissions.....	82
6.2.2.2	B-field control multiplexer (E/U-MUX)	83
6.2.2.3	B-field mode multiplexer E-type and E+U-type modes.....	85
6.2.2.3.1	E-type and E+U-type modes for slots with more than one subfield	85
6.2.2.3.2	Half slot (j=80) modes for 2-level modulation	99
6.2.2.4	Priority scheme in E or E+U mode	100
6.2.3	MAC Encryption	101
6.2.4	Scrambling	101
6.2.5	Error control.....	103
6.2.5.0	General	103
6.2.5.1	R-CRC overview	103
6.2.5.2	R-CRC generation and checking.....	104
6.2.5.3	X-CRC overview.....	104
6.2.5.4	X-CRC generation and checking.....	105
6.2.5.5	B-CRC generation and checking.....	107
6.2.6	Broadcast controller.....	107
7	Medium access layer messages	107
7.0	General	107
7.1	Header field.....	108
7.1.1	Overview/formatting.....	108
7.1.2	Tail identification, TA, bits a ₀ to a ₂	108
7.1.3	The "Q1/BCK" bit, bit a ₃	109
7.1.4	B-field identification, BA, bits a ₄ to a ₆	109
7.1.5	The "Q2" bit, bit a ₇	110
7.1.6	Combined coding of the bits a ₃ to a ₇	110
7.2	Messages in the tail field.....	111
7.2.1	Overview	111
7.2.2	Identities information (N _T).....	111
7.2.3	System information and multiframe marker (Q _T).....	111
7.2.3.1	General	111
7.2.3.2	Static system information.....	112
7.2.3.2.1	General, Q _H = 0, 1 (hex).....	112
7.2.3.2.2	Q _H and Normal-Reverse (NR).....	113
7.2.3.2.3	Slot Number (SN).....	113
7.2.3.2.4	Start Position (SP).....	113
7.2.3.2.5	ESCAPE bit (ESC).....	114
7.2.3.2.6	Number of transceivers.....	114
7.2.3.2.7	Extended RF carrier information available (Mc).....	114
7.2.3.2.8	RF carriers available (RF-cars).....	114
7.2.3.2.9	Spare bits (SPR)	115
7.2.3.2.10	Carrier number.....	115
7.2.3.2.11	Extended static system information available (Ext-System-Info) and spare bit.....	115
7.2.3.2.12	Primary receiver Scan Carrier Number (PSCN).....	116
7.2.3.3	Extended RF carrier information part 1	116
7.2.3.3.1	General, Q _H = 2 (hex).....	116
7.2.3.3.2	Further RF carrier extensions	117
7.2.3.3.3	Number of RF carriers.....	117
7.2.3.4	Fixed part capabilities	117
7.2.3.4.1	General, Q _H = 3 (hex).....	117
7.2.3.4.2	Standard capabilities.....	117

7.2.3.5	Extended fixed part capabilities	118
7.2.3.5.1	General, $Q_H = 4$ (hex)	118
7.2.3.5.2	Extended Physical and MAC layer capabilities	119
7.2.3.5.3	Extended higher layer capabilities	120
7.2.3.6	Secondary access rights identities	120
7.2.3.6.1	General, $Q_H = 5$ (hex)	120
7.2.3.6.2	SARI message	120
7.2.3.7	Multiframe number	120
7.2.3.7.1	General, $Q_H = 6$ (hex)	120
7.2.3.7.2	Multiframe number	120
7.2.3.8	Escape	121
7.2.3.8.1	General, $Q_H = 7$ (hex)	121
7.2.3.8.2	Escape information	121
7.2.3.9	Extended RF carrier information part 2	121
7.2.3.9.1	General, $Q_H = 9$ (hex)	121
7.2.3.10	Transmit information	121
7.2.3.10.1	General, $Q_H = B$ (hex)	121
7.2.3.11	Extended fixed part capabilities (part 2)	122
7.2.3.11.1	General, $Q_H = C$ (hex)	122
7.2.3.11.2	Extended Physical and MAC layer capabilities (part 2)	122
7.2.3.11.3	Extended higher layer capabilities (part 2)	123
7.2.3.12	Extended static system information	123
7.2.3.12.1	General, $Q_H = D$ (hex)	123
7.2.3.12.2	Spare bits (Spare)	124
7.2.3.12.3	RFP slot scheme info	124
7.2.3.13	Extended fixed part capabilities (part 3)	124
7.2.3.13.1	General, $Q_H = E$ (hex)	124
7.2.3.13.2	Extended Physical and MAC layer capabilities (part 3)	125
7.2.3.13.3	Extended higher layer capabilities (part 3)	125
7.2.4	Paging Tail (P_T)	126
7.2.4.1	General format	126
7.2.4.1.1	P_T format for full and long page messages	126
7.2.4.1.2	P_T format for short page messages	126
7.2.4.1.3	P_T format for zero length page messages	126
7.2.4.1.4	P_T format for MAC_Resume_and_Control_page message	126
7.2.4.2	P_T header format	127
7.2.4.2.1	General format	127
7.2.4.2.2	Bit a_8 is the extend flag	127
7.2.4.2.3	B_S SDU length indication	127
7.2.4.3	MAC layer information for PT	128
7.2.4.3.1	Information type	128
7.2.4.3.2	Fill bits / Blind long slot ($j=640$ / $j=672$) information	128
7.2.4.3.3	Blind full slot information	129
7.2.4.3.4	Bearer description	129
7.2.4.3.5	Escape	130
7.2.4.3.6	Dummy or connectionless downlink bearer marker	130
7.2.4.3.7	Bearer handover/replacement and no-emission mode information	130
7.2.4.3.8	RFP status and modulation types	131
7.2.4.3.9	Active carriers	132
7.2.4.3.10	RFP power level	132
7.2.4.3.11	Blind double slot/RFP-FP interface resource information	133
7.2.4.3.12	Extended modulation types	133
7.2.5	MAC control (M_T)	134
7.2.5.1	General format and contents	134
7.2.5.2	Basic connection control	134
7.2.5.2.1	General	134
7.2.5.2.2	Format for most messages	135
7.2.5.2.3	WAIT	135
7.2.5.2.4	ATTRIBUTES_T_{Req;Cfm}	135
7.2.5.3	Advanced connection control	136
7.2.5.3.1	General	136
7.2.5.3.2	ACCESS_REQUEST	136

7.2.5.3.3	BEARER_HANDOVER_REQUEST	136
7.2.5.3.4	CONNECTION_HANDOVER_REQUEST	136
7.2.5.3.5	UNCONFIRMED_ACCESS_REQUEST	137
7.2.5.3.6	BEARER_CONFIRM	137
7.2.5.3.7	WAIT	137
7.2.5.3.8	ATTRIBUTES_T_{Req;Cfm}	137
7.2.5.3.9	BANDWIDTH_T_{Req;Cfm}	143
7.2.5.3.10	Channel_list	143
7.2.5.3.11	Unconfirmed_dummy	145
7.2.5.3.12	Unconfirmed_handover	145
7.2.5.3.13	RELEASE	145
7.2.5.4	MAC layer test messages	146
7.2.5.4.0	General	146
7.2.5.4.1	Basic format	146
7.2.5.4.2	FORCE_TRANSMIT	147
7.2.5.4.3	LOOPBACK_DATA	147
7.2.5.4.4	DEFEAT_ANTENNA_DIVERSITY	148
7.2.5.4.5	ESCAPE	149
7.2.5.4.6	NETWORK_TEST	149
7.2.5.4.7	CLEAR_TEST_MODES	149
7.2.5.4.8	CHANGE_MODULATION_SCHEME	149
7.2.5.5	Quality control	150
7.2.5.5.0	General	150
7.2.5.5.1	Prolonged preamble diversity	151
7.2.5.6	Broadcast and connectionless services	152
7.2.5.7	Encryption control	153
7.2.5.8	B-field setup, first PT transmission	154
7.2.5.9	Escape	154
7.2.5.10	TARI message	154
7.2.5.11	REP connection control	154
7.2.5.11.1	General	154
7.2.5.11.2	Format for most messages	154
7.2.5.11.3	REP CHANNEL MAP REQUEST	155
7.2.5.11.4	REP CHANNEL MAP CONFIRM	155
7.2.5.12	Advanced connection control part 2	155
7.2.5.12.1	General	155
7.2.5.12.2	Short description of the advanced connection control part 2 messages	156
7.2.5.12.3	Format for most advanced connection control part 2 messages	156
7.2.5.12.4	Format for "ready for release with G _{FA} " and "expedited release with G _{FA} " messages	156
7.2.5.12.5	Reason codes in "ready for release with G _{FA} " and "expedited release with G _{FA} " messages	158
7.2.5.12.6	Format for "Null or GFACHannel transmission" message	159
7.3	Messages in the B-field	160
7.3.1	Overview	160
7.3.2	Advanced connection control	161
7.3.2.1	General format	161
7.3.2.2	BEARER_REQUEST	162
7.3.2.3	BEARER_CONFIRM	163
7.3.2.4	WAIT	163
7.3.2.5	ATTRIBUTES_B_{Req;Cfm}	164
7.3.2.6	BANDWIDTH_B_{Req;Cfm}	167
7.3.2.7	CHANNEL_LIST	168
7.3.2.8	UNCONFIRMED_DUMMY	170
7.3.2.9	UNCONFIRMED_HANDOVER	170
7.3.2.10	RELEASE	170
7.3.3	Null or I _{PF} segmentation info	172
7.3.3.0	General	172
7.3.3.1	Spare or I _{PF} segmentation info	173
7.3.3.2	Extended NCF bits	173
7.3.4	Quality control	174
7.3.4.1	General format	174
7.3.4.2	Bearer and connection control	174
7.3.4.3	RESET	175

7.3.4.4	Bearer quality in an asymmetric connection	176
7.3.5	Extended system information	176
7.3.5.1	General format	176
7.3.5.2	TARI messages	177
7.3.5.3	"no-emission" mode sync information or ULE Dummy Bearer subfield 2.....	177
7.3.5.3.0	General	177
7.3.5.3.1	"no-emission" mode sync information for dummy bearer.....	177
7.3.5.3.2	ULE Dummy Bearer subfield 2.....	178
7.3.5.4	ULE Dummy Bearer subfield 3	178
7.3.5.5	ULE Dummy Bearer subfield 0	178
7.3.5.6	ULE Dummy Bearer subfield 1	178
7.3.6	G _F channel data packet.....	179
7.3.7	Escape	179
8	Medium access layer primitives	180
8.0	General	180
8.1	Connection oriented service primitives	180
8.1.0	General.....	180
8.1.1	Connection setup: MAC_CON {req;ind;cfm}	180
8.1.2	Connection modification: MAC_MOD {req;ind;cfm}	182
8.1.3	CO data transmit ready: MAC_CO_DTR {ind}	183
8.1.4	CO data transfer: MAC_CO_DATA {req;ind}	183
8.1.5	Restart DLC: MAC_RES_DLC {ind}	183
8.1.6	Connection release: MAC_DIS {req;ind}	184
8.1.7	MAC bandwidth: MAC_BW {ind;res}	184
8.1.8	Encryption.....	184
8.1.8.1	Load encryption key: MAC_ENC_KEY {req}.....	184
8.1.8.2	Enable/disable encryption: MAC_ENC_EKS {req;ind;cfm}	185
8.1.9	C-plane switching procedure	185
8.1.9.1	C-plane switching procedure: MAC_Cs_Cf {req, cfm, ind, res}.....	185
8.1.9.2	C-plane switching procedure: MAC_CsCf_END {ind}	185
8.2	Connectionless and broadcast service primitives	186
8.2.1	Paging: MAC_PAGE {req;ind}	186
8.2.2	Downlink connectionless: MAC_DOWN_CON {req;ind}	186
8.2.3	Uplink connectionless: MAC_UP_CON {req;ind;cfm}	187
8.2.4	"no-emission" mode.....	187
8.3	Management primitives	187
8.3.0	General.....	187
8.3.1	Connection control.....	187
8.3.1.1	Connection setup: MAC_ME_CON {ind}.....	187
8.3.1.2	Connection setup allowed: MAC_ME_CON_ALL {req}	187
8.3.1.3	Bearer release: MAC_ME_REL {req}	188
8.3.1.4	MBC release report: MAC_ME_REL_REP {ind}	188
8.3.2	System information and identities	188
8.3.2.1	FP information preloading: MAC_ME_RFP_PRELOAD {req}	188
8.3.2.2	PT information preloading: MAC_ME_PT_PRELOAD {req}	188
8.3.2.3	System information output: MAC_ME_INFO {ind;res}	188
8.3.2.4	Extended system info: MAC_ME_EXT. {req;ind;res;cfm}	188
8.3.3	Channel map: MAC_ME_CHANMAP {ind;res}.....	189
8.3.4	Status reports: MAC_ME_STATUS {req;ind;res;cfm}	189
8.3.5	Error reports: MAC_ME_ERROR {ind;res}	189
8.4	Flow control	189
8.4.1	MA SAP flow control.....	189
8.4.2	MB SAP flow control	189
8.4.3	MC SAP flow control	189
9	Broadcast and connectionless procedures	192
9.1	Downlink broadcast and connectionless procedures	192
9.1.0	General.....	192
9.1.1	Downlink broadcast procedure	192
9.1.1.1	Broadcast information.....	192
9.1.1.2	Channel selection for downlink broadcast services.....	192

9.1.1.3	Downlink broadcast procedure description.....	194
9.1.2	Downlink connectionless procedure.....	194
9.1.2.1	Channel selection at the RFP.....	194
9.1.2.2	Downlink connectionless procedure description.....	194
9.1.3	Paging broadcast procedure.....	194
9.1.3.0	General.....	194
9.1.3.1	RFP paging broadcasts.....	195
9.1.3.2	PP paging procedures.....	197
9.1.3.2.1	PP paging detection.....	197
9.1.3.2.2	PP paging processing.....	197
9.1.4	Downlink connectionless procedures for ULE.....	197
9.1.4.0	General.....	197
9.1.4.1	Transmission over the ULE dummy bearer.....	198
9.1.4.2	Transmission over the additional C/L bearers.....	198
9.1.4.2.0	General.....	198
9.1.4.2.1	MAC signalling.....	198
9.1.4.3	Announcement via the B _U paging channel.....	199
9.1.4.4	Routing and instance separation.....	199
9.1.4.5	Additional attributes.....	199
9.1.4.6	Encryption.....	199
9.1.4.7	Destination and addressing: unicast and multicast.....	199
9.1.4.7.0	General.....	199
9.1.4.7.1	C/L downlink unicast service.....	199
9.1.4.7.2	C/L downlink multicast service.....	200
9.1.4.7.3	Identities in C/L downlink multicast service.....	200
9.1.4.8	Scrambling.....	200
9.1.4.9	Time references for the multicast transmission.....	200
9.1.4.9.1	Time reference for transmission over the dummy bearer.....	200
9.1.4.9.2	Time reference for transmission over additional C/L bearers.....	201
9.2	Uplink connectionless procedures.....	201
9.2.1	General.....	201
9.2.2	Bearer selection for the connectionless uplink.....	201
9.2.3	Procedure for the connectionless uplink.....	202
9.2.3.1	Predicates.....	202
9.2.3.2	PT D-field construction.....	202
9.2.3.3	PT transmission sequence.....	202
9.2.3.4	FT procedure.....	203
9.3	Non-continuous broadcast procedure.....	203
9.3.0	General.....	203
9.3.1	Request for specific Q channel information.....	203
9.3.1.0	General.....	203
9.3.1.1	A-field procedure.....	203
9.3.1.2	B-field procedure.....	204
9.3.2	Request for a new dummy bearer.....	204
9.4	"No-emission" mode procedures.....	204
9.4.0	General.....	204
9.4.1	Initiation of the "no-emission" mode.....	205
9.4.1.1	Successful activation (countdown to zero).....	205
9.4.1.2	Multiframe countdown stopped by FT.....	205
9.4.1.3	Multiframe countdown stopped by PT.....	206
9.4.1.4	PT does not receive multiframe countdown "zero".....	207
9.4.2	Behaviour during power-down-mode.....	207
9.4.3	Waking up, FT initiated.....	207
9.4.4	Waking up, PT initiated.....	211
9.5	Ultra Low Energy (ULE) Mode Procedures.....	212
9.5.0	General.....	212
9.5.1	Initiation of the ULE Mode.....	212
9.5.1.0	General.....	212
9.5.1.1	ULE Dummy Bearer Subfield 0.....	213
9.5.1.2	ULE Dummy Bearer Subfield 1.....	214
9.5.1.3	ULE Dummy Bearer Subfield 2.....	216
9.5.1.3.0	General.....	216

9.5.1.3.1	M _U Channel Info 1 coding	217
9.5.1.3.2	M _U Channel Info 2 coding	218
9.5.1.4	ULE Dummy Bearer Subfield 3	219
9.5.1.5	Elements of the ULE paging system	220
9.6	U-NEMo mode procedures.....	221
9.6.1	General.....	221
9.6.2	Initiation of the U-NEMo mode.....	221
9.6.3	Behaviour during U-NEMo mode	221
9.6.4	Waking up, PT initiated	221
9.6.5	Raising a dummy bearer	223
9.6.5.1	General	223
9.6.5.2	Scanning, blind slot map, blind slot count	224
9.6.5.3	Identity Free ULE dummy	224
9.6.5.4	NEMo++ dummy	224
9.6.6	Waking up, FT initiated	225
9.6.6.1	Waking up for ULE without waking from no-emissions mode	225
9.6.6.2	Waking up for ULE and waking from no-emissions mode.....	225
10	Connection oriented service procedures.....	225
10.1	Overview	225
10.2	C/O connection setup	226
10.2.0	Introduction.....	226
10.2.1	General.....	226
10.2.2	Initiation of a basic and a normal connection setup.....	226
10.2.3	Initiation of a fast connection setup	227
10.2.4	Connection setup procedure description	227
10.2.4.1	Creation of MBCs	227
10.2.4.2	Establishment of a single bearer duplex connection of a known service type	229
10.2.4.3	Establishment of multi-bearer connections and connections needing service negotiation.....	230
10.2.4.3.0	General	230
10.2.4.3.1	Symmetric connection	232
10.2.4.3.2	Asymmetric uplink connection.....	232
10.2.4.3.3	Asymmetric downlink connection.....	232
10.2.4.3.4	Connection established.....	233
10.2.5	Expedited connections	233
10.3	C/O connection modification	233
10.3.1	Advanced connection: bandwidth modification.....	233
10.3.1.0	General	233
10.3.1.1	Suspend and resume	235
10.3.1.1.0	General	235
10.3.1.1.1	Expedited suspend and resume.....	235
10.3.1.2	MAC resume paging	235
10.3.1.3	ULE resume paging.....	236
10.3.2	Advanced connection: service type or slot type modification	236
10.3.2.0	General	236
10.3.2.1	Procedure for service type modification	236
10.3.2.2	Procedures for slot type modification	237
10.3.2.2.1	Procedure for slot type modification full to double	237
10.3.2.2.2	Procedure for slot type modification double to full	238
10.3.2.2.3	Procedures for slot type modification to/from long	238
10.3.2.2.4	Procedure for slot type modification in multibearer connections	239
10.3.2.3	Procedure for ECN number modification in an advanced connection	239
10.3.3	Connection type modification.....	239
10.3.3.0	General	239
10.3.3.1	Procedure for connection type modification basic to advanced	240
10.3.3.1.1	General procedure	240
10.3.3.1.2	Procedure for connection type modification basic to advanced plus slot type modification full to double	240
10.3.3.1.3	Procedure for connection type modification basic to advanced plus slot type modification full to long.....	241
10.3.3.2	Procedure for connection type modification advanced to basic	241
10.3.4	Modulation type modification.....	242

10.3.4.0	General	242
10.3.4.1	Adaptive code rate.....	243
10.3.5	Additional rules for Attributes_T message exchange	243
10.4	C/O connection release.....	244
10.4.1	General.....	244
10.4.1.0	Release causes.....	244
10.4.1.1	C/O connection release in packet mode connections	245
10.4.2	Procedure description	245
10.5	C/O bearer setup	245
10.5.1	Single bearer setup procedures	245
10.5.1.0	General	245
10.5.1.1	Basic bearer setup procedure.....	245
10.5.1.2	A-field advanced single bearer setup procedure	248
10.5.1.2.0	General	248
10.5.1.2.1	PT initiated	248
10.5.1.2.2	FT initiated	251
10.5.1.3	B-field single bearer setup procedure.....	252
10.5.1.3.0	General	252
10.5.1.3.1	PT initiated	252
10.5.1.3.2	FT initiated	254
10.5.1.4	Double simplex setup procedure	255
10.5.1.4.1	Terminology and Predicates	255
10.5.1.4.2	General description.....	255
10.5.1.4.3	Channel selection procedure for circuit mode connections	256
10.5.1.4.4	Channel selection procedure for packet mode connections	257
10.5.1.4.5	Indirect setup procedure	258
10.5.1.4.6	Direct setup procedure.....	258
10.5.1.4.7	Handling of encrypted connections	262
10.5.1.5	Additional duplex bearer setup procedure.....	263
10.5.1.5.1	General and predicates	263
10.5.1.5.2	General and predicates	264
10.5.1.6	Repeater Part (REP) procedures.....	264
10.5.1.6.1	Complementary connection bearer setup.....	264
10.5.1.6.2	Double duplex bearer setup procedure: Mapping procedure.....	265
10.5.1.7	Usage of TA special code "111" and M _T message "B-field setup, first PT transmission"	266
10.5.1.7.0	General	266
10.5.1.7.1	Default rules for TA code "111"	267
10.5.1.7.2	Default rules for M _T message "B-field setup, first transmission"	267
10.5.1.8	Expedited bearer setup procedures.....	268
10.5.1.8.1	General	268
10.5.1.8.2	Procedure for Single-burst setup and release.....	268
10.5.1.8.3	Procedure for Multi burst setup	270
10.5.1.8.4	Announcement "Ready for Release"	271
10.5.1.8.5	Indirect FT initiated expedited bearer setup procedure	272
10.5.1.8.6	Insertion of U-plane in "Expedited access request" messages.....	272
10.5.1.8.7	Connected state (TBC) in expedited bearer setup.....	273
10.5.1.8.8	Encryption synchronization in expedited bearer setup	273
10.5.1.8.9	Use of short slots in expedited connections.....	273
10.5.2	Channel list procedures.....	274
10.5.2.1	General	274
10.5.2.2	Description of the channel list messages.....	275
10.5.2.3	Usage of the channel list messages	275
10.6	C/O bearer handover	277
10.6.1	General.....	277
10.6.2	Duplex bearer handover procedure.....	277
10.6.2.1	PT initiated procedure	277
10.6.2.2	FT initiated procedure	278
10.6.3	Double simplex bearer handover	279
10.6.3.1	Procedure	279
10.6.3.2	Usage of quality control messages in bearer handover procedures.....	280
10.6.4	Bearer replacement	280
10.6.4.1	General bearer replacement.....	280

10.6.4.2	Frequency replacement	281
10.7	C/O bearer release	282
10.7.1	General.....	282
10.7.2	Bearer release procedure description	283
10.7.2.1	Unacknowledged release procedure.....	283
10.7.2.1.0	General	283
10.7.2.1.1	Crossed bearer release procedure	283
10.7.2.2	Acknowledged release procedure.....	284
10.7.2.3	Fast release procedure.....	284
10.7.2.4	REP relayed bearer release.....	285
10.7.3	Expedited bearer release procedures.....	285
10.7.3.0	General	285
10.7.3.1	General Expedited Release procedure.....	285
10.7.3.1.0	Usage	285
10.7.3.1.1	Procedure description	285
10.7.3.1.2	Exceptional cases and error handling	286
10.7.3.2	Special cases of expedited release procedures	286
10.7.3.2.1	Single-message expedited release procedure.....	286
10.7.3.2.2	Abnormal expedited release procedure.....	286
10.8	C/O data transfer	287
10.8.1	Higher layer associated signalling (C).....	287
10.8.1.0	General	287
10.8.1.1	C _S channel data	287
10.8.1.1.0	General	287
10.8.1.1.1	Transmission principle	287
10.8.1.1.2	Numbering principle.....	288
10.8.1.2	C _F channel data	288
10.8.1.2.0	General	288
10.8.1.2.1	Transmission principle	288
10.8.1.2.2	Numbering principle.....	289
10.8.1.3	Q1 and Q2 bit settings for all services except I _p _error_correct.....	289
10.8.1.3.0	Coding of the bits	289
10.8.1.3.1	Q1 and Q2 bit settings for MAC service I _n	289
10.8.1.3.2	Q1 and Q2 bit settings for MAC service I _p _error_detect	289
10.8.1.3.3	Q2 bit settings.....	290
10.8.1.3.4	Q1 bit settings.....	291
10.8.1.3.5	Q1 and Q2 settings when B-field is in E-mux modes.....	292
10.8.1.3.6	Q1 and Q2 settings when B-field is in "no-B-field" mode	293
10.8.1.3.7	Q1, Q2 and BCK settings when there are transitions in the coding rules or when the rules applicable to both directions are not the same.....	293
10.8.1.3.8	Q1 and Q2 settings when B-field mode is unknown	294
10.8.2	MOD-2 protected I channel operation (I _p).....	294
10.8.2.1	General	294
10.8.2.1.0	Introduction to MOD-2 protected I channel operation (I _p).....	294
10.8.2.1.1	Use of selective reception.....	294
10.8.2.2	Limiting the lifetime of packets	295
10.8.2.2.0	General	295
10.8.2.2.1	Lifetime setting and management.....	295
10.8.2.3	A-field shall always be correct.....	297
10.8.2.4	Use of the acknowledge bits.....	297
10.8.2.4.0	General	297
10.8.2.4.1	Q2 and BCK bit setting for I _p _error_correction services	297
10.8.2.4.2	BCK bit setting	297
10.8.2.5	Data jump procedures	298
10.8.2.5.0	General	298
10.8.2.5.1	New MOD-2 numbering in case of Bearer replacement	298
10.8.2.5.2	Unilateral jump.....	298
10.8.2.5.3	MAC I _p bearer reset.....	300
10.8.2.6	Bearer handover and bearer replacement procedures.....	300
10.8.2.6.1	General	300
10.8.2.6.2	Bearer handover in a MOD-2 protected I channel.....	300
10.8.2.6.3	Bearer replacement in a MOD-2 protected I channel	301

10.8.2.7	Exchange of data from/to higher layers	301
10.8.2.7.0	General	301
10.8.2.7.1	Operation if I _{PF} channel is supported.....	302
10.8.3	Higher layer unprotected information (I _N) and MAC_error_detection services (I _P).....	302
10.8.3.1	I _N _minimum_delay service (I _{NA})	302
10.8.3.2	I _N _normal_delay service (I _{NB}).....	302
10.8.3.2.1	General operation	302
10.8.3.2.2	Operation with restriction in the handover space	303
10.8.3.3	I _P _error_detection service	303
10.8.3.3.0	General	303
10.8.3.3.1	Operation if I _{PF} channel is supported.....	304
10.8.3.4	I _P _encoded_protected service (I _{PX})	304
10.8.4	Higher layer U-plane channel (I _{PF}) in E+U type mux.....	304
10.8.4.1	Purpose of the I _{PF} channel	304
10.8.4.2	Activation of the E+U type mux mode	305
10.8.4.3	I _{PF} procedures.....	305
10.8.4.3.0	General	305
10.8.4.3.1	I _{PF} basic procedures	305
10.8.4.3.2	I _{PF} advanced procedures	306
10.8.4.3.3	Special case: slots not multiple of 64 bits.....	306
10.8.4.4	I _{PF} Mod-2 protected operation.....	306
10.8.4.5	I _{PF} _error_detect operation	307
10.8.4.6	I _{PF} _operation with I _N service	307
10.8.4.7	Backcompatibility rule	307
10.9	C/O procedures for FT connections with CRFP.....	308
10.9.0	General.....	308
10.9.1	Dual C/O bearer setup.....	308
10.9.2	C/O connection release of connection with CRFP.....	308
10.9.3	C/O connection suspend and resume	308
11	Medium access layer management procedures	309
11.1	Broadcasting.....	309
11.1.1	RFP transmission	309
11.1.2	PP reception.....	309
11.2	Extended system information.....	309
11.2.1	PP requests.....	309
11.2.2	RFP response	309
11.3	PP states and state transitions	309
11.3.0	General.....	309
11.3.1	Actions in Idle_Unlocked and Active_Unlocked states.....	309
11.3.2	Entry into the Idle_Locked state	309
11.3.3	Actions in the Idle_Locked state.....	310
11.3.3.0	General	310
11.3.3.1	Page detection in Idle_Locked state.....	310
11.3.3.2	Setup detection in Idle_Locked state.....	311
11.3.4	Idle_Locked and Active_Locked state transitions	312
11.4	Physical channel selection.....	312
11.4.0	General.....	312
11.4.1	The channel selection lists	312
11.4.2	Physical channel and RFP selection at the PP	314
11.4.3	Physical channel selection at the RFP.....	315
11.4.4	Hand over criteria due to in-connection base identification	317
11.4.5	Handover criteria due to interference.....	317
11.4.6	Exception in channel selection rules for Ultra Low Energy devices	318
11.5	In-connection quality control	318
11.5.1	RFPI handshake	318
11.5.2	Frequency control	318
11.5.2.1	RFP measurement of frequency error	318
11.5.2.2	PT frequency correction	318
11.6	Maximum allowed system load at RFPs	318
11.7	PMID and FMID definitions	318
11.7.1	FMID definition.....	318