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Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 1: Wideband speech

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Contents

Intellectual Property Rights	8
Foreword.....	8
Modal verbs terminology.....	8
1 Scope	9
2 References	9
2.1 Normative references	9
2.2 Informative references.....	10
3 Definition of terms, symbols and abbreviations.....	11
3.1 Terms.....	11
3.2 Symbols.....	12
3.3 Abbreviations	12
4 Description of services	14
4.1 Enhanced wideband speech.....	14
4.1.0 General.....	14
4.1.1 Audio performance requirements	15
4.2 Wideband speech scenarios.....	15
4.2.0 General.....	15
4.2.1 Internal calls inside a New Generation DECT system.....	15
4.2.2 Calls between two New Generation DECT systems interconnected by ISDN	15
4.2.3 Calls between two New Generation DECT systems interconnected by IP packet based network.....	16
4.2.4 Calls between a New Generation DECT system and a digital phone supporting compatible codecs.....	16
4.2.4.0 General	16
4.2.4.1 Via ISDN	16
4.2.4.2 Via IP network	16
4.2.4.3 Internal PABX calls	16
4.2.5 Legacy scenarios.....	16
4.2.6 Super-wideband scenarios	17
5 Service and feature definitions	17
5.1 New Generation DECT Speech Services	17
5.2 Network (NWK) features	18
5.3 Data Link Control (DLC) service definitions.....	18
5.4 Medium Access Control (MAC) service definitions	18
5.5 Physical Layer (PHL) service definitions.....	19
5.6 Speech coding and audio feature definitions	19
5.7 Application features	23
6 Interoperability requirements	23
6.1 General	23
6.2 New Generation DECT Speech Services support status	23
6.3 Services to DECT feature implementation mappings.....	24
6.4 NWK features.....	33
6.5 Data Link Control (DLC) services	34
6.6 Medium Access Control (MAC) services	35
6.7 Physical layer (PHL) services	35
6.8 Speech coding and audio features	36
6.9 Application features	37
6.10 Network (NWK) feature to procedure mapping.....	38
6.11 Data Link Control (DLC) Service to procedure mapping	39
6.12 Medium Access Control (MAC) service to procedure mapping	40
6.13 Application feature to procedure mapping	41
6.14 General requirements	41
6.14.1 Network (NWK) layer message contents.....	41
6.14.2 Transaction identifier.....	41
6.14.3 Length of a Network (NWK) layer message	41

6.14.4	Handling of error and exception conditions.....	42
6.14.5	Generic Access Profile (GAP) default setup attributes.....	42
6.14.6	Coexistence of Mobility Management (MM) and Call Control (CC) procedures	42
6.14.7	Coding rules for information elements	42
7	Procedure description.....	43
7.0	General	43
7.1	Backward compatibility with Generic Access Profile (GAP)	43
7.1.1	Requirement for New Generation DECT Fixed Parts (FPs) requirement.....	43
7.1.2	Requirement for New Generation DECT Portable Parts (PPs) registered on GAP compliant FPs	43
7.2	Generic Access Profile (GAP) procedures	43
7.3	Network (NWK) layer procedures	44
7.3.0	General.....	44
7.3.1	Exchange of codec list during registration and location registration.....	44
7.3.2	Basic service wideband speech and default attributes	44
7.3.3	Codec Negotiation during call establishment	44
7.3.4	Codec Change.....	46
7.3.4.0	General.....	46
7.3.4.1	Service change info.....	46
7.3.5	Slot type modification.....	47
7.3.5.0	General.....	47
7.3.5.1	Failure of slot type modification	47
7.3.6	Internal call setup.....	47
7.3.7	Terminal capability indication	48
7.3.8	Indirect FT initiated link establishment	49
7.3.8.0	General.....	49
7.3.8.1	Paging messages	49
7.3.8.1.1	LCE-REQUEST-PAGE message.....	49
7.3.8.1.2	LCE-PAGE-RESPONSE message.....	51
7.3.8.2	Associated procedure	51
7.3.8.2.1	Timer F-<LCE.03> management.....	51
7.3.8.3	Exceptional cases	51
7.3.8.3.1	The IPUI received in the {LCE-PAGE-RESPONSE} does not match	51
7.3.8.3.2	Timer <LCE.03> expiry	52
7.3.8.3.3	Release from the higher entity.....	52
7.3.9	Higher layer information FP broadcast.....	52
7.3.9.0	General.....	52
7.3.9.1	Higher layer information in standard FP broadcast (Qh= 3).....	53
7.3.9.2	Higher layer information in Extended FP broadcast (Qh= 4)	53
7.3.9.3	Higher layer information in Extended FP broadcast part 2 (Qh= 11)	53
7.4	Implementation examples of specific procedures.....	53
7.5	Data Link Control (DLC) layer procedures.....	54
7.5.0	General.....	54
7.5.1	FU1 frame operation.....	54
7.5.2	FU12 frame operation for G.729.1 codec	54
7.6	Medium Access Control (MAC) layer procedures.....	55
7.6.0	General.....	55
7.6.1	MAC services	55
7.6.2	Frame formats and multiplexers	55
7.6.3	Downlink broadcast	56
7.6.3.0	General.....	56
7.6.3.1	N _T message.....	56
7.6.3.2	Q _T - static system information.....	56
7.6.3.3	Q _T - Fixed Part capabilities	57
7.6.3.4	Q _T - Extended Fixed Part capabilities	58
7.6.3.5	Q _T - Extended Fixed Part capabilities part 2.....	58
7.6.3.6	Q _T - SARI list contents.....	58
7.6.4	Paging broadcast.....	59
7.6.4.0	General	59
7.6.4.1	Short page, normal/extended paging.....	59
7.6.4.2	Zero page normal/extended paging	59
7.6.4.3	Full page, normal/extended paging	60

7.6.4.4	Blind slot information	60
7.6.4.5	Bearer handover information	61
7.6.5	Setup of advanced connection, advanced bearer setup (A-field)	61
7.6.5.0	General	61
7.6.5.1	M _T message	61
7.6.5.2	Associated procedures	61
7.6.5.2.1	Timer T200 management	61
7.6.5.2.2	Counter N200 management	62
7.6.5.3	Exceptional cases	62
7.6.5.3.1	Bearer setup attempt fails N200+1 times	62
7.6.5.3.2	Timer T200 expiry	63
7.6.6	Connection type modification: basic to/from advanced	63
7.6.7	Slot type modification	63
7.6.7.0	General	63
7.6.7.1	Failure of slot type modification	64
7.6.8	Service type modification	64
7.6.9	ECN number modification	64
7.6.10	Connection/bearer release	64
7.6.10.0	General	64
7.6.10.1	M _T message	65
7.6.11	Bearer handover request	65
7.6.11.0	General	65
7.6.11.1	M _T message	65
7.6.12	Connection handover request	66
7.6.12.0	General	66
7.6.12.1	M _T message	66
7.7	Physical layer (PHL) requirements	66
7.7.1	Modulation	66
7.7.2	Slot type (Physical packets)	66
7.8	Requirements regarding the speech transmission	67
7.8.1	General	67
7.8.2	Speech codecs	67
7.8.3	Audio performance requirements	67
7.9	Management procedures	67
7.10	Application procedures	67
Annex A (informative): Audio codecs		68
A.1	Speech and audio coding	68
A.1.1	Overview	68
A.1.2	Narrow band speech coding	69
A.1.3	Wideband Speech coding	69
A.1.4	Super-wideband speech and audio coding	70
Annex B (normative): Audio patterns to indicate IP packet losses on the DECT link		72
B.1	Audio patterns to indicate IP packet losses	72
B.1.0	General	72
B.1.1	Insertion of audio patterns	72
B.1.2	Reception of audio patterns	72
B.1.3	Contents of the audio patterns	72
B.1.4	Packet loss patterns for Recommendation ITU-T G.722	73
B.1.5	Packet loss patterns for Recommendation ITU-T G.711	73
B.1.6	Packet loss patterns for Recommendation ITU-T G.726	73
B.1.7	Packet loss patterns for Recommendation ITU-T G.729.1	74
B.1.8	Packet loss patterns for MPEG-4 ER AAC-LD	74
Annex C (normative): Configuration signalling for specific codecs		75
C.1	MPEG-4 ER AAC-LD configuration signalling	75
C.1.0	General	75
C.1.1	<<IWU to IWU>> element to signal the supported capabilities (MPEG4CapabilityElement)	75
C.1.2	<<IWU to IWU>> element to signal the used Configuration (MPEG4ConfigurationElement)	76

C.2	LC3plus Configuration Signalling	77
C.2.1	General	77
C.2.2	<<IWU to IWU>> Information Element for LC3plus Codec Configuration	77
Annex D (informative): Recommended implementation of procedures		78
D.1	Examples of implementation of specific procedures	78
D.1.1	General	78
D.1.2	Outgoing wideband call	79
D.1.2.1	Outgoing wideband call, no codec list, Recommendation ITU-T G.722 chosen	79
D.1.2.2	Outgoing Call Wideband, codec list, negotiation results in Wideband	80
D.1.2.3	Outgoing call with progress indicator with negotiation results in CC-INFO	82
D.1.2.4	Outgoing call with progress indicator; with negotiation results in CC-INFO codec change in 200 OK	83
D.1.2.5	Outgoing Call Wideband, negotiation results in Narrowband	84
D.1.2.6	Outgoing Call Wideband, negotiation results in longslot	84
D.1.3	Incoming Call Wideband	85
D.1.3.1	Incoming Call Wideband, negotiation results in Wideband	85
D.1.3.2	Incoming Call Wideband, negotiation results in Narrowband	85
D.1.3.3	Incoming Call Wideband, No SDP Offer in Invite, negotiation results in Narrowband	86
D.1.4	Service Change	87
D.1.4.1	Service Change from Wideband to Narrowband; re-negotiation initiated from IP-Network	87
D.1.4.2	Service Change from Wideband to Narrowband; re-negotiation initiated from FP	88
D.1.4.3	Service Change from Wideband to Narrowband; PP initiated; IP Network accepts Narrowband Codec	89
D.1.4.4	Service Change from Wideband Recommendation ITU-T G.722 to Narrowband; PP initiated; IP Network does not accept Narrowband Codec	89
D.1.5	Internal Call	90
D.1.5.1	Intercom Call, PP2 confirms Wideband	90
D.1.5.2	Intercom Call, PP2 confirms narrowband	91
D.1.5.3	Intercom Call with Interworking: WB Handset -> NB Handset	91
D.1.5.4	Internal Call transfer, WB -> NB	92
D.1.5.5	Internal Call transfer, NB -> WB	93
D.1.5.6	Internal Call transfer, NB -> WB, IP negotiation results in NB	94
D.1.6	Special cases	94
D.1.6.1	Service Change from Wideband to Narrowband with Call Waiting	94
D.1.6.2	Service Change from Wideband to Narrowband with Call Hold	95
D.1.6.3	Service Change from Wideband to Narrowband; Network layer Acknowledgment	96
D.1.6.4	Service Change from Narrowband to Wideband fails; Network layer Acknowledgment	97
D.1.6.5	Outgoing Call, slot type modification fails	98
D.1.7	Slot type and/or connection type modification	98
D.1.7.1	General	98
D.1.7.2	FT initiated connection modification	99
D.1.7.2.1	FT initiated connection modification (full slot I _N _minimum_delay -> long slot I _N _minimum delay)	99
D.1.7.2.2	FT initiated connection modification (full slot I _N _minimum_delay -> long slot I _N _minimum_delay)	101
D.1.7.2.3	FT initiated connection modification (long slot I _N _minimum_delay -> full slot I _N _minimum delay)	103
D.1.7.2.4	FT initiated connection modification (long slot I _N _normal_delay -> full slot I _N _minimum delay)	104
D.1.7.3	PT initiated connection modification	105
D.1.7.3.1	PT initiated connection modification (full slot I _N _minimum_delay -> long slot I _N _minimum delay)	105
D.1.7.3.2	PT initiated connection modification (full slot I _N _minimum_delay -> long slot I _N _normal delay)	107
D.1.7.3.3	PT initiated connection modification (long slot I _N _minimum_delay -> full slot I _N _minimum delay)	109
D.1.7.3.4	PT initiated connection modification (long slot I _N _normal_delay -> full slot I _N _minimum delay)	110
D.2	Examples of implementation of procedures for MPEG-4 ER AAC-LD voice service	111
D.2.1	MPEG-4 ER AAC-LD voice service codec configuration and negotiation process	111
D.2.1.0	General	111
D.2.1.1	Transmitting non default configuration using <<LOCATE-REQUEST>>, <<LOCATE-ACCEPT>> Message	111

D.2.1.2	Transmitting non default configuration using <<ACCESS-RIGHTS-REQUEST>>, << ACCESS-RIGHTS-ACCEPT>> Message.....	112
D.2.1.3	Outgoing Call Super-wideband, codec MPEG-4 ER AAC-LD	113
D.2.1.3.0	General	113
D.2.1.3.1	Outgoing Call Super-wideband, INVITE command: AudioSpecificConfig()	113
D.2.1.3.2	Outgoing Call Super-wideband, OK command: AudioSpecificConfig().....	114
D.2.1.4	Incoming Call Super-wideband, codec MPEG-4 ER AAC-LD.....	114
D.2.1.4.0	General	114
D.2.1.4.1	Incoming Call Super-wideband, INVITE command: AudioSpecificConfig()	114
D.2.1.4.2	Incoming Call Super-wideband, OK command: AudioSpecificConfig().....	115

Annex E (informative): Services and features defined in other specifications116

E.1	Services and features defined in ETSI EN 300 444 (GAP).....	116
E.1.0	General	116
E.1.1	GAP Network (NWK) features (clause 4.1 of ETSI EN 300 444).....	116
E.1.2	GAP Speech coding and audio features (clause 4.2 of ETSI EN 300 444).....	117
E.1.3	GAP Application features (clause 4.3 of ETSI EN 300 444).....	119
E.1.4	DLC service definitions (clause 5.1 of ETSI EN 300 444).....	119
E.1.5	GAP MAC service definitions (clause 5.2 of ETSI EN 300 444).....	120
E.2	GAP Feature/service to procedure mapping tables	121
E.2.0	General	121
E.2.1	GAP NWK feature to procedure mapping table (clause 6.8.1 of ETSI EN 300 444)	121
E.2.2	GAP DLC service to procedure mapping table (clause 6.8.2 of ETSI EN 300 444).....	124
E.2.3	GAP MAC service to procedure mapping table (clause 6.8.3 of ETSI EN 300 444).....	125
E.2.4	GAP Application feature to procedure mapping table (clause 6.8.4 of ETSI EN 300 444)	126

Annex F (informative): Bibliography127

History	128
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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] and ETSI EN 300 444 [12]. General attachment requirements and speech attachment requirements are based on ETSI EN 301 406 [11] (replacing ETSI TBR 006 [i.2]) and ETSI EN 300 176-2 [10] (previously covered by ETSI TBR 010 [i.3]). Further details of the DECT system may be found in ETSI TR 101 178 [i.1].

The present document has been developed in accordance to the rules of documenting a profile specification as described in ISO/IEC 9646-6 [i.13].

The information in the present document is believed to be correct at the time of publication. However, DECT standardization is a rapidly changing area, and it is possible that some of the information contained in the present document may become outdated or incomplete within relatively short time-scales.

The present document is part 1 of a multi-part deliverable covering the New Generation DECT as identified below:

- Part 1: "Wideband speech";**
- Part 2: "Support of transparent IP packet data";
- Part 3: "Extended wideband speech services";
- Part 4: "Light Data Services; Software Update Over The Air (SUOTA), content downloading and HTTP based applications";
- Part 5: "Additional feature set nr. 1 for extended wideband speech services".

Modal verbs terminology

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1 Scope

The present document specifies a set of functionalities of the New Generation DECT.

The New Generation DECT provides the following basic new functionalities:

- Wideband voice service (the present document).
- Packet-mode data service supporting Internet Protocol with efficient spectrum usage and high data rates (ETSI TS 102 527-2 [i.4]).
- Extended Wideband speech services (ETSI TS 102 527-3 [i.5]).
- Light Data Services: Software Update Over The Air (SUOTA), Content Downloading and HTTP based applications (ETSI TS 102 527-4 [i.11]).
- Additional feature set nr.1 for Extended wideband speech services (ETSI TS 102 527-5 [i.12]).

All New Generation DECT devices will offer at least one of these services. If the device offers the wideband voice service, it will support also the DECT standard 32 kbit/s voice service according to ETSI EN 300 444 [12] (GAP).

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 services.

The aim of the present document is to guarantee a sufficient level of interoperability and to provide an easy route for the development of DECT wideband speech applications, with the features of the present document being a common fall-back option available in all devices compliant to this profile.

The present document also includes further development for super-wideband and fullband speech and audio services.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [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".
- [9] Void.
- [10] ETSI EN 300 176-2: "Digital Enhanced Cordless Telecommunications (DECT); Test specification; Part 2: Audio and speech".
- [11] ETSI EN 301 406: "Digital Enhanced Cordless Telecommunications (DECT); Harmonized EN for Digital Enhanced Cordless Telecommunications (DECT) covering the essential requirements under article 3.2 of the R&TTE Directive; Generic radio".
- [12] ETSI EN 300 444: "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)".
- [13] Void.
- [14] Void.
- [15] Recommendation ITU-T G.726 (12/1990): "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)".
- [16] Recommendation ITU-T G.711 (11/1988): "Pulse code modulation (PCM) of voice frequencies".
- [17] Recommendation ITU-T G.722 (09/2012): "7 kHz audio-coding within 64 kbit/s".
- [18] 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".
- [19] ISO/IEC 14496-3:2009: "Information technology - Coding of audio-visual objects - Part 3: Audio".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TR 101 178: "Digital Enhanced Cordless Telecommunications (DECT); A high Level Guide to the DECT Standardization".
- [i.2] ETSI TBR 006: "Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements".
- [i.3] ETSI TBR 010: "Digital Enhanced Cordless Telecommunications (DECT); General Terminal Attachment Requirements; Telephony Applications".
- [i.4] ETSI TS 102 527-2: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 2: Support of transparent IP packet data".
- [i.5] ETSI TS 102 527-3: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 3: Extended wideband speech services".

- [i.6] Recommendation ITU-T P.311 (06/2005): "Transmission characteristics for wideband (150-7000 Hz) digital handset telephones".
- [i.7] IETF RFC 3640: "RTP Payload Format for Transport of MPEG-4 Elementary Streams".
- [i.8] IETF RFC 3016: "RTP Payload Format for MPEG-4 Audio/Visual Streams".
- [i.9] Recommendation ITU-T G.729: "Coding of speech at 8 kbit/s using conjugate structure algebraic-code-excited linear prediction (CS-ACELP)".
- [i.10] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [i.11] 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".
- [i.12] ETSI TS 102 527-5: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 5: Additional feature set nr. 1 for extended wideband speech services".
- [i.13] ISO/IEC 9646-6: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".
- [i.14] ISO/IEC 9646-7: "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 7: Implementation Conformance Statements".
- [i.15] Recommendation ITU-T P.10: "Vocabulary for performance, quality of service and quality of experience".
- [i.16] ETSI TS 103 634: "Digital Enhanced Cordless Telecommunications (DECT); Low Complexity Communication Codec plus (LC3plus)".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 300 444 [12] and the following apply:

New Generation DECT (NG-DECT): further development of the DECT standard introducing wideband speech, improved data services, new slot types and other technical enhancements

fullband speech: voice service with a nominal pass-band wider than 50-14 000 Hz, usually understood to be 20-20 000 Hz (see Recommendation ITU-T P.10 [i.15])

Low Complexity Communication Codec plus (LC3plus): standard for narrowband to fullband low delay audio communication designed for very high quality communication application including all kind of audio signals, e.g. speech and music, as defined by ETSI TS 103 634 [i.16]

NOTE: LC3plus operates at sample rates 8 kHz, 16 kHz, 24 kHz, 32 kHz and 48 kHz and provides an audio bandwidth of up to 16 kHz in super-wideband mode and an audio bandwidth of up to 24 kHz in fullband mode. The codec also contains error protection capabilities and a very performant packet loss algorithm.

super-wideband speech: voice service with enhanced quality compared to ADPCM G.726 and allowing the transmission of a maximum vocal frequency of at least 14 kHz

wideband speech: voice service with enhanced quality compared to ADPCM G.726 and allowing the transmission of a vocal frequency range of at least 150 Hz to 7 kHz, and fulfilling the audio performance requirements described in the Recommendation ITU-T P.311 [i.6]

3.2 Symbols

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

B _S	Slow Broadcast channel
C	Conditional to support (process mandatory)
C _F	higher layer signalling Channel (fast)
C _S	higher layer signalling Channel (slow)
I	out-of-scope (provision optional, process optional) not subject for testing
I _N	higher layer Information channel (uNprotected)
M	Mandatory to support (provision mandatory, process mandatory)
M _T	Mac control channel on A-tail field, or one message on such channel
N	identities channel
N _T	Identities information, one N channel message
N/A	Not Applicable (in the given context the specification makes it impossible to use this capability)
O	Optional to support (provision optional, process mandatory)
Q	system information channel
Q _T	system information and multiframe marker (MAC logical channel)
ZAP	ability first to assign and then to re-program the account data held in the PP

Provision mandatory, process mandatory means that the indicated feature service or procedure will be implemented as described in the present document, and may be subject to testing.

Provision optional, process mandatory means that the indicated feature, service or procedure may be implemented, and if implemented, the feature, service or procedure will be implemented as described in the present document, and may be subject to testing.

NOTE: The used notation is based on the notation proposed in ISO/IEC 9646-7 [i.14].

3.3 Abbreviations

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

AAC	Advanced Audio Coding (MPEG)
AAC-LD	Advanced Audio Coding Low Delay profile
AC	Authentication Code
ADPCM	Adaptive Differential Pulse Code Modulation
AES	Advanced Encryption Standard
AI	Air Interface
A-MAP	A-field mapping
ARI	Access Rights Identity
ARQ	Automatic Repair reQuest
ASC	AudioSpecificConfig
BFI	Bad Frame Indicator
B-MAP	B-field mapping
CC	Call Control
CI	Common Interface
CLIP	Calling Line Identification Presentation
CN	Carrier Number
CNIP	Calling Name Identification Presentation
CODEC	COder-DECoder
CRC	Cyclic Redundancy Check
DCK	Derived Cipher Key
DECT	Digital Enhanced Cordless Telecommunications
DLC	Data Link Control
DLEI	Data Link Endpoint Identifier
D-MAP	D-field mapping
DSAA	DECT Standard Authentication Algorithm
DSAA2	DECT Standard Authentication Algorithm #2
DSC	DECT Standard Cipher (algorithm)

DSC2	DECT Standard Cipher (algorithm) #2
DTMF	Dual Tone Multi-Frequency
ECN	Exchanged Connection Number
ER	Error Resilient (MPEG)
ESC	ESCAPE bit
EV-CELP	Embedded Variable Code Excited Linear Prediction
FEC	Forward Error Correction
FMID	Fixed part MAC IDentity
FP	Fixed Part
FT	Fixed radio Termination
GAP	Generic Access Profile
GFSK	Gaussian Frequency Shift Key
HATS	Head And Torso Simulator
HTTP	HyperText Transfer Protocol
IA	Implementation Alternative
IE	Information Element
IO	Input Output
IP	Internet Protocol
IPUI	International Portable User Identity
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union - Telecommunication standardization sector
IWU	InterWorking Unit
LA	Location Area
LAPC	DLC layer C-plane protocol entity
LATM	Low overhead Audio Transport Multiplex
LBN	Logical Bearer Number
LC3	Low Complexity Communication Codec
LCE	Link Control Entity
LD	Low Delay (MPEG)
LLME	Lower Layer Management Entity
LOAS	Low Overhead Audio Stream
LOG PCM	LOGarithmic Pulse Code Modulation
LU	LAP-U service
MAC	Medium Access Control
MAP	bit MAPpings
MDCT	Modified Discrete Cosine Transform
ME	Management Entity
MIPS	Million Instructions Per Seconds
MM	Mobility Management
MOS	Mean Opinion Score
MPEG	Motion Picture Experts Group
MUX	time MULTipleXer
NB	Narrow Band
NG	New Generation
NG-DECT	New Generation DECT
NR	Normal-Reverse
NWK	NetWorK
P	Public (environment)
PA	Portable Application
PABX	Private Automatic Branch eXchange
PAP	Publilc Access Profile
PARI	Primary Access Rights Identity
PARK	Portable Access Rights Key
PCM	Pulse Code Modulation
PHL	PHysical Layer
PLC	Packet Loss Concealment
PLI	Park Length Indicator
PMID	Portable part MAC IDentity
PP	Portable Part
PRA	Primary Rate Access (ISDN)
PSCN	Primary receiver Scan Carrier Number
PSTN	Public Switched Telephone Network