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EUROPEAN TELECOMMUNICATION STANDARD

pr **ETS 300 756**

May 1996

Source: ETSI TC-RES

Reference: DE/RES-03071

ICS: 33.060, 33.060.20

Key words: DECT, GSM, Data

Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/ Global System for Mobile communications (DECT/GSM) interworking profile; Implementation of bearer services

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Foreword

This draft European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee in cooperation with the Global System for Mobile Communication (GSM) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

Introduction

This ETS is a part of a set of standards for the DECT/GSM Interworking Profile (IWP) concept that includes:

- general description of service requirements, functional capabilities and information flows, (ETS 300 466 [17]);

- access and mapping (protocol/procedure description for 3,1 kHz speech service), (ETS 300 370 [31]);

- GSM-MSC/DECT-FP fixed interconnection (ETS 300 499 [35]);

- GSM Phase 2 supplementary services implementation (ETS 300 703 [C1]);

- implementation of bearer services (this ETS).

Other standards of the DECT/GSM IWP are expected to describe:

- short message services, point-to-point and cell broadcast (DE/RES-03057 [C2]);

- implementation of facsimile group 3 (DTR/RES-03058 [C3]).

This ETS is based on Digital Enhanced Cordless Telecommunications (DECT) common interface specification ETS 300 175 [1] - [9] to enable DECT terminals to interwork in the public and private environment with DECT systems which are connected to a Global System for Mobile communications (GSM) core infrastructure.

In addition, this ETS is based on the DECT Generic Access Profile (GAP), ETS 300 444 [10], to enable the same DECT/GSM terminal to interwork with a DECT Fixed Part (FP) complying to the GAP requirements, irrespective of whether this FP provides residential, business or public access services. General attachment requirements and speech attachment requirements are based on TBR 6 [36] and TBR 10 [37].

Further details on the DECT system may be found in ETR 015 [14], ETR 043 [15], ETR 056 [16] and ETS 300 176 [12].

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 draft European Telecommunication Standard (ETS) is a part of the Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) Interworking Profile and specifies the PP interworking requirements and FP interworking requirements/mappings necessary to ensure that the GSM bearer services can be provided over DECT, as specified in ETS 300 466 [17]. To enable DECT terminals to interwork with DECT systems which are connected to the GSM infrastructure, from the DECT side this ETS is based on the DECT/GSM interworking profile, access and mappings ETS 300 370 [31], as well as the DECT data service profile, generic data link service, service type C, Class 2, ETS 300 651 [30].

NOTE: For information, the DECT data service profile is based upon the GAP ETS 300 444 [10] and on the DECT common interface specification ETS 300 175 [1] - [9].

Interworking functions/mappings are specified for Mobile Switching Centre (MSC) attachment for the DECT FP as the FP is using the A-interface towards the GSM MSC in the respect that the FP emulates a GSM Base Station Controller (BSC) with regards to the GSM messages which are relevant to this ETS. The complete interface used between the DECT Fixed Part (FP) and the GSM Mobile Switching Centre (MSC) is specified in ETS 300 499 [35]. Attachment via other interfaces to GSM-networks is outside the scope of this ETS.

The DECT access protocols and FP and PP interworking/mappings necessary for the support of basic voice telephony service are specified in ETS 300 370 [31]. The interworking/mappings and access requirements for the support of GSM phase 2 supplementary services are specified in ETS 300 703 [C1]. Support of short message services point-to-point and cell broadcast is under preparation in DE/RES-03057 [C2]. Support of facsimile is under preparation in DTR/RES-03058 [C3].

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 (1995): "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Generic Access Profile (GAP)".

[11] ETS 300 331: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); DECT Authentication Module (DAM)".

[12] I-ETS 300 176: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Approval test specification".

[13] 91/263/EEC: "Council Directive of 29 April 1991 on the approximation of the laws of the Member states concerning telecommunications terminal equipment, including the mutual recognition of their conformity". (Terminal Directive).

[14] ETR 015: "Radio Equipment and Systems; Digital European Cordless Telecommunications (DECT); Reference document".

[15] ETR 043: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Common interface; Services and facilities requirements specification".

[16] ETR 056: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); System description document".

[17] ETS 300 466: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications/Global System for Mobile Communications (DECT/GSM) interworking profile; General description of service requirements; Functional capabilities and information flows".

[18] ECMA TR/44 (1989): "An architectural framework for private networks".

[19] ETR 099: "European digital cellular telecommunications system (Phase 2); General description of a GSM Public Land Mobile Network (PLMN) GSM Public Land Mobile Network (PLMN) (GSM 01.02)".

[20] ETR 100: "European digital cellular telecommunications system (Phase 2); Abbreviations and acronyms (GSM 01.04)".

[21] ETS 300 522: "Digital cellular telecommunications system (Phase 2); Network architecture (GSM 03.02)".

[22] ETS 300 551: "European digital cellular telecommunications system (Phase 2); GSM Public Land Mobile Network (PLMN) access reference configuration (GSM 04.02)".

[23] ETS 300 557: "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 specification (GSM 04.08)".

[24] ETS 300 580-1: "European digital cellular telecommunications system (Phase 2); Full rate speech processing functions (GSM 06.01)".

[25] ETS 300 590: "Digital cellular telecommunications system (Phase 2); Mobile-services Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification (GSM 08.08)".

[26] ETS 300 608: "European digital cellular telecommunications system (Phase 2); Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface (GSM 11.11)".

[27] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".

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

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

[30] 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".

[31] ETS 300 370: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) inter-working profile; Access and mapping (Protocol/procedure description for 3,1 kHz speech service)".

[32] ETS 300 582: "European digital cellular telecommunications system (Phase 2); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS) (GSM 07.01)".

[33] ETS 300 583: "European digital cellular telecommunications system (Phase 2); Terminal Adaptation Functions (TAF) for services using asynchronous bearer capabilities (GSM 07.02)".

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

[35] ETS 300 499: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications/Global System for Mobile Communications (DECT/GSM) interworking profile; Mobile services Switching Centre (MSC) - Fixed Part (FP) interconnection".

[36] TBR 6: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); General terminal attachment requirements".

[37] TBR 10: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); General terminal attachment requirements: Telephony applications".

[38] ETS 300 501: "European digital cellular telecommunications system (Phase 2); Bearer Services (BS) supported by a GSM Public Land Mobile Network (PLMN) (GSM 02.02)".

3 Definitions, abbreviations and symbols

3.1 DECT definitions

attach: The process whereby a PP within the coverage area of a FP to which it has access rights, notifies this FP that it is operative. The reverse process is detach, which reports the PP as inoperative.

NOTE 1: An operative PP is assumed to be ready to receive calls.

authentication: The process whereby a DECT subscriber is positively verified to be a legitimate user of a particular FP.

NOTE 2: Authentication is generally performed at call set-up, but may also be done at any other time (e.g. during a call).

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

NOTE 3: The DECT user-network interface corresponds to the top of the network layer (layer 3).

C-plane: The 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 4: 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 5: Call may sometimes be used to refer to processes of all layers, since lower layer processes are implicitly required.

DECT Network (DNW): A 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 6: A DECT Network (DNW) is a logical grouping that contains one or more fixed radio termination plus their associated portable radio termination. The boundaries of the DECT network are not physical boundaries.

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

NOTE 7: A DECT FP contains the logical elements of at least one fixed radio termination, plus additional implementation specific elements.

fixed part GSM PLMN attachment (DECT fixed part attached to a GSM MSC): A definition of a functional environment where a DECT system (FP) is attached to an GSM MSC. The MSC in this case refers to a functional entity providing the required MM and CC functionality defined in this ETS in order to communicate with the FP.

Fixed radio Termination (FT): A 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 fixed radio termination 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.

Generic Access Profile (GAP): A defined part of the DECT Common Interface standard (DECT CI) that ensures inter-operability between FPs and PPs for public business and residential access services.

geographically unique identity: This term relates to FP identities, Primary Access Rights Identities (PARIs) and Radio Fixed Part Identities (RFPIs). It indicates that two systems with the same PARI, or respectively two RFPs with the same RFPI, can not be reached or listened to at the same geographical position.

Global Network (GNW): A 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.

globally unique identity: The identity is unique within DECT (without geographical or other restrictions).

handover: The process of switching a call in progress from one physical channel to another physical channel. These processes can be internal (see internal handover) or external (see external handover).

NOTE 10: There are two physical forms of handover, intra-cell handover and inter-cell handover. Intra-cell handover is always internal. Inter-cell handover can be internal or external.

incoming call: A call received at a PP.

inter-cell handover: The switching of a call in progress from one cell to another cell.

internal handover: Handover processes that are completely internal to one Fixed radio Termination (FT). Internal handover re-connects the call at the lower layers, while maintaining the call at the NWK layer.

NOTE 11: The lower layer reconnection can either be at the Data Link Control (DLC) layer (connection handover) or at the MAC layer (bearer handover).

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

inter-operator roaming: Roaming between FP coverage areas of different operators (different service providers).

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

NOTE 12: The IWU will contain the interworking functions necessary to support the required sub-network interworking.

intra-cell handover: The switching of a call in progress from one physical channel of one cell to another physical channel of the same cell.

intra-operator roaming: Roaming between different FP coverage areas of the same operator (same service provider).

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

NOTE 13: The term does not include legal or regulatory aspects, nor does it indicate if the network is a public network or a private network.

locally unique identity: The identity is unique within one FP or location area, depending on application.

location area: The domain in which a PP may receive (and/or make) calls as a result of a single location registration.

location registration: The process whereby the position of a DECT portable termination is determined to the level of one location area, and this position is updated in one or more databases.

NOTE 14: These databases are not included within the DECT FT.

Medium Access Control (MAC) connection: An association between one source 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: A call originating from a PP.

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

NOTE 15: 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): A physical grouping that contains all elements between the user and the DECT air interface. PP is a generic term that may describe one or several physical pieces.

NOTE 16: A DECT PP is logically divided into one portable termination plus one or more portable applications.

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

NOTE 17: 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.

Radio Fixed Part (RFP): One physical sub-group of an FP that contains all the radio end points (one or more) that are connected to a single system of antennas.

registration: An ambiguous term, that should always be qualified. See either location registration or subscription registration.

roaming: The movement of a PP from one FP coverage area to another FP coverage area, where the capabilities of the FPs enable the PP to make or receive calls in both areas.

NOTE 18: Roaming requires the relevant FPs and PP to be inter-operable.

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

service type C: DECT data profile service providing 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.

subscription registration: The infrequent process whereby a subscriber obtains access rights to one or more FPs.

NOTE 19: Subscription registration is usually required before a user can make or receive calls.

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

3.2 Abbreviations

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

ARI	Access Rights Identity. See SARI and TARI
BCD	Binary Coded Decimal
BSC	GSM Base Station Controller
CC	Call Control
CI	Common Interface
CISS	Call Independent Supplementary Services
CK	Cipher Key.
CLMS	Connectionless Message Service
COMS	Connection Oriented Message Service
CRSS	Call Related Supplementary Services
DAM	DECT Authentication Module
DAM DA	DECT Authentication Module DECT Application
DAM GA	DECT Authentication Module, GSM Application
DECT	Digital Enhanced Cordless Telecommunications
DLC	Data Link Control, Layer 2b of the DECT protocol stack
DSAA	DECT Standard Authentication Algorithm
DTMF	Dual Tone Multi-Frequency
FP	Fixed Part, (see definitions)
FT	Fixed radio Termination, (see definitions)
GAP	Generic Access Profile
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Subscriber Identity
IPEI	International Portable Equipment Identity
IPUI	International Portable User Identity
ISDN	Integrated Services Digital Network
ISO	International Organisation for Standardisation
ISUP	Integrated Services Digital Network User Part
IWU	Interworking Unit, (see definitions)
K	authentication Key
LAPU	Link Access Procedure (U-Plane)
LCE	Link Control Entity
LLME	Lower Layer Management Entity
MAC	Medium Access Control, Layer 2a of the DECT protocol stack
MAP	GSM Mobile Application Part
MM	Mobility Management, a NWK layer functional grouping
MSB	Most Significant Bit
MS	Mobile Station
MSC	Mobile Switching Centre
NWK	Network, Layer 3 of the DECT protocol stack
OSI	Open Systems Interconnection
PA	Portable Application
PARI	Primary Access Rights Identity
PARK	Portable Access Rights Key
PCM	Pulse Coded Modulation
PE	Portable Equipment
PLMN	Public Land Mobile Network
PP	Portable Part
PSTN	Public Switched Telephone Network
PT	Portable radio Termination. See definition
PTNX	Private Telecommunications Network Exchange
PUN	Portable User Number
PUT	Portable User Type
RAND	A Random challenge issued by a FP
RES	A Response calculated by a PP
RFP	Radio Fixed Part, (see definitions)
RFPI	Radio Fixed Part Identity
RS	A value used to establish authentication session keys
SARI	Secondary Access Rights Identity
SS	Supplementary Services

SRES	A GSM specific authentication response calculated by the GSM SIM or the DAM
TAF	Terminal Adaptation Function
TARI	Tertiary Access Rights Identity
TMSI	Temporary Mobile Subscriber Identity
TPUI	Temporary Portable User Identity
TUP	Telephony User Part
UPI	User Personal Identification

3.3 GSM abbreviations and definitions

Definition and specific GSM abbreviations may be found in ETR 100 [20].

3.4 Symbols for status columns

The symbols defined in this subclause are applied for procedures, features, messages, information elements, fields and field codings in this ETS if not explicitly otherwise stated. The interpretation of status columns in all tables is as follows:

- M for mandatory to map/support/use;

- O for optional to map/support/use;

- I for out-of-scope (not subject for testing);

- X for prohibited or excluded to map/support/use (the message, information element may be allowed to be used in the standard/standards but it is not allowed to be mapped/used depending on the environment/dynamic conditions etc.);

- N/A or -(dash) for not applicable to map/support/use;

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

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

4 General

This ETS specifies how non-transparent GSM bearer services are provided over the DECT air interface.

One of the main objectives is to describe how the GSM bearer services are mapped across the DECT air interface in a formal way, so that inter-operability of different manufacturer's equipment can be achieved. This is done by describing the interworking unit procedures and mappings loosely following CCITT Recommendations Q.600-series of ITU-T Recommendations (Q.601 to Q.699) and by describing an air interface profile following ISO 9646-6 [28]. The later document enables the subsequent generation of tests cases, if required.

This ETS is made up of 3 main clauses:

Clause 5: Interworking requirements - includes reference configurations and the protocol architecture models. Also describes the main service requirements. The context of the interworking profile is also required.

Clause 6: Interworking Unit (IWU) mappings for bearer services shows the C-plane and U-plane mappings for the FP GSM PLMN attachment in respective order. Two IWUs are considered; the FP IWU and the PP IWU, although the FP IWU is expected to be the largest. The signalling mappings are 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 transferred transparently. These clauses also include other profile specific information.

Clause 7: Connection types - this clause identifies the main DECT connection types (U-plane + C-plane) at the air interface supporting optimised groups of services, from the IWU mappings for different configurations/models. Thus this subclause defines how alternate GSM bearer services can be selected through the DECT air interface.

5 Interworking requirements

5.1 General

This ETS defines the mandatory requirements for the FP in terms of interworking functions between the air interface and the external network as well as minimum requirements at the DECT air interface. It also defines the mandatory requirements for the PP in terms of interworking functions between the air interface and the PA as well as the minimum requirements for the PP at the DECT air interface.

Unless stated otherwise, the ETS 300 370 [31] requirements are the basis of this ETS.

The interworking mappings shall be based on the Phase 2 GSM standards.

The basis for interworking shall be the protocols defined in ETS 300 557 [23] and ETS 300 590 [25].

The procedures which are used depend on which Access Rights Identifier (ARI) type is chosen by the PP; either according to the minimum requirements of the C.2 profile annex C.2 or the procedures as described in this ETS; i.e. the PPs, which are based on this ETS, shall always be capable of interworking with FP which fulfil the minimum requirements of the C.2 profile, clause C.2. The FPs, which fulfil the requirements of this ETS, and which support also non-GSM ARIs (classes A, B or C) shall also support the minimum requirements of the C.2 profile, clause C.2.

NOTE: The data profile C, class 2, clause C.2 "Interworking to connection oriented bearer services" describes how interworking to public connection oriented network services by using C.2 profile can be achieved. The C-plane procedures required by the C.2 annex are based on those of a GAP (ETS 300 444 [10]) telephone with additional mandatory elements to cover data specific aspects of the call set-up.

The minimum requirement defined in the data profile service type C, class 2 ETS 300 651 [30], clause C.2 shall be fulfilled in the PT and FT.

This ETS defines interworking environments for the FP and the PP in the case when DECT FPs are functionally attached to the GSM MSC i.e. broadcast attribute a39 "SIM services available" set to '1'B in all environments (public, business and residential). The PP shall be in alignment with the requirements as defined in this ETS.

Figure 1 illustrates the access capabilities of the terminal supported by this ETS.

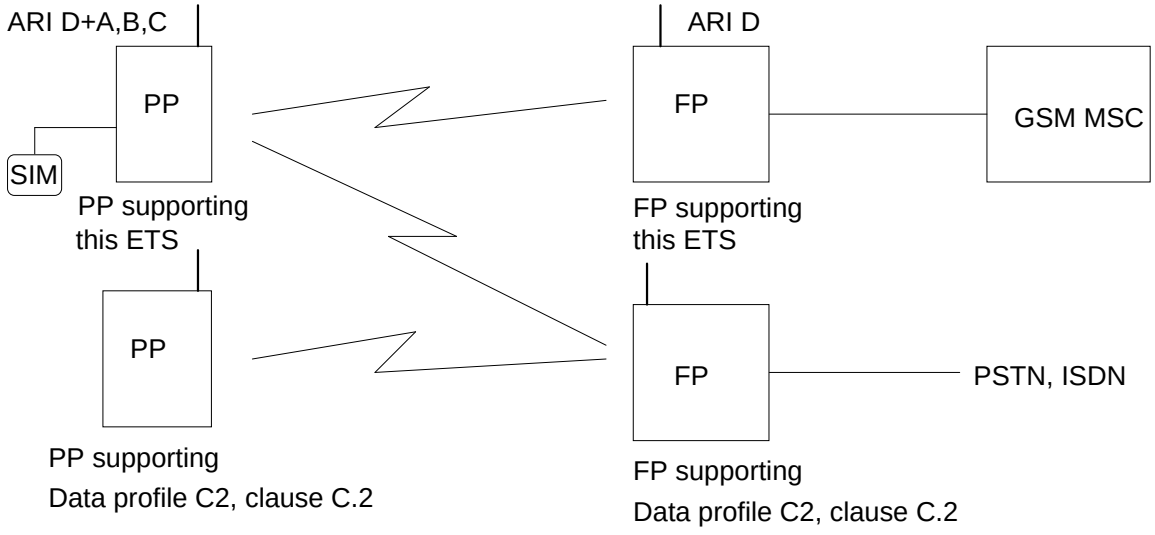

Figure 1: The profile access capabilities of terminals supported by this ETS

5.2 Reference configurations

The reference configuration of ETS 300 370 [31], subclause 5.2 shall apply.

5.3 General interworking model for FP GSM PLMN attachment

The general interworking model shown in figure 1 describes the general profile reference configuration of the FP and PP containing both control (C) and user (U) planes. The model also shows the location of the IWUs and the requirements of the air interface.

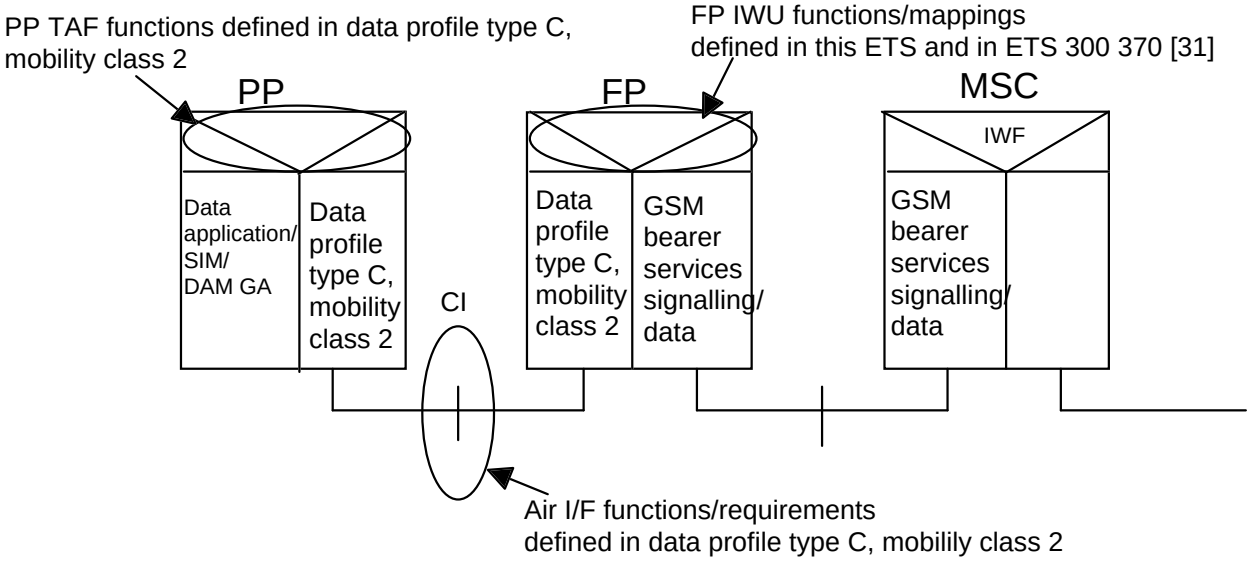

Figure 2: General interworking model for bearer services for FP GSM PLMN attachment

The C plane part of the IWU (figure 2) in the FP provides the mapping of the GSM MM (a subset of the GSM Layer 3) to the respective DECT layer 3 protocols (NWL/MM) and vice versa. The CC is composed of similar interworking model. The U plane part of the IWU in the FP provides the mapping of the GSM bearer service protocol layers to the respective DECT data profile layers and vice versa. The IWU in the PP provides the mapping of a subset of the DECT layer 3 protocols to the SIM/DAM GA. The Terminal Adaptation Function (TAF) is part of the IWU in the PP and it provides mapping of the DECT U-plane and C-plane data related to the end-to-end service to the data application or the data terminal. The PP TAF defined in the DECT data service profile, service type C, class 2 annex C.2 provides a CCITT Recommendation V.24 connection to the DECT data application.

5.4 Service requirements

General description of service requirements, functional capabilities and information flows are specified in ETS 300 466 [17]. The detailed information regarding the supported service and service types is as follows. Table 1 defines the GSM bearer services as described in ETS 300 501 [37] supported by this ETS. Only GSM non-transparent (NT) bearer services are supported by this ETS. The DECT air interface service used is non-transparent link (LAPU) providing a bit error rate of 10^{-9}.

NOTE: The rates defined in the table 1 are the rates that are used by the application. and the maximum rate is 9,6 kbit/s although the DECT data profile service type C.2 can provide in single slot operation up to 24 kbit/s rate on the air interface. This is due to the limitation of the GSM A interface

Table 1: The GSM bearer services supported by this ETS

Bearer service number	Bearer service name	Connection type
21	Asynchronous 300 bit/s	NT
22	Asynchronous 1,2 kbit/s	NT
23	Asynchronous 1200/75 bit/s	NT
24	Asynchronous 2,4 kbit/s	NT
25	Asynchronous 4,8 kbit/s	NT
26	Asynchronous 9,6 kbit/s	NT
31	Synchronous 1,2 kbit/s	NT
32	Synchronous 2,4 kbit/s	NT
33	Synchronous 4,8 kbit/s	NT
34	Synchronous 9,6 kbit/s	NT
41	PAD access 300 bit/s	NT
42	PAD access 1,2 kbit/s	NT
43	PAD access 1200/75 bit/s	NT
44	PAD access 2,4 kbit/s	NT
45	PAD access 4,8 kbit/s	NT
46	PAD access 9,6 kbit/s	NT

5.5 Interworking context

5.5.1 General

The CC entity of a PP and FP shall fulfil the requirements as defined in annexes F (C.2 PT NWK requirements) and G (C.2 FT NWK requirements) of the C.2 data profile with conditions to "circuit switched bearer services" and "GSM interconnection supported" and the requirements set in this ETS.

The CC specific requirements set by this ETS are listed in annexes A and B. Annex A lists profile specific requirements to the DECT network layer. Annex B lists all changes to the ETS 300 175-5 [5] that are required by this ETS and are due to be incorporated in the future second edition of ETS 300 175.

NOTE 1: Thus the CC entity in the FT and PT shall fulfil the minimum requirements of the C.2 data profile, ETS 300 651 [30], clause C.2. That is, the mandatory parts of the C.2 profile and ETS 300 651 [30] are mandatory for this ETS.

The MM entity in the FP and PP shall fulfil the minimum requirements of the ETS 300 651 [30].

NOTE 2: As a result this the PP profile also fulfils the minimum MM requirements of the C.2 data profile ETS 300 651 [30] and the GAP profile ETS 300 444 [10].

The minimum U-plane requirements in the FT and PT shall fulfil the C.2 data profile ETS 300 651 [30] requirements based on the service type A.

NOTE 3: The service type A refers to the data profile A/B (ETS 300 435 [34]) U-plane requirements, i.e. single slot functionality is the minimum requirement of the DECT lower layers.

This ETS does not require the support of the GAP based voice services i.e. the PP may be a data only terminal with the GSM access capabilities and a GSM subscription as defined in ETS 300 370 [31].

5.5.2 Basic interworking rules

The basic interworking rules defined in subclause 5.4.2 of ETS 300 370 [31] shall apply with following definitions:

- a FP belonging to ARI class D shall support this ETS;
- the profile as defined in this ETS may be used in association only with FPs with ARI class D;
- a PP belonging to ARI class D shall support this ETS in addition to the C.2 profile ETS 300 651 [30], clause C.2.

5.5.3 Interpretation of broadcast attributes

This subclause refers to annex F of ETS 300 175-5 [5] (Broadcast attributes coding). The codings are done as defined in ETS 300 370 [31] subclause 5.4.4 with the exceptions listed here.

a32 ADPCM/G.721 Voice service: may be set to value '1' (note);

a33 PAP/GAP voice supported: may be set to value '1' (note);

a34 Non-voice circuit switched service: shall be set to value '1'.

NOTE: This ETS does not require the support of the voice service.

5.5.4 Interpretation of terminal capability

If the <<TERMINAL CAPABILITY>> information element is used the following codings shall be used to indicate the support of this ETS.

Profile Indicator_1 Coding (Octet 4) of TERMINAL CAPABILITY information element:

Bits	7 6 5 4 3 2 1	Meaning
	x x x x 1 x x	GSM profile supported
	1 x x x x x x	data services profile C Class 2

Both codings are required.

6 Interworking mappings, FP attached to the GSM PLMN

6.1 FP C-plane IWU procedures

6.1.1 CC IWU procedures

6.1.1.1 General

The {CC-SETUP} shall contain the <<IWU ATTRIBUTES>> element. The <<IWU ATTRIBUTES>> information element shall define the GSM bearer service to be requested. The coding combinations used for alternate bearer services is defined in the clause 7 of this ETS.

Only BEARER CAPABILITY 1 is recognised in the GSM messages. That is, if a GSM Call Control message contains multiple BEARER CAPABILITY information elements only the first one shall be mapped to DECT <<IWU-ATTRIBUTES>> element and conveyed to PP.

The DECT <<IWU-ATTRIBUTES>> information element shall be mapped into GSM BEARER CAPABILITY element.

The LOWER LAYER COMPATIBILITY and HIGHER LAYER COMPATIBILITY information elements, if present in a GSM CC message, are carried with no mappings over the air interface as described in subclauses 6.1.5.1.2 and 6.1.5.1.3. The FP shall not do any mapping of these elements. The utilisation of these elements is a matter of the DECT data application in PP i.e. this ETS does not define their usage.

6.1.1.2 Outgoing data call (PP to FP)

The PT and FT shall support the dialling information included in the <<CALLED PARTY NUMBER>> information element of the {CC-INFO} message. If the <<CALLED-PARTY-NUMBER>> is in the {CC-INFO} the call establishment procedures shall be done as defined in ETS 300 370 [31] subclause 6.1.1.1 case b) with the additional mappings of <<CALLED PARTY NUMBER>> and <<IWU-ATTRIBUTES>> as defined in subclause 6.1.4 of this ETS. The service negotiation as described in subclause 6.1.1.3 shall be supported in addition to the ETS 300 370 [31] procedures.

The PT and FT may optionally support dialling information included in the <<CALLED PARTY NUMBER>> information element of the {CC-SETUP} message. If the <<CALLED-PARTY-NUMBER>> is in the {CC-SETUP} the procedures of the call establishment shall be done as defined in ETS 300 370 [31] subclause 6.1.1.1 case a) with the additional mappings of the <<IWU-ATTRIBUTES>> defined in subclause 6.1.4 of this ETS. The service negotiation as described in subclause 6.1.1.3 shall be supported in addition to the ETS 300 370 [31] procedures.

NOTE: This call establishment is an optional feature of the C.2 data profile of ETS 300 651 [30] and ETS 300 370 [31].

6.1.1.3 Service negotiation in the case of outgoing call

The negotiation procedures is illustrated in figure 3. The figure illustrates only the mappings required in addition to the ETS 300 370 [31] and related to the negotiation procedure. That is, not all messages are shown.

The service negotiation procedures are indicated/requested with <<Negotiation indicator>> field of the <<IWU-ATTRIBUTES>> information element. In order to facilitate the extended exchange parameter service negotiation the additions to ETS 300 175-5 [5] defined in the annex B of this ETS have to be adopted.

The negotiable parameter in the case of mobile originated call is <<Modem type>>.

Upon receipt of CC-SETUP-ind with <<IWU-ATTRIBUTES>> containing the value "Extended exchange parameter negotiation" in the <<Negotiation indicator field>> from the CC entity the FT IWU shall reject the request immediately issuing MNCC-REJECT-req with <<Release reason>> Hex 07 "Negotiation not supported" if the FP cannot support the extended exchange parameter negotiation.

If the FT can support the Extended exchange parameter negotiation the FT IWU shall map the <<IWU-ATTRIBUTES>> information element contained in {CC-SETUP} message to the GSM <<BEARER CAPABILITY>> element of GSM {Setup} message as described in subclause 6.1.4.2.1.

In the case the <<CALLED PARTY NUMBER>> is not present in the {CC-SETUP} message the FP IWU has to wait for the {CC-INFO} message containing the <<CALLED PART NUMBER>> before it can submit a {Setup} message with BEARER CAPABILITY element towards the GSM network as defined in subclause 6.1.1.1 case b) of ETS 300 370 [31].

Upon receipt of the GSM {Call proceeding} message the FP IWU shall map the new values of the <<BEARER CAPABILITY>> into the <<IWU-ATTRIBUTES>> information element of the DECT {CC-CALL-PROCEEDING} message as defined in subclause 6.1.4.1.3.

If no {Call proceeding} message is received or it does not contain <<BEARER CAPABILITY>> information element the service parameters have been accepted by the MSC IWF and no mapping between the <<BEARER CAPABILITY>> and <<IWU-ATTRIBUTES>> information element is be needed.

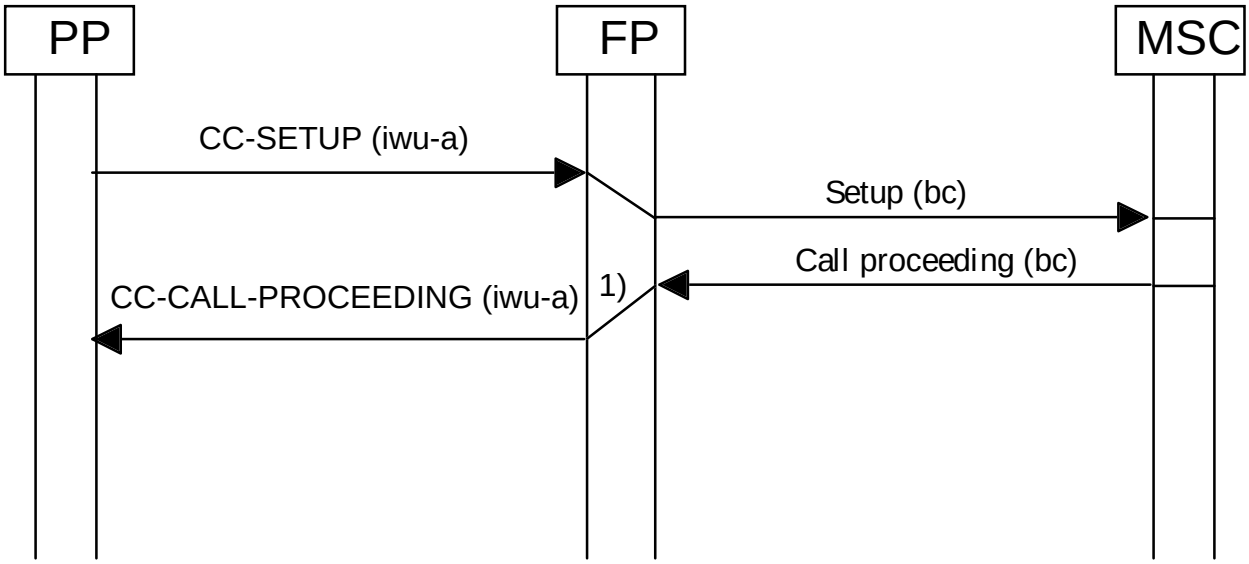

Figure 3: Extended exchange attributes negotiation in the case of outgoing call

6.1.1.4 Incoming data call (FP to PP)

The call procedures for incoming data call (FP to PP) shall be compatible with the procedures defined in the ETS 300 370 [31] subclause 6.1.1.3 with the additional mapping of <<IWU ATTRIBUTES>> as defined in subclause 6.1.4 of this ETS. The service negotiation as described in subclause 6.1.1.2.1 shall be supported in addition to the ETS 300 370 [31] procedures.

NOTE: This procedure is compatible with the C.2 data profile ETS 300 651 [30] call establishment.

6.1.1.4.1 Service negotiation in the case of incoming data call

The negotiation procedures is illustrated in figures 4 and 5. The figures illustrate only the mappings required in addition to the ETS 300 370 [31] and related to the negotiation procedure. That is, not all messages are shown.

The service negotiation procedure shall be indicated/requested with <<Negotiation indicator>> field in the <<IWU-ATTRIBUTES>> information element. In order to facilitate the service negotiation additions to DECT network layer ETS 300 175-5 [5] defined in annex B of this ETS have to be implemented.

The negotiable parameters in the case of incoming data call are <<number of data bits>>, <<number of stop bits>>, <<number of parity bits>>, <<user layer 2 protocol>> and <<Modem type>>.

Upon receipt of the GSM {Setup} message containing a BEARER CAPABILITY the FT IWU shall map the <<BEARER CAPABILITY>> into the <<IWU-ATTRIBUTES>> information element of the DECT {CC-SETUP} message as defined in subclause 6.1.1.1 and issue a MNCC-SETUP-req primitive as defined in the ETS 300 370 [31] subclause 6.1.1.3.

Two alternate cases have been defined. The new values of the <<IWU-ATTRIBUTES>> can be carried in either in the in the {CC-ALERTING} message or in the {CC-CONNECT} message. The first message arriving message of these two shall carry the new information. Upon receipt of a MNCC-CONNECT-ind or MNCC-ALERTING-ind with <<IWU-ATTRIBUTES>> element the FT IWU shall map the new values in the <<IWU-ATTRIBUTES>> information element of the {CC-CONNECT} or {CC-ALERTING} message into the GSM <<BEARER CAPABILITY>> element of the GSM {Call Confirmed} message as described in subclause 5.1.8.3. After this the procedures shall proceed as described in ETS 300 370 [31] subclause 6.1.1.3. Other mappings between {CC-CONNECT} and {Connect} message as well as {CC-ALERTING} and {Alerting} messages shall be done as described in ETS 300 370 [31].

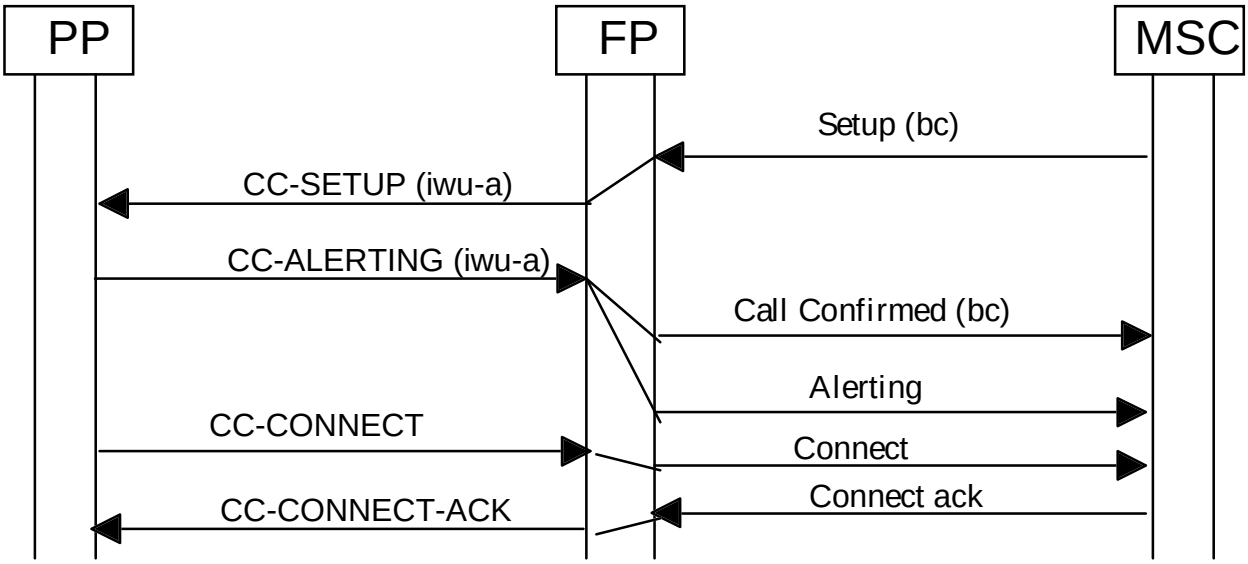

Figure 4: Extended exchange attributes negotiation in the case of incoming call where the IWU receives MNCC-ALERT-ind prior to MNCC-CONNECT-ind

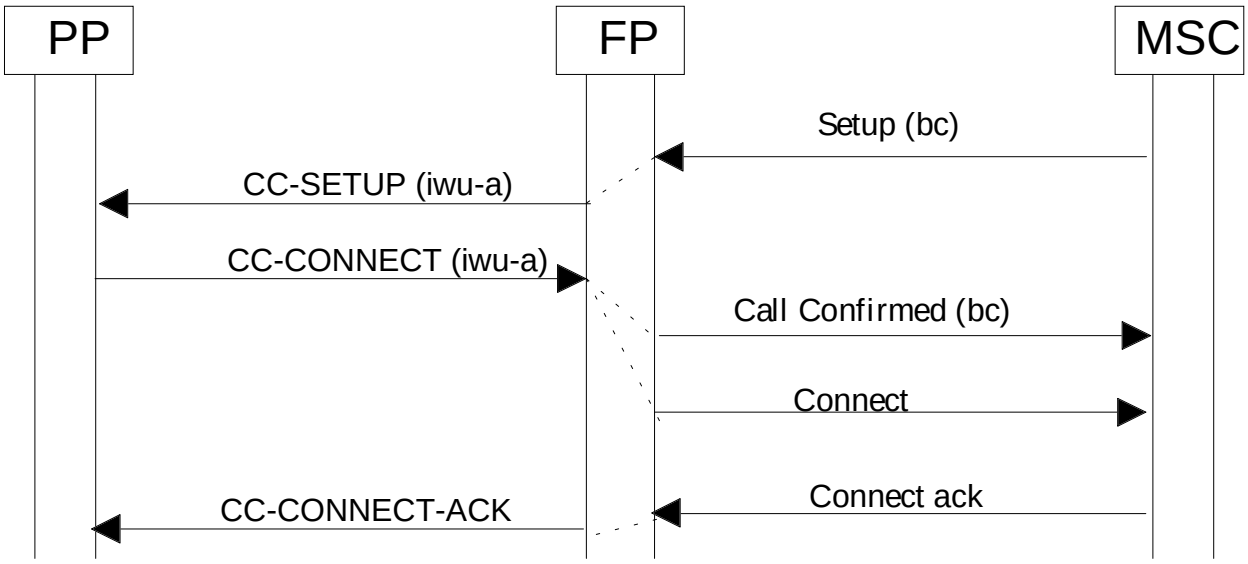

Figure 5: Extended exchange attributes negotiation in the case of incoming call where the IWU receives MNCC-CONNECT-ind without MNCC-ALERT-ind

6.1.1.5 Other CC procedures

Other CC procedure mappings and procedures shall be done according to ETS 300 370 [31].

Those C.2 profile specific call control procedures that are not used in ETS 300 370 [31] shall not be used nor mapped towards GSM.

NOTE: This rule is related to procedures such as call suspension and release.

6.1.2 MM IWU procedures

The MM procedures of ETS 300 370 [31] shall apply.

6.1.3 Other IWU procedures

Other IWU procedures shall be done according to ETS 300 370 [31].

6.1.4 Message mappings

6.1.4.1 GSM to DECT

Table 2: List of mapped messages

Item No	GSM message	Status in GSM	DECT message	Status in C.2	Ref.	Map status	Note
1	SETUP	M	CC-SETUP	M	6.1.4.1.1	M	
2	CALL PROCEEDING	M	CC-CALL-PROCEEDING	M	6.1.4.1.2	M	

All other message mappings shall be done according to ETS 300 370 [31].

6.1.4.1.1 SETUP - CC-SETUP

Table 3

Item No	Message coding GSM	Message coding DECT	Ref.	Map status	Note
	SETUP	CC-SETUP			
1	bearer capability 1	iwu-attributes	6.1.5.1.1	M	
2	lower layer compatibility	iwu-to-iwu	6.1.5.1.2	C1	
3	higher layer compatibility	iwu-to-iwu	6.1.5.1.3	C1	
C1: IF PRESENT THEN O ELSE X					

All other element mappings shall be done according to subclause 6.1.6.1.11 of ETS 300 370 [31].

6.1.4.1.2 CALL PROCEEDING-CC-CALL-PROCEEDING

Table 4

Item No	Message coding GSM	Message coding DECT	Ref.	Map status	Note
	CALL PROCEEDING	CC-CALL-PROCEEDING			
1	bearer capability 1	iwu-attributes	6.1.5.1.1	M	

All other element mappings shall be done according to subclause 6.1.6.1.9 of ETS 300 370 [31].

6.1.4.2 DECT to GSM

Table 5: List of mapped messages

Item No	DECT message	Status in C.2	GSM message	Status in GSM	Ref.	Map status	Note
1	CC-SETUP	M	SETUP	M	6.1.4.2.1	M	
2	CC-INFO	M	SETUP	M	6.1.4.2.2	M	
3	CC-CONNECT	M	CALL CONFIRMED	M	6.1.4.2.3	M	
4	CC-ALERTING	M	CALL CONFIRMED		6.1.4.2.4	M	

All other message mappings are done according to ETS 300 370 [31].

6.1.4.2.1 CC-SETUP - SETUP

Table 6

Item No	Message coding DECT	Message coding GSM	Ref.	Map status	Note
	CC-SETUP	SETUP			
1	iwu-attributes	bearer capability 1	6.1.5.1.1	M	
2	iwu-to-iwu	lower layer compatibility	6.1.5.1.2	C1	
3	iwu-to-iwu	higher layer compatibility	6.1.5.1.3	C1	
C1: IF PRESENT THEN O ELSE X					

All other element mappings shall be done according to subclause 6.1.6.2.15 of ETS 300 370 [31].

6.1.4.2.2 CC-INFO - SETUP

Table 7

Item No	Message coding DECT	Message coding GSM	Ref.	Map status	Note
	CC-INFO	SETUP			
1	called-party-number	called party number	6.1.5.1.4	M	

All other element mappings shall be done according to subclause 6.1.6.2.10 of ETS 300 370 [31].

6.1.4.2.3 CC-CONNECT - CALL CONFIRMED

Table 8

Item No	Message coding DECT	Message coding GSM	Ref.	Map status	Note
	CC-CONNECT	CALL CONFIRMED			
1	iwu-attributes	bearer capability 1	6.1.5.1.1	M	

All other element mappings shall be mapped to GSM {Connect} message as defined in subclause 6.1.6.2.9 of ETS 300 370 [31].

6.1.4.2.4 CC-ALERTING - CALL CONFIRMED

Table 9

Item No	Message coding DECT	Message coding GSM	Ref.	Map status	Note
	CC-ALERTING	CALL CONFIRMED			
1	iwu-attributes	bearer capability 1	6.1.5.1.1	M	

All other element mappings shall be mapped to GSM {Alerting} message as defined in subclause 6.1.6.2.8 of ETS 300 370 [31].

6.1.5 Information element mappings

6.1.5.1 DECT to GSM and GSM to DECT

6.1.5.1.1 Iwu-attributes - Bearer capability 1

The mapping is done between a new <IWU-ATTRIBUTES> element defined in the annex B of this ETS and the GSM standard BEARER CAPABILITY element.

Table 10

Item No	Information element coding DECT	Information element coding GSM	Ref.	Map status	Note
	iwu-attributes	bearer capability 1			
1	ID for iwu attributes	Bearer capability IEI	ETS 300 370 [31], 6.1.8.1.4	M	
2	Length of contents	Length of bearer capabilities contents	ETS 300 370 [31], 6.1.8.1.5	M	
3	-	Radio channel requirements	7.1.2.1.	X	Note 1
4	Profile	-	7.1.3.2.1	X	Note 2
5	Negotiation indicator	-	7.1.3.2.2	X	Note 2
6	Network service	-	7.1.3.2.3	X	Note 2
7	Coding standard	Coding standard	6.1.5.1.5	M	
8	Transfer mode	Transfer mode	6.1.5.1.5	M	
9	Information transfer capability	Information transfer capability	6.1.5.1.5	M	
10	Structure	Structure	6.1.5.1.5	M	
11	Duplex mode	Duplex mode	6.1.5.1.5	M	
10	Configuration	Configuration	6.1.5.1.5	M	
11	NIRR	NIRR	6.1.5.1.5	M	
12	Establishment	Establishment	6.1.5.1.5	M	
13	Access identity	Access identity	6.1.5.1.5	M	
14	Rate adaptation	Rate adaptation	6.1.5.1.5	M	
15	Signalling access protocol	Signalling access protocol	6.1.5.1.5	M	
16	Layer 1 identity	Layer 1 identity	6.1.5.1.5	M	
17	User information layer 1 protocol	User information layer 1 protocol	6.1.5.1.5	M	
18	Synchronous /asynchronous	Synchronous /asynchronous	6.1.5.1.5	M	
19	Number of stop bits	Number of stop bits	6.1.5.1.5	M	
20	Negotiation	Negotiation	6.1.5.1.5	M	

(continued)

Table 10 (concluded)

Item No	Information element coding DECT	Information element coding GSM	Ref.	Map status	Note
	iwu-attributes	bearer capability 1			
21	Number of data bits excluding parity bit if present	Number of data bits excluding parity bit if present	6.1.5.1.5	M	
22	User rate	User rate	6.1.5.1.5	M	
23	Intermediate rate	Intermediate rate	6.1.5.1.5	M	
24	Network independent clock on transmission	Network independent clock on transmission	6.1.5.1.5	M	
25	Network independent clock on reception	Network independent clock on reception	6.1.5.1.5	M	
26	Parity information	Parity information	6.1.5.1.5	M	
27	Connection element	Connection element	6.1.5.1.5	M	Note 3
28	Modem type	Modem type	6.1.5.1.5	M	
29	Layer 2 identity	Layer 2 identity	6.1.5.1.5	M	
30	User information layer 2 protocol	User information layer 2 protocol	6.1.5.1.5	M	

NOTE 1: This field is not mapped between the DECT and GSM systems since it has no meaning for DECT.
NOTE 2: This field is not mapped between the DECT and GSM systems since it has no meaning for GSM. It is used only for DECT air interface purposes.
NOTE 3: This field has no meaning for the DECT air interface but to the selection or the indication of the service provided by the IWU towards GSM PLMN.

6.1.5.1.2 Lower layer compatibility - iwu-to-iwu

If the <<Lower layer compatibility>> information element is present in GSM CC messages, it shall be carried intact in <<iwu-to-iwu>> packet <<iwu-to-iwu-information>> field. The information element <<Protocol discriminator>> in <<iwu-to-iwu>> packet shall contain coding '010001'B "GSM Recommendation 04.08, elements" (note).

NOTE: GSM 04.08 is published as ETS 300 557 [23].

6.1.5.1.3 Higher layer compatibility - iwu-to-iwu

If the <<Higher layer compatibility>> information element present in GSM CC messages, it shall be carried intact in <<iwu-to-iwu>> packet <<iwu-to-iwu-information>> field. The information element <<Protocol discriminator>> in <<iwu-to-iwu>> packet shall contain coding '010001'B "GSM Recommendation 04.08, elements" (note).

NOTE: GSM 04.08 is published as ETS 300 557 [23].

6.1.5.1.4 Called-party-number - Called party number

This element mapping shall be done as defined in ETS 300 370 [31] subclause 6.1.7.2.11.

6.1.5.1.5 General coding principle for other fields

This field shall not require mapping between DECT and GSM. That is, the coding of GSM field and DECT field are identical thus the value of the field does not change in IWU and it can be copied as it is between the systems.

6.2 FP U-plane IWU procedures

6.2.1 General

This section defines the functional requirements of the FP IWU for the mapping of the user data and the C.2 data profile U-plane flow. The functionality of the IWU shall be to map the synchronous, asynchronous and status data to respective DECT C.2 profile functionality..

6.2.2 Non-transparent service (NT)

6.2.2.1 General

The rate adaptation of the GSM data flow shall take place in the FP IWU. A general figure of the rate adaptation functions of GSM non-transparent (NT) is illustrated in figure 6. In the figure the interface between FP and MSC is the A interface.

The RLP entity and LAPU entity in FP shall function completely independently. That is, frame retransmissions and control information regarding RLP and LAPU functions are not dependent of each other.

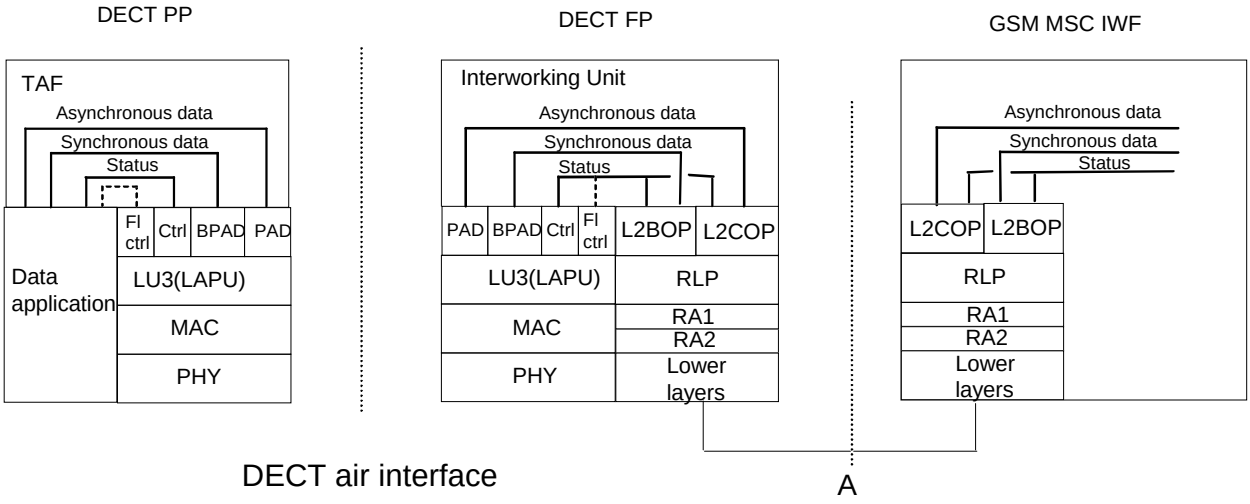

Figure 6: Rate adaptation for the DECT/GSM interworking of GSM non - transparent (NT) service

6.2.2.2 Asynchronous

The FP IWU shall contain the RA2, RA1, RLP and L2COP functions. The information of the L2COP shall be mapped as follows:

- the status octets shall not be carried in the LAPU information frames;

- the status bit (3 first bits) information of the status octet shall be mapped to the respective DECT function as defined in the subclause 6.2.3;

- character octets shall be forwarded and mapped to the C.2 PAD function as defined in the subclause 10.1 of the DECT C.2 data profile ETS 300 651 [30] following the rules defined in the same subclause. No start and stop bits shall be conveyed between systems;

- no fill octets shall be forwarded to the C.2. PAD function;

- break signal status received from GSM (status octet address field value 29) shall be mapped into the LAPU control frame <<Break coding>> with indication of "Break condition occurred". The duration of the break signal in the BREAK/PAUSE duration octet should be in between 135 ms and 200 ms as defined by ETS 300 583 [33];

  NOTE: ETS 300 583 [33] refers to CCITT Recommendation X.28 definition of the break signal.

- break signal status received from DECT direction (the LAPU control frame <<Break coding>> with indication of "Break condition occurred") shall be mapped into the L2COP address field as defined in ETS 300 583 [33]. The duration information shall be ignored.

The DECT PAD function shall be configured according to the values of the octets 8a and 8b of the <<iwu-attributes>> element if they are present. If no information for PAD functionality is available the BPAD function shall be used.

6.2.2.3 Synchronous

The FP IWU will contain the RA2, RA1, RLP and L2BOP functions. The information of the L2BOP shall be mapped as follows:

- the status octets shall not be carried in the LAPU information frames;

- the status bit (3 first bits) information of the status octet will be mapped to the respective function as defined in the subclause 6.2.3;

- the address bit (5 last bits) information of the status octet is utilised as follows: if address has the value 31 no L2BOP remaining information is forwarded to LAPU information frame. Other address values are ignored;

- user information shall be forwarded and mapped to the C.2 BPAD function as defined in subclause 10.2 of the DECT C.2 data profile ETS 300 651 [30] following the rules defined in the same subclause;

- no fill octets shall be forwarded to the C.2. BPAD function.

6.2.3 Interchange circuit signalling mapping

The CCITT Recommendation V.24 signalling status information shall be mapped between the DECT LAPU control frame function accessed through the DLU-LU3-DTR primitives and respective GSM function as follows:

- DECT C.2 data profile Control Status octet defined in C.2 data profile, ETS 300 651 [30], subclause 10.3 shall be used with <<Frame type coding>> indicating "V.24 status interworking";

- the status change of the CCITT Recommendation V.24 interface circuits 108, 107, 105, 109 and 106 mapping shall be done as shown in tables 11 and 12;

- In the direction of GSM to DECT only in the change situation of a status of each SA, SB or X bit shall be mapped thus if not change has occurred in the status bits of the GSM data flow no LAPU control frame shall be sent;

- In the direction of DECT to GSM the FP IWU shall map the old status of a status bit towards GSM if no LAPU control frames with new value has been received;

- the status of the CCITT Recommendation V.24 circuits 106 and 105 shall be mapped into/from the PAD/BPAD flow control.

Table 11

V.24 circuit in direction of GSM => DECT	V.110 bit and its value	DECT LAPU control frame bit and its value	Note
107 (DSR)	S1, S2, S3, S6, S8 = SA	DSR coding	
	0	1	107 (DSR) ON
	1	0	107 (DSR) OFF
109 (DCD)	S4, S9 = SB	CD	CD
	0	1	109 (DCD) ON
	1	0	109 (DCD) OFF
106	X	Ignored	CTS note 2.
NOTE 1: DECT provides its own flow control mechanism and end-to-end flow control is not recommended. See subclause 6.2.4.			

Table 12

V.24 circuit in direction of DECT => GSM	V.110 bit and its value	DECT LAPU control frame bit and its value	Note
108 (DTR)	S1, S2, S3, S6, S8 = SA	DTR coding	DTR
	0	1	108 (DTR) ON
	1	0	108 (DTR) OFF
105 (RTS)	S4, S9 = SB	Ignored	RTS note 1.
106 (RTS)	X	Ignored	CTS note 1.
NOTE 1: DECT provides its own flow control mechanism and end-to-end flow control is not recommended. See subclause 6.2.4.			

6.2.4 Flow control

The flow control situation indicated by the X-bit or buffers backpressure shall be mapped into the C.2 data profile ETS 300 651 [30] PAD/BPAD flow control functionality as defined in respective C.2 profile PAD/BPAD subclauses. It is the matter of implementation to ensure that no data loss shall occur due to flow control.

6.2.5 Synchronisation

It is the responsibility of the FT IWU to guarantee that no user data is conveyed before both RLP and LAPU links have been successfully established. No CCITT Recommendation V.24 signalling information is conveyed before information regarding the ready status of the MSC-network connection is guaranteed.

The RLP and LAPU links shall function independently.

6.3 PP C-plane IWU procedures

6.3.1 General

For CCITT Recommendation V.24 interworking in the PP IWU C-plane the C.2 data profile, ETS 300 651 [30], clause C.2 TAF procedures shall apply.

The mapping between the PP C-plane and V.25bis commands shall be done according to the C.2 data profile, ETS 300 651 [30], clause C.2.

6.3.2 Service negotiation in the case of outgoing call

In the call establishment phase the PT IWU shall submit the desired connection values in the <<IWU-ATTRIBUTES>> element of the {CC-SETUP} message. The PT IWU may receive new values in the <<IWU ATTRIBUTES>> element of {CALL PROCEEDING} message.

6.3.3 Service negotiation in the case of incoming call

Upon receipt of CC-SETUP-ind with <<IWU-ATTRIBUTES>> containing the value "Extended exchange parameter negotiation" in the <<Negotiation indicator field>> from the CC entity the PP IWU shall reject the request immediately issuing MNCC-REJECT-ind with <<Release reason>> Hex 07 "Negotiation not supported" if the PP cannot support Extended exchange attributes negotiation.

If the PP can support the Extended exchange parameter negotiation the PT IWU may add the new desired attributes values to the <<IWU-ATTRIBUTES>> information element either in of the {CC-CONNECT} message or {CC-ALERTING} and issue a MNCC-CONNECT-req primitive or MNCC-ALERT-req. The used message shall be the one that is sent first towards the FP.

The PP IWU shall not use <<IWU-ATTRIBUTES>> information element in the {CC-CONNECT} or {CC-ALERTING} message if it agrees with the service parameters proposed in the {CC-SETUP} message. If the PP IWU accepts the parameters proposed by MSC the call establishment proceeds as defined in ETS 300 370 [31].

6.4 PP U-plane IWU procedures

For CCITT Recommendation V.24 interworking in the PP IWU U-plane the C.2 data profile, ETS 300 651 [30], clause C.2 TAF procedures shall apply.

7 Interworking connection types

7.1 Connection type definitions

7.1.1 General

The selection of the GSM Bearer services defined in table 1 shall be done according to the codings of the GSM bearer service definitions of ETS 300 582 [32].

7.1.2 GSM elements

7.1.2.1 <<Radio channel requirement>> field

The standard value defined in ETS 300 582 [32] for the <<Radio channel requirement>> field in the GSM <<Bearer capability>> element shall be used. That is, the element mapping has not been defined in this ETS thus the value of the field is ignored in the direction from GSM to DECT and the standard value shall be used in the direction from DECT to GSM mapping.

7.1.3 DECT elements

7.1.3.1 <<BASIC SERVICE>> coding

Table 13: <<Basic service>> default coding

Octet	Information element field	Field value
2	<Call Class> <Basic Service>	"Normal Call Setup" "Other"

7.1.3.2 <<IWU-ATTRIBUTES>> coding for GSM Bearer services

Table 14: <<iwu attributes>> default coding

Octet	Information element field	Field value
3	<Coding standard> <Profile>	"Profile defined coding" "GSM interworking profile" see subclause 7.1.3.2
4	<Negotiation indicator> <Network service>	"Extended exchange parameter negotiation (GSM)" see subclause 7.1.3.3 "GSM Phase 2 bearer service" see subclause 7.1.3.4
8c	<Connection element>	"non transparent (RLP)" (note)
NOTE: The connection element is always "non transparent" since the DECT air interface service in non transparent (LAPU).		

Rest of the codings used for different GSM bearer services selection are as defined in ETS 300 582 [32].

7.1.3.2.1 <<Profile>> filed

<<profile>> field of the <<iwu-attributes>> shall always have value "GSM interworking profile".

7.1.3.2.2 <<Negotiation indicator>> field

The <<Negotiation indicator>> field of the <<iwu-attributes>> element contains information important only to DECT part. That is, the GSM PLMN does not use this field. For the coding see subclause 6.1.1 of this ETS.

7.1.3.2.3 <<Network service>> filed

The <<Network service>> field of the <<iwu-attributes>> element contains information important only to DECT part. That is, the GSM PLMN does not use this field. For the coding see subclause 6.1.1 of this ETS.

7.1.4 <<CALL ATTRIBUTES>> coding

Table 15: <<Call attributes>> default coding

Octet	Information element field	Field value
3	<Coding standard> <Network layer attributes>	"DECT standard coding" “DECT GSM IWP profile phase 2”
4	<C-plane class> <C-plane routing>	"Class A link; shared" "Cf preferred / Cs accepted"
5	<U-plane symmetry> <LU identification>	"Symmetric" "LU3"
6	<U-plane class> <U-plane frame type>	"Class 1" "FU6"
NOTE: These codings are compatible with C.2 data profile codings with the exception of <Network layer attributes>		

7.1.5 <<CONNECTION ATTRIBUTES>> coding

The following coding is the minimum requirement for GSM bearer service support i.e. one 24 kbit/s bearer is used.

Table 16: <<Connection attributes>> default coding

Octet	Information element field	Field value
3	<Symmetry> <Connection identity coding>	"Symmetric connection" "Unknown"
4	<Target bearers>	"1 bearer"
5	<Mac slot size> <Mac service>	"full slot" "Ip; Mod-2 correct"
6	<Cf channel attributes> <Mac packet lifetime>	"Cf demand/1 bearer (interrupting)" Implementation specific value
NOTE: These codings are compatible with C.2 data profile codings.		

7.1.6 <<End-to-end compatibility>>

<<End to end compatibility>> element presence in the {CC-SETUP} message as defined in the C.2 data profile has no meaning in this profile. It can be used for configuration of the PAD function. In this case it should carry values compatible with <<iwu-attributes>> element codings in fields meaningful for the PAD functions as defined in the C.2 data profile ETS 300 651 [30], subclause 10.1. However, in this case the service negotiation as defined in this profile will not function in respect to the PAD required configuration fields.

7.1.7 <<Window size>>

This element contents is implementation specific.

Annex A (normative): Profile specific network layer features

A.1 General

This annex contains profile specific coding for the DECT network layer.

A.2 <<IWU-ATTRIBUTES>> information element

The following <<IWU-ATTRIBUTES>> coding shall be used for GSM bearer services interworking.

NOTE: Beginning from Transfer Mode Field (octet 5) this element has the same content as BEARER CAPABILITY element in GSM

Bit: 8	7	6	5	4	3	2	1	Octet:
0	<< IWU-ATTRIBUTES >>							1
Length of contents (L)								2
1	Coding		Profile					3
1	Negotiation indicator			Spare				4
1	Network service			Tr mod	Information transfer capability			5
1	spare	structure		dupl mod	config	NIRR	establ	6
1	access id.		rate adapt.		signalling access protocol			7
0/1 ext	layer 1 id.		User information layer 1protocol				S/A	8
0/1 ext	S. bits	neg.	data bits	User rate				8a
0/1 ext	Interm. rate		NIC on TX	NIC on RX	Parity			8b
1	Connection element		Modem type					8c
1	Layer 2 id.		User information layer 2 protocol					9

IWU-ATTRIBUTES information element

Coding standard (octet 3):

Bits	7 6	Meaning
	0 1	Profile defined coding

All other values reserved.

Profile (octet 3):

Bits	5 4 3 2 1	Meaning
	0 0 1 0 1	GSM interworking profile

All other values reserved.

Negotiation indicator (octet 4):

Bits	7 6 5	Meaning
	0 0 0	Negotiation not possible
	1 0 0	Exchanged parameter negotiation
	1 0 1	Extended exchange parameter negotiation (G)

All other values reserved.

Network service (octet 5):

Bits	7 6 5	Meaning
	0 0 1	GSM Phase 2 bearer services

All other values reserved.

Transfer mode (octet 4):

Bits	4	Meaning
	0	Circuit mode
	1	Packet mode

Information transfer capability (octet 4):

Bits	3 2 1	Meaning
	0 0 0	Speech
	0 0 1	Unrestricted digital information
	0 1 0	3,1 kHz audio ex PLMN
	0 1 1	Facsimile group 3
	1 1 1	Reserved. used by the network. The meaning is speech/facsimile group 3 - starting with speech

All other values reserved.

Structure (octet 5)

Bits	6 5	Meaning
	0 0	SDU integrity
	1 1	Unstructured

All other values reserved.

Duplex mode (octet 5)

Bits	4	Meaning
	0	half duplex
	1	full duplex

Configuration (octet 5):

Bits	3	Meaning
	0	point-to-point

All other values reserved.

NIRR (octet 5)
(Negotiation of Intermediate Rate Requested)

Bits	2	Meaning
	0	No meaning is associated with this value
	1	Data up to and including 4,8 kbit/s, full rate, non-transparent, 6 kbit/s radio interface rate is requested

Establishment (octet 5):

Bits	1	Meaning
	0	demand

All other values reserved.

Access identity (octet 6):

Bits	7 6	Meaning
	0 0	octet identifier

All other values reserved.

Rate adaption (octet 6):

Bits	5 4	Meaning
	0 0	no rate adaption
	0 1	V.110/X.30 rate adaption
	1 0	X.31 flag stuffing

All other values reserved.

Signalling access protocol (octet 6):

Bits	3 2 1	Meaning
	0 0 1	I.440/450
	0 1 0	X.21
	0 1 1	X.28 - dedicated PAD, individual NUI
	1 0 0	X.28 - dedicated PAD, universal NUI
	1 0 1	X.28 - non dedicated PAD
	1 1 0	X.32

All other values reserved.

Layer 1 identity (octet 7):

Bits	7 6	Meaning
	0 0	octet identifier

All other values reserved.

User information layer 1 protocol (octet 7):

Bits	5 4 3 2	Meaning
	0 0 0 0	default layer 1 protocol

All other values reserved.

Synchronous/asynchronous (octet 7)

Bits	1	Meaning
	0	synchronous
	1	asynchronous

Number of Stop Bits (octet 7a)

Bits	7	Meaning
	0	1 bit (This value is also used in the case of synchronous mode)
	1	2 bits

Negotiation (octet 7a)

Bits	6	Meaning
	0	in-band negotiation not possible

All other values reserved.

NOTE: See CCITT Recommendations V.110 and X.30.

Number of data bits excluding parity bit (octet 7a)

Bits	5	Meaning
	0	7 bits
	1	8 bits (this value is also used in the case of bit oriented protocols)

User rate (octet 7a):

Bits	4 3 2 1	Meaning
	0 0 0 1	0,3 kbit/s CCITT Recommendations X.1 and V.110
	0 0 0 1	0,3 kbit/s CCITT Recommendations X.1 and V.110
	0 0 1 0	1,2 kbit/s CCITT Recommendations X.1 and V.110
	0 0 1 1	2,4 kbit/s CCITT Recommendations X.1 and V.110
	0 1 0 0	4,8 kbit/s CCITT Recommendations X.1 and V.110
	0 1 0 1	9,6 kbit/s CCITT Recommendations X.1 and V.110
	0 1 1 0	12,0 kbit/s transparent(non compliance with CCITT Recommendations X.1 and V.110)
	0 1 1 1	1,2 kbit/s/75 bit/s CCITT Recommendation V.23, (asymmetric) CCITT Recommendations X.1, V.110.

All other values reserved.

NOTE: For facsimile group 3 calls the user rate indicates the first and maximum speed the mobile station is using.

Octet 8b for CCITT Recommendation V.110/X.30 rate adaption

Intermediate rate (octet 7b):

Bits	7 6	Meaning
	1 0	8 kbit/s
	1 1	16 kbit/s

All other values reserved.

Network independent clock (NIC) on transmission (Tx) (see CCITT Recommendation V.110 and X.30) (octet 7b)

Bits	5	Meaning
	0	does not require to send data with network independent clock
	1	requires to send data with network independent clock

Network independent clock (NIC) on reception (Rx) (see CCITT Recommendation V.110 and X.30)(octet 7b)

Bits	4	Meaning
	0	cannot accept data with network independent clock (i.e. sender does not support this optional procedure)
	1	can accept data with network independent clock (i.e. sender does support this optional procedure)

Parity information (octet 7b):

Bits	3 2 1	Meaning
	0 0 0	odd
	0 1 0	even
	0 1 1	none
	1 0 0	forced to 0
	1 0 1	forced to 1

All other values reserved.

Connection element (octet 7c):

Bits	7 6	Meaning
	0 0	transparent
	0 1	non transparent (RLP)
	1 0	both, transparent preferred
	1 1	both, non transparent preferred

All other values reserved.

The requesting end (e.g. the one sending the SETUP message) should use the 4 values depending on its capabilities to support the different modes. The answering party shall only use the codings 00 or 01, based on its own capabilities and the proposed choice if any. If both MS and network support both transparent and non transparent, priority should be given to the MS preference.

Modem type (octet 7c):

Bits	5 4 3 2 1	Meaning
	0 0 0 0 0	none
	0 0 0 0 1	V.21
	0 0 0 1 0	V.22
	0 0 0 1 1	V.22 bis
	0 0 1 0 0	V.23
	0 0 1 0 1	V.26 ter
	0 0 1 1 0	V.32
	0 0 1 1 1	modem for undefined interface
	0 1 0 0 0	autobauding type 1

All other values reserved.

Layer 2 identity (octet 8):

Bits	7 6	Meaning
	0 0	octet identifier

All other values reserved.

User information layer 2 protocol (octet 8):

Bits	5 4 3 2 1	Meaning
	0 0 1 1 0	X.25, link level
	0 1 0 0 0	ISO 6429, codeset 0 (DC1/DC3)
	0 1 0 0 1	X.75 layer 2 modified (teletex)
	0 1 0 1 0	videotex profile 1
	0 1 1 0 0	COPnoFlCt (Character oriented Protocol with no Flow Control mechanism)

All other values reserved.

Annex B (normative): ETS 300 175-5 modifications

B.1 General

This annex lists the change requirements set by this ETS to the first edition of the DECT network layer ETS, ETS 300 175-5 [5]. All these changes are intended to be added to the second edition of the ETS 300 175-5 [5]. When the second edition of ETS 300 175-5 [5] is released this annex may be removed.

B.2 Additions to network layer messages

B.2.1 {CC-CALL-PROCEEDING} message

The <<IWU ATTRIBUTES>> information element is allowed to be sent in the direction FT to PT in {CC-CALL-PROCEEDING} message.

B.2.2 {CC-CONNECT} message

The <<IWU ATTRIBUTES>> information element is allowed to be sent in the direction PT to FT in {CC-CONNECT} message.

B.2.2 {CC-ALERTING} message

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

B.3 Modified network layer information elements

<<IWU-ATTRIBUTES>> information element

Bit:	8	7	6	5	4	3	2	1	Octet:
	0	<< IWU-ATTRIBUTES >>							1
	Length of Contents (L)								2
	1	Coding		Profile					3
	1	Negotiation indicator			Spare				4
	IWU Attribute(s) (octet 1)								5
	IWU Attribute(s) (octet 2)								
	....								
	IWU Attribute(s) (octet L-1 or L-2)								L+2

Coding standard (octet 3):

Bits	Meaning
0 1	Profile defined coding

All other values reserved.

Profile (octet 3):

Bits	Meaning
0 0 1 0 1	GSM Interworking profile

All other values reserved.

Negotiation indicator (octet 4):

Bits	Meaning
0 0 0	Negotiation not possible
1 0 0	Exchange parameter negotiation
1 0 1	Extended exchange parameter negotiation (GSM IWP)

All other values reserved.

IWU ATTRIBUTES (Octets 5 to L+2)

The coding of the IWU attributes is given in the profiles specified in the profile field.

Annex C (informative): Bibliography

The following references will be part of the normative references when they are approved and generally available.

[C1] prETS 300 703: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) interworking profile; GSM Phase 2 supplementary services implementation".

[C2] DE/RES-03057: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) interworking profile, Implementation of short message services, point-to-point and cell broadcast".

[C3] DE/RES-03058: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) interworking profile; Implementation of facsimile group 3".

The following references are used for informative purposes within this ETS.

- ITU-T Recommendation Q.600-series: "Interworking of Signalling Systems".

- CCITT Recommendation V.21: "300 bits per second duplex modem standardized for use in the general switched telephone network".

- CCITT Recommendation V.22: "1200 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

- CCITT Recommendation V.22bis: "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

- CCITT Recommendation V.23: "600/1200-baud modem standardized for use in the general switched telephone network".

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

- CCITT Recommendation V.25bis: "Automatic calling and/or answering equipment on the general switched telephone network (GSTN) using the 100-series interchange circuits".

- CCITT Recommendation V.26: "2400 bits per second modem standardized for use on 4-wire leased telephone-type circuits".

- CCITT Recommendation V.26ter: "2400 bits per second duplex modem using the echo cancellation technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".

- CCITT Recommendation V.32: "A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone-type circuit".

- CCITT Recommendation V.110: "Support of data terminal equipments with V-Series type interfaces by an integrated services digital network".

- CCITT Recommendation X.1: "International user classes of service in, and categories of access to, public data networks and integrated services digital networks (ISDNs)".

- CCITT Recommendation X.21: "Interface between data terminal equipment and data circuit-terminating equipment for synchronous operation on public data networks".

- CCITT Recommendation X.25: "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

- CCITT Recommendation X.28: "DTE/DCE interface for a start-stop mode data terminal equipment accessing the packet assembly/disassembly facility (PAD) in a public data network situated in the same country".

- CCITT Recommendation X.30: "Support of X.21, X.21 bis and X.20 bis based data terminal equipments (DTEs) by an integrated services digital network (ISDN)".

- CCITT Recommendation X.31: "Support of packet mode terminal equipment by an ISDN".

- CCITT Recommendation X.32: "Interface between DTE and DCE for terminals operating in the packet mode and accessing a packet switched public data network through a public switched telephone network or an integrated services digital network or a circuit switched public data network".

- CCITT Recommendation X.75: "Packet-switched signalling system between public networks providing data transmission services".

History

Document history			
May 1996	Public Enquiry	PE 106:	1996-05-20 to 1996-09-13