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Digital Enhanced Cordless Telecommunications (DECT); Ultra Low Energy (ULE); Machine to Machine Communications; Part 2: Home Automation Network (phase 2)

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Contents

Intellectual Property Rights 9
Foreword 9
Modal verbs terminology 9
Introduction 9
1 Scope 10
2 References 10
2.1 Normative references 10
2.2 Informative references 11
3 Definitions, symbols and abbreviations 12
3.1 Definitions 12
3.2 Symbols 12
3.3 Abbreviations 13
4 Description of services and features 16
4.1 DECT Ultra Low Energy 16
4.1.0 General 16
4.1.1 Back-compatibility with ULE Phase 1 16
4.1.2 Coexistence with other DECT services 16
4.1.3 Example applications covered by ULE Phase 2 16
4.1.3.0 General 16
4.1.3.1 Simple medical pendant alarms 17
4.1.3.2 Software Upgrade Over The Air 17
4.1.3.3 M2M devices with audio capability 18
4.2 Requirements for ULE Phase 2 18
4.2.1 Device types 18
4.2.1.0 General 18
4.2.1.1 ULE Phase 2 RFP 18
4.2.1.1.1 General description 18
4.2.1.1.2 Requirements 18
4.2.1.2 PP type IV: hybrid device with voice/data support 18
4.2.1.2.1 General description 18
4.2.1.2.2 Requirements 19
4.2.2 U-plane interworking and protocol architecture 19
4.2.3 Performance Objectives 19
4.3 Services and features implemented by ULE phase 2 19
4.3.0 General 19
4.3.1 MAC / PHY layer 19
4.3.2 DLC layer 19
4.3.3 NWK layer 19
4.3.4 Interworking and Application layer 20
4.3.5 Security 20
4.3.6 Management Entity 20
4.3.7 Speech services and codecs 20
5 Service and feature definitions 20
5.1 ULE Phase 2 20
5.1.1 PHL service definitions 20
5.1.2 MAC service definitions 20
5.1.3 DLC service definitions 21
5.1.4 NWK feature definitions 21
5.1.5 Application feature definitions 22
5.1.6 Management Entity (ME) definitions 22
5.1.7 U-plane service and interworking definitions 22
5.1.8 ULE device types 22
5.1.9 Speech services and speech coding definitions 22
5.1.10 Call Control (CC) and mobility management service definitions 22

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6 Profile specific requirements 23
6.1 General 23
6.2 Specific conventions 23
6.2.1 Use of symbols in support status tables 23
6.3 DECT ULE phase 1 device types 23
6.3.1 Types of devices supported by the present document 23
6.3.2 Specific procedures for specific device types 23
6.4 Physical layer (PHL) requirements 24
6.4.1 Physical layer (PHL) services 24
6.4.2 Modulation schemes 24
6.4.3 PHL service to procedure mapping 24
6.5 MAC layer requirements 25
6.5.1 MAC layer services 25
6.5.2 MAC service to procedure mapping 26
6.6 DLC layer 28
6.6.1 DLC layer services 28
6.6.2 DLC service to procedure mapping 29
6.7 NWK layer 30
6.7.1 General 30
6.7.2 NWK features 30
6.7.3 NWK features to procedures mapping 32
6.8 Application Layer 33
6.8.1 Application features 33
6.8.2 Application features to procedures mapping 33
6.9 Distributed communications 34
6.10 Management Entity (ME) 34
6.10.1 Management Entity (ME) services 34
6.10.2 Management Entity (ME) mode to procedures mapping 34
6.11 U-plane services and interworking requirements 35
6.11.1 U-plane and interworking services 35
6.11.2 U-plane and interworking service to procedure mapping 36
6.12 Speech Services 36
6.12.1 Speech Services features 36
6.12.2 Speech Services to procedures mapping 37
6.13 General class/service/interworking support 37
6.13.1 Class/service support 37
6.13.2 Protocol interworking support 37

7 Profile specific procedures description 38
7.0 General 38
7.1 Back compatibility with ULE Phase 1 38
7.1.0 General 38
7.1.1 Back compatibility with a ULE Phase 1 Fixed Part (FP) 38
7.1.2 Back compatibility with a ULE Phase 1 Portable Part (PP) 38

8 Physical Layer (PHL) procedures 38

9 Management Entity (ME) procedures 38
9.1 ULE phase 1 Management 38
9.2 Channel selection and collision avoidance procedures 38
9.3 Channel selection and collision avoidance procedures for US region 39
9.3.0 General 39
9.3.1 Overall architecture of ULE channel selection processes 39
9.3.2 Process M0 (RFP side pre-selection process) 39
9.3.3 Broadcast mechanism 39
9.3.4 Process M1 (PP side channel selection process) 40
9.3.5 Setup attempt and evaluation of responses 40
9.3.6 Process M2 (collision handling/collision avoidance process) 41
9.4 Channel selection and collision avoidance procedures for Japan region 41
9.4.0 General 41
9.4.1 Overall architecture of ULE channel selection processes 41
9.4.2 Process M0 (RFP side pre-selection process) 41
9.4.3 Broadcast mechanism 42

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9.4.4 Process M1 (PP side channel selection process) 42
9.4.5 Setup attempt and evaluation of responses 42
9.4.6 Process M2 (collision handling/collision avoidance process) 43

10 MAC layer procedures 43
10.1 Radio Control Bits 43
10.1.1 Quiet Channel Indication 43
10.1.2 PHS Detection Indication 43
10.2 Downlink broadcast (A-field) 44
10.2.0 General 44
10.2.1 N_T messages 44
10.2.2 Q_T messages 44
10.2.2.1 Q_T - static system information 44
10.2.2.2 Q_T - FP capabilities 44
10.2.2.2.1 Standard FP Capabilities 44
10.2.2.2.2 Extended FP Capabilities 45
10.2.2.2.3 Extended FP Capabilities part 2 46
10.3 Slot types and slot use 46
10.3.1 Full Slot 46
10.3.1.1 General 46
10.3.1.2 Use of full slot in C/O bearers 46
10.3.1.3 Use of full slot in C/L dummy bearers 46
10.3.2 Short Slot 46
10.3.2.1 General 46
10.3.2.2 Use of short slot in C/O bearers 46
10.3.3 Long Slot 47
10.3.3.1 General 47
10.3.3.2 Use of long slot in C/O bearers 47
10.4 No-emission compatibility mode procedures 47
10.4.1 General 47
10.5 U-plane C/L downlink services 47
10.5.0 General 47
10.5.1 U-plane C/L downlink multicast unacknowledged service 47
10.5.1.0 General 47
10.5.1.1 Logical channels and instance separation 48
10.5.1.2 Addressing and management of multicast groups 48
10.5.1.3 Procedure 48
10.5.1.4 SI_P subfield format 48
10.5.2 U-plane C/L downlink over the dummy bearer 48
10.5.2.0 General 48
10.5.2.1 Multiplexing cycle 48
10.5.2.2 Single-burst transmission 48
10.5.2.3 Identification of C/L downlink insertion 49
10.5.2.4 Announcement via the B_U paging channel and identification of instances 49
10.5.3 U-plane C/L downlink over additional C/L bearers 49
10.5.3.0 General 49
10.5.3.1 Channel selection and transmission start 49
10.5.3.2 MAC signalling in the additional C/L downlink bearer 49
10.5.3.3 Single-burst transmission 50
10.5.3.4 Announcement via the B_U paging channel and identification of instances 50
10.6 ULE Paging Procedures (phase 2) 50
10.6.0 General 50
10.6.1 P_U Paging Message Formats 50
10.6.2 Paging Descriptors for ULE Paging 50
10.6.2.1 Basic concepts of the ULE paging system 50
10.6.2.2 Basic operation of the descriptors 51
10.6.2.3 Allocation of descriptors 51
10.6.2.4 Format for descriptors in ULE phase 1 51
10.6.2.4.0 General 51
10.6.2.4.1 Master/slave types 51
10.6.2.4.2 CA subscription capability 52

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10.6.2.4.3 Format A 52
10.6.2.4.4 Format B 53
10.6.2.4.5 Format C 54
10.6.2.5 Descriptors in ULE phase 2 55
10.6.2.5.1 Descriptor codes 55
10.6.2.5.2 Descriptor detailed descriptions 55
10.6.2.5.2.0 General 55
10.6.2.5.3 Additional conventions for ULE phase 2 descriptors 56
10.6.2.5.4 Coding of additional C/L bearer position 57
10.6.2.5.4.0 General 57
10.6.2.5.5 Discrimination between multicast transmissions over the dummy and over additional C/L bearers 57
10.6.2.5.6 Time references for multicast transmissions 58
10.6.3 CA mask mechanism 58
10.7 Repeater compatibility procedures 58
10.7.1 General 58
10.7.2 Identification of a WRS 58
10.7.3 ULE page delay mechanism 58
10.7.4 Roaming 59
10.7.4.1 General 59
10.7.4.2 Regular DECT roaming 60
10.7.4.3 ULE roaming 60
10.7.4.4 ULE bearer replacement (inter-cell) 61
10.8 Additional requirements for I channel services 61
10.8.1 Lifetime management with TWO separate maximum MAC packet lifetimes 61
10.8.1.0 General 61
10.8.1.1 Operation of the counters 61

11 DLC layer procedures 62
11.1 Specific procedures for C/L downlink multicast channels 62
11.1.1 Procedures for C/L downlink multicast channels 62
11.1.1.1 LU14 Enhanced Frame RELay service with CCM (EFREL-CCM) for C/L downlink multicast channels 62
11.1.1.2 LU13 Enhanced Frame RELay service with CRC (EFREL-CRC) for C/L downlink multicast channels 62
11.1.1.2.0 General 62
11.1.1.2.1 Use of LU13 in multicast links 63
11.1.1.3 LU10 Enhanced Frame RELay service (EFREL) for C/L downlink multicast channels 63
11.1.1.4 FU10a frame operation for C/L downlink multicast channels 63
11.1.1.5 Transmission Class 1 over C/L downlink multicast channels 63
11.1.2 Security procedures for C/L downlink multicast channels 63
11.1.2.1 CCM Authenticated Encryption of C/L downlink multicast channels 63
11.1.2.2 Initialization Vector for multicast channels 63
11.1.2.3 Security provisions regarding the key for multicast channels 64

12 NWK layer procedures 64
12.1 Specific procedures for C/L downlink multicast channels 64
12.1.1 Security procedures for C/L downlink multicast channels 64
12.1.1.1 Cipher keys for CCM encryption of C/L multicast channels 64
12.1.1.2 Multicast encryption parameter assignation procedure, FT initiated 64
12.1.1.2.0 General 64
12.1.1.2.1 Procedure description 64
12.1.1.2.2 Security provision 64
12.1.1.2.3 Coding of the operation messages 64
12.1.1.3 Multicast encryption parameter retrieval procedure, PT initiated 67
12.1.1.3.0 General 67
12.1.1.3.1 Procedure description 67
12.1.1.3.2 Security provisions 67
12.1.1.3.3 Coding of the operation messages 68
12.1.2 Control procedures for C/L downlink multicast channels 70
12.1.2.1 Subscription to C/L downlink multicast channels 70
12.1.2.2 Activation of security procedures 70

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ETSI TS 102 939-2 V1.1.1
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12.1.2.3 Un-subscription to C/L downlink multicast channels 70
12.1.2.4 Parameters for the C/L downlink multicast service 70
12.2 Terminal capabilities and FP broadcasts 70
12.2.1 Terminal capability indication 70
12.2.2 FP broadcasts 72
12.2.2.1 Higher layer information FP broadcast 72
12.2.2.1.0 General 72
12.2.2.1.1 Higher layer information in standard FP broadcast (Qh = 3) 73
12.2.2.1.2 Higher layer information in Extended FP broadcast (Qh = 4) 73
12.2.2.1.3 Extended Higher Layer capabilities part 2 (Qh = 11) 73
12.3 Specific procedures for "hybrid" devices 74
12.3.1 Incoming calls for "hybrid voice" devices 74
12.3.1.1 General requirements 74
12.3.1.2 Paging descriptors for incoming calls 75
12.3.1.3 Incoming call procedure 75
12.3.2 Interactions of ULE and "circuit mode" 76
12.3.2.1 General requirements 76
12.3.2.2 ULE request whilst "circuit mode" active 76
12.3.2.3 "Circuit mode" request whilst ULE active 76
12.3.2.4 Suspend / resume ULE service 77
12.4 SUOTA push mode 77
12.4.1 General requirements 77
12.4.2 Paging descriptors for SUOTA push mode 77
12.4.3 Push mode procedure 77
12.5 Additional requirements for ULE NWK Control 77
12.5.1 Default ULE PVC transaction parameters 77
12.5.2 Default MAC parameters for implicitly created MBC 78

13 Services and Interworking procedures 78
13.1 Specific procedures for ULE phase 2 78
13.1.1 Service channels transported via <<IWU-to-IWU>> IE 78
13.1.1.1 General concepts 78
13.1.1.2 Configuration and control service channel 78
13.1.1.2.0 General 78
13.1.1.2.1 ULE Common Control Protocol procedures 79
13.1.1.3 CCM encrypted general purpose service channel 79
13.1.1.3.0 General 79
13.1.1.3.1 Services provided by the DECT sub-system 79
13.1.1.3.2 Transport of the general purpose service channel 80
13.1.1.3.3 Security procedures 80
13.1.1.3.4 Segmentation and reassembling 81
13.1.1.3.5 MAC Release Reason Emulation 82
13.1.2 IWU procedures for C/L downlink multicast service 83
13.1.2.1 General 83
13.1.2.2 U-plane procedures 83
13.1.2.3 C-plane procedures 83

14 Application procedures 83
14.1 Hybrid device voice service 83
14.1.0 Introduction 83
14.1.1 General requirements 83
14.2 Hybrid device data service 84
14.2.0 Introduction 84
14.2.1 General requirements 84
14.3 Software Upgrade Over The Air (SUOTA) for ULE devices 84
14.3.0 Introduction 84
14.3.1 General requirements 84

Annex A (normative): Parameters and Information Elements 85

A.1 Constants, variables and operating parameters 85
A.1.1 Operating parameters 85
A.1.1.1 Channel selection algorithms 85

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A.1.1.2 MAC layer 85
A.1.1.3 DLC layer 85
History 86

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Digital Enhanced Cordless Telecommunications (DECT).

The present document is based on ETSI EN 300 175 parts 1 [1] to 8 [8], ETSI EN 300 444 [9], ETSI EN 301 649 [16] and ETSI TS 102 939-1 [12].

The present document has been developed in accordance to the rules of documenting a profile specification as described in ISO/IEC 9646-6 [i.1].

The present document is part 2 of a multi-part deliverable covering Machine to Machine Communications based on DECT Ultra Low Energy (ULE), as identified below:

Part 1: "Home Automation Network (phase 1)".

Part 2: "Home Automation Network (phase 2)".

Further phases with additional functionality may be defined in the future by other parts of this multi-part deliverable.

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Introduction

DECT Ultra Low Energy (ULE) is based on the DECT base standard ETSI EN 300 175 parts 1 [1] to 8 [8], and the DECT Packet Radio Service (DPRS) ETSI EN 301 649 [16]. However DECT ULE includes substantial differences from its parent technology in order to achieve Ultra Low Power consumption.

From the point of view of DECT standardization DECT ULE is an Application Profile (AP) based on the DECT base standard (ETSI EN 300 175, parts 1 [1] to 8 [8]). This application profile may reuse definitions and procedures defined in other DECT applications profiles when needed or convenient. This is the case, for instance, of the DECT Generic Access Profile (GAP) ETSI EN 300 444 [9], the DECT Packet Radio Service (DPRS) ETSI EN 301 649 [16] and DECT Ultra Low Energy (ULE) Part 1 [12].

All DECT devices claiming to be compliant with this Application Profile will offer at least the basic services defined as mandatory. In addition to that, optional features can be implemented to offer additional DECT ULE services.

The aim of the DECT ULE standard is to guarantee a sufficient level of interoperability and to provide an easy route for development of DECT ULE applications. The DECT ULE standard also guarantees compatibility between DECT ULE applications and existing DECT applications (such as GAP or NG-DECT) running over the same spectrum and even in the same device.

1 Scope

The present document covers the following DECT ULE services and features:

- Back-compatibility with ULE Phase 1 [12].
- Regional variants of ULE for US and Japan.
- Support for hybrid devices which utilize ULE and non-ULE services (such as voice).
- Software Update Over The Air (SUOTA), compatible with the same feature as defined in New Generation DECT Part 4 [13].
- Compatibility mode for FTs that also support No-Emissions Mode (NEMo [13]).
- Connectionless Downlink, which is the capability to transmit ULE messages to multiple devices.
- Repeater compatibility support for FP and PP.

The set of DECT ULE services and features defined in the present document is named "Home Automation Network (phase 2)", and is primarily targeted to provide a global M2M solution within domestic scenarios. However, this does not prevent the use of the present document in other scenarios.

2 References

2.1 Normative references

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[1] ETSI EN 300 175-1: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".

[2] ETSI EN 300 175-2: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical layer (PHL)".

[3] ETSI EN 300 175-3: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer".

[4] ETSI EN 300 175-4: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer".

[5] ETSI EN 300 175-5: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".

[6] ETSI EN 300 175-6: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing".

[7] ETSI EN 300 175-7: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".

[8] ETSI EN 300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech and audio coding and transmission".

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[9] ETSI EN 300 444: "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)".

[10] ETSI TS 102 527-3: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 3: Extended Wideband Speech Services".

[11] ETSI TS 102 527-1: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 1: Wideband speech".

[12] ETSI TS 102 939-1: "Digital Enhanced Cordless Telecommunications (DECT); Ultra Low Energy (ULE); Machine to Machine Communications; Part 1: Home Automation Network (phase 1)".

[13] ETSI TS 102 527-4: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 4: Light Data Services; Software Update Over The Air (SUOTA), content downloading and HTTP based applications".

[14] ETSI TS 102 497: "Digital Enhanced Cordless Telecommunications (DECT); DECT in the 1 920 MHz to 1 930 MHz Unlicensed Personal Communications Services (UPCS) frequency band; Specific requirements".

[15] ARIB STD-T101: "Radio Equipment Used For TDMA Digital Enhanced Cordless Telecommunications"; (English version).

[16] ETSI EN 301 649: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS)".

[17] ETSI EN 300 700: "Digital Enhanced Cordless Telecommunications (DECT); Wireless Relay Station (WRS)".

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[i.1] ISO/IEC 9646-6: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".

[i.2] Recommendation ITU-T G.726 (12/1990): "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".

[i.3] Recommendation ITU-T G.711 (11/1988): "Pulse code modulation (PCM) of voice frequencies".

[i.4] Recommendation ITU-T G.722 (11/1988): "7 kHz audio-coding within 64 kbit/s".

[i.5] Recommendation ITU-T G.729.1 (05/2006): "G.729 based embedded variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729".

[i.6] ISO/IEC JTC1/SC29/WG11 (MPEG): International Standard ISO/IEC 14496-3:2009: "Information Technology - Coding of audio-visual objects - Part 3: Audio".

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3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TS 102 939-1 [12], ETSI TS 102 527-1 [11], ETSI TS 102 527-4 [13] and the following apply:

circuit mode: DECT connections involving setup of the MAC connection using Basic Connection control or Advanced Connection control, but not the "expedited" setup messages

NOTE: Such connections generally last of the order of several seconds (or several minutes for voice calls).

hybrid device: ULE device supporting voice and/or non-ULE data service

Last Minute Scan (LMS): RSSI scan which is generally performed at the last opportunity before transmission (e.g. in the frame before transmission)

Least Interfered Channel (LIC): slot/carrier pair which has the lowest level of interference, usually within a certain level of tolerance or range of values

NOTE: Calculation of the LIC generally requires a full matrix RSSI scan of all available slot/carrier combinations.

packet mode: DECT connections involving setup of the MAC connection using the Advanced Connection control "expedited" messages

NOTE: Such connections generally last of the order of a few frames only.

Personal Handy-phone System (PHS): cordless network telephony system operating in the 1 880 – 1 930 MHz frequency band

NOTE: PHS is used mainly in Japan, China, Taiwan, and some other Asian countries and regions.

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Full standard:
https://standards.iteh.ai/catalog/standards/sist/cfea5599-8c8a-497e-ba39-87b5a37b1340/etsi-ts-102-939-2-v1.1.1-2015-03

3.2 Symbols

For the purposes of the present document, the following symbols apply:

BA (bits)	B-field identification bits, the bits from the A-field header that provide indication for the content of the B-field of one MAC layer packet
BCK	bit used for I_P channel flow control in MAC I_P error correction services
B_S	Slow Broadcast channel
B_U	ULE Broadcast channel
C	for conditional to support (process mandatory)
C	higher layer control Channel (see C_S and C_F)
C_F	higher layer signalling Channel (Fast)
C-plane	Control plane
C_S	higher layer signalling Channel (Slow)
E+U	Mode of the B-field E/U multiplexer carrying U-plane data and signalling
G_F	higher layer information control channel (fast) (a logical channel to the MAC layer)
G_{FA}	higher layer information control channel (slow) (a logical channel to the MAC layer)
I	for out-of-scope (provision optional, process optional) not subject for testing
I	higher layer Information channel (see I_N and I_P)
I_N	higher layer Information channel (unprotected)
I_P	higher layer Information channel protected (in general, any variant)
I_{PF}	higher layer Information channel (protected) transported multiplexed with signalling in the E+U type slots
I_{PM}	higher layer Information channel, multi-subfield (protected) B-field with error detection only
I_{PMR}	higher layer Information channel, multi-subfield (protected) B-field with MOD-2 protected channel operation (ARQ)

I_{PQ}	higher layer Information channel (protected) with single subfield format and error detection only
I_{PQR}	higher layer Information channel (protected) with single subfield format and error correction using MOD-2 retransmission mechanism
LAPC	DLC layer C-plane protocol entity
Lc	a DLC layer C-plane protocol entity
LU	DECT DLC U-Plane Service
M	for mandatory to support (provision mandatory, process mandatory, see clause 6.2.1).
M	MAC control channel
M0	RFP channel pre-selection algorithm for ULE
M1	PP channel selection algorithm for ULE
M2	PP collision handling and avoidance algorithm for ULE
M_T	MAC control channel on A-tail field, or one message on such channel
M_U	MAC control channel on B-field for ULE
N	identities channel
N/A	for not-applicable (in the given context the specification makes it impossible to use this capability, see clause 6.2.1)
N_S	split identities channel on B-field for ULE
N_T	identities information channel or one message in such channel
O	for optional to support (provision optional, process mandatory, see clause 6.2.1)
O.x	option comprising number of items
P	Paging channel
P_T	one P-channel message
P_U	ULE Paging channel on B-field
Q	system information channel
Q_C	compound System Information Channel of B-field for ULE
Q_H	Q field header
Q_T	system information and Multiframe marker
RN	Received sequence Number
RR	a frame type of the DLC C-plane entity
Rx	Receiver side
S/T	ISDN S/T Interface
SI_P	higher layer connectionless channel (protected)
Tx	Transmitter side
U	ISDN U-Interface
X	excluded, not allowed
ZAP	ability first to assign and then to re-program the account data held in the PP

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3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Authentication Code
ACK	ACKnowledgement
ADPCM	Adaptive Differential Pulse Code Modulation
AES	Advanced Encryption Standard
AI	Air Interface
AP	Application Profile
ARI	Access Rights Identity
ARQ	Automatic Retransmission reQuest
C/L	ConnectionLess
CA	Channel Active
CBC-MAC	Cipher Block Chaining Message Authentication Code
CC	Call Control, a NWK layer functional grouping.
CCM	Counter with CBC-MAC
CHO	Connection HandOver
CI	Common Interface
CLIP	Calling Line Identification Presentation
CLMS	ConnectionLess Message Service
CRC	Cyclic Redundancy Check