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Foreword

This final draft European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Voting phase of the ETSI standards approval procedure.

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1 Scope

This European Telecommunication Standard (ETS) defines a profile for Digital European Cordless Telecommunications (DECT) systems conforming to ETS 300 175 parts 1 to 9 [1] to [9]. It is part of a family of profiles that build upon and extend each other, aimed at the general connection of terminals supporting non-voice services to a fixed infra-structure, private and public.

This ETS defines the types A and B services, mobility class 2 as referred to in ETR 185 [14].

This ETS supports the type A and B services using the frame relay service defined fully in ETS 300 435 [12]. Type A is optimised for low power and simplicity, while type B is optimised for high speed and throughput. Both are fully compatible and can interwork with each other.

This ETS is intended for use in roaming applications and so specifies mobility class 2. It therefore specifies the use of the network layer Call Control (CC) and Mobility Management (MM) entities, and the Data Link Control (DLC) layer LAP-C and Lc entities.

This ETS integrates the frame relay service with a fully functional Control plane (C-plane). It therefore supports interworking with all connectionless networks supported by the type A and B mobility class 1 services while removing the restrictions of closed user group operation. It extends, without modifying, the interworking conventions of the type A and B mobility class 1 services.

This ETS defines the specific requirements on the Physical (PHL), Medium Access Control (MAC), DLC and Network (NWK) layers of DECT. This ETS also specifies Management Entity (ME) requirements and generic Interworking conventions which ensure the efficient use of the DECT spectrum.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 175-1: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".

[2] ETS 300 175-2: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical Layer".

[3] ETS 300 175-3: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer".

[4] ETS 300 175-4: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer".

[5] ETS 300 175-5: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".

[6] ETS 300 175-6: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing".

[7] ETS 300 175-7: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".

[8] ETS 300 175-8: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech coding and transmission".

[9] ETS 300 175-9: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common Interface (CI); Part 9: Public Access Profile (PAP)".

[10] ETS 300 444: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Generic Access Profile (GAP)".

[11] ISO 8802: "Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- Specific requirements".

[12] ETS 300 435: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Data Services Profile (DSP); Base standard including interworking to connectionless networks (service types A and B, class 1)".

[13] prETS 300 651: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Data Services Profile (DSP); Generic data link service; Service type C, class 2".

[14] ETR 185: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Data Services Profile (DSP); Profile overview".

[15] RFC 791 (September 1981): "Internet Protocol".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply.

mobility class 1: Local area applications, 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.

multiframe: A repeating sequence of 16 successive Time Division Multiple Access (TDMA) frames, that allows low rate or sporadic information to be multiplexed (e.g. basic system information or paging).

service type A: Low speed frame relay, with a net sustainable throughput of up to 24 kbits/s, optimised for burst data, low power consumption and low complexity applications such as hand-portable equipment.

service type B: High performance frame relay, with a net sustainable throughput of up to 552 kbits/s, optimised for high speed and low latency with burst data. Equipment implementation the type B profile shall inter-operate with type A equipment.

service type C: Non-transparent connection of data streams requiring Link Access Protocol (LAP) services, optimised for high reliability and low additional complexity. This builds upon the services offered by the type A or B profiles.

TDMA frame: A time-division multiplex of 10 ms duration, containing 24 successive full slots. A TDMA frame starts with the first bit period of full slot 0 and ends with the last bit period of full slot 23.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

CC	Call Control
C-plane	Control plane
DECT	Digital European Cordless Telecommunications
DLC	Data Link Control. Layer 2b of the DECT protocol stack
FP	Fixed Part
IP	Internet Protocol
IPUI	International Portable User Identity
IWF	Interworking Functions
IWU	Interworking Unit
LAN	Local Area Network
LAP	Link Access Procedure
LAP-C	A DLC layer C-plane entity
LLME	Lower Layer Management Entity
LSB	Least Significant Bit
MAC	Medium Access Control. Layer 2a of the DECT protocol stack
ME	Management Entity
MM	Mobility Management
MSB	Most Significant Bit
NWK	Network
PARK	Portable Access Rights Key
PHL	Physical (layer)
SDU	Service Data Unit
TDMA	Time Division Multiple Access
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.

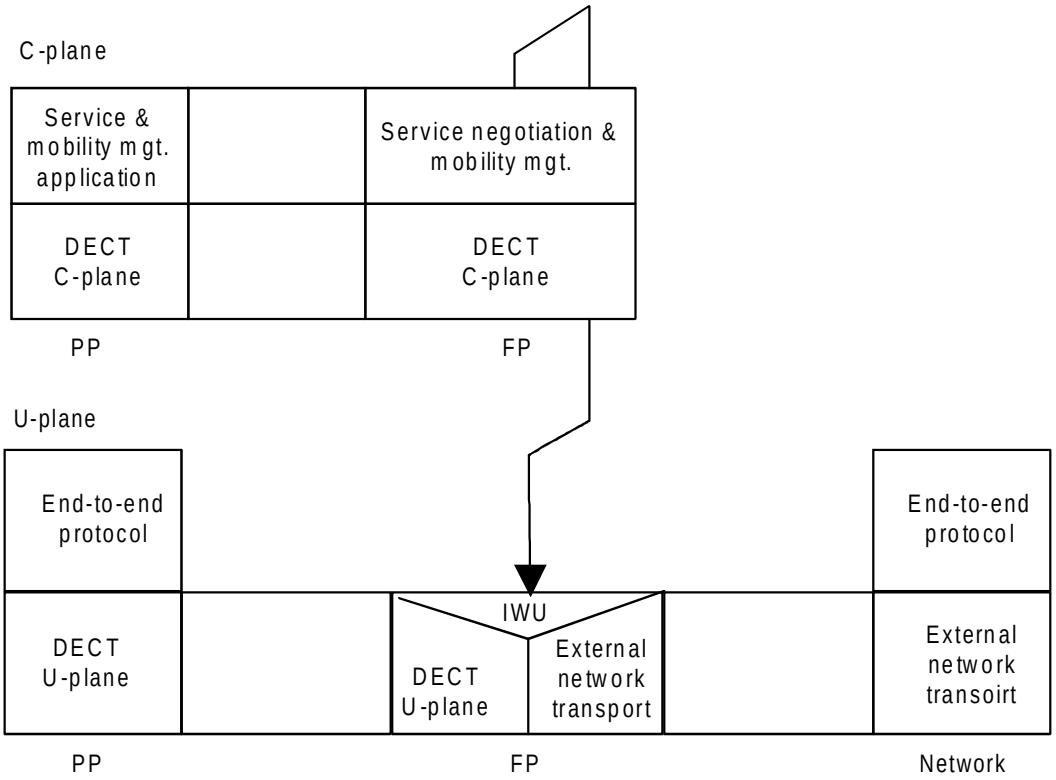

Figure 1: Profile reference configuration showing permanent virtual circuit interworking

The profile reference configuration is based upon the following principles:

- applications of this profile are treated as those which do not require DECT signalling to control external network connections;

- U-plane functionality is seen as being identical to that of the type A and B mobility class 1 services. C-plane functionality replaces the implicit parameters of class 1 with the explicit service negotiation, mobility management (mgt.) and call control procedures of mobility class 2;

- this profile offers a service which is analogous to a permanent virtual circuit service, i.e. DECT is required to provide an appropriate bearer as far as the Interworking Unit (IWU), where interworking is performed with a network that is either connectionless or uses application-based in-band signalling for connection control. In this case, the negotiated characteristics of the DECT connections include the DECT bearer parameters, the choice of IWU, together with mobility aspects such as location and operator choice.

4.2 Service objectives

The profile has the same service objectives for the U-plane as those listed in ETS 300 435 [12], subclause 4.2.

The service objectives for the C-plane are those of mobility class 2, as described in ETS 300 651 [13], subclause 4.2 and reproduced here for convenience.

Mobility class 2 uses the CC and MM entities of the DECT NWK layer (ETS 300 175-5 [5]) to enable the provision of facilities akin to those provided by the C-plane of the GAP (see ETS 300 444 [10]).

CC provides facilities for the establishment, maintenance and release of a call and for support of call-related signalling. The CC entity allows support of service negotiation during the establishment phase, permitting the flexibility of specifying the service of the call during the call initiation process. Thus, unlike mobility class 1, call attributes can be invoked on a call-by-call basis and multiple service attributes can be supported with a single terminal identity. In addition, the likelihood of obtaining service is increased even when the full service attributes supported by the fixed part are not known to the portable prior to the service request.

MM provides procedures which support the roaming of a portable, both within a single FP coverage area and between adjacent and non-adjacent FP coverage areas. The portable may use location procedures to signal its presence to the FP and thus receive incoming calls. Identification and authentication procedures allow a portable and FP to verify the authenticity of each other, while access to (subscribed) services is controlled by procedures which allow the installation and the removal of the appropriate International Portable User Identities (IPUIs) and Portable Access Rights Keys (PARKs) required by a portable. The use of encryption is managed by cipher procedures.

5 Physical layer requirements

The requirements of the service types A and B, defined in ETS 300 435 [12] shall apply.

6 MAC layer requirements

The requirements of the service types A and B, defined in ETS 300 435 [12] shall apply including those elements described as conditional on the presence of mobility class 2.

7 DLC layer requirements

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

7.1 C-plane requirements

The DLC C-plane shall provide the data link class A service (LAP-C + Lc) and the broadcast service (Lb), as defined in ETS 300 175-4 [4]. Annexes D and E of ETS 300 651 [13] specify the requirements of this profile.

7.2 U-plane requirements

The requirements of the service types A and B, mobility class 1, defined in ETS 300 435 [12] shall apply.

8 Network layer requirements

The requirements of the service type C, mobility class 2, defined in ETS 300 651 [13] shall apply with the following exception:

The Extended Higher Layer Fixed Part Information field shall be used with bit a46 set to 1, indicating the support of the AB2 profile.

9 ME requirements

In addition to the requirements of the type A and B services, the management entity shall be responsible for maintenance and updating of the logical associations between NWK, DLC, MAC and U-plane entities and shall contain the following procedure groups defined in ETS 300 175-4 [4]:

- MAC connection management;
- DLC C-plane management;
- DLC U-plane management.

In addition the ME shall contain the following procedure groups defined in ETS 300 175-5 [5]:

- service mapping and negotiation;
- service modification;
- resource management;
- management of MM procedures;
- call ciphering management;
- external handover management.

The requirements of mobility class 2 shall be met by the management procedures defined in ETS 300 444 [10].

9.1 Management procedures required when interworking to connectionless networks

The Lower Layer Management Entity (LLME) shall ensure that a link is either suspended or released after no greater than 5/n seconds, where n = number of bearers, after the last non-point-to-multipoint Service Data Unit (SDU) in the IWU buffer has been successfully transferred. The presence of point-to-multipoint SDUs in a buffer shall by itself neither cause the establishment or resumption nor the maintenance of a DECT link.

The ME may choose at any time to suspend or release the link for implementation-specific reasons. In any case, the ME shall at least suspend the link if:

- the data flow ceases for more than five seconds; and
- the ME has been in "Link Active" state for more than five seconds.

9.1.1 Link suspension

If the ME requires a link suspension, it shall issue a MNCC_MODIFY.req primitive specifying a suspension and shall await a MNCC_MODIFY.cfm primitive. If this primitive notifies failure, the management entity need not take any action. If this primitive notifies success, it shall enter the "Link Suspended" state.

If the ME receives a MNCC_MODIFY.ind primitive specifying a suspension, it shall wait until it has ceased to receive data from the U-plane and then enter the "Link Suspended" state.

9.1.2 Link release

To release the link, the ME shall issue a MNCC_RELEASE.req primitive and shall then enter the "No Link" state.

If the ME receives a MNCC_RELEASE.ind primitive, it shall enter the "No Link" state.

10 Generic interworking conventions and procedures

The interworking conventions and procedures defined for the types A and B, mobility class 1 service given in ETS 300 435 [12] shall apply.

10.1 Generic interworking conventions and procedures required when interworking to connectionless networks

10.1.1 Link establishment

If data is to be sent but no link is established (the "No Link" state), the ME shall issue an MNCC_SETUP.req primitive and shall enter the "Link Requested" state.

In the "Link Requested state", if the ME receives a MNCC_REJECT.ind primitive or a MNCC_RELEASE.ind primitive, it shall return to the "No Link" state. Its subsequent action shall be locally determined on the basis of the release reason contained in the primitive.

In the "Link Requested" state, if the ME receives an MNCC_CONNECT.ind primitive it shall enter a "Link Active" state.

Upon the receipt of a MNCC_SETUP.ind primitive, the ME shall determine that the service requested may be offered, and if so it will issue a MNCC_CONNECT.req primitive and enter the "Link Active" state. If the service cannot be supported, it will issue a MNCC_REJECT.req, indicating a release reason, and will return to the "No Link" state.

10.1.2 Link resumption

If data is to be sent and the link is suspended then the ME shall issue a MNCC_MODIFY.req primitive, specifying link resumption, and shall await an MNCC_MODIFY.cfm primitive. If this primitive notifies success, then the ME shall enter the "Link Active" state. If the primitive notifies failure, the subsequent action of the ME shall be locally determined on the basis of the failure reason contained in the primitive.

If the ME receives an MNCC_MODIFY.ind primitive, it shall enter the "Link Active" state.

Annex A (normative): Interworking conventions to specific networks

A.1 Interworking specific codings

A.1.1 IWU attribute codings

Devices implementing the Interworking Units described in this annex shall use the following IWU-Attribute coding:

Bit: 8	7	6	5	4	3	2	1	Octet:
0	<< IWU-ATTRIBUTES >>							1
Length of Contents (L)								2
1	CodeStd		Profile					3
	0	1	0	0	0	0	0	
1	Negotiation indicator			A/B	Profile subtype			4
0	Maximum SDU size (Most significant 7 bits)							5
1	Maximum SDU size (Least significant 7 bits)							5a
1						IP Addr Plan		6 (optional)

Figure A.1

Negotiation indicator (octet 4):

Bits	7 6 5	Meaning
	0 0 0	Negotiation not possible
	0 1 0	Peer attribute negotiation
	1 0 0	Exchanged attribute negotiation
	1 1 0	Exchanged attribute negotiation and Peer attribute negotiation

All other values are reserved

Profile Type A/B coding (octet 4):

Bits	4	Meaning
	0	Type A
	1	Type B

Profile subtype (octet 4):

Bits	3 2 1	Meaning
	0 0 0	Interworking to ISO 8802.3 (Ethernet) (clause A.2)
	0 0 1	Interworking to ISO 8802.5 (Token Ring) (clause A.3)
	1 0 0	Interworking to Internet Protocol (IP) (clause A.4)

All other values are reserved

Maximum SDU size (octets 5 and 5a):

This 14 bit word represents the natural binary coding of the maximum SDU length in units of eight octets used for data transmission, with the least significant bit in position 1 of octet 5a.

IP address plan (octet 6) (Optional):

This octet may be optionally included only if the 'Profile Subtype' is: 'Interworking to Internet Protocol (IP)'. If the 'Profile Subtype' is: 'Interworking to Internet Protocol (IP)' and this octet is omitted then the default value shall be used.

This facility has been specifically included to cater for the increasing trend of using IP networks for closed user groups, the so called Intra-nets. It allows routing (in the fixed network) of IP packets, independent of their IP address, to either the global Internet, or service provider or customer specific closed user groups.

Bits	2 1	Meaning
	0 0	Global IP address (default)
	0 1	Service provider specific IP address
	1 0	Customer specific IP address
	All other values are reserved	

A.1.2 IWU attributes implemented

Table A.1

Supported parameters						
Field no.	**Name of fields**	**Ref.**	**Protocol Status**	**Supp**	**Values**	
					Allowed	**Supported**
1	ID of IWU attributes of variable length	note 1	M		18	
2	Length of Contents (L)	note 2	M		0-255	5-9
3	Coding standard	note 2	M		1	
3	Profile	note 2	M		0-3,8-12	0
4	Negotiation indicator	note 2	M		0,2,4,5	
4	Profile Type A/B coding	A.1.1	I	M	0-1	
4	Profile subtype	A.1.1	M		0-7	0-1, 4
5,5a	Maximum SDU size	A.1.1	I	M	0 - 131064	
6	IP Address Plan	A.1.1	I	note 3	-, 0-2	

NOTE 1: See 2nd edition of ETS 300 175-5 7.7.1.
NOTE 2: See 2nd edition of ETS 300 175-5 7.7.21.
NOTE 3: 'O' if 'Profile Subtype' is 'Interworking to Internet Protocol (IP)', or else 'X'.

A.2 ISO 8802.3 (Ethernet)

The provisions of this clause shall apply if interworking to ISO 8802.3 [11] (Ethernet) LANs is provided.

A.2.1 Reference configuration

The reference configuration for this specific interworking convention shall be as shown in figure A.2.

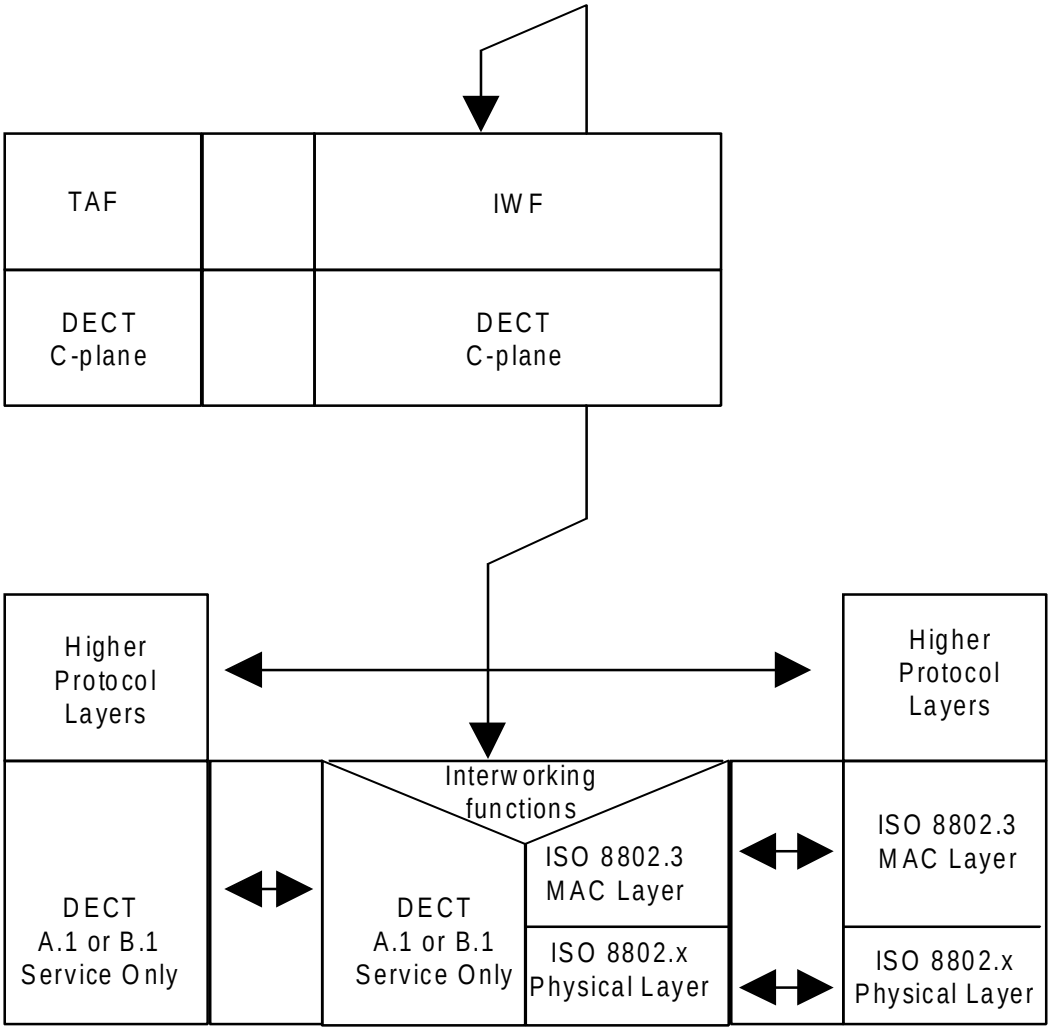

Figure A.2: Profile reference configuration showing interworking to ISO 8802.3 type LANs

A.2.2 Global assumptions

The profile reference configuration is based upon the principles stated in subclause 4.1 and the following:

- interworking is a bridging function with a network conforming to ISO 8802.3 [11].

It shall use the U-plane conventions described in clause B.1 of ETS 300 435 [12] and the C-plane conventions described in clauses 9 and 10 of this profile.

A.3 ISO 8802.5 (token ring)

The provisions of this clause shall apply if interworking to ISO 8802.5 [11] (token ring) LANs is provided.

A.3.1 Reference configuration

The reference configuration for this specific interworking convention shall be as shown in figure A.3.

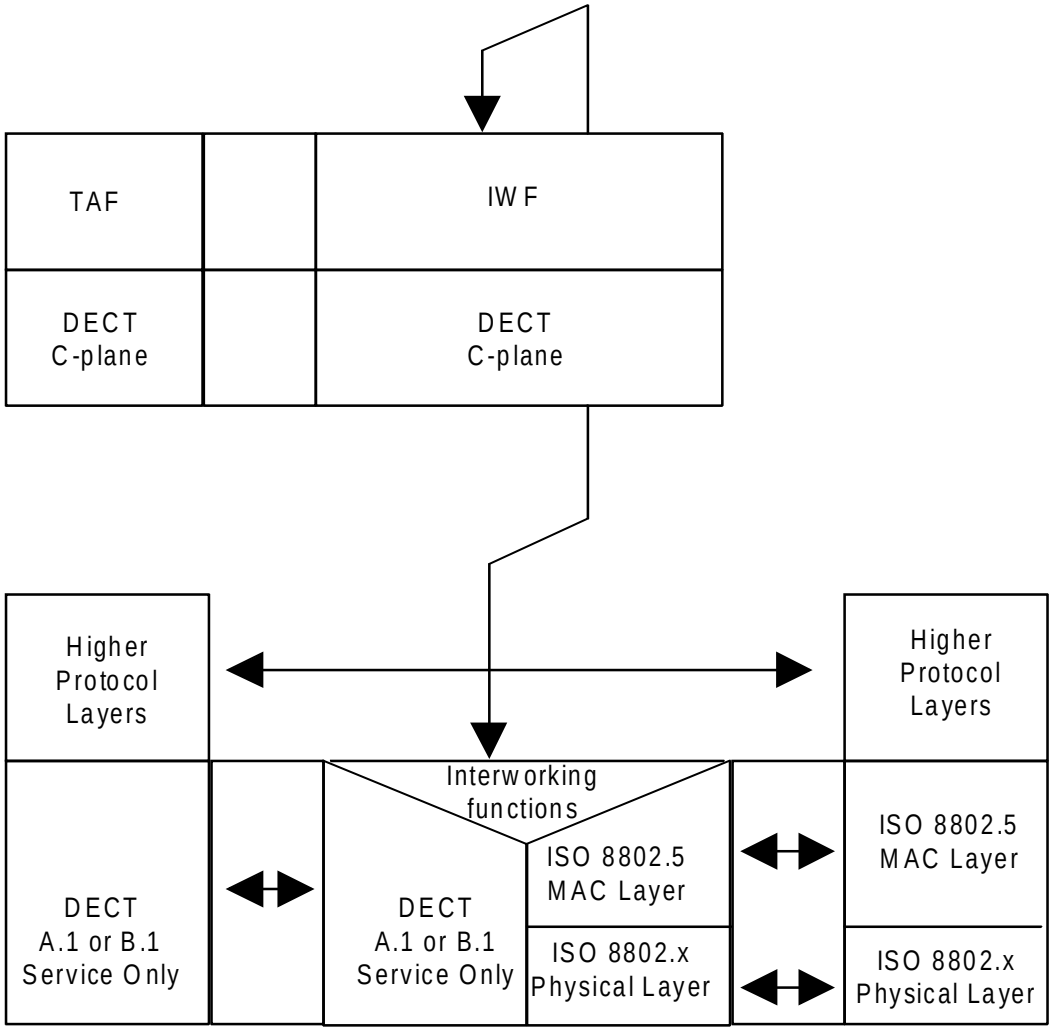

Figure A.3: Profile reference configuration showing interworking to ISO 8802.5 type LANs

A.3.2 Global assumptions

The profile reference configuration is based upon the principles stated in subclause 4.1 and the following:

- interworking is a bridging function with a network conforming to ISO 8802.5 [11].

It shall use the U-plane conventions described in clause B.1 of ETS 300 435 [12] and the C-plane conventions described in clauses 9 and 10 of this profile.

A.4 Internet protocol

The provisions of this clause shall apply if interworking to Internet Protocol (IP) networks version 4 (RFC 791 [15]) or higher is provided.

A.4.1 Reference configuration

The reference configuration for this specific interworking convention shall be as shown in figure A.4.

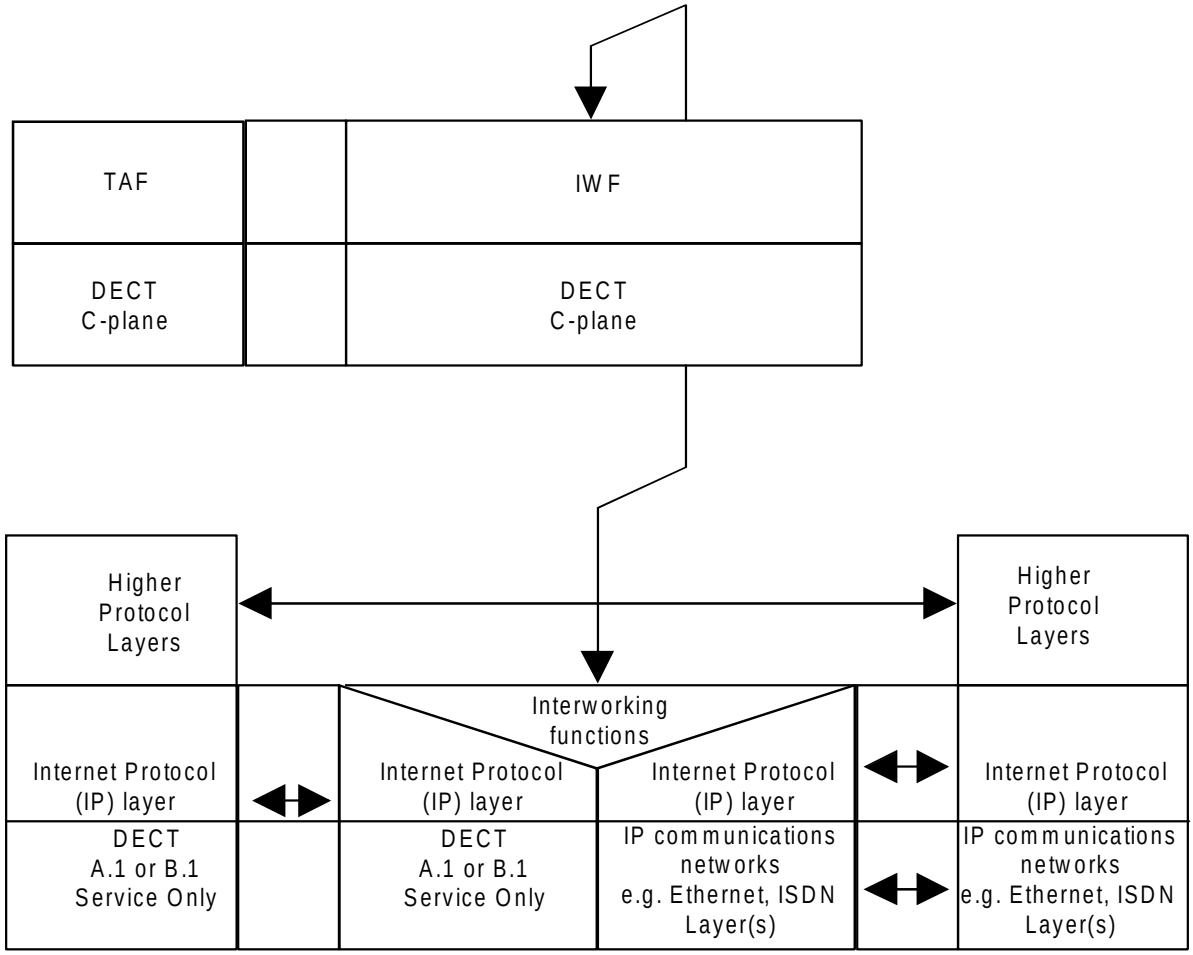

Figure A.4: Profile reference configuration showing interworking to IP networks

A.4.2 Global assumptions

The profile reference configuration is based upon the principles stated in subclause 4.1 and the following:

- interworking is a IP datagram/packet routing function with a network supporting the IP, RFC 791 [15], version 4 or higher.

It shall use the Management Entity requirements and the Generic interworking conventions and procedures described in clauses 9 and 10 of this profile.

The implementation of the IP Communications Network is out of scope for this profile reference configuration.

A.4.3 U-plane interworking conventions

The conditions of clause 10 of ETS 300 435 [12] shall be adhered to in addition to the following:

IP datagrams/packets are transmitted directly as a single U-plane DLC layer LU2 SDU, as specified in clause 7 of ETS 300 435 [12]. The SDU contains the IP header followed immediately by the IP data. Since these LU2 SDUs can be an arbitrarily short length there are no requirements for adding fill fields or padding before transmission of IP packets as LU2 SDUs.

The broadcast Internet address (the address on that network with a host part of all binary ones) (point-to-multipoint packets) shall be transmitted by the FP over the connectionless downlink, and may also be transmitted over previously established connections, as specified in clause 10 of ETS 300 435 [12].

As described in Appendix B of RFC 791 [15], version 4, the IP datagram/packet is transmitted over the DECT air interface as a series of 8-bit octets. The Most Signifcant Bit (MSB) of each octet shall be transmitted first and the Least Significant Bit (LSB) last.

History

Document history			
August 1996	Public Enquiry	PE 99:	1996-01-01 to 1996-04-26
August 1996	Vote	V 108:	1996-08-05 to 1996-09-27