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Digital Enhanced Cordless Telecommunications (DECT);
Integrated Services Digital Network (ISDN);
DECT/ISDN interworking for end system configuration;
Part 1: Interworking specification

ETSI

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Digital Enhanced Cordless Telecommunications (DECT), and is now submitted for the ETSI standards One-step Approval Procedure.

Details of the Digital Enhanced Cordless Telecommunications (DECT) Common Interface (CI) may be found in EN 300 175 (Parts 1 [1] to 9 [9]).

Further details of the DECT system may be found in ETR 043 [51], and TR 101 178 [53].

The present document is part 1 of a multi-part deliverable covering the Digital Enhanced Cordless Telecommunications (DECT); and Integrated Services Digital Network (ISDN) interworking for end system configuration, as identified below:

   Part 1:   "Interworking specification";

   Part 2:   "Access profile".

Proposed national transposition dates	
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Introduction

The present document specifies how Integrated Services Digital Network (ISDN) services are provided over the DECT air interface.

One of the main objectives is to describe how the ISDN services are mapped across the DECT air interface in a formal way, so that inter-operability of different manufacturers' equipment can be achieved. This is achieved by describing the Interworking Unit (IWU) procedures and mappings loosely following ITU-T Recommendations Q.601 to Q.699 [67] and by describing air interface protocols.

The present document is made up of 3 main clauses:

   -   clause 4: Interworking requirements which includes the reference configurations and the protocol architecture model and a description of the main service requirements;

- clause 5: IWU mappings which shows the C-plane and U-plane mappings. The signalling mappings are first described in terms of IWU procedures with informative data flow diagrams. Detailed descriptions follow using tables of what is mapped, what is ignored, and what is "piped";

- clause 6: Support of ISDN bearer services which identifies the main DECT connection types (U-plane + C-plane) at the air interface supporting optimized groups of services, from the IWU mappings.

Part 2 of the present document contains the ISDN Access Profile (IAP) for the end system and describes the air interface protocol in detail. It will enable the subsequent generation of Protocol Implementation Conformance Statements (PICS) and test cases.

1   Scope

The present document specifies how Integrated Services Digital Network (ISDN) services may be provided over Digital Enhanced Cordless Telecommunications (DECT) endsystem configurations. Apparatus claiming interoperability based upon the ISDN Access Profile (IAP) shall fully comply with the process mandatory technical requirements and those for optional features so far such are provided. Both public ISDN and private ISDN are within the scope of the present document.

An IAP is specified, defining how particular ISDN services are supported, so that inter-operability of DECT equipment can be achieved at the air interface for these services. Apparatus claiming the provision of any service feature listed in the present document should comply with the corresponding process mandatory technical requirements.

The following ISDN bearer services are covered:

- speech;

- 3,1 kHz audio; and

- unrestricted digital information 64 kbit/s.

Applications using these bearer services are outside the scope of the present document. However, such applications envisaged include 3,1 kHz telephony, 7 kHz telephony, group 4 fax, teletex, videotex, and voice-band data transmission such as group 3 fax and modem data transmission.

The bearer service "packet mode" is outside the scope of the present document.

The support of ISDN supplementary services is considered.

The DECT end system reference configuration is used where the DECT Fixed System (DFS) and DECT Portable System (DPS) together form an end system with the behaviour of an ISDN Terminal Equipment (ISDN-TE).

Mobility Management (MM) such as location registration, and subscription registration is outside the scope of the present document.

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.

[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 EN300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech Coding and Transmission".

[9]   ETSI ETS 300 175-9: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 9: Public Access Profile (PAP)".

[10]   ISO/IEC 9646-1 (1994): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts". (See also ITU-T Recommendation X.290 (1991)).

[11]   ISO/IEC 9646-3 (1998): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)". (See also ITU-T Recommendation X.292 (1992)).

[12]   ETSI ETS 300 052-1: "Integrated Services Digital Network (ISDN); Multiple Subscriber Number (MSN) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[13]   ETSI EN 300 058-1: "Integrated Services Digital Network (ISDN); Call Waiting (CW) supplementary service; Digital subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[14]   ETSI EN 300 061-1: "Integrated Services Digital Network (ISDN); Subaddressing (SUB) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[15]   ETSI EN 300 092-1: "Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[16]   ETSI EN 300 093-1: "Integrated Services Digital Network (ISDN); Calling Line Identification Restriction (CLIR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[17]   ETSI EN 300 097-1: "Integrated Services Digital Network (ISDN); Connected Line Identification Presentation (COLP) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[18]   ETSI EN 300 098-1: "Integrated Services Digital Network (ISDN); Connected Line Identification Restriction (COLR) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[19]   ETSI EN 300 130-1: "Integrated Services Digital Network (ISDN); Malicious Call Identification (MCID) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[20]   ETSI EN 300 138-1: "Integrated Services Digital Network (ISDN); Closed User Group (CUG) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[21]   ETSI EN 300 141-1: "Integrated Services Digital Network (ISDN); Call Hold (HOLD) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[22]   ETSI EN 300 182-1: "Integrated Services Digital Network (ISDN); Advice of Charge (AOC) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[23]   ETSI EN 300 185-1: "Integrated Services Digital Network (ISDN); Conference call, add-on (CONF) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[24]   ETSI ETS 300 080: "Integrated Services Digital Network (ISDN); ISDN lower layer protocols for telematic terminals".

[25]   ETSI ETS 300 081: "Integrated Services Digital Network (ISDN); Teletex end-to-end protocol over the ISDN".

[26]   ETSI ETS 300 108: "Integrated Services Digital Network (ISDN); Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category; Service description".

[27]   ETSI ETS 300 109: "Integrated Services Digital Network (ISDN); Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for speech information transfer; Service description".

[28]   ETSI ETS 300 110: "Integrated Services Digital Network (ISDN); Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3,1 kHz audio information transfer; Service description".

[29]   ETSI ETS 300 111: "Integrated Services Digital Network (ISDN); Telephony 3,1 kHz teleservice; Service description".

[30]   ETSI ETS 300 112: "Integrated Services Digital Network (ISDN); Facsimile group 4 class 1 equipment on the ISDN End-to-end protocols".

[31]   ETSI ETS 300 120: "Integrated Services Digital Network (ISDN); Service requirements for telefax group 4".

[32]   ETSI EN 300 171: "Private Integrated Services Network (PISN); Specification, functional models and information flows; Control aspects of circuit-mode basic services [ISO/IEC 11574 (1994) modified]".

[33]   ETSI EN 300 262: "Integrated Services Digital Network (ISDN); Syntax based Videotex teleservice; Service description".

[34]   ETSI ETS 300 263: "Integrated Services Digital Network (ISDN); Telephony 7 kHz teleservice; Service description".

[35]   ETSI ETS 300 264: "Integrated Services Digital Network (ISDN); Videotelephony teleservice; Service description".

[36]   ETSI ETS 300 475-1: "Private Telecommunication Network (PTN); Reference configuration; Part 1: Reference configuration for PTN eXchanges (PTNXs) [ISO/IEC 11579-1 (1994), modified]".

[37]   ETSI EN 300 012: "Integrated Services Digital Network (ISDN); Basic User-Network Interface (UNI); Layer 1 specification"

[38]   ETSI ETS 300 402-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]".

[39]   ETSI EN 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[40]   ETSI ETS 300 192: "Private Telecommunications Network (PTN); Signalling protocol at the S-reference point; Circuit mode basic services".

[41]   ETSI EN 300 122-1: "Integrated Services Digital Network (ISDN); Generic keypad protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[42]   ETSI EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[43]   ETSI EN 300 188-1: "Integrated Services Digital Network (ISDN); Three-Party (3PTY) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[44]   ETSI EN 300 207-1: "Integrated Services Digital Network (ISDN); Diversion supplementary services; Digital Subscriber Signalling System No One (DSS1); Part 1: Protocol specification".

[45]   ETSI EN 300 210-1: "Integrated Services Digital Network (ISDN); Freephone (FPH) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[46]   ETSI EN 300 286-1: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[47]   ETSI EN 300 359-1: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[48]   ETSI EN 300 369-1: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[49]   ETSI EN 300 064-1: "Integrated Services Digital Network (ISDN); Direct Dialling In (DDI) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[50]   ETSI EN 300 267-1: "Integrated Services Digital Network (ISDN); Telephony 7 kHz, videotelephony, audiographic conference and videoconference teleservices; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[51]   ETSI ETR 043: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Services and facilities requirements specification".

[52]   Void.

[53]   ETSI TR 101 178: "Digital Enhanced Cordless Telecommunications (DECT); A High Level Guide to the DECT Standardization".

[54]   ITU-T Recommendation G.821: "Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an integrated services digital network".

[55]   ITU-T Recommendation I.231.2: "Circuit-mode bearer service categories: Circuit-mode 64 kbit/s, 8 kHz structured bearer service usable for speech information transfer".

[56]   ITU-T Recommendation I.241.2: "Teleservices supported by an ISDN: Teletex".

[57]   ITU-T Recommendation I.241.3: "Teleservices supported by an ISDN: Telefax 4".

[58]   ITU-T Recommendation I.241.5: "Teleservices supported by an ISDN: Videotex".

[59]   ITU-T Recommendation I.241.6: "Teleservices supported by an ISDN: Telex".

[60]   ITU-T Recommendation I.411: "ISDN user-network interfaces - Reference configurations".

[61]   ETSI EN 300 011: "Integrated Services Digital Network (ISDN); Primary rate user-network interface; Layer 1 specification and test principles".

[62]   ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

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

[64]   ETSI ETS 300 242: "Terminal Equipment (TE); Group 3 facsimile equipment".

[65]   ETSI ETS 300 102-1: "Integrated Services Digital Network (ISDN); User-network interface layer 3 Specifications for basic call control".

[66]   ITU-T Recommendation Q.931: "ISDN user-network interface layer 3 specification for basic call control".

[67]   ITU-T Recommendations Q.601 to Q.699.

[68]   ITU-T Recommendation I.241.1: "Teleservices supported by an ISDN: Telephony".

[69]   ETSI EN 300 195-1: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

bearer service: type of telecommunication service that provides a defined capability for the transmission of signals between user-network interfaces

broadcast: simplex point-to-multipoint mode of transmission

C-plane: control plane of the DECT protocol stacks, which contains all of the internal DECT protocol control, but may also include some external user information

NOTE 1: The C-plane stack always contains protocol entities up to and including the network layer.

call: all of the Network (NWK) layer processes involved in one network layer peer-to-peer association

NOTE 2: Call may sometimes be used to refer to processes of all layers, since lower layer processes are implicitly required.

DECT Fixed System (DFS): logical grouping that contains all the functions between the DECT D reference point and the reference point on the fixed side of the DECT air interface

NOTE 3: The DFS = Fixed radio Termination (FT) + (local network up to the fixed side ISDN reference point (including fixed side IWU)), (see TR 101 178 [53]).

DECT Network (DNW): network that uses the DECT air interface to interconnect a local network to one or more portable applications. The logical boundaries of the DECT network are defined to be at the top of the DECT network layer

NOTE 4: A DNW is a logical grouping that contains one or more FTs plus their associated portable radio termination. The boundaries of the DECT network are not physical boundaries.

DECT Portable System (DPS): logical grouping that contains all the functions between the DECT D reference point and the user interface on the portable side of the DECT air interface

NOTE 5: The DPS = PT + (PA (portable application)), see TR 101 178 [53].

End System (ES): logical grouping that contains application processes and supports telecommunication services

NOTE 6: From the Open Systems Interconnection (OSI) point of view, end systems are considered as sources and sinks of information.

Fixed Part (DECT Fixed Part) (FP): physical grouping that contains all of the elements in the DECT network between the local network and the DECT air interface

> NOTE 7: A FP contains the logical elements of at least one FT, plus additional implementation specific elements.

Fixed Radio Termination (FT): logical group of functions that contains all of the DECT processes and procedures on the fixed side of the DECT air interface

> NOTE 8: A FT only includes elements that are defined in the DECT CI standard. This includes radio transmission elements together with a selection of layer 2 and layer 3 elements.

Global Network (GNW): telecommunication network capable of offering a long distance telecommunication service

> NOTE 9: The term does not include legal or regulatory aspects, nor does it indicate if the network is a public or a private network.

incoming call: call received at a portable part

inter-operability: capability of FPs and portable parts, that enable a portable part to obtain access to teleservices in more than one location area and/or from more than one operator (more than one service provider)

Interworking Unit (IWU): unit that is used to interconnect sub-networks

> NOTE 10: The IWU will contain the interworking functions necessary to support the required sub-network interworking.

ISDN Access Profile (IAP): defined part of the DECT/ISDN interworking standard that ensures inter-operability between FPs and portable parts for the access of ISDN services

Local Network (LNW): telecommunication network capable of offering local telecommunication services

> NOTE 11: The term does not include legal or regulatory aspects, nor does it indicate if the network is a public network or a private network.

MAC Connection (CONNECTION): association between one source Medium Access Control (MAC) Multi-Bearer Control (MBC) entity and one destination MAC MBC entity. This provides a set of related MAC services (a set of logical channels), and it can involve one or more underlying MAC bearers

outgoing call: call originating from a portable part

paging: process of broadcasting a message from a DECT FP to one or more DECT portable parts

> NOTE 12: Different types of paging message are possible. For example, the {LCE_REQUEST-PAGE} message orders the recipient to respond with a call set-up attempt.

Portable Application (PA): logical grouping that contains all the elements that lie beyond the DECT network boundary on the portable side

> NOTE 13: The functions contained in the portable application may be physically distributed, but any such distribution is invisible to the DECT network.

Portable Part (DECT Portable Part) (PP): physical grouping that contains all elements between the user and the DECT air interface. Portable part is a generic term that may describe one or several physical pieces

> NOTE 14: A PP is logically divided into one portable termination plus one or more portable applications.

Portable Radio Termination (PT): logical group of functions that contains all of the DECT processes and procedures on the portable side of the DECT air interface

> NOTE 15: A PT only includes elements that are defined in the DECT CI standard. This includes radio transmission elements (layer 1) together with a selection of layer 2 and layer 3 elements.

Public Access Profile (PAP): defined part of the DECT common interface standard (DECT CI) that ensures inter-operability between FPs and portable parts for public access services

Radio Fixed Part (RFP): one physical sub-group of a FP that contains all the Radio End Points (REP) (one or more) that are connected to a single system of antennas

segment: one of the pieces of data that is produced by the process of segmentation

NOTE 16: In general, one segment only represents a portion of a complete message.

segmentation: process of partitioning one service data unit from a higher layer into more than one protocol data unit. The reverse process is assembly

supplementary service: service that modifies or supplements a basic telecommunication service

teleservice: type of telecommunication service that provides the complete capability, including terminal equipment functions, for communication between users, according to protocols that are established by agreement

U-plane: user plane of the DECT protocol stacks. This plane contains most of the end-to-end (external) user information and user control

NOTE 17: The U-plane protocols do not include any internal DECT protocol control, and it may be null at the network layer and at the Data Link Control (DLC) layers for some services.

3.2 Symbols

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

< >	timer
<< >>	information element
{ }	message

3.3 DECT abbreviations and acronyms

For the purposes of the present document, the following DECT abbreviations and acronyms apply:

CC	Call Control
ITU-T	ITU - Telecommunications standardization sector
CI	Common Interface
CISS	Call Independent Supplementary Services
CLMS	ConnectionLess Message Service
CLSS	ConnectionLess Supplementary Service
COMS	Connection Oriented Message Service
CRSS	Call Related Supplementary Services
D	DECT reference point for end system
DECT	Digital Enhanced Cordless Telecommunications
DFS	DECT Fixed System
DLC	Data Link Control
DPS	DECT Portable System
FIFO	First-In-First-Out
FP	Fixed Part
FT	Fixed radio Termination
GAP	Generic Access Profile
IAP	ISDN Access Profile
IWU	InterWorking Unit
LCE	Link Control Entity
MAC	Medium Access Control
MM	Mobility Management
NWK	Network
PAP	Public Access Profile
PI	Progress Indicator
PP	Portable Part
PSTN	Public Switched Telephone Network
PT	Portable radio Termination
REP	Radio End Point
RFP	Radio Fixed Part
TI	Transaction Identifier

3.4 ISDN abbreviations and acronyms

For the purposes of the present document, the following ISDN abbreviations and acronyms apply:

3PTY	Three party
ADPCM	Adaptive Differential Pulse Code Modulation
AOC	Advice Of Charge
AOC-D	Advice Of Charge: charging information During the call
AOC-E	Advice Of Charge: charging information at the End of the call
AOC-S	Advice Of Charge: charging information at call Set-up time
BC	Bearer Capability
BRA	Basic Rate Access
CCBS	Completion of Calls to Busy Subscriber
CD	Call Deflection
CFB	Call Forwarding Busy
CFNR	Call Forwarding No Reply
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COLP	COnnected Line identification Presentation
COLR	COnnected Line identification Restriction
CONF	Conference call, add-on
CUG	Closed User Group
CW	Call Waiting
DDI	Direct Dialling In
ECT	Explicit Call Transfer
FPH	Free Phone
HLC	High Layer Compatibility
HOLD	Call Hold
ISDN	Integrated Services Digital Network
ISDN-TE	ISDN Terminal Equipment
LLC	Low Layer Compatibility
MCID	Malicious Call IDentification
MMC	Meet-Me Conference
MSN	Multiple Subscriber Number
NT	Network Termination
PHL	PHysical Layer
PRA	Primary Rate Access
SS	Supplementary Services
SUB	SUBaddressing
TP	Terminal Portability
UUS	User-to-User Signalling
UUS1	UUS service 1
UUS2	UUS service 2
UUS3	UUS service 3

3.5 ISO 9646 abbreviations

For the purposes of the present document, the following ISO 9646 [10] and [11] abbreviations apply:

OSI	Open Systems Interconnection
PICS	Protocol Implementation Conformance Statement

4   Interworking requirements

4.1   Reference configurations and interface

4.1.1   End system reference configuration

The reference configurations describe the functional groupings of DECT and ISDN and their relationships via reference points. In general, reference points may or may not correspond to a physical interface. The functional groupings and reference points are described in ITU-T Recommendation I.411 [60] for public ISDN and in EN 300 475-1 [36], for private ISDN.

The DECT end system reference configurations are used where the DECT Fixed System (DFS) and DPS together form an end system with the behaviour of an ISDN-TE.

Figure 1 shows the end system reference configurations.

```
ISDN ──┤├── NT1 ──┤├── NT2 ──┤├── TA ──┤├── TE2
        U           T           S          R

              ──┤├── DFS ──┤├── DPS
                S/T          D

      T ┌─ PTNX ──┤├── DFS ──┤├── DPS
      C └─          P          D

        ──┤├── NT2 ──┤├── DFS ──┤├── DPS
          T           S          D
```
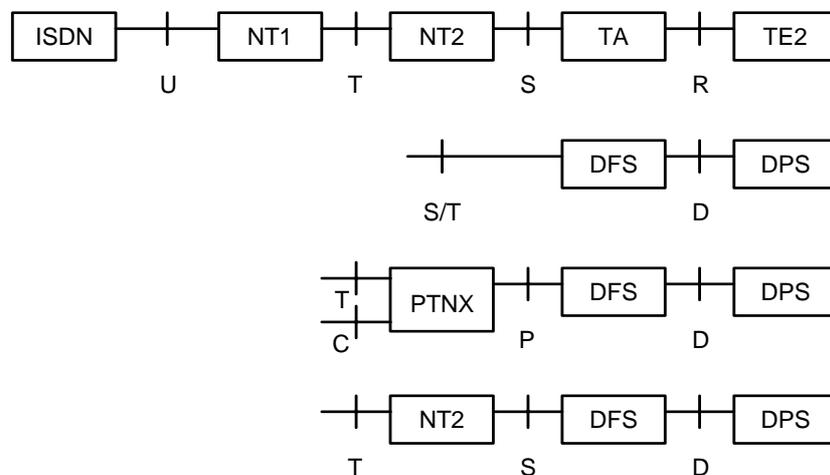
Figure 1: End system reference configurations

4.1.2   Interfaces

In general, reference points may or may not correspond to physical interfaces. But as stated in ITU-T Recommendation I.411 [60], for all ISDN user-network interfaces standardized in ISDN there shall be a corresponding reference point. This means that if the scope of specification of ISDN interworking to DECT is restricted to user-network interfaces, it is possible to assume that the ISDN reference point at the DFS always corresponds to a physical interface.

>   NOTE: This also means that the logical DFS is always bounded by two physical interfaces and therefore is also one or more physical entities.

4.1.2.1   ISDN interfaces

This interworking specification is based on the public user-network interface standard, EN 300 403-1 [39]. The private ISDN specification, EN 300 192 [40], is very similar and is not considered.

Furthermore, this interworking specification is based on the ISDN specifications for bearer services and the generic and service specific supplementary service specifications, which apply at the S/T reference point.

4.1.2.2   Interfaces supported for a DECT end system

The following ISDN interfaces are assumed to be supported by the DFS:

-   one or more Basic Rate Access (BRA);

-   Primary Rate Access (PRA).

4.2   Protocol architecture models

Protocol architecture models are used to describe the protocol interactions at control plane (C-plane) and user-plane (U-plane) of the DFS and DPS. The concept of the protocol architecture model is based on TR 101 178 [53] and therefore ECMA TR/44 (see bibliography). The protocol architecture model also shows the location of the IWU.

NOTE 1:   The IWU will contain the interworking functions necessary to support the required sub-network interworking.

NOTE 2:   The IWUs, in the context of DECT, interconnect the FT at the fixed side to the attached sub-network.

The protocol architecture model for the end system configuration is based on full termination of the whole ISDN layer protocol in the DFS. The IWU in the DFS provides the mapping of the ISDN layer 3 protocol to the DECT layer 3 protocol and vice versa.

ISDN L3:   EN 300 403-1 [39]
ISDN L2:   EN 300 402-2 [38]
ISDN L1:   EN 300 011 [61]/EN 300 012 [37]
NWL: EN 300 175-5 [5]
DLC: EN 300 175-4 [4]
MAC: EN 300 175-3 [3]
PHL: EN 300 175-2 [2]
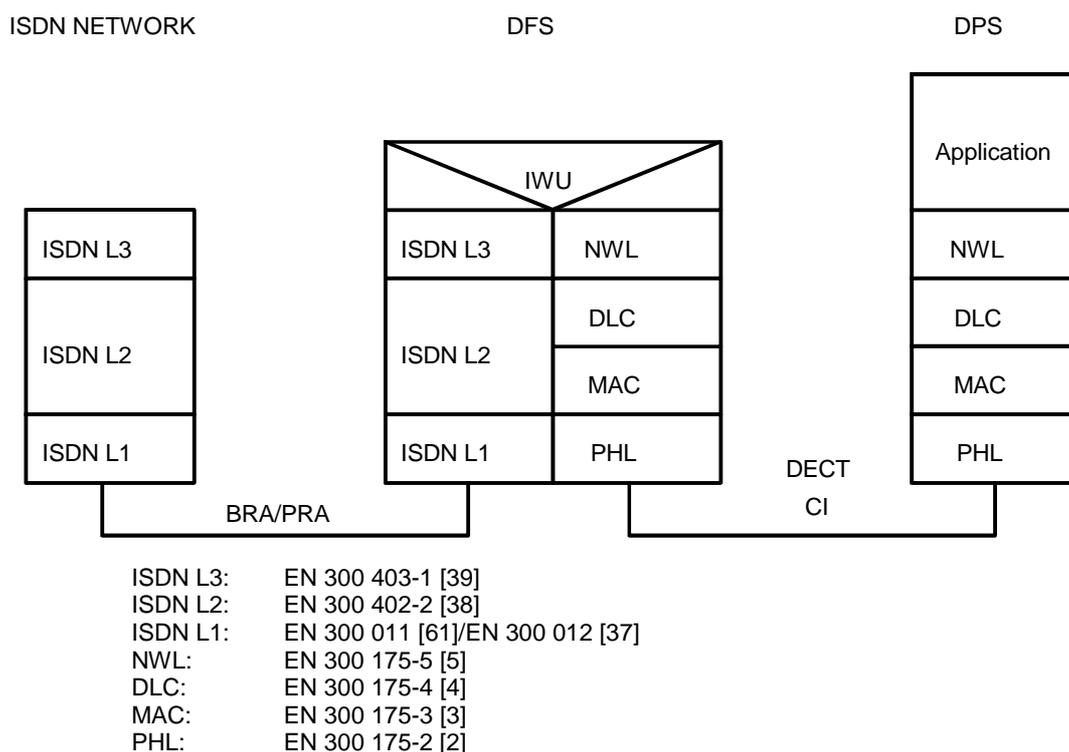
Figure 2: System C-plane model

ISDN NETWORK   DFS   DPS

```
                        ┌──────────────┐
                        │     IWU      │
┌──────────┐    ┌───────┬──────────┐   ┌──────────┐
│   PCM    │    │  PCM  │  ADPCM   │   │  ADPCM   │
│          │    │       │          │   │          │
│          │    │       │          │   │          │
│          │    │       │   DLC    │   │   DLC    │
│          │    │       │   MAC    │   │   MAC    │
│ ISDN L1  │    │ISDN L1│   PHL    │   │   PHL    │
└──────────┘    └───────┴──────────┘   └──────────┘
        BRA/PRA              DECT CI
```

PCM	ITU-T Recommendation G.711 [62]
ADPCM	ITU-T Recommendation G.726 [63]
ISDN L1:	EN 300 011 [61]/EN 300 012 [37]
DLC:	EN 300 175-4 [4]
MAC:	EN 300 175-3 [3]
PHL:	EN 300 175-2 [2]
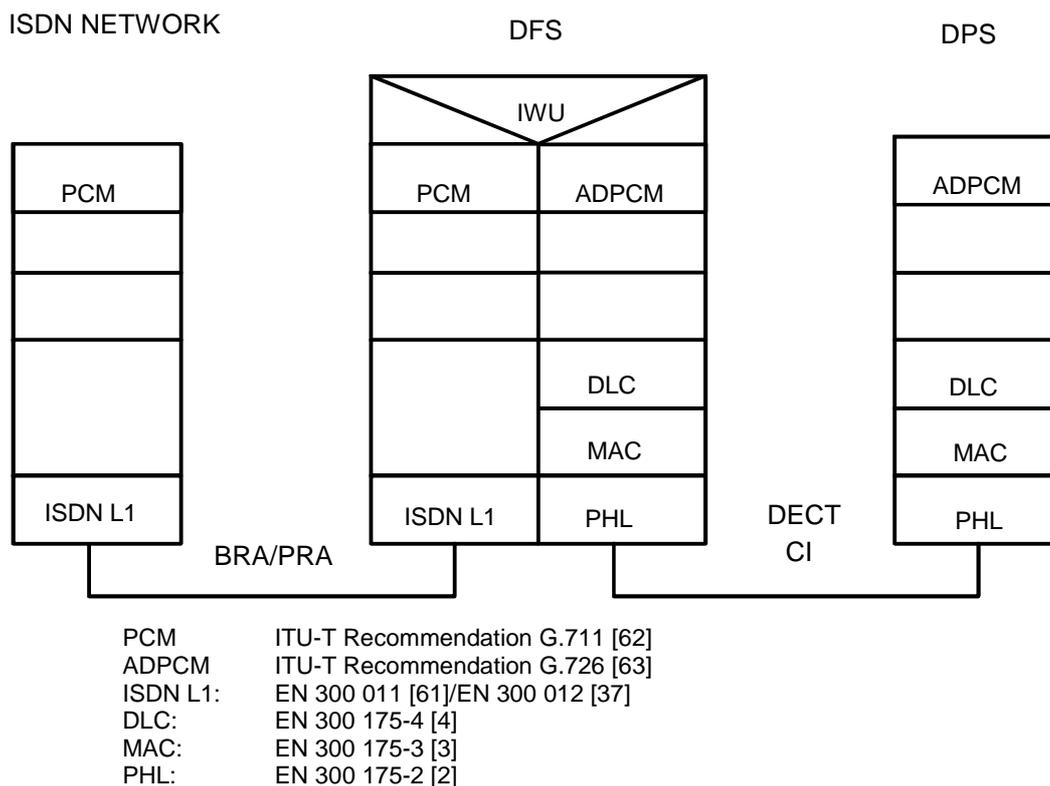
Figure 3: System U-plane model example- basic speech

4.3   Service requirements

4.3.1   Bearer service requirements

This interworking specification covers the following bearer services:

-   circuit-mode speech, ITU-T Recommendation I.231.2 [55], EN 300 109 [27] and EN 300 171 [32];

-   circuit-mode 3,1 kHz audio, ITU-T Recommendation I.231.2 [55], EN 300 110 [28] and EN 300 171 [32]*;

-   circuit-mode 64 kbit/s unrestricted (digital information), ITU-T Recommendation I.231.2 [55], EN 300 108 [26] and EN 300 171 [32]*.

NOTE: The bearer services marked with "*" are the minimum set covered by the 1989 MoU for European Network Operators.

4.3.2   Teleservice requirements

4.3.2.1   General

This interworking specification covers the following teleservices:

-   3,1 kHz telephony, ITU-T Recommendation I 241.1 [68], EN 300 111 [29];

-   7 kHz telephony, EN 300 263 [34];

-   videotelephony (in other terms: audio-visual teleservices, narrow band visual telephone systems), EN 300 264 [35];

-   telematic services:

    -   teletex, ITU-T Recommendation I.241.2 [56], EN 300 080 [24], and EN 300 081 [25];

- telefax group 4, ITU-T Recommendation I.241.3 [57], EN 300 080 [24], EN 300 112 [30], and EN 300 120 [31];

- syntax based videotex, ITU-T Recommendation I.241.5 [58], EN 300 080 [24], and EN 300 262 [33];

- telex, ITU-T Recommendation I.241.6 [59].

NOTE 1: Presently the telex service may indirectly be accessed via the teletex service if teletex service providers support service interworking by interworking facilities. Specifications for the direct support of the telex service in the ISDN environment do not exist at ETSI nor are under discussion. Therefore the telex service is not further regarded here.

NOTE 2: Currently, only the 3,1 kHz telephony teleservice is fully specified in the basic DECT standard.

There are a lot of applications which are not standardized as services but use ISDN bearer services. Such applications include voice band data transmission, (e.g. group 3 facsimile (EN 300 242 [64]), data transmission via modems supported by terminal adapters) and digital data transmission. Applications such as these may have specific service requirements.

4.3.2.2   Relationship to other ISDN service categories

Principally these services are based on ISDN bearer services. All requirements when using the bearer services need to be covered by the teleservices. Use of ISDN supplementary services is optional. If used, the generic procedure rules and the service specific protocols shall be applied at the ISDN interfaces.

4.3.2.3   Relationship to ISDN bearer services and information transfer capabilities

Table 1 describes how bearer services and transfer capabilities are used by teleservices and applications.

Table 1: Usage of bearer services and transfer capabilities by teleservices and applications

Bearer service (bs)/ transfer capability (tc)	Speech (bs)	3,1 kHz audio (bs)	Unrestricted digital information with tones and announcement (tc)	Unrestricted digital information (bs)	packet mode (bs)
teleservice:					
3,1 kHz telephony	X	X (note 1)			
7 kHz telephony	X (note 2)	X (note 1)	X (note 5)	X (note 4 and 5)	
video-telephony	X (note 2)	X (note 1)	X (note 6)	X (note 4 and 5)	
teletex				X (note 5)	
telefax group 4				X (note 5)	
videotex				X (note 5)	X (note 3)
classes of application: -data				X	X
- voice band data		X			
NOTE 1: Public Switched Telephone Network (PSTN) originated calls.					
NOTE 2: If fall-back is allowed.					
NOTE 3: Under discussion in some countries.					
NOTE 4: For the second connection if resultant from inband negotiation in the first connection and for the first call as short-term solution.					
NOTE 5: Specific handling of BC is required for connections with terminals behind networks with restricted transfer capabilities.					
NOTE 6: For the first call as long term solution.					

4.3.2.4   Relationship to signalling procedures

Service specific signalling requirements exceeding those defined in ISDN layer 1 - 3 standards do not exist. In the 7 kHz telephony service and the videotelephony, service procedures for the selection of bearer capability and high layer compatibility (videotelephony only) can be applied by the ISDN terminal and the network.

Coding and handling of the ISDN compatibility information elements (BC, LLC, HLC) is defined in the service specific standards. When interworking with non ISDN networks occurs (for example within the 3,1 kHz telephony service with PSTN) additionally the <<PROGRESS-INDICATOR>> information element (PI) needs to be included into checking of compatibility. The tables below present the general service specific requirements.

Table 2: 3,1 kHz telephony

Information element	outgoing call	incoming call	action on mismatch
BC + (PI note)	M	M	ignore/reject
LLC	O	O	ignore/reject
HLC	M	O	ignore/reject, may be absent
NOTE: PI in PSTN originated incoming calls only.			

M: mandatory, O: optional.

Table 3: 7 kHz telephony

Information element	outgoing call	incoming call	action on mismatch
BC	M	M	ignore/reject
LLC	O	O	ignore/reject
HLC	M	M	ignore/reject

M: mandatory, O: optional.

Table 4: Videotelephony service

Information element	outgoing call	incoming call	action on mismatch
BC	M	M	ignore/reject
LLC	N/A	N/A	ignore/reject
HLC	M	M	ignore/reject
NOTE: All elements to be applied for both connections.			

M: mandatory, O: optional.

Table 5: Telematic services

Information element	outgoing call	incoming call	action on mismatch
BC	M	M	ignore/reject
LLC	M	M	ignore/reject may be absent
HLC	M	M	ignore/reject

M: mandatory.

4.3.2.5   General aspects on error performance

The purpose of the services is to allow the users to exchange user information with service specific characteristics. Therefore the general requirement exists that this information needs to be conveyed by such means that, if at all, only a very small portion can be tolerated to be corrupted within the network. The profile of corruption needs to be foreseeable so that means can be provided outside the network for an efficient enhancement of the given error performance if necessary application dependent.

In the clauses below, the error performance aspects will be considered along with the service specific transmission methods applied. Here these aspects are preceded by the more general ISDN network point of view which can be considered to be the framing guideline for the services so far defined and for a wide range of applications not defined ISDN and not known to the DECT/ISDN environment but relying on ISDN characteristics.

ITU-T Recommendation G.821 [54] gives such objectives for quality and availability targets in terms of error performance parameters inside the network between the terminating T-reference points, (see ITU-T Recommendation G.821 [54], table 1) as follows:

- degraded minutes: < 10 % of one-minute intervals have a Bit Error Ratio (BER) worse than 10^{-6};

- severely errored seconds: < 0,2 % of one-second intervals have a BER worse than 10^{-3};

- errored seconds: < 8 % of one-second intervals have any error (equivalent to 92 % error free seconds).

NOTE: The achievable BER depends on the radio propagation conditions. The LU7 service is intended to improve the BER of the U-plane at the air interface towards the above values.

4.3.3   Supplementary service requirements

4.3.3.1   General

The three ITU-T supplementary service protocol types are used in DECT:

- keypad protocol;

- feature key management protocol; and

- functional protocol.

The portable system and fixed system may optionally support one or more of these. But in public ISDN only two types are defined:

- keypad protocol (EN 300 122-1 [41]); and

- functional protocol (EN 300 196-1 [42]).

Figure 4 summarizes the status of the interworking between these protocols.

mapping procedure status

o : optional to map - specified

i : out of scope - not specified
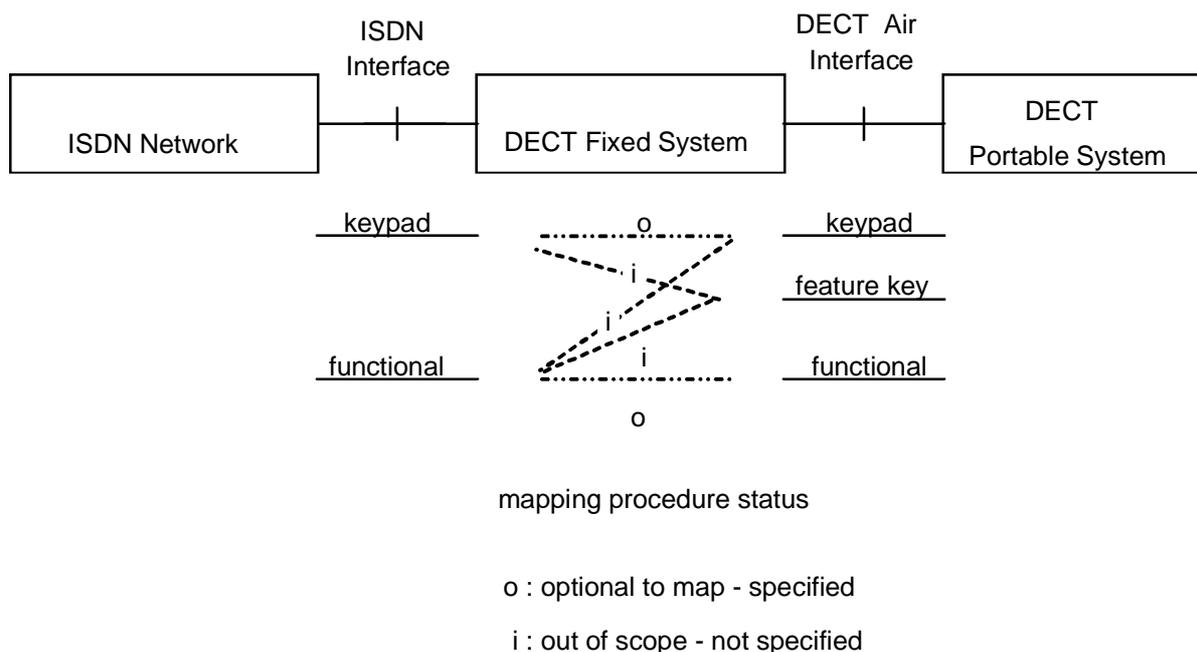
Figure 4: Public ISDN SS interworking status

For private ISDN, all three protocol types are defined and therefore figure 5 summarizes the status of the interworking.
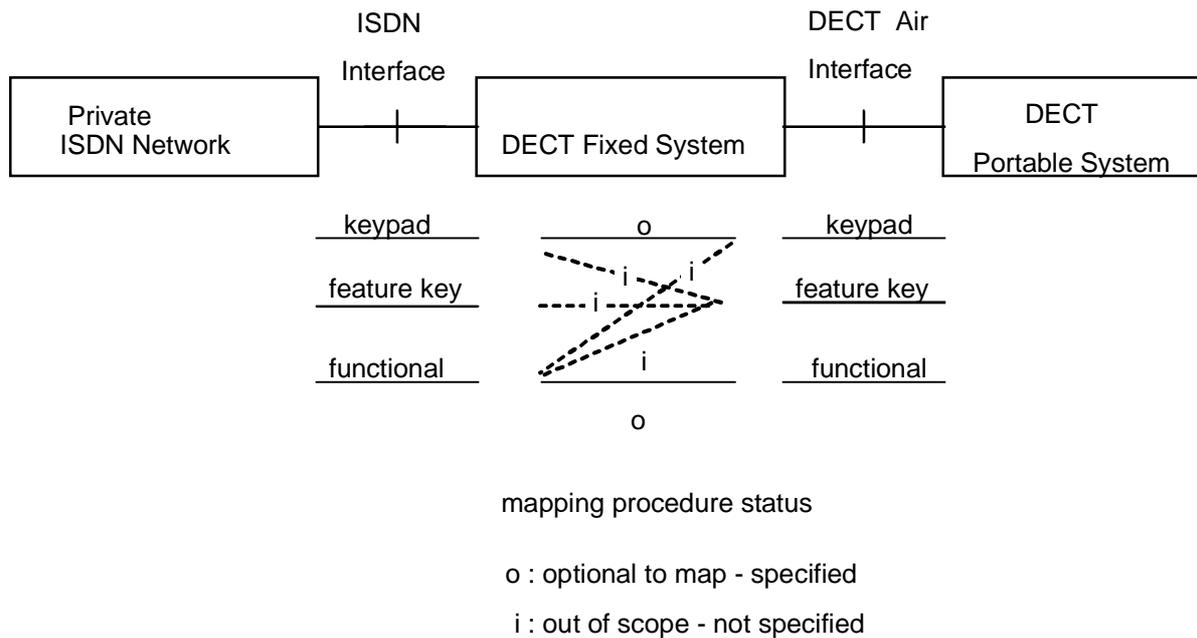
Figure 5: Private ISDN SS interworking status

4.3.3.2   Keypad protocol

The DECT keypad protocol may be used by the portable system internally to the DECT fixed system or externally to the network. If used externally the IWU shall map the DECT keypad protocol either to the ISDN keypad protocol or to the ISDN functional protocol (outside the scope of the present document). In this context "internal" means that the service is provided by the DECT fixed system while "external" indicates that the service is provided by the ISDN. Only supplementary services that are provided externally are covered by this interworking specification.

4.3.3.3   Feature key management protocol

The DECT feature key management protocol has five main uses:

1) **DECT internal SS:** queue management, indication of subscriber number and control of echo control functions. These are mapped internally to the fixed system and are therefore not subject to interworking with ISDN (not applicable);

2) **DECT external SS:** cost information. Cost information may be used internally to the FP or externally to the network. If used externally the IWU may map either to the ISDN keypad protocol (out of scope) or to the ISDN functional protocol (out of scope). For private ISDN attachment this may be mapped to the feature key management protocol (out of scope).

NOTE: The same SS may be available via the functional protocol (e.g. Advice Of Charge (AOC));

3) **unspecified feature key use:** this may be used internally to the FP or externally for private ISDN attachment. For private ISDN attachment this may be mapped to the feature key management protocol (outside the scope of the present document);

4) **proprietary product use:** register recall specific line selection and specific trunk selection. These are proprietary in nature and therefore are outside the scope of the present document;

5) **external handover switch:** this is for Mobility Management (MM) and therefore outside the scope of the present document.

4.3.3.4   Functional protocol

The following functional SS are defined in ISDN. Some of them are available in every public European ISDN network, others will be available according to the individual plans of the different network providers. For each service there exists (or are being prepared) EN which describe the service from the users point of view, information flows, and the protocol at the network-user interface:

- Advice Of Charge (AOC) services:

  - Advice Of Charge: charging information at call set-up time (AOC-S);

  - Advice Of Charge: charging information during the call (AOC-D);

  - Advice Of Charge: charging information at the end of the call (AOC-E).

- Call Waiting (CW);

- Call Hold (HOLD);

- Explicit Call Transfer (ECT);

- Number identification services:

  - Calling Line Identification Presentation (CLIP)*;

  - Calling Line Identification Restriction (CLIR)*;

  - Connected Line Identification Presentation (COLP);

  - Connected Line identification Restriction (COLR).

- Closed User Group (CUG);

- Completion of Calls to Busy Subscriber (CCBS);

- Conference services:

  - Conference call, add-on (CONF);

  - Meet-Me Conference (MMC).

- Direct Dialling In (DDI)*;

- Diversion services:

  - Call Forwarding Busy (CFB);

  - Call Forwarding Unconditional (CFU);

  - Call Forwarding No Reply (CFNR);

  - Call Deflection (CD).

- Free Phone (FPH);

- Malicious Call Identification (MCID);

- Multiple Subscriber Number (MSN)*;

- Subaddressing (SUB);

- Terminal Portability (TP)*;

- Three party (3PTY);

- User-to-User Signalling (UUS):

  - UUS services 1, 2 and 3 (UUS1, UUS2 and UUS3).

NOTE: The supplementary services marked with "*" are the minimum set covered by the 1989 MoU for European Network Operators. These are considered to be of higher priority.

4.3.3.4.1 Classification of the ISDN procedures supporting the ISDN-SS

Different types of procedures are applied for the control of the ISDN-SS:

1) basic call control procedures with ISDN defined information elements only, i.e. CLIP, CLIR, MSN, DDI, SUB, CW;

2) as 1) however with additional service specific defined information elements, i.e. COLP, COLR;

3) as 1) however additionally using the {FACILITY} message and the <<FACILITY>> information element (the <<FACILITY>> information element can be carried by the {FACILITY} message and/or most basic call control messages) i.e. AOC, MCID, CUG, CD, CONF, 3PTY, ECT, CCBS, UUS;

4) call independent procedures based on the use of the {FACILITY} message and the <<FACILITY>> information element i.e. CFU, CFB, CFNR;

5) HOLD/RETRIEVE-procedures inside an existing call i.e. HOLD (can be used by other services or in combination with other services: for example ECT, CONF, 3PTY, CW);

6) Suspend/Resume-procedures i.e. TP;

7) procedures for the exchange of user-user-information i.e. UUS2, and UUS3, applying the message type {USER-INFORMATION};

8) notification procedures using the <<NOTIFICATION INDICATOR>> in call control messages, {FACILITY} or {NOTIFY} messages.

4.4 Interworking context

The IAP may be combined with other DECT access profiles. The intention is that in the case of speech service a combination of the IAP with the DECT Generic Access Profile (GAP) or the DECT PAP should be possible. This means that in this case, for a selected service, mandatory parts of the IAP plus the selected service mandatory parts of the other applied profile will both become mandatory.

5 Interworking mappings

This clause defines the interworking procedures in the IWU relating to the associated DECT and ISDN procedures.

All messages, information elements and fields which are not mapped across the IWU shall either be ignored or processed locally as defined in the present document, EN 300 175-9 [9], or the relevant ISDN EN.

The layout of each IWU mapping is as follows:

1) a procedure description clause describes the interworking procedures in the IWU. In the procedures, references are being made to two clauses which summarize the message mapping (one clause for each direction);

2) the two clauses reference to a more detailed message mapping;

3) the detailed message mapping subsequently refer to information elements mapping;

4) the information element mapping refer to coding mapping.

The text is normative and the figures are informative in this clause.

5.1   Symbols for map columns

The Map status column shall be interpreted as follows:

- M or m for mandatory to map (the message, information element or coding is required to be mapped between the two standards if previously received);

- O or o for optional to map (Boolean - the message, information element or coding may be mapped between the two standards if previously received, but it shall be done as described);

- I or i for out-of-scope (the message, information element or coding may be mapped between the two standards if previously received, but it is irrelevant how it is done and is not subject for testing);

- X or x for prohibited or excluded to map (the message, information element or coding may be allowed to be used in the standard/standards but it is not allow to map between the two standards);

- N/A, n/a or -(dash) for not applicable to map (logical impossible to map the message, information element or coding between the two standards);

- C or c for conditional to map (the message, information element or coding mapping depends on the selection of other optional and/or conditional items).

NOTE: The symbol "----" means that there is no message, information element or coding specified in this column.

5.2   DFS C-plane IWU mappings

5.2.1   Call Control (CC) IWU procedures

5.2.1.1   Call establishment procedures

Handling call collision is an implementation option and is therefore outside the scope of the present document.

5.2.1.1.1   Outgoing call

Upon receipt of a MNCC-SETUP-ind primitive the interworking unit at the DFS (DFS-IWU) shall analyse the contents of the {CC-SETUP} message from the CC entity at the DPS side (DPS-CC). Depending on the information element <<CALLED-PARTY-NUMBER>> the DFS-IWU has to take different action (1 and 2);

1) <<CALLED-PARTY-NUMBER>> included in the {CC-SETUP}.

The outgoing call procedure with <<CALLED-PARTY-NUMBER>> information element included in the {CC-SETUP} is shown in figure 6.

In the case the {CC-SETUP} contains <<CALLED-PARTY-NUMBER>> with or without <<SENDING-COMPLETE>> then the DFS-IWU shall interpret the dialling as finished and therefore map the {CC-SETUP} into {SETUP} as described in clause 5.2.4.2, Item no. 17. The DECT <<CALLED-PARTY-NUMBER>> shall always be mapped into ISDN <<CALLED-PARTY-NUMBER>> and also <<SENDING-COMPLETE>> information element shall be included in the ISDN message.

Upon receipt of a {PROGRESS} message from the NT during establishment then the DFS-IWU shall map it into a {CC-INFO} as described in clause 5.2.4.1, Item no. 17.

If the NT replies with {CALL-PROC}, {ALERTING} and/or {CONNECT} as responses to {SETUP}, then the message(s) shall be mapped to correspondent DECT messages as described in clause 5.2.4.1, Item nos. 1, 2, and 6. {CC-CALL-PROC}, {CC-ALERTING} and {CC-CONNECT} shall never be sent before their peer ISDN messages have been received. When a {CONNECT} message is received, then the DFS may send a {CONNECT-ACK} back to the network.

If the NT sends a DISC or REL or REL-COM message in the states defined for outgoing calls, then the DFS-IWU shall apply the appropriate release procedures defined in clause 5.2.1.3.

When the DFS-CC is in state F-03 or F-04 the DFS-IWU shall map all received {CC-INFO} messages into ISDN as described in clause 5.2.4.2, Item no. 7.

	Reference	Note
	5.2.4.1	**general table**
	5.2.4.2	**general table**
	5.2.4.2.11	**(note)**
	5.2.4.1.2	
	5.2.4.1.1	
	5.2.4.1.6	
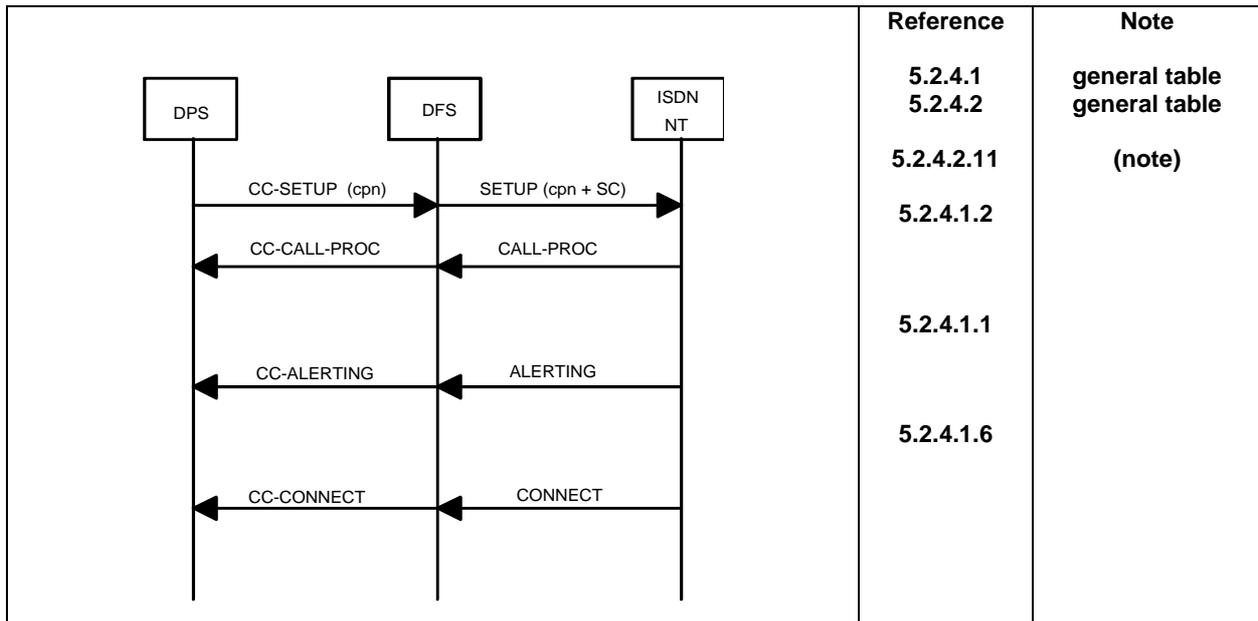
NOTE: cpn = <<CALLED-PARTY-NUMBER>> and SC = <<SENDING-COMPLETE>>.

**Figure 6: Outgoing call procedure with <<CALLED-PARTY-NUMBER>>
included in the {CC-SETUP}**

2) No <<CALLED-PARTY-NUMBER>> included in the {CC-SETUP}. Dialling in {CC-INFO} in DECT OVERLAP SENDING state.

If the {CC-SETUP} does not contain <<CALLED-PARTY-NUMBER>> then the DFS-IWU shall either map the {CC-SETUP} into {SETUP} as described in clause 5.2.4.2, Item no. 17 or issue a MNCC-SETUP-ACK-req primitive and this shall result in a {CC-SETUP-ACK} message being sent back to the DPS.

case a)   {SETUP} is sent into ISDN;

case b)   {CC-SETUP-ACK} is sent back to DPS.

In the error condition case when the {CC-SETUP} does not contain <<CALLED-PARTY-NUMBER>> but does contain <<SENDING-COMPLETE>> then the DFS-IWU shall reject the {CC-SETUP} by respond with MNCC-REJECT-req primitive and this shall result in a {CC-RELEASE-COM} message being sent to the DPS.

a) {SETUP} is sent into ISDN.

The outgoing call procedures with dialling information in DECT and ISDN OVERLAP SENDING state are shown in figures 7 and 8.

The DFS may receive a {SETUP-ACK} message from the NT. In that case, the DFS shall initiate MNCC-SETUP-ACK-req and map the {SETUP-ACK} into a {CC-SETUP-ACK} a described in clause 5.2.4.1, Item no. 32. The DFS then has to wait for dialling information in one or more {CC-INFO}. The dialling information can be either in one or more <<KEYPAD>> or in one <<CALLED-PARTY-NUMBER>> information element.

If <<CALLED-PARTY-NUMBER>> information element is used for dialling information, it shall immediately be mapped into ISDN <<CALLED-PARTY-NUMBER>> and also <<SENDING-COMPLETE>> information element shall be included in the {INFORMATION} message. The mapping from {CC-INFO} to {INFORMATION} shall be done as described in clause 5.2.4.2, Item no. 5.

If <<KEYPAD>> information elements are used for dialling information, then the DFS-IWU shall map the <<KEYPAD>> into <<CALLED-PARTY-NUMBER>> in a {INFORMATION} message. The DFS-IWU shall only map those keys which it can not distinguish to be non-dialling information, i.e. map by default unknown (for the DFS-IWU) keys to <<CALLED-PARTY-NUMBER>>. The mapping from {CC-INFO} to {INFORMATION} shall be

done as described in clause 5.2.4.2, Item no. 5. See supplementary services IWU procedures in clause 5.2.2 for mapping of keys the DFS-IWU can distinguish to be non-dialling information.

Upon receipt of a {PROGRESS} message from the NT during establishment then the DFS-IWU shall map it into a {CC-INFO} as described in clause 5.2.4.1, Item no. 17.

If the NT replies with {CALL-PROC}, {ALERTING} and/or {CONNECT} as responses to {SETUP} or as a result of overlap sending, then the message(s) shall be mapped to corresponding DECT messages as described in clause 5.2.4.1, Items No. 1, 2, and 6. {CC-CALL-PROC}, {CC-ALERTING} and {CC-CONNECT} shall never be sent before their peer ISDN messages have been received. When a {CONNECT} message is received, then the DFS may send a {CONNECT-ACK} back to the network.

If the NT replies with {RELEASE} or {RELEASE-COM} as a response to the {SETUP}, then the DFS-IWU shall apply the appropriate release procedures defined in clause 5.2.1.3.

When the DFS-CC is in state F-03 or F-04 the DFS-IWU may map all received {CC-INFO} messages into ISDN as described in clause 5.2.4.2, Item no. 7.

Upon receipt of a {INFORMATION} message from the NT during establishment then the DFS-IWU may map it into a {CC-INFO} as described in clause 5.2.4.1, Item no. 14. The mapping of {INFORMATION} in ISDN OVERLAP SENDING state is mandatory and shall be done as described in clause 5.2.4.1, Item no. 14.

	Reference	Note
	5.2.4.1	**general table**
	5.2.4.2	**general table**
DPS DFS ISDN NT		
	5.2.4.2.11	
CC-SETUP (no cpn) → SETUP (no cpn) →		
← CC-SETUP-ACK ← SETUP-ACK	**5.2.4.1.24**	
	5.2.4.2.3	**(note)**
CC-INFO (cpn) → INFO (cpn + SC) →	**5.2.4.1.2**	
← CC-CALL-PROC ← CALL-PROC	**5.2.4.1.1**	
← CC-ALERTING ← ALERTING		
	5.2.4.1.6	
← CC-CONNECT ← CONNECT		

NOTE: cpn = <<CALLED-PARTY-NUMBER>> and SC = <<SENDING-COMPLETE>>

Figure 7: The DPS sends <<CALLED-PARTY-NUMBER>> in DECT and ISDN OVERLAP SENDING state (case a)

	Reference	Note
	5.2.4.1 **5.2.4.2**	**general table** **general table**
CC-SETUP (no cpn) / SETUP (no cpn)	**5.2.4.2.11**	
CC-SETUP-ACK / SETUP-ACK	**5.2.4.1.24**	
	5.2.4.2.3	**(note)**
CC-INFO (kpd) / INFO (cpn)	**5.2.4.2.3**	
CC-INFO (kpd) / INFO (cpn)	**5.2.4.1.2**	
CC-CALL-PROC / CALL-PROC	**5.2.4.1.1**	
CC-ALERTING / ALERTING		
	5.2.4.1.6	
CC-CONNECT / CONNECT		
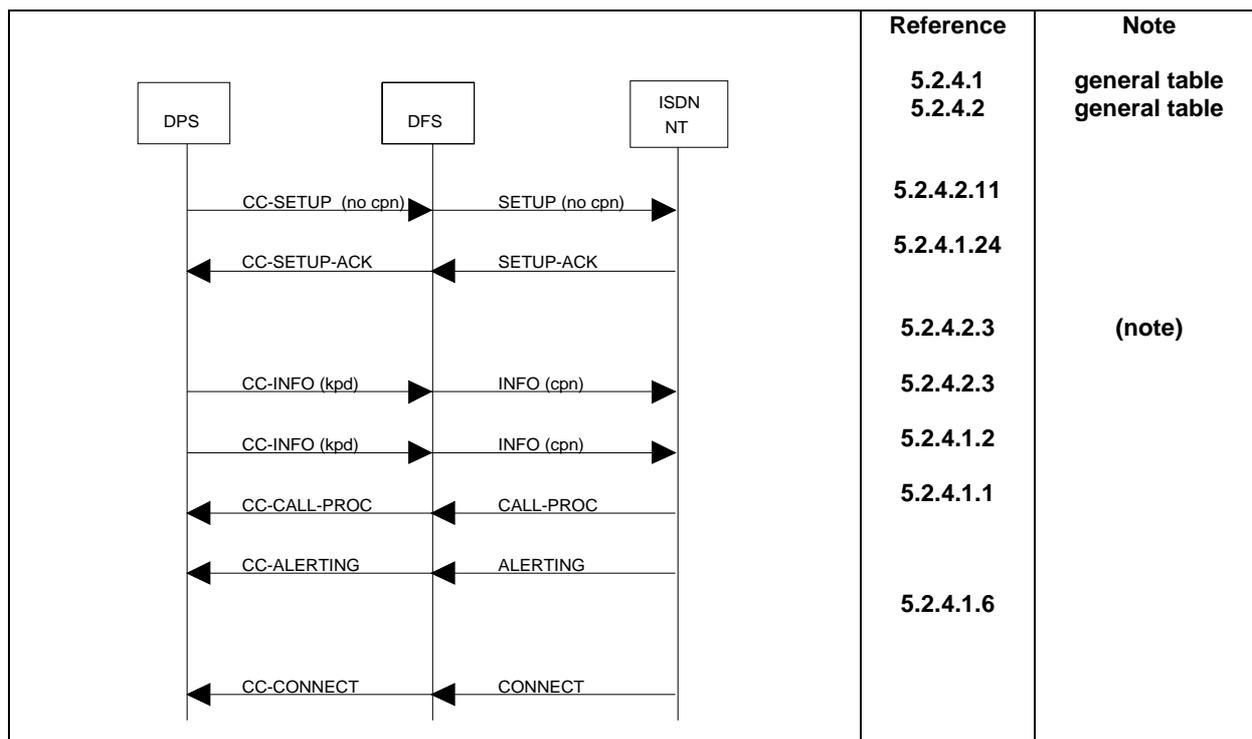
NOTE: cpn = <<CALLED-PARTY-NUMBER>> and kpd = <<KEYPAD>> with dialling information.

Figure 8: The DPS sends <<KEYPAD>> in DECT and ISDN OVERLAP SENDING state (case a)

b) {CC-SETUP-ACK} is sent back to the DPS.

The outgoing call procedures with dialling information in DECT OVERLAP SENDING state and ISDN NULL state are shown in figures 9 and 10.

After {CC-SETUP-ACK} has been sent to the DPS, the DFS-IWU then has to wait for dialling information in one or more {CC-INFO} messages. The dialling information can be either in one or more <<KEYPAD>> or in one <<CALLED-PARTY-NUMBER>> information element.

If <<CALLED-PARTY-NUMBER>> information element is used for dialling information, it shall immediately be mapped into ISDN <<CALLED-PARTY-NUMBER>> and also <<SENDING-COMPLETE>> information element shall be included in the {SETUP} message. The mapping from {CC-INFO} to {SETUP} shall be done as described in clause 5.2.4.2, Item no. 6.

If <<KEYPAD>> information elements are used for dialling information, then the DFS-IWU shall map the <<KEYPAD>> into <<CALLED-PARTY-NUMBER>> in a {SETUP} message. The DFS-IWU shall map those keys which it can not distinguish to be non-dialling information, i.e. map by default unknown (for the DFS-IWU) keys to <<CALLED-PARTY-NUMBER>>. The mapping from {CC-INFO} to {SETUP} shall be done as described in clause 5.2.4.2, Item no. 6. See supplementary services IWU procedures in clause 5.2.2 for mapping of keys the DFS-IWU can distinguish to be non-dialling information.

The DFS-IWU may collect information in received {CC-INFO} messages. If it does, it shall map all the information in the previously received {CC-INFO} messages and the {CC-SETUP} message into {SETUP}. The mapping of {CC-INFO} to {SETUP} shall be done as described in clause 5.2.4.2, Item no. 6. The {SETUP} shall be sent when an inter-digit IWU timer expires or the DFS-IWU receives a {CC-INFO) message which contains:

- <<CALLED-PARTY-NUMBER>>; or

- the first dialling information which the DFS-IWU does not know if it completes the called party number; or

- dialling information which the DFS-IWU knows that it completes the called party number; or

- <<SENDING-COMPLETE>>.

ETSI

If <<KEYPAD>> in {CC-INFO} has been used for dialling information, then the NT can answer with a {SETUP-ACK}. If the {SETUP-ACK} contains <<PROGRESS-INDICATOR>> then the DFS-IWU shall map {SETUP-ACK} into {CC-INFO} and if it contains <<DISPLAY>> and no <<PROGRESS INDICATOR>> then it may do the mapping. The mapping of {SETUP-ACK} into {CC-INFO} shall be done according to clause 5.2.4.1, Item no. 31. The DFS then has to wait for more dialling information in <<KEYPAD>> in one or more {CC-INFO}. The {CC-INFO} shall be mapped in the DFS-IWU into {INFORMATION} as shown in clause 5.2.4.2, Item no. 5.

Upon receipt of a {PROGRESS} message from the NT during establishment then the DFS-IWU shall map it into a {CC-INFO} as described in clause 5.2.4.1, Item no. 17.

If the NT replies with {CALL-PROC}, {ALERTING} and/or {CONNECT} as responses to {SETUP} or as a result of ISDN overlap sending, then the message(s) shall be mapped to corresponding DECT messages as described in clause 5.2.4.1, Item nos. 1, 2, and 6. {CC-CALL-PROC}, {CC-ALERTING} and {CC-CONNECT} shall never be sent before their peer ISDN messages have been received. When a {CONNECT} message is received, then the DFS may send a {CONNECT-ACK} back to the network.

If the NT replies with {RELEASE} or {RELEASE-COM} as a response to the {SETUP}, then the DFS-IWU shall apply the appropriate release procedures defined in clause 5.2.1.3.

When the DFS-CC is in state F-03 or F-04 the DFS-IWU may map all received {CC-INFO} messages into ISDN {INFORMATION} messages as described in clause 5.2.4.2, Item no. 7.

Upon receipt of a {INFORMATION} message from the NT during establishment then the DFS-IWU may map it into a {CC-INFO} as described in clause 5.2.4.1, Item no. 14. The mapping of {INFORMATION} in ISDN OVERLAP SENDING state is mandatory and shall be done as described in clause 5.2.4.1, Item no. 14.
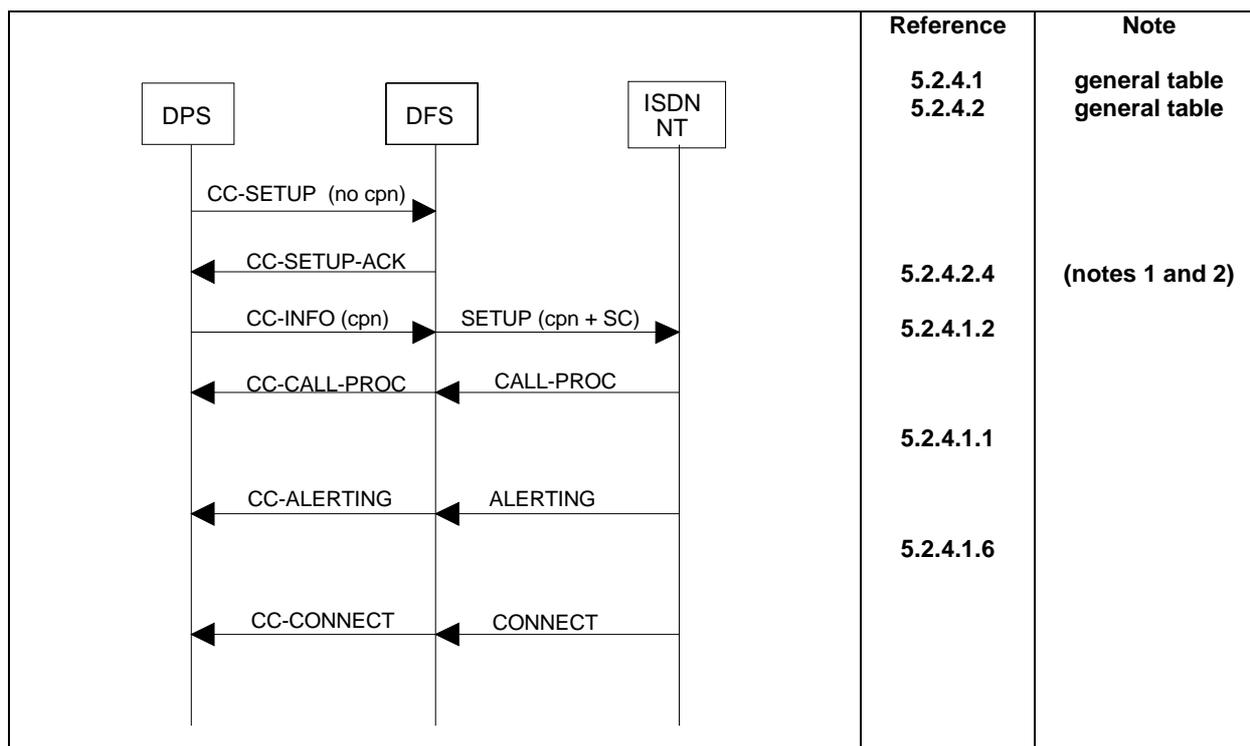
NOTE 1: All information from previously received DECT messages shall be included in the {SETUP} message.

NOTE 2: cpn = <<CALLED-PARTY-NUMBER>>, SC = <<SENDING-COMPLETE>>

Figure 9: The DPS sends <<CALLED-PARTY-NUMBER>> in DECT OVERLAP SENDING state and ISDN NULL state (case b)
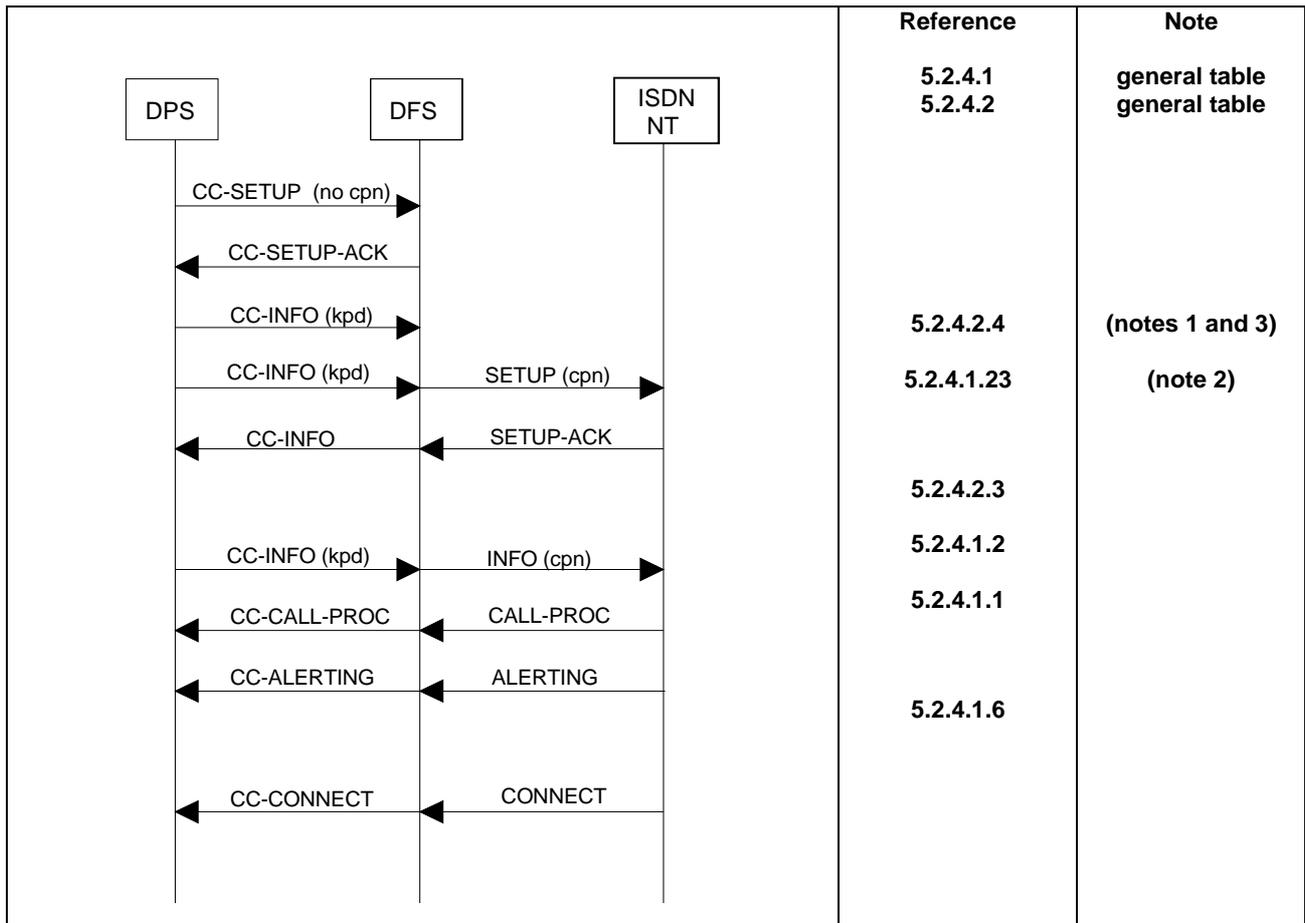
	Reference	Note
	5.2.4.1	general table
	5.2.4.2	general table
	5.2.4.2.4	(notes 1 and 3)
	5.2.4.1.23	(note 2)
	5.2.4.2.3	
	5.2.4.1.2	
	5.2.4.1.1	
	5.2.4.1.6	

NOTE 1: All information from previously received DECT messages shall be included in the {SETUP} message.
NOTE 2: This message shall be mapped if the message contains <<PROGRESS-INDICATOR>> and optionally mapped if it contains <<DISPLAY>>.
NOTE 3: cpn = <<CALLED-PARTY-NUMBER>>, kpd = <<KEYPAD>> with dialling information.

**Figure 10: The DPS sends <<KEYPAD>> in DECT OVERLAP SENDING state
and ISDN NULL state (case b)**

5.2.1.1.2   Incoming call

The incoming call procedures are shown in figures 11 and 12.

Upon receipt of a {SETUP} message the interworking unit at the DFS (DFS-IWU) shall analyse the contents of the {SETUP} message.

In case the {SETUP} message contains enough dialling information to identify the destination, the DFS-IWU shall send a {CALL-PROC} message back to the NT and issue MNCC-SETUP-req primitive to the DFS-CC. The {SETUP} shall be mapped into {CC-SETUP} as described in clause 5.2.4.1.

In case the {SETUP} message does not contain enough dialling information to identify the destination, the DFS may send a {SETUP-ACK} message back to the NT and enter ISDN OVERLAP RECEIVING state or reject the {SETUP} as described in EN 300 403-1 [39]. If the ISDN OVERLAP RECEIVING state is used, then the NT has to send the rest of the dialling information in one or more {INFORMATION} messages. When the DFS-IWU has received enough dialling information from the NT, the DFS shall send a {CALL-PROC} message back to the NT and issue MNCC-SETUP-req primitive to the DFS-CC. The {INFORMATION} shall be mapped to {CC-SETUP} according to clause 5.2.4.1, Item no. 15. Information in previous received {INFORMATION} messages and {SETUP} message shall be included in the {CC-SETUP}.

In the case the {SETUP} contains <<SENDING-COMPLETE>> and the DFS-IWU cannot identify the destination address to be complete, then the DFS shall not send a {CC-SETUP} message to the DPS-CC and it shall not send a {SETUP-ACK} message back to the NT, but it shall reject the {SETUP} as described in EN 300 403-1 [39].

If the DPS replies with {CC-ALERTING} and/or {CC-CONNECT} as responses to the {CC-SETUP}, then the message(s) shall be mapped to corresponding ISDN messages as described in clause 5.2.4.2.

If the DPS replies with {CC-RELEASE-COM} as a response to the {CC-SETUP} message, then the DFS-IWU shall apply the appropriate release procedure defined in clause 5.2.1.3.

Upon receipt of a {CONNECT-ACK} message from the NT as a confirmation of the {CONNECT}, the DFS-IWU shall issue a MNCC-CONNECT-res primitive and map the {CONNECT-ACK} message into a {CC-CONNECT-ACK} message as described in clause 5.2.4.1, Item no. 7.

When the DFS-CC is in state F-07, the DFS-IWU may map all received {CC-INFO} messages into an {INFORMATION} message as described in clause 5.2.4.2, Item no. 7.

Upon receipt of a {INFORMATION} message from the NT during establishment then the DFS-IWU may map it into a {CC-INFO} as described in clause 5.2.4.1, Item no. 14.
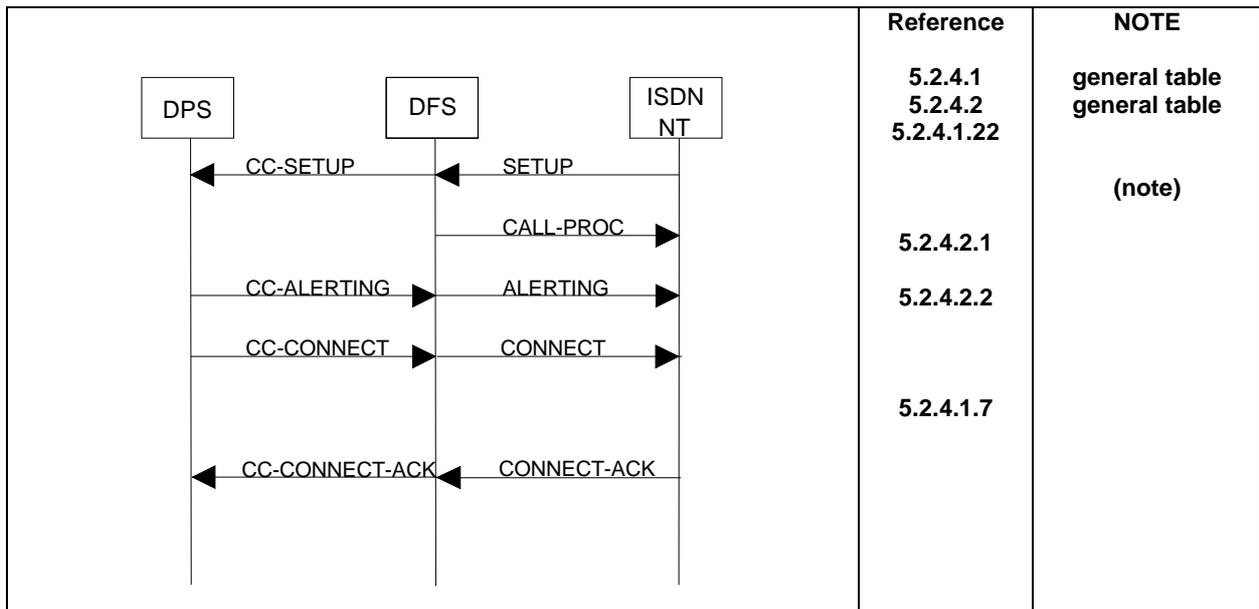
NOTE: The DFS shall send {CALL-PROC} because the timer in the network should not time out.

Figure 11: Incoming call where the DFS-IWU receives enough dialling information in {SETUP}

	Reference	Note
	5.2.4.1	**general table**
	5.2.4.2	**general table**

```
  DPS              DFS            ISDN
                                  NT
   |                |              |
   |                |    SETUP     |
   |                |<-------------|                      (note 1)
   |                |              |
   |                |   SETUP-ACK  |
   |                |------------->|          5.2.4.1.14  (note 2)
   |                |              |
   |   CC-SETUP     |     INFO     |
   |<---------------|<-------------|                      (note 3)
   |                |              |
   |                |   CALL-PROC  |
   |                |------------->|          5.2.4.2.1
   |                |              |
   |   CC-ALERTING  |   ALERTING   |
   |--------------->|------------->|          5.2.4.2.2
   |                |              |
   |   CC-CONNECT   |   CONNECT    |
   |--------------->|------------->|
   |                |              |          5.2.4.1.7
   |                |              |
   | CC-CONNECT-ACK | CONNECT-ACK  |
   |<---------------|<-------------|
   |                |              |
```
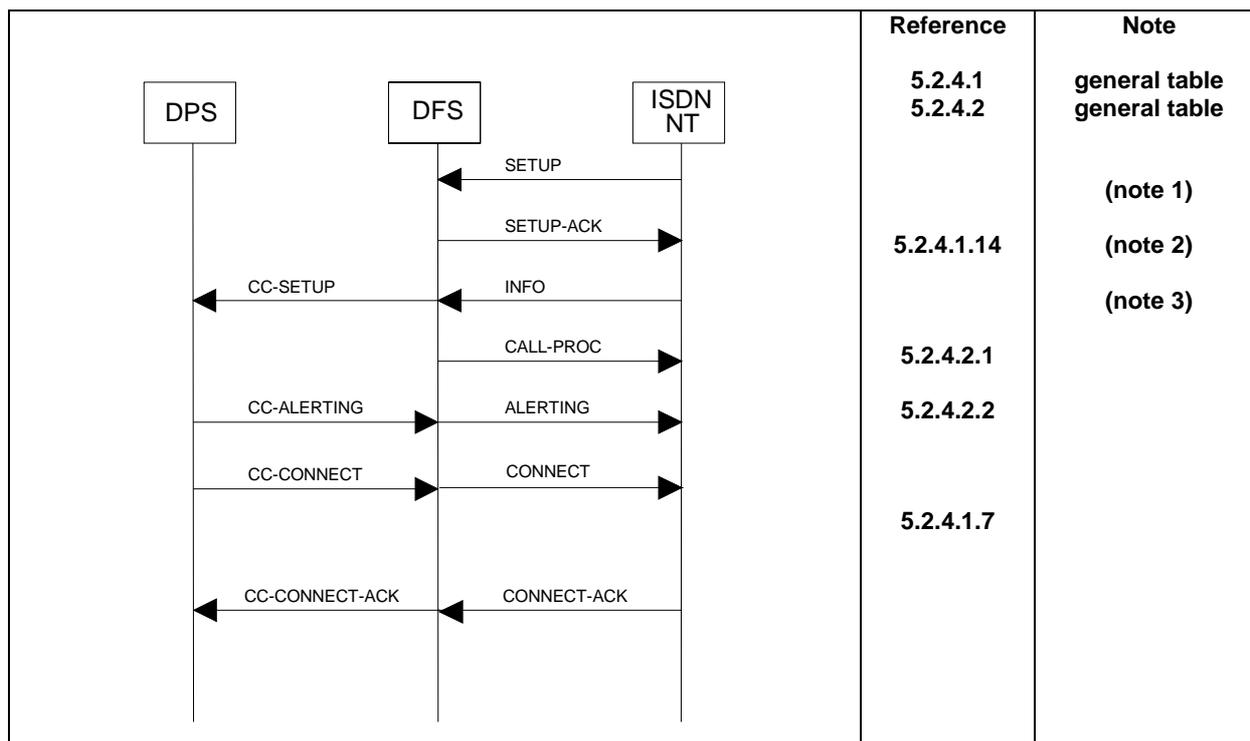
NOTE 1: The DFS shall send {SETUP-ACK} when not enough digits has been sent from the network and no
        <<SENDING-COMPLETE>> information element is included in the {SETUP}.
NOTE 2: The DFS has received enough digits in one or more {INFORMATION}, it shall send {CC-SETUP} with
        information from previous received {SETUP} and {INFORMATION} messages as well.
NOTE 3: The DFS shall send {CALL-PROC} because the timer in the network should not time out.

Figure 12: Incoming call where the DFS-IWU does not receive enough dialling information in {SETUP}

5.2.1.1.3 Fall-back procedures

If an incoming call arrives allowing fall-back, indicated by 2 <<BEARER-CAPABILITY>> elements and possibly
2 <<HIGH-LAYER-COMPATIBILITY>> elements, then the DFS-IWU shall select one set of attributes and forward
this chosen set to the DPS and follow the procedural path at the ISDN interface according to EN 300 267-1 [50].

    NOTE: The use of the lower priority attributes is recommended.

For outgoing calls, the DPS shall not apply the ISDN fall-back procedures.

The support of the ISDN fall-back procedures at the DECT CI is outside the scope of the present document.

5.2.1.2 Call information procedures

The call information procedures are shown in figure 13.

The DFS-IWU may map all received {CC-INFO} message into an {INFORMATION} message as described in
clause 5.2.4.2, Item no. 7.

Upon receipt of a {INFORMATION} message from the NT during active state the DFS-IWU may map it into a
{CC-INFO} message as described in clause 5.2.4.1, Item no. 14.

	Reference	Note
	5.2.4.1 **5.2.4.2**	**general table** **general table**
	5.2.4.2.5	
	5.2.4.1.13	
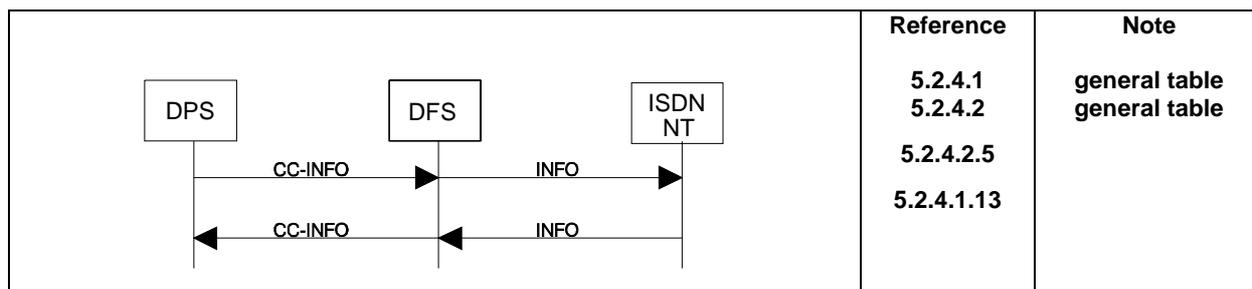
Figure 13: Call Information Procedure

5.2.1.3 Call release procedures

In case the ISDN network mandate a "cause" value and DECT does not provide a valid reason (if present) then "cause" value shall be set to cause #127 by default.

5.2.1.3.1 Call release initiated by the DPS

The call release procedures initiated by the DPS can be done either with {CC-RELEASE} (case 1) or with {CC-RELEASE-COM} (case 2).

case 1): {CC-RELEASE} is used for call release;

Upon receipt of a MNCC-RELEASE-ind primitive the DFS-IWU shall map the {CC-RELEASE} into {DISCONNECT} as described in clause 5.2.4.2, Item no. 11.

When the DFS-IWU later on receives a {RELEASE} message, it shall initiate a MNCC-RELEASE-res and map the {RELEASE} message into a {CC-RELEASE-COM} message as described in clause 5.2.4.1. The DFS shall also send a {RELEASE-COM} message back to the NT.

The normal call release initiated by the DPS is shown in figure 14.

	Reference	Note
	5.2.4.1 **5.2.4.2**	**general table** **general table**
	5.2.4.2.8	
	5.2.4.1.18	
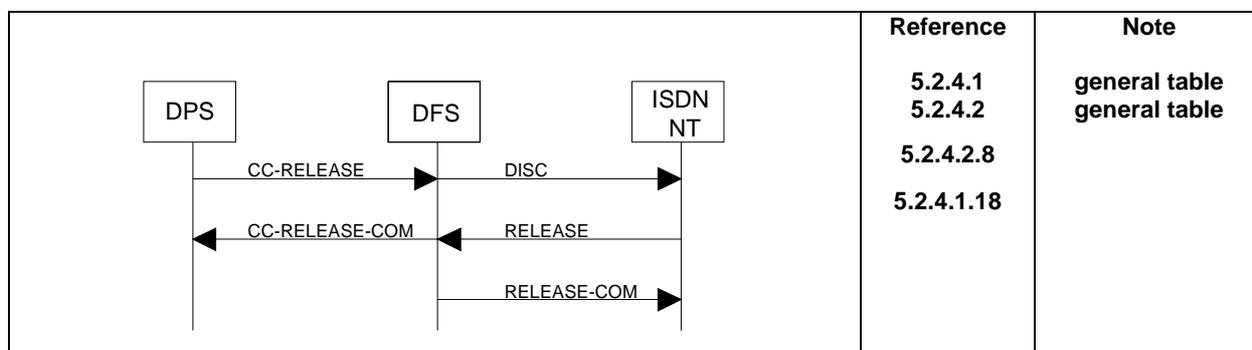
Figure 14: Normal Release initiated by the DPS

case 2): {CC-RELEASE-COM} is used for call release;

Upon receipt of a {CC-RELEASE-COM} message the DFS-IWU shall map the {CC-RELEASE-COM} message to a {DISCONNECT} message according to clause 5.2.4.2.

Upon receipt of the subsequent {RELEASE} message the DFS shall respond with a {RELEASE-COM} message. That received {RELEASE} message shall not be mapped.

The DECT abnormal call release initiated by the DPS is shown in figure 15.

	Reference	Note
	5.2.4.1 **5.2.4.2** **5.2.4.2.10**	**general table** **general table**

DPS — DFS — ISDN NT

CC-RELEASE-COM → DISCONNECT →

← RELEASE
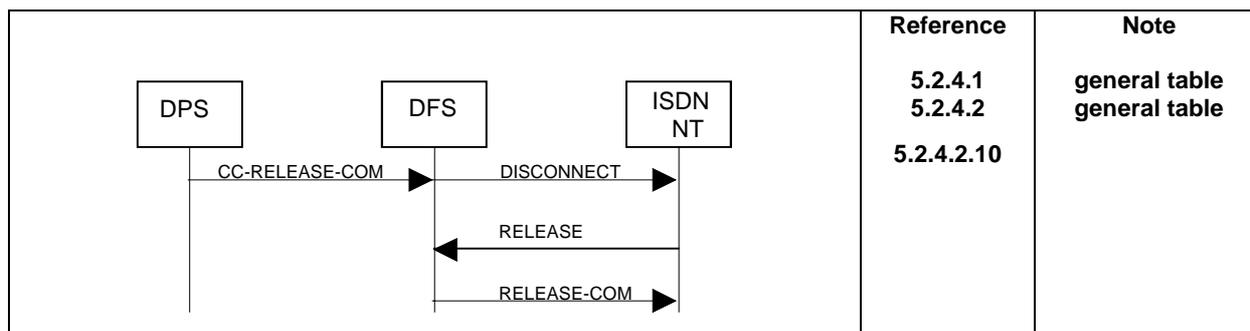
RELEASE-COM →

Figure 15: Abnormal call release initiated by the DPS

5.2.1.3.2   Call release initiated by the NT

The call release procedures initiated by the NT can be done with {DISCONNECT} (case 1), with {RELEASE} (case 2) or with {RELEASE-COM} (case 3).

case 1):   {DISCONNECT} is used for call release;

Upon receipt of a {DISCONNECT} message the DFS-IWU shall issue a MNCC-RELEASE-req and this shall result in a {CC-RELEASE} message. The DFS-IWU shall map the {DISCONNECT} message into a {CC-RELEASE} message as described in clause 5.2.4.1, Item no. 8. The DFS starts the timer <CC.02>.

The information elements of the {DISCONNECT} message shall be mapped to information elements of a {CC-RELEASE} message according to the table in clause 5.2.4.1.8.

Upon receipt of a {CC-RELEASE-COM} message the DFS shall map the {CC-RELEASE-COM} into {RELEASE} as described in clause 5.2.4.2, Item no. 12.

If the timer <CC.02> expires before the receipt of a {CC-RELEASE-COM} message, the DFS-IWU shall immediately initiate a MNCC-RELEASE-res primitive and this shall result in a {CC-RELEASE-COM} message. The DFS-IWU shall also initiate a {RELEASE} to the NT. The response from the NT is {RELEASE-COM} and the DFS-IWU shall not map this finalizing message.

The normal call release using {DISCONNECT} initiated by the NT is shown in figure 16.

	Reference	Note
	5.2.4.1 **5.2.4.2** **5.2.4.1.8** **5.2.4.2.9** **5.2.4.1.19**	**general table** **general table** **(note)**

DPS — DFS — ISDN NT

← CC-RELEASE ← DISC

Invoke of Supp. Services →

← Resp. to Supp. Services

← CC-RELEASE-COM → RELEASE →

← RELEASE-COM
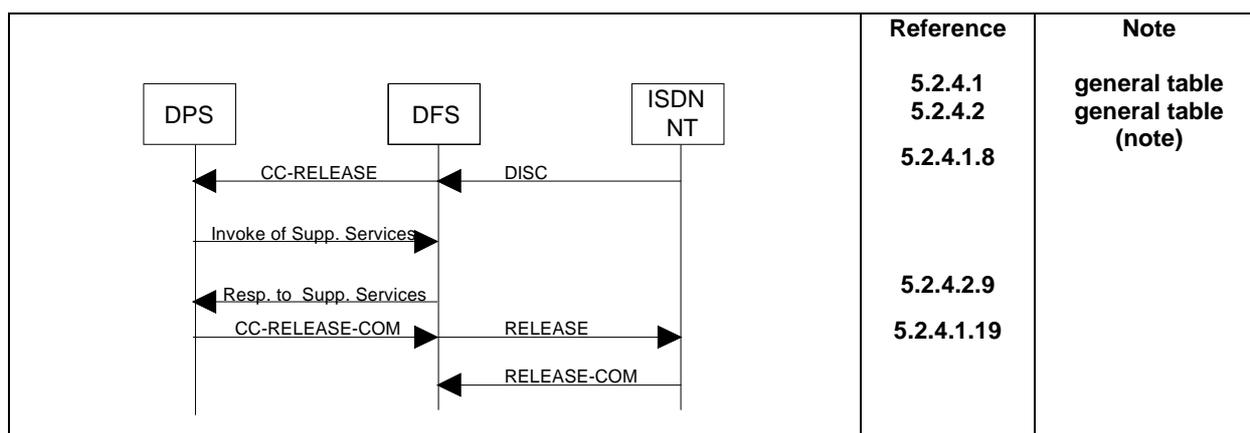
NOTE 1: The content of the {DISCONNECT} message is mapped to the content of the {CC-RELEASE} message. The message type DISCONNECT is mapped to a <<IWU-TO-IWU>> information element in the {CC-RELEASE} message.
NOTE 2: The user can invoke some ISDN supplementary services using a {FACILITY} message. It is however his responsibility to await a returning message before completing the clearing operation.

Figure 16: where NT initiate normal call release with {DISCONNECT} (case 1)

case 2):   {RELEASE} is used for call release;

           Upon receipt of a {RELEASE} message the DFS-IWU shall initiate a MNCC-RELEASE-ind and map the {RELEASE} into a {CC-RELEASE-COM} message as described in clause 5.2.4.1, Item no. 19. The DFS shall also send a {RELEASE-COM} message back to the NT.

The call release using {RELEASE} initiated by the NT is shown in figure 17.
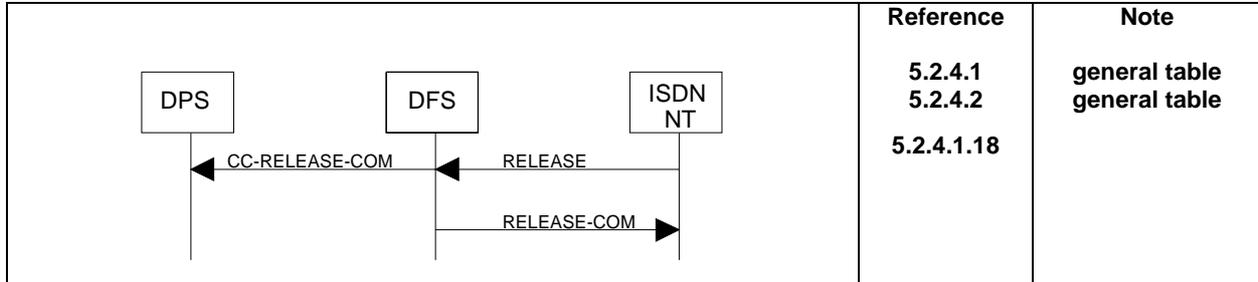
Figure 17: where NT initiate normal call release with {RELEASE} (case 2)

case 3):   {RELEASE-COM} is used for call release;

           Upon receipt of a {RELEASE-COM} message the DFS-IWU shall map the {RELEASE-COM} to {CC-RELEASE-COM} according to clause 5.2.4.1, Item no. 20.

The call release initiated by the NT is shown in the following figure 18.
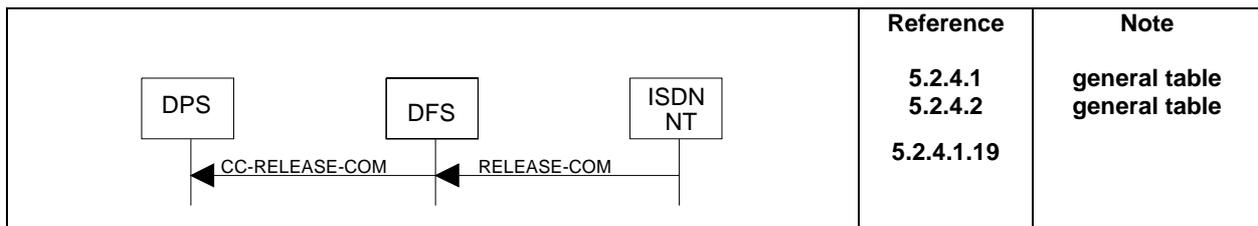
Figure 18: Abnormal call release initiated by the NT

5.2.2   Supplementary services IWU procedures

5.2.2.1   Keypad protocol procedures for Call Related Supplementary Services (CRSS)

One of the following two procedures (see clause 5.2.2.1.1 or clause 5.2.2.1.2) shall be used for mapping supplementary services between DECT and ISDN using the Keypad protocol if mapping of procedures for supplementary services is supported.

5.2.2.1.1   DECT stimulus to/from ISDN stimulus

Supplementary services utilising the keypad protocol may be mapped between DECT keypad protocol and the ISDN keypad protocol. Upon reception of a message, the keypad and display stimuli contained in DECT <<KEYPAD>> elements and ISDN <<DISPLAY>> elements are mapped between the respective ISDN <<KEYPAD-FACILITY>> and DECT <<DISPLAY>> elements. The DFS-IWU shall only map the key data that can be determined to be supplementary service information.

    NOTE 1:   The rules for the keypad protocol at the ISDN interface are defined in EN 300 122-1 [41]. Network specific rules for the order of appearance of supplementary service information and dialling information in the phase of call establishment may additionally apply.

For a <<KEYPAD>> element in a DECT {CC-SETUP} message, the key data shall be considered supplementary service information and may be mapped to a <<KEYPAD-FACILITY>> element in an ISDN {SETUP} message as specified in clause 5.2.4.2, Item no. 17.

NOTE 2:   The DFS-IWU may collect the supplementary service key data, received in the <<KEYPAD>> element in the DECT {CC-SETUP} message and in subsequent {CC-INFO} messages, before sending the collected data in a <<KEYPAD-FACILITY>> element in the ISDN {SETUP} message. (See the outgoing call establishment procedure for overlap sending in clause 5.2.1.1.3 - case b)

NOTE 3:   The DFS-IWU will have the knowledge of a separator or an equivalent method used to distinguish between supplementary service key data and non-supplementary service key data.

For a <<KEYPAD-FACILITY>> element in an ISDN {SETUP} message, the key data shall be considered supplementary service information. If mapping of the keypad protocol is supported, then the received<<KEYPAD-FACILITY>> element shall be mapped to an <<IWU-TO-IWU>> element in the next sent DECT {CC-SETUP} message as specified in clause 5.2.4.1, Item no. 30 for en-bloc receiving, or as specified in clause 5.2.4.1, Item no. 15 for overlap receiving.

NOTE 4:   The DFS-IWU may collect the supplementary service key data received in the <<KEYPAD-FACILITY>> element in the ISDN {SETUP} message and in subsequent ISDN {INFORMATION} messages before sending the collected data in an <<IWU-TO-IWU>> element in the DECT {CC-SETUP} message.

For a <<KEYPAD>> element in DECT {CC-INFO} messages, the DFS-IWU shall have the capability to distinguish the supplementary service key data from non-supplementary service key data and map the supplementary service key data to a <<KEYPAD-FACILITY>> element of the appropriate ISDN message. If the {CC-INFO} message is received as part of an outgoing call establishment procedure then the SS key data shall be mapped to a <<KEYPAD-FACILITY>> element of the next sent message; either the ISDN {INFORMATION} message as described in clause 5.2.4.2, Item no. 5 or the ISDN {SETUP} message as described in clause 5.2.4.2, Item no. 6. Otherwise, the supplementary service key data shall be mapped to the <<KEYPAD-FACILITY>> element in an ISDN {INFORMATION} message as described in clause 5.2.4.2, Item no. 7.

For a <<KEYPAD-FACILITY>> element in an ISDN {INFORMATION} message the key data shall be considered supplementary service information. For an ISDN {INFORMATION} message received during overlap receiving the key data shall be mapped to a <<IWU-TO-IWU>> element in a DECT {CC-SETUP} message as described in clause 5.2.4.1, Item no. 15. Otherwise, the key data shall be mapped to a <<IWU-TO-IWU>> element in a DECT {CC-INFO} message as described in clause 5.2.4.1, Item no. 14.

See the call establishment procedures in clause 5.2.1 for the mapping of key data that the DFS-IWU can distinguish as non-supplementary service.

The display information contained in the <<DISPLAY>> elements of ISDN call control messages shall be mapped to <<DISPLAY>> elements of the corresponding DECT messages as described by the mapping procedures provided for basic call control (see clause 5.2.1).

5.2.2.1.2   DECT stimulus to/from ISDN functional protocol

The DFS-IWU supporting mapping for ISDN supplementary services may map between the DECT keypad protocol and the ISDN functional protocol standardized for the specific supplementary service. These procedures are outside the scope of the present document.

5.2.2.2   Keypad protocol procedures for CISS

Call Independent Supplementary Services (CISS) using <<KEYPAD>> in the DECT CISS messages: {CISS-FACILITY}, {CISS-REGISTER}, {CISS-RELEASE}, and {FACILITY} is outside the scope of the present document.

NOTE: These services may be mapped to the functional protocol, however these procedures are outside the scope of the present document.

5.2.2.3   General functional protocol procedures for CRSS

The use of the supplementary service procedures defined for ISDN is recommended for DECT functional protocol supplementary services (see EN 300 175-5 [5], clause 10.6.1). This clause defines the use of these protocols in the DECT system.

The service use instance can reside in the DFS or DPS. In both cases the protocols as defined for a specific service in ISDN shall apply at the ISDN interface if this service is implemented in a DECT instance.

If the service use instance resides in the DFS then the access of the DPS to this instance is outside the scope of the present document.

This clause covers the case where the service use instance resides in the DPS using DECT defined procedures at the CI being mapped to and from the ISDN procedures in the DFS-IWU. The following basic principles shall apply:

- for every service implemented, the service use instance in the DPS shall follow the procedure defined at the S/T reference point in the service specific ISDN standard. The exception is that requirements, which are addressed within this clause, shall apply additionally or instead of;

- the DFS-IWU, if supporting the service by mapping, shall map between the ISDN protocol and the DECT protocol in accordance with this clause. In most cases the DFS-IWU is transparent to service specific functions. Exceptions are addressed in this clause. From the protocol point of view, however, the DFS-IWU is responsible to perform an unambiguous mapping, taking into account the properties of its access to the network.

5.2.2.3.1 Common information element approach - messages for outgoing call control

This clause specifies how <<FACILITY>> information elements contained in the outgoing call establishment messages, as specified in the outgoing call procedures of clause 5.2.1.1.3, shall, if a specific service applying this information element is supported, be mapped between DECT and ISDN.

Upon reception of a DECT {CC-SETUP} message containing a <<FACILITY>> element, the DFS-IWU shall map the <<FACILITY>> element to a <<FACILITY>> element of an ISDN {SETUP} message as described in either clause 5.2.4.2, Item no. 17 or, for overlap sending, clause 5.2.4.2, Item no. 6.

> NOTE 1: No procedures are given for mapping a <<FACILITY>> element contained in a DECT {CC-INFO} message since this condition is not specified in the ISDN supplementary service procedures.

Upon reception of an ISDN {SETUP-ACK} message containing a <<FACILITY>> element, the DFS-IWU shall map the <<FACILITY>> element to a <<FACILITY>> element of either a DECT {CC-SETUP-ACK} message as described in clause 5.2.4.1, Item no. 32 or, during overlap sending, a DECT {CC-INFO} as described in clause 5.2.4.1, Item no. 31.

> NOTE 2: For the outgoing call establishment procedure for overlap sending see clause 5.2.1.1.3 - case 2b.

Upon reception of an ISDN {PROGRESS} message containing a <<FACILITY>> element, the DFS-IWU shall map the <<FACILITY>> element to a <<FACILITY>> element of a DECT {CC-INFO} message as described in clause 5.2.4.1, Item no. 17.

Upon reception of an ISDN {CALL-PROC} or {ALERTING} or {CONNECT} message containing a <<FACILITY>> element, the DFS-IWU shall map the <<FACILITY>> element to a <<FACILITY>> element of a corresponding DECT {CC-CALL-PROC}, {CC-ALERTING} and {CC-CONNECT} message as described in clause 5.2.4.1, Items No. 2, 1, and 6, respectively.

5.2.2.3.2 Common information element approach - messages for incoming call control

This clause specifies how <<FACILITY>> information elements contained in the incoming call establishment messages, as specified in the incoming call procedures of clause 5.2.1.1.2, shall, if a specific service applying this information element is supported, be mapped between DECT and ISDN.

Upon reception of an ISDN {SETUP} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of a DECT {CC-SETUP} message as described in either clause 5.2.4.1, Item no. 30.

Upon reception of a DECT {CC-ALERTING} or {CC-CONNECT} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of a corresponding ISDN {ALERTING} or {CONNECT} message as described in clause 5.2.4.2.

> NOTE: No procedures are given for mapping a <<FACILITY>> element contained in an ISDN {CONNECT-ACK} message since this condition is not specified in the ISDN supplementary service procedures.

5.2.2.3.3   Common information element approach - active call messages

This clause specifies how <<FACILITY>> information elements contained in the call information messages, as specified in the call information procedures of clause 5.2.1.2, shall, if a specific service applying this information element is supported, be mapped between DECT and ISDN.

NOTE: No procedures are given for mapping a <<FACILITY>> element contained in an ISDN {INFORMATION} message or DECT {CC-INFO} message since these conditions are not specified in any of the ISDN supplementary service procedures.

5.2.2.3.4   Common information element approach - call release messages

This clause specifies how <<FACILITY>> information elements contained in the call release procedure messages, as specified in the call release procedures of clause 5.2.1.3, shall, if a specific service applying this information element is supported, be mapped between DECT and ISDN.

During a normal release initiated by the DPS and upon reception of a DECT {CC-RELEASE} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of an ISDN {DISCONNECT} message as described in clause 5.2.4.2, Item no. 11.

Upon reception of an ISDN {DISCONNECT} message containing a <<FACILITY>> info element, the DFS-IWU shall apply the clearing procedure as described in clause 5.2.1.3.2.

During a normal release initiated by the NT and upon reception of a DECT {CC-RELEASE} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of an ISDN {RELEASE} message as described in clause 5.2.4.2, Item no. 12.

During a normal release initiated by the DPS and upon reception of an ISDN {RELEASE} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of a DECT {CC-RELEASE-COM} message as described in clause 5.2.4.1, Item no. 19.

NOTE: If the <<FACILITY>> element contained in the {CC-RELEASE-COM} message contains an error then the DPS cannot use the reject procedure (EN 300 196-1 [42], clause 8.2.2.4) to reject the reply (error).

Upon reception of a DECT {CC-RELEASE-COM} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of an ISDN {RELEASE-COM} message as described in clause 5.2.4.2, Item no. 13.

Upon reception of an ISDN {RELEASE-COM} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of a DECT {CC-RELEASE-COM} message as described in clause 5.2.4.1, Item no. 20.

5.2.2.3.5   Common information element approach - additional CRSS messages

This clause specifies how <<FACILITY>> information elements contained in messages additional to those specified in the basic call control procedures of clause 5.2.1 shall, if a specific service applying this information element is supported, be mapped between DECT and ISDN.

The NT can send an ISDN {FACILITY-crss} message during the phases of a call where a call reference exists. Upon reception of an ISDN {FACILITY-crss} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of a DECT {FACILITY-crss} message as described in clause 5.2.4.1, Item no. 10.

The DPS can send a DECT {FACILITY-crss} message when applicable in accordance with the supplementary service specifications. Upon reception of a DECT {FACILITY} message containing a <<FACILITY>> element, the DFS-IWU may map the <<FACILITY>> element to a <<FACILITY>> element of an ISDN {FACILITY-crss} message as described in clause 5.2.4.2, Item no. 22.

5.2.2.3.6   Common information element approach - extended facility element

The processing of ISDN <<EXTENDED-FACILITY>> elements is not defined.

5.2.2.3.7   Separate message approach

Upon reception of a DECT {HOLD}, {HOLD-ACK} or {HOLD-REJ} message, carried in the appropriate MNCC-HOLD- {ind, cfm} primitive, the DFS-IWU may map the message to the respective ISDN {HOLD}, {HOLD-ACK} or {HOLD-REJ} message as described in clause 5.2.4.2, Item nos. 23, 24, and 25.

Upon reception of a DECT {RETRIEVE}, {RETRIEVE-ACK} or {RETRIEVE-REJ} message, carried in the appropriate MNCC-RETRIEVE- {ind, cfm} primitive, the DFS-IWU may map the message to the respective ISDN {RETRIEVE}, {RETRIEVE-ACK} or {RETRIEVE-REJ} message as described in clause 5.2.4.2, Item nos. 27, 28, and 29.

Upon reception of an ISDN {HOLD}, {HOLD-ACK} or {HOLD-REJ} message, the DFS-IWU may map the message to the respective DECT {HOLD}, {HOLD-ACK} or {HOLD-REJ} message as described in clause 5.2.4.1, Item nos. 11, 12, and 13. The DFS-IWU shall send the DECT message in the appropriate MNCC-HOLD- {req, res} primitive.

Upon reception of an ISDN {RETRIEVE}, {RETRIEVE-ACK} or {RETRIEVE-REJ} message, the DFS-IWU may map the message to the respective DECT {RETRIEVE}, {RETRIEVE-ACK} or {RETRIEVE-REJ} message as described in clause 5.2.4.1, Item nos. 26, 27, and 28. The DFS-IWU shall send the DECT message in the appropriate MNCC-RETRIEVE- {req, res} primitive.

The DFS-IWU having received a HOLD message on a specific DECT bearer which controls one or more DECT information channels shall associate the functions as described in EN 300 196-1 [42] for the ISDN interface to this DECT bearer. Subsequent actions controlling the held call or making use of the B-channel reservation (e.g. new calls) shall only be applied upon this association if they are related to the same DECT bearer carrying the signalling channel for that association. For example, upon reception of a DECT {CC-SETUP} message, the DFS-IWU shall re-use the TEI associated with the previous held call (i.e. re-use the reserved ISDN channel) if the EID of the new call set-up is the same as the EID from the held call (i.e. the MAC bearer from the held call is desired for the new call).

5.2.2.3.8   Generic notification mapping procedures - outgoing call messages

This clause specifies how the <<NOTIFICATION-INDICATOR>> information elements contained in the outgoing call establishment messages, as specified in the outgoing call procedures of clause 5.2.1.1.3, shall be mapped from ISDN to DECT.

Upon reception of an ISDN {SETUP-ACK} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of either a DECT {CC-SETUP-ACK} message as described in clause 5.2.4.1, Item no. 32 or, during overlap sending, a DECT {CC-INFO} message as described in clause 5.2.4.1, Item no. 31.

    NOTE: For the outgoing call establishment procedure for overlap sending see clause 5.2.1.1.3 - case 2b.

Upon reception of an ISDN {PROGRESS} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-INFO} message as described in clause 5.2.4.1.

Upon reception of an ISDN {CALL-PROC} or {ALERTING} or {CONNECT} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to the <<IWU-TO-IWU>> element of the corresponding DECT {CC-CALL-PROC}, {CC-ALERTING} and {CC-CONNECT} message as described in clause 5.2.4.1, Item nos. 2, 1, and 6, respectively.

5.2.2.3.9   Generic notification mapping procedures - incoming call messages

This clause specifies how the <<NOTIFICATION-INDICATOR>> information elements contained in the incoming call establishment messages, as specified in the incoming call procedures of clause 5.2.1.1.2, shall be mapped from ISDN to DECT.

Upon reception of an ISDN {SETUP} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-SETUP} message as described in either clause 5.2.4.1 or, optionally for overlap receiving, as described in clause 5.2.4.1, Item no. 15.

Upon reception of an ISDN {CONNECT-ACK} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-CONNECT-ACK} message as described in clause 5.2.4.1.

5.2.2.3.10 Generic notification mapping procedures - active call messages

Because the <<NOTIFICATION-INDICATOR>> element is not used in the ISDN {INFORMATION} message, no mapping procedures are necessary for <<NOTIFICATION-INDICATOR>> elements in the active call messages specified in the call information procedures of clause 5.2.1.2.

NOTE: See Generic notification procedures - Additional CRSS messages in clause 5.2.2.3.12 for the mapping procedures of <<NOTIFICATION-INDICATOR>> elements in the ISDN {NOTIFY} and {FACILITY} messages.

5.2.2.3.11 Generic notification mapping procedures - call release messages

This clause specifies how the <<NOTIFICATION-INDICATOR>> information elements contained in the call release procedure messages, as specified in the call release procedures of clause 5.2.1.3, shall be mapped from ISDN to DECT.

Upon reception of an ISDN {DISCONNECT} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the <<NOTIFICATION-INDICATOR>> element in one of two ways according to clause 5.2.4.1, Item no. 8. The first is to map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-INFO} message. The second, is to map the entire {DISCONNECT} message to an <<IWU-TO-IWU>> element of a {CC-INFO} message. If the first method is used then the DPS-IWU may analyse the <<IWU-TO-IWU>> element for the ISDN coded <<NOTIFICATION-INDICATOR>> element. If the second method is used then the DPS-IWU may analyse the ISDN {DISCONNECT} message for the notification.

During a normal release initiated by the DPS and upon reception of an ISDN {RELEASE} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-RELEASE-COM} message as described in clause 5.2.4.1, Item no. 19.

Upon reception of an ISDN {RELEASE-COM} message containing an <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-RELEASE-COM} message as described in clause 5.2.4.1, Item no. 20.

5.2.2.3.12 Generic notification mapping procedures - additional CRSS messages

This clause specifies how the <<NOTIFICATION-INDICATOR>> information elements contained in messages additional to those specified in the call control procedures of clause 5.2.1 shall be mapped from ISDN to DECT.

The NT can send an ISDN {NOTIFY} message containing a <<NOTIFICATION-INDICATOR>> element during applicable phases of a call according to EN 300 196-1 [42]. Upon reception of an ISDN {NOTIFY} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {CC-INFO} message as described in clause 5.2.4.1, Item no. 16.

The NT can send an ISDN {FACILITY-crss} message containing a <<NOTIFICATION-INDICATOR>> element during applicable phases of a call according to EN 300 196-1 [42]. Upon reception of an ISDN {FACILITY-crss} message containing a <<NOTIFICATION-INDICATOR>> element, the DFS-IWU may map the entire ISDN coded <<NOTIFICATION-INDICATOR>> element to an <<IWU-TO-IWU>> element of a DECT {FACILITY-crss} message as described in clause 5.2.4.1, Item no. 10.

5.2.2.4 Functional protocol IWU procedures for CISS

5.2.2.4.1 Connection-oriented

Concerning CISS connection establishment, the DFS-IWU may map a DECT {CISS-REGISTER} message to an ISDN {REGISTER} as described in clause 5.2.4.2, Item no. 19 and a {REGISTER} message received from the ISDN may be mapped to a DECT {CISS-REGISTER} message as described in clause 5.2.4.1, Item no. 18.

After CISS connection establishment, all subsequent DECT {FACILITY-ciss} messages may be mapped to ISDN {FACILITY-ciss} messages as described in clause 5.2.4.2 and all ISDN {FACILITY-ciss} messages may be mapped to DECT {FACILITY-ciss} messages as described by clause 5.2.4.1, Item no. 9.

Concerning the release of a CISS, a DECT {CISS-RELEASE-COM} message may be mapped to an ISDN {RELEASE} message as described in clause 5.2.4.2, Item no. 20. A {RELEASE} message received from the ISDN may be mapped to a DECT {CISS-RELEASE-COM} message as described in clause 5.2.4.1, Item no. 3.

5.2.2.4.2   Connectionless

This clause describes the mapping procedures that shall be used for interworking the bearer-independent connectionless class of ISDN procedures to DECT. The mapping shall be performed by applying the DECT ConnectionLess Supplementary Service (CLSS) procedures upon a connection oriented DECT layer 2 link. Annex C describes the basics of the CLSS procedure.

The DPS may initiate a DECT CLSS connectionless transaction as follows:

The DPS sets up a DECT layer 2 link if no acceptable link currently exists. The DPS then sends the DECT {FACILITY-ciss} message to the DFS with the Transaction Identifier (TI) value set to indicate connectionless (TI = 6).

Upon reception of the DECT {FACILITY-ciss} message, the DFS-IWU maps the DECT {FACILITY-ciss} message to the ISDN {FACILITY-ciss} message as described in clause 5.2.4.2, Item no. 21. This ISDN {FACILITY-ciss} message shall be transported via an already existing or a new link associated to the DECT link on which the DECT {FACILITY-ciss} message has been received.

If the DPS expects a response to the invoke component sent with the {FACILITY-ciss} message, then the timer as defined by the specific ISDN standards shall apply. Upon reception of an ISDN {FACILITY-ciss} message, containing the dummy call reference on an existing ISDN layer 2 point-to-point link, the DFS-IWU shall map the ISDN {FACILITY-ciss} message to the DECT {FACILITY-ciss} message containing the connectionless TI as described in clause 5.2.4.1, Item no. 9. This message shall be forwarded to the DPS via the DECT link associated to the ISDN link upon which the ISDN message has been received.

The DPS shall release the link if not used by other network layer entities if:

a) a response is expected and the response is received or the timer of a supplementary service operation in the DPS expires waiting for the expected response;

b) no response is expected.

Clause 5.3.2 describes more details upon layer 2 management.
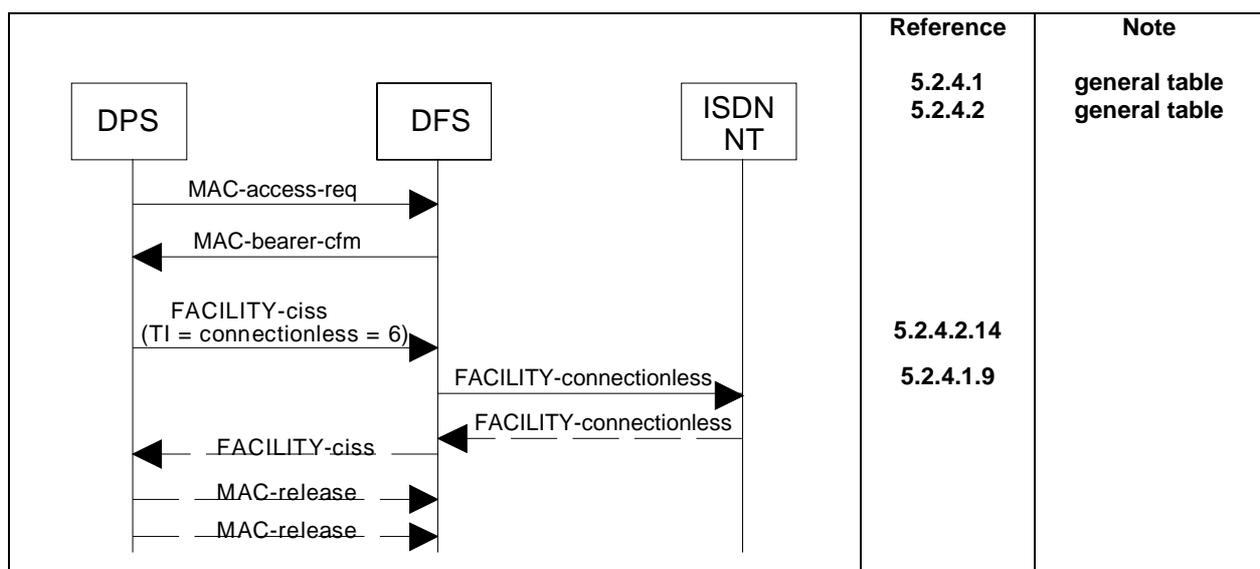
Figure 19: DPS invocation of a connectionless transaction

The DFS initiates a DECT CLSS transaction as follows:

Upon reception of an ISDN {FACILITY-ciss} message containing a dummy call reference (i.e. connectionless service), the DFS-IWU starts the DECT CLSS transaction. If an existing link is not already established, the DFS-IWU starts the CLSS transaction by paging the DPS. When the DPS receives the page it sets up a DECT layer 2 link and answers the page by sending a {LCE-PAGE-RESPONSE} message to the DFS.

The DFS-IWU then maps the ISDN {FACILITY-ciss} message to the DECT {FACILITY-ciss} message as described in clause 5.2.4.1, Item no. 9. The DECT {FACILITY-ciss} message shall contain a TI value for connectionless service (TI value = 6).

If the DFS-IWU has to forward {FACILITY} messages broadcasted by the network to a specific DPS only it shall perform appropriate analysing functions upon address information. The according mapping functions are described in the clauses dealing with the services.

If there is no further information to be sent then the DPS shall release the link.
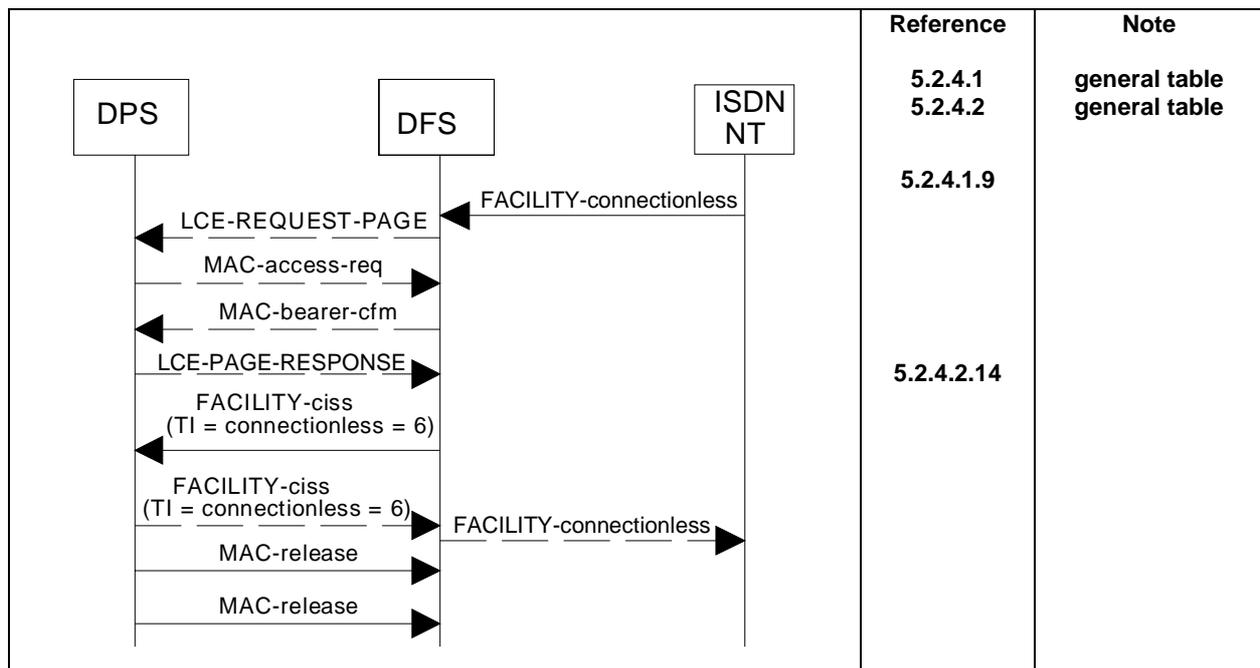
Figure 20: DFS invocation of a connectionless transaction

5.2.2.5   Specific procedures for the individual supplementary services

If the access to a given supplementary service is to be implemented in the DFS, then the interworking procedures and/or class of procedures specified in the following clause for that service shall be followed. EN 300 195-1 [69] applies for interactions between specific supplementary services.

5.2.2.5.1   Specific procedures for Calling Line Identification Presentation (CLIP)

The ISDN procedures as defined in EN 300 092-1 [15], clauses 7 to 9, shall be used. The mapping procedures as provided for basic call control shall be followed (clause 5.2.1).

Upon receipt of an ISDN {SETUP} message, the DFS-IWU shall map the CLIP information contained in the <<CALLING-PARTY-NUMBER>> and <<CALLING-PARTY_SUBADDRESS>> elements, if present, to the <<CALLING-PARTY-NUMBER>> and <<IWU-TO-IWU>> elements of the next sent DECT {CC-SETUP} message as described in clause 5.2.4.1, Item no. 30.

5.2.2.5.2   Specific procedures for Calling Line Identification Restriction (CLIR)

The ISDN procedures as defined in EN 300 093-1 [16], clauses 7 to 9 shall be used. The mapping procedures as provided for basic call control shall be followed (clause 5.2.1).

Upon receipt of a DECT {CC-SETUP} message the DFS-IWU shall map the <<CALLING-PARTY-NUMBER>> element to the <<CALLING-PARTY-NUMBER>> element of an ISDN {SETUP} message as described in clause 5.2.4.2, Item no. 17.

5.2.2.5.3 Specific procedures for COnnected Line identification Presentation (COLP)

The ISDN procedures as defined in EN 300 097-1 [17], clauses 7 to 9, shall be used. The mapping procedures as provided for basic call control shall be followed (clause 5.2.1).

Upon receipt of an ISDN {CONNECT} message containing COLP information the DFS-IWU shall map the whole <<CONNECTED-NUMBER>> and <<CONNECTED-SUBADDRESS>> elements to a <<IWU-TO-IWU>> element in a DECT {CC-CONNECT} message as specified in clause 5.2.4.1.6.

5.2.2.5.4 Specific procedures for COnnected Line identification Restriction (COLR)

The ISDN procedures as defined in EN 300 098-1 [18], clauses 7 to 9, shall be used. The mapping procedures as provided for basic call control shall be followed (clause 5.2.1).

The DPS-IWU may send a DECT <<IWU-TO-IWU>> element containing an ISDN coded <<CONNECTED-NUMBER>> element in a DECT {CC_CONNECT} message. This <<CONNECTED-NUMBER>> element shall contain the desired restriction indication. Upon receipt of the DECT {CC_CONNECT} message the DPS-IWU shall analyse the <<IWU-TO-IWU>> element for the <<CONNECTED-NUMBER>> element and shall map the element to an ISDN {CONNECT} message as described in clause 5.2.4.2, Item no. 3.

5.2.2.5.5 Specific procedures for Multiple Subscriber Number (MSN)

The ISDN procedures as defined in EN 300 052-1 [12], clauses 7 to 9, shall be used. No mapping procedures other than the procedures provided for basic call control are required (see clause 5.2.1). This service should be subscribed if a DFS supports other supplementary services employing procedures which require selective paging of a specific DPS.

5.2.2.5.6 Specific procedures for Direct Dialling In (DDI)

The ISDN procedures as defined in EN 300 064-1 [49], clauses 7 to 9, shall be used. The procedures are mapped to normal DECT call control procedures (see clause 5.2.1.1.2).

5.2.2.5.7 Specific procedures for SUBaddressing (SUB)

The ISDN procedures as defined in EN 300 061-1 [14], clauses 7 to 9, shall be used. The mapping procedures as provided for basic call control shall be followed (clause 5.2.1).

Upon receipt of an ISDN {SETUP} message, the DFS-IWU shall map the called party sub-address information contained in the <<CALLED-PARTY-SUBADDRESS>> element to a <<CALLED-PARTY-SUBADDRESS>> element of a DECT {CC-SETUP} message as described in clause 5.2.4.1, Item no. 30.

5.2.2.5.8 Specific procedures for Terminal Portability (TP)

The terminal portability feature allows the movement of terminals from one physical socket to another. The application of this service is out of scope of the present document.

5.2.2.5.9 Specific procedures for Call Waiting (CW)

The ISDN procedures as defined in EN 300 058-1 [13], clauses 7 to 9, shall be used. If the call waiting supplementary service is supported, the DFS-IWU shall map the whole ISDN coded <<CHANNEL-ID>> information element received in an incoming {SETUP} message to an <<IWU-TO-IWU>> info element of a DECT {CC-SETUP} message as described in clause 5.2.4.1. The {CC-SETUP} associated with the waiting call shall only be offered to the busy DPSs.

A DPS, upon reception of a DECT {CC-SETUP} message, shall analyse the <<IWU-TO-IWU>> element, if present, for the ISDN coded <<CHANNEL-ID>> element. If the ISDN coded <<CHANNEL-ID>> element is present then the DPS shall follow the "user" procedures for CW as specified in EN 300 058-1 [13].

5.2.2.5.10   Specific procedures for Call Hold (HOLD)

The ISDN procedures as defined in EN 300 141-1 [21], clauses 7 to 9, and the DECT procedures as defined in EN 300 175-5 [5], clause 10.4.1, shall be used. No mapping procedures other than the procedures provided for basic call control and the separate message approach are required (see clauses 5.2.1 and 5.2.2.3.7, respectively).

5.2.2.5.11   Specific procedures for Closed User Group (CUG)

The ISDN procedures as defined in EN 300 138-1 [20], clauses 7 to 9, shall be used. No mapping procedures other than the procedures provided for the common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

5.2.2.5.12   Specific procedures for Advice Of Charge (AOC-S,D,E)

The ISDN procedures as defined in EN 300 182-1 [22], clauses 7 to 9, shall be used. No mapping procedures other than the procedures provided for the common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

5.2.2.5.13   Specific procedures for Malicious Call Identification Detection (MCID)

The ISDN procedures as defined in EN 300 130-1 [19], clauses 7 to 9, shall be used. No mapping procedures other than the procedures provided for the common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

   NOTE: The connection should not be release by the user side before the reception of the response. Otherwise the transport of the response to the DPS is outside the scope of the present document.

5.2.2.5.14   Specific procedures for add on CONFerence (CONF)

The ISDN procedures as defined in EN 300 185-1 [23], clauses 7 to 9, shall be used. No mapping procedures other than the procedures provided for the Common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

5.2.2.5.15   Specific procedures for 3 Party (3PTY)

The ISDN procedures as defined in EN 300 188-1 [43], clauses 7 to 9, shall be used. For HOLD/RETRIEVE the DECT procedures as defined in EN 300 175-5 [5], clause 10.4.1, shall be used. No mapping procedures other than the procedures provided for the Common information element approach and Separate information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5 and 5.2.2.3.7).

5.2.2.5.16   Specific procedures for Call Deflection (CD)

The ISDN procedures as defined in EN 300 207-1 [44], clauses 7 and 8, and clause 9.2.3.5 shall be used. No mapping procedures other than the procedures provided for the Common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

5.2.2.5.17   Specific procedures for User to User Service 1 (UUS1)

The ISDN procedures as defined in EN 300 286-1 [46], clauses 7 and 8 and clause 9.1, shall be used. Concerning the explicit activation of UUS1, no mapping procedures other than the procedures provided for the common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

Concerning the transfer of user information from the DPS-IWU to the ISDN, the following mapping procedures apply:

-    the <<IWU-TO-IWU>> element of a DECT {CC-SETUP}, {CC-ALERTING}, {CC-CONNECT}, {CC-RELEASE}, {CC-RELEASE-COM}, or {CC-INFO} message may be used to transfer the ISDN coded <<USER-TO-USER>> elements from the DPS-IWU to the DFS-IWU. Upon reception of one of the above DECT messages, the DFS-IWU shall analyse the <<IWU-TO-IWU>> element, if present, for an ISDN coded <<USER-TO-USER>> element. If an ISDN coded <<USER-TO-USER>> element is found in the DECT {CC-SETUP}, {CC-ALERTING}, {CC-CONNECT}, {CC-RELEASE}, or {CC-RELEASE-COM} then the DFS-IWU may include the element in the appropriate ISDN message as described in the basic call control procedures (see clause 5.2.1).

Concerning the transfer of user information from the DFS-IWU to the PP, the following mapping procedure applies:

- the <<USER-TO-USER>> element of an ISDN {SETUP}, {ALERTING}, {CONNECT}, {DISCONNECT}, {RELEASE}, or {RELEASE-COM} message may be mapped whole to an <<IWU-TO-IWU>> element of the respective DECT {CC-SETUP}, {CC-ALERTING}, {CC-CONNECT}, {CC-INFO}, {CC-RELEASE}, {CC-RELEASE-COM} or {CC-INFO} message as described in the basic call control procedures (see clause 5.2.1).

5.2.2.5.18   Specific procedures for User to User Service 2 (UUS2)

The ISDN procedures as defined in EN 300 286-1 [46], clauses 7 and 8 and clause 9.2, shall be used. Concerning the explicit activation of UUS2, no mapping procedures other than the procedures provided for the common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

Concerning the transfer of user information from the DPS-IWU to the ISDN, the following mapping procedure applies:

- the <<IWU-TO-IWU>> element of a DECT {CC-INFO} message may be used to transfer the ISDN coded {USER-INFORMATION} message containing the <<USER-TO-USER>> element from the DPS-IWU to the DFS-IWU. Upon reception of a DECT {CC-INFO} message, the DFS-IWU shall analyse the <<IWU-TO-IWU>> element, if present, for an ISDN coded {USER-INFORMATION} message. If an ISDN coded {USER-INFORMATION} message is found then the DFS-IWU may send the message to the NT.

Concerning the transfer of user information from the DFS-IWU to the PP, the following mapping procedure applies:

- an ISDN {USER-INFORMATION} message may be mapped whole to an <<IWU-TO-IWU>> element of a {CC-INFO} message as described in clause 5.2.4.1.25.

If a DFS supports this service and receives. a STATUS message from the network it shall map this entire message to an < IWU-to-IWU > info. element according to clause 5.2.4.1.26 and forward it to the DPS in a CC-lNFO message.

5.2.2.5.19   Specific procedures for User to User Service 3 (UUS3)

The ISDN procedures as defined in EN 300 286-1 [46], clauses 7 and 8 and clause 9.3, shall be used. Concerning the explicit activation of UUS3, no mapping procedures other than the procedures provided for the common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

Concerning the transfer of user information from the DPS-IWU to the ISDN, the following mapping procedure applies:

- the <<IWU-TO-IWU>> element of a DECT {CC-INFO} message may be used to transfer the ISDN coded {USER-INFORMATION} message containing the <<USER-TO-USER>> element from the DPS-IWU to the DFS-IWU. Upon reception of a DECT {CC-INFO} message, the DFS-IWU shall analyse the <<IWU-TO-IWU>> element, if present, for an ISDN coded {USER-INFORMATION} message. If an ISDN coded {USER-INFORMATION} message is found, then the DFS-IWU may send the message to the NT.

Concerning the transfer of user information from the DFS-IWU to the PP, the following mapping procedure applies:

- an ISDN {USER-INFORMATION} message may be mapped whole to an <<IWU-TO-IWU>> element of a {CC-INFO} message as described in clause 5.2.4.1.25.

Concerning the transfer of flow control information between the NT and the DPS, the following mapping procedures apply:

- an ISDN {CONGESTION-CONTROL} message, may be mapped whole to an <<IWU-TO-IWU>> element of a {CC-INFO} message as described in clause 5.2.4.1.5.

5.2.2.5.20   Specific procedures for Explicit Call Transfer (ECT)

The ISDN procedures as defined in EN 300 369-1 [48] clauses 7 through 9 shall be used. No mapping procedures other than the procedures provided for the common information element approach as described in clause 5.2.2.3.1 to 5.2.2.3.5 are required.

5.2.2.5.21 Specific procedures for Call Completion on Busy Subscribers (CCBS)

The ISDN procedures as defined in EN 300 359-1 [47], clauses 7 to 9, shall be used. The mapping procedures provided for the common information element approach as described in clauses 5.2.2.3.1 to 5.2.2.3.5 and clause 5.2.2.4.2 are required.

To provide CCBS to a specific DPS the DFS-IWU shall include a <<calling party number>> information element in a {SETUP} message outgoing to the network. This information element shall uniquely identify a connection between the network and a DPS. It can either be supplied by the DFS-IWU itself or mapped from the <<portable identity>> information element in the {CC-SETUP} message received from that DPS. Furthermore the supplementary service MSN should be subscribed.

The DFS-IWU shall then analyse connectionless {FACILITY} messages received from the network for the <<CALLED-PARTY-NUMBER>> and forward the respective {FACILITY} message to that DPS identified by the address.

5.2.2.5.22 Specific procedures for Free Phone (FPH)

The ISDN procedures as defined in EN 300 210-1 [45], clauses 7 to 9, shall be used. No mapping procedures other than the procedures provided for the Common information element approach are required (see clauses 5.2.2.3.1 to 5.2.2.3.5).

5.2.2.5.23 Specific procedures for Meet Me Conference (MMC)

No mapping procedures other than the procedures provided for basic call control are required (see clause 5.2.1).

5.2.2.5.24 Specific procedures for call forwarding: (CFU), (CFNR), (CFB)

The ISDN procedures as defined in EN 300 207-1 [44], clauses 7 and 8 and clauses 9.2.3.1 to 9.2.3.4, shall be used. No mapping procedures other than the procedures provided for the general CISS connectionless procedures are required (see clause 5.2.2.4).

NOTE 1: The supplementary service MSN should be subscribed and supported by the DFS for selective paging of DPS's if the subscriber option "notification of a call being forwarded" is supported.

NOTE 2: The mapping of the activation/deactivation status notification procedures to DECT procedures is out of the scope of the present document for a configuration with one DFS supporting more than one DPS.

5.2.2.6 Error handling for supplementary services

5.2.2.6.1 Error handling procedures at the DECT CI

Ambiguity exists regarding the DECT error handling procedures for supplementary services. The DECT procedure specified in EN 300 175-5 [5], clause 10.6.1, recommends the use of the ISDN supplementary service procedures of EN 300 196-1 [42]. The ISDN supplementary service procedures of EN 300 196-1 [42] refer to the error handling procedures in EN 300 102-1 [65]. Also, error-handling procedures are specified in EN 300 175-5 [5], clause 17. Therefore, the following assumptions have been taken concerning the error handling procedures:

- the DECT error handling procedures regarding the reception of unexpected/unrecognized messages (EN 300 175-5 [5], clause 17.4.1) shall be applied at the DECT CI for unexpected/unrecognized supplementary service messages with the exception that a {CC-RELEASE-COM} message shall not be returned;

- the DECT error handling procedures regarding the reception of unrecognized information elements (EN 300 175-5 [5], clause 17.7.1) shall be applied at the DECT CI for unrecognized supplementary service information elements.

5.2.2.6.2 IWU error handling procedures - information from the NT

The minimum ISDN procedures according to EN 300 196-1 [42] and EN 300 403-1 [39] shall apply.

5.2.2.6.3   IWU error handling procedure - information from the DPS

If interworking for supplementary services is not supported on the {FACILITY} message level then the DFS-IWU shall ignore the supplementary service message, not change the call state, and continue the basic call control procedures.

If interworking for supplementary services is not supported on the level of the <<FACILITY>> information element, then <<FACILITY>> information elements received by the DFS-IWU from the DPS or the network shall be ignored and basic call procedures shall continue.

>   NOTE: The DPS, and therefore the user, will not receive any indication that invocations are discarded.

5.2.3   Other IWU procedures

5.2.3.1   Segmentation

The DLC "more bit" shall be used, if a DECT message needs to be segmented.

>   NOTE: The mapping of ISDN messages which need an <<IWU-to-IWU>> information field longer than
>   254 bytes is outside the scope of the present document.

5.2.3.2   Identity mapping procedures

The mapping of ISDN identities to DECT identities shall be performed in the DFS-IWU. The MSN supplementary service should be subscribed to in order that the called party number is included in the incoming {SETUP} and broadcasted FACILITY messages under certain supplementary service related conditions. The called party number can then be used to derive the DECT identity for paging. Aspects of roaming between different ISDN access points are outside the scope of the present document.

5.2.4   Message mappings

The mapping tables contain both the ISDN information elements defined in the ETSs for basic call control procedures and those contained in the ETSs for the specific supplementary services. The information elements in the destination message, are not necessarily transmitted in the order as described in the tables.

5.2.4.1   Messages - ISDN to DECT

Item no	ISDN message	DECT message	Reference.	Map Status
1	ALERTING	CC-ALERTING	5.2.4.1.1	M
2	CALL-PROC	CC-CALL-PROC	5.2.4.1.2	M
3	CISS-RELEASE	CISS-RELEASE-COM	5.2.4.1.3	O (note 3)
4	CISS-RELEASE-COM	CISS-RELEASE-COM	5.2.4.1.4	O (note 3)
5	CONGESTION-CONTROL	CC-INFO	5.2.4.1.5	C6
6	CONNECT	CC-CONNECT	5.2.4.1.6	M
7	CONNECT-ACK	CC-CONNECT-ACK	5.2.4.1.7	C13
8	DISCONNECT	CC-RELEASE	5.2.4.1.8	M
9	FACILITY-ciss	FACILITY-ciss	5.2.4.1.9	O
10	FACILITY-crss	FACILITY-crss	5.2.4.1.10	O
12	HOLD-ACK	HOLD-ACK	5.2.4.1.11	C9
13	HOLD-REJ	HOLD-REJ	5.2.4.1.12	C9
14	INFORMATION	CC-INFO	5.2.4.1.13	O
15	INFORMATION	CC-SETUP	5.2.4.1.14	O
16	NOTIFY	CC-INFO	5.2.4.1.15	O
17	PROGRESS	CC-INFO	5.2.4.1.16	M
18	REGISTER	CISS-REGISTER	5.2.4.1.17	O
19	RELEASE	CC-RELEASE-COM	5.2.4.1.18	M
20	RELEASE-COM	CC-RELEASE-COM	5.2.4.1.19	M
21	RESTART	----		I
22	RESTART-ACK	----		I
23	RESUME	----		I (note 1)
24	RESUME-ACK	----		I (note 1)
25	RESUME-REJ	----		I (note 1)
27	RETRIEVE-ACK	RETRIEVE-ACK	5.2.4.1.20	C9
28	RETRIEVE-REJ	RETRIEVE-REJ	5.2.4.1.21	C9
29	SEGMENT	----		- (note 2)
30	SETUP	CC-SETUP	5.2.4.1.22	C13
31	SETUP-ACK	CC-INFO	5.2.4.1.23	C15
32	SETUP-ACK	CC-SETUP-ACK	5.2.4.1.24	M
33	STATUS	CC-INFO	5.2.4.1.26	C3
34	STATUS-ENQUIRY	----		X
35	SUSPEND	----		I (note 1)
36	SUSPEND-ACK	----		I (note 1)
37	SUSPEND-REJ	----		I (note 1)
38	USER-INFORMATION	CC-INFO	5.2.4.1.25	C3
NOTE 1:	Belongs to SS-Terminal Portability, therefore out-of-scope in this profile.			
NOTE 2:	SEGMENT is built together in the DFS and can therefore not be mapped. DLC-"More data bit" shall be used for segmentation in DECT.			
NOTE 3:	The prefix "CISS" is used to indicate that these messages relate to connections established by a REGISTER message.			

C3:   IF support of user-to-user signalling on service 2 (call establishment) OR service 3 (active state) THEN M ELSE O

C6:   IF support of user-to-user signalling on service 3 (active state) THEN M ELSE O

C9:   IF support of functional supplementary service HOLD THEN M ELSE O

C13:   IF DECT_inc_call THEN M ELSE X

C15:   IF {SETUP-ACK} contains <<PROGRESS INDICATOR>> THEN M ELSE O

5.2.4.1.1   ALERTING - CC-ALERTING

Item no	Message in ISDN network ALERTING	Message in DECT air interface CC-ALERTING	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	bearer capability	----		I	(note)
5	channel identification	----		X	
6	facility	facility display feature indicate	5.2.5.1.8	O I I	
7	progress indicator	progress indicator	5.2.5.1.15	M	
8	notification indicator	IWU to IWU	5.2.5.1.11	O	
9	display	display feature indicate	5.2.5.1.5	O I	
	redirecting number	IWU to IWU	6.2.5.1.11	O	
10	high layer compatibility	----		I	(note)
11	user to user	IWU to IWU	5.2.5.1.11	O	
NOTE:	These information elements are only used in fall-back procedures which are not supported at the DECT air interface.				

5.2.4.1.2   CALL-PROC - CC-CALL-PROC

Item no	Message in ISDN network CALL-PROC	Message in DECT air interface CC-CALL-PROC	Reference	Map status	note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	bearer capability	----		I	(note)
5	channel identification	----		X	
6	facility	facility display feature indicate	5.2.5.1.8	O I I	
7	progress indicator	progress indicator	5.2.5.1.15	M	
8	notification indicator	IWU to IWU	5.2.5.1.11	O	
9	display	display feature indicate	5.2.5.1.5	O I	
10	high layer compatibility	----		I	(note)
NOTE:	These information elements are only used in fall-back procedures which are not supported at the DECT air interface.				

5.2.4.1.3   CISS-RELEASE - CISS-RELEASE-COM

Item no	Message in ISDN network CISS-RELEASE	Message in DECT air interface CISS-RELEASE-COM	Reference	Map status	note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU release reason	5.2.5.1.11 5.2.5.1.17	O O	
5	facility	facility	5.2.5.1.8	M	
6	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.4   CISS-RELEASE-COM - CISS-RELEASE-COM

Item no	Message in ISDN network	Message in DECT air interface	Reference	Map status	note
	CISS-RELEASE-COM	CISS-RELEASE-COM			
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU	5.2.5.1.11	O	
		release reason	5.2.5.1.17	O	
5	facility	facility	5.2.5.1.8	M	
6	display	display	5.2.5.1.5	O	
		feature indicate		I	

5.2.4.1.5   CONGESTION-CONTROL - CC-INFO

Item no	Message in ISDN network	Message in DECT air interface	Reference	Map status	note
	CONGESTION-CONTROL	CC-INFO			
1	protocol discriminator	----		X	
2	call reference	----		X	
3	message type	IWU to IWU	5.2.5.1.12	M	(note)
4	congestion level				
5	cause				
6	display				
NOTE:	The whole {CONGESTION-CONTROL} message, excluding the protocol discriminator and call reference, shall be mapped into the <<IWU-TO-IWU>> information element.				

5.2.4.1.6   CONNECT - CC-CONNECT

Item no	Message in ISDN network	Message in DECT air interface	Reference	Map status	note
	CONNECT	CC-CONNECT			
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	bearer capability	----		I	(note)
5	channel identification	----		X	
6	facility	facility	5.2.5.1.8	O	
		display		I	
		feature indicate		I	
7	progress indicator	progress indicator	5.2.5.1.15	M	
8	notification indicator	IWU to IWU	5.2.5.1.11	O	
9	display	display	5.2.5.1.5	O	
		feature indicate		I	
10	date/time	IWU to IWU	5.2.5.1.11	O	
11	connected party number	IWU to IWU	5.2.5.1.11	C1	
12	connected party subaddress	IWU to IWU	5.2.5.1.11	C1	
13	low layer compatibility	IWU to IWU	5.2.5.1.11	O	
14	high layer compatibility	----		I	(note)
15	user to user	IWU to IWU	5.2.5.1.11	O	
NOTE:	These information elements are only used in fall-back procedures which are not supported at the DECT air interface.				

C1:   IF COLP THEN M ELSE O

5.2.4.1.7 CONNECT-ACK - CC-CONNECT-ACK

Item no	Message in ISDN network	Message in DECT air interface			
	CONNECT-ACK	**CC-CONNECT-ACK**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	---- display feature indicate		X I I	
5	notification indicator	IWU to IWU	5.2.5.1.11	O	
6	display	display feature indicate	5.2.5.1.5	O I	
7	channel identification	----		I	

5.2.4.1.8 DISCONNECT - CC-RELEASE

Item no	Message in ISDN network	Message in DECT air interface			
	DISCONNECT	**CC-REL**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU	5.2.5.1.11	O	
5	facility	facility display feature indicate	5.2.5.1.8	O I I	
6	progress indicator	progress indicator	5.2.5.1.15	M	
7	notification indicator	IWU to IWU	5.2.5.1.11	O	
8	display	display feature indicate	5.2.5.1.5	O I	
9	user to user	IWU to IWU	5.2.5.1.11	O	

5.2.4.1.9 FACILITYciss - FACILITYciss

Item no	Message in ISDN network	Message in DECT air interface			
	FACILITYciss	**FACILITYciss**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	facility display feature indicate	5.2.5.1.8	C1 I I	
5	display	display feature indicate	5.2.5.1.5	O I	

C1: IF not mapped to <<display>> OR <<feature indicate>> THEM M ELSE O

5.2.4.1.10 FACILITYcrss - FACILITYcrss

Item no	Message in ISDN network FACILITYcrss	Message in DECT air interface FACILITYcrss	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	facility display feature indicate	5.2.5.1.8	C1 I I	
5	notification indicator	IWU to IWU	5.2.5.1.11	O	
6	display	display feature indicate	5.2.5.1.5	O I	

C1: IF not mapped to <<display>> OR <<feature indicate>> THEM M ELSE O

5.2.4.1.11 HOLD-ACK - HOLD-ACK

Item no	Message in ISDN network HOLD-ACK	Message in DECT air interface HOLD-ACK	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.12 HOLD-REJ - HOLD-REJ

Item no	Message in ISDN network HOLD-REJ	Message in DECT air interface HOLD-REJ	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU reject reason	5.2.5.1.11 5.2.5.1.16	O O	
5	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.13 INFORMATION - CC-INFO (F-02, F-03, F-04, F-07, F-10)

Item no	Message in ISDN network INFORMATION	Message in DECT air interface CC-INFO (F-02, F-03, F-04, F-07, F-10)	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
5	cause	IWU to IWU	5.2.5.1.11	O	
6	display	display feature indicate	5.2.5.1.5	O I	
7	keypad facility	IWU to IWU	5.2.5.1.11	O	

5.2.4.1.14 INFORMATION - CC-SETUP

	Message in ISDN network	Message in DECT air interface			
Item no	INFORMATION	CC-SETUP	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	sending complete	sending complete	5.2.5.1.18	M	1
5	facility	facility display feature indicate	5.2.5.1.8	O I I	
6	cause	IWU to IWU	5.2.5.1.11	O	
7	notification indicator	IWU to IWU	5.2.5.1.11	O	
8	display	display feature indicate	5.2.5.1.5	O I	
9	keypad facility	IWU to IWU	5.2.5.1.11	O	
10	called party number	called party number		I	
NOTE 1:	All dialling information which has been received in previous {INFORMATION} messages and the {SETUP} message shall be incorporated in the {CC-SETUP}.				
NOTE 2:	Information elements which have been received in previous {INFORMATION} messages and the {SETUP} message and which are mandatory to map, shall be incorporated in the {CC-SETUP}.				

5.2.4.1.15 NOTIFY - CC-INFO

	Message in ISDN network	Message in DECT air interface			
Item no	NOTIFY	CC-INFO	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	notification indicator	IWU to IWU	5.2.5.1.11	M	
5	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.16 PROGRESS - CC-INFO

	Message in ISDN network	Message in DECT air interface			
Item no	PROGRESS	CC-INFO	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	bearer capability	----		I	(note)
5	cause	IWU to IWU	5.2.5.1.11	O	
6	facility	facility display feature indicate	5.2.5.1.8	O I I	
7	progress indicator	progress indicator	5.2.5.1.15	M	
8	notification indicator	IWU to IWU	5.2.5.1.11	O	
9	display	display feature indicate	5.2.5.1.5	O I	
	redirecting number	IWU to IWU	6.2.5.1.11	O	
10	high layer compatibility	----		I	(note)
11	user to user	IWU to IWU	5.2.5.1.11	O	
NOTE:	These information elements are only used in fall-back procedures which are not supported at the DECT air interface.				

5.2.4.1.17   REGISTER - CISS-REGISTER

Item no	Message in ISDN network	Message in DECT air interface	Reference	Map status	Note
	REGISTER	**CISS-REGISTER**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	facility display feature indicate	5.2.5.1.8	O I I	
5	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.18   RELEASE - CC-RELEASE-COM

Item no	Message in ISDN network	Message in DECT air interface	Reference	Map status	Note
	RELEASE	**CC-RELEASE-COM**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU release reason	5.2.5.1.11 5.2.5.1.17	O O	
5	facility	facility display feature indicate	5.2.5.1.8	O I I	
6	notification indicator	IWU to IWU	5.2.5.1.11	O	
7	display	display feature indicate	5.2.5.1.5	O I	
8	user to user	IWU to IWU	5.2.5.1.11	O	

5.2.4.1.19   RELEASE-COM - CC-RELEASE-COM

Item no	Message in ISDN network	Message in DECT air interface	Reference	Map status	Note
	RELEASE-COM	**CC-RELEASE-COM**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU release reason	5.2.5.1.11 5.2.5.1.17	O O	
5	facility	facility display feature indicate	5.2.5.1.8	O I I	
6	notification indicator	IWU to IWU	5.2.5.1.11	O	
7	display	display feature indicate	5.2.5.1.5	O I	
8	user to user	IWU to IWU	5.2.5.1.11	O	

5.2.4.1.20   RETRIEVE-ACK - RETRIEVE-ACK

	Message in ISDN network	Message in DECT air interface			
Item no	RETRIEVE-ACK	RETRIEVE-ACK	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	channel identification	----		X	
5	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.21   RETRIEVE-REJ - RETRIEVE-REJ

	Message in ISDN network	Message in DECT air interface			
Item no	RETRIEVE-REJ	RETRIEVE-REJ	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	cause	IWU to IWU reject reason	5.2.5.1.11 5.2.5.1.16	O O	
5	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.22   SETUP - CC-SETUP

	Message in ISDN network	Message in DECT air interface			
Item no	SETUP	CC-SETUP	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	sending complete	sending complete	5.2.5.1.18	O	
5	bearer capability	basic service IWU attributes end-to-end comp.	5.2.5.1.1 5.2.5.1.9 5.2.5.1.6	M C1 C1	
6	channel identification	IWU-to-IWU	5.2.5.1.11	C5	
7	facility	facility display feature indicate	5.2.5.1.8	O I I	
8	progress indicator	progress indicator	5.2.5.1.15	M	
9	network specific facil.	IWU to IWU	5.2.5.1.11	O	
10	notification indicator	IWU to IWU	5.2.5.1.11	O	
11	display	display feature indicate	5.2.5.1.5	O I	
12	keypad facility	IWU to IWU	5.2.5.1.11	O	
13	calling party number	calling party number	5.2.5.1.2	C2	
14	calling party subaddr.	IWU to IWU	5.2.5.1.11	C3	
15	called party number	called party number	5.2.5.1.3	O	
16	called party subaddr.	called party subaddr.	5.2.5.1.4	C3	
	redirecting number	IWU to IWU	5.2.5.1.11	O	
17	transit network sel.	----		X	
18	low layer compatibility	IWU to IWU	5.2.5.1.11	C7	
19	high layer compatibility	IWU to IWU	5.2.5.1.11	C7	
20	user to user	IWU to IWU	5.2.5.1.11	C4	
21	---	signal	5.2.5.1.19	M	(note)

C1:   IF Bearer Capability is not equal to DECT PAP "default set-up attributes" THEN M ELSE X

C2:   IF CLIP THEN M ELSE O

C3:   IF SUB THEN M ELSE O

C4:   IF support user-to-user signalling during set-up and clearing phases of a call (service 1) THEN O ELSE X

C5:   IF call_wait_ss THEN M ELSE O

C6:   IF msn_ss THEN M ELSE O

C7:   IF not basic-service THEN M ELSE I

5.2.4.1.23   SETUP-ACK - CC-INFO

	Message in ISDN network	Message in DECT air interface			
Item no	SETUP-ACK	CC-INFO	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	channel identification	----		X	
5	facility	facility display feature indicate	5.2.5.1.8	O I I	
6	progress indicator	progress indicator	5.2.5.1.15	M	
7	notification indicator	IWU to IWU	5.2.5.1.11	O	
8	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.24   SETUP-ACK - CC-SETUP-ACK

	Message in ISDN network	Message in DECT air interface			
Item no	SETUP-ACK	CC-SETUP-ACK	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	call reference	transaction identifier	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	channel identification	----		X	
5	facility	facility display feature indicate	5.2.5.1.8	O I I	
6	progress indicator	progress indicator	5.2.5.1.15	M	
7	notification indicator	IWU to IWU	5.2.5.1.11	O	
8	display	display feature indicate	5.2.5.1.5	O I	

5.2.4.1.25 USER-INFORMATION - CC-INFO

	Message in ISDN network	Message in DECT air interface			
Item no	USER-INFORMATION	CC-INFO	Reference	Map status	Note
1	protocol discriminator	----		X	
2	call reference	----		X	
3	message type	IWU to IWU	5.2.5.1.12	M	(note)
4	more data				
5	user to user				
NOTE: The whole {USER-INFORMATION} message, excluding the protocol discriminator and call reference, shall be mapped into the <<IWU-TO-IWU>> information element.					

5.2.4.1.26 STATUS - CC-INFO

	Message in ISDN network	Message in DECT air interface			
Item no	STATUS	CC-INFO	Reference	Map status	Note
1	protocol discriminator	----		X	
2	call reference	----		X	
3	message type	IWU to IWU	5.2.5.1.12	M	(note)
4	cause				
5	call state				
6	display				
NOTE: The whole {STATUS} message, excluding the protocol discriminator and call reference, shall be mapped into the <<IWU-TO-IWU>> information element.					

5.2.4.2 Messages - DECT to ISDN

Item no	DECT message	ISDN message	Reference	Map Status
1	CC-ALERTING	ALERTING	5.2.4.2.1	C3
3	CC-CONNECT	CONNECT	5.2.4.2.2	C9
5	CC-INFO (F-02)	INFORMATION (U2)	5.2.4.2.3	M
6	CC-INFO (F-02)	SETUP	5.2.4.2.4	M
7	CC-INFO(F-03, F-04, F-07, F-10, F-19)	INFORMATION	5.2.4.2.5	O
8	CC-INFO	FACILITY-crss	5.2.4.2.6	C8
9	CC-INFO	USER-INFORMATION	5.2.4.2.7	C8
11	CC-RELEASE	DISCONNECT	5.2.4.2.8	M
12	CC-RELEASE-COM	RELEASE	5.2.4.2.9	M
13	CC-RELEASE-COM	DISCONNECT	5.2.4.2.10	M
14	CC-SERVICE-ACCEPT	----		X
15	CC-SERVICE-CHANGE	----		X
16	CC-SERVICE-REJECT	----		X
17	CC-SETUP	SETUP	5.2.4.2.11	M
19	CISS-REGISTER	REGISTER	5.2.4.2.12	O
20	CISS-RELEASE-COM	CISS-RELEASE	5.2.4.2.13	O
21	FACILITY-ciss	FACILITY-ciss	5.2.4.2.14	O
22	FACILITY-crss	FACILITY-crss	5.2.4.2.15	O
23	HOLD	HOLD	5.2.4.2.16	C4
26	IWU-INFO	----		I
27	RETRIEVE	RETRIEVE	5.2.4.2.17	C4
30	CLMS-FIXED	----		I
31	COMS-	----		I
32	MM-	----		I

C3:   IF DECT_inc_call THEN M ELSE X

C4:   IF support of functional supplementary service HOLD THEN M ELSE O

C8:   IF mapping of {CC-INFO} is called up by item 5, 6 or 7 THEN M ELSE X

C9:   IF ISDN_inc_call AND DECT_inc_call THEN M ELSE X

5.2.4.2.1   CC-ALERTING - ALERTING

Item no	Message in DECT air interface CC-ALERTING	Message in ISDN network ALERTING	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	call attributes	----		X	
5	connection identity	----		X	
6	facility	facility	5.2.5.1.8	O	
11	terminal capability	----		X	
12	transit delay	----		X	
13	window size	----		X	
14	IWU to IWU	user to user	5.2.5.1.11	C1	
15	IWU packet	----		I	

C1:   IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.2   CC-CONNECT - CONNECT

Item no	Message in DECT air interface CC-CONNECT	Message in ISDN network CONNECT	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	call attributes	----		X	
5	connection identity	----		X	
6	facility	facility	5.2.5.1.8	O	
11	terminal capability	----		X	
12	transit delay	----		X	
13	window size	----		X	
14	IWU to IWU	user to user	5.2.5.1.11	C1	
		connect. party number	5.2.5.1.11	C2	
		connected party subaddress	5.2.5.1.11	O	
15	IWU packet	----		I	

C1:   IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

C2:   IF COLR with options "per call" and "override" is subscribed THEN M ELSE O

5.2.4.2.3 CC-INFO (F-02) - INFORMATION (U2)

Item no	Message in DECT air interface CC-INFO (F-02)	Message in ISDN network INFORMATION (U2)	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	location area	----		I	
5	NWK assigned identity	----		I	
6	facility	----		I	
9	keypad	keypad called party number	5.2.5.1.14 5.2.5.1.13	C1 C2	
11	feature activate	feature activate keypad		I I	private ISDN
13	network parameter	----		I	
14	called party number	called party number	5.2.5.1.3	M	
15	called party subaddr.	----		X	
16	sending complete	sending complete	5.2.5.1.18	M	
18	IWU to IWU	{USER-INFORMATION}	5.2.4.2.7	C3	
19	IWU packet	----		I	

C1: IF NOT called party number info AND NOT mapped to <<FACILITY>> THEN O ELSE X

C2: IF called party number info THEN M ELSE X

C3: IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.4 CC-INFO (F-02) - SETUP

Item no	Message in DECT air interface CC-INFO (F-02)	Message in ISDN network SETUP	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	location area	----		I	
5	NWK assigned identity	----		I	
6	facility	----		I	
9	keypad	keypad called party number facility	5.2.5.1.14 5.2.5.1.13	C1 C2 I	
11	feature activate	feature activate keypad facility		I I I	private ISDN
13	network parameter	----		I	
14	called party number	called party number	5.2.5.1.3	M	
15	called party subaddr.	called party subaddr.	5.2.5.1.4	C3	
16	sending complete	sending complete	5.2.5.1.18	M	
18	IWU to IWU	user to user calling party subaddr. ISDN IE	5.2.5.1.11 5.2.5.1.11	C6 C4	clip, clir from previous CC-SETUP
19	IWU packet	----		I	
20	calling party number	calling party number	5.2.5.1.2	C5	from previous CC-SETUP

C1: IF NOT called party number info AND NOT mapped to <<FACILITY>> THEN O ELSE X

C2: IF called party number info THEN M ELSE X

C3: IF SUB THEN M ELSE O

C4: From previous CC-SETUP, IF calling_party_subaddress is in <<IWU-TO-IWU>> AND SUB THEN M ELSE X

C5: From previous CC-SETUP, IF CLIP THEN M ELSE O

C6: IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.5 CC-INFO (F-03, F-04, F-07, F-10, F-19) - INFORMATION

	Message in DECT air interface	**Message in ISDN network**			
Item no	**CC-INFO (F-03, F-04, F-07, F-10, F-19)**	**INFORMATION**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	location area	----		I	
5	NWK assigned identity	----		I	
6	facility	----		I	
9	keypad	keypad {FACILITY-crss}	5.2.5.1.14	O I	(note)
11	feature activate	feature activate keypad {FACILITY-crss}		I I I	private ISDN (note)
13	network parameter	----		I	
14	called party number	----		X	
15	called party subaddress	----		X	
16	sending complete	----		X	
18	IWU to IWU	{USER-INFO}	5.2.4.2.7	C1	(note)
19	IWU packet	----		I	
NOTE:	These information elements have to be mapped into messages.				

C1: IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.6 CC-INFO - FACILITY-crss

	Message in DECT air interface	**Message in ISDN network**			
Item no	**CC-INFO**	**FACILITY-crss**	**Reference**	**Map status**	**Note**
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	location area	----		I	
5	NWK assigned identity	----		I	
6	facility	----		I	
9	keypad	facility		I	
11	feature activate	facility		I	
13	network parameter	----		I	
14	called party number	----		I	
15	called party subaddress	----		I	
16	sending complete	----		I	
18	IWU to IWU	----		I	
19	IWU packet	----		I	

5.2.4.2.7   CC-INFO - USER-INFORMATION

Item no	Message in DECT air interface	Message in ISDN network			
	CC-INFO	USER-INFORMATION	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	location area	----		I	
5	NWK assigned identity	----		I	
6	facility	----		I	
9	keypad	----		I	
11	feature activate	----		I	
13	network parameter	----		I	
14	called party number	----		X	
15	called party subaddr.	----		X	
16	sending complete	----		X	
18	IWU to IWU	user to user	5.2.5.1.11	C1	
19	IWU packet	----		I	

C1:   IF ISDN coded {USER-INFORMATION} info THEN O ELSE X

5.2.4.2.8   CC-RELEASE - DISCONNECT

Item no	Message in DECT air interface	Message in ISDN network			
	CC-RELEASE	DISCONNECT	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	release reason	cause	5.2.5.1.17	O	
5	facility	facility	5.2.5.1.8	O	
8	IWU to IWU	user to user	5.2.5.1.11	C1	
9	IWU packet	----		I	

C1:   IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.9   CC-RELEASE-COM - RELEASE

Item no	Message in DECT air interface	Message in ISDN network			
	CC-RELEASE-COM	RELEASE	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	release reason	cause	5.2.5.1.17	O	
5	facility	facility	5.2.5.1.8	O	
8	IWU to IWU	user to user	5.2.5.1.11	C1	
9	IWU packet	----		I	

C1:   IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.10   CC-RELEASE-COM - DISCONNECT

Item no	Message in DECT air interface CC-RELEASE-COM	Message in ISDN network DISCONNECT	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	release reason	cause	5.2.5.1.17	O	
7	IWU attributes	----		I	
8	facility	facility	5.2.5.1.8	O	
12	IWU to IWU	user to user	5.2.5.1.11	C1	
13	IWU packet	----		I	

C1:   IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

5.2.4.2.11   CC-SETUP - SETUP

Item no	Message in DECT air interface CC-SETUP	Message in ISDN network SETUP	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	portable identity	----		I	
5	fixed identity	----		I	
6	basic service	bearer capability	5.2.5.1.1	M	
7	IWU attributes	bearer capability low layer compatibility	5.2.5.1.9 5.2.5.1.10	C1 C2	
8	repeat indicator	----		X	(note 1)
9	call attributes	----		X	
10	repeat indicator	----		X	(note 1)
11	connection attributes	----		X	
12	cipher info	----		I	
13	connection identity	----		X	
14	facility	facility	5.2.5.1.8	O	
17	keypad	keypad facility	5.2.5.1.14	C10 I	(note 2)
19	feature activate	feature activate keypad facility		I I I	private ISDN
21	network parameter	----		I	
22	terminal capability	----		X	
23	end to end compatibility	bearer capability low layer compatibility	5.2.5.1.6 5.2.5.1.7	C3 C4	
24	rate parameter	----		X	
25	transit delay	----		X	
26	window size	----		X	
27	calling party number	calling party number	5.2.5.1.2	C5	
28	called party number	called party number	5.2.5.1.3	M	(note 2)
29	called party subaddr.	called party subaddr.	5.2.5.1.4	O	
30	sending complete	sending complete	5.2.5.1.18	M	
31	IWU to IWU	high layer comp.(HLC) user to user calling party subaddr.	5.2.5.1.11 5.2.5.1.11 5.2.5.1.11	C7 C8 O	
32	IWU packet	----		I	
NOTE 1: Not allowed in DECT PAP.					
NOTE 2: Only dialling information in <<CALLED-PARTY-NUMBER>>.					

ETSI

C1:   IF NOT speech(default) THEN M ELSE O

C2:   IF present THEN M ELSE X

C3:   IF parameters are significant for the network THEN M ELSE X

C4:   IF parameters are significant for end to end THEN O ELSE X

C5:   IF CLIR with option "per call" and "default override" subscribed THEN M ELSE O

C7:   IF high layer comp.(HLC) is in <<IWU-TO-IWU>> THEN M ELSE X

C8:   IF ISDN coded <<USER-TO-USER>> info THEN O ELSE X

C10:   IF NOT mapped to <<FACILITY>> THEN M ELSE O

5.2.4.2.12   CISS-REGISTER - REGISTER

	Message in DECT air interface	Message in ISDN network			
Item no	CISS-REGISTER	REGISTER	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	facility	5.2.5.1.8	O	
6	keypad	facility		I	
7	feature activate	facility		I	

5.2.4.2.13   CISS-RELEASE-COM - CISS-RELEASE

	Message in DECT air interface	Message in ISDN network			
Item no	CISS-RELEASE-COM	CISS-RELEASE	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	release reason	cause	5.2.5.1.17	O	
5	facility	facility	5.2.5.1.8	O	
7	keypad	facility		I	
8	feature activate	facility		I	

5.2.4.2.14   FACILITYciss - FACILITYciss

	Message in DECT air interface	Message in ISDN network			
Item no	FACILITYciss	FACILITYciss	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	facility	5.2.5.1.8	M	
5	display	----		X	
6	keypad	facility		I	
7	feature activate	facility		I	
8	feature indicate	----		X	
9	IWU to IWU	calling party number	5.2.5.1.11	C1	
		calling party subaddr.	5.2.5.1.11	C2	

C1:   IF present and MSN THEN M ELSE O

C2:   IF present and SUB THEN M ELSE O

5.2.4.2.15   FACILITYcrss - FACILITYcrss

Item no	Message in DECT air interface	Message in ISDN network			
	FACILITYcrss	FACILITYcrss	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	
4	facility	facility	5.2.5.1.8	M	
6	keypad	facility		I	
7	feature activate	facility		I	

5.2.4.2.16   HOLD - HOLD

Item no	Message in DECT air interface	Message in ISDN network			
	HOLD	HOLD	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	

5.2.4.2.17   RETRIEVE - RETRIEVE

Item no	Message in DECT air interface	Message in ISDN network			
	RETRIEVE	RETRIEVE	Reference	Map status	Note
1	protocol discriminator	protocol discriminator	5.2.6.25	M	
2	transaction identifier	call reference	5.2.6.34	M	
3	message type	message type	5.2.6.14	M	

5.2.5   Information element mappings

The fields which are in the destination information element, are not always in the right order.

5.2.5.1   ISDN to DECT and DECT to ISDN

5.2.5.1.1   Basic-service - bearer-capability

DECT to ISDN:

-    if the <<BASIC-SERVICE>> information element contains "Default set-up attributes" then the connection type for "speech" shall be used in the <<BEARER-CAPABILITY>> information element.

ISDN to DECT:

-    if the <<BEARER-CAPABILITY>> information element is the same as connection type for "speech" then the "Default set-up attributes" in <<BASIC-SERVICE>> shall be used in DECT. If the <<BEARER-CAPABILITY>> information element is the same as connection type for "3,1 kHz audio" and the <<PROGRESS-INDICATOR>> element indicates "not ISDN originated", then the "Default set-up attributes" in <<BASIC-SERVICE>> may be used in DECT.

5.2.5.1.2   Calling-party-number - Calling-party-number

Item no	info elem in DECT air interface calling party number	info elem in ISDN network calling party number	Reference	Map status	Note
1	ID for calling party number	info element ID	5.2.6.6	M	
2	length of contents	length of calling party number contents	5.2.6.11	M	
3	number type	type of number	5.2.6.19	M	
4	numbering plan identification	numbering plan identification	5.2.6.20	M	
5	presentation indicator	presentation indicator	5.2.6.23	M	
6	screening indicator	screening indicator	5.2.6.29	M	
7	calling party address (DECT char)	number digits (IA5 char)		M	(note)
NOTE: Only the IA5 characters in DECT char shall be mapped into IA5 char.					

5.2.5.1.3   Called party number - Called party number

Item no	info elem in DECT air interface called party number	info elem in ISDN network called party number	Reference	Map status	Note
1	ID for called party number	info element ID	5.2.6.6	M	
2	length of contents	length of called party number contents	5.2.6.11	M	
3	number type	type of number	5.2.6.19	M	
4	numbering plan identification	numbering plan identification	5.2.6.20	M	
5	called party address (DECT char)	number digits (IA5 char)		M	(note)
NOTE: Only the IA5 characters in DECT char shall be mapped into IA5 char.					

5.2.5.1.4   Called-party-subaddress - Called-party-subaddress

Item no	info elem in DECT air interface called party subaddress	info elem in ISDN network called party subaddress	Reference	Map status	Note
1	ID for called party subaddress	info element ID	5.2.6.6	M	
2	length of contents	length of called party subaddress contents	5.2.6.11	M	
3	subaddress type	type of subaddress	5.2.6.32	M	
4	odd/even	odd/even indicator	5.2.6.21	M	
5	called party subaddress	number digits		M	

5.2.5.1.5   Display - Display

Item no	info elem in DECT air interface multi display	info elem in ISDN network display	Reference	Map status	Note
1	ID for multi display	info element ID	5.2.6.6	M	
2	length of contents	length of display contents	5.2.6.11	M	
3	display info (DECT char)	display info (IA5 char)		M	(note)
NOTE: Only the IA5 characters in DECT char shall be mapped into IA5 char.					

5.2.5.1.6   End-to-end-compatibility - Bearer-capability

Item no	info elem in DECT air interface	info elem in ISDN network	Reference	Map status	Note
	End to end comp	bearer capability			
1	ID for End-to-end-comp	info element ID	5.2.6.6	M	
2	length of contents	length of bearer capability	5.2.6.11	M	
3	<<IWU-ATTRIB>>	coding standard		M	(note)
4	<<IWU-ATTRIB>>	info transfer capability		M	(note)
7	<<IWU-ATTRIB>>	transfer mode		M	(note)
8	<<IWU-ATTRIB>>	info transfer rate (octet 4)		M	(note)
9	<<IWU-ATTRIB>>	rate multiplier (octet 4.1)		I	(note)
10	<<IWU-ATTRIB>>	user info layer 1 prot.		M	(note)
11	sync./async.	sync./async.	5.2.6.33	M	
12	negotiation	negotiation	5.2.6.16	M	
13	user rate	user rate	5.2.6.37	M	
14	intermediate rate	intermediate rate	5.2.6.9	M	
15	NIC on Tx	NIC on Tx	5.2.6.18	M	
16	NIC on Rx	NIC on Rx	5.2.6.17	M	
17	flow control on Tx	flow control on Tx	5.2.6.5	M	
18	flow control on Rx	flow control on Rx	5.2.6.4	M	
19	----	rate adop. hdr/no hdr		I	
20	----	multi frame support		I	
21	----	mode of operation		I	
22	----	LLI negotiation		I	
23	----	assignor/assignee		I	
24	----	in-band/out-band neg.		I	
25	number of stop bits	number of stop bits	5.2.6.31	M	
26	number of data bits	number of data bits	5.2.6.2	M	
27	parity information	parity information	5.2.6.22	M	
28	duplex mode	duplex mode	5.2.6.3	M	
29	modem type	modem type	5.2.6.15	M	
30	<<IWU-ATTRIB>>	user info layer 2 prot.		M	(note)
31	<<IWU-ATTRIB>>	user info layer 3 prot.		M	(note)
NOTE:	These fields are mapped from <<BEARER-CAPABILITY>> to <<IWU-ATTRIBUTES>>.				

5.2.5.1.7   End-to-end-compatibility - Lower-Layer-compatibility

Item no	info elem in DECT air interface	info elem in ISDN network	Reference	Map status	Note
	End to end comp	lower layer compatibility			
1	ID for End-to-end-comp	info element ID	5.2.6.6	M	
2	length of contents	length of bearer lower layer compatibility	5.2.6.11	M	
3	sync./async.	sync./async.	5.2.6.33	M	
4	negotiation	negotiation	5.2.6.16	M	
5	user rate	user rate	5.2.6.37	M	
6	intermediate rate	intermediate rate	5.2.6.9	M	
7	NIC on Tx	NIC on Tx	5.2.6.18	M	
8	NIC on Rx	NIC on Rx	5.2.6.17	M	
9	flow control on Tx	flow control on Tx	5.2.6.5	M	
10	flow control on Rx	flow control on Rx	5.2.6.4	M	
11	number of stop bits	number of stop bits	5.2.6.31	M	
12	number of data bits	number of data bits	5.2.6.2	M	
13	parity information	parity information	5.2.6.22	M	
14	duplex mode	duplex mode	5.2.6.3	M	
15	modem type	modem type	5.2.6.15	M	

5.2.5.1.8   Facility - Facility

	info elem in DECT air interface	info elem in ISDN network			
Item no	**facility**	**facility**	**Reference**	**Map status**	**Note**
1	ID for facility	info element ID	5.2.6.6	M	
2	length of contents	length of facility contents	5.2.6.11	M	
3	service discriminator	protocol profile	5.2.6.30	M	
4	component(s)	component(s)		M	(note)
NOTE:	The DECT shall have the same coding of component(s) as defined in the relevant ISDN supplementary service standards and as in the general coding description of ISDN EN 300 196-1 [42].				

5.2.5.1.9   IWU-attributes - Bearer-capability

	info elem in DECT air interface	info elem in ISDN network			
Item no	**IWU attributes**	**bearer capability**	**Reference**	**Map status**	**Note**
1	ID for IWU attributes	info element ID	5.2.6.6	M	
2	length of contents	length of bearer capability	5.2.6.11	M	
3	coding standard	coding standard	5.2.6.1	M	
4	info transfer capability	info transfer capability	5.2.6.7	M	
5	negotiation indicator	----		X	(note 2)
6	external connection type	----		X	(note 5)
7	transfer mode	transfer mode	5.2.6.35	M	
8	info transfer rate (octet 5)	info transfer rate (octet 4)	5.2.6.8	M	
9	unit rate (octet 5a)	info transfer rate (octet 4)		I	(note 1)
10	rate multiplier (octet 5a)	rate multiplier (octet 4.1)		I	(note 1)
11	structure	----		X	
12	configuration	----		X	
13	establishment	----		X	
14	symmetry	----		X	(note 3)
15	info transfer rate (octet 5c)	----		X	(note 3)
16	unit rate (octet 5d)	----		I	(notes 1 and 3)
17	rate multiplier (octet 5d)	----		I	(notes 1and 3)
18	protocol ID coding	protocol ID coding	5.2.6.26	M	
19	user protocol ID	user info layer 1 prot.	5.2.6.36	M	
20	<<END-TO-END>>	sync./async.		M	(note 4)
21	<<END-TO-END>>	negotiation		M	(note 4)
22	<<END-TO-END>>	user rate		M	(note 4)
23	<<END-TO-END>>	intermediate rate		M	(note 4)
24	<<END-TO-END>>	NIC on Tx		M	(note 4)
25	<<END-TO-END>>	NIC on Rx		M	(note 4)
26	<<END-TO-END>>	flow control on Tx		M	(note 4)
27	<<END-TO-END>>	flow control on Rx		M	(note 4)
28	----	rate adop. hdr/no hdr		I	
29	----	multi frame support		I	
30	----	mode of operation		I	
31	----	LLI negotiation		I	
32	----	assignor/assignee		I	
33	----	in-band/out-band neg.		I	
34	<<END-TO-END>>	number of stop bits		M	(note 4)

ETSI

| Item no | info elem in DECT air interface | info elem in ISDN network | Reference | Map status | Note |
	IWU attributes	bearer capability			
35	<<END-TO-END>>	number of data bits		M	(note 4)
36	<<END-TO-END>>	parity information		M	(note 4)
37	<<END-TO-END>>	duplex mode		M	(note 4)
38	<<END-TO-END>>	modem type		M	(note 4)
39	L3 protocol ID	user info layer 3 prot. (octet 7)	5.2.6.13	M	
40	L2 protocol ID	user info layer 2 prot. (octet 6)	5.2.6.12	M	
NOTE 1: Only calls which result in a rate of 64 kbit/s can be mapped.					
NOTE 2: When mapping <<BEARER-CAPABILITY>> to <<IWU-ATTRIBUTES>>, this field should be set to "Negotiation not possible". When mapping <<IWU-ATTRIBUTES>> TO << BEARER-CAPABILITY>>, this field should be ignored.					
NOTE 3: Only calls with a symmetric transfer rate can be mapped.					
NOTE 4: These fields are mapped from <<BEARER-CAPABILITY>> to <<END-TO-END-COMPATIBILITY>>.					
NOTE 5: When mapping <<BEARER-CAPABILITY>> to <<IWU-ATTRIBUTES>>, this field should be set to "Not applicable". When mapping <<IWU-ATTRIBUTES>> TO << BEARER-CAPABILITY>>, this field should be ignored.					

5.2.5.1.10 IWU-attributes - Lower-layer-compatibility

| Item no | info elem in DECT air interface | info elem in ISDN network | Reference | Map status | Note |
	IWU attributes	lower layer compatibility			
1	ID for IWU attributes	info element ID	5.2.6.6	M	
2	length of contents	length of lower-layer capability	5.2.6.11	M	
3	coding standard	coding standard	5.2.6.1	M	
4	info transfer capability	info transfer capability	5.2.6.7	M	
5a	negotiation indicator	----		X	(note 4)
5b	----	negotiation indicator		X	(note 2)
6	external connection type	----		X	(note 4)
7	transfer mode	transfer mode	5.2.6.35	M	
8	info transfer rate (octet 5)	info transfer rate (octet 4)	5.2.6.8	M	
9	unit rate (octet 5a)	info transfer rate (octet 4)		I	(note 1)
10	rate multiplier (octet 5a)	rate multiplier (octet 4.1)		I	(note 1)
11	structure	----		X	
12	configuration	----		X	
13	establishment	----		X	
14	symmetry	----		X	(note 3)
15	info transfer rate (octet 5c)	----		X	(note 3)
16	unit rate (octet 5d)	----		I	(note 3)
17	rate multiplier (octet 5d)	----		I	(note 3)
18	protocol ID coding	protocol ID coding	5.2.6.26	M	
19	user protocol ID	user info layer 1 prot.	5.2.6.36	M	
20	L3 protocol ID	user info layer 3 prot.	5.2.6.13	M	
21	L2 protocol ID	user info layer 2 prot.	5.2.6.12	M	
NOTE 1: Only calls which result in a rate of 64 kbit/s can be mapped.					
NOTE 2: This optional octet containing this field should not be used in the <<LOWER-LAYER-COMPATIBILITY>> element.					
NOTE 3: Only calls with a symmetric transfer rate can be mapped.					
NOTE 4: When mapping this field should be ignored.					

5.2.5.1.11   IWU-to-IWU - ISDN-information-element

Item no	info elem in DECT air interface IWU to IWU	info elem in ISDN network	Reference	Map status	Note
1	ID for IWU to IWU	----		X	
2	length of contents	----		X	
3	send/reject	----		X	set to send
4	protocol discriminator	----		X	(note 1)
5	IWU to IWU info	ISDN information element		M	(note 2)
NOTE 1:	The protocol discriminator shall be "001001"B which means EN 300 403-1 [39] information element(s).				
NOTE 2:	The whole ISDN information element shall be mapped into <IWU to IWU info> without changes in ISDN to DECT direction. The <IWU to IWU info> shall contain the whole ISDN information element. The ISDN information elements in <IWU to IWU info.> shall only be information elements which are allowed to be sent in the ISDN message the DECT message is mapped to.				

5.2.5.1.12   IWU-to-IWU - ISDN-message

Item no	info elem in DECT air interface IWU to IWU	message in ISDN network	Reference	Map status	Note
1	ID for IWU to IWU	----		X	
2	length of contents	----		X	
3	send/reject	----		X	set to send
4	protocol discriminator	----		X	(note 1)
5	IWU to IWU info	ISDN message		M	(note 2)
NOTE 1:	The protocol discriminator shall be "001010"B which means "ITU-T Recommendation Q.931 [66]" partial message.				
NOTE 2:	The ISDN message, excluding the protocol discriminator and call reference, shall be mapped into <IWU to IWU info> without changes in direction ISDN to DECT. The <IWU to IWU info> shall contain the ISDN message, excluding the protocol discriminator and call reference, in direction DECT to ISDN.				

5.2.5.1.13   Keypad - Called party number

Item no	info elem in DECT air interface multi keypad	info elem in ISDN network Called party number	Reference	Map status	Note
1	ID for multi keypad	info element ID	5.2.6.6	M	
2	length of contents	length of called party number contents	5.2.6.11	M	
3	----	type of number		M	(note 2)
4	----	numbering plan identification		M	(note 2)
5	keypad info (DECT char)	keypad info (IA5 char)		M	(note 1)
NOTE 1:	Only the IA5 characters in DECT char shall be mapped into IA5 char.				
NOTE 2:	This field should be set to "unknown" codepoint.				

5.2.5.1.14   Keypad - Keypad

Item no	info elem in DECT air interface multi keypad	info elem in ISDN network keypad facility	Reference	Map status	Note
1	ID for multi keypad	info element ID	5.2.6.6	M	
2	length of contents	length of keypad contents	5.2.6.11	M	
3	keypad info (DECT char)	keypad info (IA5 char)		M	
NOTE:	Only the IA5 characters in DECT char shall be mapped into IA5 char.				

5.2.5.1.15   Progress-indicator - Progress-indicator

Item no	info elem in DECT air interface	info elem in ISDN network			
	progress indicator	progress indicator	Reference	Map status	Note
1	ID for progress indicator	info element ID	5.2.6.6	M	
2	length of contents	length of progress indicator contents	5.2.6.11	M	
3	coding standard	coding standard	5.2.6.1	M	
4	location	location	5.2.6.10	M	
5	progress description	progress description	5.2.6.24	M	

5.2.5.1.16   Reject-reason - Cause

Item no	info elem in DECT air interface	info elem in ISDN network			
	reject reason	cause	Reference	Map status	Note
1	ID for reject reason	info element ID	5.2.6.6	M	
2	length of contents	length of cause contents	5.2.6.11	M	
3	----	coding standard		I	(note)
4	----	location		I	(note)
4	----	recommendation		I	(note)
4	reject reason code	cause value	5.2.6.27	M	
5	----	diagnostic		I	
NOTE: The DFS shall include the appropriate values as defined by ISDN standards.					

5.2.5.1.17   Release-reason - Cause

Item no	info elem in DECT air interface	info elem in ISDN network			
	release reason	cause	Reference	Map status	Note
1	ID for release reason	info element ID	5.2.6.6	M	
2	----	length of cause contents		X	
3	----	coding standard		I	(note)
4	----	location		I	(note)
5	----	recommendation		I	(note)
6	release reason code	cause value	5.2.6.28	M	
7	----	diagnostic		I	
NOTE: The DFS shall include the appropriate values as defined by ISDN standards.					

5.2.5.1.18   Sending-complete - Sending-complete

Item no	info elem in DECT air interface	info elem in ISDN network			
	sending complete	sending complete	Reference	Map status	Note
1	"10100001"B	"10100001"B		M	

5.2.5.1.19   Signal

Item no	info elem in DECT air interface	info elem in ISDN network			
	signal	---	Reference	Map status	Note
1	"0100 0000"B to "0100 1000"B				

5.2.6   Information element coding mappings

5.2.6.1   coding-standard - coding-standard

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface	in ISDN network			
	coding standard	coding standard	Reference	Map status	Note
1	"00"B	"00"B		M	ITU-T standard
2	"01"B	"01"B		C1	other international standard
3	"10"B	"10"B		C1	national standard
4	"11"B	"11"B		C1	standard specific

C1:   IF <<PROGRESS_IND>> THEN M ELSE I

5.2.6.2   data bits coding - number of data bits

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface	in ISDN network			
	data bits coding	number of data bits	Reference	Map status	Note
1	"00"B	"00"B		X	not used
2	"01"B	"01"B		M	5 bits
3	"10"B	"10"B		M	7 bits
4	"11"B	"11"B		M	8 bits

5.2.6.3   duplex mode - duplex mode

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface	in ISDN network			
	duplex mode	duplex mode	Reference	Map status	Note
1	"0"B	"0"B		M	half duplex
2	"1"B	"1"B		M	full duplex

5.2.6.4   Flow control on reception - Flow control on reception

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface Flow control on reception	in ISDN network Flow control on reception	Reference	Map status	Note
1	"0"B	"0"B		M	cannot accept
2	"1"B	"1"B		M	can accept

5.2.6.5   Flow control on transmission - Flow control on transmission

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface Flow control on transmission	in ISDN network Flow control on transmission	Reference	Map status	Note
1	"0"B	"0"B		M	not required
2	"1"B	"1"B		M	required

5.2.6.6   id-for-info-element - info-element-id

The element identifier mapping is depending of which message it is sent in. The table which refers to this clause shows which element identifiers shall be mapped with each other.

5.2.6.7   information-transfer-capability - information-transfer-capability

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface information transfer capability	in ISDN network information transfer capability	Reference	Map status	Note
1	"00000"B	"00000"B		M	speech
2	"01000"B	"01000"B		C1	unrestricted digital information
3	"10000"B	"10000"B		C2	3,1 kHz audio
4	"10001"B	"10001"B		C1	unrestricted digital information with tones and announcements
5	"11000"B	"11000"B		C1	video
NOTE: If the capability is not implemented then the connection should be released.					

C1:   IF capability is implemented THEN M ELSE X

C2:   ISDN to DECT:

IF capability is implemented and PI THEN M ELSE X

DECT to ISDN:

IF capability is implemented THEN M ELSE X

5.2.6.8 information-transfer-rate - information-transfer-rate

DECT to ISDN:

Item no	in DECT air interface information transfer rate	in ISDN network information transfer rate	Reference	Map status	Note
1	"00000"B	"00000"B		I	pkt mode call
2	"01010"B	"10000"B		I	16 kbit/s to 64 kbit/s
3	"01011"B	"10000"B		M	32 kbit/s to 64 kbit/s
4	"10000"B	"10000"B		M	64 kbit/s
5	"10001"B	"10001"B		I	2 x 64 kbit/s
6	"10011"B	"10011"B		I	384 kbit/s
7	"11110"B	----		I	unspecified
8	"11111"B	"11000"B		I	defined by rate multiplier
NOTE:	If the rate is not implemented then the connection should be released.				

ISDN to DECT:

Item no	in ISDN network information transfer rate	in DECT air interface information transfer rate	Reference	Map status	Note
1	"00000"B	"00000"B		I	pack mode call
2	"10000"B	"01010"B		I	64 kbit/s to 16 kbit/s
3	"10000"B	"01011"B		O.1	64 kbit/s to 32 kbit/s
4	"10000"B	"10000"B		O.1	64 kbit/s
5	"10001"B	"10001"B		I	2 x 64 kbit/s
6	"10011"B	"10011"B		I	384 kbit/s
7	"10101"B	"11111"B		I	1 536 kbit/s to rate multiplier
8	"10111"B	"11111"B		I	1 920 kbit/s to rate multiplier
9	"11000"	"11111"B		I	multi-rate
NOTE:	If the rate is not implemented then the connection should be released.				

O.1: At least one of the mappings shall be applied. The rate is depending on the service.

5.2.6.9 intermediate rate - intermediate rate

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface intermediate rate	in ISDN network intermediate rate	Reference	Map status	Note
1	"00"B	"00"B		X	not used
2	"01"B	"01"B		M	8 kbit/s
3	"10"B	"10"B		M	16 kbit/s
4	"11"B	"11"B		M	32 kbit/s

5.2.6.10   location - location

ISDN to DECT and DECT to ISDN:

Item no	in ISDN network location	in DECT air interface location	Reference	Map status	Note
1	"0000"B	"0000"B		M	user
2	"0001"B	"0001"B		M	private network service local user
3	"0010"B	"0010"B		M	public network service local user
4	"0100"B	"0100"B		M	public network service remote user
5	"0101"B	"0101"B		M	private network service remote user
6	"0111"B	"0111"B		M	international network
7	"1010"B	"1010"B		M	network beyond interworking point
NOTE:	Both directions, for direct mapping ISDN to DECT and DECT to ISDN.				

5.2.6.11   length-of-contents - length-of-contents

The DFS shall calculate the length by itself. Therefore no real translation is made.

5.2.6.12   L2-protocol-identifier - user-information-layer-2-protocol

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface L2 protocol identifier	in ISDN network user info layer 2 protocol	Reference	Map status	Note
1	"00000"B	"10000"B		M	user specific
2	"00001"B	"00001"B		M	basic mode ISO publicat. 1745
3	"00010"B	"00010"B		M	EN 300 402-2 [38]
4	"00110"B	"00110"B		M	X.25: link layer
5	"00111"B	"00111"B		M	X.25: multilink
6	"01000"B	"01000"B		M	extended LAP.B
7	----	"01001"B		X	HDLC ARM
8	----	"01010"B		X	HDLC NRM
9	----	"01011"B		X	HDLC ABM
7	"01100"B	"01100"B		M	ISO 8802/2
8	----	"01101"B		X	X.75
	----	"01110"B		X	Q.922
	----	"01111"B		X	Q.922 Core
	----	"10001"B		X	ISO 7776
8	"10001"B	----		X	ISO 8802/x (no LLC impl.)
9	"10010"B	----		X	GSM 04.06
10	"10110"B	----		X	V.42 (LAP.M)
NOTE:	The usage in <<BEARER-CAPABILITY>> and <<LOWER-LAYER-COMPATIBILITY>> shall be according to EN 300 403-1 [39].				

5.2.6.13   L3-protocol-identifier - user-information-layer-3-protocol

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface L3 protocol identifier	in ISDN network user information layer 3 protocol	Reference	Map status	Note
1	"00000"B	----		X	user specific
2	"00010"B	"00010"B		M	EN 300 403-1 [39]
3	"00110"B	"00110"B		M	X.25: pkt. layer.
4	"00111"B	----		X	ISO 8208
5	"01000"B	----		X	ISO 8348
6	"01001"B	----		X	ISO 8473
7	"01010"B	----		X	T.70
8	"10010"B	----		X	GSM 04.08
NOTE:	The usage in <<BEARER-CAPABILITY>> and <<LOWER-LAYER-COMPATIBILITY>> shall be according to EN 300 403-1 [39].				

5.2.6.14   message-type - message-type

The messages mapping is dependent of which procedure and state the DFS is in. The table which refers to here shows which message types shall be mapped with each other.

5.2.6.15   modem type - modem type

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface modem type	in ISDN network modem type	Reference	Map status	Note
1	"000001"B	"010001"B		M	V.21
2	"000010"B	"010010"B		M	V.22
3	"000011"B	"010011"B		M	V.22 bis
4	"000100"B	"010100"B		M	V.23
5	"000101"B	"010101"B		M	V.26
6	"000110"B	"010110"B		M	V.26 bis
7	"000111"B	"010111"B		M	V.26 ter
8	"001000"B	"011000"B		M	V.27
9	"001001"B	"011001"B		M	V.27 bis
10	"001010"B	"011010"B		M	V.27 ter
11	"001011"B	"011011"B		M	V.29
12	"001100"B	"011000"B		M	V.32
13	"001101"B	----		X	V.35

5.2.6.16   negotiation - negotiation

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface negotiation	in ISDN network negotiation	Reference	Map status	Note
1	"0"B	"0"B		M	neg. impossible
2	"1"B	"1"B		M	neg. possible

5.2.6.17   Network Independent Clock (NIC) on reception - NIC on reception

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface network independent clock on reception	in ISDN network network independent clock on reception	Reference	Map status	Note
1	"0"B	"0"B		M	cannot accept
2	"1"B	"1"B		M	can accept

5.2.6.18   Network Independent Clock (NIC) on transmission - NIC on transmission

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface network independent clock on transmission	in ISDN network network independent clock on transmission	Reference	Map status	Note
1	"0"B	"0"B		M	not required
2	"1"B	"1"B		M	required

5.2.6.19   number-type - type-of-number

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface number type	in ISDN network type of number	Reference	Map status	Note
1	"000"B	"000"B		M	unknown
2	"001"B	"001"B		M	internal number
3	"010"B	"010"B		M	national number
4	"011"B	"011"B		M	network spec.numer
5	"100"B	"100"B		M	subscr.number
6	"110"B	"110"B		M	abbreviation number
7	"111"B	"111"B		M	reserved for extens.

5.2.6.20   numbering-plan - numbering-plan

DECT to ISDN:

Item no	in DECT air interface numbering plan identification	in ISDN network numbering plan identification	Reference	Map status	Note
1	"0000"B	"0000"B		M	unknown
2	"0001"B	"0001"B		M	E.164/E.163
3	"0011"B	"0011"B		M	X.121 (data)
4	"1000"B	"1000"B		M	National standard plan
5	"1001"B	"1001"B		M	private plan
6	"1111"B	"1111"B		M	reserved for extens.

ISDN to DECT:

Item no	in ISDN network numbering plan identification	in DECT air interface numbering plan identification	Reference	Map status	Note
1	"0000"B	"0000"B		M	unknown
2	"0001"B	"0001"B		M	E.164/E.163
3	"0011"B	"0011"B		M	X.121 (data)
4	"0100"B	"0000"B		M	F.69 (Telex)
5	"1000"B	"1000"B		M	National standard plan
6	"1001"B	"1001"B		M	private plan
7	"1111"B	"1111"B		M	reserved for extens.

C1:   IF NOT mapped to optional option THEN M ELSE X

5.2.6.21   odd/even - odd/even-indicator

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface odd/even	in ISDN network odd/even indicator	Reference	Map status	Note
1	"0"B	"0"B		M	Even number
2	"1"B	"1"B		M	Odd number

5.2.6.22   parity - parity

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface parity	in ISDN network parity	Reference	Map status	Note
1	"000"B	"000"B		M	odd
3	"010"B	"010"B		M	even
4	"011"B	"011"B		M	none
5	"100"B	"100"B		M	forced to 0
6	"101"B	"101"B		M	forced to 1

5.2.6.23   presentation-indicator - presentation-indicator

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface presentation indicator	in ISDN network presentation indicator	Reference	Map status	Note
1	"00"B	"00"B		M	present. allowed
2	"01"B	"01"B		M	present. restrict.
3	"10"B	"10"B		M	number not availab.
4	"11"B	"11"B		-	(note)
NOTE: "reserved" code should not appear in either protocol.					

5.2.6.24 progress-description - progress-description

ISDN to DECT:

Item no	in ISDN network progress description	in DECT air interface progress description	Reference	Map status	Note
1	"0000001"B	"0000001"B		M	not end-to-end ISDN
2	"0000010"B	"0000010"B		M	dest. non-ISDN
3	"0000011"B	"0000011"B		M	orig. non-ISDN
4	"0000100"B	"0000100"B		M	return to ISDN
5	"0000101"B	"0000101"B		M	service change has occurred
6	"0001000"B	"0001000"B		M	in-band or appr. pattern availab.
NOTE:	This coding mapping goes only in direction ISDN to DPS.				

5.2.6.25 protocol-discriminator - protocol-discriminator

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface protocol discriminator	in ISDN network protocol discriminator	Reference	Map status	Note
1	"0011"B	"00001000"B		M	CC, CRSS
2	"0100"B	"00001000"B		M	CISS
3	"0101"B	----		I	MM
4	"0110"B	----		I	CLMS
5	"0111"B	----		I	COMS
6	"1???"B			-	unknown

5.2.6.26 protocol-identifier-coding - protocol-identifier-coding

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface protocol identifier coding	in ISDN network protocol identifier coding	Reference	Map status	Note
1	"00"B	"01"B		M	user prot.ID (1)
2	"11"B	"11"B		M	L3 prot.ID (3)
3	"10"B	"10"B		M	L2 prot.ID (2)

5.2.6.27 reject-reason-code - cause-value

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface reject reason code	in ISDN network cause value	Reference	Map status	Note
1	"00100000"B	"1111111"B		M	20-incom.serv.

5.2.6.28 release-reason-code - cause-value

DECT to ISDN:

Item no	in DECT air interface release reason code	in ISDN network cause value	Reference	Map status	Note (H = hex)
1	"00000000"B	"0010000"B		M	00 to 16-norm.
2	"00000001"B thru "00000101"B	"1111111"B		M	01H thru 05H to 127 - interworking unspecified
3	"00000110"B	"1001111"B		M	06H to 79-not implemented
4	"00000111"B thru "00001001"B	"1111111"B		M	07H thru 09H to 127 - interworking unspecified
5	"00001101"B thru "00001110"B	"1111111"B		M	0DH thru 0EH to 127 - interworking unspecified
6	"00001111"B	"0011111"B		M	0FH to 31-unknown to norm. unspecified
7	"00010000"B	"0011011"B		M	10H to 18 - user detach. to user not responding
8	"00010001"B	"0000011"B		M	11H to 3 not-in-range to no-route-to-destination
9	"00010010"B	"0000001"B		M	12H to 1 user-unknown to unallocated-number
10	"00010011"B	"1111111"B		M	13H to 127 - interworking unspecified
11	"00010100"B	"0010001"B		M	14H to 17 user-busy
12	"00010101"B	"0010101"B		M	15H to 21-reject.
13	"00100000"B to "00100011"B	"1111111"B		M	20H thru 23H to 127 - interworking unspecified
14	"00110001"B	"1111111"B		M	31H to 127 - interworking unspecified
15	"00110010"B	"0101111"B		M	32H to 47-insufficient resources - resources unavailab
16	"00110011"B to "00110100"B	"1111111"B		M	33H thru 34H to 127 - interworking unspecified

ISDN to DECT:

	in ISDN network	in DECT air interface			
Item no	cause value	release reason code	Reference	Map status	Note
1	"0010000"B	"00000000"B		M	16 to 00-normal
2	"1001111"B	"00000110"B		M	79 to 06 not implemented
3	"0011111"B	"00001111"B		M	31 to 0F-normal unspecified to unknown
4	"0011011"B	"00010000"B		M	10 to 18 - user not responding to user detach.
5	"0000011"B	"00010001"B		M	3 to 11 not-in-range to no-route-to-destination
6	"0000001"B	"00010010"B		M	1 to 12 unallocated-number to user-unknown
7	"0010001"B	"00010100"B		M	17 to 14 user-busy
8	"0010101"B	"00010101"B		M	21 to 21-reject.
9	"0101111"B	"00110010"B		M	47 to 32 - insuff.resources - resources unavailab
NOTE:	All other ISDN cause values are mapped in an <<IWU-TO-IWU>> information element.				

5.2.6.29 screening-indicator - screening-indicator

DECT to ISDN and ISDN to DECT:

	in DECT air interface	in ISDN network			
Item no	screening indicator	screening indicator	Reference	Map status	Note
1	"00"B	"00"B		M	U-prov.; not scr.
2	"01"B	"01"B		M	U-prov.; ver and passed
3	"10"B	"10"B		M	U-prov.; ver and failed
4	"11"B	"11"B		M	network prov.

5.2.6.30 service-discriminator - service-discriminator

DECT to ISDN and ISDN to DECT:

	in DECT air interface	in ISDN network			
Item no	service discriminator	protocol profile	Reference	Map status	Note
1	"10001"B	"10001"B		M	

5.2.6.31   stop bits coding - number of stop bits

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface stop bits coding	in ISDN network number of stop bits	Reference	Map status	Note
1	"00"B	"00"B		X	not used
2	"01"B	"01"B		M	1 bit
3	"10"B	"10"B		M	1,5 bits
4	"11"B	"11"B		M	2 bits

5.2.6.32   subaddress-type - type-of-subaddress

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface subaddress type	in ISDN network type of subaddress	Reference	Map status	Note
1	"000"B	"000"B		M	NSAP
2	"010"B	"010"B		M	user specified

5.2.6.33   synchronous/asynchronous - synchronous/asynchronous

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface sync/async	in ISDN network sync/async	Reference	Map status	Note
1	"0"B	"0"B		M	sync.
2	"1"B	"1"B		M	async.

5.2.6.34   transaction-identifier - call-reference

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface transaction identifier	in ISDN network call reference	Reference	Map status	Note
1	0-5	0-65536		M	(notes 1 and 2)
2	6	0		M	(note 3)
NOTE 1:	The DFS should keep record of all DECT-TI and ISDN-CR which belongs to each other. On the DECT side it is done with the Endpoint Identifier and on the ISDN side it is done with the Terminal Identifier.				
NOTE 2:	The Call Reference is 1 octet for Basic rate and 2 octets for Primary rate.				
NOTE 3:	The TI value 6 is mapped to the dummy call reference value 0 and the dummy call reference 0 is mapped to TI value 6.				

5.2.6.35   transfer-mode - transfer-mode

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface transfer mode	in ISDN network transfer mode	Reference	Map status	Note
1	"00"B	"00"B		M	circuit mode
2	"10"B	"10"B		I	packet mode
3	"11"B	----		I	1 - none

5.2.6.36   user-protocol-identifier - user-information-layer-1-protocol

DECT to ISDN:

| Item no | in DECT air interface | in ISDN network | Reference | Map | Note |
	user protocol identifier	user information layer 1 protocol		status	
1	"00000"B	----		X	user specific
2	"00001"B	"00001"B		M	V.110/X.30 rate adoption
3	"00010"B	"00010"B		M	G.711 µ-law
4	"00011"B	"00011"B		M	G.711 A-law
5	"00100"B	"00010"B "00011"B "00100"B		O O I	ADPCM - µ_law ADPCM - A_law G.721 ADPCM
6	"00101"B	"00101"B		M	H.221 and H.242
7	"00110"B	----		I	H.261 video
8	"00111"B	"00111"B		M	non-standard rate adoption
9	"01000"B	"01000"B		I	V.120 rate adop.
10	"01001"B	"01001"B		M	X.31 rate adop.
11	"10000"B	----		I	
12	"10001"B	----		I	
13	"11000"B	----		I	

ISDN to DECT:

| Item no | in ISDN network | in DECT air interface | Reference | Map | Note |
	user information layer 1 protocol	user protocol identifier		status	
1	"00001"B	"00001"B		M	V.110/X.30 rate adoption
2	"00010"B	"00100"B "00010"B		O I	µ-law - ADPCM G.711 µ-law
3	"00011"B	"00100"B "00011"B		O I	A-law - ADPCM G.711 A-law
4	"00100"B	"00100"B		M	G.721 ADPCM
5	"00101"B	"00101"B		M	H.221 and H.242
6	"00111"B	"00111"B		M	non-standard rate adoption
7	"01000"B	"01000"B		I	V.120 rate adop.
8	"01001"B	"01001"B		M	X.31 rate adop.

5.2.6.37   user rate - user rate

DECT to ISDN and ISDN to DECT:

Item no	in DECT air interface user rate	in ISDN network user rate	Reference	Map status	Note
1	----	"00000"B		I	E-bits REC I.460
2	"00001"B	"00001"B		M	0,6 kbit/s
3	"00010"B	"00010"B		M	1,2 kbit/s
4	"00011"B	"00011"B		M	2,4 kbit/s
5	"00100"B	"00100"B		M	3,6 kbit/s
6	"00101"B	"00101"B		M	4,8 kbit/s
7	"00110"B	"00110"B		M	7,2 kbit/s
8	"00111"B	"00111"B		M	8,0 kbit/s
9	"01000"B	"01000"B		M	9,6 kbit/s
10	"01001"B	"01001"B		M	14,4 kbit/s
11	"01010"B	"01010"B		M	16 kbit/s
12	"01011"B	"01011"B		M	19,2 kbit/s
13	"01100"B	"01100"B		M	32 kbit/s
14	"01110"B	"01110"B		M	48 kbit/s
15	"01111"B	"01111"B		M	56 kbit/s
16	"10000"B	"10000"B		M	64 kbit/s
17	"10101"B	"10101"B		M	0,1345 kbit/s
18	"10110"B	"10110"B		M	0,1 kbit/s
19	"10111"B	"10111"B		M	0,075/1,2 kbit/s
20	"11000"B	"11000"B		M	1,2/0,075 kbit/s
21	"11001"B	"11001"B		M	0,050 kbit/s
22	"11010"B	"11010"B		M	0,075 kbit/s
23	"11011"B	"11011"B		M	0,110 kbit/s
24	"11100"B	"11100"B		M	0,150 kbit/s
25	"11101"B	"11101"B		M	0,200 kbit/s
26	"11110"B	"11110"B		M	0,300 kbit/s
27	"11111"B	"11111"B		M	12 kbit/s

5.3   ISDN Layer 2 management

Concerning DECT layer 2 management, at least the MAC Cs channel shall be supported and at least the DLC class of service A shall be supported for both connection oriented and connectionless transactions.

The following ISDN layer 2 establishment and release procedures only apply if the ISDN layer 2 link is not permanently activated.

5.3.1   ISDN layer 2 management during a connection oriented transaction

For an outgoing call, the ISDN layer 2 if not yet existing shall be established upon reception of the first DECT layer 3 message requiring mapping to an ISDN message as shown in figure 21.
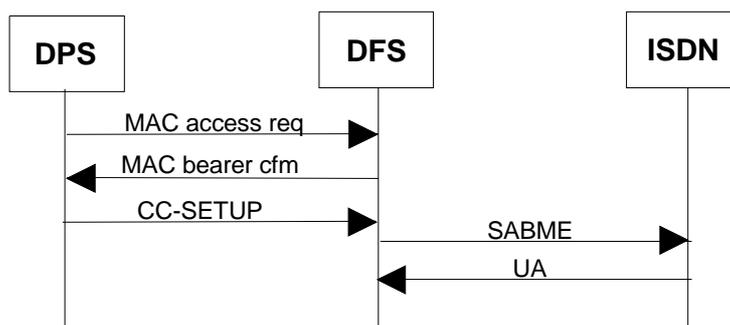

Figure 21: ISDN L2 establishment in connection oriented transaction in outgoing call

For an incoming call, the ISDN layer 2 establishment shall be initiated by the DFS upon reception of the {SETUP} from the ISDN as shown in figure 22. If more than one DPS is paged upon an incoming SETUP message each additionally responding DPS requires an additional ISDN L2 link.
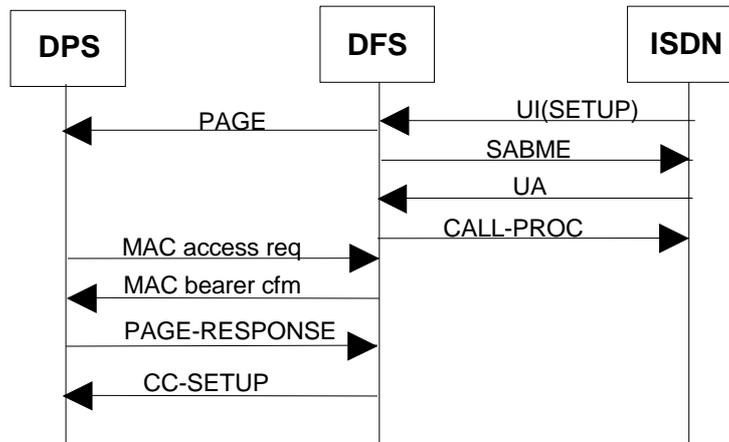

Figure 22: ISDN L2 establishment in connection oriented transaction in incoming call

The ISDN layer 2 release shall be initiated upon release of the layer 3 connection as shown in figures 23 to 27 (see clause 5.2.1.3 for the layer 3 call release procedures).
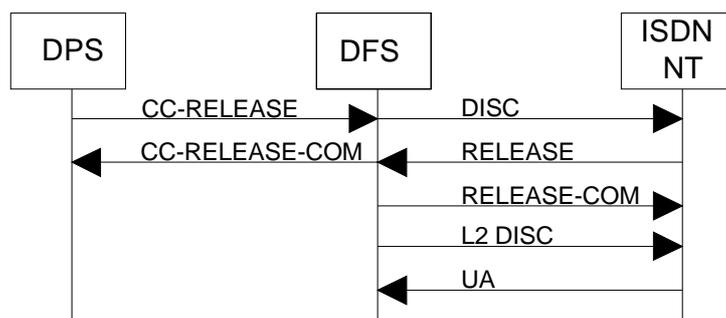
Figure 23: ISDN L2 release (normal Release initiated by the DPS)
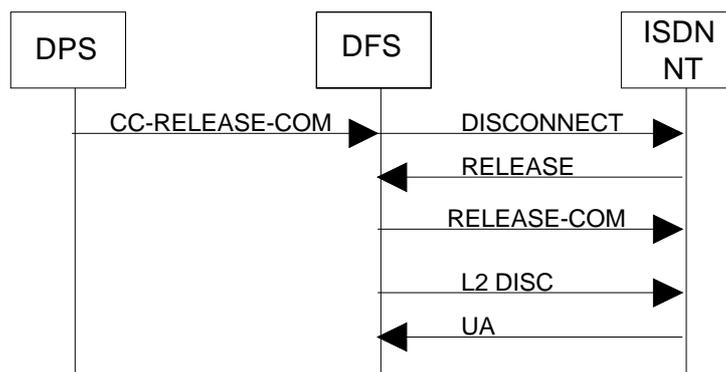
Figure 24: ISDN L2 release (abnormal call release initiated by the DPS)
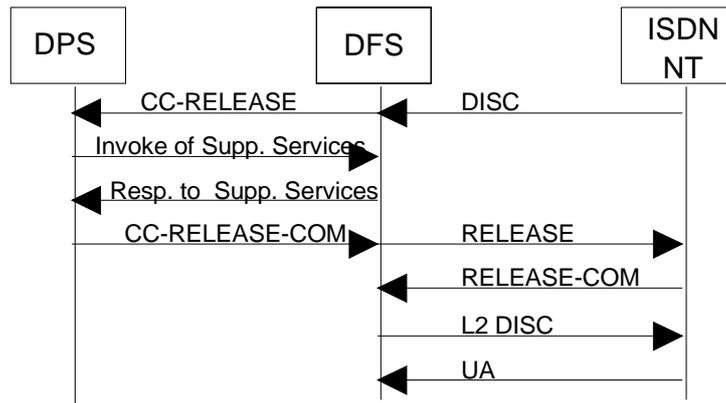
Figure 25: ISDN L2 release (where NT initiate normal call release with {DISCONNECT})
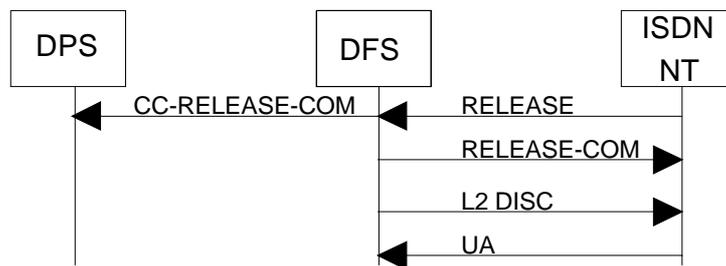
Figure 26: ISDN L2 release (where NT initiate normal call release with {RELEASE})
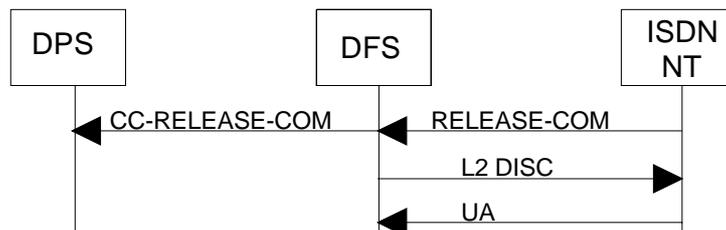
Figure 27: ISDN L2 release (Abnormal call release initiated by the NT)

5.3.2   ISDN layer 2 management during a connectionless transaction

For a connectionless transaction, ISDN layer 2 establishment shall be initiated upon reception of the first DECT layer 3 message, associated with the connectionless transaction (i.e. a DECT {FACILITY} message). ISDN layer 2 release shall be initiated upon release of the associated layer 2 DECT connection, if a single one-to-one relation exists between the DECT and the ISDN links. It is the responsibility of the DPS and DFS that links supporting more than one network layer transaction at a time are not released, if still otherwise in use.

ISDN Layer 2 connection establishment and release during a connectless transaction is shown in figure 28.
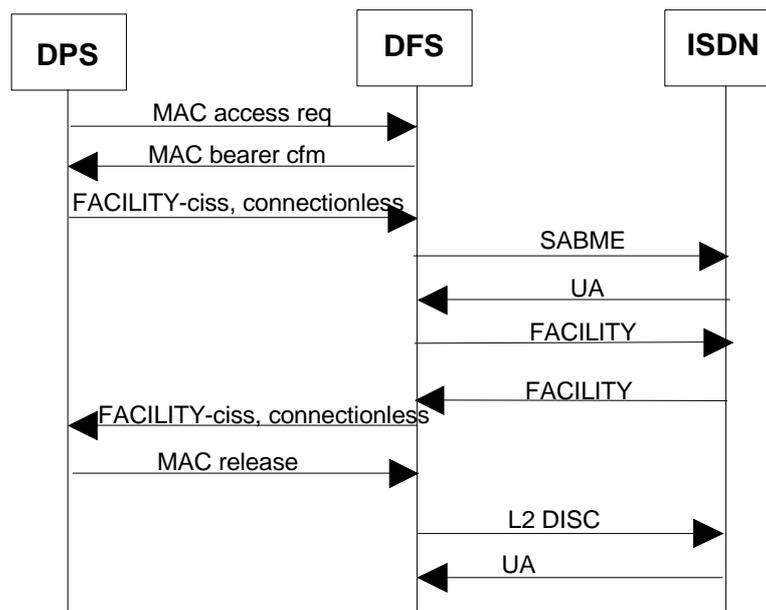
Figure 28: ISDN layer 2 management during a connectionless transaction

5.4   DFS U-Plane IWU mappings

The DECT U-Plane service shall be mapped into the ISDN B-channel and vice versa.

The connection type defines which U-plane mapping to use.

5.4.1   Service activation

The IWU's in the DFS and DPS shall have activated the DECT U-plane and related inherent U-plane services at the CI latest:

1) for an outgoing call: at conveying a CC-CONNECT from the DFS to the DPS;

2) for an incoming call: at conveying a CC-CONNECT from the DPS to the DFS;

3) for an outgoing call: after receipt of a <<PROGRESS INDICATOR>> information element with progress indicator #1 "call is not end-to-end ISDN; further call progress information may be available in-band" or progress indicator #8 "in-band information or appropriate pattern is now available";

4) at conveying a CC-RETRIEVE in either direction.

The entire DECT U-plane shall be connected to the selected B-channel and the user by the following events:

1) for an outgoing call: at the receipt of an ISDN {CONNECT} by the DFS and CC-CONNECT by the DPS;

2) for an incoming call: at the receipt of ISDN {CONNECT-ACK} by the DFS and CC-CONNECT-ACK by the DPS;

3) for an outgoing call: after the receipt of the ISDN <<PROGRESS-INDICATOR>> information element with progress indicator #1 "call is not end-to-end ISDN; further call progress information may be available in-band" or progress indicator #8 "in-band information or appropriate pattern is now available" for outgoing call;

4) for either direction: at conveying the ISDN {RETRIEVE-ACK} and the corresponding DECT {RETRIEVE-ACK} message.

It is recommended that the DFS-IWU connects the U-plane as soon as the "B" channel selection procedure has been completed.

The U-plane activation shall be co-ordinated by the DFS-IWU such that both the DECT FT and ISDN part do not cause un-necessary noise to the calling and called party.

The connection of the DECT U-plane to the ISDN U-plane shall conform to the "8 kHz structure" of the ISDN bearer services.

5.4.2   Service de-activation

The DFS-IWU shall disconnect the U-plane upon reception of a {CC-RELEASE} or {CC-RELEASE-COM} message from the DPS or upon reception of a {RELEASE} or {RELEASE-COM} message from the NT.

The DPS shall disconnect the U-plane according to the release procedures defined in EN 300 403-1 [39].

During the call hold procedure, the DFS-IWU shall disconnect the U-plane upon reception of a DECT {HOLD-ACK} message or an ISDN {HOLD-ACK} message.

During the call hold procedure, the DPS shall disconnect the U-plane upon reception of a DECT {HOLD-ACK} message.

6   Support of ISDN bearer services

The DECT fixed system shall inspect the <<BEARER-CAPABILITY>> information element in order to determine the requested bearer service. Depending on the bearer service DECT bearers shall be set up as specified in the following table. The DECT fixed system shall be transparent to the U-plane.

NOTE: The U-plane protocol may be terminated in the DPS.

Table 6: End system support of bearer services

bearer service	needed MAC bearer
speech	1 full slot unprotected minimum delay B-channel is transcoded to ADPCM with 32 kbit/s
3,1 kHz audio	1 full slot unprotected minimum delay B-channel is transcoded to ADPCM with 32 kbit/s
unrestricted digital information	1 double slot unprotected

Annex A (normative):
EN 300 175 additions/modifications

A.1   MAC layer additions/modifications (part 3)

1) Broadcast bit for ISDN.

A broadcast bit in the higher layer capabilities of the FP capability is reserved for ISDN indicating "ISDN data supported".

NOTE: "ISDN data" means the bearer service 64 kbit/s unrestricted digital information.

A.2   DLC layer additions/modifications (part 4)

A.2.1   LU7 64 kbit/s data bearer service

The 64 kbit/s data bearer service is specified in annex B.

A.3   NWL layer additions/modifications (part 5)

1) {CC-CONNECT-ACK} message in incoming call procedures;

   F-08, "CONNECT-PENDING". The {CC-CONNECT-ACK} shall not be sent by the F-CC before it has received a MNCC-CONNECT-res primitive from the IWU. When sent, the F-CC shall enter the state F-10, "ACTIVE".

The possible elements in the MNCC-CONNECT-res are the same as in MNCC-CONNECT-cfm.

2) {CC-ALERTING} message;

   The <<FACILITY>> information element is allowed to be sent in direction PT to FT in a {CC-ALERTING} message.

3) {CC-RELEASE} message;

   The <<FACILITY>> information element is allowed to be sent in direction PT to FT in a {CC-RELEASE} message.

4) {CC-RELEASE-COM} message;

   The <<FACILITY>> information element is allowed to be sent in direction PT to FT in a {CC-RELEASE-COM} message.

5) {CC-INFO} message;

   The <<FACILITY>> information element is allowed to be sent in direction FT to PT in a {CC-INFO} message.

6) Addition of <<IWU-TO-IWU>>;

   The <<IWU-TO-IWU>> information element shall be allowed in the {FACILITY}, {HOLD-REJ}, and {RETRIEVE-REJ} messages.

7) CLSS;

   the new CLSS service is specified in annex B.

8) {FACILITY} in RELEASE-PENDING state

To allow the exchange of {FACILITY} messages in the RELEASE-PENDING state F19 in both directions.

9) <<CALL-ATTRIBUTES>> information element;

The <<CALL-ATTRIBUTES>> information element has a new coding for the LU-identification field and the U-plane frame type field.

Bit 5-1 in field LU-identification: "00111" LU7

Bit 5-1 in field U-plane frame type: "00111" FU7

10) Clarification regarding the <<CALLED-PARTY-NUMBER>> information element;

a call. Dialling in <<KEYPAD>> information elements is only allowed if <CALLED-PARTY-NUMBER>> information element has not previously been sent.

11) TI;

the TI value of 6 shall be reserved to indicate connectionless transport.

12) Protocol Discriminator (PD) in <<IWU-TO-IWU>> information element;

a new protocol discriminator (PD) code shall be added to octet 3 of the <<IWU-TO-IWU>> information element. Also, a new note shall be added.

Bits **654321** **Meaning**
      001010   ITU-T Recommendation Q.931 [66] (I.451), partial message (see note).

   NOTE: The ITU-T Recommendation Q.931 [66] (I.451) partial message excludes the protocol discriminator and the call reference.

13) Repetition of information elements;

The repetition of the <<IWU-TO-IWU>>, <<FACILITY>>, <<PROGRESS-INDICATOR>>, <<IWU-ATTRIBUTES>>, <<END-TO-END-COMP>>, and <<BASIC-SERVICE>> information elements shall be allowed without using a <<REPEAT-INDICATOR>>.

14) User protocol ID

The code point ("00101"B) in the "user protocol ID" field (octet 6) of the DECT <<IWU-ATTRIBUTES>> element shall be renamed (from "G.722 and G.725 7,0 kHz Audio") to "H.221 and H.242".

15) International network code point;

The code point, "International network" ("10100"B), shall be added in the "location" field of the DECT <<PROGRESS-IND>> element.

16) {CC-RELEASE-COM} in RELEASE-PENDING state;

The FT shall be allowed to send {CC-REL-COM} in the RELEASE-PENDING state F19 before the expiry of the timer <CC.02> (the timer is stopped in this case).

17) CC release timer;

The CC release timer <CC.02> shall be increased from 30 to 36 seconds.

18) {CC-RELEASE} in overlap sending state;

The FT shall be allowed to send the {CC-RELEASE} message in the overlap sending state F02.

Annex B (normative):
LU7 64 kbit/s data bearer service

B.1   General

This annex describes the 64 kbit/s data bearer service specified for the DECT radio interface. The LU7 service supports a full-duplex synchronous data bearer service with 64 kbit/s. The service provides an improved residual error rate. The resultant improvement of the error rate at the ISDN interface is, due to the nature of radio wave propagation, dependent on the specific environment of the configuration. The service is realized on the basis of using a combination of FEC and ARQ. The service introduces an additional fixed delay of 80 ms in order to provide time for a limited re-transmission capability.

B.2   PHL layer service

The used physical packet is the double slot (packet P80).

B.3   MAC layer service

The duplex unprotected normal delay MAC service with the B-field multiplex U80a offering a data rate of 80 kbit/s, shall be used. A symmetric single-bearer MAC-connection shall be used. Advanced MAC connection control shall be used.

For MAC connection establishment, bearer handover and connection handover B-field signalling channel shall be used.

For paging of the DPS the full format page shall be used. This allows the NWK layer to indicate the MAC service in the Link Control Entity (LCE) request paging message.

B.4   DLC layer service

B.4.1   Architectural model

In order to provide a limited ARQ capability and still maintain the 64 kbit/s data rate, a transmit buffer, receive buffer and an increased data transfer rate of 72 kbit/s are utilized (see figure B.1). The transmit buffer provides a limited duration storage facility for previously sent frames and therefore allows for the possible re-transmission of these previously sent frames. The receive buffer delays the forwarding of the received frames to L3 in order to allow a period where erroneous frames may be replaced. The increased data transfer rate of 72 kbit/s is used to compensate for any re-transmission attempts that may occur.
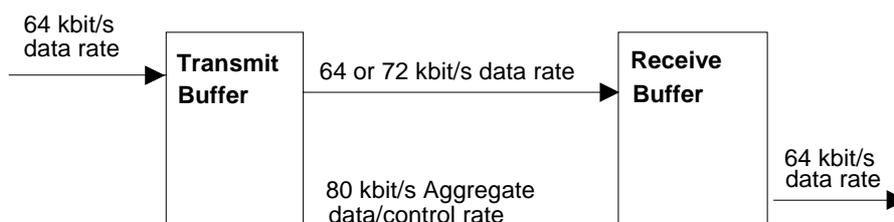

Figure B.1

B.4.1.1   Transmit (Tx) frame buffering

Each LU7 service endpoint shall have an associated Tx frame buffer. The transmit frame buffer capable of buffering the data from 8 ARQ frames shall be used to buffer the newly arriving frames coming from the application. During normal operation, each frame that is transmitted is also saved in the Tx frame buffer for possible re-transmission. The format of the first time-transmitted frame shall thereby be preserved. Each frame will therefore be available for re-transmission until it is overwritten, 8 DECT frame times later (8 x 10 ms = 80 ms). When re-transmitting a previously sent frame, the newly arriving frames are saved in Tx frame buffers until transmission is possible.

B.4.1.2   Receive (Rx) frame buffering

Each LU7 service endpoint shall have an associated Rx frame buffer. A First-In-First-Out (FIFO) frame buffer structure of fixed size shall be used to buffer the newly arriving frames coming over the CI from the source LU7 service endpoint. The Rx buffer provides a fixed delay period between the reception of a frame from the source LU7 endpoint and the forwarding of the frame. This delay period allows for the ARQ procedures to occur without disruption of the outbound 64 kbit/s synchronous data stream.

B.4.2   Automatic-Repeat-Request (ARQ) and Forward Error Control (FEC)

The FEC shall provide Reed-Solomon error control coding of the data to correct a number of errors occurring over the radio interface. In the transmit direction, FEC shall add the parity symbols and shall pass the code word to the MAC layer. In the receive direction, FEC shall check and remove the parity symbols.

An FEC frame shall consist of a 800-bit Reed-Solomon code word. The Reed-Solomon code word shall comprise 100 eight-bit symbols, k of which shall carry control information and user data, and 100-k of which shall be parity symbols. The 800-bit frame shall fully occupy the B field of one double slot transmit burst. The bits in an FEC code word shall be transmitted from left to right (parity symbols last).

Bits	8*k	8*(100-k)
	Reed Solomon Message Symbols	Reed Solomon Parity Symbols

Figure B.2: FEC Frame Structure

Systematic shortened Reed-Solomon block codes (100,k) with 8-bit symbols shall be used for FEC.

A Reed-Solomon code is described as a (N,K) code, where N is the number of m-bit symbols in a code word and K is the number of message symbols. In this case, $m = 8$ and $N = 2^m - 1 = 255$ symbols per code word. The code is shortened to a (n,k) code where n=N-i and k=K-i by setting the i most significant code words to zero. The Reed-Solomon decoder can correct up to the (the integer part of) (n-k)/2 symbols. In this case $n = 100$ and $i = 155$ symbols (i.e. 1 240 bits).

The Reed-Solomon codes use polynomials in the Galois Field GF(256), which is an extension field of GF(2) constructed with the primitive polynomial:

$$g(x) = 1 + x^2 + x^3 + x^4 + x^8$$

Since a code word containing all zeroes is a valid code word, the parity symbols of a code word shall be inverted (one's-complement).

The FEC shall check the parity symbol by computing a syndrome over the code word. If the syndrome is zero, the code word contains no detectable errors. If the parity symbols indicate that the code word is in error (i.e. it has a non-zero syndrome), FEC may apply the error correction algorithm to the code word.

In addition to the FEC, an ARQ facility shall be provided. The ARQ frames shall be carried in the FEC message symbols, one ARQ frame per FEC code word. The ARQ frame consists of three fields, starting at the beginning of the FEC code word, these shall be:

- Control field: 2 octets;

- Information field: 90 octets, contains in the case of format 64 kbit/s 10 fill-octets at the end;

- Checksum field: 2 octets (16 bits).

Figure B.3 shows the frame structure. The bits in an FEC code word shall be transmitted from left to right (control field first, parity symbols last).

Bits	16	8*(k-4)	16	8*(n-K)
	Control	**Information**	**Checksum**	**RS Parity Symbols**

Figure B.3: Frame Structure

The checksum shall indicate erroneous frames. The maximum number of bits in an ARQ frame is 8k, where k is the number of message symbols in the Reed-Solomon code word. 32 of these bits are for the control field and checksum field and the remaining information bits must make a multiple of eight. The number of octets in the information field is 90. In the case of format 64 kbit/s there are 10 fill octets at the end of the information field. The corresponding data rates are 64 kbit/s and 72 kbit/s. The FU7 frame structure is shown in table B.1.

Table B.1: FU7 frame structure

	FU7 Format	
Reed-Solomon-Code (n,k)	(100, 94)	
Control field	16 bits	2 bytes
Information field	720 bits	90 bytes
Checksum field	16 bits	2 bytes
RS parity symbol field	48 bits	6 bytes
total	800 bits	100 bytes

The fields within the ARQ-frame structure are described in the following clause. The coding of the bits within these fields is such that the lowest numbered bit within the field is the least significant bit.

B.4.2.1   Control field

The control field format is shown in figure B.4. The control field is two octets long. The control field identifies the format of the frame (Format-control parameter), the ARQ operation of the frame (ARQ-control parameter), and the sequence numbers (N(S), N(R) and N(O) parameters).

The parameters within the control field and the state variables associated with the control field are described in this clause. The coding of the bits within these parameters is such that the lowest numbered bit within the parameter field is the least significant bit.

Bit	8	7	5	6	4	3	2	1	
	Format-1		N(O)						Octet 1
	Format-2		N(R)			N(S)			Octet 2

Figure B.4: Control field format

B.4.2.1.1   Format control parameter coding

The Format control parameter indicates the type of frame being used for the transmit direction (format 64 kbit/s or format 72 kbit/s) and whether re-transmission is requested for the receive direction.

Format-control coding in octet 1 and octet 2:

oct 1		oct 2		
8	7	8	7	Meaning
0	0	0	0	format 64 kbit/s
0	0	0	1	format 64 kbit/s, re-transmit request
0	1	0	0	format 72 kbit/s
0	1	0	1	format 72 kbit/s, re-transmit request

all other values reserved.

B.4.2.1.2   Offset variable V(O)

Each point-to-point LU7 service endpoint shall have an associated offset variable V(O) which can take on the value 0 to 56. The offset variable indicates the time delay caused by re-transmissions and the format to be used.

For each re-transmission V(O) shall be incremented by 8. A re-transmission is only allowed if $V(O) \leq 48$. If $V(O) > 48$, then a re-transmit request shall be ignored and a new frame shall be transmitted.

If $V(O) > 0$, then for the first time transmission of a frame the format 72 kbit/s shall be used. For each first time transmission of a frame with format 72 kbit/s V(O) shall be decremented by 1.

If $V(O) = 0$, then for the first time transmission of a frame the format 64 kbit/s shall be used. For each first time transmission of a frame with format 64 kbit/s V(O) shall not be changed.

B.4.2.1.3   Time variables $V_n(T)$

Each point-to-point LU7 service endpoint shall have 8 time variables $V_n(T)$ with n = 0, 1, ..., 7, which are associated to the last frames already transmitted and saved in the transmit buffer. The time variables indicate the age (re-transmit delay) of the last 8 transmitted frames and the hypothetical position of that frame in the receive buffer. The position of a frame in the buffers is defined by the position of its first (leading) octet of the info field. They can take on the value 0 to 56.

For the first time transmission of a frame a variable $V_n(T)$ is associated with this frame and set equal to V(O). With each transmission (or re-transmission) of any frame all time variables $V_n(T)$ shall be incremented by 8. This means that after the first time transmission of a frame the value of the corresponding $V_n(T)$ is equal to V(O) + 8 and is further incremented by 8 with each subsequent transmission of a frame (every 10 ms). Frames with $V_n(T) > 56$ shall not be retransmitted.

> NOTE: For the association of $V_n(T)$ with a frame the relation n = N(S) can be used, where N(S) is the send sequence number of the relevant frame.

B.4.2.1.4   Offset number N(O)

The offset number N(O) defines the time delay of a transmitted frame, compared to the normal transmit time of this frame across the air interface and thus the actual position for that frame in the receive buffer of the receiver. The normal transmit time of a frame is the transmit time, when there has not been any re-transmission of any frame before. Without any re-transmissions a frame is transmitted almost immediately (with "normal delay") across the air interface. N(O) defines the offset in multiples of 10 bytes. N(O) can take on the value 0 to 56. The actual position of a frame is defined by the position of the first octet of its info field.

In the case of a first time transmission of a frame, N(O) is set equal to V(O).

In the case of a re-transmission of a frame, N(O) is set equal to that $V_n(T)$, which corresponds to the frame that is going to be retransmitted.

Offset number N(O) in octet 1:

6 bit binary coded number.

B.4.2.1.5   Send state variable V(S)

Each point-to-point LU7 service endpoint shall have an associated V(S) state variable. V(S) denotes the sequence number of the next frame to be transmitted. V(S) can take on the value 0 to 7. The modulus of V(S) equals 8. The value of V(S) shall be incremented by 1 with each first time transmission of a frame.

NOTE: In case of a re-transmission V(S) is not incremented.

B.4.2.1.6   Acknowledge state variable V(A)

Each point-to-point LU7 service endpoint shall have an associated V(A) state variable. V(A) identifies the last frame that has been acknowledged by its peer (V(A)-1 equals the N(S) of the last acknowledged frame, see clause 4.3.1.5). V(A) can take on the value 0 to 7. The modulus of V(A) equals 8. The value of the acknowledge state variable shall be updated by the valid N(R) values received from its peer (see clause 4.3.1.7). A valid N(R) value is one that is in the range $V(A) \leq N(R) \leq V(S)$.

B.4.2.1.7   Send sequence number N(S)

N(S) is the send sequence number of transmitted frames. In the case of a first time transmission of a frame, N(S) is set equal to V(S). In the case of a re-transmission, N(S) is set equal to V(A).

Sending sequence number N(S) in octet 2:

3 bit binary coded number.

B.4.2.1.8   Receive state variable V(R)

Each point-to-point LU7 service endpoint shall have an associated V(R) state variable. V(R) denotes the sequence number of the next in-sequence frame expected to be received. V(R) can take on the value 0 to 7. The modulus of V(R) equals 8. Upon receipt of an error free frame whose N(S) equals V(R), the value of V(R) shall be incremented by 1 and then additionally by 1 for each subsequent error free frame in the Rx buffer.

B.4.2.1.9   Receive sequence number N(R)

At the time that a frame is designated for transmission, the value of N(R) is set equal to V(R). N(R) indicates that the LU7 service entity transmitting the N(R) has correctly received all frames numbered up to and including N(R)-1.

N(R) indicates the sequence number of the frame that is to be transmitted or re-transmitted.

Receiving sequence number N(R) in octet 2:

3 bit binary coded number.

B.4.2.2   Information field

The information field of a frame follows the control field and precedes the frame checksum (see clause B.4.2.3). The number of octets in the information field is 90. In the case of format 64 kbit/s the information field contains 10 fill octets at the end. The fill octets shall be set to zero, if present.

NOTE: The fill octets may in future contain further service information such as whether additional formats are supported by the sending side.

B.4.2.3   ARQ checksum

The ARQ checksum shall be a sixteen-bit sequence. It shall be the ones complement of the sum (modulo 2) of:

a)   the remainder of (x raised to k power)
$(x^{15} + x^{14} + x^{13} + x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^7 + x^6 + x^5 + x^4 + x^3 + x^2 + x^1 + 1)$
divided (modulo 2) by the generator polynomial $x^{16} + x^{12} + x^5 + 1$, where k is the number of bits in the frame existing between, but not including, the final bit of the opening flag and the first bit of the checksum, excluding bits inserted for transparency; and

b) the remainder of the division (modulo 2) by the generator polynomial $x^{16} + x^{12} + x^5 + 1$, of the product of x^{16} by the content of the frame existing between, but not including, the final bit of the opening flag and the first bit of the checksum, excluding bits inserted for transparency.

As a typical implementation at the transmitter, the initial content of the register of the device computing the remainder of the division is pre-set to all 1s and is then modified by division by the generator polynomial (as described above) on the address, control, and information fields; the ones complement of the resulting remainder is transmitted as the sixteen-bit checksum.

As a typical implementation at the receiver, the initial content of the register of the device computing the remainder is pre-set to all 1s. The final remainder after multiplication by x^{16} and then division (modulo 2) by the generator polynomial $x^{16} + x^{12} + x^5 + 1$ of the serial incoming protected bits and the checksum, will be "0001 1101 0000 1111" (x^{15} to x^0, respectively) in the absence of transmission errors.

B.4.3   Procedures for normal operation

The normal operation procedures for use by the LU7 service entity are specified in the following clauses.

B.4.3.1   Establishment and synchronization procedures

Upon establishment of the MAC layer connection, each LU7 service entity shall set V(S), V(R), V(A) and V(O) to 0.

Following the establishment of the MAC layer both service entities shall start transmitting valid frames if they have by themselves knowledge from the ISDN interface or the application that the ISDN bearer service "unrestricted digital information" with or without tones and announcements shall be used for the connection or they have detected a LU7 service request in the {CC-SETUP} message received from the adjacent entity.

The information field of these frames shall be set to all "1" or information from the ISDN and application interfaces shall be used if the B-channel is allocated and connected.

Starting with the transmission of the first frame operations upon N(S), N(R), N(O) shall follow the normal procedures.

NOTE: N(S) shall continuously be incremented while N(R) and N(O) are "0".

The entities having started the transmission shall analyse received information for a first correct frame being valid (correct CRC after FEC operation) with correct sequence numbering.

NOTE: A MAC layer B-Field set to all "0" will result in a MAC layer checksum error.

The entities shall start the timer <DLU.02> with the transmission of the first frame. The timer is stopped upon the reception of a first valid frame.

<DLU.02>LU7 timer

FT value: 5 seconds
PT value: 5 seconds
Start: first transmission of valid LU7 frame
Stop: a valid LU7 frame is received

The received information of the valid frames is stored in the receive buffer.

Commencing in that cycle carrying the first valid frame the receiver shall start forwarding dummy information (containing all "1") at its output interface for 8 consecutive cycles.

Then the service is established and the receiver takes subsequent frames to be forwarded from the information queue in its receive buffer.

Starting in the cycle following the event of the reception of the first valid frame the exceptional procedures according to clause B.4.4 apply.

Concerning U-plane handling see clause 6.4.

DECT Fixed System   DECT Portable System

NWK   MAC   MAC   NWK

{LCE request page}

(service: In-normal delay, double slot)

MAC-access-req, MAC-attributes-req

(In-normal delay, double slot)

MAC-bearer-cfm, MAC-attributes-cfm

(In-normal delay, double slot)

{LCE page response}

start LU7
in B-field

{CC-SETUP}

<<Call attributes: LU7>>   start LU7
                                                  in B-field

e.g. {CC-ALERTING}
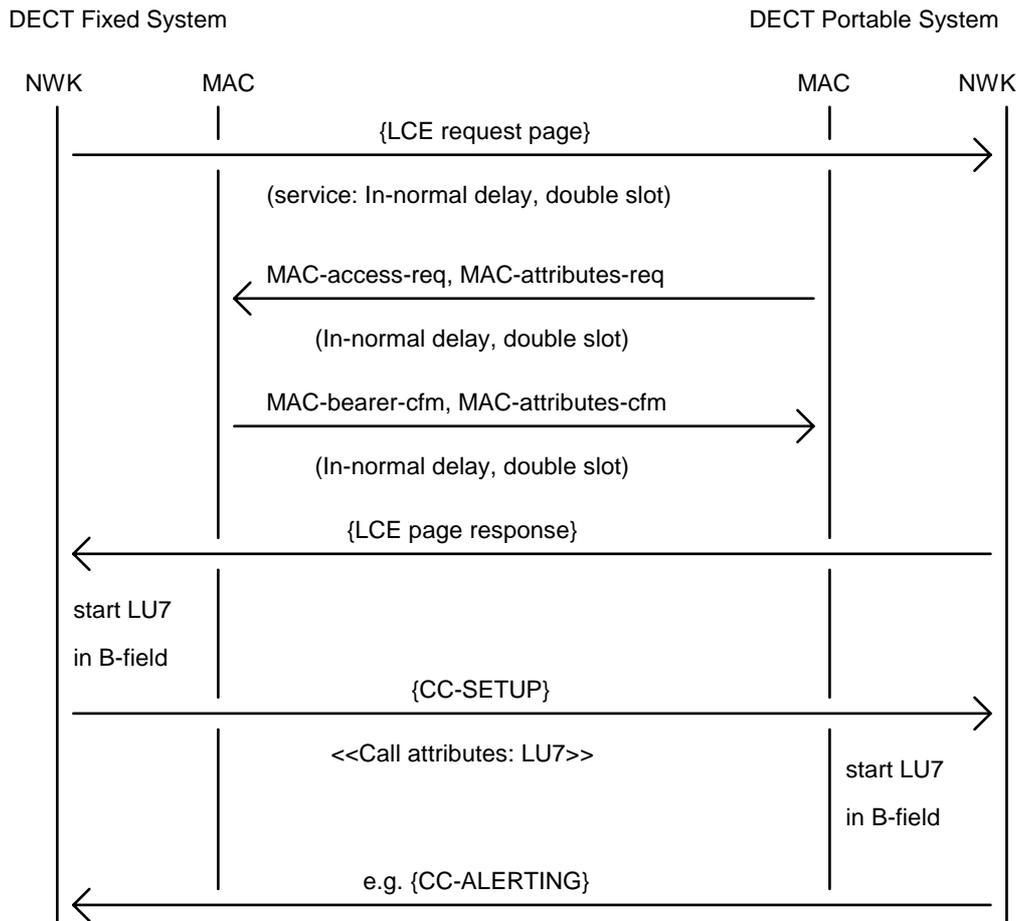
Figure B.5: Service establishment for an incoming call

DECT Fixed System   DECT Portable System

NWK   MAC   MAC   NWK

MAC-access-req, MAC-attributes-req

(In-normal delay, double slot)

MAC-bearer-cfm, MAC-attributes-cfm

(In-normal delay, double slot)

start LU7
in B-field

{CC-SETUP}

<<Call attributes: LU7>>

start LU7
in B-field

e.g. {CC-SETUP-ACK}
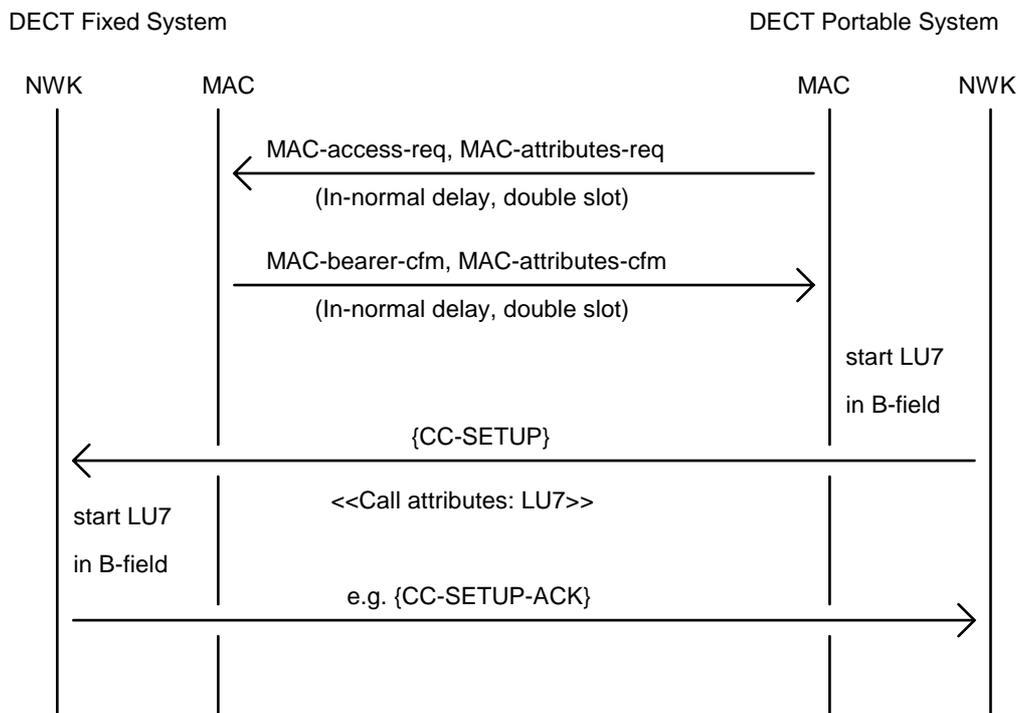
Figure B.6: Service establishment for an outgoing call

B.4.3.2   Active phase

B.4.3.2.1   Transmitting frames (first time transmission)

The transmitter performs first time transmission of a frame if:

    a) a frame with incorrect checksum has been received (after possibly having applied FEC); or

    b) no re-transmit request has been received; or

    c) an invalid N(R) has been received (valid N(R) means $V(A) \leq N(R) \leq V(S)$); or

    d) the time variable $V_n(T)$ of the frame for which re-transmission has been requested has the value > 56; or

    e) $V(O) > 48$.

The control field parameters N(S), N(R) and N(O) shall be assigned the values V(S), V(R) and V(O), respectively.

If the time offset variable $V(O) = 0$ then a "format 64 kbit/s" frame shall be transmitted. Otherwise, a "format 72 kbit/s" frame shall be transmitted.

V(S) shall be incremented by 1 and all $V_n(T)$ with $0 \leq V_n(T) \leq 56$ shall be incremented by 8 at the end of the transmission of the frame. If a "format 72 kbit/s" frame has been transmitted, then V(O) shall be decremented by 1 at the end of the transmission of the frame.

B.4.3.2.2   Re-transmitting frames

The re-transmission of a frame is requested when:

    a) a frame is received containing a format control field indicating a re-transmit request for frame N(R); and

    b) a valid N(R) has been received (valid N(R) means $V(A) \leq N(R) \leq V(S)$); and

    c) the time variable $V_n(T)$ of the frame N(R) for which re-transmission has been requested is in the range $0 \leq V_n(T) \leq 56$; and

    d) $V(O) \leq 48$.

The control field parameter N(S) shall be set to the requested re-transmission sequence number, N(R). The control field parameter N(R) shall be set to the current value of V(R). The control field parameter N(O) shall be set to the current value of that $V_n(T)$, which is associated to the requested frame N(S). The format, indicated by the format-control parameter coding (format 64 kbit/s or format 72 kbit/s), of the re-transmitted frame shall not be changed from the format used for the initial sending of the frame.

V(O) and all $V_n(T)$ with $0 \leq V_n(T) \leq 56$ shall be incremented by 8 at the end of the transmission of the frame.

B.4.3.2.3   Receiving frames

When an LU7 service entity receives a valid frame whose N(S) is equal to the current V(R), then the LU7 service entity shall:

-   store the frame in the LU7 entity's receive buffer, the position of the frame in the receive buffer is defined by the received offset number N(O);

-   update V(A) with the value of N(R);

-   V(R) shall be incremented by 1 and then additionally by 1 for each subsequent error free frame in the Rx buffer;

-   if the format control field indicates a re-transmit request for frame N(R) and the associated time variable $V_n(T)$ is in the range $0 \leq V_n(T) \leq 56$ and $V(O) \leq 48$ then the requested frame shall be re-transmitted as described in clause B.4.3.2.2. Otherwise the next un-transmitted frame in the Tx buffer shall be transmitted as described in clause B.4.3.2.1.

When the LU7 service entity receives a valid frame whose N(S) is greater than V(R) then the LU7 service entity shall:

- store the frame in the LU7 entity's receive buffer, the position of the frame in the receive buffer is defined by the received offset number N(O);

- update V(A) with the value of N(R);

- if the transmission of data to the line interface contained in the originally expected frame V(R) should start before a next frame can be received from the air interface, then V(R) shall be incremented by 1 and then additionally by 1 for each subsequent error free frame in the Rx buffer;

- if the format control field indicates a re-transmit request for frame N(R) and the associated time variable $V_n(T)$ is in the range $0 \leq V_n(T) \leq 56$ and $V(O) \leq 48$ then the requested frame shall be re-transmitted as described in clause B.4.3.2.2. Otherwise the next un-transmitted frame in the Tx buffer shall be transmitted as described in clause B.4.3.2.1.

N(O) defines the position of a frame in the receive buffer. The value N(O) = 0 means, that the transmitted frame has not been delayed because of any previous re-transmissions. A value of N(O) ≠ 0 defines the delay of the frame caused by previous re-transmissions of this or other frames. N(O) defines the delay in multiples of 10 octets, which corresponds to multiples of 1,25 ms. Therefore the time interval between the reception of a frame over the air interface and starting to forward the data to the line interface can be calculated as:

Time_interval = Fixed_delay - N(O) * 1,25 ms.

Where the Fixed_delay is 80 ms.

B.4.3.2.4   Sending acknowledgements

Whenever an LU7 service entity transmits a frame, N(R) shall be set equal to V(R), indicating acknowledgement of all previously received frames up to N(R) -1. Thus, if no transmission errors have occurred a transmitting entity acknowledges the frames it has received in the TDMA half cycle just before. An entity shall not request re-transmission for purposes other than recovery from transmission errors.

B.4.3.2.5   Receiving acknowledgements

Upon receipt of a error free frame, the LU7 service entity shall treat the N(R) value contained in this frame as an acknowledgement for all the frames it has transmitted with an N(S) up to and including the received N(R)-1 and V(A) shall be set to N(R).

B.4.3.3   Release

A normal release is initiated by the service primitives from the upper layer. The release of the LU7 service is combined with the MAC layer release. Therefore no additional procure is necessary.

B.4.4   Exceptional procedures

Exception conditions may occur as the result of physical layer errors, MAC errors, or LU7 service entity procedural errors.

The error recovery procedures which are available to effect recovery following the detection of an exception condition at the LU7 service entity are defined in this clause.

B.4.4.1   Invalid frame condition

A frame shall be detected as invalid if it contains a frame checksum error. The frame may be stored in the Rx buffer and marked as invalid. If an invalid frame is stored in the Rx buffer no valid data shall be overwritten.

B.4.4.2   Establishment

The LU7 service is started by transmitting LU7 frames. The service has been established with the reception of a correct frame and the installation of the delay. The reception of a correct frame is supervised by the timer <DLU.02>. If the timer <DLU.02> expires before a first correct frame has been received the network layer shall be informed and the entire connection shall be released.

B.4.4.3   Transmitting frames

First time transmission according to clause B.4.3.2.1 shall continue if no valid frame has been received before.

B.4.4.4   Receiving frames

Handling of invalid frames that cannot be recovered in time is left to the implementation. The objective is to achieve a low residual BER.

> NOTE: If an invalid frame has been received its contents may be stored in the receive buffer to have best choice data available to be forwarded if that frame cannot be recovered in time. The format just now being in use may be assumed.

A received valid frame which was previously requested for re-transmission shall override a possibly stored invalid frame in the receive buffer.

B.4.4.5   Sending acknowledgements

Retransmission of a frame shall be requested as long as a value $N(0) \leq 56$ can be expected for the retransmitted frame assumed being valid.

The receiver shall otherwise acknowledge that frame according to clause B.4.3.2.1.

B.4.4.6   Forwarding of received data

If a frame in the receive buffer cannot be recovered in time this produces a residual frame error. The bit sequence forwarded in this case is left to the implementation (see also clause B.4.4.4).

> NOTE: Available data, also if partly incorrect, should be sent out at the ISDN interface.

B.4.4.7   N(R) sequence error

An N(R) sequence error exception condition occurs when a frame is received which contains an invalid N(R) value.

A valid N(R) is one that is in the range $V(A) \leq N(R) \leq V(S)$.

An invalid N(R) shall be ignored and normal operation upon sequencing of N(S) shall be continued.

B.4.4.8   N(O) sequence error

An N(O) sequence error exception condition occurs when:

   a) a frame is received which contains an N(O) value indicating a frame position in the RX-buffer that would overwrite already correctly received data, which has not yet been forwarded to the line interface or application; or

   b) frame is received which contains an N(O) value indicating a frame position in the RX-buffer that would partly provide needed data and partly overwrite already correctly received data, which have not yet been forwarded to the line interface or application; or

c) frame is received which contains an N(O) value indicating a frame position in the RX-buffer that would leave gaps in the RX-buffer, which cannot be filled up with allowed frames without causing overlapping data; or

d) frame is received which contains an N(O) value indicating a frame position in the RX-buffer that would leave an unexpected large gap in the RX-buffer.

In case a) the received frame should be ignored. Only if the old data was marked with "position-error", then the new frame should be used.

In case b) the received frame may be ignored. Those parts which are not overwriting correct and still valid data may be used. If the old data was marked with "position-error", then the new frame should be used.

In case c) the received data should be stored and marked with "position-error".

In case d) the received data should be stored and marked with "position-error".

   NOTE: The N(O) sequence error should be supervised. If the error condition continues, then the link should be released.

B.4.4.9 N(S) sequence error

An N(S) sequence error exception condition occurs when:

a) a frame is received which contains a different N(S) value for an already correctly received frame; or

b) a frame is received which contains a N(S) value which has not been incremented by one compared with the preceding neighbourhood frame.

In case a) the received frame should be ignored.

In case b) the received frame should be stored and marked with "sequence-error".

   NOTE: The N(S) sequence error should be supervised. If the error condition continues, then the link should be released.

B.4.4.10 Format error

A format error condition occurs upon the receipt of a frame with an undefined format-control parameter in the control field.

The frame should be stored, if the control variable N(O) and N(S) are valid. If the format cannot be estimated unambiguously the frame should by marked with "format-error".

   NOTE: The format error should be supervised. If the error condition continues, then the link should be released.

B.4.4.11 Abnormal release

If the MAC layer indicates abnormal release, then the LU7 service shall be released and the abnormal release shall be indicated to the higher layer.

B.5   NWK layer service

B.5.1   LCE service

As specified in the DECT network layer specification EN 300 175-5 [5]. For paging the long format message with the TPUI address structure shall be supported. The "LCE Header" shall indicate the U-plane MAC service type "I_N-normal-delay". The "Attributes" coding shall be set to "double slot". The "Target bearers" field shall be set to "1". The "MAC packet life" shall be set to "Not applicable".

   NOTE: If no TPUI has been assigned, then the default TPUI is used.

B.5.2   CC service

As specified in the DECT network layer specification EN 300 175-5 [5]. In the {CC-SETUP} message the <<CAL-ATTRIBUTES>> information element shall indicate "U-plane symmetry" = "Symmetric", "LU identification" = "LU7", "U-plane class" = "Class 0 normal_delay" and "U-plane frame type" = "FU7".

Annex C (normative):
ConnectionLess Supplementary Service (CLSS) procedure

C.1 General

This procedure is defined at the network layer level. The purpose is to provide a procedural bridge between the DFS and DPS which allows the mapping of corresponding procedures used at the ISDN user-network interface. The use of this procedure is necessary where the DPS has access to some ISDN supplementary services by employing the common information element protocol as defined for ISDN.

The CLSS procedure is derived from the point-to-point connectionless transport mechanism in ISDN described in EN 300 196-1 [42], clause 8.3.2.2.

The layer 3 procedure is defined between service control entities in the network and the DPS. The DFS performs mapping functions only.

The CLSS procedure uses a point-to-point DECT layer 2 link. CLSS maps the point-to-point transport mechanism (connectionless) and broadcast transport mechanism (connectionless) as defined for ISDN in EN 300 196-1 [42], clauses 8.3.2.2 and 8.3.2.4.

C.2 Normal operation

If a point-to-point DECT link is known to exist or can be established, a connectionless transport mechanism can be used using a reliable data link connection.

The connectionless transport mechanism is based on {CISS-FACILITY} messages. The CLSS procedure shall only use the dummy TI value 6 indicating "connectionless".

Before data can be sent the originating entity shall first establish, if not already available, a reliable data link connection between the user and the network using the DL-ESTABLISH-REQUEST service primitive as described in EN 300 175-4 [4]. Completion of establishment of this connection is indicated by a DL-ESTABLISH-CONFIRM primitive.

The {CISS-Facility} message is used to carry the "user" information, i.e. the component structures in the <<FACILITY>> information element. Structure and coding principles of and the procedures upon the components are described in EN 300 196-1 [42], clauses 8.1 and 8.2. Service specific coding is defined in the respective clauses of the ISDN stage 3 standards for the supplementary services.

C.3 Exceptional procedures

If a <<FACILITY>> information element is received with an invalid protocol profile, the receiving entity shall discard the {CISS-FACILITY} message.

If a {CISS-FACILITY} message is received and it does not contain the <<FACILITY>> information element, the receiving entity shall discard the {CISS-FACILITY} message.

When a message other than {CISS-FACILITY} is received using the connectionless TI, the receiving entity shall discard the message.

If either protocol entity receives an indication that the data link has been released or that the data link has spontaneously been reset, then the procedures as they affect the higher layer protocol are outside the scope of the present document.

NOTE: The handling of layer 2 errors is supplementary service dependant and is therefore specified in the individual supplementary services.

C.4   Identification of the user

C.4.1   One-to-one relation between DECT and ISDN layer 2 point-to-point links

If a one-to-one relation between a DECT layer 2 link and an ISDN layer 2 link is known to exist to the DFS-IWU and the CLSS procedure is started by the DPS, then the DECT user is identified by the DECT link/connection which is associated to an according ISDN link.

C.4.2   No one-to-one relation between a DECT and an ISDN point-to-point links

If it is known to the DFS-IWU that more than one DECT link relates to one ISDN point-to-point link and the CLSS procedure is started by the DPS it is the responsibility of the DFS-IWU to provide for unambiguous routing of components containing a response to the invoking entities. According identity mapping procedures are outside the scope of the present document.

C.4.3   FACILITY message broadcast by the network

The support of some ISDN supplementary services can require that a {FACILITY} message broadcasted by the network in a point-to-multipoint configuration shall be forwarded to a specific DPS only. If the service is supported the DFS-IWU shall perform appropriate actions for identification of the DPS derived from addressing information submitted by itself or received from the DPS. The specific functions are described in the clauses dealing with the mapping functions for the service.

NOTE: If CCBS is not supported by the DFS, then the DFS may ignore these {FACILITY} messages broadcasted by the network.

Annex D (informative):
Interworking state machine

## D.1   IWU CC state transition diagram
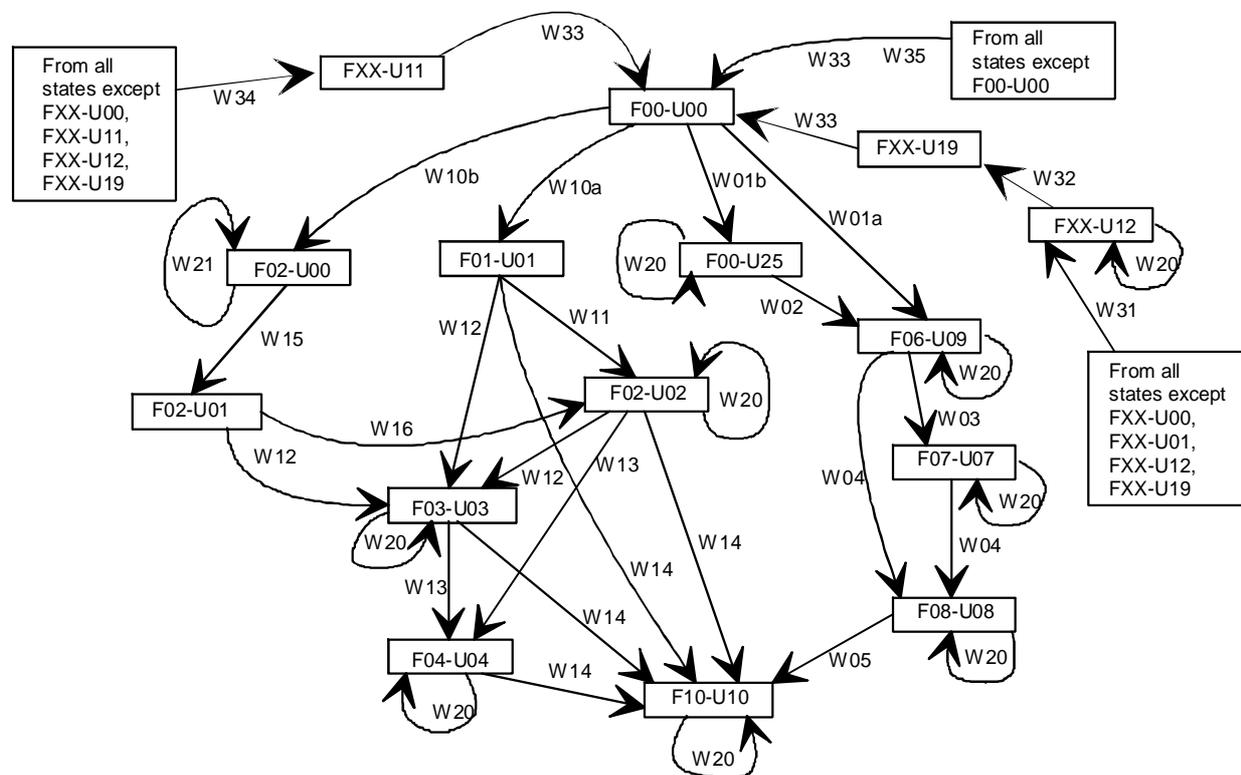
Figure D.1: IWU CC state transition diagram

Figure D.1 only contains a subset of all possible state combinations and transitions.

D.2   IWU CC states

All states are a combination of a DECT FT state Fxx and an ISDN user state Uyy (i.e. Fxx-Uyy).

D.3   IWU CC transition procedures

W01a: {SETUP} is received from ISDN;
    Send {CC-SETUP} to DECT;
    Send {CALL-PROC} to ISDN.

W01b: {SETUP} is received from ISDN;
    Send {SETUP-ACK} to ISDN;
    Save any partial dialling information and/or SS information.

W02:   {INFORMATION} containing end of dialling information is received from ISDN;
    Send {CC_SETUP} to DECT;
    Send {CALL-PROC} to ISDN.

W03: {CC-ALERTING} received from DECT;
     Send {ALERTING} to ISDN.

W04: {CC-CONNECT} received from DECT;
     Send {CONNECT} to ISDN.

W05: {CONNECT-ACK} is received from ISDN;
     Send {CC-CONNECT-ACK} to DECT.

W10a: {CC-SETUP} received from DECT;
     Send {SETUP} to ISDN.

W10b: {CC-SETUP} received from DECT;
     Save any partial dialling information and/or SS information;
     Send {CC-SETUP-ACK} to DECT.

W11: {SETUP-ACK} is received from ISDN;
     Send {CC-SETUP-ACK} to DECT.

W12: {CALL-PROCEEDING} is received from ISDN;
     Send {CC-CALL_PROC} to DECT.

W13: {ALERTING} is received from ISDN;
     Send {CC-ALERT} to DECT.

W14: {CONNECT} is received from ISDN;
     Send {CC-CONNECT} to DECT.

W15: {CC-INFO} is received from DECT completing dialling;
     Send {SETUP} to ISDN with <<SENDING_COMPLETE>>.

W16: {SETUP-ACK} is received from ISDN.

W20: {INFORMATION} is received from ISDN; Send {CC_INFO} to DECT;
     or {CC-INFO} is received from DECT; Send {INFORMATION} to ISDN.

W21: {CC-INFO} received from DECT;
     Collect information.

W31: {DISCONNECT} is received from ISDN;
     Send the whole ISDN DISCONNECT in a <<IWU-TO-IWU>> in a {CC-INFO} to DECT.

W32: {CC-RELEASE} is received from DECT;
     Send {RELEASE} to ISDN.

W33: {RELEASE-COM} or {RELEASE} is received from ISDN;
     Send {CC-RELEASE-COM} to DECT and respond with REL-COM if REL has been received.

W34: {CC-RELEASE} is received from DECT;
     Send {DISCONNECT} to ISDN.

W35: {CC-RELEASE-COM} is received from DECT.

Annex E (informative):
Bibliography

ECMA TR/44: "An Architectural Framework for Private Networks".

  NOTE: This document has been withdrawn.

History

Document history		
Edition 1	April 1996	Publication as ETS 300 434-1
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