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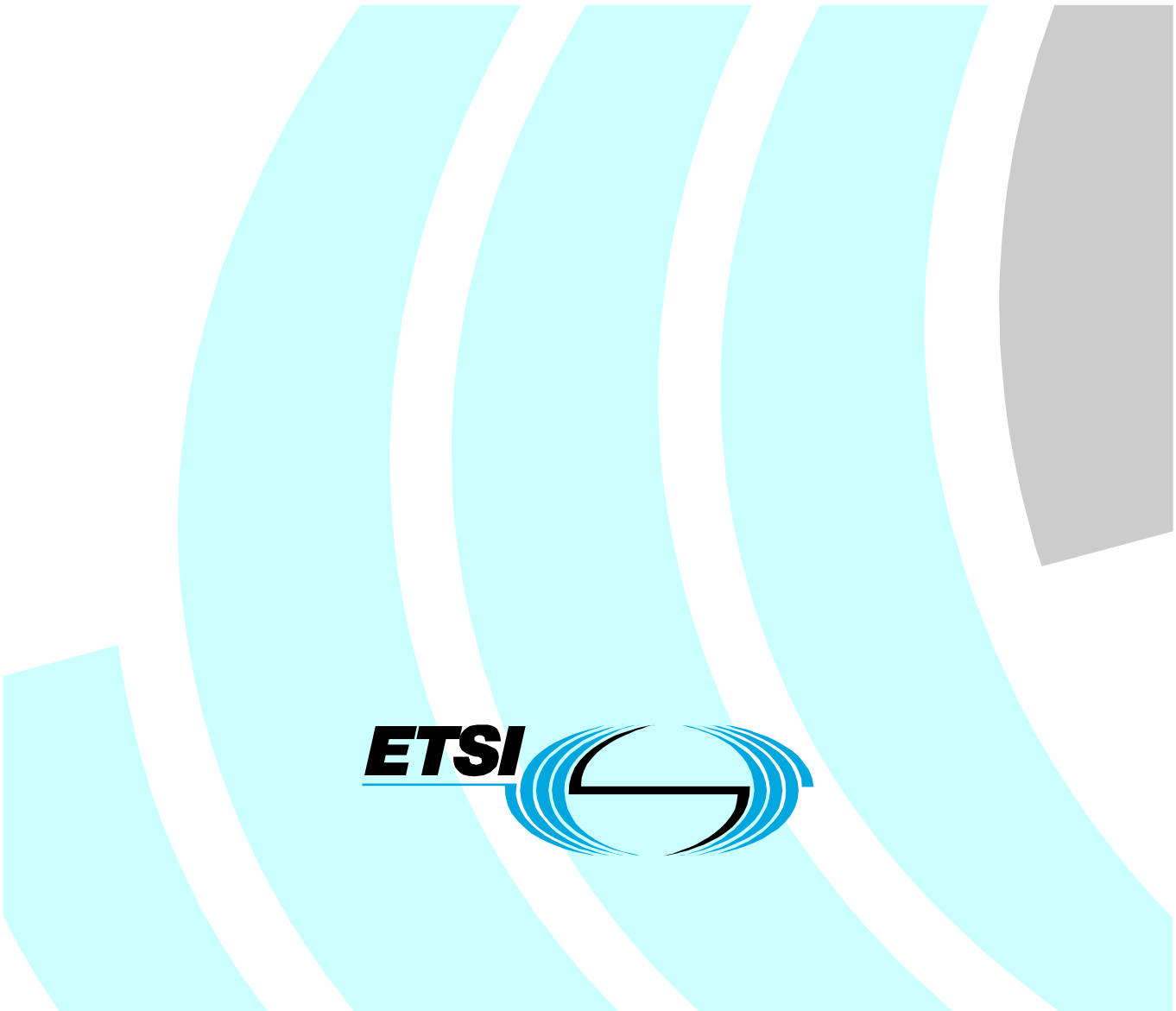
Technical Specification

Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 2: Support of transparent IP packet data



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Contents

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Foreword

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

The present document is based on EN 300 175, parts 1 [1] to 8 [8] , EN 300 444 [15] and EN 301 649 [16]. General attachment requirements and speech attachment requirements are based on EN 301 406 [11] (replacing TBR 006 (see bibliography)) and EN 300 176-2 [10] (previously covered by TBR 010 (see bibliography)).

The present document has been developed in accordance to the rules of documenting a profile specification as described in ISO/IEC 9646-6 [12].

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a rapidly changing area, and it is possible that some of the information contained in the present document may become outdated or incomplete within relatively short time-scales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 2 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: "Support of phase 2 services".

1 Scope

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

The functionalities defined in this profile are based on DECT base standard, EN 300 175, parts 1 [1] to 8 [8] , DECT Generic Access Profile (GAP), EN 300 444 [15], and DECT Packet Radio Service (DPRS), EN 301 649 [16].

The New Generation DECT provides the following basic new functionalities:

- Wideband voice service.
- Packet-mode data service supporting Internet Protocol with efficient spectrum usage and high data rates.

The present document describes the second part: packet-mode data service supporting Internet Protocol with efficient spectrum usage and high data rate. For description of the Wideband voice service see TS 102 527-1 [17].

All New Generation DECT devices will offer at least one or both 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 EN 300 444 [15] (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 development of DECT data applications, with the features of the present document being a common fall-back option available in all compliant to this profile equipment.

DECT does not standardize Internet Application protocols or other high layer data protocols, which are in the scope of other standarization organizations.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

[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 coding and transmission".

[9] ETSI EN 300 176-1: "Digital Enhanced Cordless Telecommunications (DECT); Test specification; Part 1: Radio".

[10] ETSI EN 300 176-2: "Digital Enhanced Cordless Telecommunications (DECT); Test specification; Part 2: Speech".

[11] ETSI EN 301 406: "Digital Enhanced Cordless Telecommunications (DECT); Harmonized EN for Digital Enhanced Cordless Telecommunications (DECT) covering essential requirements under article 3.2 of the R&TTE Directive; Generic radio".

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

[13] ISO/IEC 9646-7: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[14] ISO/IEC 8073 (1997): "Information technology - Open Systems Interconnection - Protocol for providing the connection-mode transport service".

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

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

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

[18] ISO/IEC 8802-3 (1996): "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".

[19] IETF RFC 791 (1981): "Internet Protocol" (STD 51).

[20] IETF RFC 768 (1980): "User Datagram Protocol" (STD 6).

[21] IETF RFC 793 (1981): "Transmission Control Protocol" (STD 7).

[22] IETF RFC 2460 (1998): " Internet Protocol version 6".

[23] IETF RFC 1541 (1993): " Dynamic Host Configuration Protocol".

[24] IETF RFC 826 (1982): "An Ethernet Address resolution Protocol" STD 37.

[25] IETF RFC 903 (1984): "A Reverse Address resolution Protocol" STD 38.

[26] IETF RFC 894 (1984): "A Standard for transmission of IP datagrams over Ethernet Networks" STD 41.

[27] IETF RFC 948 (1988): "A Standard for the Transmission of IP datagrams over IEEE 802 Networks" STD 43.

[28] ETSI EN 300 824: "Digital Enhanced Cordless Telecommunications (DECT); Cordless Terminal Mobility (CTM); CTM Access Profile (CAP)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 301 649 [16] shall apply.

3.2 Symbols

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

BA	The part from the A-field that provides indication for the content of the B-field of one MAC layer packet
C	For conditional to support (process mandatory)
I	For irrelevant or out-of-scope (provision optional, process optional), not subject for testing
I_P	Higher layer Information channel (protected)
Lc	DLC layer C-plane protocol entity
M	For mandatory to support (provision mandatory, process mandatory)
M_T	MAC control, one M-channel message
N	Identities channel
N/A	For not-applicable (in the given context the specification makes it impossible to use this capability)
N_T	Identities information, one N-channel message
O	For optional to support (provision optional, process mandatory)
O.x	Option comprising number of items
P_T	One P-channel message
Q	System information channel
Q_T	System information and multiframe marker
SI_P	Higher layer connectionless channel (protected)
WtA	Waiting time A
WtB	Waiting time B
X	Excluded, not allowed

The symbols defined in this clause are applied for procedures, features, and services in the present document if not explicitly otherwise stated. The interpretation of status columns in all tables is as follows:

- Provision mandatory, process mandatory means that the indicated feature service or procedure shall 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 shall 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 [13].

3.3 Abbreviations

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

AC	Authentication Code
ACK	ACKnowledgement
AI/F	Air InterFace
ARC	Access Rights Class
ARD	Access Rights Details
ARI	Access Rights Identity
ARQ	Automatic Retransmission reQuest
ASAP	Application Specific Access Profile

BCD Binary Coded Decimal
C higher layer control Channel

NOTE: See C_S and C_F.

C/L ConnectionLess
CC Call Control

NOTE: A NWK layer functional grouping.

CI Common Interface
C_F higher layer signalling Channel (Fast)
CLIP Calling Line Identification Presentation
CLMS ConnectionLess Message Service
C-plane Control plane
CRC Cyclic Redundancy Check
C_S higher layer signalling Channel (Slow)
CSMA/CD Carrier Sense Multiple Access with Collision Detection
DCDL-net Distributed Communication DECT Local network
DCE Data Circuit terminating Equipment
DCK Derived Cipher Key
DECT Digital Enhanced Cordless Telecommunications
DHCP Dynamic Host Configuration Protocol
DLC Data Link Control
DPRS Data Packet Radio Service
DSC Data System Categories
DTE Data Terminal Equipment
DTMF Dual Tone Multi-Frequency
ECN Exchanged Connection Number
EFREL Enhanced Frame RELay service
E+U Mode of the B-field E/U multiplexer carrying U-plane data and signalling
FP Fixed Part
FREL Frame RELay
FT Fixed radio Termination
FTP File Transfer Protocol
FU10 Frame structure for U-plane service 10

NOTE: See EN 300 175-4[4].

GAP Generic Access Profile
GSM Global System Mobile
GPRS General Packet Radio Service
HDLC High level Data Link Control
HTTP HyperText Transfer Protocol
HyP Hybrid Part
I higher layer Information channel

NOTE: See I_N and I_P.

IETF Internet Engineering Task Force
IMS IP Multimedia Subsystem
I_N higher layer Information channel (unprotected)
IP Internet Protocol
I_{PF} higher layer U-plane channel in E+U mode slots
I_{PQ} higher layer Information channel (protected) single B-field
ISDN Integrated Services Digital Network
IWF InterWorking Functions
IWU InterWorking Unit
L Length
LA Location Area
LAN Local Area Network
LBN Logical Bearer Number

LCE	Link Control Entity
LLC	Logical Link Control
LLME	Lower Layer Management Entity
LLN	Logical Link Number
LU10	LAP-U service 10

NOTE: See EN 300 175-4[4].

M	MAC control channel
MAC	Medium Access Control
MBC	Multi Bearer Control
ME	Management Entity
MIME	Multipurpose Internet Mail Extensions
MM	Mobility Management
MMSC	Mobility Management Service Class
MSB	Most Significant Bit
MTU	Maximum Transmission Unit
MUX	time MUltipleXors
NAT	Network Address Translator
NG-DECT	New Generation DECT
NWK	NetWorK
ODAP	Open Data Access Profile
P	Paging channel
PABX	Private Automatic Branch eXchange
PAD	Packet Assembler-Disassembler
PAT	Port Address Translator
PARK	Primary Access Rights Key
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PHL	PHysical Layer
PHY	PHYsical
PMID	Portable part MAC IDentity
PP	Portable Part
PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
PT	Portable radio Termination
PVC	Permanent Virtual Circuit
Q_H	Q field header
RFC	Request For Comment
RFP	Radio Fixed Part
RFPI	Radio Fixed Part Identity
RTP	Real-time Transport Protocol
RTSP	Real-Time Streaming Protocol
SAP	Service Access Point
SARI	Secondary Access Rights Identity
SDU	Service Data Unit
SIP	Session Initiation Protocol
SI_{PF}	Higher layer connectionless channel in E+U mode slots
SOHO	Small Office and Home Office
SMTP	Simple Message Transport Protocol
TARI	Tertiary Access Rights Identity
TCP	Transmission Control Protocol
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
TPUI	Temporary Portable User Identity
UDP	User Datagram Protocol
UMTS	Universal Mobile Telecomunication System
U-plane	User-plane
VC	Virtual Calls
WLAN	Wireless Local Area Network

4 Description of Services

4.1 The data service in New Generation DECT

4.1.1 Service objectives

At the moment of drafting of the present document the Internet Protocol has been consolidated as the universal data standard able to transport any application or service, and able of being transported by any transmission media.

The DECT community has recognized this reality a long time ago, and DECT specification includes mechanisms for efficient transport of Internet protocol and the application protocols on top of that.

The DECT Packet Radio Service (DPRS) [16] is the DECT specification for the transport of packet-mode data. It includes powerful mechanisms providing context control, mobility management and security, and takes advantage of powerful features of the DECT common interface to offer a high performance data transport mechanism.

The data service in New Generation DECT is based on the efficient transport of Internet protocol (IP) [19] and takes advantage of the work done by IETF and the IT industry to cover a wide range of services and applications (figure 1). Furthermore, by using this approach, DECT will be able to provide further applications and services to be developed in the future.

The present document selects a specific set of features from DPRS and defines an interoperability profile. The aim of the specification is to guarantee interoperability at IP level, and to provide an easy route for development of DECT data applications.

4.1.2 Characteristics of the DECT packet data service

The DECT packet data service provides an efficient transparent transport of IP and upper layers with the following characteristics:

Packet mode: the service provided by DECT uses only the air interface resources when there are data to be transported, allowing re-use of the spectrum by statistical multiplexing between multiple users and systems

Connection Oriented: the service provided by DECT provides controlled and isolated logical paths between ends –Virtual Circuits – that can be permanent or switched. The fact that DECT provides a connection oriented service does not introduce any kind of restriction when transporting connectionless protocols (like IP), and provides important advantages regarding the security and mobility management. It is also possible to have in the same DECT system several data networks completely isolated from one another.

Complete mobility management: DECT provides complete mobility management (handover, roaming) like a cellular system.

Security: DECT provides serious authentication and ciphering exactly as a cellular system (i.e. GSM). Ciphering is performed at MAC layer using a dedicated hardware and does not consume application processing power

Asymmetric connections: DPRS makes use of the TDD characteristic of DECT to revert the transmission direction of the bearers, doubling the transmission speed of the system. This process is performed automatically and continuously by the system in order to optimize transmission speed. There is no a pre-set direction of transmission. The system could move from maximum speed downlink to maximum speed uplink according to the data to be transmitted.

High Speed: DECT offers transmission speeds of up to 5,068 Mbit/s with 64 QAM modulation. In the present document, the simpler GFSK modulation schema is used allowing a maximum transmission speed of 845 kbit/s + 57,6 kbit/s asymmetric or 460 kbit/s + 460 kbit/s symmetric.

The capabilities offered by DECT are similar to a cellular communication system like GPRS or UMTS.

Table 1: Summary of service capabilities

Service	FT	PP
Point-to-point protected data transfer PP-FP with ARQ	YES	YES
Point-to-point protected data transfer FP-PP with ARQ	YES	YES
Point-to-multi-point data transfer FP-PP	OPTIONAL	OPTIONAL
Authentication	YES	YES
Encryption	YES	YES
Permanent Virtual Circuit (PVC) operation	YES	YES
Virtual Call (VC) operation	YES	YES
Intra-cell bearer handover (see note)	YES	YES
Inter-cell bearer handover (see note)	YES	YES
Inter-cell connection handover (for multicell systems)	OPTIONAL	OPTIONAL
Inter-cell external handover	OPTIONAL	OPTIONAL
NOTE: Bearer handover capability may be provided by the bearer replacement procedure.		

4.2 Protocol architecture

Although the primary objective is to guarantee IP transparency, and this service is provided by DPRS [16], the present specification (New Generation DECT, part 2) privileges the Interworking function at IEEE 802.3 level (annex B.4 of DPRS is Mandatory for PP and FP). However, the Interworking function at IP level is also allowed as an option (annex B.6 of DPRS is optional for PP and FP).

Annex B.4 of DPRS means that part of the IEEE 802.3 header is transported by the air interface. This is done to simplify implementations in many systems that are likely to have external Ethernet interfaces. Only part of the IEEE 802.3 header is transported by air interface.

In the case of scenarios or applications with no external Ethernet stacks, either the "Direct IP" solution is used (annex B.6 of DPRS), or an IEEE 802.3 header with conventional addresses should be added for transporting the data over air interface using DPRS annex B.4 configuration. DECT does not use the IEEE 802.3 header for routing or addressing.

4.2.1 IPv6

IP version 6 (IPv6) [22] can also be used with no difference compared to IPv4 [19].

4.2.2 Other LAN protocols: DHCP, ARP, RARP

Due to the Mandatory support of Interworking function at IEEE 802.3 level, other protocols commonly transported by Ethernet Networks can always be transparently transported by the DECT system if needed. It includes DHCP [23], ARP [24], and RARP [25].

4.2.3 Data protocol reference configuration

The described view of IP as a universal transport is summarized in figure 1.

The present document allows two reference configurations for transporting IP data over DECT:

- IEEE 802.3 (or Ethernet) frames over DECT layers (use of DPRS annex B4).
- IP datagrams directly transported by DECT layers (use of DPRS annex B6).

The reference model for both configurations is described in the following clauses.

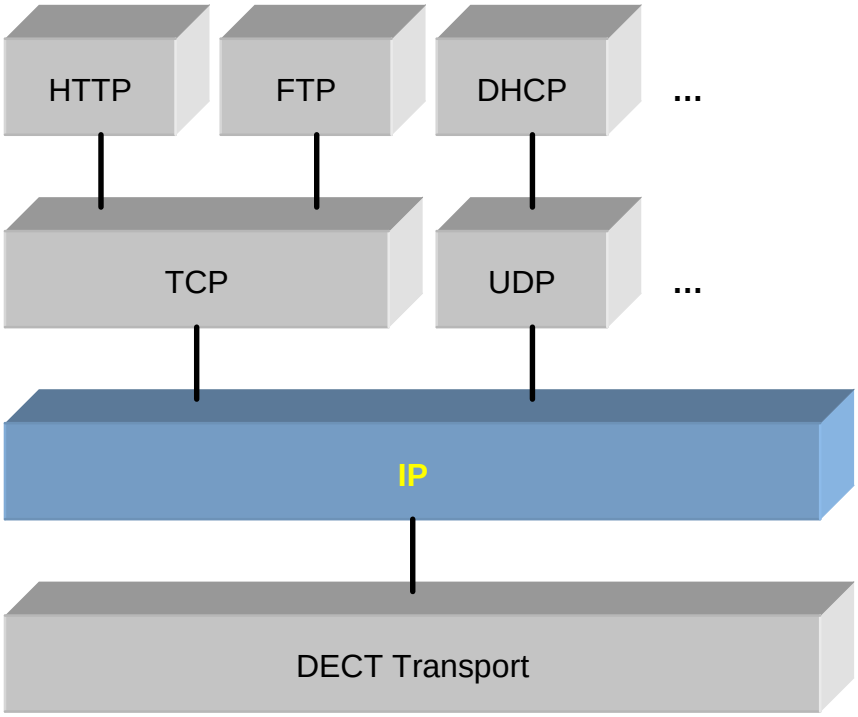


Figure 1: Data services simplified Reference Configuration

4.2.3.1 IEEE 802.3/Ethernet over DECT (DPRS annex B.4) reference configuration

The reference model of the data protocol stacks at air interface and Interworking functions is depicted in figures 2 and 3.

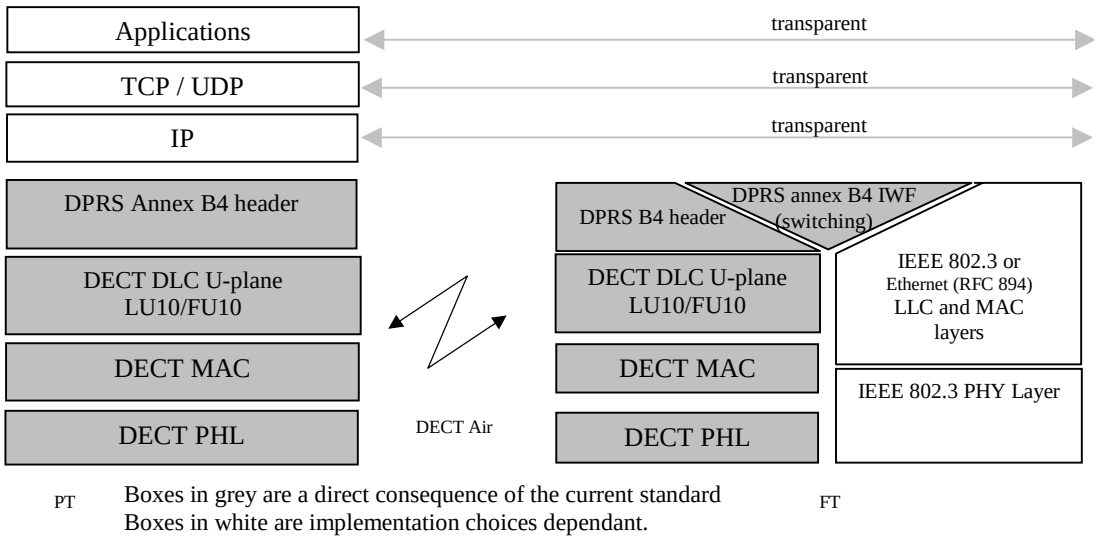
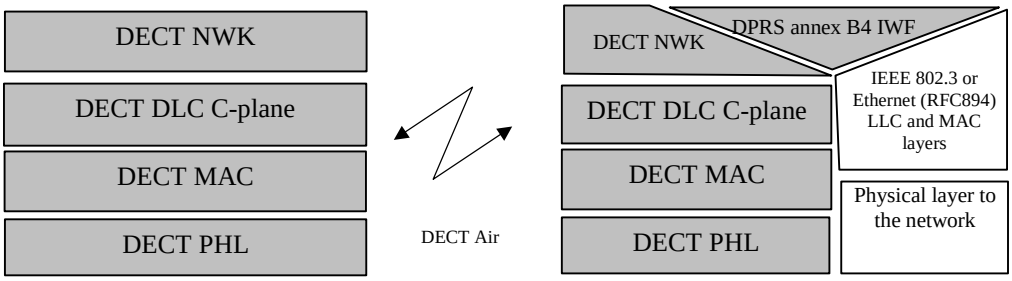


Figure 2: IEEE 802.3/Ethernet over DECT (use of DPRS annex B4): U-plane stack

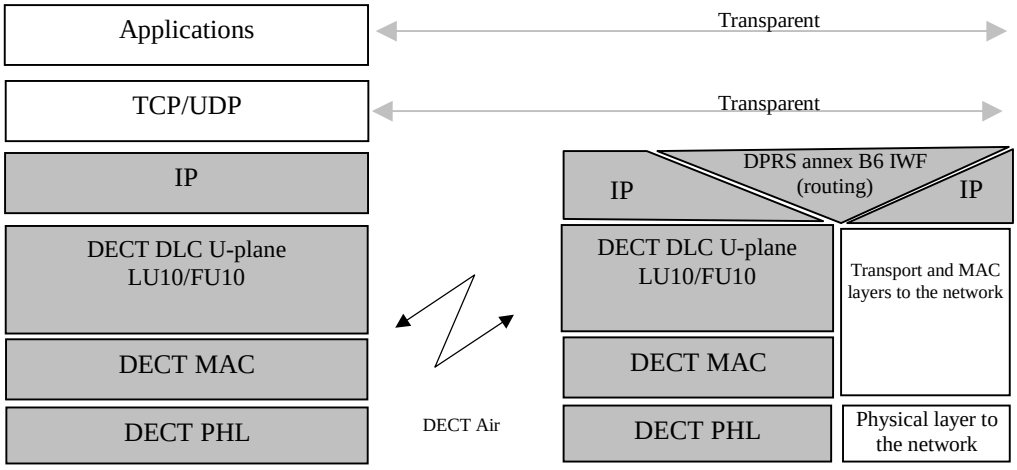


Boxes in grey are a direct consequence of the current standard.
Boxes in white are implementation choices dependant.

Figure 3: IEEE 802.3/Ethernet over DECT (use of DPRS annex B4): C-plane stack

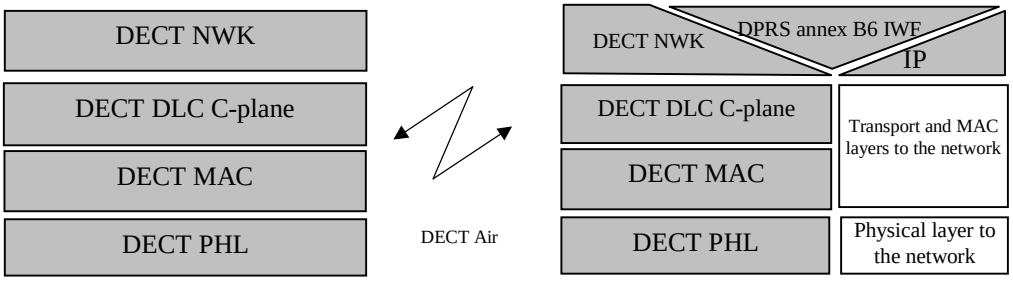
4.2.3.2 Internet Protocol (IP) over DECT (DPRS annex B.6) reference configuration

The reference model of the data protocol stacks at air interface and Interworking functions is depicted in figures 4 and 5.



Boxes in grey are a direct consequence of the current standard.
Boxes in white are implementation choices dependant.

Figure 4: Internet Protocol (IP) over DECT (use of DPRS annex B6): U-plane stack



Boxes in grey are a direct consequence of the current standard.
Boxes in white are implementation choices dependant.

Figure 5: Internet Protocol (IP) over DECT (use of DPRS annex B6): C-plane stack

4.2.3.3 Other implementation options

A DECT system could include additional routing, protocol handling or interworking functions at higher levels. A typical case is the Internet Protocol routing with or without NAT. This is irrelevant from the point of view of DECT and does not require any provision in the present document. Furthermore, PP should be interoperable irrespective of the implementation option at the FP. As example for implementers, the next figure shows the likely case of a PP with external LAN interface, IEEE 802.3/Ethernet transported over DECT (DPRS annex B.4) plus IP routing at FP.

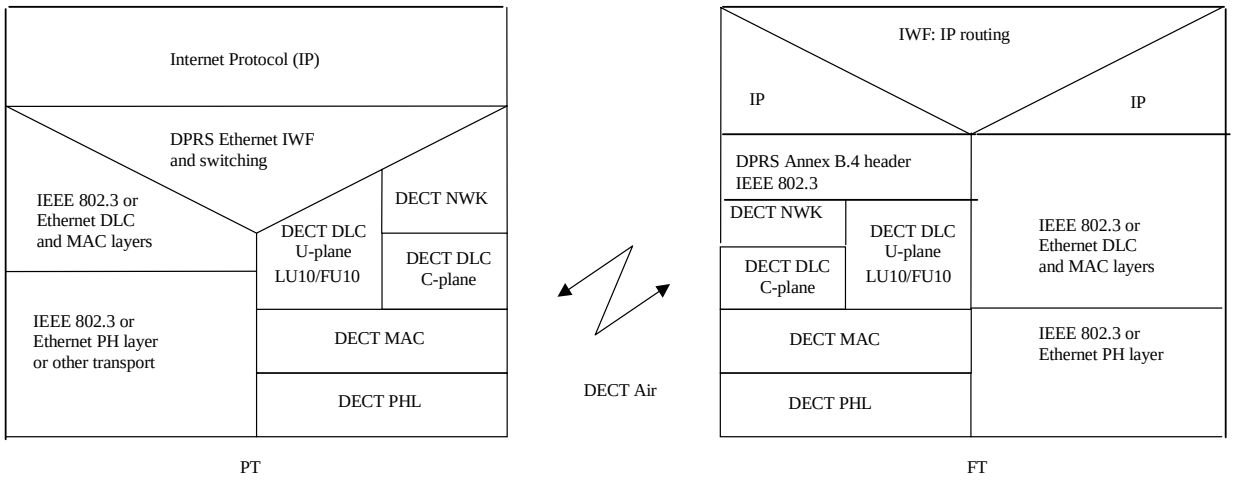


Figure 6: Option of IEEE 802.3/Ethernet transport (DPRS annex B.4) with IP routing at FP

4.3 Performance Objectives

The performance characteristics figures are shown in table 2. The table defines the applicable performance figures for a system designed to achieve the full capability provided by the standard. Due to the nature of radio transmission and packet data in general, figures could be lower in case of bad radio links, or spectrum usage competition from other system.

Table 2: Performance objectives

Performance parameter	Value	Notes
Maximum transportable packet size without IP segmentation	≥ 1 528 octets	See note 1
Maximum one-way delay	Down to 50 ms configurable	See note 2
Maximum sustainable unidirectional throughput (per slot)	76,8 kbit/s net	See notes 3 and 4
Maximum sustainable unidirectional throughput (per transceiver)	844,8 kbit/s net	See notes 3 and 4
Maximum sustainable full bi-directional throughput (per transceiver)	460,8 kbit/s net	See notes 3 and 4
Maximum system sustainable unidirectional throughput (per a system composed of 10 transceivers)	8,448 Mbit/s (10 parallel unidirectional connections)	See notes 3 and 4
Total bandwidth available to be shared between all transmitters in an area (assuming 10 frequencies)	9,216 Mbit/s (10 frequencies)	See notes 3, 4 and 5
Establishment of PT to FT physical connection (average)	< 50 ms	See note 2
Establishment of FT to PT physical connection (average)	< 50 ms	See note 2

Performance parameter	Value	Notes
Undetected bit error ratio	$< 10^{-10}$	
Uncorrected bit error ratio (for air interface BER 10^{-3} and delay = 100 ms)	$< 10^{-7}$	
NOTE 1: This is the MTU (Maximum Transmission Unit). This figure is compatible with IEEE 802.3 and IP, and does not introduce any restriction.		
NOTE 2: Figures could be impossible to achieve in case of competition acceding the air interface between several terminals or systems.		
NOTE 3: Net user data rate available for high layer protocols without considering the DECT overheads.		
NOTE 4: Assuming double slot and MAC service I_{PQ}		
NOTE 5: Assuming the 10 frequencies available in the original DECT frequency spectrum 1 880 MHz to 1 900 MHz. In several countries, frequencies are available at 1 900 MHz to1 920 MHz, 1 910 MHz to 1 930 MHz, and ISM band.		

4.4 System Categories

New Generation DECT data systems are classified in categories depending on the data performance objectives of the system. Each category has specific requirements, additional to the general features and services applicable to all NG-DECT data systems. Table 3 defines the mandatory requirements for each category.

The declaration of data category is optional. It is possible to have NG-DECT data systems not belonging to any data category. Such systems are called "non categorized" systems. However, the alignment to one (or several) categories is advisable in order to improve interoperability.

The following categories are defined:

- **Category 1:** Low-end systems providing a symmetric data rate of 50 kbit/s over a single bearer, using long slot.
- **Category 2:** Mid-end multibearer systems providing a data rate up to 500 kbit/s supporting symmetric and asymmetric connections.
- **Category 3:** High-end systems providing a data rate up to 844 kbit/s supporting symmetric and asymmetric connections.

Category 2 uses long slots (j=640), which is convenient for slow hopping radios. Category 3 uses double slots and MAC service I_{PQ} and is intended to achieve higher data rates.

Clause 5.2, tables 3 and 4, defines the mandatory features and services for each NG-DECT data category. Such mandatory requirements should be understood as additional to the base requirements that are applicable to all NG-DECT data systems.

NG-DECT data categories are back compatible in the following way:

- NG-DECT Data Category 2 systems shall support also Category 1.
- NG-DECT Data Category 3 systems shall support also Categories 1 and 2.

When FP and PP do not have the same Category, the features of the highest category supported by both sides shall be used.

4.5 General application environments

The following clause introduces some potential application scenarios as guidance. This clause is not exhaustive and is provided as application example. There will be more applications and scenarios not covered by this clause.

4.5.1 Residential (home networking) environment

In the residential scenario, the user typically operates a single DECT FP with external connection to Internet or to a dedicated data IP network by means of ADSL, xDSL, Cable, ISDN or PSTN. Several DECT PPs are connected to the DECT FP, creating a wireless home network with voice and data capability. This capability can be used for many applications:

1) Wireless LAN service.

   The DECT network provides a Wireless LAN service that can be used for interconnection of computer equipment between them, and with the Internet. The provided Wireless LAN service has a data rate similar to initial versions of IEEE 802.11 (≈1 Mbit/s) and can be enough for many scenarios.

In addition to these computer-oriented applications, there are many other data applications where DECT technology is especially suitable.

2) Auxiliary functions of voice DECT terminals (address book, SMS, etc.).

   An advanced DECT voice terminal could incorporate DPRS capabilities in order to provide auxiliary services like a shared address book centralized in the FP. A similar function could be the browsing of short messages or MMS stored in the Fixed Part. For these scenarios DECT data is by far the most convenient implementation.

3) Multimedia capability (I.e. video conference) in DECT terminals.

   Multimedia capabilities can be easily provided using SIP or IMS on top of the transparent IP transport provided by DECT. Service can be based on IMS (3GPP) protocols, or a more simplified approach.

4) Interconnection with set-top boxes and consumer electronics equipment.

   The DECT device could be used for implementation of interactive data communication with audio/video, video-games and other consumer electronics equipment.

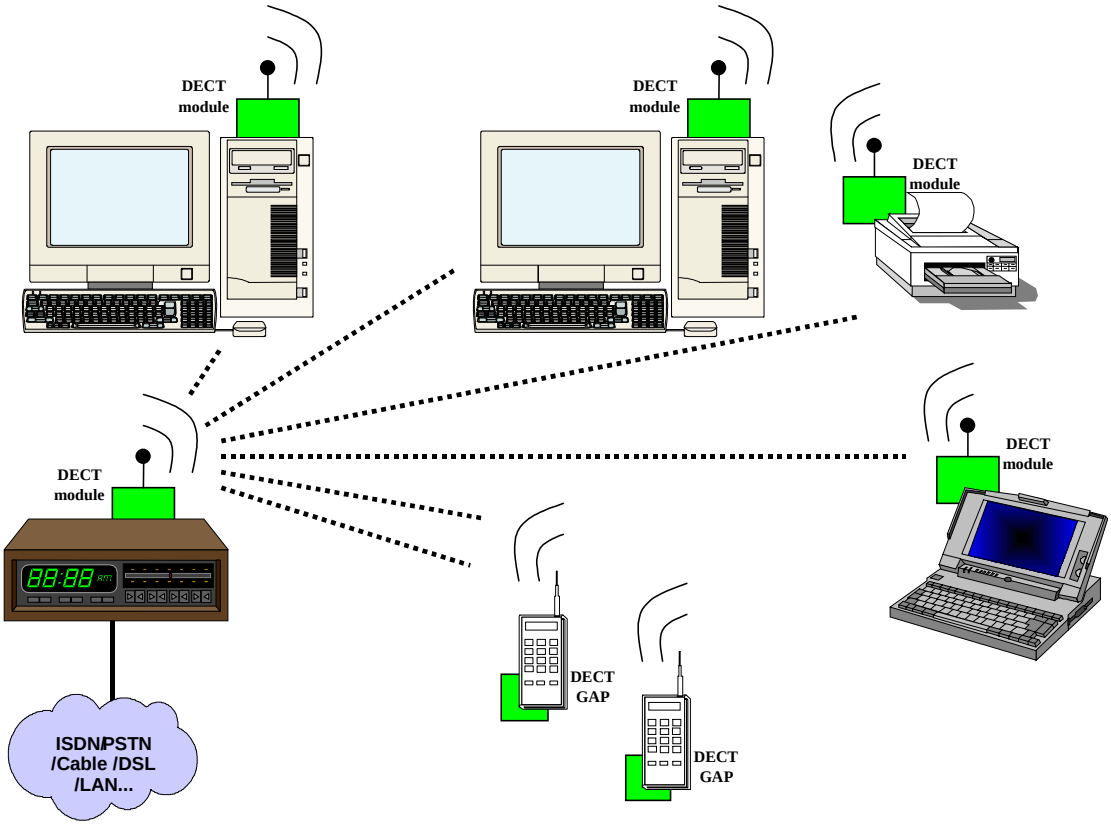


Figure 7: Home Wireless LAN based on DECT - FT implemented as a Router (including Gateway); Voice and data capability in the same radio network

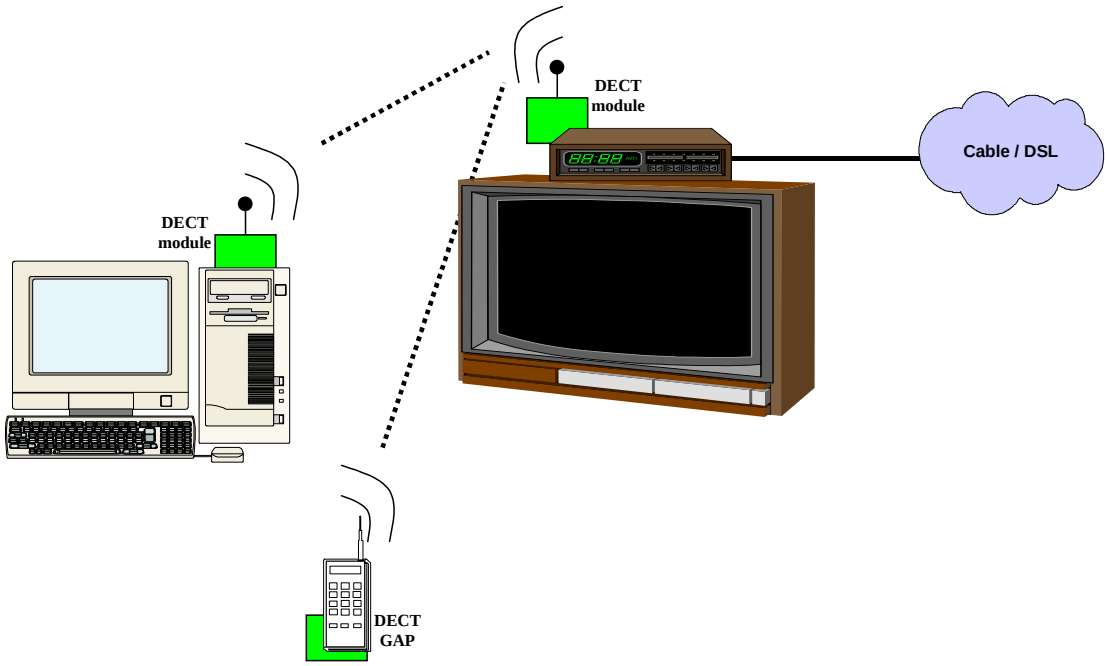


Figure 8: Wireless Ethernet connection to a Set-top box (e.g. Cable or xDSL modem) providing data and voice service

4.5.2 Business scenario

Contrary to the Residential/Private environment, the enterprize environment is characterized by a controlled distribution, installation of radio base stations and by the use of specially dedicated terminals. The DECT technology is widely used in this scenario for voice service. It allows the creation of a micro-cellular private network with all the features commonly associated to the public mobile service, as high security or handover capabilities. The radio properties of DECT make possible a systematic planning of the radio network, which is the basis of a predictable high quality service. All these advantages can be extended to data applications, adding the support of DPRS to the DECT system.

The DECT data in a corporate environment allows the provision of a reasonable rate Wireless LAN service (1 Mbit/s in DECT 2-level modulation) using the same radio infrastructure as the voice services. It means that only one set of base stations will be needed, and that existing radio planning can be reused. The DECT network is designed for systematic coverage (cellular) of large areas, and can be the right choice for many applications. It should be noted also that DECT provides a reduced power consumption and RF radiated power compared with other technologies.

This DECT capability can be used for many applications:

1) Cellular Wireless LAN service.

   DECT provides a wireless LAN service with reasonable data rate and handover capabilities. This service can be designed for predictable, systematic coverage of large areas. It can be used for computer interconnection to corporate LANs. Compared to other technologies, the service is specially convenient for nomadic devices.

2) Wireless LAN service in restricted areas.

   The radio properties of DECT (dedicated band, low power) make it convenient for operation in scenarios where other technologies operating in the ISM band can not be used. It includes medical, aeronautical or industrial applications.

3) 3) Specific industrial, control or security applications.

   The DECT advantage when the important point is a systematic, predictable coverage, makes it suitable for industrial applications, as interconnection between control systems and industrial equipment. The same is applicable to security applications (i.e. alarms). Such applications include:

   - Hospital, medical equipment and biological sensors.
   - Hotel and restaurant environments: dedicated equipment for personnel.
   - Point-of-sale applications (order entry, credit card processing, checking available stock).
   - Warehouses: inventory applications (bar-code reading, etc). By updating stock information in real-time, significant savings can be achieved by reducing the inventory.

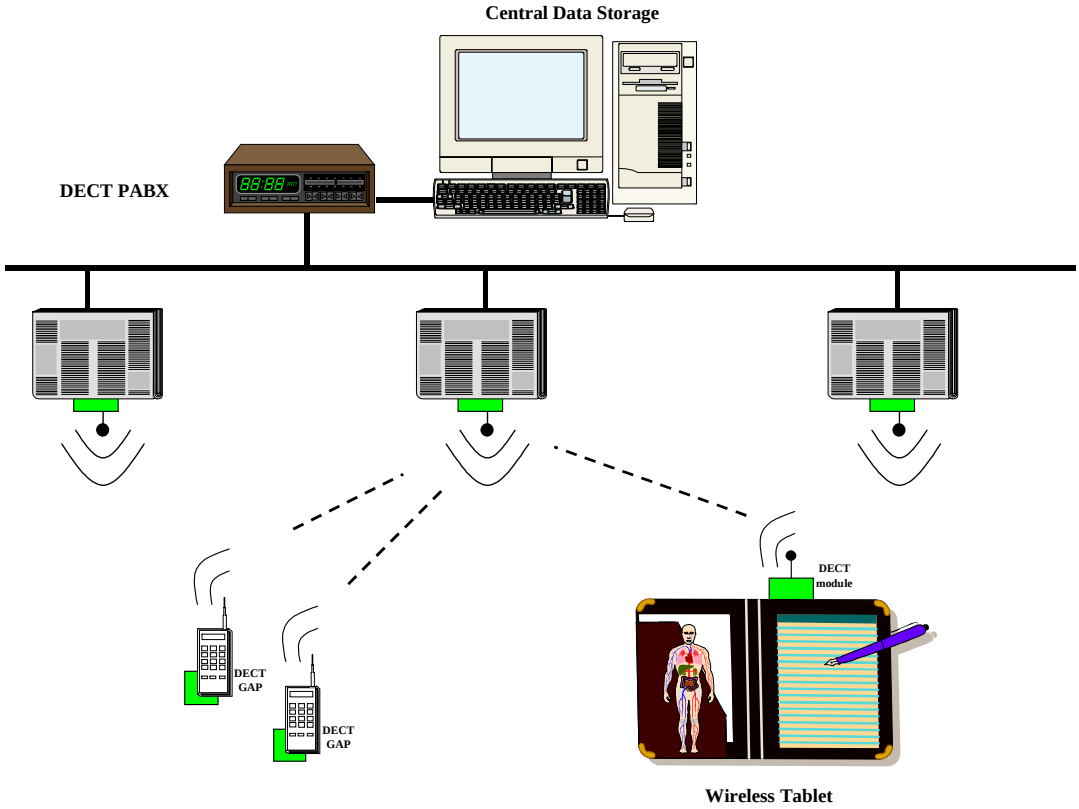


Figure 9: Example of business scenario: Wireless LAN service with systematic coverage of company premises

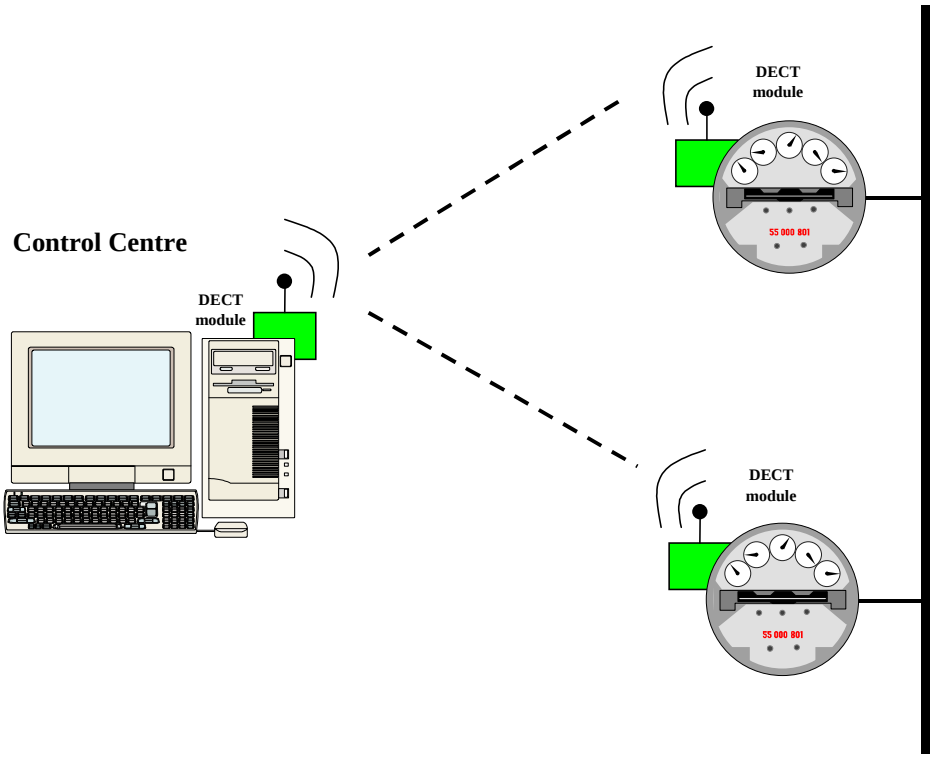


Figure 10: Business scenario: DECT Wireless LAN for remote retrieval of information from a system of sensors

4.5.3 Small Office and Home Office (SOHO)

The SOHO environment may be considered in most cases as either a minimized replica of the enterprize environment, or, as a magnified replica of the residential private environment, therefore all of the examples given that are relevant for the enterprize or for the residential private environments may be applied.

4.6 Examples of implementation of most usual scenarios

4.6.1 Fixed Part (FP) acting as a router with WLAN/DECT access point

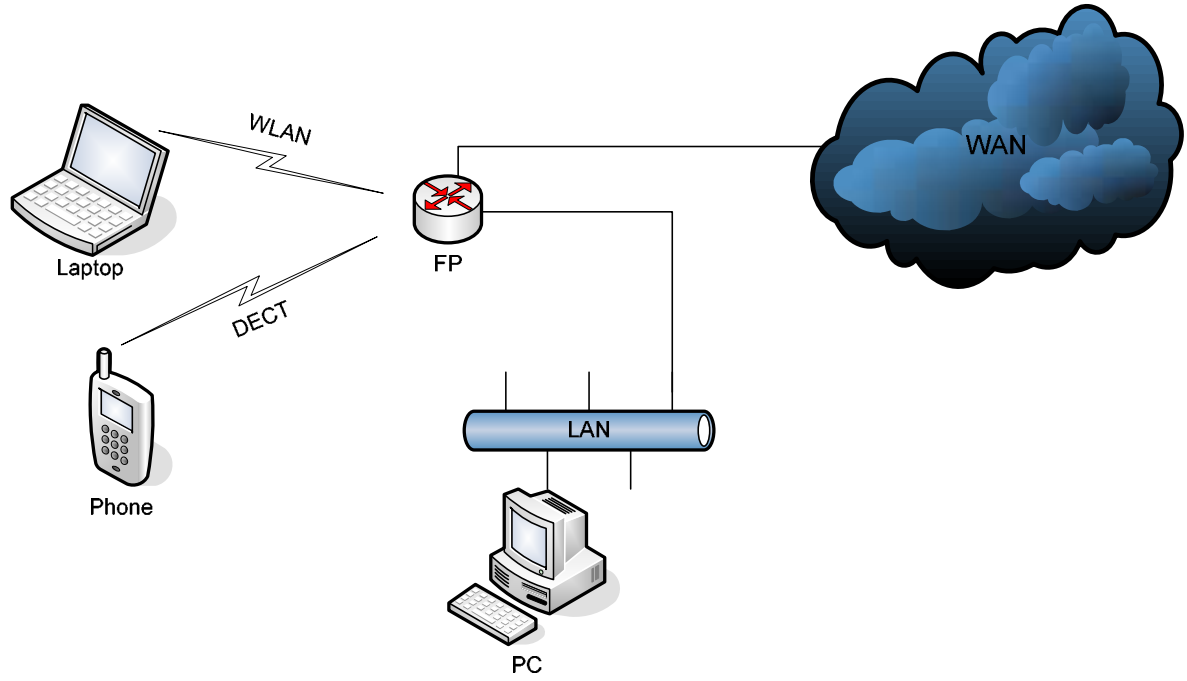


Figure 11: Network example with FP acting as router

In this implementation, the DECT FP implements an IP routing function and includes IEEE 802.3 interfaces to LAN(s). This use case can be applicable to home, enterprize or soho scenarios.

The configuration parameters for each client participating in the IP network are provided by the DHCP server of the FP, which also has router functionality in this example. Each client has its own Ethernet MAC address. The FP has one Ethernet MAC address for the LAN and one for the WAN side.

The routing function at FP can be complemented with NAT and PAT, if required by the IP addressing plan.

4.6.2 Fixed Part (FP) acting as a switch with WLAN/DECT access point

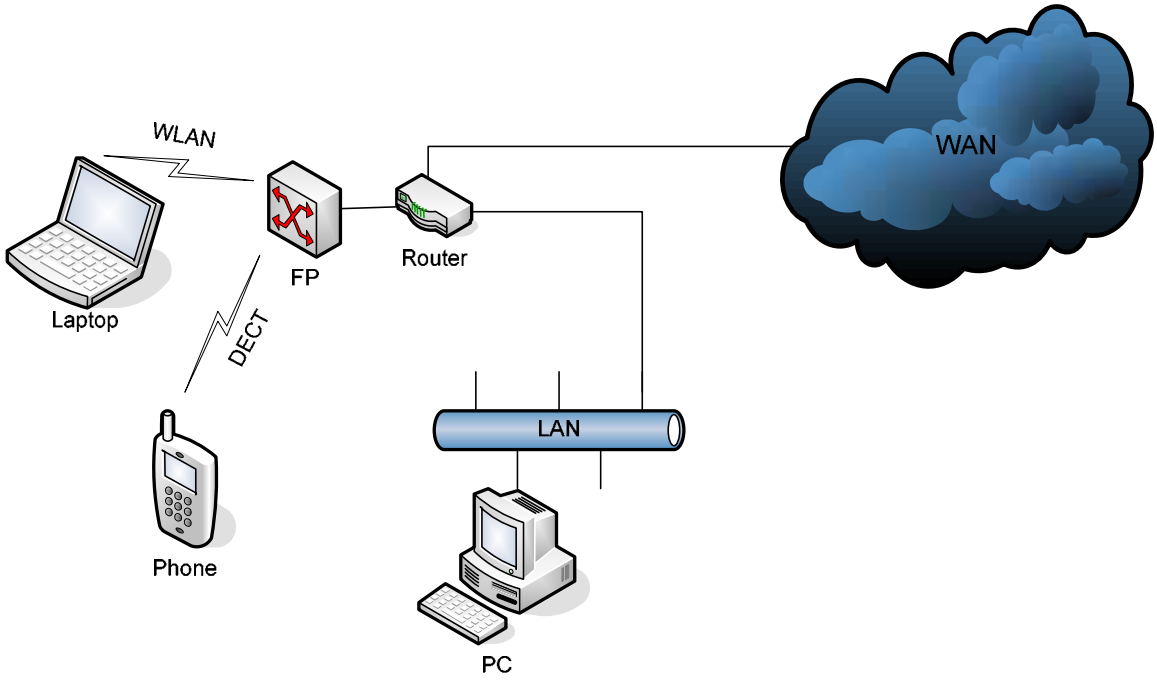


Figure 12: Network example with FP acting as switch

As alternative, it is possible to build the implementation with only LAN switching function at the DECT FP. In this case, the DECT FT acts as a LAN switch with IEEE 802.3 interfaces. In this implementation, the same LAN transported by DECT air interface is accessible at the FT Ethernet port. This use case is applicable to home, enterprize or SOHO scenarios.

The configuration parameters for each client participating in the LAN are provided by a DHCP server, usually collocated with a LAN router (external to the DECT FT). Each client has its own Ethernet MAC address.

5 Relevant requirements

The requirements of EN 301 649 [16] relevant for Class 2 equipment shall apply with the modifications stated in clauses 5 and 6 of the present document.

The encapsulation of external data protocol shall be done as stated in EN 301 649 [16], annex B.4.

In any case, the requirements of EN 300 176-1 [9] and any of the harmonized standard EN 301 406 [11] shall apply as well.

5.1 Service and feature definitions

5.1.1 PHL service definitions

For the purpose of the present document, the definitions of EN 301 649 [16], clause 4.3.1 shall apply.

5.1.2 MAC service definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.2 shall apply.

5.1.3 DLC service definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.3 shall apply.

5.1.4 NWK feature definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.4 shall apply.

5.1.5 Application service definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.5 shall apply.

5.1.6 Management Entity (ME) definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.7 shall apply.

5.1.7 Call Control (CC) and mobility management service definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.8 shall apply.

5.1.8 U-plane service and interworking definitions

For the purposes of the present document, the definitions of EN 301 649 [16], clause 4.3.9 shall apply.

5.1.9 NG-DECT Data System Categories (DSC)

For the purposes of the present document, the following definitions shall apply:

Category 1 [NG-DECT-Cat.1]: low-end systems providing a symmetric data rate of 50 kbit/s over a single bearer, using long slot

Category 2 [NG-DECT-Cat.2]: mid-end multibearer systems providing a data rate up to 500 kbit/s supporting symmetric and asymmetric connections

Category 3 [NG-DECT-Cat.3]: high-end systems providing a data rate up to 844 kbit/s supporting symmetric and asymmetric connections

5.2 Requirements applicable to categorized systems

The following requirements apply to NG-DECT data systems declaring compliance to one or more NG-DECT/DPRS data category (see also clause 4.4).

5.2.1 Mapping between NG-DECT data categories and features/services

Equipment belonging to each NG-DECT data category type shall support the features and services defined in the following table and shall use these features/services when establish communication with other systems belonging to the same category.

For features/services not listed in table 3, the status defined in clause 6 shall apply:

Table 3: Features/services supported for each NG-DECT data system category

NG-DECT data Category to feature/service mapping					
Category	**NG-DECT data Feature/Service**	**Reference**	**Note**	**Status**	
				PT	**FT**
[NG-DECT-Cat.1] Category 1 systems		4.4, 5.1.9			
	GFSK modulation [DPRS-P.1]:	4.3.1 [16]		M	M
	Physical Packet P64 [DPRS-P.14]:	4.3.1 [16]		M	M
	I_P_error_detection MAC service type [DPRS.M.6]	4.3.2 [16]		M	M
	I_P_error_correction MAC service type [DPRS.M.7]	4.3.2 [16]		O	O
	G_F channel [DPRS-M.19]	4.3.2 [16]		C31	C31
	I_{PF} channel [DPRS-M.23]	4.3.2 [16]		C31	C31
	Long slot 640 [DPRS-M.25]	4.3.2 [16]		M	M
	Multibearer connections [DPRS-M.28]	4.3.2 [16]		O	O
	Asymmetric connections [DPRS-M.29]	4.3.2 [16]		O	O
	Class 2 Management [DPRS-ME.2]	4.3.7 [16]	2	M	M
	Service Class 2 [DPRS-G.2]	4.3.8 [16]	2	M	M
[NG-DECT-Cat.2] Category 2 systems	GFSK modulation [DPRS-P.1]	4.3.1 [16]		M	M
	Physical Packet P64 [DPRS-.P.14]	4.3.1 [16]		M	M
	I_P_error_detection MAC service type [DPRS.M.6]	4.3.2 [16]		M	M
	I_P_error_correction MAC service type [DPRS.M.7]	4.3.2 [16]		O	O
	G_F channel [DPRS-M.19]	4.3.2 [16]		M	M
	I_{PF} channel [DPRS-M.23]	4.3.2 [16]		M	M
	Long slot 640 [DPRS-M.25]	4.3.2 [16]		M	M
	Multibearer connections [DPRS-M.28]	4.3.2 [16]		M	M
	Asymmetric connections [DPRS-M.29]	4.3.2 [16]		M	M
	Class 2 Management [DPRS-ME.2]	4.3.7 [16]	2	M	M
	Service Class 2 [DPRS-G.2]	4.3.8 [16]	2	M	M
	Category 1 operation [NG-DECT-Cat.1]	4.4, 5.1.9	3	M	M
[NG-DECT-Cat.3] Category 3 systems	GFSK modulation [DPRS-P.1]	4.3.1 [16]		M	M
	Physical Packet P80 [DPRS-.P.16]	4.3.1 [16]		M	M
	I_{PQ}_error_detection MAC service type [DPRS.M.20]	4.3.2 [16]		M	M
	I_{PQ}_error_correction MAC service type [DPRS.M.21]	4.3.2 [16]		O	O
	G_F channel [DPRS-M.19]	4.3.2 [16]		M	M
	I_{PF} channel [DPRS-M.23]	4.3.2 [16]		M	M
	Double slot [DPRS-M.27]	4.3.2 [16]		M	M
	Multibearer connections [DPRS-M.28]	4.3.2 [16]		M	M
	Asymmetric connections [DPRS-M.29]	4.3.2 [16]		M	M
	Class 2 Management [DPRS-ME.2]	4.3.7 [16]	2	M	M
	Service Class 2 [DPRS-G.2]	4.3.8 [16]	2	M	M
	Category 1 operation [NG-DECT-Cat.1]	4.4, 5.1.9	4	M	M
	Category 2 operation [NG-DECT-Cat.2]	4.4, 5.1.9	4	M	M
C31: IF DPRS-M.29 is supported THEN M ELSE O.					
NOTE 1: There can be non categorized NG-DECT data systems NOTE 2: All categories are based on Class 2 management and Service Class 2. NOTE 3: Category 2 systems shall also support all features of Category 1 systems and shall be able to interoperate with them. NOTE 4: Category 3 systems shall also support all features of Category 1 and Category 2 systems and shall be able to interoperate with them. NOTE 5: In the case where a FP and a PP do not have the same category capabilities, the initiating side should use the highest category supported by both sides. NOTE 6: The reference column refers to the relevant clause in the present or in the referenced document.					

5.2.2 Supported data rates for equipment declaring compliance to a data category

Equipment belonging to each NG-DECT data category type shall support, at least, the following number of active slots and data rates described as mandatory in table 4. They may optionally support the number of active slots and data rates described as optional in table 4.

NOTE: The mandatory supported data rate has been chosen to allow two simultaneous wideband calls (see TS 102 527-1 [17]) in addition to the data transfer.

Table 4: Supported data rates for each system Category

Supported data rates for each system category						
Category	**Parameter**	**Notes**	**Value**			
			Data rates in kbit/s (see notes 1 and 2)		**Corresponding number of bearers**	
			downlink (FT > PT)	**uplink (PT > FT)**	**downlink (FT > PT)**	**uplink (PT > FT)**
NG-DECT-Cat.1 Category 1 systems	Mandatory supported data-rate for symmetric connections	4	51,2	51,2	**1**	**1**
NG-DECT-Cat.2 Category 2 systems	Mandatory supported data rate for symmetric connections	4, 5	204,8	204,8	**4**	**4**
	Optional maximum data rate for symmetric connections	4, 6	307,2	307,2	**6**	**6**
	Mandatory supported downlink data rate for asymmetric connections	4, 5, 7, 3	358,4	44,8	**7**	**1**
	Optional maximum downlink data rate for asymmetric connections	4, 6, 8	563,2	44,8	**11**	**1**
	Optional maximum uplink data rate for asymmetric connections	4, 6, 8	44,8	563,2	**1**	**11**
NG-DECT-Cat.3 Category 3 systems	Mandatory supported data rate for symmetric connections	9, 5	307,2	307,2	**4**	**4**
	Optional maximum data rate for symmetric connections	9, 6	460,8	460,8	**6**	**6**
	Mandatory supported downlink data rate for asymmetric connections	9, 5, 7, 3	537,6	57,6	**7**	**1**
	Optional maximum downlink data rate for asymmetric connections	9, 6, 8	844,8	57,6	**11**	**1**
	Optional maximum uplink data rate for asymmetric connections	9, 6, 8	57,6	844,8	**1**	**11**

NOTE 1: Data rate indicates net data rate provided by MAC layer.
NOTE 2: The value of the backward rate in asymmetric connections includes the reduction by using the I_{PF} channel due to the insertion of the "Quality control message" in all frames.
NOTE 3: The asymmetric uplink configuration is not mandatory.
NOTE 4: Slot type shall be Long slot (j=640) with MAC service I_P.
NOTE 5: The system shall support all intermediate number of bearers between the minimum 1+1 and this value.
NOTE 6: The system may optionally support higher number of bearers than the mandatory configuration. If supported, the system shall support all intermediate values between 1+1 and the claimed maximum.
NOTE 7: In asymmetric connections, the system shall support all intermediate values in the number of duplex bearers from 1 to the mandatory value for symmetric connections, plus all intermediate values in the number of double simplex bearers from 1 to the necessary to fulfil the mandatory asymmetric rate. However it does not need to support a higher number of bearers in total than the used in a 1+N full asymmetric case.
NOTE 8: If the system claims a higher value of asymmetric bearers than the mandatory value, then, it shall fulfil the rule of note 7 up to the claimed number of bearers.
NOTE 9: Slot type shall be Double slot with MAC service I_{PQ}.

In addition to table 4, systems shall fulfil all the mandatory requirements for each system category (table 3) and the backcompatibility rule described in notes 3, 4 and 5 of table 3.

5.2.3 Indication of compliance with a data category

All NG-DECT data equipment compliant with the present specification, shall broadcast the supported number of bearers and the supported category type, if any, using the Terminal capability and the fixed part capabilities information elements in the way described in the present document.

NOTE: Manufacturers may indicate the category type and the maximum number of supported bearers in their documentation with the text "DPRS Cat n x+x/y+1" where n is the maximum category supported and x and y the maximum number of bearers supported in symmetric and asymmetric configurations.

6 Profile specific requirements

6.1 General

The tables listed in this clause define the status of all protocol elements (i.e. features, services, and procedures), which can be: mandatory, optional, conditional under the provision of another protocol element, outside the scope of the present document, or not applicable. The status is identified by the status column designations defined in clause 3.2, and is described separately for FT and PT.

All optional elements shall be process mandatory according to the procedures described in the present document.

Protocol elements defined as mandatory, optional or conditional in this clause are further defined in the referenced DECT specification, or, if needed, in clause 7 of the present document.

New Generation DECT; part 2: support of transparent packet data is defined as an application specific access profile of DPRS [16]. All procedures not specific to the new generation DECT are referenced to their original description in EN 301 649 (DPRS) [16].

The requirements of EN 301 649 [16] relevant for Class 2 equipment shall apply with the modifications stated, if needed, in clause 7 of the present document.

The encapsulation of external data protocol shall be done as stated in EN 301 649 [16], annex B.4 (Ethernet Interworking) or annex B.6 (IP Interworking).

In any case, the requirements of EN 300 176-1[9], EN 300 176-2 [10] and any of the harmonized standard EN 301 406 [11] shall be met by all equipment conforming to the present document.

The requirements tables in the following clauses are derived from the EN 301 649 [16]. In the service to procedure and feature to procedure mapping tables, the status of each particular item is explicitly stated only when it constitutes a change to the status indicated in EN 301 649 [16].

6.2 General class/service/interworking support

6.2.1 Class/service support

The following service classes and end-user services shall be supported by New Generation DECT data equipment.

Table 5: General class and service support

Item	Name of service	Reference	Support status	
			PT	FT
DPRS-G.1	DPRS Class 1	4.3.8 [16]	I	I
DPRS-G.2	DPRS Class 2	4.3.8 [16]	M	M
DPRS-G.3	Frame Relay (FREL)	4.3.9 and annex B [16]	M	M
DPRS-G.4	Character stream	4.3.9 and annex C [16]	I	I
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.2.2 Protocol interworking support

The following protocol interworking modes shall be supported by New Generation DECT data equipment.

Table 6: General service/interworking support

			Status	
Service	**Interworking**	**Reference**	**PT**	**FT**
DPRS-G.3, Frame Relay (FREL)		4.3.9 and annex B [16]	M	M
	DPRS-I.1, Ethernet	4.3.9 and B.4 [16]	M	M
	DPRS-I.2, Token Ring	4.3.9 and B.5 [16]	I	I
	DPRS-I.3, IP	4.3.9 and B.6 [16]	O	O
	DPRS-I.4, PPP	4.3.9 and B.7 [16]	I	I
	DPRS-I.5, Generic media encapsulation	4.3.9 and B.8 [16]	I	I
DPRS-G.4, Character stream		4.3.9 and annex C [16]	I	I
	DPRS-I.6, V.24	4.3.9 and C.4 [16]	I	I
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.3 Void

6.4 Physical layer (PHL) requirements

6.4.1 Physical layer (PHL) services

New Generation DECT data devices shall support the following Physical layer (PHL) services.

Table 7: Physical layer service support

Item	**Name of service**	**Reference**	**Support status**	
			PT	**FT**
DPRS-P.1	GFSK modulation	4.3.1 [16]	M	M
DPRS-P.2	π/2 DBPSK modulation	4.3.1 [16]	I	I
DPRS-P.3	π/4 QBPSK modulation	4.3.1 [16]	I	I
DPRS-P.4	π/8 D8PSK modulation	4.3.1 [16]	I	I
DPRS-P.5	16 QAM modulation	4.3.1 [16]	I	I
DPRS-P.6	64 QAM modulation	4.3.1 [16]	I	I
DPRS-P.13	Physical Packet P32	4.3.1 [16]	I	I
DPRS-P.14	Physical Packet P64	4.3.1 [16]	M	M
DPRS-P.15	Physical Packet P67	4.3.1 [16]	O	O
DPRS-P.16	Physical Packet P80	4.3.1 [16]	C71	C71
DPRS-P.17	General PHL	4.3.1 [16]	M	M
DPRS-P.18	Fast hopping radio	4.3.1 [16]	O	O
C71: IF NG-DECT-Cat.3 THEN M ELSE O.				
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.4.2 Modulation schemes

The following modulation schemes defined by EN 300 175-2 [2], annex D shall be supported.

Table 8: Allowed combinations of modulation schemes

Item	Modulation scheme	S-field	A-field	B + Z-field	Support status
	1a	GFSK	GFSK	GFSK	M
	1b	π/2-DBPSK	π/2-DBPSK	π/2-DBPSK	I
	2	π/2-DBPSK	π/2-DBPSK	π/4-DQPSK	I
	3	π/2-DBPSK	π/2-DBPSK	π/8-D8PSK	I
	5	π/2-DBPSK	π/2-DBPSK	16 QAM	I
	6	π/2-DBPSK	π/2-DBPSK	64 QAM	I

6.4.3 PHL service to procedure mapping

The PHL service to procedure mapping of EN 301 649 [16], clause 5.3 shall apply.

6.5 MAC layer requirements

6.5.1 MAC layer services

New Generation DECT data devices shall support the following MAC layer services:

Table 9: MAC service support

Item	Name of service	Reference	Support status	
			PT	FT
DPRS-M.1	General	4.3.2 [16]	M	M
DPRS-M.2	Non continuous broadcast	4.3.2 [16]	O	O
DPRS-M.3	Continuous broadcast	4.3.2 [16]	M	M
DPRS-M.4	Paging broadcast	4.3.2 [16]	M	M
DPRS-M.5	Advanced connections	4.3.2 [16]	M	M
DPRS-M.6	I_P_error_detection	4.3.2 [16]	M	M
DPRS-M.7	I_P_error_correction	4.3.2 [16]	O	O
DPRS-M.8	U-plane point-to-multipoint service	4.3.2 [16]	O	O
DPRS-M.9	C_S higher layer signalling	4.3.2 [16]	M	M
DPRS-M.10	C_F higher layer signalling	4.3.2 [16]	O	O
DPRS-M.11	Encryption activation	4.3.2 [16]	M	M
DPRS-M.12	Encryption deactivation	4.3.2 [16]	C93	C93
DPRS-M.13	Quality control	4.3.2 [16]	M	M
DPRS-M.14	Physical channel selection	4.3.2 [16]	M	M
DPRS-M.15	SARI support	4.3.2 [16]	M	O
DPRS-M.16	DPRS Bearer handover	4.3.2 [16]	M	M
DPRS-M.18	Connection handover	4.3.2 [16]	O	O
DPRS-M.19	G_F channel	4.3.2 [16]	C97	C97

Item	Name of service	Reference	Support status	
			PT	FT
DPRS-M.20	I_{PQ}_error_detection	4.3.2 [16]	C94	C94
DPRS-M.21	I_{PQ}_error_correction	4.3.2 [16]	O	O
DPRS-M.22	I_{P}_encoded protected	4.3.2 [16]	I	I
DPRS-M.23	I_{PF} channel	4.3.2 [16]	C97	C97
DPRS-M.24	Full slot	4.3.2 [16]	I	I
DPRS-M.25	Long slot 640	4.3.2 [16]	M	M
DPRS-M.26	Long slot 672	4.3.2 [16]	O	O
DPRS-M.27	Double slot	4.3.2 [16]	C94	C94
DPRS-M.28	Multibearer connections	4.3.2 [16]	C97	C97
DPRS-M.29	Asymmetric connections	4.3.2 [16]	C94	C94
C93: If DPRS-N.28 or DPRS-N.29 then M else I. C94: Status depending on system category. See table 3. For non categorized systems THEN O. C97: Status depending on system category. See table 3. For non categorized systems: IF M.29 THEN M, ELSE O.				
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.5.2 MAC service to procedure mapping

The MAC layer service to procedure mapping specified in EN 301 649 [16], clause 6.2 shall apply.

6.6 DLC layer

6.6.1 DLC layer services

New Generation DECT data devices shall support the following DLC layer services.

Table 10: DLC service status

			Status	
Item no.	Name of service	Reference	PT	FT
DPRS-D.1	LU10 Enhanced Frame RELay service (EFREL)	4.3.3 [16]	M	M
DPRS-D.2	FU10a	4.3.3 [16]	M	M
DPRS-D.3	FU10b	4.3.3 [16]	O	O
DPRS-D.4	FU10c	4.3.3 [16]	M	M
DPRS-D.5	Data Link Service (LAPC + Lc) class A service	4.3.3 [16]	M	M
DPRS-D.6	Data Link Service (LAPC + Lc) class U service	4.3.3 [16]	O	O
DPRS-D.7	Lc Frame delimiting and sequencing service	4.3.3 [16]	M	M
DPRS-D.8	Broadcast Lb service	4.3.3 [16]	M	M
DPRS-D.9	Inter-cell voluntary connection handover	4.3.3 [16]	O	O
DPRS-D.10	Connection modification	4.3.3 [16]	M	M
DPRS-D.11	Encryption activation	4.3.3 [16]	M	M
DPRS-D.12	Encryption deactivation	4.3.3 [16]	C101	C101
DPRS-D.13	Connectionless U-plane	4.3.3 [16]	O	O
C101: If DPRS-N.28 or DPRS-N.29 then M else I.				
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.6.2 DLC service to procedure mapping

The DLC layer service to procedure mapping specified in EN 301 649 [16], clause 7.2 shall apply.

6.7 NWK layer

6.7.1 General

The NWK layer provisions shall include the following entities:

- Call Control (CC).
- Mobility Management (MM).
- Link Control Entity (LCE).
- ConnectionLess Message Service (CLMS).

New Generation DECT data equipment is based on DPRS Class 2 (see clause 4.3.8 [16]), and therefore requires a NWK layer.

6.7.2 NWK features

New Generation DECT data devices shall support the following NWK layer features:

Table 11: NWK features status

Feature supported				
Features			Status	
Item no.	Name of feature	Reference	PT	FT
DPRS-N.1	Outgoing call	4.3.4 [16]	O	O
DPRS-N.2	Off hook	4.3.4 [16]	M	M
DPRS-N.3	On hook (full release)	4.3.4 [16]	M	M
DPRS-N.4	Dialled digits (basic)	4.3.4 [16]	O	O
DPRS-N.5	Register recall	4.3.4 [16]	O	O
DPRS-N.6	Go to DTMF signalling (defined tone length)	4.3.4 [16]	O	O
DPRS-N.7	Pause (dialling pause)	4.3.4 [16]	O	O
DPRS-N.8	Incoming call	4.3.4 [16]	O	O
DPRS-N.9	Authentication of PP	4.3.4 [16]	M	M
DPRS-N.10	Authentication of user	4.3.4 [16]	O	O
DPRS-N.11	Location registration	4.3.4 [16]	M	O
DPRS-N.12	On air key allocation	4.3.4 [16]	M	O
DPRS-N.13	Identification of PP	4.3.4 [16]	O	O
DPRS-N.14	Service class indication/assignment	4.3.4 [16]	O	O
DPRS-N.15	Alerting	4.3.4 [16]	O	O
DPRS-N.16	ZAP	4.3.4 [16]	O	O
DPRS-N.17	Encryption activation FT initiated	4.3.4 [16]	M	M
DPRS-N.18	Subscription registration procedure on-air	4.3.4 [16]	M	M
DPRS-N.19	Link control	4.3.4 [16]	M	M
DPRS-N.20	Terminate access rights FT initiated	4.3.4 [16]	M	O
DPRS-N.21	Partial release	4.3.4 [16]	O	O
DPRS-N.22	Go to DTMF (infinite tone length)	4.3.4 [16]	O	O
DPRS-N.23	Go to Pulse	4.3.4 [16]	O	O
DPRS-N.24	Signalling of display characters	4.3.4 [16]	O	O
DPRS-N.25	Display control characters	4.3.4 [16]	O	O
DPRS-N.26	Authentication of FT	4.3.4 [16]	O	O
DPRS-N.27	Encryption activation PT initiated	4.3.4 [16]	O	O
DPRS-N.28	Encryption deactivation FT initiated	4.3.4 [16]	O	O

Feature supported				
Features			Status	
Item no.	Name of feature	Reference	PT	FT
DPRS-N.29	Encryption deactivation PT initiated	4.3.4 [16]	O	O
DPRS-N.30	Calling Line Identification Presentation (CLIP)	4.3.4 [16]	O	O
DPRS-N.31	Internal call	4.3.4 [16]	O	O
DPRS-N.32	Service call	4.3.4 [16]	O	O
DPRS-N.33	Dynamic parameters allocation	4.3.4 [16]	M	M
DPRS-N.34	Service Negotiation	4.3.4 [16]	M	M
DPRS-N.35	In call service change	4.3.4 [16]	O	O
DPRS-N.36	NWK layer management	4.3.4 [16]	M	M
DPRS-N.37	Identity assignment	4.3.4 [16]	O	O
DPRS-N.38	DECT External handover	5.1 [28]	O	O
DPRS-N.39	Message Waiting Indication	5.1 [28]	O	O
DPRS-N.40	Detach	5.1 [28]	O	O
DPRS-N.41	Periodic location registration	5.1 [28]	O	O
DPRS-N.42	On-air modification of user parameters	5.1 [28]	O	O
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.7.3 NWK features to procedures mapping

The NWK layer feature to procedure mapping specified in EN 301 649 [16], clause 8.2 shall apply.

6.8 Application features

6.8.1 Application features

New Generation DECT data devices shall support the following application features.

Table 12: Application features status

Feature supported			Status	
Item no.	Name of feature	Reference	PT	FT
DPRS-A.1	AC_bitstring_mapping	4.3.5 [16]	M	M
DPRS-A.2	Multiple subscription registration	4.3.5 [16]	O	N/A
DPRS-A.3	Manual entry of the PARK	4.3.5 [16]	O	N/A
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.8.2 Application features to procedures mapping

The Application feature to procedure mapping specified in EN 301 649 [16], clause 8.4 shall apply.

6.9 Distributed communications

The distributed communication mode (PP-PP communication) is not part of the present document.

Table 13: Distributed communication requirements

Feature supported			Status	
Feature	Name of feature	Ref.	PT	FT
DPRS-DC.1	Distributed Communication	4.3.6 [16]	I	I
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.10 Management Entity (ME)

6.10.1 Management Entity (ME) operation modes

In regard to the New Generation DECT data equipment, the following ME operation modes from EN 301 649 [16], clause 9.1 shall apply:

Table 14: Management Entity Requirements

Feature supported			Status	
Feature	**Name of feature**	**Ref.**	**PT**	**FT**
DPRS-ME.1	Class 1 management	4.3.7 [16]	I	I
DPRS-ME.2	Class 2 management	4.3.7 [16]	M	M
NOTE: The reference column refers to the relevant clause in the referenced document.				

6.10.2 Management Entity (ME) mode to procedures mapping

In regard to the New Generation DECT data equipment, the operation mode to procedure mapping specified in EN 301 649 [16], clause 9.1.2 shall apply.

7 Profile specific procedures description

7.1 General

This clause identifies differences and additions to the feature/service/procedure definitions and descriptions as specified in EN 301 649 [16], DPRS.

7.2 Management Entity (ME) procedures

No differences/additions - the procedures as specified in EN 301 649 [16], clauses 9 and A.1 shall apply.

7.3 MAC layer procedures

No differences/additions - the procedures as specified in EN 301 649 [16], clause 10 shall apply.

7.4 DLC layer procedures

No differences/additions - the procedures as specified in EN 301 649 [16], clause 11 shall apply.

7.5 NWK layer procedures

The procedures as specified in EN 301 649 [16], clause 12 shall apply with the modifications listed in the present clause.

7.5.1 Terminal capability indication

The contents of the <Terminal Capability> information elements shall be based on the requirements of EN 301 649 [16], clause 12.3.

For the purpose of this ASAP only the status of the fields and specific values implementation that **has changed** is indicated in this clause. For the rest whatever specified in EN 301 649 [16] shall apply.

Table 15: Values used within the <<TERMINAL CAPABILITY>> information element

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Terminal capability>>			
	<ext4>	0	
	<Profile indicator_1>	"x 1 x x x x"B	OUT OF SCOPE (DPRS Stream support)
		"1 x x x x x"B	OPTIONAL (Asymmetric bearer)
	<ext4a>	0	
	<Profile indicator_2>	"x x x x x 1"B	MANDATORY (DPRS FREL support)
	<ext4b>	0	
	<Profile indicator_3>	"x 1 x x x x"B	MANDATORY (Ethernet support)
		"1 x x x x x"B	OUT OF SCOPE (Token Ring support)
	<ext4c>	0	
	<Profile indicator_4>	"x x x x x 1"B	OPTIONAL (IP support)
		"x x x x 1 x"B	OUT OF SCOPE (PPP support)
		"x x x 1 x x"B	OUT OF SCOPE (V.24 support)
		"x x 1 x x x"B	OPTIONAL (C_F supported)
		"x 1 x x x x"B	OPTIONAL (I_{PQ} services supported)
	< ext4d >	0	
	< ext4e >	0	
		"x 1 x x x x"B	C151 (E+U-type mux and channel I_{PF} basic procedures supported)
		"1 x x x x x"B	OPTIONAL (Channel I_{PF} advanced procedures supported)
		"1 x x x x x"B	OPTIONAL (Channel SI_{PF} supported)
	< ext4f >	1	
	<Packet data category>	[0, 1, 2, 3]	MANDATORY (NG-DECT Packet Data Category)
		"1 x x x x x"B	C152 (Channel G_F supported)
C151: IF DPRS-M.23 THEN MANDATORY ELSE OPTIONAL C152: IF DPRS-M.19 THEN MANDATORY ELSE OPTIONAL			

7.5.2 Call resources/parameters negotiation

The contents of the messages applicable to this procedure shall be based on the requirements of the EN 301 649 [16], clause 12.5.

For the purpose of this ASAP only the status of the fields and specific values implementation that **has changed** is indicated in this clause. For the rest whatever specified in EN 301 649 [16] shall apply.

Table 16: Values used within the {CC-SETUP} message

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<IWU attributes>>			
	<Profile>	00001	OUT OF SCOPE (Stream support)
		00000	MANDATORY (FREL support)
	<Profile Subtype>	0000	C161 (Ethernet (WLAN)
		1000	OUT OF SCOPE (Interworking to V.24 circuits (RS232))
		0001	OUT OF SCOPE (ISO 8802-5 (clause B.5))
		0010	C161 (Internet Protocol (IP) (clause B.6 (IETF RFC 791 [19]))
		0100	OUT OF SCOPE (Point-to-Point Protocol (clause B.7 (IETF RFC 1661))
C161: One of them shall be used			

7.5.3 IWU-attributes change

The contents of the messages applicable to this procedure shall be based on the requirements of the EN 301 649 [16], clause 12.7.

For the purpose of this ASAP only the status of the fields and specific values implementation that **has changed** is indicated in this clause. For the rest whatever specified in EN 301 649 [16] shall apply.

Table 17: Values used within the {CC-SERVICE-CHANGE} message

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<IWU attributes>>			
	<Profile>	00001	OUT OF SCOPE (Stream support)
		00000	MANDATORY (FREL support)
	<Profile Subtype>	0000	C171 (Ethernet (WLAN)
		1000	OUT OF SCOPE (Interworking to V.24 circuits (RS232)
		0001	OUT OF SCOPE (ISO 8802-5 (clause B.5))
		0010	C171 (Internet Protocol (IP) (clause B.6 (IETF RFC 791 [19]))
		0100	OUT OF SCOPE (Point-to-Point Protocol (clause B.7 (IETF RFC 1661))
C171: One of them shall be used			

7.5.4 Collective and group ringing

The contents of the messages applicable to this procedure shall be based on the requirements of the EN 301 649 [16], clause 12.13.

For the purpose of this ASAP only the status of the fields and specific values implementation that **has changed** is indicated in this clause. For the rest whatever specified in EN 301 649 [16], shall apply.

Table 18: Values used within the {LCE-REQUEST-PAGE} message

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
	<IWU identification>	0001	C181 (Ethernet)
		0010	OUT OF SCOPE (Token Ring)
		0011	C181 (IP)
		0100	OUT OF SCOPE (PPP)
		0101	OUT OF SCOPE (V.24)
C181: One of them shall be used			

7.5.5 Broadcast attributes management

The contents of the messages applicable to this procedure shall be based on the requirements of the EN 301 649 [16], clause 12.16.

For the purpose of this ASAP only the status of the fields and specific values implementation that **has changed** is indicated in this clause. For the rest whatever specified in EN 301 649 [16], shall apply.

Table 19: Extended higher layer capabilities interpretation by the PP

BIT Number	Attribute	Value	Note
a29	Ethernet	1	MANDATORY
a30	Token Ring	x	OUT OF SCOPE
a31	IP	1	OPTIONAL
a32	PPP	x	OUT OF SCOPE
a33	V.24	x	OUT OF SCOPE
a45	DPRS Stream support	x	OUT OF SCOPE
a46	DPRS FREL support	1	MANDATORY

Table 20: Extended higher layer capabilities part 2 interpretation by the PP

BIT Number	Attribute	Value	Note
< a_{25} - a_{28} >	NG-DECT Packet Data Category	[0, 1, 2, 3]	MANDATORY (NG-DECT Packet Data Category)

7.6 Interworking requirements

No differences/additions - the procedures as specified in EN 301 649 [16], clauses B.1 to B.4 and B.6 shall apply.

7.7 Physical layer procedures

No differences/additions - the procedures as specified in EN 301 649 [16], clause 5 shall apply.

Annex A (normative): Amendments to other DECT specifications

A.1 Amendments to EN 301 649 (DECT Packet Radio Service)

The following amendments to EN 301 649 [16] shall apply for the purpose of the present document.

A.1.1 Scope (add to clause 1 of EN 301 649)

The following text shall be added to clause 1 "Scope" of EN 301 649 [16]:

1 Scope

The present document includes New Generation DECT, a further development of the DECT standard introducing wideband speech, improved data services, new slot types and other technical enhancements.

A.1.2 References (add to clause 1 of EN 301 649)

The following entries shall be added to clause 2 "References" of EN 301 649 [16]:

[x] ETSI EN 301 406: "Digital Enhanced Cordless Telecommunications (DECT); Harmonized EN for Digital Enhanced Cordless Telecommunications (DECT) covering essential requirements under article 3.2 of the R&TTE Directive; Generic radio".

[x] IETF RFC 2460: " Internet Protocol version 6".

[x] ETSI EN 300 176-1: "Digital Enhanced Cordless Telecommunications (DECT); Approval test specification; Part 1: Radio".

[x] ETSI EN 300 176-2: "Digital Enhanced Cordless Telecommunications (DECT); Approval test specification; Part 2: Speech".

The complete clause 2 of EN 301 649 [16] shall be as follows:

2 References

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

[9] ETSI EN 300 824: "Digital Enhanced Cordless Telecommunications (DECT); Cordless Terminal Mobility (CTM); CTM Access Profile (CAP)".

[10] ISO/IEC 8802-3: "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".

[11] ISO/IEC 8802-5: "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 5: Token ring access method and physical layer specifications".

[12] IETF RFC 791 (1981): "Internet Protocol".

[13] IETF RFC 1661 (1994): "The Point-to-Point Protocol (PPP)".

[14] IETF RFC 1662 (1994): "PPP in HDLC-like Framing".

[15] ITU-T Recommendation V.24 (2000): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[16] ISO/IEC 9646-7: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[17] IETF RFC 768: "User Datagram Protocol".

[18] IETF RFC 793: "Transmission Control Protocol".

[19] IETF RFC 1939: "Post Office Protocol - Version 3".

[20] IETF RFC 2045: "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies".

[21] IETF RFC 2046: "Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types".

[22] IETF RFC 2049: "Multipurpose Internet Mail Extensions (MIME) Part Five: Conformance Criteria and Examples".

[23] IETF RFC 2326: "Real Time Streaming Protocol (RTSP)".

[24] IETF RFC 2616: "Hypertext Transfer Protocol -- HTTP/1.1".

[25] IETF RFC 2633: "S/MIME Version 3 Message Specification".

[26] IETF RFC 2821: "Simple Mail Transfer Protocol".

[27] IETF RFC 2822: "Internet Message Format".

[28] IETF RFC 3261: "SIP: Session Initiation Protocol".

[29] IETF RFC 3232: "Assigned Numbers".

[30] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".

[31] ETSI EN 301 406: "Digital Enhanced Cordless Telecommunications (DECT); Harmonized EN for Digital Enhanced Cordless Telecommunications (DECT) covering essential requirements under article 3.2 of the R&TTE Directive; Generic radio".

[32] ETSI TS 102 342: "Digital Enhanced Cordless Telecommunications (DECT); Cordless Multimedia Communication System; Open Data Access Profile (ODAP)".

[33] ETSI TS 102 265: "Digital Enhanced Cordless Telecommunications (DECT); DECT Access to IP networks".

[34] IETF RFC 2460 (1998): " Internet Protocol version 6".

[35] ETSI EN 300 176-1: "Digital Enhanced Cordless Telecommunications (DECT); Approval test specification; Part 1: Radio".

[36] ETSI EN 300 176-2: "Digital Enhanced Cordless Telecommunications (DECT); Approval test specification; Part 2: Speech".

A.1.3 Definitions and abbreviations

A.1.3.1 Definitions (add to clause 3.1 of EN 301 649)

The following entry shall be added to clause 3.1 of EN 301 649 [16]:

3.1 Definitions

New Generation DECT: a further development of the DECT standard introducing wideband speech, improved data services, new slot types and other technical enhancements.

A.1.3.2 Definitions (modify clause 3.1 of EN 301 649)

The following entry in clause 3.1 of EN 301 649 [16] shall be modified as follows:

Virtual Circuit: any packet-mode user connection able to transport the user packet data protocol. Each Virtual Circuit provides an independent and isolated context for each subscriber data session.

NOTE: A Virtual Circuit in DPRS is equivalent to what in GPRS is called PDP context.

A.1.3.3 Abbreviations (add to clause 3.3 of EN 301 649)

The following entry shall be added to clause 3.3 of EN 301 649 [16]:

3.3 Abbreviations

FTP	File Transfer Protocol
DHCP	Dynamic Host Configuration Protocol
LLC	Logical Link Control
PSTN	Public Switched Telephone Network
PABX	Private Automatic Branch eXchange
NAT	Network Address Translator
PAT	Port Address Translator
SI_{PF}	Higher layer connectionless channel in E+U mode slots
AI/F	Air InterFace
LU10	LAP-U service 10

NOTE: See EN 300 175-4[4].

FU10 Frame structure for U-plane service 10

NOTE: See EN 300 175-4[4].

ARC	Access Rights Class
ARD	Access Rights Details
BCD	Binary Coded Decimal
CI	Common Interface
E+U	Mode of the B-field E/U multiplexer carrying U-plane data and signalling
GSM	Global System Mobile

GPRS	General Packet Radio Service
HL	Higher Layer
HLFPI	Higher Layer Fixed Part Information
HLI	Higher Layer Information
IMS	IP Multimedia Subsystem
I_{PF}	higher layer U-plane channel in E+U mode slots
NG-DECT	New Generation DECT
NTP	Normal Transmit Power
PDP	Packet Data Protocol
UMTS	Universal Mobile Telecommunication System

A.1.4 Description of services

A.1.4.1 Service Objectives (modify clause 4.2 of EN 301 649)

Clause 4.2 of EN 301 649 [16] shall be modified as follows:

4 Description of services

4.2 Service objectives

4.2.1 Characteristics of the DECT packet data service

The DECT packet data service provides an efficient transparent transport of IP and upper layers with the following characteristics:

Packet mode: the service provided by DECT uses only the air interface resources when there are data to be transported, allowing re-use of the spectrum by statistical multiplexation between multiple users and systems.

Connection Oriented: the service provided by DECT provides controlled and isolated logical paths between ends –Virtual Circuits- that can be permanent or switched. The fact that DECT provides a connection-oriented service does not introduce any kind of restriction when transporting connectionless protocols (like IP), and provides important advantages regarding to the security and mobility management. It is also possible to have in the same DECT system several data network completely isolated between them.

Complete mobility management: DECT provides complete mobility management (handover, roaming) like a cellular system.

Security: DECT provides serious authentication and ciphering exactly as a cellular system (i.e. GSM). Ciphering is performed at MAC layer using dedicated Hw and does not consume application processing power.

Asymmetric connections: DPRS makes use of the TDD characteristic of DECT to revert the transmission direction of the bearers, doubling the transmission speed of the system. This process is performed automatically and continuously by the system in order to optimize transmission speed. There is no a pre-set direction of transmission. The system could move from maximum speed downlink to maximum speed uplink according to the data to be transmitted.

High Speed: DECT offers transmission speeds of up to 5 068 Mbit/s asymmetric or 2 772 Mbit/s + 2 772 Mbit/s symmetric with the higher modulation mode (64 QAM modulation). With the simpler GFSK modulation schema is possible to 845 kbit/s asymmetric or 460 kbit/s + 460 kbit/s symmetric.

The capacities offered by DECT are similar to a cellular communication system like GPRS or UMTS.

Table 1: Summary of service capabilities

Service	Class 1	Class 2
Point-to-point protected data transfer PP-FP with ARQ	YES	YES
Point-to-point protected data transfer FP-PP with ARQ	YES	YES
Point-to-multi-point data transfer FP-PP	OPTIONAL	OPTIONAL
Point-to-point data transfer PP-PP (distributed communication)	OPTIONAL	OPTIONAL
Authentication	-	YES
Encryption	YES	YES
Permanent Virtual Circuit (PVC) operation	YES	YES
Virtual Call (VC) operation	-	YES
Intra-cell bearer handover (see note)	YES	YES
Inter-cell bearer handover (see note)	-	YES
Inter-cell connection handover (for multicell systems)	-	OPTIONAL
Inter-cell external handover	-	OPTIONAL
NOTE: Bearer handover capability may be provided by the bearer replacement procedure.		

4.2.2 Performance Objectives

The DPRS has the performance and service objectives given in the following tables. Due to the nature of radio transmission and packet data in general, figures could be lower in case of bad radio links, or spectrum usage competition from other system.

Table 2: Performance objectives

Performance	Value	Notes
Maximum supported SDU size for Frame Relay services (see annex B)	≥ 1 528 octets	See note 1
Maximum supported SDU size for character oriented services (see annex C)	≥ 29 octets	
Maximum one-way delay	Down to 50 ms configurable	See note 2
Maximum sustainable unidirectional throughput (per slot), GFSK 2-level modulation.	76,8 kbit/s net	See notes 3, and 4
Maximum sustainable unidirectional throughput (single-transceiver system), GFSK 2-level modulation.	844,8 kbit/s net	See notes 2, 3, and 4
Maximum sustainable full bi-directional throughput (single-transceiver system), GFSK 2-level modulation	460,8 kbit/s net	See notes 2, 3, and 4
Maximum sustainable unidirectional throughput (per slot), high-level modulation.	460,8 kbit/s net	See notes 3, 4, and 5
Maximum sustainable unidirectional throughput (single-transceiver system), high-level modulation.	5,0688 Mbit/s net	See notes 2, 3, 4, and 5
Maximum sustainable full bi-directional throughput (single-transceiver system), high level modulation	2,7648 Mbit/s net	See notes 2, 3, 4, and 5
Maximum system throughput in a multi-transceiver system	50 Mbit/s (10 parallel unidirectional connections in a DCDL-net)	See notes 3, 4, and 5
Total user bandwidth available to be shared between all transmitters in an area (assuming 10 frequencies), GFSK 2-level modulation	9,216 Mbit/s (10 frequencies)	See notes 3, and 4
Total user bandwidth available to be shared between all transmitters in an area (assuming 10 frequencies), high level modulation	55,296 Mbit/s (10 frequencies)	See notes 3, 4, and 5
Establishment of PT to FT physical connection (average)	< 50 ms	See note 2
Establishment of FT to PT physical connection (average)	< 50 ms	See note 2

Performance	Value	Notes
Undetected bit error ratio	$< 10^{-10}$	
Uncorrected bit error ratio (for air interface BER 10^{-3} and delay = 100 ms)	$< 10^{-7}$	
NOTE 1: This is the MTU (Maximum Transmission Unit). This figure is compatible with the characteristics of IEEE 802.3 and IP.		
NOTE 2: Figures could be impossible to achieve in case of competition at the air i/f between several terminals or systems.		
NOTE 3: Net user data rate available for high layer protocols without considering the DECT overheads.		
NOTE 4: Assuming Double Slot and MAC service I_{PQ}		
NOTE 5: Using 64 QAM modulation.		
NOTE 6: Assuming the 10 frequencies available in the original DECT frequency spectrum 1 880 MHz to 1 900 MHz. Additional frequencies are available in several countries at 1 900 MHz to 1 920 MHz, 1 910 MHz to 1 930 MHz, and ISM band.		

4.2.3 DPRS U-plane Services

DPRS provides a set of U-plane protocol transport capabilities. Each of them, are defined in an annex of the specification, which, by historic reasons, are called "Interworking" specifications. The present edition of DPRS supports the following U-plane interworking modes:

Ethernet: provides the transport of IEEE 802.3 [18] or Ethernet LAN protocols.

Token Ring: provides the transport of IEEE 802.5, Token Ring protocol.

IP: provides the transport of Internet Protocol v4 [12] or v6 [34] protocols.

PPP: provides the transport of Point to Point Protocol [13]

Generic media encapsulation: provides a generic transport for application protocols (such as SMTP, HTTP, POP, SIP, etc) directly transported over DECT.

V.24: provides the emulation of a V.24 asynchronous serial line.

The DPRS Interworking types can be classified in two classes: Frame Relay or Character stream services.

Frame Relay Service: it is a packet transport service intended for transporting frames of any data protocol.

Character stream service: it is packet transport service intended for transporting streams of octets.

The Interworking type V.24 is a character stream service. All others are Frame Relay services.

The Frame Relay service is intended for transporting frames of any data protocol. The service provides packet delimiters. The character stream service is intended for transporting streams of octets. It provides a Packet Assembler and Disassembler (PAD).

The different Protocol interworking services are defined in annex B and C of the present document.

4.2.4 DPRS System Categories

DPRS systems are classified in categories depending on the data performance objectives of the system. Each category has specific requirements, additional to the general DPRS features and services. Table 4 defines the mandatory requirements for each DPRS category.

The declaration of DPRS category is optional. It is possible to have DPRS systems not belonging to any data category. Such systems are called "no categorized" systems. However, the alignment to one or several DPRS categories is advisable in order to improve interoperability.

The following categories are defined:

Category 1: low-end systems providing a symmetric data rate of 50 kbit/s over a single bearer, using long slot

Category 2: mid-end multibearer systems providing a data rate up to 500 kbit/s supporting symmetric and asymmetric connections

Category 3: high-end systems providing a data rate up to 844 kbit/s supporting symmetric and asymmetric connections

Table 4 defines the mandatory features and services for each DPRS category. Such mandatory requirements should be understood as additional to the base DPRS requirements that are applicable to all DPRS systems.

DPRS Categories are back compatible in the following way:

- DPRS Category 2 systems shall support also Category 1.
- DPRS Category 3 systems shall support also Category 1 and 2.

When FP and PP do not have the same Category, the features of the highest category supported by both sides shall be used.

A.1.4.2 Feature and service definitions (modify clause 4.3 of EN 301 649)

Clause 4.3 of EN 301 649 [16] shall be modified as follows:

4.3 Service and feature definitions

4.3.1 PHL service definitions

GFSK modulation [DPRS-P.1]: 2 level Gaussian frequency Shift Key (GFSK) modulation as defined by EN 300 175-2 [2] clause 5.

π/2 DBPSK modulation [DPRS-P.2]: 2 level π/2 DBPSK modulation as defined by EN 300 175-2 [2] annex D.1.

π/4 QBPSK modulation [DPRS-P.3]: 4 level π/4 DQPSK modulation as defined by EN 300 175-2 [2] annex D.2.

π/8 D8PSK modulation [DPRS-P.4]: 8 level π/8 D8PSK modulation as defined by EN 300 175-2 [2] annex D.3.

16 QAM modulation [DPRS-P.5]: 16 level QAM modulation as defined by EN 300 175-2 [2] annex D.4.

64 QAM modulation [DPRS-P.6]: 64 level QAM modulation as defined by EN 300 175-2 [2] annex D.5.

Physical Packet P32 [DPRS-P.13]: physical packet P32 (full slot) as defined by EN 300 175-2 [2] clause 4.4.2.

Physical Packet P64 [DPRS-P.14]: variable capacity Physical packet P00j as defined by EN 300 175-2 [2] clause 4.4.3, with j = 640.

Physical Packet P67 [DPRS-P.15]: variable capacity Physical packet P00j as defined by EN 300 175-2 [2] clause 4.4.3, with j = 672.

Physical Packet P80 [DPRS-.P.16]: physical packet P80 (double slot) as defined by EN 300 175-2 [2] clause 4.4.4.

General PHL [DPRS-P.18]: general physical layer procedures applicable to all DPRS terminals.

Fast hopping radio [DPRS-P.18]: radio transceiver able to perform frequency change during the interval between two consecutive Physical Packets P32 (full slot) or P80 (double slot).

4.3.2 MAC service definitions

general [DPRS-M.1]: set of basic requirements regarding data formats, multiplexing, CRC usage, scanning and locking, which are prerequisites to communication between peer MAC entities.

non-continuous broadcast [DPRS-M.2]: simplex service from FT to PT which allows PTs to acquire more Q channel information (i.e. TARI) and to request a new dummy bearer.

continuous broadcast [DPRS-M.3]: simplex service from FT to PT whereby the FT maintains at least one bearer with continuous transmissions. The PT can use the information carried in this bearer to lock to the FT and to obtain knowledge about the FT (GAP-M.2).

paging broadcast [DPRS-M.4]: service whereby the identities of specific PTs can be broadcast by the FT. This service is normally used by the FT to request a specific PT to set up a link to the FT (GAP-M.3).

advanced connection [DPRS-M.5]: service providing connection between FT and PT consisting of one or more duplex and zero or more double simplex bearers. Advanced connections have a common connection number, called Exchanged Connection Number (ECN) which is assigned by the ME. Therefore, more than one advanced connection may exist between a PT and one FT. The service includes the means for setting-up and releasing the required bearer(s).

U-plane point-to-multipoint service [DPRS-M.8]: simplex service from FT to PT whereby the FT transfers a single SDU of U-plane data from one source point to one (or more) destination points. The service uses the SI_P logical channel: the SI_P information is protected by MAC layer error detection procedure based on 16 bit CRCS.

C_S higher layer signalling [DPRS-M.9]: low rate connection oriented data service with ARQ using the C_S channel to transfer higher layer signalling data (GAP-M.5).

C_F higher layer signalling [DPRS-M.10]: high rate connection oriented data service with ARQ using the C_F channel to transfer higher layer signalling data.

encryption activation [DPRS-M.11]: service providing means for enabling the encryption whereby on demand all higher layer data is transferred across the DECT air interface in an encrypted form. Always initiated by the PT. A connection release automatically disables ciphering (GAP-M.7).

encryption deactivation [DPRS-M.12]: service providing means for disabling the encryption whereby on demand all higher layer data is transferred across the DECT air interface in an encrypted form. A connection release automatically disables ciphering (GAP-M.14).

quality control [DPRS-M.13]: provides means for monitoring and controlling the radio link quality (GAP-M.6).

physical channel selection [DPRS-M.14]: defines the policy for the dynamic selection of a channel, caused by the fact that an old one has to be changed or a new one is needed. Detection of bad quality on the physical channel in use (i.e. due to weak signals or interference), detection of a RFP with a stronger signal than the one of the own RFP, detection of local congestion are all criteria that can be used to select the channel.

Secondary Access Rights Identity (SARI) support [DPRS-M.15]: ability to support, in addition to the primary Access Rights Identity (ARI), secondary ARIs that the FT broadcasts less frequently than PARIs. These may be used to reflect an inter-operators agreement allowing a portable to access more than one operator or services through FT (GAP-M.13).

DPRS bearer handover [DPRS-M.16]: bearer quality maintenance procedure by setting up a replacement bearer in the same cluster. Opposing to conventional voice channel handover, there is no the requirement of using identical LBN and maintaining identical data on both bearers. Furthermore, the old bearer can be released, before or after the setup of the new one.

[DPRS-M.17]: void.

connection handover [DPRS-M.18]: connection quality maintenance by setting up replacement bearers in the same or a different cluster, each with identical LBN and maintaining identical data bearers with identical LBN. Subsequently the old bearers are released.

G_F channel [DPRS-M.19]: fast simplex channel that is used to provide control of U-plane entities. For example it is used to carry acknowledgements for asymmetric connections.

I_P_error_detection MAC service type [DPRS.M.6]: I_P_ error_detection symmetric or asymmetric service as defined in EN 300 175-5 [3] clauses 5.6.2.1 (type 3: I_P_ error_detection symmetric) and 5.6.2.2. (type 7: I_P_ error_detection asymmetric) with multi-subfield protected B-field as defined in [3] clause 6.2.1.3.3.

$I_{P_}$error_correction MAC service type [DPRS.M.7]: $I_{P\_}$ error_correction symmetric or asymmetric service as defined in EN 300 175-5 [3] clauses 5.6.2.1 (type 4: $I_{P\_}$ error_correction symmetric) and 5.6.2.2. (type 8: $I_{P\_}$ error_correction asymmetric) with multi-subfield protected B-field as defined in [3] clause 6.2.1.3.3 and Mod-2-protected channel operation as defined by [3] clause 10.8.2.

$I_{PQ_}$error_detection MAC service type [DPRS.M.20]: $I_{PQ\_}$ error_detection symmetric or asymmetric service as defined in EN 300 175-5 [3] clauses 5.6.2.1 (type 3: $I_{P\_}$ error_detection symmetric) and 5.6.2.2. (type 7: $I_{P\_}$ error_detection asymmetric) with single-subfield protected B-field as defined in [3] clause 6.2.1.3.4.

$I_{PQ_}$error_correction MAC service type [DPRS.M.21]: $I_{PQ\_}$ error_correction symmetric or asymmetric service as defined in EN 300 175-5 [3] clauses 5.6.2.1 (type 4: $I_{P\_}$ error_correction symmetric) and 5.6.2.2. (type 8: $I_{P\_}$ error_correction asymmetric) with single-subfield protected B-field as defined in [3] clause 6.2.1.3.4 and Mod-2-protected channel operation as defined by [3] clause 10.8.2.

$I_{P_}$encoded protected MAC service type [DPRS.M.22]: $I_{P\_}$ encoded protected symmetric or asymmetric service as defined in EN 300 175-5 [3] clauses 5.6.2.1 (type 5: $I_{P\_}$ encoded protected symmetric), 5.6.2.2. (type 9: $I_{P\_}$ encoded protected asymmetric) and annex I.

I_{PF} channel [DPRS-M.23]: simplex channel used to transmit I_P data multiplexed in the same bearer with MAC signalling and G_F channel data. Also known as E+U mux mode. Defined in EN 300 175-3 [3] clause 10.8.4.

Full slot [DPRS-M.24]: support of the physical packet P32 and appropriate D-field mapping according to modulation type (D32a for GFSK modulation).

Long slot 640 [DPRS-M.25]: support of the physical packet P00j with j=640 and appropriate D-field mapping according to modulation type (D64a for GFSK modulation).

Long slot 672 [DPRS-M.26]: support of the physical packet P00j with j=672 and appropriate D-field mapping according to modulation type (D67a for GFSK modulation).

Double slot [DPRS-M.27]: support of the physical packet P80 and appropriate D-field mapping according to modulation type (D80a for GFSK modulation).

Multibearer connections [DPRS-M.28]: support of multibearer connections using more than one bearer.

Asymmetric connections [DPRS-M.29]: support of asymmetric connections using double simplex bearers, and the asymmetric variant of the MAC service type (types 7, 8 and 9) as defined in EN 300 175-3 [3] clause 5.6.2.2.

4.3.3 DLC service definitions

LU10 Enhanced Frame RELay service (EFREL) [DPRS-D.1]: an enhanced frame relay service accessed through the LU10 SAP. The LU10 shall operate on a generic field of user data that shall be transferred into and out of the DLC U-plane as a single SDU. This SDU is assumed to contain one external frame, but the operation of LU10 shall be independent of the actual contents of the SDU. LU10 shall provide mechanisms that offer reliable transport of the generic SDUs, and that preserve the SDU boundaries.

FU10a [DPRS-D.2]: offers a defined fixed length frame structure and buffering functions for transmission of U-plane data to the MAC layer (at the transmit side) or accepts data from the MAC layer (at the receiving side) on demand and with minimum delay. Frame type FU10a is used for the forward path of unidirectional links.

FU10b [DPRS-D.3]: offers a defined fixed length frame structure and buffering functions for transmission of higher layer U-plane control data from the DLC to the MAC layer (at the transmit side) or accepts data from the MAC layer (at the receiving side) on demand and with minimum delay. Only be used for symmetrical connections using bi-directional links.

FU10c [DPRS-D.4]: offers a defined fixed length frame structure and buffering functions for transmission of higher layer U-plane control data from the DLC to the MAC layer (at the transmit side) or accepts data from the MAC layer (at the receiving side) on demand and with minimum delay. Used to carry acknowledgements or negative acknowledgement for connections. Frame type FU10c is used for the backward control path of unidirectional links: it contains a list of receive sequence numbers for the forward link.

Data Link Service (LAPC + Lc) class A service [DPRS-D.5]: single frame acknowledged C-plane data link service providing a data link between one FT and one PT. The higher layer information is segmented (if necessary) and transmitted in numbered frames. The Lc service, upon which LAPC is defined, provides frame delimiting, transparency and frame synchronization (GAP-D.1).

Data Link Service (LAPC + Lc) class U service [DPRS-D.6]: unacknowledged C-plane data link service providing a data link between one FT and one or more PTs. The higher layer information is segmented (if necessary) and transmitted in unnumbered frames. The Lc service, upon which LAPC is defined, provides frame delimiting, transparency and frame synchronization, but no error recovery is defined.

Lc Service [DPRS-D.7]: service providing channel dependant fragmentation, recombination, frame synchronization and frame delimiting transparency. Fragmentation is obtained by means of dividing a LAPC data unit into more than one service data units for delivery to the MAC layer C logical channel, whilst recombination is obtained by means of joining several service units received from the MAC layer C logical channel into a LAPC data unit. Allows the LLME to select the logical channel for Lc operation on a frame-by-frame basis.

broadcast Lb service [DPRS-D.8]: simplex point-to-multipoint transmission using simple fixed length DLC frames providing a restricted broadcast service in direction FP to PP(s) (GAP-D.3).

intercell voluntary connection handover [DPRS-D.9]: internal handover process provided and initiated by the DLC layer (as a result of a particular policy, implementers dependent, application on link management. E.g. continued poor quality of service from the MAC layer), whereby one set of DLC entities (C-plane and U-plane) can re-route data from one MAC connection to a second new MAC connection not in the domain of the same cell, while maintaining the service provided to the NWK layer (GAP-D.5).

connection modification [DPRS-D.10]: service that allows the DLC to modify a connection with connection type "Unknown"

encryption activation [DPRS-D.11]: transporting the NWK layer encryption request and the cipher key to the MAC layer, thereby enabling the encryption process in the MAC layer (GAP-D.6).

encryption deactivation [DPRS-D.12]: transporting the NWK layer encryption deactivation request to the MAC layer, thereby disabling the encryption process in the MAC layer (GAP-D.9).

Connectionless U-plane [DPRS-D.13]: provision of data to multiple addresses using the SI_P MAC channel.

4.3.4 NWK feature definitions

outgoing call [DPRS-N.1]: call initiated at a DECT PP (GAP-N.1).

off-hook [DPRS-N.2]: ability to indicate the action of going off-hook, e.g. to start call set-up or accept a call (GAP-N.2).

on-hook (FULL Release) [DPRS-N.3]: ability to indicate the action of going on-hook (e.g. to terminate a call) and fully release the radio resource (GAP-N.3).

dialled digits (basic) [DPRS-N.4]: capability to dial digits 0-9, x, # (GAP-N.4).

register recall [DPRS-N.5]: ability of the PP to request the invocation of the supplementary service "register recall" over the DECT interface and the ability of the FP to transmit the request to the local network. Register recall means to seize a register (with dial tone) to permit input of further digits or other action (GAP-N.5).

go to DTMF signalling (defined tone length) [DPRS-N.6]: go to DTMF signalling with defined tone length (GAP-N.6).

pause (dialling pause) [DPRS-N.7]: ability to generate or indicate a dialling pause, e.g. to await further dial tone (GAP-N.7).

incoming call [DPRS-N.8]: call received at a DECT PP (GAP-N.8).

authentication of PP [DPRS-N.9]: process by which the identity of a DECT PP is checked by the FP (GAP-N.9).

authentication of user [DPRS-N.10]: process by which the identity of a user of a DECT PP is checked by the FP. The User Personal Identification (UPI), a personal identification of 0 to 8 digits, manually entered by the user, is used for user authentication (GAP-N.10).

location registration [DPRS-N.11]: facility whereby a PP can be registered with a FP or a cluster of FPs such that incoming calls, radio pages or messages may be routed to it (GAP-N.11).

on-air key allocation [DPRS-N.12]: capability to transform Authentication Code (AC) into User Authentication Key (UAK) using the key allocation procedure (GAP-N.12).

identification of PP [DPRS-N.13]: ability for the FP to request and PP to provide specific identification parameters (GAP-N.13).

service class indication/assignment [DPRS-N.14]: assignment by the FP to PP of the service class and indication to the FP by the PP of the contents of its service class (GAP-N.14).

alerting [DPRS-N.15]: activates or deactivates alerting at the PP using any appropriate indication (GAP-N.15).

ZAP [DPRS-N.16]: ability first to assign and then to re-program the account data held in the PP so that access rights may be suspended subject to the conditions set by the service provider being met, coupled with the ability to re-program the account data again to reinstate access rights once these conditions have been met. One ZAP field shall be provided per account field. The PP has the right to authenticate the FP prior to the execution of ZAP suspend (GAP-N.16).

encryption activation FT initiated [DPRS-N.17]: activation of the encryption process requested by FT (GAP-N.17).

subscription registration procedure on-air [DPRS-N.18]: standardized procedure for loading subscription registration data into a PP in real time over the air-interface (GAP-N.18).

link control [DPRS-N.19]: ability to request, accept, maintain and release a data link for the purposes of a NWK layer procedure (GAP-N.19).

terminate access rights FT initiated [DPRS-N.20]: ability of the FP to delete a subscription in the PP (GAP-N.20).

partial release [DPRS-N.21]: ability to release an established or in progress Call Control (CC) call whilst retaining the radio resource for the purpose of accessing further services (GAP-N.21).

go to DTMF (infinite tone length) [DPRS-N.22]: go to DTMF signalling, indicating infinite DTMF tone duration (GAP-N.22).

go to pulse [DPRS-N.23]: go to pulse (decadic) signalling (GAP-N.23).

signalling of display characters [DPRS-N.24]: transmission to the PP of characters to be displayed on the user's PP display (if provided) (GAP-N.24).

display control characters [DPRS-N.25]: characters sent to the PP to control the user's display in the PP (if provided). Such characters include cursor control, clear screen, home, flash, inverse video etc. (GAP-N.25).

authentication of FT [DPRS-N.26]: process by which the identity of a FP is checked by the PP (GAP-N.26).

encryption activation PT initiated [DPRS-N.27]: activation of the encryption process suggested by PT. The real time start of ciphering is done in the MAC layer and is always initiated by the PT (GAP-N.27).

encryption deactivation FT initiated [DPRS-N.28]: deactivation of the encryption process requested by FT. The real time stop of ciphering is done in the MAC layer and is always initiated by the PT (GAP-N.28).

encryption deactivation PT initiated [DPRS-N.29]: deactivation of the encryption process suggested by PT. The real time stop of ciphering is done in the MAC layer and is always initiated by the PT (GAP-N.29).

Calling Line Identification Presentation (CLIP) [DPRS-N.30]: ability to provide the calling party number to the called party before accepting the call (GAP-N.30).

internal call [DPRS-N.31]: call between 2 users that does not make use of the local network resources. This is typically useful in residential environments (GAP-N.31).

service call [DPRS-N.32]: call initiated by a DECT PT for entering of FT related service and adjustment procedures in a transparent way. After having sent the service call indication, the PT behaves according to the rules of a normal call (GAP-N.32).

Dynamic parameters allocation [DPRS-N.33]: ability to assign/negotiate DPRS protocol handling specific parameters.

Service Negotiation [DPRS-N.34]: ability to negotiate call/service parameters during call set-up.

In call service change [DPRS-N.35]: ability to modify call/service parameters (e.g. bandwidth, IWU parameters etc.) while the call is maintained.

NWK layer management [DPRS-N.36]: management of NWK layer related data (e.g. identities, location registration, etc.).

Identity assignment [DPRS-N.37]: ability to assign and store different types of PT related identities.

DECT external handover [DPRS-N.38]: external handover is the process of switching a call in progress from one Fixed Part (FP-1) to another Fixed Part (FP-2). This means the handover occurs between two independent systems, where each system has its own lower layers of protocol and has an independent set of network layer Service Access Points (SAPs). To make external handover possible, a common management entity above the two fixed terminations is necessary (CAP-N.1).

Message waiting indication [DPRS-N.39]: this feature enables a user to receive an indication of the status of a message server (e.g. a voice mailbox) to which the user has access (CAP-N.4).

Detach [DPRS-N.40]: this feature enables a PT to report to the FT that the PT is not ready to receive calls (CAP-N.5).

Enhanced location registration [DPRS-N.41]: this feature enables automatic location registration of PT at expected intervals of time. (CAP-N.6).

On-air modification of user parameters [DPRS-N.42]: this feature enables the FT to modify the active subscription data of the PT (CAP-N.7).

4.3.5 Application service definitions

AC to bitstring mapping [DPRS-A.1]: mapping of the AC into a bitstring (GAP-A.1)

multiple subscription registration [DPRS-A.2]: ability of PP to store more than one subscription (GAP-A.2)

manual entry of the Portable Access Rights Key (PARK) [DPRS-A.3]: ability of the PP to accept a manual entry of the PARK for ensuring attachment to the right FP in a physical area covered by many providers (GAP-A.3)

4.3.6 Distributed communication

Distributed communication [DPRS-DC.1]: ability of a DECT terminal to provide means for or assist direct communication between any two terminals, members of a "closed" local DECT network. Such terminals may be of type HyP, or, of type PP or FP (when additional specific procedures are provided)

4.3.7 Management Entity (ME)

Class 1 management [DPRS-ME.1]: inter and intra DECT protocol layers management of the simplified version of DPRS protocol requirements that does not incorporate Network layer C-plane

Class 2 management [DPRS-ME.2]: inter and intra DECT protocol layers management of the full version of DPRS protocol requirements that does incorporate full C-plane

4.3.8 Call control and Mobility Management Service Class (MMSC)

Service class 1 [DPRS-G.1]: it is restricted service without Network layer C-plane. It excludes call set-up procedures and does not provide mobility management

Service class 2 [DPRS-G.2]: it is full operational DPRS service. It offers complete C-plane DECT protocols, including call-set-up procedures, mobility management, service management and service negotiation

4.3.9 U-plane Service and interworking type

Frame relay service [DPRS-G.3]: it is a packet transport service intended for transporting frames of any data protocol. The service provides packet delimiters

Character stream service [DPRS-G.4]: a packet transport service intended for transporting streams of octets.

NOTE: It provides a Packet Assembler and Disassembler (PAD).

Ethernet interworking [DPRS-I.1]: provides the transport of IEEE 802.3 [18] or Ethernet LAN protocols

Token ring [DPRS-I.2]: provides the transport of IEEE 802.5, Token Ring protocol

IP interworking [DPRS-I.3]: provides the transport of Internet Protocol v4 [19] or v6 [34] protocols

PPP interworking [DPRS-I.4]: provides the transport of Point to Point Protocol [13]

Generic media encapsulation interworking [DPRS-I.5]: provides a generic transport for application protocols (such as SMTP, HTTP, POP, SIP, etc) directly transported over DECT

V.24 interworking [DPRS-I.6]: provides the emulation of a V.24 asynchronous serial line

4.3.10 DPRS system categories

Category 1 [DPRS-Cat.1]: low-end systems providing a symmetric data rate of 50 kbit/s over a single bearer, using long slot

Category 2 [DPRS-Cat.2]: mid-end multibearer systems providing a data rate up to 500 kbit/s supporting symmetric and asymmetric connections

Category 3 [DPRS-Cat.3]: high-end systems providing a data rate up to 844 kbit/s supporting symmetric and asymmetric connections

A.1.4.3 General class/service/interworking support (modify clause 4.4 of EN 301 649)

Clause 4.4 of EN 301 649 [16] shall be modified as follows:

4.4 General class/service/interworking support

Table 3: General class and service support

Item	Name of service	Reference	Support status	
			PT	FT
DPRS-G.1	DPRS Class 1	4.3.8	O.31	O.32
DPRS-G.2	DPRS Class 2	4.3.8	O.31	O.32
DPRS-G.3	Frame Relay (FREL)	4.3.9, annex B	O.33	O.34
DPRS-G.4	Character stream	4.3.9, annex C	O.33	O.34
O.31, O.32, O.33, O.34: At least one of these services shall be supported.				
NOTE: The reference column refers to the relevant clause in the present document.				

Table 3a: General service/interworking support

			Status	
Service	**Interworking**	**Reference**	**PT**	**FT**
DPRS-G.3, Frame Relay (FREL)		4.3.9, annex B	O.41	O.42
	DPRS-I.1, Ethernet	4.3.9, B.4	C.43	C.44
	DPRS-I.2, Token Ring	4.3.9, B.5	C.43	C.44
	DPRS-I.3, IP	4.3.9, B.6	C.43	C.44
	DPRS-I.4, PPP	4.3.9, B.7	C.43	C.44
	DPRS-I.5, Generic media encapsulation	4.3.9, B.8	C.43	C.44
DPRS-G.4, Character stream		4.3.9, annex C	O.41	O.42
	DPRS-I.6, V.24	4.3.9, C.4	M	M
O.41, O.42: At least one of these Services shall be supported. C.43, C.44: At least one of these Interworking shall be supported.				
NOTE: The reference column refers to the relevant clause in the present document.				

A.1.4.4 Requirements applicable to categorized systems (add to clause 4 of EN 301 649)

A new clause with the following text shall be added to clause 4 of EN 301 649 [16]:

4.5 Requirements applicable to categorized systems

The following requirements apply to DPRS data systems declaring compliance to one or more DPRS data categories (see also clause 4.2.4).

4.5.1 Mapping between DPRS categories and features/services

Equipment belonging to each DPRS category type shall support the features and services defined in table 4 and shall use these features/services when establish communication with other systems belonging to the same category.

For features/services not listed in table 4, the status defined in clauses 5,6,7,8 and 9 shall apply:

Table 4: Features/services supported for each DPRS system category

DPRS Category to feature/service mapping					
Category	**DPRS Feature/Service**	**Reference**	**Note**	**Status**	
DPRS-Cat.1 Category 1 systems		4.3.10			
	GFSK modulation [DPRS-P.1]:	4.3.1		M	M
	Physical Packet P64 [DPRS-P.14]:	4.3.1		M	M
	I_P_error_detection MAC service type [DPRS.M.6]	4.3.2		M	M
	I_P_error_correction MAC service type [DPRS.M.7]	4.3.2		O	O
	G_F channel [DPRS-M.19]	4.3.2		C41	C41
	I_{PF} channel [DPRS-M.23]	4.3.2		C41	C41
	Long slot 640 [DPRS-M.25]	4.3.2		M	M
	Multibearer connections [DPRS-M.28]	4.3.2		O	O
	Asymmetric connections [DPRS-M.29]	4.3.2		O	O
	Class 2 Management [DPRS-ME.2]	4.3.7	2	M	M
	Service Class 2 [DPRS-G.2]	4.3.8	2	M	M

DPRS Category to feature/service mapping					
Category	**DPRS Feature/Service**	**Reference**	**Note**	**Status**	
DPRS-Cat.2 Category 2 systems	Physical Packet P64 [DPRS-.P.14]	4.3.1		M	M
	I_P_error_detection MAC service type [DPRS.M.6]	4.3.2		M	M
	I_P_error_correction MAC service type [DPRS.M.7]	4.3.2		O	O
	G_F channel [DPRS-M.19]	4.3.2		M	M
	I_{PF} channel [DPRS-M.23]	4.3.2		M	M
	Long slot 640 [DPRS-M.25]	4.3.2		M	M
	Multibearer connections [DPRS-M.28]	4.3.2		M	M
	Asymmetric connections [DPRS-M.29]	4.3.2		M	M
	Class 2 Management [DPRS-ME.2]	4.3.7	2	M	M
	Service Class 2 [DPRS-G.2]	4.3.8	2	M	M
	Category 1 operation [DPRS-Cat.1]	4.3.10, 4.4	3	M	M
DPRS-Cat.3 Category 3 systems	GFSK modulation [DPRS-P.1]	4.3.1		M	M
	Physical Packet P80 [DPRS-.P.16]	4.3.1		M	M
	I_{PQ}_error_detection MAC service type [DPRS.M.20]	4.3.2		M	M
	I_{PQ}_error_correction MAC service type [DPRS.M.21]	4.3.2		O	O
	G_F channel [DPRS-M.19]	4.3.2		M	M
	I_{PF} channel [DPRS-M.23]	4.3.2		M	M
	Double slot [DPRS-M.27]	4.3.2		M	M
	Multibearer connections [DPRS-M.28]	4.3.2		M	M
	Asymmetric connections [DPRS-M.29]	4.3.2		M	M
	Class 2 Management [DPRS-ME.2]	4.3.7	2	M	M
	Service Class 2 [DPRS-G.2]	4.3.8	2	M	M
	Category 1 operation [DPRS-Cat.1]	4.3.10, 4.4	4	M	M
	Category 2 operation [DPRS-Cat.2]	4.3.10, 4.4	4	M	M
C41: IF DPRS-M.29 is supported THEN M ELSE O.					
NOTE 1: There can be non categorized DPRS systems NOTE 2: All categories are based on Class 2 management and Service Class 2. NOTE 3: Category 2 systems shall also support all features of Category 1 systems and shall be able to interoperate with them. NOTE 4: Category 3 systems shall also support all features of Category 1 and Category 2 systems and shall be able to interoperate with them. NOTE 5: In the case where a FP and a PP do not have the same category capabilities, the initiating side should use the highest category supported by both sides.					

4.5.2 Supported data rates for equipment declaring compliance to a data category

Equipment belonging to each DPRS data category type shall support, at least, the following number of active slots and data rates described as mandatory in table 4a. They may optionally support the number of active slots and data rates described as optional in table 4a.

Table 4a: Supported data rates for each system category.

Supported data rates for each system category						
Category	**Parameter**	**Notes**	**Value**			
			Data rates in kbit/s (see notes 1 and 2)		**Corresponding number of bearers**	
			downlink (FT > PT)	**uplink (PT > FT)**	**downlink (FT > PT)**	**uplink (PT > FT)**
DPRS-Cat.1 Category 1 systems	Mandatory supported data-rate for symmetric connections	*4*	51,2	51,2	**1**	**1**
DPRS-Cat.2 Category 2 systems	Mandatory supported data rate for symmetric connections	*4, 5*	204,8	204,8	**4**	**4**
	Optional maximum data rate for symmetric connections	*4, 6*	307,2	307,2	**6**	**6**
	Mandatory supported downlink data rate for asymmetric connections	*4, 5, 7, 3*	358,4	44,8	**7**	**1**
	Optional maximum downlink data rate for asymmetric connections	*4, 6, 8*	563,2	44,8	**11**	**1**
	Optional maximum uplink data rate for asymmetric connections	*4, 6, 8*	44,8	563,2	**1**	**11**
DPRS-Cat.3 Category 3 systems	Mandatory supported data rate for symmetric connections	*9, 5*	307,2	307,2	**4**	**4**
	Optional maximum data rate for symmetric connections	*9, 6*	460,8	460,8	**6**	**6**
	Mandatory supported downlink data rate for asymmetric connections	*9, 5, 7, 3*	537,6	57,6	**7**	***1***
	Optional maximum downlink data rate for asymmetric connections	*9, 6, 8*	844,8	57,6	**11**	**1**
	Optional maximum uplink data rate for asymmetric connections	*9, 6, 8*	57,6	844,8	**1**	**11**

NOTE 1: Data rate indicates net data rate provided by MAC layer.
NOTE 2: The value of the backward rate in asymmetric connections includes the reduction by using the I_{PF} channel due to the insertion of the "Quality control message" in all frames.
NOTE 3: The asymmetric uplink configuration is not mandatory.
NOTE 4: Slot type shall be Long slot (j=640) with MAC service I_P.
NOTE 5: The system shall support all intermediate number of bearers between the minimum 1+1 and this value.
NOTE 6: The system may optionally support higher number of bearers than the mandatory configuration. If supported, the system shall support all intermediate values between 1+1 and the claimed maximum.
NOTE 7: In asymmetric connections, the system shall support all intermediate values in the number of duplex bearers from 1 to the mandatory value for symmetric connections, plus all intermediate values in the number of double simplex bearers from 1 to the necessary to fulfil the mandatory asymmetric rate. However it does not need to support a higher number of bearers in total than the used in a 1+N full asymmetric case.
NOTE 8: If the system claims a higher value of asymmetric bearers than the mandatory value, then, it shall fulfil the rule of Note 7 up to the claimed number of bearers.
NOTE 9: Slot type shall be Double slot with MAC service I_{PQ}.

In addition to this table, systems shall fulfil all the mandatory requirements for each system category (table 3) and the backcompatibility rule described in notes 3, 4 and 5 of table 3.

4.5.3 Indication of compliance with a data category

All DPRS data equipment compliant with the present specification, shall broadcast the supported number of bearers and the supported category type, if any, using the Terminal capability and the fixed part capabilities information elements in the way described in the present document.

NOTE: Manufacturers may indicate the category type and the maximum number of supported bearers in their documentation with the text "DPRS Cat n x+x/y+1" where n is the maximum Category supported and x and y the maximum number of bearers supported in symmetric and asymmetric configurations.

A.1.5 PHL Requirements (modify clause 5 of EN 301 649)

Clause 5 of EN 301 649 [16] shall be modified as follows:

5 PHL requirements

5.1 Physical layer services

PT and FT shall support the following PHL requirements:

Table 5: Physical layer service support

Item	Name of service	Reference	Support status	
			PT	FT
DPRS-P.1	GFSK modulation	4.3.1	C51	C51
DPRS-P.2	π/2 DBPSK modulation	4.3.1	C52	C52
DPRS-P.3	π/4 QBPSK modulation	4.3.1	O	O
DPRS-P.4	π/8 D8PSK modulation	4.3.1	O	O
DPRS-P.5	16 QAM modulation	4.3.1	O	O
DPRS-P.6	64 QAM modulation	4.3.1	O	O
DPRS-P.13	Physical Packet P32	4.3.1	C55	C55
DPRS-P.14	Physical Packet P64	4.3.1	C55	C55
DPRS-P.15	Physical Packet P67	4.3.1	O	O
DPRS-P.16	Physical Packet P80	4.3.1	C55	C55
DPRS-P.17	General PHL	4.3.1	M	M
DPRS-P.18	Fast hopping radio	4.3.1	O	O
C51: IF DPRS-P.2 is not supported THEN M ELSE O. C52: IF DPRS-P.1 is not supported THEN M ELSE O. C55: At least one should be supported.				

5.2 Modulation schemes

The following modulation schemes defined by EN 300 175-2 [2], annex D shall be supported.

Table 5a: Allowed combinations of modulation schemes

	Modulation scheme	S-field	A-field	B + Z-field	Support status
	1a	GFSK	GFSK	GFSK	C56
	1b	π/2-DBPSK	π/2-DBPSK	π/2-DBPSK	C57
	2	π/2-DBPSK	π/2-DBPSK	π/4-DQPSK	O
	3	π/2-DBPSK	π/2-DBPSK	π/8-D8PSK	O
	5	π/2-DBPSK	π/2-DBPSK	16 QAM	O
	6	π/2-DBPSK	π/2-DBPSK	64 QAM	O
C56: If 1b is not supported mandatory, else optional. C57: If 1a is not supported mandatory, else optional.					

For the 4- and 8-level modulation option, the requirements of EN 300 175-2 [2], annex D shall apply.

5.3 PHL service to procedure mapping

Table 5b: PHL service to procedure mapping

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-P.1 GFSK modulation		4.3.1	C51	C51
	GFSK modulation	5 [2]	M	M
	Modulation scheme 1a	5.3	M	M
DPRS-P.2 π/2 DBPSK modulation		D.1 [2]	C52	C52
	π/2 DBPSK modulation	D.1 [2]	M	M
	Modulation scheme 1b	5.3	M	M
DPRS-P.3 π/4 QBPSK modulation		4.3.1	O	O
	π/4 QBPSK modulation	D.2 [2]	M	M
	Modulation scheme 2	5.3	M	M
DPRS-P.4 π/8 D8PSK modulation		4.3.1	O	O
	π/8 D8PSK modulation	D.3 [2]	M	M
	Modulation scheme 3	5.3	M	M
DPRS-P.5 16 QAM modulation		4.3.1	O	O
	16 QAM modulation	D.4 [2]	M	M
	Modulation scheme 5	5.3	M	M
DPRS-P.6 64 QAM modulation		4.3.1	O	O
	64 QAM modulation	D.5 [2]	M	M
	Modulation scheme 6	5.3	M	M
DPRS-P.13 Physical Packet P32		4.3.1	C55	C55
	Physical Packet P32	4.4.2 [2]	M	M
DPRS-P.14 Physical Packet P64		4.3.1	C55	C55
	Physical Packet P64	4.4.3 [2]	M	M
DPRS-P.15 Physical Packet P67		4.3.1	O	O
	Physical Packet P67	4.4.3 [2]	M	M
DPRS-P.16 Physical Packet P80		4.3.1	C55	C55
	Physical Packet P80	4.4.4 [2]	M	M
DPRS-P.17 General PHL		4.3.1	M	M
	General radio requirements	5.4.1	M	M
	Minimum Normal Transmit Power (NTP)	5.4.2	M	M
	Radio receiver sensitivity	5.4.3	M	M
	Z-field	5.4.4	M	M
	Sliding collision detection	5.4.5	M	M
	Physical channel availability	5.4.6	M	M
	Synchronization window	5.4.7	M	M
	Power Management	5.4.8	O	O
DPRS-P18 Fast hopping radio		4.3.1	O	O
	Fast hopping radio	5.4.8	M	M
C51: IF DPRS-P.2 is not supported THEN M ELSE O. C52: IF DPRS-P.1 is not supported THEN M ELSE O. C55: Status defined in table 4. For non categorized systems, at least one should be supported.				
NOTE: The reference column refers to the relevant clause in the present document except otherwise noted.				

5.4 PHL layer procedures

5.4.1 General radio requirements

As specified in EN 300 175-2 [2], and EN 301 406 [31] (replacing TBR 006).

5.4.2 Minimum Normal Transmit Power (NTP)

The nominal NTP shall be greater than 80 mW per simultaneously active transmitter as shown by the test verdict criteria and declaration of EN 300 176-1 [35], clause 10.2.3.

5.4.3 Radio receiver sensitivity

The radio receiver sensitivity shall be -86 dBm, or better.

5.4.4 Z-field

The Z-field shall be transmitted by RFPs and PTs.

5.4.5 Sliding collision detection

PT and FT shall be able to detect sliding collision on received packets.

Minimum criteria for sliding collision are defined as S- or Z-field failure. Early sliding collision detection may be supported by other means e.g. signal strength measurements in the guard band.

The Z-field is defined to have failed if the received X- and Z-fields are not identical.

S-field failure is defined with some tolerance in order not to restrict the physical implementation of the word synchronization detector.

S-field failure may be indicated if there are 1 or more bit errors in bits s12 to s31 (errors in bits s0 to s11 shall be ignored). In all cases, S-field failure shall be indicated if 3 or more bit errors occur in bits s16 to s31.

5.4.6 Physical channel availability

An FP shall be able to receive and transmit on all DECT frequencies f0 to f9 and at least half of the slot pairs 0 to 11.

A PP shall be able to receive and transmit on all DECT frequencies f0 to f9, and shall be able to lock on any slot number 0 to 11, and receive and transmit at least on every slot pair that is not directly neighboured to the slot the PP is locked to, or to a slot on which a traffic bearer is active at the PP.

5.4.7 Synchronization window

Related to its reference timer, the PP synchronization window shall be at least ±4 bits for bearers to the RFP to which the reference timer is synchronized, and at least ±10 bits for other bearers.

5.4.8 Power management

To fight mutual interference between data terminals operating in different local DECT networks when using for the transmission most of the slots from a frame, control of the transmission power is recommended.

If transmission power control procedure is implemented, the requirements in EN 300 175-2 [36], annex E shall fully apply.

5.4.9 Fast hopping radio

The radio transceiver shall be able to perform any frequency change during the interval between two consecutive Physical Packets P32 (full slot) or P80 (double slot).

A.1.6 MAC layer Requirements (modify clause 6 of EN 301 649)

Clause 6 of EN 301 649 [16] shall be modified as follows:

6 MAC layer requirements

6.1 MAC services

Table 6: MAC service support for mobility class 1 and 2

Item	Name of service	Reference	Support status	
			PT	FT
DPRS-M.1	General	4.3.2	M	M
DPRS-M.2	Non continuous broadcast	4.3.2	O	O
DPRS-M.3	Continuous broadcast	4.3.2	M	M
DPRS-M.4	Paging broadcast	4.3.2	M	M
DPRS-M.5	Advanced connections	4.3.2	M	M
DPRS-M.6	I_P_error_detection	4.3.2	C64	C64
DPRS-M.7	I_P_error_correction	4.3.2	O	O
DPRS-M.8	U-plane point-to-multipoint service	4.3.2	O	O
DPRS-M.9	C_S higher layer signalling	4.3.2	C61	C61
DPRS-M.10	C_F higher layer signalling	4.3.2	C62	C62
DPRS-M.11	Encryption activation	4.3.2	M	M
DPRS-M.12	Encryption deactivation	4.3.2	C63	C63
DPRS-M.13	Quality control	4.3.2	M	M
DPRS-M.14	Physical channel selection	4.3.2	M	M
DPRS-M.15	SARI support	4.3.2	C61	C62
DPRS-M.16	DPRS Bearer handover	4.3.2	M	M
DPRS-M.18	Connection handover	4.3.2	O	O
DPRS-M.19	G_F channel	4.3.2	C67	C67
DPRS-M.20	I_{PQ}_error_detection	4.3.2	C64	C64
DPRS-M.21	I_{PQ}_error_correction	4.3.2	O	O
DPRS-M.22	I_P_encoded protected	4.3.2	C65	C65
DPRS-M.23	I_{PF} channel	4.3.2	C67	C67
DPRS-M.24	Full slot	4.3.2	C66	C66
DPRS-M.25	Long slot 640	4.3.2	C66	C66
DPRS-M.26	Long slot 672	4.3.2	C66	C66
DPRS-M.27	Double slot	4.3.2	C66	C66
DPRS-M.28	Multibearer connections	4.3.2	C67	C67
DPRS-M.29	Asymmetric connections	4.3.2	C68	C68

C61: IF (CLASS 1) THEN I ELSE M.
C62: IF (CLASS 1) THEN I ELSE O.
C63: If DPRS-N.28 or DPRS-N.29 then M else I.
C64: Status depending on system category. See table 4. For non Categorized systems, at least one should be supported.
C65: IF 16 QAM or 64 QAM modulation THEN M ELSE O
C66: Status depending on system category. See table 4. For non Categorized systems, at least one should be supported.
C67: Status depending on system category. See table 4. For non Categorized systems: IF M.29 THEN M, ELSE O
C68: Status depending on system category. See table 4. For non Categorized systems THEN O

NOTE: The reference column refers to the relevant clause in the present document.

6.2 MAC service to procedure mapping

Table 7: MAC service to procedure mapping

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-M.1 General		4.3.2	M	M
	General	10.1	M	M
	A-field Multiplexer (T-MUX)	10.21.1	M	M
	B-field control Multiplexer (E/U-MUX), basic modes	10.21.2.1	M	M
DPRS-M.2 Non continuous broadcast		4.3.2	O	O
	Request for specific Q channel information	10.2.1	O	O
	Request for a new dummy	10.2.2	O	O
DPRS-M.3 Continuous broadcast		4.3.2	M	M
	Downlink broadcast	10.3	M	M
DPRS-M.4 Paging broadcast		4.3.2	M	M
	Normal paging	10.4.3, 10.4.1, 10.4.2	M	M
	Fast paging	10.4.4, 10.4.1, 10.4.2	O	O
	Low duty cycle paging	10.4.5, 10.4.1, 10.4.2	O	O
	MAC paging	10.4.6, 10.4.1, 10.4.2	M	M
DPRS-M.5 Advanced connection		4.3.2	M	M
	Fast setup	10.10.1.2	O	O
	idle-locked state with set-up detection	11.1.3.2 [3]	O	I
	Logical connection setup	10.5	M	M
	Logical connection release	10.6	M	M
	Connection modification	10.7	M	M
	Single bearer Physical connection setup	10.8.1	M	M
	Physical Connection release	10.9	M	M
	Single duplex bearer setup	10.10.1	M	M
	Usage of channel list messages	10.10.1.3	M	M
	Unacknowledged bearer release	10.11.1	M	M
	Acknowledged bearer release	10.11.2	O	O
DPRS-M.6 I_P_error_detection service		4.3.2	C64	C64
	Type 3: I_P_ error_detection symmetric MAC service	5.6.2.1 [3]	M	M
	Type 7: I_P_ error_detection asymmetric MAC service	5.6.2.2 [3]	C75	C75
	Multi-subfield protected B-field	6.2.1.3.3 [3]	M	M
	Q1/Q2 bit setting for: I_P_ error_detection	10.8.1.3.2 [3]	M	M
	Protected I channel error_detect procedure	10.13.1	M	M
DPRS-M.7 I_P_error_correction service		4.3.2	O	O
	Type 4: I_P_ error_correction symmetric MAC service	5.6.2.1 [3]	M	M
	Type 8: I_P_ error_correction asymmetric MAC service	5.6.2.2 [3]	C75	C75
	Multi-subfield protected B-field	6.2.1.3.3 [3]	M	M
	MOD-2 protected channel operation	10.8.2 [3]	M	M
	Protected I channel error_correct mode	10.13.2	M	M

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-M.8 U-plane point-to-multipoint service		4.3.2	O	O
	Connectionless SI_P mode	10.13.3	M	M
DPRS-M.9 C_S higher layer signalling		4.3.2	C71	C71
	C_S channel data	10.14.1	M	M
DPRS-M.10 C_F higher layer signalling		4.3.2	C72	C72
	C_F channel data	10.14.2	M	M
	B-field control Multiplexer (E/U-MUX), C_F modes	10.21.2.2	M	M
DPRS-M.11 Encryption activation		4.3.2	M	M
	Encryption process - initialization and synchronization	10.15.1	M	M
	Encryption mode control	10.15.2	M	M
	Encryption handover control	10.15.3	M	M
DPRS-M.12 Encryption deactivation		4.3.2	C73	C73
	Encryption mode control	10.15.2	M	M
DPRS-M.13 Quality control		4.3.2	M	M
	RFPI handshake	10.16.1	M	M
	PT frequency correction procedure	10.16.2	O	O
	Bearer quality report	10.16.3	M	M
	Bearer quality report for asymmetric bearers (MAC-mod2-ACK)	10.16.3.1	C75	C75
	Bearer and connection control	10.16.4	O	O
	A-CRC handshake	10.16.5	M	M
DPRS-M.14 Physical channel selection		4.3.2	M	M
	Physical channel selection	10.17	M	M
DPRS-M.15 SARI support		4.3.2	C71	C72
	Downlink broadcast	10.3.2.3	M	M
DPRS-M.16 DPRS Bearer handover		4.3.2	M	M
	MAC Bearer replacement	10.18	M	M
		4.3.2		
	MAC Bearer handover	10.19	O	O
DPRS-M.18 Connection handover		4.3.2	O	O
	Advanced connection handover	10.12	M	M
DPRS-M.19 G_F channel		4.3.2	C67	C67
	G_F channel transmission	10.20.1.1	O	O
	G_F channel reception	10.20.1.2	M	M
DPRS-M.20 I_{PQ}_error_detection service			C64	C64
	Type 3: I_P_ error_detection symmetric MAC service	5.6.2.1 [3]	M	M
	Type 7: I_P_ error_detection asymmetric MAC service	5.6.2.2 [3]	C75	C75
	Single-subfield protected B-field	6.2.1.3.4 [3]	M	M
	Q1/Q2 bit setting for: I_P_ error_detection	10.8.1.3.2 [3]	M	M
	Protected I channel error_detect procedure	10.13.1	M	M
DPRS-M.21 I_{PQ}_error_correction service			O	O
	Type 4: I_P_ error_correction symmetric MAC service	5.6.2.1 [3]	M	M
	Type 8: I_P_ error_correction asymmetric MAC service	5.6.2.2 [3]	C75	C75
	Single-subfield protected B-field	6.2.1.3.4 [3]	M	M
	MOD-2 protected channel operation	10.8.2 [3]	M	M
	Protected I channel error_correct mode	10.13.2	M	M

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-M.22 I_P_encoded protected		4.3.2	C65	C65
	Type 5: I_P_ encodec protected symmetric MAC service	5.6.2.1 [3]	M	M
	Type 9: I_P_ encodec protected asymmetric MAC service	5.6.2.2 [3]	C75	C75
	Channel coding	annex I.1 [3]	M	M
DPRS-M.23 I_{PF} channel		4.3.2	C67	C67
	B-field control Multiplexer (E/U mux), E+U mode	10.21.2.3	M	M
	I_{PF} channel general	10.22.1	M	M
	I_{PF} channel advanced procedures	10.22.2	O	O
	I_{PF} channel error correct procedures	10.22.3	C76	C76
	SI_{PF} channel	10.22.4	C77	C77
DPRS-M.24 Full slot				
	D-field mapping for the full slot structure (physical packet P32)	6.2.1.1.2 [3]	M	M
	B-field mapping for the full slot structure (physical packet P32)	6.2.1.3.1.2 [3]	M	M
DPRS-M.25 Long slot 640		4.3.2	C66	C66
	D-field mapping for the variable slot structure (physical packet P00j) with j=640	6.2.1.1.4 [3]	M	M
	B-field mapping for the half and long slot structure (physical packet P00j) with j=640	6.2.1.3.1.3 [3]	M	M
	Additional procedures for Long and double slots	D.2	M	M
DPRS-M.26 Long slot 672		4.3.2	C66	C66
	D-field mapping for the variable slot structure (physical packet P00j) with j=672	6.2.1.1.4 [3]	M	M
	B-field mapping for the half and long slot structure (physical packet P00j) with j=672	6.2.1.3.1.3 [3]	M	M
	Additional procedures for Long and double slots	D.2	M	M
DPRS-M.27 Double slot		4.3.2	C66	C66
	D-field mapping for the double slot structure (physical packet P80)	6.2.1.1.1 [3]	M	M
	B-field mapping for the double slot structure (physical packet P80)	6.2.1.3.1.1 [3]	M	M
	Additional procedures for Long and double slots	D.2	M	M
DPRS-M.28 Multibearer connections		4.3.2	C67	C67
	Multi bearer Physical connection setup	10.8.2	M	M
	MBC Multibearer control	new	M	M

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-M.29 Asymmetric connections		4.3.2	C68	C68
	Double simplex bearers	10.10.2	M	M
	Double simplex bearer setup	10.10.2	M	M
	Fast bearer release	10.11.3	M	M
	Unacknowledged double simplex bearer release	10.11.1	M	M
	Acknowledged double simplex bearer release	10.11.2	O	O
C71: IF (CLASS 1) THEN I ELSE M. C72: IF (CLASS 1) THEN I ELSE O. C73: If DPRS-N.28 or DPRS-N.29 then M else I. C74: If (4 - or 8 - level modulation scheme) then M else I. C75: If DPRS-M.29 THEM M ELSE I. C76: If DPRS-M.7 OR DPRS-M.21 THEM M ELSE I. C77: If DPRS-M.8 THEM O ELSE I.				
NOTE: The reference column refers to the relevant clause in the present or in the referenced document.				

A.1.7 DLC layer Requirements (modify clause 7 of EN 301 649)

Clause 7 of EN 301 649 [16] shall be modified as follows:

7 DLC-layer requirements

7.1 DLC services

Table 8: DLC service status

			Status	
Item no.	**Name of service**	**Reference**	**PT**	**FT**
DPRS-D.1	LU10 Enhanced Frame RELay service (EFREL)	4.3.3	M	M
DPRS-D.2	FU10a	4.3.3	M	M
DPRS-D.3	FU10b	4.3.3	O	O
DPRS-D.4	FU10c	4.3.3	M	M
DPRS-D.5	Data Link Service (LAPC + Lc) class A service	4.3.3	M	M
DPRS-D.6	Data Link Service (LAPC + Lc) class U service	4.3.3	O	O
DPRS-D.7	Lc Frame delimiting and sequencing service	4.3.3	M	M
DPRS-D.8	Broadcast Lb service	4.3.3	M	M
DPRS-D.9	Inter-cell voluntary connection handover	4.3.3	O	O
DPRS-D.10	Connection modification	4.3.3	M	M
DPRS-D.11	Encryption activation	4.3.3	M	M
DPRS-D.12	Encryption deactivation	4.3.3	C81	C81
DPRS-D.13	Connectionless U-plane	4.3.3	C82	C82
C81: If DPRS-N.28 or DPRS-N.29 then M else I. C82: If (Ethernet OR Token ring) THEN O ELSE I.				
NOTE: The reference column refers to the relevant clause in the present document.				

7.2 DLC feature to procedure mapping

Table 9: DLC service to procedure mapping

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-D.1 LU10 Enhanced Frame RELay service (EFREL)		4.3.3	M	M
	U-plane transmission class 2	11.1.2	M	M
DPRS-D.2 FU10a		4.3.3	M	M
	FU10a frame operation	11.2.1	M	M
DPRS-D.3 FU10b		4.3.3	O	O
	FU10b frame operation	11.2.2	M	M
DPRS-D.4 FU10c		4.3.3	M	M
	FU10c frame operation	11.2.3	M	M
	Insertion in FU10a frames of the opposite link	11.2.3.1	M	M
DPRS-D.5 Data Link Service (LAPC + Lc) class A service		4.3.3	M	M
	Class A link establishment	11.3.1	M	M
	Class A acknowledged information transfer	11.3.2	M	M
	Class A link release	11.3.3	M	M
	Class A link re-establishment	11.3.4	M	M
DPRS-D.6 Data Link Service (LAPC + Lc) class U service		4.3.3	O	O
	Class U use of LLN for unacknowledged information transfer	11.4.1	M	M
	Class U link establishment	11.4.2	M	M
	Class U unacknowledged information transfer	11.4.3	M	M
	Class U unacknowledged release	11.4.4	M	M
DPRS-D.7 Lc Frame delimiting and sequencing service		4.3.3	M	M
	C_S channel fragmentation and recombination	11.5.1	M	M
	C_F channel fragmentation and recombination	11.5.2	O	O
	Selection of logical channels (C_S and C_F)	11.5.3	M	M
DPRS-D.8 Broadcast Lb service		4.3.3	M	M
	Normal operation	11.6.1	M	M
	Expedited operation	11.6.2	C92	C92
DPRS-D.9 Inter-cell voluntary connection handover		4.3.3	O	O
	Class A connection handover	11.7.1	M	M
DPRS-D.10 Connection modification		4.3.3	M	M
	Connection modification	11.8	M	M
DPRS-D.11 Encryption activation		4.3.3	M	M
	Encryption switching	11.9	M	M
	Connection handover of ciphered connection	11.9.2.2	M	C94
DPRS-D.12 Encryption deactivation		4.3.3	C93	C93
	Encryption switching	11.9	M	M

			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-D.13 Connectionless U-plane		4.3.3	C91	C91
	FU10a frame operation	11.2.1	M	M
	Connectionless point-to-multipoint transmission	11.10	M	M
C91: If (Ethernet OR Token ring) THEN O ELSE I. C92: If DPRS-N.19 - fast paging implemented then M else I. C93: If DPRS-N.28 or DPRS-N.29 then M else I. C94: If DPRS-D.9 then M else I				
NOTE: The reference column refers to the relevant clause in the present document.				

A.1.8 NWK layer Requirements (modify clause 8 of EN 301 649)

Clause 8 of EN 301 649 [16] shall be modified as follows:

8 NWK layer requirements

The NWK layer provisions shall include the following entities:

- Call Control (CC);
- Mobility Management (MM);
- Link Control Entity (LCE);
- Connectionless Message Service (CLMS).

Only mobility class 2 equipment requires a NWK layer. For mobility class 1 equipment, configuration parameters shall be according to annex A of the present document.

NWK layer procedures shall be as defined in EN 300 444 [8] (GAP), in EN 300 824 [9] (CAP), or when relevant, in the present document.

8.1 NWK features

Table 10: NWK features status

Feature supported				
Features			**Status**	
Item no.	**Name of feature**	**Reference**	**PT**	**FT**
DPRS-N.1	Outgoing call	4.3.4	O	O
DPRS-N.2	Off hook	4.3.4	M	M
DPRS-N.3	On hook (full release)	4.3.4	M	M
DPRS-N.4	Dialled digits (basic)	4.3.4	O	O
DPRS-N.5	Register recall	4.3.4	O	O
DPRS-N.6	Go to DTMF signalling (defined tone length)	4.3.4	O	O
DPRS-N.7	Pause (dialling pause)	4.3.4	O	O
DPRS-N.8	Incoming call	4.3.4	O	O
DPRS-N.9	Authentication of PP	4.3.4	M	M
DPRS-N.10	Authentication of user	4.3.4	O	O
DPRS-N.11	Location registration	4.3.4	M	O
DPRS-N.12	On air key allocation	4.3.4	M	O
DPRS-N.13	Identification of PP	4.3.4	O	O
DPRS-N.14	Service class indication/assignment	4.3.4	O	O
DPRS-N.15	Alerting	4.3.4	O	O
DPRS-N.16	ZAP	4.3.4	O	O
DPRS-N.17	Encryption activation FT initiated	4.3.4	M	M
DPRS-N.18	Subscription registration procedure on-air	4.3.4	M	M

Feature supported				
Features			Status	
Item no.	Name of feature	Reference	PT	FT
DPRS-N.19	Link control	4.3.4	M	M
DPRS-N.20	Terminate access rights FT initiated	4.3.4	M	O
DPRS-N.21	Partial release	4.3.4	O	O
DPRS-N.22	Go to DTMF (infinite tone length)	4.3.4	O	O
DPRS-N.23	Go to Pulse	4.3.4	O	O
DPRS-N.24	Signalling of display characters	4.3.4	O	O
DPRS-N.25	Display control characters	4.3.4	O	O
DPRS-N.26	Authentication of FT	4.3.4	O	O
DPRS-N.27	Encryption activation PT initiated	4.3.4	O	O
DPRS-N.28	Encryption deactivation FT initiated	4.3.4	O	O
DPRS-N.29	Encryption deactivation PT initiated	4.3.4	O	O
DPRS-N.30	Calling Line Identification Presentation (CLIP)	4.3.4	O	O
DPRS-N.31	Internal call	4.3.4	O	O
DPRS-N.32	Service call	4.3.4	O	O
DPRS-N.33	Dynamic parameters allocation	4.3.4	M	M
DPRS-N.34	Service Negotiation	4.3.4	M	M
DPRS-N.35	In call service change	4.3.4	O	O
DPRS-N.36	NWK layer management	4.3.4	M	M
DPRS-N.37	Identity assignment	4.3.4	O	O
DPRS-N.38	DECT External handover	5.1 [9]	O	O
DPRS-N.39	Message Waiting Indication	5.1 [9]	O	O
DPRS-N.40	Detach	5.1 [9]	O	O
DPRS-N.41	Periodic location registration	5.1 [9]	O	O
DPRS-N.42	On-air modification of user parameters	5.1 [9]	O	O
NOTE: The reference column refers to the relevant clause in the present document, except where stated otherwise.				

8.2 NWK feature to procedure mapping

Table 11: NWK feature to procedure mapping

Feature/Procedure mapping			Status	
Feature	Procedure	Ref.	PT	FT
DPRS-N.1, Outgoing call		4.3.4	O	O
	Outgoing call request	12.1	M	M
	Overlap sending	8.3 [8]	M	O
	Outgoing call proceeding	8.4 [8]	M	O
	Outgoing call confirmation	8.5 [8]	M	O
	Outgoing call connection	8.6 [8]	M	M
	Sending keypad information	8.10 [8]	O	O
DPRS-N.2, Off Hook		4.3.4	M	M
	Outgoing call request	12.1	M	M
	Incoming call connection	8.15 [8]	M	M
DPRS-N.3, On Hook (full release)		4.3.4	M	M
	Normal call release	8.7 [8]	M	M
	Abnormal call release	8.8 [8]	M	M
DPRS-N.4, Dialled digits (basic)		4.3.4	O	O
	Sending keypad information	8.10 [8]	M	M
DPRS-N.5, Register recall		4.3.4	O	O
	Sending keypad information	8.10 [8]	M	M
DPRS-N.6 Go to DTMF signalling (defined tone length)		4.3.4	O	O
	Sending keypad information	8.10 [8]	M	M
DPRS-N.7, Pause (dialling pause)		4.3.4	O	O
	Sending keypad information	8.10 [8]	M	M
DPRS-N.8, Incoming call		4.3.4	O	O
	Incoming call request	12.2	M	M
	Incoming call confirmation	8.13 [8]	M	M
	PT alerting	8.14 [8]	M	M
	Incoming call connection	8.15 [8]	M	M

Feature/Procedure mapping			Status	
Feature	**Procedure**	**Ref.**	**PT**	**FT**
DPRS-N.9, Authentication of the PP		4.3.4	M	M
	Authentication of PT	8.24 [8]	M	M
DPRS-N.10, Authentication of the user		4.3.4	O	O
	Authentication of user	8.25 [8]	M	M
DPRS-N.11, Location registration		4.3.4	M	O
	Location registration	8.28 [8]	M	M
	Location update	8.29 [8]	M	O
	Terminal capability indication	12.3	M	M
DPRS-N.12, On air key allocation		4.3.4	M	O
	Key allocation	8.32 [8]	M	M
DPRS-N.13, Identification of PP		4.3.4	O	O
	Identification of PT	8.22 [8]	M	M
DPRS-N.14, Service class indication/assignment		4.3.4	O	O
	Obtaining access rights	8.30 [8]	M	M
	Authentication of PT	8.24 [8]	M	M
DPRS-N.15, Alerting		4.3.4	O	O
	PT alerting	8.14 [8]	M	M
DPRS-N.16, ZAP		4.3.4	O	O
	Obtaining access rights	8.30 [8]	M	M
	Incrementing the ZAP value	8.26 [8]	M	M
	Authentication of FT	8.23 [8]	O	M
DPRS-N.17, Encryption activation FT initiated		4.3.4	M	M
	Cipher-switching initiated by FT	8.33 [8]	M	M
	Storing the Derived Cipher Key (DCK)	8.27 [8]	M	M
DPRS-N.18, Subscription registration user procedure on-air		4.3.4	M	M
	Obtaining access rights	8.30 [8]	M	M
	Terminal capability indication	12.3	M	M
DPRS-N.19, Link control		4.3.4	M	M
	Indirect FT initiated link establishment	12.11	M	M
	Fast Paging	12.12	O	O
	Collective and group ringing	12.13	O	O
	Direct FT initiated link establishment	12.14	O	O
	Direct PT initiated link establishment	8.36 [8]	M	M
	Link release "normal"	8.37 [8]	M	M
	Link release "abnormal"	8.38 [8]	M	M
	Link release "maintain"	8.39 [8]	I	I
	LCE Resume Paging	12.15	M	C111
DPRS-N.20, Terminate access rights FT initiated		4.3.4	M	O
	FT terminating access rights	8.31 [8]	M	M
	Authentication of FT	8.23 [8]	O	M
DPRS-N.21, Partial release		4.3.4	O	O
	Partial release	8.9 [8]	M	M
DPRS-N.22, Go to DTMF (infinite tone length)		4.3.4	O	O
	Sending keypad information	8.10 [8]	M	M
DPRS-N.23, Go to Pulse		4.3.4	O	O
	Sending keypad information	8.10 [8]	M	M
DPRS-N.24, Signalling of display characters		4.3.4	O	O
	Display	8.16 [8]	M	M
	Terminal capability indication	12.3	M	M
DPRS-N.25, Display control characters		4.3.4	O	O
	Display	8.16 [8]	M	M
	Terminal capability indication	12.3	M	M
DPRS-N.26, Authentication of FT		4.3.4	O	O
	Authentication of FT	8.23 [8]	M	M

Feature/Procedure mapping			Status	
Feature	**Procedure**	**Ref.**	**PT**	**FT**
DPRS-N.27, Encryption activation PT initiated		4.3.4	O	O
	Cipher-switching initiated by PT	12.9	M	M
	Storing the DCK	8.27 [8]	M	M
DPRS-N.28, Encryption deactivation FT initiated		4.3.4	O	O
	Cipher-switching initiated by FT	8.33 [8]	M	M
DPRS-N.29, Encryption deactivation PT initiated		4.3.4	O	O
	Cipher-switching initiated by PT	12.9	M	M
DPRS-N.30, Calling Line Identification Presentation (CLIP)		4.3.4	O	O
	Incoming call request	12.2	M	M
DPRS-N.31, Internal call		4.3.4	O	O
	Internal call set-up	8.18 [8]	M	M
	Internal call keypad	12.4	O	O
DPRS-N.32, Service call		4.3.4	O	O
	Service call set-up	8.20 [8]	M	M
	Service call keypad	8.21 [8]	O	O
DPRS-N.33, Dynamic parameters allocation		4.3.4	M	M
	Dynamic parameters allocation	12.8	M	M
DPRS-N.34, Service Negotiation		4.3.4	M	M
	Call Resources/Parameters negotiation	12.5	M	M
DPRS-N.35, In call service change		4.3.4	O	O
	Bandwidth Change	12.6	M	M
	IWU-attributes change	12.7	M	M
DPRS-N.36, NWK layer management		4.3.4	M	M
	Management of MM procedures	12.18	M	M
	Management - Location registration initiation	13.2 [8]	M	C113
	Management - Assigned individual TPUI	13.3 [8]	M	C113
	Management - PMID	12.19	M	M
	Management - DCK	13.6 [8]	M	M
	Management - Broadcast attributes	12.17 [8]	M	M
	Management - Storage of subscription related data	13.7 [8]	M	M
	U-plane handling	12.17	M	M
	Length of NWK layer messages	12.20	M	M
	Identities	12.21	M	M
DPRS-N.37, Identity Assignment		4.3.4	O	O
	Temporary Identity Assign	12.10	M	M
DPRS-N.38, DECT External handover		5.1 [8]	O	O
	Handover candidate indication	9.1.1.1 [8]	M	M
	Handover candidate retrieval	9.1.1.2 [8]	M	O
	Target FP selection	9.1.2 [8]	M	N/A
	Handover reference indication	9.1.3.1 [8]	M	C112
	Handover reference retrieval	9.1.3.2 [8]	M	C112
	External handover call setup	9.1.4 [8]	M	M
	Ciphering procedure PT initiated	9.1.5.1 [8]	O	O
	Ciphering procedure FT initiated	9.1.5.2 [8]	M	M
	U-plane handling	9.1.6 [8]	M	M
DPRS-N.39, Message Waiting Indication		5.1 [8]	O	O
	Message waiting indication	9.7 [8]	M	M
DPRS-N.40, Detach		5.1 [8]	O	O
	Detach	9.5 [8]	M	M
DPRS-N.41, Periodic location registration		5.1 [8]	O	O
	Enhanced location registration	9.6 [8]	M	M

Feature/Procedure mapping			Status	
Feature	**Procedure**	**Ref.**	**PT**	**FT**
DPRS-N.42, On-air modification of user parameters		5.1 [8]	O	O
	On-air modification of user parameters	9.8 [8]	M	M
	FT authentication	8.23 [8]	M	M
C111: If single cluster system: O else M. C112: At least one of these procedures shall be supported. C113: If DPRS-N.11 then M else I.				
NOTE: The reference column refers to the relevant clause in the present document, except where stated otherwise.				

8.3 Application features

Table 12: Application features status

Feature supported			Status	
Item no.	**Name of feature**	**Reference**	**PT**	**FT**
DPRS-A.1	AC_bitstring_mapping	4.3.5	M	M
DPRS-A.2	Multiple subscription registration	4.3.5	O	N/A
DPRS-A.3	Manual entry of the PARK	4.3.5	O	N/A
NOTE: The reference column refers to the relevant clause in the present document.				

8.4 Application feature to procedure mapping

Table 13: Application feature to procedure mapping

Feature/Procedure mapping			Status	
Feature	**Procedure**	**Ref.**	**PT**	**FT**
DPRS-A.1, AC to bitstring mapping		4.3.5	M	M
	AC to bitstring mapping	14.2 [8]	M	M
DPRS-A.2, Multiple subscription registration		4.3.5	O	N/A
	Subscription control	14.1 [8]	M	N/A
DPRS-A.3, Manual entry of the PARK		4.3.5	O	N/A
	Manual entry of the PARK	14.3 [8]	M	N/A
NOTE: The reference column refers to the relevant clause in the present document, except where stated otherwise.				

8.5 Distributed Communications

8.5.1 Distributed Communications features

Table 14: Distributed Communications feature status

Feature supported			Status		
Item no.	**Name of feature**	**Reference**	**PT**	**FT**	**HyP**
DPRS-DC.1	Distributed Communications	4.3.6	O	O	M
NOTE: The reference column refers to the relevant clause in the present document.					

8.6 Distributed Communications feature to procedure mapping

Table 15: Distributed Communication feature to procedure mapping

Feature/Procedure mapping					
Feature/Procedure			Status		
Feature Name	Procedure name	Reference	PT	FT	HyP
DPRS-DC.1		4.3.6	O	O	M
	General Requirements	13.2	M	M	M
	HyP Identities handling	13.3.1	N/A	M	M
	Membership Access Rights Allocation	13.3.2	M	M	M
	Re-initialization of membership access rights	13.3.3	M	M	M
	Members Data Transfer	13.3.4	M	M	M
	Presence/Absence Indication	13.3.5	M	M	M
	Bandwidth management	13.3.6	M	M	M
	Direct Link Establishment	13.3.7	M	M	M
	Indirect Link Establishment	13.3.8	M	M	M
	MASTER management	13.3.9	M	M	M
	Common Subscription Database management	13.3.10	M	M	M
	Handover issues	13.3.11	M	M	M
	Usage of PPs or FPs in DCDL-net	13.5	M	M	M
NOTE: The reference column refers to the relevant clause in the present document.					

A.1.9 Management Entity requirements (modify clause 9 of EN 301 649)

Clause 9 of EN 301 649 [16] shall be modified as follows:

9 Management Entity requirements

9.1 Introduction

The Management Entity (ME) is responsible for management of physical resources and logical associations between and into the DECT protocol layers.

9.1.1 Management Entity (ME) operation modes

DPRS provides two operation modes of the Management Entity (ME): Class 1 and Class 2. ME Class 1 mode shall be used for CC and MM Service Class 1 (clause 4.3.8) and ME Class 2 mode shall be used for CC and MM Service Class 2 clause (4.3.8)

Table 16: Management Entity operation mode status

Feature supported			Status	
Service	Name of feature	Ref.	PT	FT
DPRS-ME.1	Class 1 management	4.3.7	C162	C162
DPRS-ME.2	Class 2 management	4.3.7	C163	C163
C162: IF DPRS CC and MM Service Class 1 supported [DPRS-G.1] THEN M ELSE I. C163: IF DPRS CC and MM Service Class 2 supported [DPRS-G.2] THEN M ELSE I.				
NOTE: The reference column refers to the relevant clause in the present document.				

9.1.2 Management Entity (ME) mode to procedures mapping

Table 17: Management Entity mode to procedures mapping

Feature/Procedure mapping			Status	
Service	**Procedure**	**Reference**	**PT**	**FT**
DPRS-ME.1, Class 1 management		4.3.7	C172	C172
	Logical Connection management	9.4.1, 9.2.2	M	M
	Suspend management	9.3.1.2, 9.3.2.2	M	M
	Resume management	9.3.1.1.2, 9.3.2.1	M	M
	Stay Alive	9.4.3	M	M
	Dynamic Bandwidth management	9.3.1.4, 9.3.2.3	C171	C171
DPRS-ME.2, Class 2 management		4.3.7	C173	C173
	Logical Connection management	9.4.2, 9.2.3	M	M
	Suspend management	9.3.1.2, 9.3.2.2	M	M
	Resume management	9.3.1.1.2, 9.3.2.1	M	M
	Stay Alive	9.4.3	M	M
	Dynamic Bandwidth management	9.3.1.4, 9.3.2.3	C171	C171
C171: IF (DPRS-M.5. Multi bearer Physical connection setup) THEN M ELSE I. C172: IF DPRS CC and MM Service Class 1 supported THEN M ELSE I. C173: IF DPRS CC and MM Service Class 2 supported THEN M ELSE I.				
NOTE: The reference column refers to the relevant clause in the present document.				

A.1.10 MAC layer Procedures

A.1.10.1 General (modify clause 10.1 of EN 301 649)

Clause 10.1 of EN 301 649 [16] shall be modified as follows:

10.1 General

10.1.1 Frame and multiframe structure

The FT and PT shall support frame and multiframe structures as defined in EN 300 175-3 [3], clause 4.2.

10.1.2 Bit mappings

The FT and PT shall support the D-field mappings as defined in EN 300 175-3 [3], clause 6.2.1.1 for the supported Physical Packets (clause 5.1, table 5) and modulation schemas (clause 5.2, table 5a).

The FT and PT shall support the A-field mappings as defined in EN 300 175-3 [3], clause 6.2.1.2 for the supported modulation schemas (clause 5.2, table 5a).

The FT and PT shall support the B-field mappings as defined in EN 300 175-3 [3], clause 6.2.1.3 for the supported Physical Packets (clause 5.1, table 5) and modulation schemas (clause 5.2, table 5a).

10.1.3 Multiple bitmappings rule

All bearers in use by the PT and FT in the same connection shall be identical regarding slot type and B-field CRC schema. However, if the PT or FT supports multiple slots an/or B-field CRC-schemas, they can be different for different connections.

NOTE: In I_{PQ} or I_P encodec protected MAC services, the switching to multisubfield CRC schema due to the insertion of E or E+U type mux is not considered for this rule and can happen on a bearer-by-bearer basis.

10.1.4 Scrambling

The FT and PT shall support scrambling as defined in EN 300 175-3 [3], clause 6.2.4.

10.1.5 Error control

The FT and PT shall support R-CRC and X-CRC generation as defined in EN 300 175-3 [3], clause 6.2.5.

For modulation schemes 1a and 1b as defined in clause 5.2 of the present document, FT and PT shall support 16-Bit R-CRC as defined in EN 300 175-3 [3], clause 6.2.5.2.

For modulation schemes 2 and 3 as defined in clause 5.2 of the present document, FP and PT shall support 32-Bit CRC as defined in EN 300 175-3 [3], clause 6.2.5.5.

10.1.6 void

10.1.7 void

10.1.8 RFP idle receiver scan sequence

The FT shall support primary scan as defined in EN 300 175-3 [3], clause 11.8.

10.1.9 PT receiver scan sequence

The PT receive scan sequence, whenever active, shall lead the RFP primary scan by one frame, as defined in EN 300 175-3 [3], clause 11.9.

If PT has blind slots, i.e. slots on which setup of bearer is not possible due to implementation limitations these shall be indicated during subscription and location registration to the FT as described in clause 12.3.

NOTE: Indication for PT blind slots has been introduced to the present document after version 1.1.1. Therefore PTs developed before version 1.2.0 may have limitation but will not be able to indicate them to the FT. Therefore, a FT supporting fast setup should be aware that failure of the setup may be due to PT limitations which have not been announced. Some examples of possible limitations could be inability of the PT to receive setup on slots adjacent to the slot on which the PT is locked or currently transmitting, or PT is able to receive only on every second slot odd or even. In such situation the FT should repeat the setup on different slot expecting possible limitations.

10.1.10 PP states and state transitions

The procedure shall be performed as specified in EN 300 175-3 [3], clause 11.3.3, with the following provisions:

- The PT shall allow fast setup (if supported) for a period of time immediately following the transition from Active_Locked to Idle_Locked state. The duration of this period is communicated to MAC by ME (see clause 9.3.1.3).

10.1.11 Identities

The provisions of EN 300 175-3 [3], clause 11.7 and EN 300 175-6 [6] shall be implemented with respect to the structure and use of identities.

A.1.10.2 Q_T - FP capabilities (modify clause 10.3.2.2 of EN 301 649)

Clause 10.3.2.2 of EN 301 649 [16] shall be modified as follows:

10.3.2.2 Q_T - FP capabilities

10.3.2.2.1 Standard FP Capabilities

The FP shall indicate its standard capabilities using the fixed part capabilities Q_T message as described in EN 300 175-3 [3], clause 7.2.3.4, with contents as defined below. The PT shall be able to receive and understand this message.

Table 22: Values used within standard FP capabilities

MAC message	Field within the message	Standard values within the MAC message	Normative action/comment
<< FP capabilities >>			
	< Q_H >	3	
	< a_{12} >	1	Extended FP info
	< a_{17} >	1	Full slot.
	< a_{19} >	[0, 1]	low duty cycle Idle_Locked mode allowed.
	< a_{21} >	[0, 1]	C/L uplink, relates to Distributed communication.
	< a_{22} >	[0, 1]	C/L downlink, relates to procedure Dynamic Parameter Allocation, clause 12.8, SI_P service and Distributed communication.
	< a_{25} >	1	B-field set-up.
	< a_{26} >	[0, 1]	C_F messages, if PT supports only C_S messages it may ignore this value.
	< a_{29} >	1	I_P_error_detect.
	< a_{30} >	[0, 1]	I_P_error_correction, if PT supports only I_P_error_detect it may ignore this value.
	< a_{31} >	[0, 1]	Multibearer connections.
NOTE: For the higher layer capabilities, bits < a_{32} – a_{47} >, see clause 12.16.			

In case of mobility class 2, the MAC extended fixed part information message shall be used and, therefore, bit a_{12} of the fixed part information field shall be set to 1

10.3.2.2.2 Extended FP capabilities

The FP shall indicate its extended capabilities using the Extended fixed part capabilities Q_T message as described in EN 300 175-3 [3], clause 7.2.3.5, with contents as defined below. The PT shall be able to receive and understand this message.

Table 23: Values used within extended FP capabilities

MAC message	Field within the message	Standard values within the MAC message	Normative action/comment
<< FP capabilities >>			
	< Q_H >	4	
	< a_{21} >	1	MAC suspends and resume procedure supported.
	< a_{22} >	[0, 1]	I_{PQ} services supported.
	< a_{23} >	1	Extended FP capabilities Part 2
NOTE: For the higher layer capabilities, bits < a_{25} – a_{47} >, see clause 12.16.			

In case of mobility class 2, the MAC extended fixed part capability part 2, information message shall be used and, therefore, bit a_{23} of the extended FP capability field shall be set to 1.

10.3.2.2.3 Extended FP capabilities part 2

The FP shall indicate its extended capabilities using the extended fixed part capabilities part 2 Q_T message as described in EN 300 175-3 [3], clause 7.2.3.11, with contents as defined below. The PT shall be able to receive and understand this message.

Table 23a: Values used within extended FP capabilities part 2

MAC message	Field within the message	Standard values within the MAC message	Normative action/comment
<< FP capabilities >>			
	< Q_H >	C (hex)	
	< a_{12} >	[0, 1]	Long slot support (j = 640)
	< a_{13} >	[0, 1]	Long slot support (j = 672)
	< a_{14} >	[0, 1]	E+U-type mux and channel I_{PF} basic procedures supported (see note 2)
	< a_{15} >	[0, 1]	channel I_{PF} advanced procedures supported (see note 2)
	< a_{16} >	[0, 1]	channel SI_{PF} supported (see note 2)
	< a_{17} >	[0, 1]	channel G_F supported (see note 3)
NOTE 1: For the higher layer capabilities, bits < a_{24} – a_{47} >, see clause 12.16. NOTE 2: See clauses 10.21.2.3 and 10.22 for E+U type mux and channel I_{PF} procedures. NOTE 3: This bit indicates that the FP is able to receive the G_F channel.			

A.1.10.3 PT initiated single duplex bearer setup (modify clause 10.10.1.1 of EN 301 649)

Clause 10.10.1.1 of EN 301 649 [16] shall be modified as follows:

10.10.1.1 PT initiated single duplex bearer setup

This procedure shall be performed as defined by EN 300 175-3 [3], clause 10.5.1.3.1.

Optionally, a number of WAIT messages may be exchanged between "bearer_request" and "bearer_confirm" if required by the implementation.

NOTE: The use of WAIT messages should be avoided since it slows down the procedure.

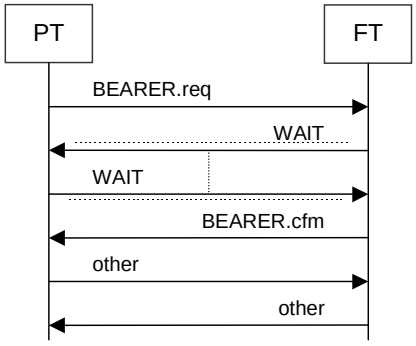


Figure 5: PT initiated setup of single duplex bearer

A.1.10.4 FT initiated single duplex bearer setup (modify clause 10.10.1.2 of EN 301 649)

Clause 10.10.1.2 of EN 301 649 [16] shall be modified as follows:

10.10.1.2 FT initiated single duplex bearer setup

This procedure shall be performed as defined by EN 300 175-3 [3], clause 10.5.1.3.2.

The FT initiated connection setup is also referred to as fast setup. The only bearer-request message allowed in this case is the access-request. Optionally a number of WAIT messages may be exchanged between "bearer_request" and "bearer_confirm" if required by the implementation.

NOTE: The use of WAIT messages should be avoided since it slows down the procedure.

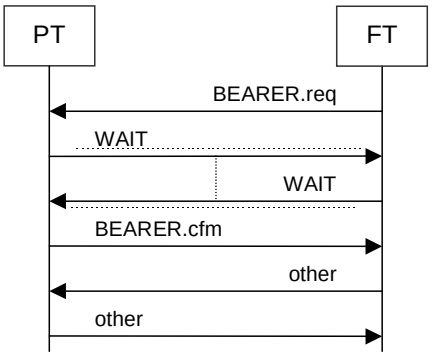


Figure 6: FT initiated setup of pilot bearer (fast setup)

A.1.10.5 PT initiated Single duplex bearer setup (remove from clause 10.10.2 of EN 301 649)

The following note shall be removed from clause 10.10.2 of EN 301 649 [16]:

NOTE 2: Each side has a line for the duplex bearer and a line for the double simplex bearer. All channel list messages should be sent at the same duplex bearer.

A.1.10.6 Bearer quality report (modify clause 10.16.3 of EN 301 649)

Clause 10.16.3 of EN 301 649 [16] shall be modified as follows:

10.16.3 Bearer quality report

Receiver side will send bits Q1 and Q2 reporting quality of received bearers. Report shall be done in bits a_3 and a_7 of a field in the reverse bearer in case of duplex bearers. In I_P_error_correct service, the bit Q2 shall be set as defined in EN 300 175-3 [3], clause 10.8.2.4.1, and the bit BCK, set as defined in EN 300 175-3 [3], clause 10.8.2.4.2, shall be send in the place of bit Q1.

The bit Q1 shall be set as defined in EN 300 175-3 [3], clause 10.8.1.3.4. The bit Q2 shall be set as described in EN 300 175-3 [3], clause 10.8.1.3.3.

FT and PT should use the information of the received bits Q1 and Q2 to take the decision to perform bearer replacement procedures.

FT may use the information of the Q1 and Q2-bits sent by the PT, to decide whether to switch antenna or not.

10.16.3.1 Bearer quality report for asymmetric bearers

For asymmetric connections, the bits Q1 and Q2 reporting quality of the double simplex bearers shall be carried by means of the "bearer quality in an asymmetric connection" message, (EN 300 175-3 [3], clause 7.3.4.4).

The bit Q1 shall be set as defined in EN 300 175-3 [3], clause 10.8.1.3.4. The bit Q2 shall be set as described in EN 300 175-3 [3], clause 10.8.1.3.3. In I_P_error_correct service, the bit Q2 shall be set as defined in EN 300 175-3 [3], clause 10.8.2.4.1, and the bit BCK, set as defined in EN 300 175-3 [3], clause 10.8.2.4.2, shall be send in the place of bit Q1.

FT and PT should use the information of the received bits Q1 and Q2 to take the decision to perform bearer replacement procedures.

FT may use the information of the Q1 and Q2-bits sent by the PT, to decide whether to switch antenna or not.

By negotiation it is possible to avoid the insertion of the message in all frames, or to suppress the message. In this case the procedure described in clause 10.16.4 shall be used for quality control purposes (see note 3).

The negotiation is performed as described in clause 12.8.

In absence of negotiation the report shall be send in all frames.

NOTE 1: The bearer carrying the message is called "special bearer" (see EN 300 175-3 [3], clause 5.6.2.2).

NOTE 2: There is the possibility to send the message in more than one bearer, however the content of the message is to be always updated according to the time it is sent.

NOTE 3: The suppression of the "bearer quality in an asymmetric connection" message deactivates the DECT basic quality feedback mechanism (bits Q1/Q2) and should be only done under very good and steady radio quality conditions. The alternative procedure has a slower response time and a limited control capability and may not handle properly the case of simultaneous loss of quality on several bearers.

A.1.10.7 G_F channel (modify clause 10.20 of EN 301 649)

Clause 10.20 of EN 301 649 [16] shall be modified as follows:

10.20 G_F channel

10.20.1 G_F channel data

10.20.1.1 G_F channel transmission

The transmitter side of FT and PT shall support the G_F channel transmission as defined in EN 300 175-3 [3], clause 7.3.6.

10.20.1.2 G_F channel reception

The receiver side of FT and PT shall support the of G_F channel reception, as defined in EN 300 175-3 [3], clause 7.3.6,.and shall understand the frame format FU10c when transmitted over G_F channel.

A.1.10.8 Time multiplexers (add to clause 10 of EN 301 649)

A new clause with the following text shall be added to clause 10 of EN 301 649 [16]:

10.21 Time multiplexers

10.21.1 A-field multiplexer

10.21.1.1 Tail multiplexer (T-MUX)

The FT and PT shall support T-MUX as defined in EN 300 175-3 [3], clause 6.2.2.1.

10.21.1.2 A-tail identifications

The FT and PT shall understand all A-field tail identifications (bits a_0 to a_2) as defined in EN 300 175-3 [3], clause 7.1.2. The value 101 - "escape" need not be understood. To distinguish a connectionless bearer from a non-connectionless bearer the N_T message send on a connectionless bearer shall carry the value "Identity information (N_T) on connectionless bearer" (010) and the value "Identity information (N_T)"(011) in all other cases.

10.21.2 B-field control multiplexer (E/U-MUX)

10.21.2.1 B-field control multiplexer (E/U-MUX), basic modes

10.21.2.1.1 U-type multiplexer

The FT and PT shall support U-type mode multiplexer as defined in EN 300 175-3 [3], clause 6.2.2.2.

10.21.2.1.2 E-type multiplexer, all MAC control

The FT and PT shall support E-type mode multiplexer as defined in EN 300 175-3 [3], clauses 6.2.2.2 and 6.2.2.3 with the following restriction:

- Only the "all MAC control" mode (channels M and G_F, BA code "110"), shall be supported.

The FT and PT shall support the E-type mode "all MAC control" as defined in EN 300 175-3 [3], clause 6.2.2.3 (tables 6.24 to 6.33) for the supported D-field mappings (defined in clause 6.2, table 7) and modulation type (defined in clause 5.1, table 5).

10.21.2.1.3 E/U-Mux priority schema

The FT and PT shall support the priority schema as defined in EN 300 175-3 [3], clause 6.2.2.4 with the following restriction:

- I_{PF} channel modes and I_{PF} segmentation control are not applicable;
- C_F channel modes are not applicable.

10.21.2.1.4 B-field identifications (basic)

The FT and PT shall use and understand all B-field identifications (bits a_4 to a_6) as defined in EN 300 175-3 [3], clause 7.1.4 with the following restrictions:

- Codes for E-mux with C_F channel ("010", "011", "100" and "101") are not applicable.
- Code "110" is only understood as "E-type all MAC control".
- Code "111" is only understood as "no B-field".

10.21.2.2 B-field control multiplexer (E/U-MUX), C_F modes

10.21.2.2.1 E-type multiplexer, all modes

The FT and PT shall support E-type mode multiplexer as defined in EN 300 175-3 [3], clauses 6.2.2.2 and 6.2.2.3, including the modes "E-type all C_F", and "E-type not all C_F".

The FT and PT shall support all E-type modes as defined in EN 300 175-3 [3], clause 6.2.2.3 (tables 6.24 to 6.33) for the supported D-field mappings (defined in clause 6.2, table 7) and modulation type (defined in clause 5.1, table 5).

10.21.2.2.3 E/U-Mux priority schema

The FT and PT shall support the priority schema as defined in EN 300 175-3 [3], clause 6.2.2.4 with the following restriction:

- I_{PF} channel modes and I_{PF} segmentation control are not applicable.

10.21.2.2.4 B-field identifications (C_F)

The FT and PT shall use and understand all B-field identifications (bits a_4 to a_6) as defined in EN 300 175-3 [3], clause 7.1.4 with the following restrictions:

- Code "110" is only understood as "E-type all MAC control".
- Code "111" is only understood as "no B-field".

10.21.2.3 B-field control multiplexer (E/U-MUX), E+U modes

10.21.2.3.2 E+U-type multiplexer

The FT and PT shall support the E+U type multiplexer as defined in EN 300 175-3 [3], clauses 6.2.2.2 and 6.2.2.3.

The FT and PT shall support all E+U-type modes as defined in EN 300 175-3 [3], clause 6.2.2.3 (tables 6.24 to 6.33) for the supported D-field mappings (defined in clause 6.2, table 7) and modulation type (defined in clause 5.1, table 5).

10.21.2.3.3 E/U-Mux priority schema

The FT and PT shall support the priority schema as defined in EN 300 175-3 [3], clause 6.2.2.4.

10.21.2.3.4 B-field identifications (E+U type)

The FT and PT shall use and understand all B-field identifications (bits a_4 to a_6) as defined in EN 300 175-3 [3], clause 7.1.4 with the following restrictions:

- Codes for E-mux with C_F channel ("010", "011", "100" and "101") are only applicable if C_F channel is supported.
- Code "111" is only used for E+U type mux if MAC service I_P_error_correct is used. Otherwise it means "no B-field".

A.1.10.9 I_{PF} channel (add to clause 10 of EN 301 649)

A new clause with the following text shall be added to clause 10 of EN 301 649 [16]:

10.22 I_{PF} channel

10.22.1 I_{PF} channel general

The FT and PT shall support the higher layer U-Plane channel in E+U type slots (I_{PF}) as defined in EN 300 175-3 [3], clauses 5.3.1.4 and 10.8.4.

The FT and PT shall support the "Null or I_{PF} segmentation info" message as defined in EN 300 175-3 [3], clause 7.3.3, using and understanding the meaning of the "spare or I_{PF} segmentation info" field, and all NCF header codes.

The FT and PT shall use and understand all NCF codes in the message "G_F channel data packet" as defined in EN 300 175-3 [3], clause 7.3.6.

The FT and PT shall activate the I_{PF} channel and the E+U type multiplexer (see clause 10.21.2.3) as defined in EN 300 175-3 [3], clause 10.8.4.2.

The FT and PT shall support the I_{PF} channel basic procedures as defined in EN 300 175-3 [3], clause 10.8.4.3.1.

The FT and PT shall support the special case procedure as defined in EN 300 175-3 [3], clause 10.8.4.3.3, if the B-field mapping of the supported slot type (defined in clause 6.2, table 7) and modulation type (defined in clause 5,1, table 5), produces a MAC packet size (DLC PDU) not multiple of 64 bits.

The FT and PT shall support the I_{PF}_error_detect operation procedures as defined in EN 300 175-3 [3], clause 10.8.4.5.

The FT and PT shall support the backcompatibility rule as defined in EN 300 175-3 [3], clause 10.8.4.7.

10.22.2 I_{PF} channel advanced procedures

The FT and PT shall support the I_{PF} channel advanced procedures as defined in EN 300 175-3 [3], clause 10.8.4.3.2.

10.22.3 I_{PF} channel error_correct procedures

The FT and PT shall support the I_{PF} channel error_correct procedures as defined in EN 300 175-3 [3], clause 10.8.4.4.

10.22.4 SI_{PF} channel

The FT and PT shall support the connectionless U-Plane channel in E+U type slots, (SI_{PF}) as defined in EN 300 175-3 [3], clause 5.3.2.3.

A.1.11 DLC layer procedures

A.1.11.1 Insertion of FU10c frames in FU10a frames of the opposite link (add to clause 11.2.3 of EN 301 649)

A new clause with the following text shall be added to clause 11.2.3 of EN 301 649 [16]:

11.2.3.1 Insertion of FU10c frames in FU10a frames of the opposite link

The FT and PT shall support the transport of FU10c frames by insertion in the frame FU10a of the opposite link using the procedure described in EN 300 175-4 [4], clause 12.11.2.1.

The sending side can take dynamically the decision on how to transport the FU10c frames according to traffic and situation of the E/U mux multiplexer of the bearers used in the connection.

NOTE 1: As general rule, the sending side should avoid the use of G_F channel using instead the FU10a insertion mechanism if there is no bearer with E/U mux in selection E or E+U due to other reason.

NOTE 2: The FU10a insertion mechanism is recommended in any case for FU10c frames related to the backward link in an asymmetric connection (FU10c sent in forward direction).

NOTE 3: For FU10c frames related to the forward link (FU10c frames sent on backward channel), it is recommended the use of the G_F channel, if the backward slot (or if any of them, if there are more than one) is in E or E+U mux selection due to other channel (f.i. MAC control).

A.1.12 NWK layer procedures

A.1.12.1 Terminal capability indication (modify clause 12.3 of EN 301 649)

Clause 12.3 of EN 301 649 [16] shall be modified as follows:

12.3 Terminal capability indication

The procedure shall be performed as defined in EN 300 444 [8], clause 8.17. The following text together with the associated clauses defines the mandatory requirements with regard to the present document.

In addition the following fields need to be supported in regard to the particular DPRS application supported, see annexes B and C.

Table 69: Values used within the << TERMINAL CAPABILITY >> information element

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<< Terminal capability >>			
	< ext3 >	1,0	
	< Tone capability >	All	DPRS does not support tone capability. PT shall set it according to its capabilities; the FT is not required to understand it.
	< Display Capability >	All	PT shall set it according to its capabilities; the FT is not required to understand it if the FT does not provide DECT display services.
	< Echo parameter >		See note 3.
	< N-REJ >		See note 3.
	< A-VOL >		See note 3.
	< ext4 >	0	
	< Profile indicator_1 >	"xxxxx1x"B	(I) - Out of scope for DPRS, need not to be supported.
		"x1xxxxx"B	DPRS Stream support (see note 1).
		"1xxxxxx"B	Asymmetric bearer.
	< ext4a >	0	
	< Profile indicator_2 >	"xxxxxx1"B	DPRS FREL support (see note 1).
	< ext4b >	0	
	< Profile indicator_3 >	"x1xxxxx"B	Ethernet support (see note 2).
		"1xxxxxx"B	Token Ring support (see note 2).
	< ext4c >	0	
	< Profile indicator_4 >	"xxxxxx1"B	IP support (see note 2).
		"xxxxx1x"B	PPP support (see note 2).
		"xxxx1xx"B	V.24 support (see note 2).
		"xxx1xxx"B	C_F supported. The support of the C_F is optional.
		"xx1xxxx"B	I_{PQ} services supported. Optional for 2-level modulation scheme.
		"1xxxxxx"B	Generic media encapsulation transport supported (see note 2).
	< ext4d >	0	See note 5.
	< Profile indicator_5 >	"x x x x x 1"B	2-level modulation scheme supported (B + Z field).
		"x x x x 1 x"B	4-level modulation scheme supported (B + Z field) - Optional.
		"x x x x 1 x x"B	8-level modulation scheme supported (B + Z field) - Optional.
		"x x 1 x x x x"B	2-level modulation scheme supported (A field).
	< Control codes >	All	PT shall set it according to its capabilities; the FT is not required to understand it if the FT does not provide DECT display services or does not support control codes.
	< ext4e >	0	
		"x x 1 x x x x"B	C691 (E+U-type mux and channel I_{PF} basic procedures supported).
		"x 1 x x x x x"B	OPTIONAL (Channel I_{PF} advanced procedures supported).
		"1 x x x x x x"B	OPTIONAL (Channel SI_{PF} supported).
	< ext4f >	1	
	<Packet data category>	All	OPTIONAL (NG-DECT Packet Data Category).
		"1 x x x x x x"B	C692 (Channel G_F supported).
	< ext6 >	0,1	

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
	< Blind slot indication >	All	PT shall set the value according to its support; FT shall understand all values in order to be able to setup bearers. Value "11" shall be used to indicate that the FT shall read the following SPx fields in order to establish the exact PT limitations (see note 4).
	< SP0 > to < SP4 >	All	PT shall set the value according to its support; FT shall understand all values in order to be able to setup bearers (see note 4).
	< ext6a >	1	
	< SP5 > to < SP11 >		PT shall set the value according to its support; FT shall understand all values in order to be able to setup bearers (see note 4).
C691: IF DPRS-M.23 THEN MANDATORY ELSE OPTIONAL. C692: IF DPRS-M.19 THEN MANDATORY ELSE OPTIONAL.			
NOTE 1: At least one of these bit maps shall contain 1. NOTE 2: At least one of these bit maps shall contain 1. NOTE 3: All this values are out of the scope of the DPRS and need not to be included; however, if an application wished to indicate Display capabilities including octets from Octet 3d onwards, these fields may be set to "Not applicable". NOTE 4: PTs that have limitations shall always indicate them. However, as this requirement for indication of the PT blind slots has been introduced to DPRS after version 1.1.1, some PTs developed before this change may still have limitation but will not be able to indicate them to the FT. Therefore, a FT supporting fast setup should be aware that failure of the setup may be due to PT limitations which has not been announced. Some examples of possible limitations could be inability of the PT to receive setup on slots adjacent to the slot on which the PT is locked or currently transmitting, or PT is able to receive only on every second slot odd or even. In such situation the FT should repeat the setup on different slot expecting possible limitations. NOTE 5: All Profile indicators fields shall be included and set according to the support of the particular item. For backwards compatibility, if Profile_indicator_5 is not included it shall be understood that the PT supports only 2-level modulation scheme.			

A.1.12.2 Broadcast attributes management (modify clause 12.16 of EN 301 649)

Clause 12.16 of EN 301 649 [16] shall be modified as follows:

12.16 Broadcast attributes management

RFPs belonging to the same LA shall broadcast the same values of higher layer attributes (see EN 300 175-5 [5], annex F) at any given time.

12.16.1 Higher Layer (HL) capabilities

The Higher Layer Fixed Part Information (HLFPI) field shall be used with the information described in table 98.In the case that the FP is capable of supporting encryption, this shall use the DECT standard algorithm and shall be signalled to the PP by the setting of the MAC Q channel Higher Layer Information (HLI) message bit a_{37}.

The DPRS PP shall be capable to read and interpret at least the following broadcast attributes codings during locking procedure. In the locked state the PP may assume them as static.

Table 98: Higher Layer capabilities interpretation by the PP

BIT Number	Attribute	Value	Note
a_{34}	Non-voice circuit switched service	1	
a_{35}	Non-voice packet switched service	0	
a_{36}	Standard authentication required	[0, 1]	
a_{37}	Standard ciphering supported	[0, 1]	
a_{38}	Location registration supported	[0, 1]	See location update procedure as an exception.
a_{40}	Non-static FP	[0, 1]	A FP which is mounted on a moving vehicle.
a_{42}	CLMS service available	[0, 1]	FT may send this and PT need to understand it if FT supports CLMS services at NWK layer.
a_{44}	Access Rights requests supported	[0, 1]	The FP can toggle this bit to enable or disable on air subscription.
a_{45}	External handover supported	[0, 1]	FT may send this and PT need to understand it if DPRS-N.38 is supported.
a_{46}	Connection handover supported	[0, 1]	

12.16.2 Extended Higher Layer capabilities

The Extended Higher Layer Fixed Part Information (HLFPI) field shall be used with bit a_{46} and a_{45} indicating the support for DPRS frame relay and character oriented service and bits a_{27} - a_{33} indicating the supported interworking. Bit a_{41} shall be used to indicate the support of asymmetric bearers.

Table 99: Extended Higher Layer capabilities interpretation by the PP

BIT Number	Attribute	Value	Note
a_{27}	Generic Media encapsulation transport	[0, 1]	Depends on the actual service supported by the terminal (see note 1).
a_{29}	Ethernet	[0, 1]	Depends on the actual service supported by the terminal (see note 1).
A_{30}	Token Ring	[0, 1]	Depends on the actual service supported by the terminal (see note 1).
A_{31}	IP	[0, 1]	Depends on the actual service supported by the terminal (see note 1).
A_{32}	PPP	[0, 1]	Depends on the actual service supported by the terminal (see note 1).
A_{33}	V.24	[0, 1]	Depends on the actual service supported by the terminal (see note 1).
A_{41}	Asymmetric Bearers Supported	[0, 1]	Depends on the actual service supported by the terminal.
A_{45}	DPRS Stream support	[0, 1]	Depends on the actual service supported by the terminal (see note 2).
A_{46}	DPRS FREL support	[0, 1]	Depends on the actual service supported by the terminal (see note 2).
NOTE 1: At least one of these bits shall be set to "1". NOTE 2: At least one of these bits shall be set to "1".			

12.16.3 Extended Higher Layer capabilities part 2

The Extended Higher Layer capabilities, part 2, Fixed Part Information field shall be used with bits < a_{25} - a_{28} > indicating the packet data Category of the FT.

Table 99b: Extended Higher Layer Capabilities part 2 interpretation by the PP

BIT Number	Attribute	Value	Note
< a_{25} - a_{28} >	NG-DECT Packet Data Category	0	No Packet data supported or non categorized system
		1	Cat 1: data Category 1 (see note)
		2	Cat 2: data Category 2 (see note)
		3	Cat 3: data Category 3 (see note)
NOTE: See clause 4.2.4 for definition of Packet data Categories. Packet data Categories are incremental: Cat 3 systems also support Cat 1 and Cat 2; Cat 2 systems also support Cat 1.			

A.2 Amendments to EN 300 175-3 (DECT CI; MAC layer)

The following amendments to EN 300 175-3 [3] shall apply for the purpose of the present document.

A.2.1 Symbols and abbreviations

A.2.1.1 Symbols (add to clause 3.2 of EN 300 175-3)

The following entries shall be added to clause 3.2 of EN 300 175-3 [3]:

3.2 Symbols

E type	B-field multiplexer mode when the slot carries signalling only (channels C_F, G_F and M)
E+U type	B-field multiplexer mode when the slot carries U-plane data (channel I_{PF}) AND signalling (channels G_F and M)
E/U-mux	B-field multiplexer (switching between E, U or E+U modes)
I_{PF}	higher layer Information channel (protected) transported multiplexed with signalling in the E+U type slots
I_{PQ}	higher layer Information channel (protected) with single subfield format
SI_{PF}	higher layer connectionless channel (protected) transported multiplexed with signalling in the E+U type slots
U type	B-field multiplexer mode when the slot carries U-plane data only (channels $\mathbf{I_N}$ or I_P)

A.2.1.2 Abbreviations (remove from clause 3.3 of EN 300 175-3)

The following entry shall be removed from clause 3.3 of EN 300 175-3 [3]:

3.3 Abbreviations

E/U-MUX	switch between E-type and U-type MUltipleXes

A.2.2 Higher layer U-Plane channels I_{PF} and SI_{PF}

A.2.2.1 The higher layer U-Plane channels (modify clause 5.3.1.2 of EN 300 175-3)

Clause 5.3.1.2 of EN 300 175-3 [3] shall be modified as follows:

5.3.1.2 The higher layer U-Plane channels, I

Higher layer information from the DLC U-plane uses the I channels. These are the I_N channel and the I_P channel, and they have different MAC layer protection schemes. The higher layers choose one of the two channels, the I_N and I_P channels shall not be used in parallel for the same connection.

The I_N information is protected by limited MAC layer error detection (X-field) and may include a minimum delay mode for coded speech transmission. Depending on the physical packet size the MAC layer processes I_N channel data in fields of different length.

The I_P information is protected by MAC layer procedures, either error correction based on a modulo 2 retransmission scheme or just error detection based on 16 bits or 32 bits CRCs or error correction with Turbo Code. Three B-field formats for I_P channel data are available:

- the Encoded protected format;
- the Multisubfield protected format (service I_P); and
- the Singlesubfield protected format (service I_{PQ}).

The DLC layer requests a service type, maximum allowed transmission time, and target and minimum acceptable numbers of uplink and downlink bearers which the MAC layer tries to provide.

The I_{PF} channel (see clause 5.3.1.4) can also be used for transporting U-plane information, in slots carrying at the same time channels G_F and M.

A.2.2.2 The higher layer U-Plane channel in E+U type slots, I_{PF} (add to clause 5.3.1 of EN 300 175-3)

A new clause with the following text shall be added to clause 5.3.1 of EN 300 175-3 [3]:

5.3.1.4 The higher layer U-Plane channel in E+U type slots, I_{PF}

The channel I_{PF} is used to carry U-plane information in slots where the B-field multiplexer is in E+U type mode (see clause 6.2.2): In E+U type, the B-field carries C-plane signalling (channels G_F and M) in some of the subfields and U-plane data in the other subfields. The number of subfields used for U-plane data and C-plane signalling varies depending on modulation, slot type, and amount of signalling to be transported. The possible combinations are defined in clause 6.2.2.3.1.

At least one subfield carrying C-plane signalling should exist. Subfields with U-plane data are always at the end of the slot.

I_{PF} channel could be used either if the regular I service is I_P or I_{PQ} , and either if the service is provided with error correction (I_P_error_correct) or error detection only (I_P_error_detect).

Due to the variable number of subfields allocated for U-plane data, and the different size of the U-plane bits per slot, compared to normal I_P or I_{PQ} size, a segmentation mechanism is required to split regular I_P or I_{PQ} packets for transporting by the I_{PF} channel. This mechanism uses the MAC message "Null or segmentation information"

(see clause 7.3.3) and the NCF header of G_F channel message (see clause 7.3.6) in order to exchange segmentation information.

I_{PF} channel operation is described in clause 10.8.4.

I_{PF} channel is protected by MAC layer CRC (16 bits CRC for each subfield) and can be used with and without MAC ARQ.

A.2.2.3 The connectionless U-Plane channel in E+U type slots, SI_{PF} (add to clause 5.3.2 of EN 300 175-3)

A new clause with the following text shall be added to clause 5.3.2 of EN 300 175-3 [3]:

5.3.2.3 The connectionless U-Plane channel in E+U type slots, SI_{PF}

The equivalent of the I_{PF} channel for connectionless message control is the channel SI_{PF}. The SI_{PF} channel allows the transmission of reduced rate connectionless U-plane data multiplexed with connectionless MAC signalling broadcast.

SI_{PF} inherits all capabilities and procedures of I_{PF}, however with the following limitations:

- SI_{PF} can only operate in error_detection mode.
- There is no G_F channel in connectionless bearers.

A system can only support SI_{PF} channel if it also supports channel SI_P and channel I_{PF}.

A.2.3 Symmetric and Asymmetric connections

A.2.3.1 Symmetric connections (modify clause 5.6.2.1 of EN 300 175-3)

Text of clause 5.6.2.1 of EN 300 175-3 [3] and table 5.1 in the same clause shall be modified as follows:

5.6.2.1 Symmetric connections

A DECT symmetric connection has the same number of bearers in both directions and is composed of duplex bearers only.

The five symmetric service types are distinguished by their I channel data protection and their throughput:

type 1: I_N_minimum_delay: limited error protection, minimum delay, fixed throughput;

type 2: I_N_normal_delay: limited error protection, normal delay, fixed throughput;

type 3: I_P_error_detection: error detection capability, fixed throughput;

type 4: I_P_error_correction: error correction, variable throughput; and

type 5: I_P_encoded_protected.

NOTE 1: Service type 1 (I_N_minimum _delay) exists only as single bearer service. I_N_minimum_delay and I_N_normal_delay services have different I channel flow control (see clause 8.4).

NOTE 2: The throughput of service types 2 and 3 can vary if the MAC layer changes the number of bearers assigned to that connection.

Service type 3 using the single subfield protected B-field format is called I_{PQ}_error_detection; service types 4 using the single subfield protected B-field format is called I_{PQ}_error_correction.

The bearers of a symmetric connection shall be normally in U-type multiplexer mode. However, from time to time, they can be switched to E or E+U type mode to exchange signalling messages (channels M, G_F or C_F). During the time the bearer is in E or E+U type mode it cannot carry I_N, I_P, I_{PQ} channel data. However, if they are in E+U type mode, they can carry I_{PF} channel data;

The most important parameters of the five symmetric services are listed in tables 5.1, 5.2 and 5.3.

NOTE 3: In the channel capacity calculations, it is assumed that the all bearers are in U-type mux mode, since the switch to E-type or E+U-type, if needed, only happens occasionally.

Table 5.1: Symmetric services (2-level modulation)

ST	I channel capacity (kbit/s)	B-field multiplex schemes	NP	err det	err corr	maximum C_F (kbit/s)	delay (ms)
1d2	80	(U80a,E80)	I_N	No	No	64,0	≈ 10
1l2 (j=640)	64	(U64a,E64)	I_N	No	No	51,2	≈ 10
1f2	32	(U32a,E32)	I_N	No	No	25,6	≈ 10
1h2	8 + j/10	(U08a,E08)	I_N	No	No	6,4	≈ 10
2d2	k x 80	(U80a,E80)	I_N	No	No	64,0	15
2l2 (j=640)	k x 64	(U64a,E64)	I_N	No	No	51,2	15
2l2 (j=672)	k x 67,2	(U67a,E67)	I_N	No	No	51,2	15
2f2	k x 32	(U32a,E32)	I_N	No	No	25,6	15
2h2	8 + j/10	(U08a,E08)	I_N	No	No	6,4	15
3d2	k x 64,0	(U80b,E80)	I_P	Yes	No	64,0	15
3l2 (j=640)	k x 51,2	(U64b,E64)	I_P	Yes	No	51,2	15
3l2 (j=672)	k x 51,2	(U67b,E67)	I_p	Yes	No	51,2	15
3f2	k x 25,6	(U32b,E32)	I_P	Yes	No	25,6	15
3h2	6,4	(U08b,E08)	I_P	Yes	No	6,4	15
4d2	≤ k x 64,0	(U80b,E80)	I_P	Yes	Yes, ARQ	64,0	var
4l2 (j=640)	≤ k x 51,2	(U64b,E64)	I_P	Yes	Yes, ARQ	51,2	var
4l2 (j=672)	≤ k x 51,2	(U67b,E67)	I_p	Yes	Yes, ARQ	51,2	var
4f2	≤ k x 25,6	(U32b,E32)	I_P	Yes	Yes, ARQ	25,6	var
4h2	≤ 6,4	(U08b,E08)	I_P	Yes	Yes, ARQ	6,4	var
3d2ssub	k x 76,8	U80c	I_{PQ}	Yes	No	64,0	15
3l2ssub (j=640)	k x 60,8	U64c	I_{PQ}	Yes	No	51,2	15
3l2ssub (j=672)	k x 64,0	U67c	I_{PQ}	Yes	No	51,2	15
3f2ssub	k x 30,4	U32c	I_{PQ}	Yes	No	25,6	15
4d2ssub	≤ k x 76,8	U80c	I_{PQ}	Yes	Yes, ARQ	64,0	var
4l2ssub (j=640)	k x 60,8	U64c	I_{PQ}	Yes	Yes, ARQ	51,2	var
4l2ssub (j=672)	k x 64,0	U67c	I_{PQ}	Yes	Yes, ARQ	51,2	var
4f2ssub	≤ k x 30,4	U32c	I_{PQ}	Yes	Yes, ARQ	25,6	var
5d2encoded	k x (60,0/64,0/80,0)	(U80d, E80)	I_P	Yes	Yes, code	64,0	15
5l2encoded (j=640)	k x (48,0/51,2/64,0)	(U64d, E64)	I_P	Yes	Yes, code	51,2	15
5f2encoded	k x (24,0/25,6/32,0)	(U32d, E32)	I_P	Yes	Yes, code	25,6	15
5h2encoded	k x (6,0/6,4/8,0)	(U08d, E08)	I_P	Yes	Yes, code	6,4	15

ST: Service Type:
xdy = type x double slot, modulation y levels;
xly = type x long slot (j=640 or j=672), modulation y levels;
xfy = type x full slot, modulation y levels;
xhy = type x half slot, modulation y levels;
ssub = single subfield protected B-field format.

encoded: Encoded protected B-field format; The I channel capacity varies in function of the adaptive code rate r.

NP: Name of the U-plane channel (I_N, I_P, or I_{PQ});

err. det.: error detection capability.

err. corr.: error correction capability (ARQ or channel coding);

max. C_F: maximum C_F channel throughput.

dly: approximate delay incurred by I channel data in ms. "var" is variable.

t: the target number of duplex bearers; $w \leq t$.

k: the actual number of duplex bearers; $w \leq k \leq t$.

NOTE: Refer to clause 6.2.2.2 for details of B-field multiplex schemes.

A.2.3.2 Asymmetric connections (modify clause 5.6.2.2 of EN 300 175-3)

Text of clause 5.6.2.2 of EN 300 175-3 [3] and table 5.4 in the same clause shall be modified as follows:

5.6.2.2 Asymmetric connections

A DECT connection is called asymmetric if it includes double simplex bearers and, as consequence of it, has different number of bearers in both directions.

NOTE 1: Simplex bearers are always allocated in pairs. A pair of simplex bearers in opposite directions is called "duplex bearer". A pair of simplex bearers in the same direction is called "double simplex bearer". In both cases, pairs of simplex bearers are one half TDMA frame apart.

General principles:

a) an asymmetric connection is composed of *d* duplex bearers plus *s* double simplex bearers, with both $d \geq 1$, $s \geq 1$;

b) all double-simplex bearers shall go in the same direction. The direction of the double-simplex bearers is, by definition, called the "forward direction" of the connection. The opposite one is the "backward direction" or "reverse direction";

c) there exists *k* simplex bearers in the forward direction , being $k = d + 2*s$;

d) there exist $m + n$ simplex bearers in the backward direction being $m + n = d$;

NOTE 2: $k \geq m + n \geq 1$ in all cases.

e) the *n* simplex bearers in the reverse direction are called "special" bearers. These bearers shall be in E-type or E+U-type multiplexer mode (see clause 6.2.2.2) and shall carry the "bearer quality in an asymmetric connection" message (see clause 7.3.4.4) in subfield B0. They are used to report reception quality on the double simplex bearers in the forward data direction and to carry G_F channel data. These special bearers shall not carry I_N, I_P or I_{PQ} channel data. However, if the mode is E+U type, they can carry I_{PF} channel data, and if the mode is E-type, they can carry C_F channel signalling;

NOTE 3: A special bearer is, by definition, a reverse bearer carrying the "bearer quality report in an asymmetric connection" message.

f) the number of special bearers shall be $n \geq 1$. However, some profiles could allow, by negotiation, to drop the number of *n* bearers to $n = 0$ in some cases. In such situation the *n* bearer becomes an *m* bearer. In all cases $(n + m) \geq 1$;

NOTE 4: It should be assumed that the most usual case will be $n = 1$ (one special bearer).

NOTE 5: The suppression of the "bearer quality in an asymmetric connection" ($n = 0$) deactivates the DECT basic quality feedback mechanism (bits Q1/Q2), and should only be used under very good and steady radio quality conditions (i.e.: very short range links). In case of incidental air interface errors, the message "bearer and connection control" could be used by the receiver side to request handover or antenna switch. However, this mechanism has a slower response time and a limited control capability and will not handle properly the case of simultaneous loss of quality on several bearers.

g) the *m* simplex bearers in the reverse direction shall be normally in U-type multiplexer mode and will carry I_N, I_P or I_{PQ} channel data. However, it is allowed to switch occasionally them to E or E+U type mode to exchange signalling messages (channels M, G_F or C_F) if the capacity of the *n* bearers is not enough for it. During the time the bearers are in E or E+U type mode they cannot carry I_N, I_P, I_{PQ}. If the mode is E+U type, they can carry I_{PF} channel data;

NOTE 6: The number of m bearers can be zero, however $n + m \geq 1$.

h) all the k simplex bearers in the forward direction shall be normally in U-type multiplexer mode. However, from time to time, some of them can be switched to E or E+U type mode to exchange signalling messages (channels M, G_F or C_F). During the time the bearers are in E or E+U type mode they cannot carry I_N, I_P, I_{PQ} channel data. However, if the mode is E+U type, they can carry I_{PF} channel data.

NOTE 7: Only the bearers that are part of a duplex bearer can be switched to E-type or E+U-type mode.

NOTE 8: It is not recommended to switch forward bearers to E or E+U type mux, only to carry G_F channel. Instead of it, the alternative mechanisms provided by some LU services (i.e. LU10) may be used.

The four asymmetric service types are distinguished by their I channel data protection and their throughput:

type 6: I_N_normal_delay: limited error protection, normal delay, fixed throughput;

type 7: I_P_error_detection: error detection capability, fixed throughput;

type 8: I_P_error_correction: error correction, variable throughput;

type 9: I_P_encoded_protected.

Service type 6 using the single subfield protected B-field format is called I_{PQ}_error_detection; service types 7 using the single subfield protected B-field format is called I_{PQ}_error_correction.

Tables 5.4 to 5.6 show the most important parameters for asymmetric connections. The first line in each description defines the forward data direction. The second and third line describe the reverse direction.

NOTE 9: In the channel capacity calculations, it is assumed that the all bearers of the forward channel are in U-type mux mode, since the switch to E-type or E+U-type only happens occasionally.

Table 5.4: Asymmetric services (2-level modulation)

ST	I channel capacity (kbit/s) Forward channel Backward channel m bearers Backward channel n bearers	B-field multiplex schemes	NP	Err det.	Err corr.	max. C_F (kbit/s)
6d2	k x 80 m x 80 variable: 0 to (n x 6,4 x 9)	(U80a,E80) (U80a,E80) (E80)	I_N I_N I_{PF}	No No Yes	No No No	d x 64,0 m x 64,0 n x 57,6 (note 1)
6l2 (j=640)	k x 64 m x 64 variable: 0 to (n x 6,4 x 7)	(U64a,E64) (U64a,E64) (E64)	I_N I_N I_{PF}	No No Yes	No No No	d x 51,2 m x 51,2 n x 44,8 (note 1)
6l2 (j=672)	k x 67,2 m x 67,2 variable: 0 to (n x 6,4 x 7)	(U67a, E67) (U67a, E67) (E67)	I_N I_N I_{PF}	No No Yes	No No No	d x 51,2 m x 51,2 n x 44,8 (note 1)
6f2	k x 32 m x 32 variable: 0 to (n x 6,4 x 3)	(U32a,E32) (U32a,E32) (E32)	I_N I_N I_{PF}	No No Yes	No No No	d x 25,6 m x 25,6 n x 19,2 (note 1)
7d2	k x 64 m x 64 variable: 0 to (n x 6,4 x 9)	(U80b,E80) (U80b,E80) (E80)	I_P I_P I_{PF}	Yes Yes Yes	No No No	d x 64,0 m x 64,0 n x 57,6 (note 1)
7l2 (j=640)	k x 51,2 m x 51,2 variable: 0 to (n x 6,4 x 7)	(U64b,E64) (U64b,E64) (E64)	I_P I_P I_{PF}	Yes Yes Yes	No No No	d x 51,2 m x 51,2 n x 44,8 (note 1)
7l2 (j=672)	k x 51,2 m x 51,2 variable: 0 to (n x 6,4 x 7)	(U67b,E67) (U67b,E67) (E67)	I_P I_P I_{PF}	Yes Yes Yes	No No No	d x 51,2 m x 51,2 n x 44,8 (note 1)

ST	I channel capacity (kbit/s) Forward channel Backward channel m bearers Backward channel n bearers	B-field multiplex schemes	NP	Err det.	Err corr.	max. C_F (kbit/s)
7f2	k x 25,6 m x 25,6 variable: 0 to (n x 6,4 x 3)	(U32b,E32) (U32b,E32) (E32)	I_P I_P I_{PF}	Yes Yes Yes	No No No	d x 25,6 m x 25,6 n x 19,2 (note 1)
7d2ssub	k x 76,8 m x 76,8 variable: 0 to (n x 6,4 x 9)	(U80c) (U80c) (E80)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	No No No	d x 64,0 m x 64,0 n x 57,6 (note 1)
7l2ssub (j=640)	k x 60,8 m x 60,8 variable: 0 to (n x 6,4 x 7)	(U64c) (U64c) (E64)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	No No No	d x 51,2 m x 51,2 n x 44,8 (note 1)
7l2ssub (j=672)	k x 64 m x 64 variable: 0 to (n x 6,4 x 7)	(U67c) (U67c) (E67)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	No No No	d x 51,2 m x 51,2 n x 44,8 (note 1)
7f2ssub	k x 30,4 m x 30,4 variable: 0 to (n x 6,4 x 3)	(U32c) (U32c) (E32)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	No No No	d x 25,6 m x 25,6 n x 19,2 (note 1)
8d2	≤ k x 64 ≤ m x 64 variable: 0 to (n x 6,4 x 9)	(U80b,E80) (U80b,E80) (E80)	I_P I_P I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQNo	d x 64,0 m x 64,0 n x 57,6 (note 1)
8l2 (j=640)	≤ k x 51,2 ≤ m x 51,2 variable: 0 to (n x 6,4 x 7)	(U64b,E64) (U64b,E64) (E64)	I_P I_P I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 51,2 m x 51,2 n x 44,8 (note 1)
8l2 (j=672)	≤ k x 51,2 ≤ m x 51,2 variable: 0 to (n x 6,4 x 7)	(U67b,E67) (U67b,E67) (E67)	I_P I_P I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 51,2 m x 51,2 n x 44,8 (note 1)
8f2	≤ k x 25,6 ≤ m x 25,6 variable: 0 to (n x 6,4 x 3)n x 0	(U32b,E32) (U32b,E32) (E32)	I_P I_P I_{PF}-	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 25,6 m x 25,6 n x 19,2 (note 1)
8d2ssub	≤ k x 76,8 ≤ m x 76,8 variable: 0 to (n x 6,4 x 9)	(U80c) (U80c) (E80)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 64 m x 64 n x 57,6 (note 1)
8l2ssub (j=640)	k x 60,8 m x 60,8 variable: 0 to (n x 6,4 x 7)	(U64c) (U64c) (E64)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 51,2 m x 51,2 n x 44,8 (note 1)
8l2ssub (j=672	k x 64 m x 64 variable: 0 to (n x 6,4 x 7)	(U67c) (U67c) (E67)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 51,2 m x 51,2 n x 44,8 (note 1)
8f2ssub	≤ k x 30,4 ≤ m x 30,4 variable: 0 to (n x 6,4 x 3)	(U32c) (U32c) (E32)	I_{PQ} I_{PQ} I_{PF}	Yes Yes Yes	Yes, ARQ Yes, ARQ Yes, ARQ No	d x 51,2 m x 51,2 n x 19,2 (note 1)
9d2encoded	≤ k x (60,0/64,0/80,0) ≤ m x (60,0/64,0/80,0) variable: 0 to (n x 6,4 x 9)	(U80d,E80) (U80d,E80) (E80)	I_P I_P I_{PF}	Yes Yes Yes	Yes, code Yes, code No	d x 64 m x 64 n x 57,6 (note 1)
9l2encoded (j=640)	≤ k x (48,0/51,2/64,0) ≤ m x (48,0/51,2/64,0) variable: 0 to (n x 6,4 x 7)	(U64d,E64) (U64d,E64) (E64)	I_P I_P I_{PF}	Yes Yes Yes	Yes, code Yes, code No	d x 51,2 m x 51,2 n x 44,8 (note 1)

ST	I channel capacity (kbit/s) Forward channel Backward channel m bearers Backward channel n bearers	B-field multiplex schemes	NP	Err det.	Err corr.	max. C_F (kbit/s)
9f2encoded	≤ k x (24,0/25,6/32,0) ≤ m x (24,0/25,6/32,0) variable: 0 to (n x 6,4 x 3)	(U32d,E32) (U32d,E32) (E32)	I_P I_P I_{PF}	Yes Yes Yes	Yes, code Yes, code No	d x 25,6 m x 25,6 n x 19,2 (note 1)

ST: Service Type:
xdy = type x double slot, y levels modulation;
xly = type x long slot (j=640 or j=672), y levels modulation;
xfy = type x full slot, y levels modulation;
xh = type x half slot, where x = the Service Type;
ssub = singlesubfield protected B-field format.
encoded: Encoded protected B-field format; The I channel capacity varies in function of the adaptive code rate r;
NP: Name of the U-plane channel (I_N, I_P, or I_{PF});
err.det.: error detection capability.
err.corr.: error correction capability and type (ARQ or channel coding);
max.C_F: maximum C_F channel throughput.
k: the actual number of simplex bearers in the forward direction.
m: the actual number of simplex data bearers in the reverse direction with U-type mux.
n: the actual number of simplex special bearers in the reverse direction.

NOTE 1: The C_F capacity in *n* type bearers includes the reduction due to the "bearer quality in an asymmetric connection" sent on this bearer.
NOTE 2: Refer to clause 6.2.2.2 for details of B-field multiplex schemes.

A.2.4 B-field control multiplexer

A.2.4.1 B-field control multiplexer (E/U-MUX) (modify clause 6.2.2.2 of EN 300 175-3)

Text of clause 6.2.2.2 of EN 300 175-3 [3] and table 6.20 in the same clause shall be modified as follows:

6.2.2.2 B-field control multiplexer (E/U-MUX)

The E/U-MUX switches the B-field between three types of multiplex, the E-type, the U-type and the E+U type.

1) E-type:

- For traffic bearers the B-field is used to carry M channel data and/or C_F channel data and/or G_F channel data. For connectionless bearers the B-field is used to carry M channel data and/or CL_F channel data.

2) U-type:

- The B-field is used to carry either I_N channel data or I_P channel data, or SI_N or SI_P channel data.

3) E+U-type:

- The B-field is used to carry M channel data and/or G_F channel data and protected U plane data. The U-plane channel transported by this format is named I_{PF} channel. For connectionless bearers the B-field carries M channel data and SI_{PF} channel data.

NOTE: The I_{PF} channel incorporates a segmentation mechanism in order to transport I_P or I_{PQ} size packets by the variable capacity I_{PF} channel (see clause 10.8.4 for description of the I_{PF} channel operation).

The E/U MUX operates on a slot-by-slot basis in response to immediate traffic demands. The chosen multiplex for each frame is indicated with the BA bits in the A-field header. E-type or E+U type multiplexers have priority over U-type multiplex.

The B-field multiplexers are defined in tables 6.20 to 6.22a.

Table 6.20: B-field multiplexes (2-level)

B-field multiplex for 2-level modulation					E/U	B-field format	Logical channel
D80-field	D64-field	D67-field	D32-field	D08-field			
E80	E64	E67	E32	(note 2)	E+U	Multisubfield protected	M or G_F or I_{PF} or SI_{PF}
E80	E64	E67	E32	E08	E	Multisubfield protected	M or G_F or C_F
U80a	U64a	U67a	U32a	U08a	U	Unprotected	I_N or SI_N
U80b	U64b	U67b	U32b	U08b	U	Multisubfield protected	I_P or SI_P
U80c	U64c	U67c	U32c		U	Singlesubfield protected	I_P
U80d	U64d	-	U32d	U08d	U	Encoded protected (see note 1)	I_P
NOTE 1: The Encoded protected format is defined in annex I. NOTE 2: E+U mode is not possible in slot type D08.							

The E-type and E+U type multiplexers always use the multisubfield protected B-field format. The possible modes of the E-type and E+U type multiplexers are defined in clause 6.2.2.3.

The U-type multiplex in connection oriented services may use either: the single-subfield protected B-field format, the multi-subfield protected B-field format, or the unprotected B-field format. This choice is defined at connection establishment for all bearers belonging to that connection, and it corresponds to the logical channel required for the chosen service, I_{PQ} ,I_P or I_N. The chosen format is maintained until it is re-negotiated or the connection ends.

A.2.4.2 B-field control multiplexer in E-type and E+U-type modes (modify clause 6.2.2.3 of EN 300 175-3)

A.2.4.2.1 B-field control multiplexer in E-type and E+U-type modes (modify clause 6.2.2.3 of EN 300 175-3)

Title of clause 6.2.2.3 of EN 300 175-3 [3] shall be modified as follows:

6.2.2.3 B-field multiplexer in E-type and E+U-type modes

A.2.4.2.2 E-type and E+U-type modes for slots with more than one subfield (modify clause 6.2.2.3.1 of EN 300 175-3)

Title, title of clauses and text of clause 6.2.2.3.1 of EN 300 175-3 [3] and tables 6.23, 6.26 and 6.33 in the same clause shall be modified as follows:

6.2.2.3.1 E-type and E+U-type modes for slots with more than one subfield

This clause applies to all cases except half slot with 2-level modulation.

6.2.2.3.1.1 Slot modes with more than one subfield: E-type mux mode

For double slot, long slot (j=640 or j=672), full slot and half slot modes, in case of 2-level, 4-level, 8-level, 16-level and 64-level modulation all B-subfields are used for control. The following types of information have to be multiplexed:

- higher layer control from the C_F or CL_F logical channel;
- MAC layer connection related signalling;
- higher layer information from the G_F logical channel; and

- MAC layer control to describe the contents of the subfields.

All extended MAC control and G_F segments carried in the B-subfields have a header with a bit indicating if the next subfield in the same databurst contains an extended MAC control or G_F segment, or whether it contains higher layer control channels C_F or CL_F).

6.2.2.3.1.2 Slot modes with more than one subfield: E+U type mux mode

For double slot, long slot (j=640 or j=672), full slot and half slot modes, in case of 2=level and 4-level modulation, the B-subfields are used for control or for transporting I_{PF} channel U-plane data.

The following types of information have to be multiplexed:

- MAC layer connection related signalling.
- Higher layer information from the G_F logical channel.
- MAC layer control to describe the contents of the subfields.
- U-plane data (channels I_{PF} and SI_{PF}).
- MAC layer control to describe the segmentation of channels I_{PF} and SI_{PF}.

The following rules shall be fulfilled:

- At least the first subfield shall carry signalling.
- Subfields transporting signalling shall precede subfields carrying I_{PF} channel data.
- The number of subfields carrying I_{PF} channel data is variable from 1 to N-1 subfields, being N the number of subfields.
- No C_F channel signalling can be transported by E+U type mux slots.
- If there are not enough signalling messages plus I_{PF} channel segments to fill the slot, the slot shall be filled with the MAC message "NULL" (clause 7.3.3) repeated as many times as needed and placed after the valid signalling subfields and before the I_{PF} channel segments.
- All extended MAC control and G_F segments carried in the B-subfields have a header with a bit indicating if the next subfield in the same databurst contains an extended MAC control or G_F segment, or whether it contains U-plane data (channels I_{PE} and SI_{PE}).

6.2.2.3.1.3 Double slot modes

For D80 double slot operation (2-level modulation) the modes are given in table 6.23.

Table 6.23: D80 double slot 2-level modes

		Subfield		B0	B1	B2	B3	B4	B5	B6	B7	B8	B9
E type mux	*1	Mode 0	C/O	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
	BA codes 100 or 101	Mode 1	C/O	$M/M+G_F$	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 2	C/O	$M/M+G_F$	$M/M+G_F$	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	M	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 3	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	M	M	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 4	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	M	M	M	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 5	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F	C_F	C_F	C_F	C_F
			C/L	M	M	M	M	M	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 6	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F	C_F	C_F	C_F
			C/L	M	M	M	M	M	M	CL_F	CL_F	CL_F	CL_F
		Mode 7	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F	C_F	C_F
			C/L	M	M	M	M	M	M	M	CL_F	CL_F	CL_F
		Mode 8	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F	C_F
			C/L	M	M	M	M	M	M	M	M	CL_F	CL_F
		Mode 9	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	C_F
			C/L	M	M	M	M	M	M	M	M	M	CL_F
	BA codes 110 or 111	Mode 10	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$
			C/L	M	M	M	M	M	M	M	M	M	M
E+U type mux		Mode 11	C/O	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 12	C/O	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 14	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 15	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 16	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 16	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 17	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	M	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 18	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}	I_{PF}
			C/L	M	M	M	M	M	M	M	M	SI_{PF}	SI_{PF}
		Mode 19	C/O	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	$M/M+G_F$	I_{PF}
			C/L	M	M	M	M	M	M	M	M	M	SI_{PF}
*1 = E-type mux, C_F only: BA codes 010 or 011													

For D80 double slot operation the A-field header coding (BA bits) shall distinguish between the following modes:

- E-type, C_F only: mode 0 (BA bits codes "010" and "011");
- E-type, $M + G_F + C_F$: modes 1 to 9 (BA bits codes "100" and "101");

- E type, M + G_F : mode 10: (BA bit code "110");
- E+U type, M + G_F +I_{PF} : modes 11 to 19: (BA bit codes "110" and "111");

BA bit code "111" shall only be used if regular (U-type) MAC service is IP-error-correct.

6.2.2.3.1.4 Full slot modes

For D32 full slot operation (2-level modulation) the modes given in table 6.26 are allowed.

Table 6.26: D32 full slot 2-level modes

		Subfield		B0	B1	B2	B3
E type mux	*1	Mode 0	C/O	C_F	C_F	C_F	C_F
			C/L	CL_F	CL_F	CL_F	CL_F
	BA codes 100 or 101	Mode 1	C/O	M/M+G_F	C_F	C_F	C_F
			C/L	M	CL_F	CL_F	CL_F
		Mode 2	C/O	M/M+G_F	M/M+G_F	C_F	C_F
			C/L	M	M	CL_F	CL_F
		Mode 3	C/O	M/M+G_F	M/M+G_F	M/M+G_F	C_F
			C/L	M	M	M	CL_F
	BA codes 110 or 111	Mode 4	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F
			C/L	M	M	M	M
E+U type mux		Mode 5	C/O	M/M+G_F	I_{PF}	I_{PF}	I_{PF}
			C/L	M	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 6	C/O	M/M+G_F	M/M+G_F	I_{PF}	I_{PF}
			C/L	M	M	SI_{PF}	SI_{PF}
		Mode 7	C/O	M/M+G_F	M/M+G_F	M/M+G_F	I_{PF}
			C/L	M	M	M	SI_{PF}
*1 = E-type mux, C_F only: BA codes 010 or 011							

For full slot D32 operation the A-field header coding (BA bits) will distinguish between the following modes:

- E-type, C_F only: mode 0 (BA bits codes "010" and "011");
- E-type, M + G_F +C_F: modes 1 to 3 (BA bits codes "100" and "101");
- E type, M + G_F : mode 4: (BA bit code "110");
- E+U type, M + G_F +I_{PF} : modes 4 to 7: (BA bit codes "110" and "111").

BA bit code "111" shall only be used if regular (U-type) MAC service is IP-error-correct.

6.2.2.3.1.6 Long slot (j=640 or j=672) modes

For D64/D67 long slot operation with j=640/672 (2-level modulation) the modes are given in table 6.33.

Table 6.33: D64/D67 long slot (j=640/672) 2-level modes

		Subfield		B0	B1	B2	B3	B4	B5	B6	B7
E type mux	*1	Mode 0	C/O	C_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
	BA codes 100 or 101	Mode 1	C/O	M/M+G_F	C_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 2	C/O	M/M+G_F	M/M+G_F	C_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	M	CL_F	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 3	C/O	M/M+G_F	M/M+G_F	M/M+G_F	C_F	C_F	C_F	C_F	C_F
			C/L	M	M	M	CL_F	CL_F	CL_F	CL_F	CL_F
		Mode 4	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	C_F	C_F	C_F	C_F
			C/L	M	M	M	M	CL_F	CL_F	CL_F	CL_F
		Mode 5	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	C_F	C_F	C_F
			C/L	M	M	M	M	M	CL_F	CL_F	CL_F
		Mode 6	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	C_F	C_F
			C/L	M	M	M	M	M	M	CL_F	CL_F
		Mode 7	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	C_F
			C/L	M	M	M	M	M	M	M	CL_F
	BA codes 110 or 111	Mode 8	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F
			C/L	M	M	M	M	M	M	M	M
E+U type mux		Mode 9	C/O	M/M+G_F	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 10	C/O	M/M+G_F	M/M+G_F	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 11	C/O	M/M+G_F	M/M+G_F	M/M+G_F	I_{PF}	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 12	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	I_{PF}	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 13	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	I_{PF}	I_{PF}	I_{PF}
			C/L	M	M	M	M	M	SI_{PF}	SI_{PF}	SI_{PF}
		Mode 14	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	I_{PF}	I_{PF}
			C/L	M	M	M	M	M	M	SI_{PF}	SI_{PF}
		Mode 15	C/O	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	M/M+G_F	I_{PF}
			C/L	M	M	M	M	M	M	M	SI_{PF}
*1 = E-type mux, C_F only: BA codes 010 or 011											

For D64/D67 long slot operation with j=640/672 the A-field header coding (BA bits) shall distinguish between the following modes:

- E-type, C_F only: mode 0 (BA bits codes "010" and "011");
- E-type, M + G_F +C_F: modes 1 to 7 (BA bits codes "100" and "101");
- E type, M + G_F : mode 8: (BA bit code "110");
- E+U type, M + G_F +I_{PF} : modes 9 to 15: (BA bit codes "110" and "111").

BA bit code "111" shall only be used if regular (U-type) MAC service is I_P-error-correct.

A.2.4.2.3 Half slot (j=80) modes for 2-level modulation (remove from clause 6.2.2.3.2 of EN 300 175-3)

The following text of clause 6.2.2.3.2 of EN 300 175-3 [3] shall be removed:

When in E mode, the following priority scheme shall be used to fill the B_0 subfield in connection oriented services:

1) **Release:** bearer release messages for this bearer may be placed in B_0.
2) **Retransmissions of C_F**.
3) **MAC layer control** (excluding Null message).
4) **New C_F data**.
5) **New G_F data**.
6) **Null Message:** U-type information should normally be sent in preference to this.

For connectionless services, CL_F data has priority over MAC control.

A.2.4.2.4 Half slot (j=80) modes for 2-level modulation (add to clause 6.2.2.3.2 of EN 300 175-3)

The following note shall be added to clause 6.2.2.3.2 of EN 300 175-3 [3]:

NOTE: E+U type mode is not applicable to half slot (j=80) with 2-level modulation.

A.2.4.3 Priority scheme in E or E+U mode (add to clause 6.2.2 of EN 300 175-3)

A new clause with the following text shall be added to clause 6.2.2 of EN 300 175-3 [3]:

6.2.2.4 Priority scheme in E or E+U mode

For Connection Oriented services (C/O) and when E/U mux is in E or E+U mode, the following priority scheme shall be used to fill the B-subfields:

1) **Release:** bearer release messages for this bearer may be transmitted and may be placed in all subfields.
2) **Bearer quality control in an asymmetric connection:** in an asymmetric connection a "Bearer quality in an asymmetric connection" message (see clause 7.3.4.4), if used, shall be placed in the subfield B_0.
3) **Other MAC layer control (excluding Null message):** this may be placed in the remaining subfields. The subfields are used in the following order of preference, B0, B1, B2, B3, B4, B5, B6, B7, B8, B9.
4) **Retransmissions of C_F:** for retransmissions of B-fields containing C_F, the same mode shall be used (note 1).
5) **New C_F data:** any remaining subfields may be used for C_F data. The subfields are used in the following order of preference, B_N, B_{N-1}, …,B_1, B_0. However, the sequence of data through the MC SAP shall be B_0, B_1, …, B_{N-1} B_N (note 1).
6) **G_F data:** this may be placed in any subfield that has not yet been used. The order of usage of subfields and the sequence of data segments through the MC SAP is not specified (note 2).
7) **Remaining I_{PF} packets of partially transmitted PDUs and NULL message carrying segmentation info if needed** (notes 3, 4 and 7).

If there is no channel with priority 1 to 7 to be transmitted in the slot, THEN, the E/U-mux shall go to **U-type mux mode**. The priorities 8 and 9 only apply if the E-mux is set because one or more channels with priority 1 to 7 are present.

8) I_{PF} packets carrying the first part of a PDU and NULL message carrying segmentation info if needed (notes 3, 4, 5 and 7).

9) Null message: this shall be used to fill any subfields still empty (note 6).

NOTE 1: This only applies to E-type mux mode. Incompatible with channel I_{PF}.

NOTE 2: In some LU services (LU10), it is possible to avoid the use of the G_F channel by using other mechanism for transmitting the acknowledgement information. It is advisable to do that, when there is no other reason for using E-mux mode multiplexing.

NOTE 3: A G_F of a NULL message should be always in the same slot as I_{PF} data. In some cases, a NULL message is mandatory.

NOTE 4: This only applies to E+U-type mux mode. Incompatible with C_F channel.

NOTE 5: ONLY if there is other reason for setting the E/U mux in E or E+U mode. Otherwise the E/U-mux should go to U mode.

NOTE 6: It applies to the filling of remaining subfields. If there is no other channel for multiplexing, then the E/U-mux should go to U-mux mode.

NOTE 7: Items 7 and 8 are not applicable to half slot (D08) and 2-level modulation.

A.2.5 B-field identification, BA bits (modify clause 7.1.4 of EN 300 175-3)

Table 7.2 in clause 7.1.4 of EN 300 175-3 [3] shall be modified as follows:

7.1.4 B-field identification, BA, bits a_4 to a_6

Table 7.2: B-field ID

a_4	a_5	a_6	B-field contents
0	0	0	U-type, I_N, SI_N, or I_P packet number 0 or no valid I_P_error_detect channel data
0	0	1	U-type, I_P_error_detect or I_P packet number 1 or SI_N or no valid I_N channel data
0	1	0	E-type, all C_F or CL_F, packet number 0
0	1	0	double slot required
0	1	1	E-type, all C_F, packet number 1
1	0	0	E-type, not all C_F or CL_F; C_F packet number 0 (note 5)
1	0	0	half slot required
1	0	1	E-type, not all C_F; C_F packet number 1 (note 5)
1	0	1	long slot (j=640) required
1	1	0	E+U-type, I_N, I_P_error_detect OR E+U type I_P_error_correct packet number 0 OR E-type all MAC signalling (Notes 3, 4 and 5)
1	1	0	long slot (j=672) required
1	1	1	E+U-type, I_P_error_correct packet number 1 OR no B-field if I_N or I_P_error_detect (notes 3, 4, 5 and 6)

NOTE 1: The 000 code may be used to indicate that the B-field does not contain valid data, only for an already established I_P_error_detect connection.

NOTE 2: The 001 code may be used to indicate that the B-field does not contain valid data, only for an already established I_N connection.

NOTE 3: The E+U type mux (codes 110 and 111) allows the transmission of MAC messages (e.g. bearer quality report for a duplex bearer of an asymmetric connection) and U-type data in one B-field.

NOTE 4: The 111 is only used to indicate E+U mux if MAC service is I_P_error_correct. For I_N , SI_N and I_P_error_detect , this code indicates no valid B-field.

NOTE 5: All MAC control (all subfields carrying MAC signalling or G_F) can be also transmitted using codes 100 and 101 if C_F channel is supported, and 111 if MAC service is I_P_error_correct.

NOTE 6: For I_P_error_correct, no B-field may be implemented using the MAC control message "NULL" in all subfields.

A.2.6 Extended fixed part capabilities (part 2) (modify clause 7.2.3.11 of EN 300 175-3)

Clause 7.2.3.11 of EN 300 175-3 [3] shall be modified as follows:

7.2.3.11 Extended fixed part capabilities (part 2)

7.2.3.11.1 General, Q_H = C (hex)

NOTE: Bit a_{23} of the extended FP capabilities message (see clause 7.2.3.5) indicates whether or not this message is broadcast.

1100	Extended physical and MAC layer capabilities (part 2)	Extended higher layer information (part 2)
a8 a11	a12 a23	a24 a47

Figure 7.15c

7.2.3.11.2 Extended physical and MAC layer capabilities (part 2)

If a capability is available:

THEN bit a_x shall be set to 1;

ELSE (capability is not available) the bit a_x shall be set to 0;

Reserved bits shall be set to 0.

Table 7.16b

Bit number	Capability
a_{12}	Long slot support (j = 640)
a_{13}	Long slot support (j = 672)
a_{14}	E+U-type mux and channel I_{PF} basic procedures supported (see note 1)
a_{15}	channel I_{PF} advanced procedures supported (see note 1)
a_{16}	channel SI_{PF} supported (see notes 1 and 2)
a_{17}	channel G_F supported (see note 3)
$a_{18} – a_{23}$	Reserved for future standardization
NOTE 1: See clauses 5.3.1.4 and 6.2.2.2 for description of the I_{PF} channel and the E+U-type multiplexer. NOTE 2: Requires the support of the SI_P channel. See clause 5.3.2.3 for description of SI_{PF} channel. NOTE 3: This bit indicates that the FT has the ability to receive the G_F channel.	

7.2.3.11.3 Extended higher layer capabilities (part 2)

The coding and the meaning of these bits are defined in annex F of EN 300 175-5 [5]. The bits for which the coding is not defined shall be set to 0.

A.2.7 Messages in the B-field

A.2.7.1 Messages in the B-field, Overview (modify clause 7.3.1 of EN 300 175-3)

Clause 7.3.1 of EN 300 175-3 [3] shall be modified as follows:

7.3 Messages in the B-field

7.3.1 Overview

Messages may be carried in the B-field only when operating in the E-type or E+U-type multiplex (see clause 6.2.2.2). Each B-field message occupies one subfield, and different subfields will usually carry a different message. The possible arrangements of B-field messages are defined by the E/U-MUX algorithm defined in clause 6.2.2.3 and 6.2.2.4.

All B-field messages have a fixed length of 64 bits.

MAC B-field messages are used to:

1) set-up, maintain and release bearers and connections;

2) provide extra flow, error and quality control in symmetric connections;

3) carry G_F channel data;

4) transport extended system information and TARI information;

5) exchange information about I_{PF} channel segmentation in E+U type mux; and

6) fill the B-field if there are insufficient MAC, C_F, G_F, or I_{PF} segments to fill the whole of the B-field.

A M_{Bn} message is a B-field MAC layer control message sent in the Bn subfield. M_{Bn} messages are sent in 80 bit packets using the E mapping described in clause 6.2.2.2. This allows M_{Bn} messages to be compatible across all types of packets. Within the 80 bits, the format is as given in figure 7.1.

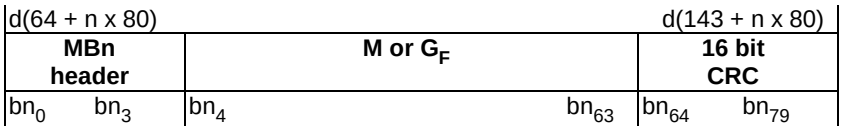


Figure 7.1: B-field messages

"n" denotes the number of the subfield in the B-field. For the D08 field, n = 0, while for the D32 field n={0,1,2,3}. The CRC calculation is described in clause 6.2.5.2.

The M_{Bn} header defines whether the message contains M or G_F channel data and whether another M_{Bn} message follows in the next Bn subfield. In a full-slot transmission, up to 4 messages can be sent in the B-field.

Table 7.1

MBn header				Message type
bn_0			bn_3	
X	0	0	0	reserved
X	0	0	1	advanced connection control
X	0	1	0	Null or I_{PF} segmentation information
X	0	1	1	quality control
X	1	0	0	extended system information
X	1	0	1	G_F channel data packet
X	1	1	0	reserved
X	1	1	1	escape

The meaning of the MSB bit of the MBn header (bn_0) is the following:

For half slot 2-level modulation:

X = 1: the bit shall be set to "1" in all cases.

For all other slot types and modulation levels:

- For E+U type mux (B-field identification, BA=110 or BA=111, see 7.1.4):

  X = 1: subfield B(n + 1) exists and contains a M_{Bn} or G_F message, or subfield B(n) is the last subfield in this slot;

  X = 0: subfields B(n + 1) and all following in this slot contain I_{PF} (or SI_{PF}) segments.

- For E-type mux (B-field identification, BA=100 or BA=101, see 7.1.4):

  X = 1: subfield B(n + 1) exists and contains a M_{Bn} or G_F message, or subfield B(n) is the last subfield in this slot;

  X = 0: subfields B(n + 1) and all following in this slot contain C_F or CL_F segments.

NOTE: There are no MBn headers in E-type-all-C_F mux mode (BA=010 or BA=011).

A.2.7.2 Null or I_{PF} segmentation info (modify clause 7.3.3 of EN 300 175-3)

Title and content of clause 7.3.3 of EN 300 175-3 [3] shall be modified as follows:

7.3.3 Null or I_{PF} segmentation info

This message has two meanings depending on the NCF codes:

- Filling Bn subfields when there is no I data or C_F data or G_F data or other M_{Bn} messages to send (NULL).
- To transport segmentation info of the I_{PF} data channel (I_{PF} segmentation info).

	NCF	extended NCF	Spare or segmentation info
X 0 1 0			
bn_0 bn_3	bn_4 bn_7	bn_8 bn_{15}	bn_{16} bn_{63}

Figure 7.76

Table 7.50

NCF				Meaning
0	0	0	0	no C_F or CL_F data in the B-field
0	0	0	1	one B-subfield contains C_F or CL_F data
0	0	1	0	two B-subfields contain C_F or CL_F data
0	0	1	1	three B-subfields contain C_F or CL_F data
0	1	0	0	four B-subfields contain C_F or CL_F data
0	1	0	1	five B-subfields contain C_F or CL_F data
0	1	1	0	six B-subfields contain C_F or CL_F data
0	1	1	1	seven B-subfields contain C_F or CL_F data
1	0	0	0	eight B-subfields contain C_F or CL_F data
1	0	0	1	nine B-subfields contain C_F or CL_F data
1	0	1	0	This is an E+U slot, and the U part contains the first part of a DLC PDU (see note 4)
1	0	1	1	This is an E+U slot, and the U part contains the first part of a DLC PDU, and the rest of the PDU is empty (filling with padding bits, see notes 1, 2 and 4)
1	1	0	0	This is an E+U slot, any other case, (see notes 3 and 4)
1	1	0	1	}
to				} reserved
1	1	1	0	}
1	1	1	1	the multiplex for 4-level, 8-level, 16-level and 64-level is indicated in bits bn_8 to bn_{15}

NOTE 1: If the transmitter uses this code, it should not transmit more segments of the PDU.
NOTE 2: Padding bits are defined by the DLC layer (see EN 300 175-4 [4]).
NOTE 3: The bits bn_{16} to bn_{63} contain additional information for the segmentation control.
NOTE 4: This message, when NCF codes are "1010", "1011" or "1100" is considered segmentation info for E/U-MUX priority scheme (clause 6.2.2.4).

7.3.3.1 Spare or I_{PF} segmentation info

For NCF = "1100" this field carries the following information:

Table 7.50a

Octet	bits	meaning
1	bn16 - bn23	Send sequence number of the first PDU transported in this slot (note 1)
2	bn24	9th bit of the send sequence number (note 2)
2	bn25	=1 Indicates this is the last segment of the PDU
2	bn26	=1 Indicates that the rest of the PDU shall be filling with padding (note 3)
2	bn27	=1 Indicates that there is a second PDU segment in this slot
2	bn28-bn31	Sequence number of the PDU segment (note 4)
3	bn32-bn39	Size (in blocks of 64 bits) of the PDU segment (note 5)
4	bn40-bn47	only used if bn27=1. Same meaning as octet 1, but for the second PDU (notes 6, 7).
5	bn48-bn55	only used if bn27=1. Same meaning as octet 2, but for the second PDU (notes 6, 7).
6	bn56-bn63	only used if bn27=1. Same meaning as octet 3, but for the second PDU (notes 6, 7).

NOTE 1: Copy of the first octet of the PDU.
NOTE 2: Applicable only to some LU frames (LU10). If not used, it shall be set to "0".
NOTE 3: In this case, the rest of the PDU shall not be transmitted.
NOTE 4: Sequence number of the segment (1,2,3,4 .etc.).
NOTE 5: For first PDU segment, the size is the number of 64 bit blocks from the beginning of the U-plane section to the end of the PDU segment. It shall be < number of subfields available.
NOTE 6: If used, the second PDU starts immediately after the first one (position indicated by octet 3).
NOTE 7: If octets 4-6 are not used, they shall be filled with "0000 1111".

For any other value of NCF, this field shall be padded with the pattern "0000 1111 0000 . . . .. . 1111 0000 1111".

A.2.7.3 Bearer quality in an asymmetric connection (add to clause 7.3.4.4 of EN 300 175-3)

The following note shall be added to clause 7.3.4.4 of EN 300 175-3 [3]:

7.3.4.4 Bearer quality in an asymmetric connection

NOTE: This message was formerly called "MAC-mod2-ACK".

A.2.7.4 G_F channel data packet (modify clause 7.3.6 of EN 300 175-3)

Table 7.55 in clause 7.3.6 of EN 300 175-3 [3] shall be modified as follows:

7.3.6 G_F channel data packet

X 1 0 1	NCF	56 bit G_F channel SDU
bn_0 bn_3	bn_4 bn_7	bn_8 bn_{63}

Figure 7.85

Table 7.55

NCF				Meaning
0	0	0	0	no C_F data in the B-field
0	0	0	1	one B-subfield contains C_F data
0	0	1	0	two B-subfields contain C_F data
0	0	1	1	three B-subfields contain C_F data
0	1	0	0	four B-subfields contain C_F data
0	1	0	1	five B-subfields contain C_F data
0	1	1	0	six B-subfields contain C_F data
0	1	1	1	seven B-subfields contain C_F data
1	0	0	0	eight B-subfields contain C_F data
1	0	0	1	nine B-subfields contain C_F data
1	0	1	0	This is an E+U slot, and the U part contains the first part of a DLC PDU
1	0	1	1	This is an E+U slot, and the U part contains the first part of a DLC PDU, and the rest of the PDU is empty (filled with padding bits, see notes 2 and 3)
1	1	0	0	0 outstanding subfields, see note
1	1	0	1	1 outstanding subfield, see note
1	1	1	0	2 outstanding subfields, see note
1	1	1	1	> 2 outstanding subfields, see note
NOTE 1: If there are more than 9 subfields in total, then the outstanding subfields are indicated.				
NOTE 2: If the transmitter uses this code, it shall not transmit more segments of the PDU				
NOTE 3: Padding bits are defined by the DLC layer (see EN 300 175-4 [4]).				
NOTE 4: NCF codes "1010" and "1011" and "1100" are considered segmentation info for E/U-MUX priority scheme (see clause 6.2.2.4).				

A.2.8 Q2 and BCK bit setting for I_P_error_correction services (modify clause 10.8.2.4.1 of EN 300 175-3)

Title of clause 10.8.2.4.1 of EN 300 175-3 [3] shall be modified as follows:

10.8.2.4.1 Q2 and BCK bit setting for I_P_error_correction services

A.2.9 I_{PF} Procedure description (add to clause 10.8 of EN 300 175-3)

A new clause with the following text shall be added to clause 10.8 of EN 300 175-3 [3]:

10.8.4 Higher layer U-plane channel (I_{PF}) in E+U type mux

10.8.4.1 Purpose of the I_{PF} channel

The I_{PF} channel is used to transport U-plane data over slots with B-field multiplexer type E+U (see clause 6.2.2) and not all subfields used by signalling channels. I_{PF} allows to use the remaining subfields of the slot for transporting user data.

The I_{PF} channel transports data packets of the standard size (PDU) defined by the MAC plane service in use (I_P or I_{PQ}) and slot type. In order to insert these packets over the reduced capacity E+U slot, the I_{PF} channel uses an adaptation procedure that transport information on the PDU boundaries by means of MAC layer messages.

I_{PF} channel could be used either if the regular I service is $I_{N,}$ I_P or I_{PQ}, and either if the service is provided with error correction (I_P_error_correct) or error detection only (I_P_error_detect).

NOTE: The primary utility of the I_{PF} channel is the transmission of limited amount of U-plane data (i.e. acknowledgement messages) over the reverse bearer of asymmetric data connections.

10.8.4.2 Activation of the E+U type mux mode

The B-field multiplexer enters in E+U mode due to the existence of signalling data (channels G_F and M) to be transmitted according to the priority rules defined in clause 6.2.2.4. The activation of the E+U mode has the consequence of closing the I_P or I_{PQ} channel over the bearer, and simultaneously opening a reduced rate I_{PF} channel using the spare capacity of the bearer.

The number of subfields used for U-plane data and C-plane signalling varies depending on modulation, slot type, and amount of signalling to be transported. The possible combinations are defined in clause 6.2.2.3.1.

At least one subfield with signalling should exist. Subfields transporting signalling shall precede subfields carrying I_{PF} channel data.

If there are not enough signalling messages plus I_{PF} channel segments to fill the slot, the slot shall be filled with the MAC message "NULL" (clause 7.3.3) repeated as many times as needed and placed at the end of the signalling subfields and before the I_{PF} channel segments.

Once the B-field mux enters in E+U mode, this mode is kept until the end of C-plane transmission, and until the total transmission of a complete MAC U-plane packet (equivalent to a DLC PDU). When there is no reason to keep the E+U type mode, the slot passes to U-mode with the MAC service in use.

The E+U type mux mode is indicated by the code "110" in the B-field identification bits (BA header) in A-field. The code "111" is also used if MAC service is I_P_error_correct.

NOTE: It not possible to use E+U mux type for transmission of C_F higher layer signalling channel.

10.8.4.3 I_{PF} procedures

I_{PF} channel uses specific procedures in order to adapt the size of the standard MAC packet (equivalent to the DLC PDU) to the reduced and variable size of the E+U slot U plane subfields. There are two sets of procedures:

- Basic procedures.
- Advanced procedures.

Basic procedures guarantees I_{PF} channel operation. Advanced procedures increases efficiency in usage of all available subfields in the slot.

In addition to them, there are specific procedures for Mod-2 protected operation.

10.8.4.3.1 I_{PF} basic procedures

Basic procedures allow the transportation of a single segment of MAC packet (DLC PDU) in each E+U type slot. The transmitter side segments the packet according to the available U-plane subfields. However, if the PDU contains filling area (the SDU ends before the end of the PDU), the transmitter side may remove the padding bits, by placing a special code in the signalling control message described later in this clause.

The following cases could happen:

- Case 1: The slot carries the first part of a MAC packet (DLC PDU).
- Case 2: The slot carries the first and only part of a MAC packet (DLC PDU).

NOTE 1: Case 2 can only happen due to the padding removal option described above.

- Case 3: The slot carries the n^{th} part, but not the last, of a MAC packet (DLC PDU).
- Case 4: The slot carries the n^{th} and last part of a MAC packet (DLC PDU).

NOTE 2: In 2-level modulation, double or long slots, with the expected signalling needs, cases 1, 2 and 4 will happen with relative probability, while case 3 will be rare.

NOTE 3: In the reverse channel of asymmetric connections carrying Internet Protocol (IP), case 2 will happen with high probability due to the relatively short TCP acknowledgement packets.

In cases 1 and 2, the slot shall carry at least one G_F channel packet or "NULL and I_{PF} segmentation info" message. If no G_F channel packet is to be transmitted, then the message "NULL or I_{PF} segmentation info" shall be inserted in one of the signalling subfields of the slot.

In cases 3 and 4, a message "NULL or I_{PF} segmentation info" shall be, in any case, inserted in one of the signalling subfields (see clause 7.3.3).

The NCF field of the G_F or "NULL or I_{PF} segmentation info" shall carry the following codes:

Case 1: "1010".

Case 2: "1011".

Cases 3 or 4: "1100" only in a "NULL or I_{PF} segmentation info" message.

In cases 1 or 2, if the NCF header is in a "NULL or I_{PF} segmentation info" message, the content of the "segmentation info" field in the message is irrelevant.

In cases 3 and 4, only, the octets 1, 2 and 3 of the "segmentation info" field in the "NULL or I_{PF} segmentation info" shall be written by the transmitter and shall be analyzed by the receiver. The meaning of such octets is defined in clause 7.3.3.1. By analysing this information, the receiver side could reconstruct the original MAC packet (DLC PDU).

In all cases, the PDU segment shall start in the first U-mode subfield in the slot. Note that there could be unused space at the end of the U-type area.

10.8.4.3.2 I_{PF} advanced procedures

Advanced procedures add the possibility to have two PDU segments (two segments belonging to two consecutive DLC PDUs) in the same E+U mux slot. The number of possible cases is increased. In turn of that, the E+U slots can be filled more efficiently.

NOTE 1: In previous paragraph the word "consecutive" refers to the sequence of PDUs as received from the DLC by the MAC layer. The DLC sequence numbers may not necessarily be consecutive due to DLC retransmissions.

In order to implement advanced procedures, the bit bn27 in octet 2 and the octets 4, 5 and 6 in the "NULL or I_{PF} segmentation info" message shall be filled by the transmitter and analyzed by the receiver. The two segments of PDUs shall be packed one after the other, starting in the first U-mode subfield in the slot. There could be unused space at the end of the U-type area.

NOTE 2: The maximum number of PDU segments in the same slot is limited to two.

10.8.4.3.3 Special case: slots not multiple of 64 bits

In some rare cases, the MAC packet size (DLC PDU size) of the I_P or I_{PQ} slot is not a multiple of 64 bits. This happens, for instance, with long slot 640 and MAC I_{PQ} mode.

If the MAC packet size is not a multiple of 64 bits, it shall first be filled to the next 64 bits multiple, and then the normal I_{PF} procedures shall be used. The receiver side shall remove the padding bits before delivering the packet to higher layers.

NOTE: Note that in this case, the number of padding bits is a constant well known to both peers.

10.8.4.4 I_{PF} Mod-2 protected operation

The I_{PF} channel inherits the behaviour of the regular I_P or I_{PQ} U-plane MAC service. If the MAC service is "error_correct" then the I_{PF} channel shall operate also in "error correction mode".

The I_{PF} channel also inherits the value of the "MAC lifetime" parameter used in the regular U-plane service.

The operation of the I_{PF} channel in error correct mode shall use the same procedure as the I_P or I_{PQ} channel (clause 10.8.2), with the following specific previsions:

4) The series of E+U type slots shall be an independent MOD-2 sequence, different of the sequence of I_P_error_correct slots transmitted before or after the E+U mode.

5) From the point of view of the main I_P_error correct sequence, the insertion of E+U slots produces an I_P bearer reset (see clause 10.8.2.5.3).

6) If there were I_P packets pending for retransmission when the slot changes to E+U type mode, the transmitter side could, at its choice, reschedule the packet in the I_P channel of other bearer (if available), or pass the packet to the new I_{PF} channel. However, the "MAC lifetime" counter should be passed with the proper value.

7) The E+U slots shall be MOD-2 numbered by using, alternatively, the BA codes "110" and "111" (see table 7.2 in clause 7.1.4).

8) The MOD-2 receiver may use selective reception for building all subfields in the E+U slot.

9) The G_F channel and the "NULL or I_{PF} segmentation control" message, when NCF indicates any type of segmentation control, shall be always retransmitted together with U plane subfields.

10) The bearer quality message "MAC-MOD-2-ACK" shall never be retransmitted. Instead of them, a "fresh" message shall always be placed in the same subfield.

11) The retransmission or not of other MAC messages is free to the implementer. It is allowed to insert new MAC messages (or NULL) in these subfields when slot is retransmitted.

12) The insertion of an "all MAC control" (E-type, codes 110 or 111) field does not break the MOD-2 sequence. In this case the BA code 110 or 111 shall be used according to the sequence and the retransmission behaviour shall be as described in this clause.

NOTE: This is the only case when the BA code 111 could be used for an E-type "all MAC control or G_F" slot.

13) However, if the E/U mux has to switch to "E-type mux, C_F only" or "E-type mux with C_F" (BA codes 010, 011, 100 or 101), this breaks the sequence, and the numbering and retransmission of the slot shall be ruled by the C_F channel rules (clause 10.8.1.2).

14) In case of multibearer, it is allowed to retransmit a badly received bearer over another E+U type bearer. However, the packet lifetime counter shall be passed to new bearer with the proper value. This operation causes a "jump" (see 10.8.2) for the first bearer.

10.8.4.5 I_{PF}_error_detect operation

When the regular MAC service is I_P (or I_{PQ}) error detect, the I_{PF} channel shall operate without retransmission, however with CRC error detection capability. In such cases, only the B-field (BA) code "110" shall be used. There shall not be MAC retransmission of any channel in E+U type slots.

10.8.4.6 I_{PF}_operation with I_N service

When the regular MAC service is I_N, the I_{PF} channel shall operate without retransmission, with the same format and procedures as for I_P_error_detect. However, packets shall be assembled at the receiver side, even in the case of CRC error of individual I_{PF} subfields. The CRC of A-field should be, however, correct to accept a packet. Subfields carrying segmentation info should be also received with correct B-field CRC.

10.8.4.7 Backcompatibility rule

The support of I_{PF} channel and E+U-type mux by PT or FT shall be indicated by a flag in the <Terminal capability> Information Element (see EN 300 175-5 [4] clause 7.7.41) and in "Extended higher layer capabilities (part 2)" broadcast (see EN 300 175-5 [4] annex F.3). This flag indicates the support of both, channel I_{PF} and E+U-type mux mode.

The transmitter side shall not set E+U-type mux mode if the receiver side does not support I_{PF} channel.

NOTE: However, the transmitter side may use the BA code "110" for transmission of E-type, all MAC control, mux mode.

A.3 Amendments to EN 300 175-5 (DECT CI; NWK layer)

The following amendments to EN 300 175-5 [5] shall apply for the purpose of the present document.

A.3.1 References (add to clause 2 of EN 300 175-5)

The following entries shall be added to clause 2 "References" of EN 300 175-5 [5]:

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

A.3.2 Terminal capability (add to clause 7.7.41 of EN 300 175-5)

The following codings of Profile/Application Indicator 6 and 7 (Octets 4e and 4f) and notes shall be added to clause 7.7.41 of EN 300 175-5 [5]:

7.7.41 Terminal capability

Profile/Application Indicator_6 Coding (Octet 4e):

Bits	7 6 5 4 3 2 1	Meaning
	x x x x x x 1	DECT/UMTS interworking profile supported (TS 101 863 [64])
	x x x x x 1 x	DECT/UMTS interworking - GPRS services supported (TS 101 863 [64])
	x x x x 1 x x	Basic ODAP supported (TS 102 342 [73])
	x x x 1 x x x	F-MMS Interworking profile supported (TS 102 379 [74])
	x x 1 x x x x	E+U-type mux and channel I_{PF} basic procedures supported (see note 15)
	x 1 x x x x x	Channel I_{PF} advanced procedures supported (see note 15)
	1 x x x x x x	Channel SI_{PF} supported (see notes 15 and 16)

Profile/Application Indicator_7 Coding (Octet 4f):

Bits	**7 6 5 4 3 2 1**	**Meaning**
	x x x x x x 1	64-level modulation scheme supported (B+Z field)
	x x x x x 1 x	NG-DECT Part 1: Wide band voice supported (TS 102 527-1[76])
	x 0 0 0 0 x x	NG-DECT Packet Data: No packet data supported or non categorized system (see note 17)
	x 0 0 0 1 x x	NG-DECT Packet Data Category: Cat 1 (low-end data devices, see note 17)
	x 0 0 1 0 x x	NG-DECT Packet Data Category: Cat 2 (mid-end data devices, see note 17)
	x 0 0 1 1 x x	NG-DECT Packet Data Category: Cat 3 (high-end data devices, see note 17)
	x 0 1 x x x x	Reserved for future Data Categories
	x 1 0 x x x x	Reserved for future Data Categories
	x 1 1 x x x x	Reserved for future Data Categories
	1 x x x x x x	Channel G_F supported (see note 18)

NOTE 15: See EN 300 175-3 [3] for description of the I_{PF} channel and the E+U-type mux.

NOTE 16: Requires the support of the SI_P channel. See EN 300 175-3 [3] for description of SI_{PF} channel.

NOTE 17: See the data profile specification for exact definition of Packet data Categories (bits 3 to 6 of Octet 4f). Packet data Categories are incremental: Cat 3 systems also support Cat 1 and Cat 2; Cat 2 systems also support Cat 1.

NOTE 18: This bit indicates that the PT has the ability to receive the G_F channel.

A.3.3 Extended higher layer capabilities (part 2) (modify clause F.3 of EN 300 175-5)

Clause F.3 of EN 300 175-5 [5] shall be modified as follows:

F.3 Extended higher layer capabilities (part 2)

If a profile is supported or a capability provided, then the bit corresponding to that profile is set to 1; otherwise (if profile/capability is not supported) the bit is set to 0.

For NG-DECT systems supporting packet data, the system category is indicated by bits a25 - a28.

Table F.3: Extended higher layer capabilities

Bit number	Profile supported
a24	NG-DECT Wideband voice (see TS 102 527-1 [76])
a25 – a28	NG-DECT Packet Data Category (see table F.3a)
a29 – a47	Reserved for future standardization

Table F.3a: NG-DECT DPRS Packet data Category (Cat)

Bits a25 – a 28	NG-DECT Packet Data Category supported
0000	No Packet data supported or non categorized system
0001	Cat 1: data Category 1 (see note 3)
0010	Cat 2: data Category 2 (see note 3)
0011	Cat 3: data Category 3 (see note 3)
All other values	Reserved for future standardization

NOTE 1: The bit numbers refer to the bit positions in the MAC message. Refer to EN 300 175-3 [3], clause 7.2.3.11.

NOTE 2: The default setting for all bits is "0"; meaning "not available".

NOTE 3: See the data profile specification for exact definition of Packet data Categories. Packet data Categories are incremental: Cat 3 systems also support Cat 1 and Cat 2; Cat 2 systems also support Cat 1.

Annex B (informative): Bibliography

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History

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