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**Digital Enhanced Cordless Telecommunications (DECT);
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DECT access to GSM via ISDN;
General description of service requirements**

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Foreword

This final draft European Telecommunication Standard (ETS) has been produced by the Digital Enhanced Cordless Telecommunications (DECT) Project 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

General

This European Telecommunication Standard (ETS) defines the general requirements needed for the provisioning of Global System for Mobile communications (GSM) basic services via the Digital Enhanced Cordless Telecommunications (DECT) air interface for the case that the DECT network elements are interconnected with the GSM Public Land Mobile Networks (PLMNs) via Integrated Services Digital Network (ISDN) interfaces.

To enable DECT terminals to interwork with DECT systems which are connected to the GSM infrastructure via ISDN interfaces, this ETS specifies the requirements on the network that derive from the fact that an ISDN interface is used rather than the standard A-interface. This ETS is based on the DECT/GSM interworking profile specifications ETS 300 466 [1] and ETS 300 370 [2] and on the DECT and ISDN interworking for end system configuration ETS 300 434 [3].

NOTE 1: Interconnection of GSM PLMN and DECT access network elements via interfaces other than the ISDN interface (e.g. the A-interface) is outside the scope of this ETS.

This ETS and the corresponding stage 2 standard specify the requirements for:

- the protocols for mobility management functions across the ISDN interface; and
- the DECT access network interworking/mappings for mobility management functions across the ISDN interface; and
- the additions to the ISDN protocols for the support of basic telephony services as specified in ETS 300 403-1 [4].

The DECT access network interworking/mappings for DECT and ISDN interworking are specified in ETS 300 434 [3].

The DECT access protocols and Portable Part (PP) interworking/mappings necessary for the support of basic telephony services are specified in ETS 300 370 [2] and ETS 300 444 [5].

Interaction with services/supplementary services are outside the scope of this ETS.

Handover among DECT cells and GSM cells as well as handover among DECT cells connected to different DECT access networks, which are individually linked to a Mobile Switching Centre (MSC), is outside the scope of this ETS.

Definition and applicability

This ETS describes how users with DECT PPs are enabled to access to GSM services and to make calls from and to receive calls at any location where:

- a) DECT radio coverage is provided; and
- b) access is allowed to the user.

The application of an ISDN interface between GSM PLMN and DECT access network elements as opposed to the A-interface introduces the capability for GSM service providers to offer their services by making use of the DECT radio equipment of existing DECT access networks having implemented ISDN interfaces.

NOTE 2: The DECT access network can be owned by the GSM service provider but it could also be a Private Automatic Branch Exchange (PABX) or private network providing transparent access to GSM.

Provided this, the GSM user accesses his/her telecommunication services in any DECT radio covered location where access is allowed. The DECT/GSM network keeps track of the terminals location throughout the entire network.

Furthermore, conformance to this ETS is met by conforming to the stage 3 standards with the field of application appropriate to the equipment being implemented. Therefore no method of testing is provided for this ETS.

2 Normative references

This ETS incorporates by dated and 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 300 466: "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".
- [2] 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)".
- [3] ETS 300 434: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT) and Integrated Services Digital Network (ISDN) interworking for end system configuration".
- [4] ETS 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".
- [5] ETS 300 444: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Generic Access Profile (GAP)".
- [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 300 511: "European digital cellular telecommunications system (Phase 2); Man-Machine Interface (MMI) of the Mobile Station (MS) (GSM 02.30)".
- [8] ETS 300 530: "European digital cellular telecommunications system (Phase 2); Location registration procedures (GSM 03.12)".
- [9] ETS 300 506: "European digital cellular telecommunications system (Phase 2); Security aspects (GSM 02.09)".
- [10] ETS 300 534: "Digital cellular telecommunications system (Phase 2); Security related network functions (GSM 03.20)".

3 Definitions and abbreviations

3.1 Definitions

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

DECT access network: Physical entity that contains all of the elements of a DECT Fixed Part (FP) and that is attached to a GSM MSC.

NOTE 1: A DECT access network provides a transparent access to the services of the GSM PLMN. This does however not exclude that it may in addition provide services and switching capabilities to its own users.

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

DECT location area: The domain in which a DECT PP may receive and/or make calls as a result of a single location registration in the DECT access network.

GSM location area: The domain in which a DECT PP may receive and/or make calls as a result of a single location updating in the GSM network.

NOTE 3: A GSM location area may cover more than one DECT location area.

GSM service provider: An administration which offers global mobile telecommunication services to its subscribers.

GSM services: Services which are offered to the subscriber/user by a GSM Service Provider and which are defined by the appropriate GSM specifications.

location area: The domain in which a DECT PP may receive and/or make calls as a result of a single location registration/updating in the network.

location registration: The process whereby the position of a PP is determined to the level of one location area, and this position is updated in the network.

location updating: The process whereby the position of a PP is determined to the level of one location area, and this position is updated in the network.

NOTE 4: DECT and GSM respectively use the terms location registration and location updating for actually similar processes.

MSC area: The MSC area is the part of the network covered by an MSC. An MSC area may consist of one or several GSM location areas. An MSC area may also consist of one or several Base Station Controller (BSC) areas and/or one or several DECT location areas.

network: The totality of GSM and DECT access network elements through which the GSM service provider provides its services to the served user.

Public Land Mobile Network (PLMN): A PLMN is established and operated by an administration or for the specific purpose of providing land mobile telecommunication services to the public. A PLMN may be regarded as an extension of a network (e.g. ISDN); it is a collection of MSC areas within a common numbering plan (e.g. same National Destination Code) and a common routing plan. The MSCs are the functional interfaces between the fixed networks and a PLMN for call set-up. Functionally the PLMNs may be regarded as independent telecommunication entities even though different PLMNs may be interconnected through the Integrated Services Digital Network / Private Integrated Services Network (ISDN/PISN) and Packet Data Networks (PDNs) for forwarding of calls or network information. A similar type of interconnection may exist for the interaction between the MSCs of one PLMN.

served user: The user of a DECT PP who has a subscription with the GSM service provider. The DECT PP accepts the GSM Subscriber Identification Module (SIM) and optionally the DECT Authentication Module (DAM) with a GSM application.

NOTE 5: For the purpose of this ETS no distinction is made between the served user and its associated DECT PP.

3.2 Abbreviations

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

ARI	Access Rights Identifier
BSC	Base Station Controller
DAM	DECT Authentication Module
DECT	Digital Enhanced Cordless Telecommunications
FP	Fixed Part
GSM	Global System for Mobile communications
IMEI	International Mobile Equipment Identity
IMSI	International Mobile Station Identity
ISDN	Integrated Services Digital Network
IWU	Interworking Unit
MSC	Mobile Switching Centre
PABX	Private Automatic Branch Exchange
PDN	Packet Data Network
PISN	Private Integrated Services Network
PLMN	Public Land Mobile Network
PP	Portable Part
SIM	Subscriber Identification Module
TMSI	Temporary Mobile Station Identity
VLR	Visitor Location Register

4 Description

4.1 General

This ETS specifies the requirements to provide GSM basic services over the DECT air interface for the case that the DECT access network is connected with the GSM PLMN via ISDN user-network interfaces (basic access and/or primary rate access).

Served users are enabled to be mobile within and between DECT access networks using the GSM PLMN infrastructure. Where DECT radio coverage is provided and the DECT PP has appropriate access rights (see ETS 300 175-6 [6]) the served user shall be able to make calls from, and to receive calls at, any location within the network, and may move without interruption of call in progress.

4.2 DECT access network attachment to GSM PLMN

Figure 1 shows the basic interconnection architecture. The network is composed of GSM PLMN and DECT access network elements. A DECT access network is not spread over more than one GSM location area. The DECT access network may contain more than one DECT location areas.

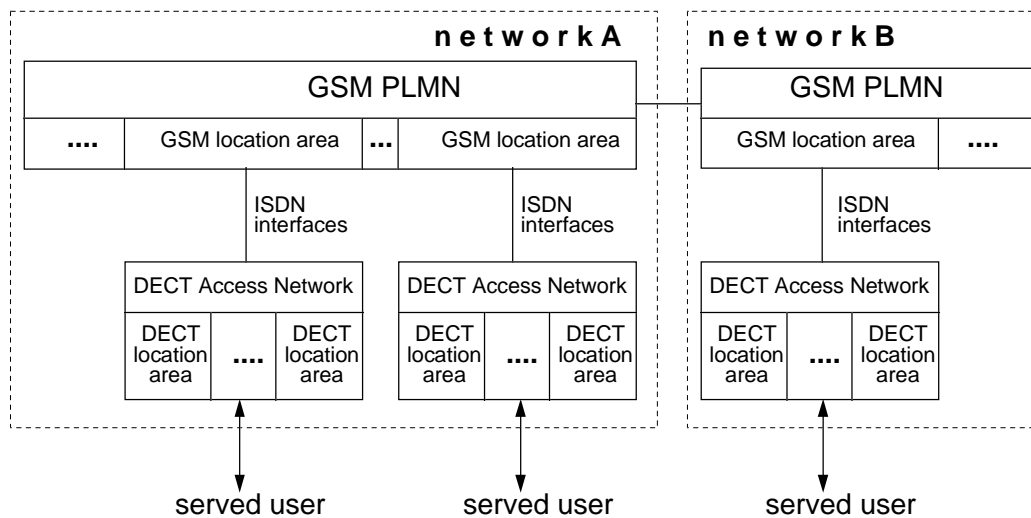


Figure 1: Basic interconnection architecture

Figure 2 shows a configuration where a DECT access network is connected to 2 GSM PLMNs, i.e. is part of two networks. The network keeps the access rights for each of these PLMNs. Served users attaching to the DECT access network may be routed to one of the GSM PLMNs e.g. by their International Mobile Station Identity (IMSI) or by some other, implementation specific, means.

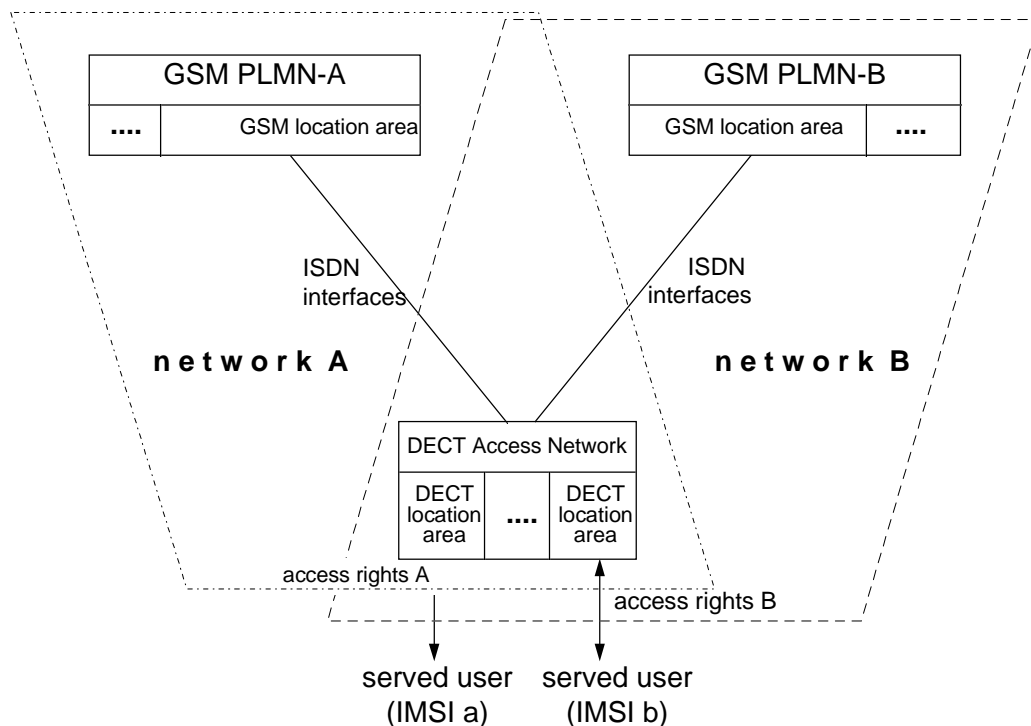


Figure 2: One DECT access network connected to two PLMNs

The served user has a contractual relationship (subscription) with the GSM service provider. The service profile related to this subscription is kept by the GSM part of the network.

4.3 Interworking model

The interworking model shown in figure 3 is used to show the relationship with other standards:

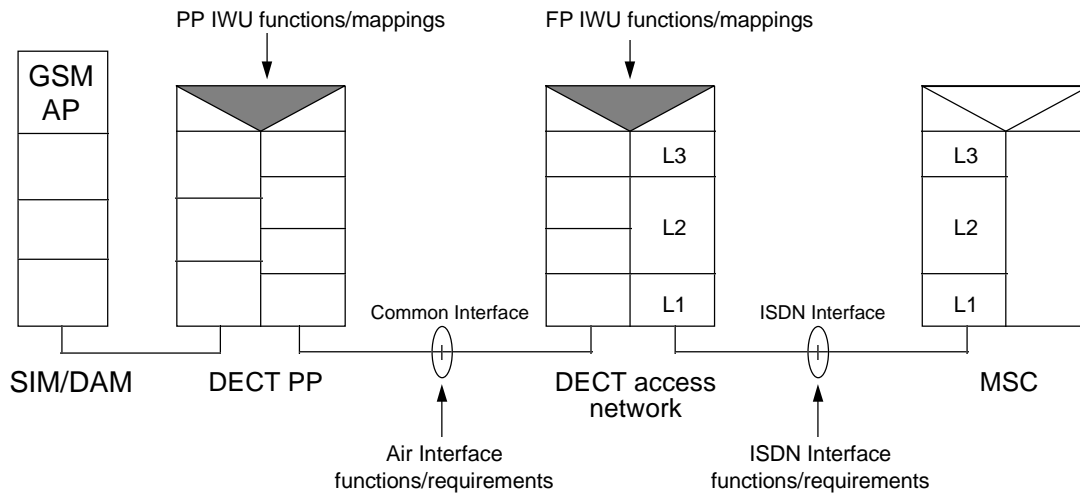


Figure 3: Interworking model

Relations to other standards:

- the air interface functions and requirements are defined in ETS 300 370 [2];
- the PP Interworking Unit (IWU) functions and mappings are defined in ETS 300 370 [2];
- the FP Interworking Unit functions and mappings of the DECT access network are defined in ETS 300 370 [2] for the mobility management functions and in ETS 300 434 [3] for the call control functions.

ISDN Interface functions and requirements are defined in this ETS and in the related stage 2 standard in terms of additions to ETS 300 403-1 [4]. These additions are mainly concerned with mobility management functions. Minor additions are required to call control functions. The purpose of this ETS and the related stage 2 is to guide and constrain the work for a stage 3 standard on the enhancement of DSS1 with mobility management capabilities.

The following clauses describe the core features that are supported.

5 Core features

The core features covered by this ETS are listed hereafter.

5.1 Outgoing call

This feature enables a served user to originate calls from the DECT PP irrespective of its location in the network, on condition that DECT radio coverage is provided and access permitted. The GSM PLMN shall be provided with information that allows identification and authentication of the served user.

5.2 Emergency call

This feature enables a user to make an emergency call, i.e. a fast and easy means of giving information about an emergency situation to the appropriate emergency organisation (e.g. fire service, police and ambulance).

It shall be possible to place an emergency call by entering 112 followed by SEND in the manner specified in ETS 300 511 [7] (GSM 02.30).

NOTE: In addition to the above procedure, calls to national emergency services may be made in the way standard for the country of the serving PLMN. However, with the exception of code "112", these are not treated within the PLMN as "Teleservice Emergency call", and would require a valid IMSI.

5.3 Incoming call

This feature enables a served user to have incoming calls delivered to the DECT PP irrespective of its location in the network. The user holds a GSM number that has to be used to reach the DECT PP associated to this number, wherever it is located, within DECT radio coverage area. The GSM PLMN shall provide the DECT access network with information that allows for the paging of the served user.

If the served user is outside the radio coverage area or the DECT PP is switched off the network shall handle the call according to the GSM specifications, e.g. send an appropriate notification to the calling user or divert the call to another destination.

5.4 Location handling

Location handling procedures enable a served user to move within and between DECT radio coverage areas interconnected via the GSM PLMN. Therefore, the network shall enable the user to register its current location. The network shall also enable the deregistration of the served user's location. The domain in which this feature is offered to the user, may depend on the served user's subscription.

NOTE: Moving within and between DECT access networks supporting this feature requires that all DECT access networks maintain access rights information relating to each GSM service provider with whom a relationship exists (see also figure 2).

The following location handling procedures are defined for this ETS:

- location updating;
- location cancellation. The support of this procedure is optional for the GSM PLMN. If it is supported, it can be used to update a possible local database in the DECT access network;
- periodic location updating;
- IMSI attach/detach.

General aspects of these procedures are described in ETS 300 530 [8] (GSM 03.12).

5.5 Handover

This feature enables a served user to move with the DECT PP with a call in progress within a DECT access network where continuous radio coverage is provided and the DECT PP has appropriate access rights.

Handover which needs support of switching GSM PLMNs for handover execution process is out of the scope of this ETS. Consequently, calls may be terminated in these cases.

5.6 Security features

Security features provide for the protection of both the user and the network against undesirable intrusion of third parties. General aspects of GSM security features are described in ETS 300 506 [9] (GSM 02.09). ETS 300 534 [10] (GSM 03.20) describes the related network functions.

The following security features are covered by this ETS:

- subscriber identity (IMSI) confidentiality (Temporary Mobile Station Identity (TMSI) reallocation procedure);
- subscriber identity (IMSI) authentication;
- user data and signalling data confidentiality (ciphering procedure).

Different GSM service providers may offer different levels of security mechanisms to their subscribers.

5.7 Identity feature

The identity request procedure allows the network to request the DECT PP for an identity of a specified type. Examples of the use of this feature are:

- if upon location updating, the DECT PP identifies itself using a TMSI and the old VLR appears to be not reachable, the GSM PLMN will request the DECT PP to identify itself by use of the IMSI;
- if the GSM PLMN wants to verify whether a DECT PP is blacklisted it will request the DECT PP to identify itself by use of the International Mobile Equipment Identity (IMEI).

6 Interworking requirements

This clause describes the interworking requirements between the DECT access network and:

- a) the GSM service provider; and
- b) the GSM PLMN.

Other interworking scenarios than those mentioned in this clause, are outside the scope of this ETS.

6.1 Interworking between DECT access network and GSM service provider

The DECT access network shall keep the Access Right Identifiers (ARIs), see ETS 300 175-6 [6], containing the operator code of the GSM service provider. These ARIs shall be used to enable served users to attach to the network and to validate the service requests of the served user.

If the DECT access network is related to more than one GSM service provider it shall keep the access rights containing the operator codes of each of those GSM service providers. This situation is illustrated by figure 2.

6.2 Interworking between DECT access network and GSM PLMN

Each DECT access network attached to the GSM PLMN shall be regarded as one GSM location area, i.e. the GSM PLMN shall not be informed on movements of the served user within the DECT access network.

If a served user requests a GSM service, the DECT access network shall pass the request to the GSM PLMN for further processing.

Incoming calls from the GSM PLMN to the served user shall be routed by the GSM PLMN to the appropriate DECT access network. The DECT access network shall route the call further to the served user.

Location registration/updating of a served user may occur in two steps. At first the served user initiates a location registration procedure with the DECT access network. This location registration procedure may cause the DECT access network to initiate a location updating procedure also in the GSM PLMN. The second step may not be required in the situation where the served user roams between DECT location areas but remains in the same GSM location area. If location registration/updating is performed both in the DECT access network and the GSM PLMN, then still the served user shall be sent only one confirmation. If the GSM PLMN sends a location cancellation to the DECT access network, the DECT access network should delete the location information of the served user.

As a result of a location updating the GSM PLMN may assign a temporary identity to the served user. The new temporary identity shall be passed by the DECT access network to the DECT PP.

If a served user detaches from the network this shall be reported by the DECT access network to the GSM PLMN.

Authentication requests received from the GSM PLMN shall be passed by the DECT access network to the served user and the served user's reply shall be passed by the DECT access network to the GSM PLMN.

Cipher requests received from the GSM PLMN shall be passed by the DECT access network to the served user and the served user's reply shall be passed by the DECT access network to the GSM PLMN. Cipher keys received from the GSM PLMN shall remain in the DECT access network and shall be used to encrypt the radio link. Cipher information received from the served user shall be passed by the DECT access network to the GSM PLMN.

If the served user originates a call, the DECT access network shall pass the call to the GSM PLMN ensuring that an appropriate identification of the subscriber is included.

History

Document history			
August 1996	Public Enquiry	PE 111:	1996-08-05 to 1996-11-29
April 1997	Vote	V 9724:	1997-04-15 to 1997-06-13