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Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Isochronous data bearer services for closed user groups (service type D, mobility class 1)

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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Digital Enhanced Cordless Telecommunications (DECT).

National transposition dates	
Date of adoption of this EN:	5 June 1998
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1 Scope

The present document specifies a profile for Digital Enhanced Cordless Telecommunications (DECT) systems conforming to EN 300 175, parts 1 to 7 [1] - [7]. It is part of a family of profiles aimed at the general connection of terminals supporting non-voice services to a fixed infra-structure, private and public.

The type D service, mobility class 1, as described in the ETR 185 [9], supports Isochronous Data Bearer Services (IDBSs) for Closed User Groups (CUGs) and is suitable for transparent transfer of isochronous data streams. It is intended for use in non-public applications. Video services and secure telephony services (end-to-end encrypted) over external networks can be considered as applications of IDBS.

Phase 1 of the present document defines an unprotected service offering an unrestricted digital 32 kbit/s data bearer service and an unprotected single bearer, multi-rate, rate adaptation service to interwork to synchronous ITU-T Recommendations V.series services.

Further phases of this profile may additionally provide multiple rate, multi-bearer support and error correction capability for services and applications requiring higher rates and high quality isochronous data transmission.

The present document specifies the requirements on the Physical (PHL) layer, Medium Access Control (MAC) layer, Data Link Control (DLC) layer and Network (NWK) layer of DECT. The standard also specifies Management Entity (ME) requirements and generic Interworking Conventions (IC).

2 Normative references

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

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

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

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

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

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

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

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

[9]   ETR 185: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Profile overview".

[10]   EN 301 238: "Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Isochronous data bearer services with roaming mobility (service type D, mobility class 2)".

[11]   CCITT Recommendation V.24 (1988): "List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)".

[12]   ITU-T Recommendation V.34: "A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits".

[13]   ITU-T Recommendation R.140: "Definitions of essential technical terms in the field of telegraph transmission".

3   Definitions and abbreviations

3.1   Definitions

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

   a) the definitions in EN 300 444 [8]; and

   b) the following terms:

bearer service: A type of telecommunications service that provides the capability for the transmission of signals between user/network interfaces. For DECT systems, the Air (Radio) interface provides the bearer services between the DECT Fixed radio Termination (FT) and the DECT Portable radio Termination (PT).

isochronous: Pertaining to a signal or a time-varying phenomenon characterized by significant instants separated by time intervals having a duration theoretically equal to the duration of a unit interval or to an integral multiple of this duration (ITU-T Recommendation R.140 [13]).

mobility class 1: Closed user groups, for which terminals are pre-registered off-air with one or more specific Fixed Parts (FPs), and establishment of service and user parameters is therefore implicit, according to a profile-defined list.

mobility class 2: Private and public roaming applications for which terminals may move between FPs within a given domain and for which association of service parameters is explicit at the time of service request.

service: A set of functions offered to a user by an organization.

synchronous transmission: Transmission using isochronous signals in which the sending and receiving instruments are operating continuously in a constant time difference between corresponding significant instants (ITU-T Recommendation R.140 [13]).

synchronous: The essential characteristics of time-scales or signals such that their corresponding significant instants occur at precisely the same average rate. (not in ITU-T Recommendation R.140 [13])

3.2   Abbreviations

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

   AI   Air Interface
   ARI   Access Rights Identity
   C   higher layer control Channel
   CC   Call Control

C-plane   Control plane
Cs   higher layer signalling Channel (slow)
CUG   Closed User Group
DCE   Data Circuit-terminating Equipment
DECT   Digital Enhanced Cordless Telecommunications
DIC   DECT Independent Clocking
DLC   Data Link Control
DSP   Data Services Profile
DTE   Data Terminal Equipment
FP   Fixed Part
FT   Fixed radio Termination
GAP   Generic Access Profile
GSM   Global System for Mobile communication
I   higher layer Information channel
IC   Interworking Conventions
IDBS   Isochronous Data Bearer Service
IPUI   International Portable User Identity
ISDN   Integrated Services Digital Network
IWF   Interworking Functions
IWP   Interworking Profile
IWU   Interworking Unit
LAP-B   Link Access Procedure (Balanced)
LAP-C   Link Access Procedure (Control)
Lb   a DLC layer C-plane protocol entity
Lc   a DLC layer C-plane protocol entity
MAC   Medium Access Control
ME   Management Entity
NWK   NetWorK
PHL   PHysicaL
PICS   Protocol Implementation Conformance Statement
PP   Portable Part
PT   Portable radio Termination
TAF   Terminal Adaptation Function
U-plane   User plane

4   Description of services

4.1   Reference configuration

The reference configuration for this profile shall be as shown in figure 1.
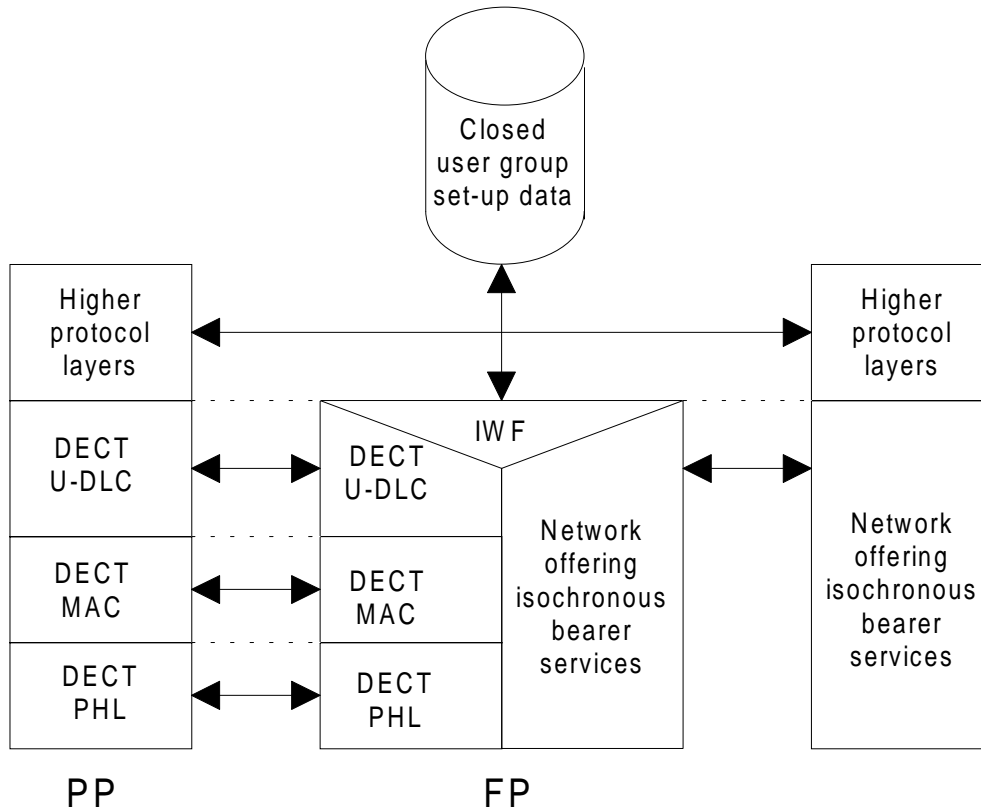
**Figure 1: Profile reference configuration showing interworking to a network
via the DECT U-plane (only)**

4.2   Service objectives

4.2.1   General

The general service objectives for data service profiles with mobility class 1 are described in subclause 6.2.2 of
ETR 185 [9].

The specific U-plane service objectives of this profile are listed in subclauses 4.2.2 and 4.2.3. There are no requirements
or service objectives in relation to the C-plane.

4.2.2   32 kbit/s unprotected service

The U-plane service objective for the unprotected service are detailed in table 1.

Table 1: Service objectives of the 32 kbit/s unprotected service

Transfer mode	Circuit mode
Transfer capability	unrestricted digital
Data structure integrity	semi-octet
Continuous data rate	32 kbit/s
User data protection	none
User data delay	10 ms
Service change and negotiation	optional
Encryption support	optional

4.2.3   Unprotected rate adaptation service

The U-plane service objectives for the unprotected rate adaptation service are detailed in table 2.

Table 2: Service objectives of the unprotected rate adaptation service

Transfer mode	Circuit mode
Transfer capability	unrestricted digital
Data structure integrity	octet
Continuous data rate	by steps of 2,4 kbit/s up to 28,8 kbit/s; and by steps of 4 kbit/s up to 28,0 kbit/s
User data protection	none
User data delay	15 ms
Service change and negotiation	optional
Encryption support	mandatory
Network independent clocking	supported
In band rate changes	supported
V.24 control signalling	optional
Asymmetric rates	supported

5   PHL layer requirements

The requirements of the D.2 data service profile as defined in EN 301 238 [10], clause 5 and annex D shall apply.

6   MAC layer requirements

For both the services, the following shall apply:

a) bit a12 of the Fixed Part Capabilities message (defined in EN 300 175-3 [3], subclause 7.2.3.4) shall be set to 1; and

b) the MAC Extended Fixed Part Capabilities message (defined in EN 300 175-3 [3], subclause 7.2.3.5) shall be used and bit a44 of Extended capabilities field shall be set to 1.

NOTE: The Extended Fixed Part Capabilities message is broadcast by a FP to indicate the support of the D profile.

6.1   32 kbit/s unprotected service

The requirements of the D.2 data service profile as defined in EN 301 238 [10], subclause 6.1 and annexes E and F with condition C1 equal to "TRUE" shall apply.

6.2   Unprotected rate adaptation service

The requirements of the D.2 data service profile as defined in EN 301 238 [10], subclause 6.2 and annexes E and F with condition C2 equal to "TRUE" shall apply.

7   DLC layer requirements

The DLC layer shall contain two independent planes of protocol: the C-plane and the U-plane. All external user data and control shall be handled by the U-plane.

7.1   C-plane requirements

No C-plane functionality is required for this mobility class 1 profile.

7.2   U-plane requirements

7.2.1   32 kbit/s unprotected service

The requirements of the D.2 data service profile as defined in EN 301 238 [10], subclauses 7.2.1, G.2.1 and H.2.1 shall apply.

7.2.2   Unprotected rate adaptation service

The requirements of the D.2 data service profile as defined in EN 301 238 [10], subclauses 7.2.2, G.2.2 and H.2.2 shall apply.

8   NWK layer requirements

Inter-operability between DECT Portable Parts (PPs) and FPs claiming support for this profile shall be independent of network layer functionality. No DECT network layer services are required for the this mobility class 1 profile.

9   Management entity requirements

The management entity shall be responsible for maintenance and updating of the logical associations between NWK, DLC, MAC and U-plane entities.

The requirements of the D.2 data service profile as defined in EN 301 238 [10], clause 9 shall apply with the exception of those specific to the C-plane.

10   Generic interworking conventions and procedures

The requirements of the D.2 data service profile as defined in EN 301 238 [10], clause 10 shall apply.

11   Configuration data and capabilities

Table 3 lists those parameters which need to be configured in equipment claiming to conform to this mobility class 1 profile. Equipment shall provide suitable documentation, instructions and equipment interface(s) to allow user configuration of these parameters.

Table 3: D.1 profile configuration data and capabilities

Variable parameter	Value	Fixed(F)/Portable(P)
Service associated with identity	Type D	F, P
Network associated with identity	Selected from annex A	F, P
International Portable User Identity (IPUI)	Unique value within local environment	P
Access Rights Identity (ARI)	Unique value within local environment	F
Diversity capability	Yes/No	F, P
Encryption capability	Yes/No	F, P
Static cipher key	64 bits	F, P
Symmetry	Asymmetric, full duplex/; or Symmetric, full duplex	F, P
User data rate resolution	$n \times 2,4$ kbit/s; or $n \times 4$ kbit/s	F, P
Min user data rate PP to FP	0 - 28,8 kbit/s (note)	F, P
Max user data rate PP to FP	0 - 28,8 kbit/s (note)	F, P
Min user data rate FP to PP	0 - 28,8 kbit/s (note)	F, P
Max user data rate FP to PP	0 - 28,8 kbit/s (note)	F, P
NOTE: User data rates shall be configured in multiples of either $n \times 2,4$ kbit/s or $n \times 4$ kbit/s, as indicated by the "User data rate resolution".		

Annex A (normative):
Specific interworking conventions

A.1   Interworking to V.24 isochronous bearer services

A.1.1   Scope

The provisions of this subclause shall apply to interworking to private V.24 isochronous bearer services, CCITT Recommendation V.24 [11]. For the purposes of this interworking annex, only full duplex transmissions are to be supported.

The physical implementation of these services and the use of the IWF to other networks (if present) are abstracted from the user. The PP user sees a standardized wireless service which is functionally equivalent to interfacing to an V.24 isochronous bearer service (such as specified by ITU-T for synchronous modems, e.g. ITU-T Recommendation V.34 [12]).

This annex defines the Terminal Adaptation Functions (TAF) integral to a PP and the IWF integral to a FP which enable the attachment of synchronous serial data applications to a PP and the attachment of isochronous connection-oriented serial data transmission (network) services to an FP. The application may be a software application or a terminal: however this annex does not mandate the implementation of a specific interface between the PP and the terminal and the FP and the service/network, but specifies the air interface requirements in order to facilitate interoperability between equipment of different origin. Subclause A.1.5 specifies interworking conventions for Data Terminal Equipment (DTE)-to-PP interfaces based on CCITT Recommendation V.24 [11], and corresponding conventions for FP Interworking Units (IWUs) with a nominal internal V.24 interface.

A.1.2   Reference configuration

The reference configuration for U-plane operation is shown in figure A.1. There are no requirements with regard to the C-plane. The present document refers to PPs and FPs which support applications with synchronous serial data transmission capabilities. The TAF is functionally a part of a PP and the IWF is functionally part of FP with an integral synchronous data capability of the DECT D.1 profile.
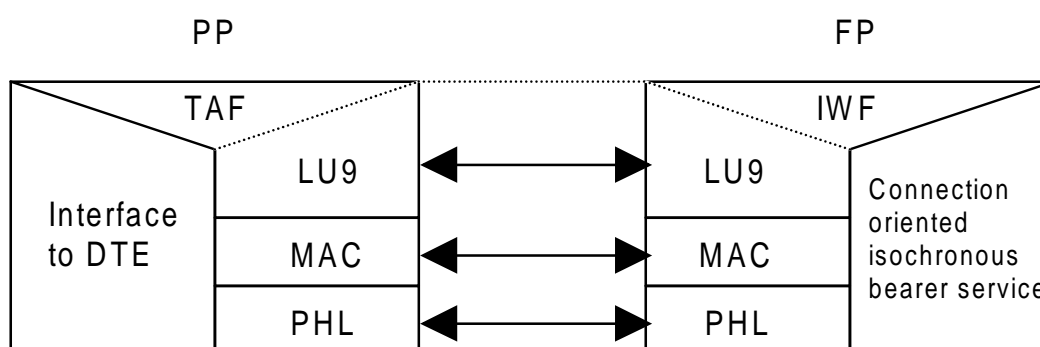

Figure A.1: Profile reference U- plane configuration showing the interworking to a connection-oriented isochronous bearer service

The serial data application may implement any proprietary TAF-interface solution using the services provided by the TAF in order to facilitate application/terminal connection (such as V.24, V.35 or X.21). The serial data transmission service contains a network specific IWUs using the IWF services to provide interconnection to outside networks or interfaces such as RS-232 or V.35. Subclause B.1.5 defines the TAF and the IWF for a V.24 service as an example.

A.1.2.1   PP

The following functions are included in the PP:

U-plane:

- DECT Independent Clocking (DIC);

- in-band rate changes;

- V.24 control information handling.

NOTE: The management of DIC, in-band rate changes and V.24 control information is described in annex A of the D.2 profile, EN 301 238 [10].

A.1.2.2   FP

The following functions are included in the FP:

U-plane:

- DECT Independent Clocking (DIC);

- in-band rate changes;

- V.24 control information handling.

NOTE: The management of DIC, in-band rate changes and V.24 control information is described in annex A of the D.2 profile EN 301 238 [10].

A.1.2.3   General configuration

The general configuration of the PP and FP for the mobility class 1 D type profile is managed statically and off-line and takes place prior to PP to FP connection establishment. This implies (as with all mobility class 1 equipment) that the connection and service parameters are always established a priori and are identified at connection establishment on the basis of the PP and FP identities.

Table 3 specifies the information which shall be configured into the PP and FP prior to connection establishment.

A.1.3   PP connection establishment procedures

The PP connection establishment procedures shall be those as specified in clauses 5, 6 and 7 of this profile for the PHL, MAC and DLC layer specifications, together with the management entity requirements specified in clause 9.

The PP equipment shall use what ever means are appropriate to ensure that DECT connections are activated only for the duration that valid data to and from the TAF is available.

During and following the connection establishment the DECT connection shall operate in accordance with the configuration parameters specified in clause 11.

A.1.4   FP connection establishment procedures

The FP connection establishment procedures shall be those as specified in clauses 5, 6 and 7 of this profile for the PHL, MAC and DLC layer specifications, together with the management entity requirements specified in clause 9.

The FP equipment shall use what ever means are appropriate to ensure that DECT connections are activated only for the duration that valid data to and from the IWU is available.

During and following the connection establishment the DECT connection shall operate in accordance with the configuration parameters specified in clause 11.

A.1.5   Isochronous bearer interworking service using V.24 connection

A.1.5.1   General

This subclause specifies the interworking of the DECT D.1 services with DTE connected by V.24 to the PP. It also specifies the functionality of the corresponding IWU in the FP by means of a nominal, reference V.24 interface to ITU-T-specified Data Circuit-terminating Equipment (DCE). This subclause will describe how CCITT Recommendation V.24 [11] signalling should take place in the TAF and in the IWU.

This subclause (and related subclauses) do not specify or require the physical realization of V.24 capable interfaces for equipment claiming support of this interworking annex. Instead they require only the logical realization of equivalent functionality with the aim of DECT air interface interoperability.

A.1.5.2   Reference configuration

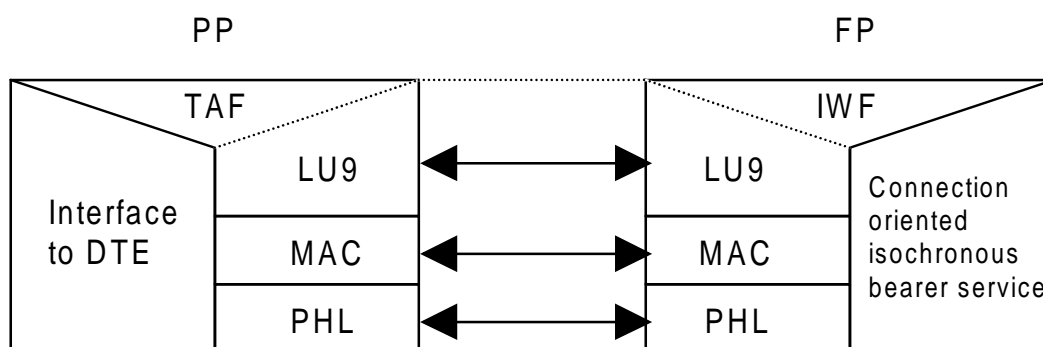The reference configuration is illustrated in figure A.2.

Figure A.2: The reference configuration

A.1.5.3   TAF Interworking to V.24

A.1.5.3.1   General

The V.24 TAF emulates DCE towards the DTE while interworking the V.24 status to the CC and DLC primitives. The implementation of the V.24 interface is not mandatory in the context of this interworking annex, but if the V.24 interface is implemented physically or logically in the TAF then the provisions of this subclause are mandatory.

A.1.5.3.2   V.24 Interchange circuit handling rules

The circuit 108/2 (DTR) is required to be in the ON state before the Portable radio Termination/Terminal Adaptation Function (PT/TAF) may initiate connection establishment (manual or automatic). The circuit 108/2 (DTR) may be used to indicate with ON state to the PT/TAF that the DTE is ready to accept an incoming connection.

In the active state, the 108/2 (DTR) transition from ON to OFF state shall cause the TAF to release the connection, after an implementation-specific time-out.

If 108/2(DTR) is OFF, the TAF shall respond to receiving a page for an incoming connection by turning ON circuit 125 (RI). If circuit 108/2(DTR) goes ON in this condition, the TAF shall complete the requested connection establishment. It shall be an implementation-specific feature for the TAF to time-out if circuit 108/2(DTR) does not go ON in this condition, in which case it shall not respond the incoming connection request. The TAF may also release or ignore the connection independently of the state of circuit 108/2 (DTR), for implementation-specific reasons.

The status change of circuit 107 (DSR) from OFF to ON by PT/TAF shall indicate to the DTE that a successful DTE to DCE, and vice-versa, connection has been established.

The status change of 107 (DSR) from ON to OFF by PT/TAF shall indicate to the DTE that the connection has been released. Circuit 107 (DSR) shall be turned OFF when the PT to FT connection is released.

Circuit 109 (DCD) and 106 (CTS) may be turned ON by the PT/TAF, when a DLU-LU9_CTRL.ind primitive is received reporting these circuits ON during the call establishment, indicating to the DTE the successful establishment of a data carrier to the far-end DCE (e.g. modem), and the availability of service for end-to-end data transfer. PT/TAF shall transfer the status of circuit 106 (CTS) during the call, as indicated by the DLU-LU9_CTRL.ind primitive, managing momentary unavailability of the fixed network connection due to for example modem retrains and/or rate renegotiation. PT/TAF shall turn OFF circuit 109 (DCD) if the value of this circuit, as transferred by a DLU-LU9_CTRL.ind primitive, is set to OFF, or if the call is released. PT/TAF shall be responsible for turning circuit 109 (DCD) OFF before circuit 107 (DSR) is turned OFF if it is not already OFF. The status of circuits 105 (RTS) shall not be conveyed across the radio interface.

A.1.5.3.3   Call establishment signalling handling

The TAF shall control connection establishment by means of the relevant U-DLC primitives, in accordance with subclause A.1.3. Information about the state of call establishment may be transferred by the TAF to the DTE using V.24 control signals or locally defined means. In particular, the TAF shall include means to provide notification to the DTE or the user of the successful establishment of an active connection.

A.1.5.3.4   Data transmission

The data is interworked to LU9 in the PP as described in annex A of the D.2 profile, EN 301 238 [10]. For the purposes of this interworking annex the connection over the LU9 service is always a duplex service.

Where octet integrity is available (e.g. 8 bit data asynchronous) to and from the PP application the TAF shall maintain this integrity with respect to the receiving and transmitting of user data via LU9.

A.1.5.4   DECT FP Interworking procedures
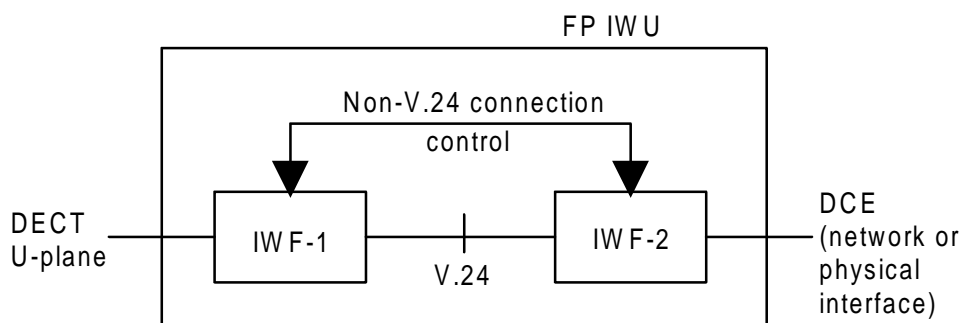
A.1.5.4.1   General

Figure A.3: FP IWU reference configuration

This subclause specifies the interworking procedures for the IWU of the fixed side isochronous bearer service. This IWU is split into 2 sub-functions called IWF-1 and IWF-2 as shown in figure A.3. IWF-2 is the only function which is attached to the local fixed network. From the perspective of the PP it is IWF-2 which provides an isochronous bearer service which is uniquely associated with the FP identity. Typically such a service will be an audio or video stream which requires isochronous data transport.

Issues related to call control or establishment in the attached network are outside the scope of the mobility class 1 type D data service profile. These may be pre-configured (e.g. a hot-line) or managed through V.24 in-band signalling such as V.25bis. Where call-control services are required, such as voice-band modem services, it is strongly recommended that the mobility class 2 type D profile, EN 301 238 [10], is used instead.

The FP IWU reference configuration defines a logical V.24 reference point between IWF-1 and IWF-2. This is used to simplify the specification of the interworking of the U-plane data to various isochronous data bearer services by specifying the DECT service relative to the well standardized V.24 interface. This shall not in any way restrict the implementation of the FP IWU. In addition, the V.24 logical interface shall support primitives for transferring in-band rate changes from IWF-2 to IWF-1, for example due to modem rate re-negotiation procedures.

IWF-1 shall provide the PP TAF transmission clock to IWF-2, as regenerated by means of the DIC functionality, if provided. IWF-1 shall transfer to the PP TAF the clock signal coming from IWF-2 by means of the same functionality.

A.1.5.4.2   Call establishment signalling handling

The IWU shall control connection establishment by means of the relevant U-DLC primitives, in accordance with subclause A.1.4. Information about the state of call establishment may be transferred by the IWU to the DCE using V.24 control signals or locally defined means. In particular, the IWU shall include means to provide notification to the DCE or the user of the successful establishment of an active

A.1.5.4.3   V.24 interchange circuit handling rules

Circuit 107 (DSR) is required to be in the ON state before the IWF-1 may transmit data on circuit 103 (TXD).

The state of circuit 125 (RI) may be used by IWF-1 to initiate paging for the establishment of a connection to the appropriate PP. Alternatively the presence of an incoming call, connection or data shall be interworked from the DECT network by the IWF-2. The IWF-1 shall transfer the value of circuits 109 (DCD) and circuit 106 (CTS) in DLU9_CONTROL.req primitives using the codings defined in annex A of the D.2 profile, EN 301 238 [10].

Data received via DLU_DATA-req primitives shall be interworked to circuit 103 (TXD). Data received on circuit 104 (RXD) shall be interworked to DL_U_DATA-ind.

A.1.5.4.4   DCE selection

The selection of the DCE, interface, service or network end point in the DECT local network and the associated service parameters shall be made on the basis of the pre-configured data entered into the FP as defined in clause 11.

A.1.5.4.5   Data transmission

The data is interworked for LU9 in the FP as described in annex A of the D.2 profile, EN 301 238 [10]. For the purposes of this interworking annex the connection over the LU9 service is always a duplex service.

Where octet integrity is available (e.g. 8 bit data async) to and from the DECT local network the IWF shall maintain this integrity with respect to the receiving and transmitting of user data via LU9.

History

Document history				
V1.1.1	August 1997	Public Enquiry	PE 9748:	1997-08-01 to 1997-11-28
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