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**Radio Equipment and Systems (RES);
Digital Enhanced Cordless Telecommunications/
Global System for Mobile communications (DECT/GSM)
interworking profile;
Profile overview**

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Foreword

This ETSI Technical Report (ETR) has been produced by the Digital Enhanced Cordless Telecommunications (DECT) Project of the European Telecommunications Standards Institute (ETSI).

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or the application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or an I-ETS.

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1 Scope

The purpose of this ETSI Technical Report (ETR) is to give an overview of the Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) Interworking Profile (GIP) standards and Technical Bases for Regulation (TBRs) and how they may be applied. Most attention is given to DECT/GSM interworking via the GSM A-interface, as this area of standardization is presently the most advanced.

2 References

This ETR incorporates by dated and undated reference, provisions from other publications. These 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 ETR only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ETS 300 370: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) inter-working profile; Access and mapping (Protocol/procedure description for 3,1 kHz speech service)".
- [2] 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]".
- [3] ETS 300 434-1: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT) and Integrated Services Digital Network (ISDN) interworking for end system configuration; Part 1: Interworking specification".
- [4] ETS 300 434-2: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT) and Integrated Services Digital Network (ISDN) interworking for end system configuration; Part 2: Access profile".
- [5] ETS 300 444: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Generic Access Profile (GAP)".
- [6] 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".
- [7] ETS 300 499: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile Communications (DECT/GSM) interworking profile; Mobile services Switching Centre (MSC) - Fixed Part (FP) interconnection".
- [8] 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)".
- [9] ETS 300 557: "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3 specification (GSM 04.08)".
- [10] ETS 300 558: "Digital cellular telecommunications system (Phase 2); Mobile radio interface layer 3; Supplementary services specification; General aspects (GSM 04.10)".
- [11] ETS 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".

- [12] ETS 300 702-1: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) interworking profile; Part 1: Profile Test Specification (PTS) summary".
- [13] ETS 300 703: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) Interworking Profile (IWP); GSM phase 2 supplementary services implementation".
- [14] ETS 300 704: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) Interworking Profile (IWP); Profile Implementation Conformance Statement (ICS)".
- [15] ETS 300 755: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Data services profile; Multimedia Messaging Service (MMS) with specific provision for facsimile services; (Service type F, class 2)".
- [16] ETS 300 756: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) interworking profile; Implementation of bearer services".
- [17] ETS 300 757: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Data services profile; Low rate messaging service; (Service type E, class 2)".
- [18] ETS 300 764: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) Interworking Profile (IWP); Implementation of short message service, point-to-point and cell broadcast".
- [19] ETS 300 787: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); DECT access to GSM via Integrated Services Digital Network (ISDN); General description of service requirements".
- [20] ETS 300 788: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); DECT access to GSM via Integrated Services Digital Network (ISDN); Functional capabilities and information flows".
- [21] ETS 300 792: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); DECT/GSM interworking profile; Implementation of facsimile group 3".
- [22] TBR 6: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements".
- [23] TBR 10: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements; Telephony applications".
- [24] TBR 19: "European digital cellular telecommunications system (Phase 2); Attachment requirements for Global System for Mobile communications (GSM) mobile stations; Access".
- [25] TBR 20: "European digital cellular telecommunications system (Phase 2); Attachment requirements for Global System for Mobile communications (GSM) mobile stations; Telephony".

- [26] TBR 22: "Radio Equipment and Systems (RES); Attachment requirements for terminal equipment for Digital Enhanced Cordless Telecommunications (DECT) Generic Access Profile (GAP) applications".
- [27] TBR 36: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); DECT/GSM radio access".
- [28] TBR 39: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); DECT/GSM dual-mode portables/mobiles".
- [29] ISO/IEC 9646-6 (1991): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".
- [30] CCITT Recommendation Q.65 (1988): "Stage 2 of the method for the characterization of services supported by an ISDN".
- [31] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".
- [32] GSM TS 01.48: "Digital cellular telecommunications system (Phase 2+); ISDN-based DECT/GSM interworking; Feasibility study".
- [33] ETS 300 175: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI)".
- [34] DE/RES-03065: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT access to GSM Public Land Mobile Network (PLMN) via enhanced Integrated Services Digital Network (ISDN+) interface, bearer services and Short Message Service (SMS)".
- [35] DE/RES-03066: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); DECT/GSM interworking profile; DECT access to GSM Public Land Mobile Network (PLMN) via enhanced Integrated Services Digital Network (ISDN+) interface".
- [36] DE/RES-03067: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communication (GSM); DECT access to GSM Public Land Mobile Network (PLMN) via enhanced Integrated Services Digital Network (ISDN+) interface; GSM supplementary services".
- [37] DE/RES-03079: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) inter-working profile; Enhanced DECT/GSM bearer services".
- [38] DTR/RES-03095: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); Integration based on dual-mode terminals".
- [39] DTR/RES-03096: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM); Advanced integration of dual-mode terminals".
- [40] DE/RES-03097: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) inter-working profile: DECT/GSM interworking to General Packet Radio Service (GPRS)".

- [41] DE/RES-03098: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM) inter-working profile: DECT/GSM interworking to High Speed Circuit Switched Data service (HSCSD)".
- [42] DE/SPS-05121: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol and Signalling System No.7 protocol; Signalling application for the alpha interface of Cordless Terminal Mobility (CTM)".
- [43] ITU-T Recommendation Q6XX Series: "Interworking of signalling systems".

3 Abbreviations and Definitions

3.1 Abbreviations

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

ADPCM	Adaptive Pulse Code Modulation
BTS	Base Transceiver Station
CBS	Cell Broadcast Services
CC	Call Control
CTA	Cordless Terminal Adapter
CTM	Cordless Terminal Mobility
DAM	DECT Authentication Module
DCS 1 800	Digital Cellular System 1 800
DECT	Digital Enhanced Cordless Telecommunications
DSS1	Digital Subscriber Signalling No. 1
DTMF	Dual Tone Multi-Frequency
EC	European Commission
FP	Fixed Part
GAP	Generic Access Profile
GIP	DECT/GSM Interworking Profile
GSM	Global System for Mobile communications
GPRS	General Packet Radio Service
HLR	Home Location Register
HSCSD	High Speed Circuit Switched Data service
IAP	DECT-ISDN interworking profile
IMSI	International Mobile Subscriber Identity
ISDN	Integrated Services Digital Network
IWU	Interworking Unit
LAPU	Link Access Procedure: User plane
MM	Mobility Management
MSC	Mobile Switching Centre
NT	Non-Transparent
PBX	Private Branch Exchange
PLMN	Public Land Mobile radio Network
PP	Portable Part
PSTN	Public Switched Telephone Network
RAP	RLL Access Profile
RFP	Radio Fixed Part
RLL	Radio Local Loop
SIM	Subscriber Identity Module
SMS	Short Message Services
TBR	Technical Basis for Regulation
TMSI	Temporary Mobile Subscriber Identity
VLR	Visitor Location Register
WRS	Wireless Relay Station

3.2 Definitions

For the purposes of this ETR, the definitions given in ETS 300 370 [1] apply. In addition, the following definitions apply.

DSS1+: Enhanced Digital Subscriber Signalling No. 1 (DSS1) protocol with new messages for mobility and authentication.

ISDN+: Enhanced Integrated Services Digital Network (ISDN) with mobility and authentication capabilities.

4 Introduction

DECT is a standard for short range, low power, digital cordless communications. GSM is a standard for digital radio telephony and data networks, offering high tier mobility. The combination of DECT with GSM offers new possibilities.

There are three approaches to DECT/GSM integration:

- Dual mode terminal with no interworking;
- A-interface interconnection;
- ISDN+ interconnection.

The main body of this ETR describes the GIP based on the GSM A-interface. DECT access to GSM via Integrated Services Digital Network (ISDN) is described in annex A. Dual mode terminals are outlined in annex B but will be described in other ETRs (DTR/RES-03095 [38] and DTR/RES-03096 [39]) and in TBR 39 [28]. Annex C outlines future standardization work for GIP based on A-interface interconnection. Annex D of this ETR describes some scenarios of DECT/GSM integration, based on one or more of the 3 approaches above.

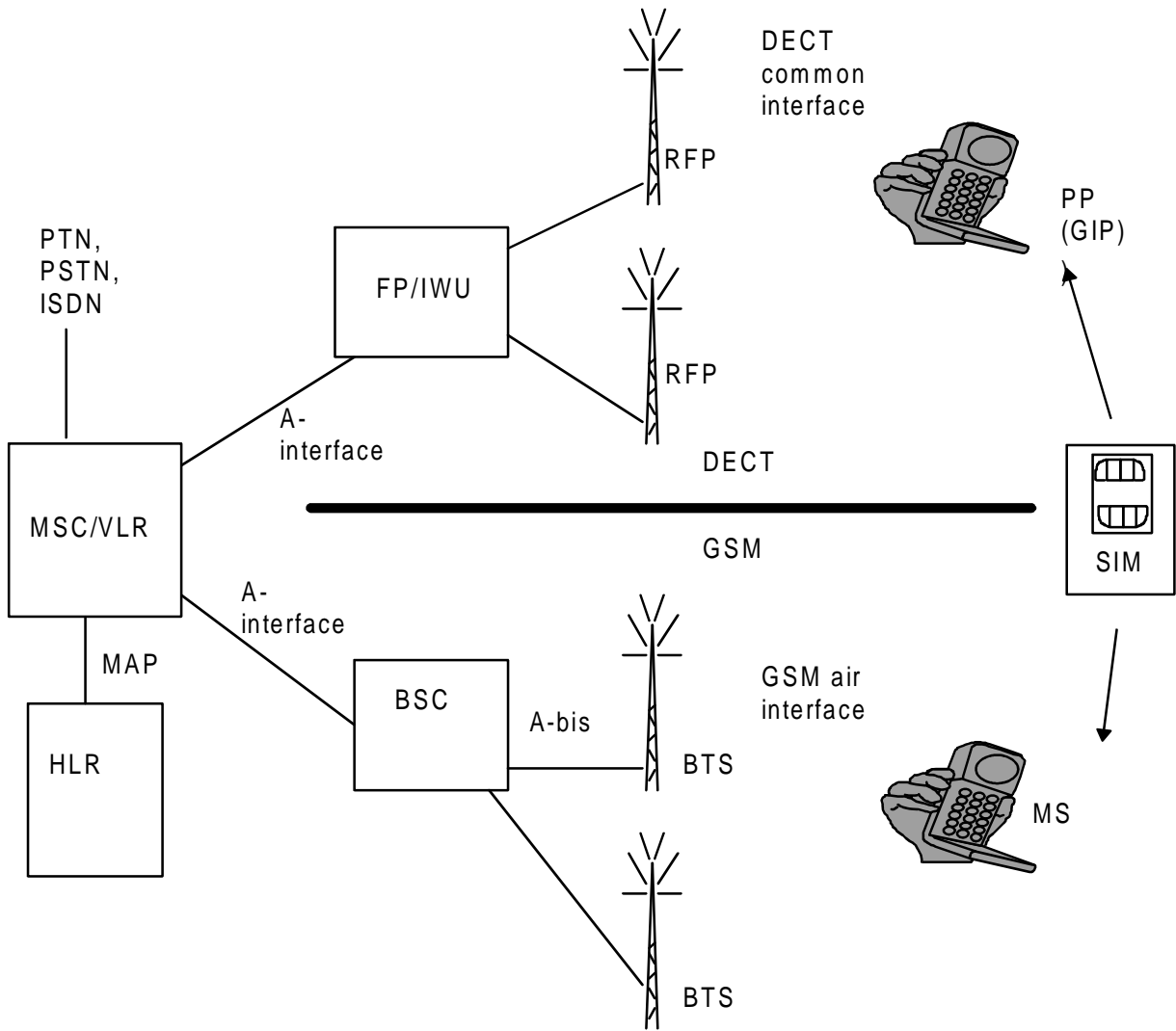


Figure 1: DECT/GSM interworking based on A-interface interconnection

DECT/GSM interworking based on A-interface interconnection is shown in figure 1. The DECT Fixed Part (FP) is connected to the GSM Mobile Switching Centre (MSC) on the GSM A-interface. Interworking Units (IWUs) in the DECT FP and Portable Part (PP) make the translation between DECT and GSM layer 3 protocols. To the MSC, the DECT FP appears like a base station system (BSS). An advantage of this method of interworking is that no changes to the A-interface or MSCs are required. However, changes to the A-interface may be considered in the future for more efficient interworking (e.g. to allow Adaptive Pulse Code Modulation (ADPCM), DECT specific bearer services).

The terminal that attaches to the FP is a GIP compliant DECT PP and accepts a card with a Subscriber Identity Module (SIM). It can roam between Radio Fixed Parts (RFPs) connected to the same FP, or between RFPs connected to different RFPs by involving the MSC. The SIM can be physically moved to a ME which accesses the Public Land Mobile radio Network (PLMN) via the GSM air interface.

NOTE: For more advanced scenarios involving dual mode terminals, see annex D.

5 DECT/GSM Interworking profiles - A-interface

5.1 Summary

This clause is a summary of the GIP standards, based on A-interface interconnection. These standards add detail to DECT Common Interface specification ETS 300 175 [33] and the Generic Access Profile (GAP), ETS 300 444 [5] to enable DECT terminals to inter-work in the public and private environment with DECT systems which are connected to a MSC. Inter-working is based on GSM PLMN phase 2.

The topics covered are:

Topic	Document ref.
Service requirements	ETS 300 466 [6]
Access/mappings for 3,1 kHz speech service	ETS 300 370 [1]
Test specifications for ETS 300 370 [1]	ETS 300 702-1 [12]
PICS for ETS 300 370 [1]	ETS 300 704 [14]
TBR for ETS 300 370 [1]	TBR 39 [28]
MSC interconnection	ETS 300 499 [7]
Supplementary services	ETS 300 703 [13]
Bearer services	ETS 300 756 [16]
Short Message Services (SMS)	ETS 300 764 [18]
Facsimile	ETS 300 755 [15]
Enhanced bearer services	
Implementation of General Packet Radio Service (GPRS)	
Implementation of High Speed Circuit Switched Data service (HSCSD)	

5.2 GSM MSC to DECT FP interconnection ETS 300 499

Interconnection of the MSC to the DECT FP using the GSM A-interface is defined in ETS 300 499 [7]. ETS 300 499 [7] describes the modifications to the GSM 08.00 series which themselves describe the MSC to BSS interconnection. As the IWU in the DECT FP makes the DECT FP appear to a MSC as a BSS, the procedures on the A-interface are very similar to those described in the GSM 08.00 series. Only the relevant procedures and restrictions are described in detail in ETS 300 499 [7].

The basic attachment of the FP to the MSC as specified in ETS 300 499 [7] is shown in figure 2.

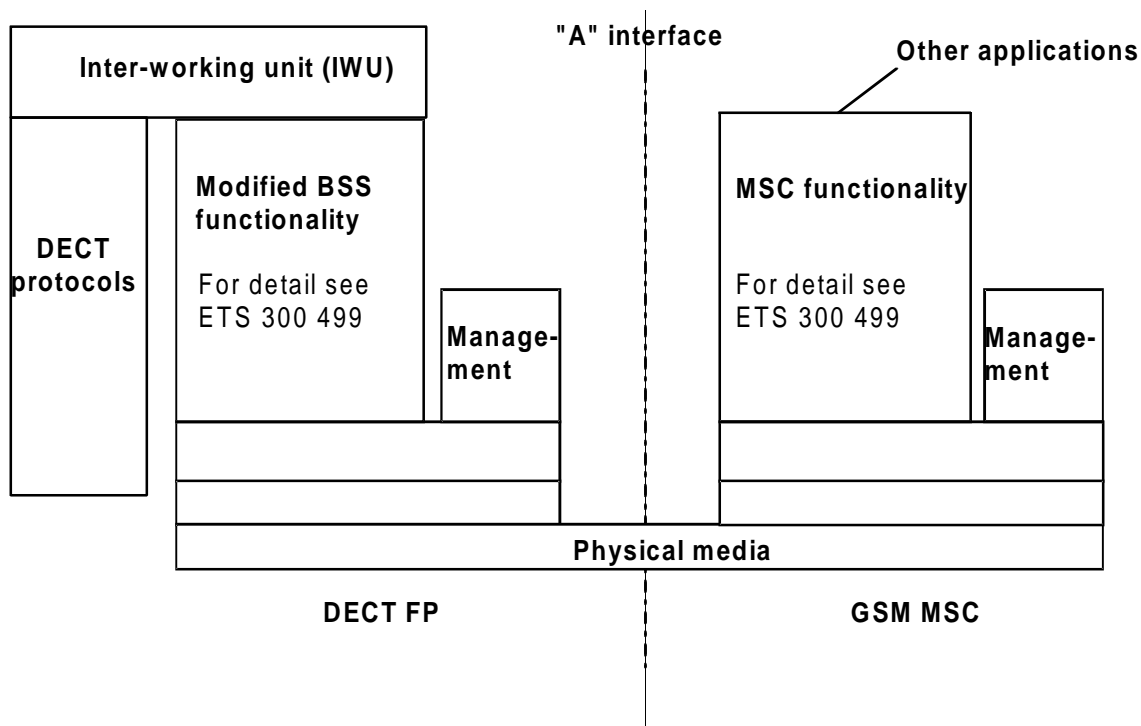


Figure 2: Attachment to the GSM PLMN via the GSM A-interface

ETS 300 499 [7] is designed to allow the following:

- 1) connection of various manufactures FPs to the same MSC;
- 2) the use of the same FPs in any PLMN;
- 3) support of all services defined in the GIP.

The FP to MSC interface is based on the use of 1 or more 2 048 kbits/s digital transmission system interfaces. Each 2 048 kbits/s interface provides 31 x 64 kbits/s channels which can be used for traffic or signalling as the operator requires. The DECT radio path traffic channel is at a rate of 32 kbit/s. A rate adapting function is therefore used for the rate conversion.

5.3 Access and mapping standards

In the following standards, IWUs are specified in the FP and PP for mapping DECT protocols to GSM layer 3 protocols defined in ETS 300 557 [9] (GSM 04.08). IWU procedures and mappings are described by following CCITT Recommendations Q.601 to Q.699 [43] and ISO 9646-6 [29]. The latter document enables the subsequent generation of test cases.

The access and mapping standards are based on the GAP, ETS 300 444 [5] but interworking with GSM networks adds some requirements such as:

- the PP has to support GSM PLMN authentication algorithms, which are different from the standard DECT authentication algorithms;
- the GSM PLMN cipher keys have to be used;
- GSM PLMN identities have to be used;
- interworking of GSM procedures to DECT procedures adds some protocol additions (compared to GAP) to the DECT FP and PP;
- the PP has to support a SIM.

5.3.1 Access and mapping for 3,1 kHz speech service, ETS 300 370

ETS 300 370 [1] was the first of the GIP standards to be published and has been updated to a second edition to include new functionality (e.g. Dual Tone Multi-Frequency (DTMF) and external handover). ETS 300 370 [1] specifies how GSM 3,1 kHz speech service is mapped across the DECT air interface and is organized as follows:

- interworking requirements - this part includes reference configurations, protocol architecture models, and the main service requirements for GIP. The basis for inter-working is the GSM Call Control (CC) and Mobility Management (MM) protocols and GSM paging procedures;
- IWU mappings for 3,1 kHz speech;
- connection types - identifies the main DECT connection types at the air interface supporting optimized groups of services;
- external handover - i.e. in-call handover between different DECT FPs involving the MSC.

5.3.2 GSM Phase 2 supplementary services implementation, ETS 300 703

ETS 300 703 [13] specifies the PP interworking requirements and FP interworking requirements & mappings necessary to ensure that GSM phase 2 supplementary services can be provided over a DECT common interface.

The general interworking functions, the inter-working model, and the inter-working context, clause 5 in ETS 300 370 [1] apply.

The protocol in ETS 300 558 [10] (GSM 04.10) is used for the support of supplementary services. The GSM supplementary service messages are passed transparently.

5.3.3 Implementation of bearer services, ETS 300 756

ETS 300 756 [16] specifies the PP interworking requirements and FP interworking requirements & mappings necessary to ensure that GSM bearer services can be provided over a DECT common interface.

The general interworking functions, the inter-working model, and the inter-working context of ETS 300 370 [1], clause 5 apply.

To enable DECT terminals to inter-work with DECT systems which are connected to the GSM infrastructure, from the DECT side this ETS is based ETS 300 651 [11].

Of the GSM bearer services described in ETS 300 501 [8] (GSM 02.02), ETS 300 756 [16] supports only Non-Transparent (NT) bearer services, i.e. GSM bearer services 21-26, 31-34, and 41-46. The DECT air interface service used is a non-transparent link (Link Access Procedure: User plane (LAPU)) providing a bit error rate of 10^{-9} . The maximum rate used is 9,6 kbit/s although the DECT data profile service type C.2 can in single slot operation provide up to 24 kbit/s rate on the air interface. This limitation is due to the of the GSM A-interface.

5.3.4 Implementation of facsimile group 3, ETS 300 792

The general interworking functions, the inter-working model, and the inter-working context of ETS 300 370 [1], clause 5 apply.

GSM teleservice 61, automatic facsimile group 3, is based on ETS 300 755 [15].

GSM teleservice 62, alternate speech and facsimile group 3 is not currently supported, but may be in a future edition of ETS 300 792 [21].

5.3.5 Implementation of short message services, point to point and cell broadcast services, ETS 300 764

ETS 300 764 [18] specifies the PP and FP interworking requirements & mappings necessary to ensure that the GSM point-to-point short message services (GSM Teleservices 21 and 22) and Cell Broadcast Service (GSM Teleservice 23) can be provided over a DECT common interface. Different parts of ETS 300 764 [18] describe point to point SMS and Cell Broadcast Services (CBS).

The general interworking functions, the inter-working model, and the inter-working context of ETS 300 370 [1], clause 5 apply for point-to-point SMS. ETS 300 764 [18] defines a new reference model for CBS.

ETS 300 764 [18] is based on ETS 300 757 [17] for point-to-point SMS. For CBS, the basis is the CLMS fixed service provided by the DECT common interface network layer in part 5 of ETS 300 175 [33]. For CBS, only DECT air interface functions are defined.

6 Test specifications

Test specifications for ETS 300 370 [1] are based on the second edition of the ETS 300 370 [1]. Only the air-interface is subject to testing.

ETS 300 370 [1] has a Protocol Implementation Conformance Statement (PICS), ETS 300 704 [14], and a Profile Test Specification (PTS), ETS 300 702-1 [12]. The PICS, which must be completed by a manufacturer to declare conformance of a GIP implementation to ETS 300 370 [1], is in two parts - part 1 for the PP IWU and part 2 for the FP IWU. All DECT speech applications also have to conform to the minimum requirements of GAP, ETS 300 444 [5].

The PTS provides approval tests giving a high probability of air interface interoperability between any DECT FP and PP conforming to ETS 300 370 [1] offered by different manufacturers. It is in 3 parts - part 1 giving an overview of documents relevant for each of the DECT protocol layers to be tested; part 2 describing profile specific tests for the PP, and part 3 describing profile specific tests for the FP.

7 TBR for DECT terminal equipment access to GSM PLMNs

TBR 36 [27] specifies the technical characteristics to be provided by terminal equipment connected to a GSM PLMN using DECT for access. TBR 36 [27] ensures air interface interoperability between a FP and PP implementations of ETS 300 370 [1] and ETS 300 466 [6]. TBR 36 [27] covers only air-interface aspects of the PP and FP. A PP complying to TBR 36 [27] needs also to comply with TBR 10 [23], TBR 6 [22] and TBR 22 [26].

TBR 36 [27] also applies to terminals accessing a GSM PLMN via alternative interfaces (e.g. DSS1+). When the FP is part of the GSM PLMN, TBR 36 [27] applies to the PP only. When the FP is not part of the GSM PLMN, TBR 36 [27] applies to the PP and FP. The GSM A-interface is not a public interface thus the FP is part of the PLMN. TBR 36 [27] is structured to allow testing of the PP and FP as separate items.

Annex A: DECT access to GSM via ISDN

A.1 Introduction

DECT access to GSM via ISDN is shown in figure A.1.

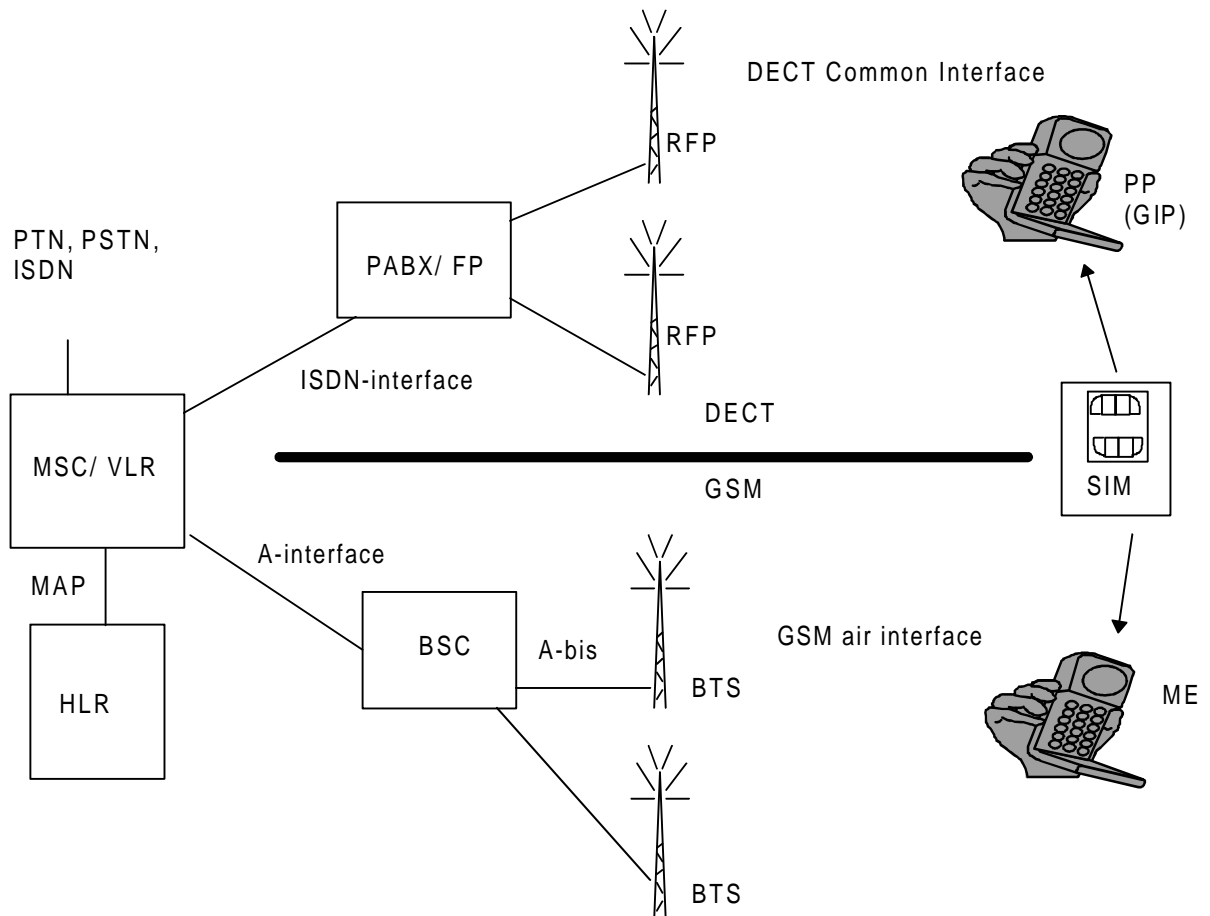


Figure A.1: DECT access to GSM via ISDN

The DECT system is connected to the GSM PLMN via ISDN. This method of interworking is particularly suitable to Private Branch Exchange (PBX) applications as PBXs generally support the DSS1 interface but not the GSM A-interface.

It is required that the DSS1 protocol be enhanced to support new messages for authentication and mobility management. This work is under preparation in DE/SPS-05121 [42], along with enhancement of DSS1 for Cordless Terminal Mobility (CTM) applications. Stage 1 and 2 descriptions of DECT/GSM interworking have been prepared (ETS 300 787 [19] and ETS 300 788 [20]) and the stage 3 is dependent upon the enhanced DSS1 protocol. This method of interworking has been studied within ETSI (see ETS 300 787 [19]).

An ISDN interface between GSM PLMN and DECT access allows GSM service providers to offer their services via existing DECT access networks which have ISDN interfaces. The DECT access network could be owned by the GSM operator but it could also be a PBX or private network providing access to GSM. The GSM user would access telecommunication services in any DECT radio covered location where access is allowed. Local mobility is managed by the DECT system and wide area mobility by the GSM PLMN.

Unlike A-interface interworking, this service is produced in three stages according to the method specified in CCITT Recommendation I.130 [31], see table A.1.

Table A.1

Topic	Related document numbers
DECT access via GSM via ISDN stage 1	ETS 300 787 [19]
DECT access via GSM via ISDN stage 2	ETS 300 788 [20]
DECT access via GSM via ISDN stage 3	DE/RES-03065 [34], DE/RES-03066 [35], DE/RES-03067 [36] and SPS5 work items

A.2 DECT access to GSM via ISDN stage 1

ETS 300 787 [19] defines the general requirements for provision of GSM basic services via the DECT air interface for the DSS1+ case. The DECT access protocols and PP interworking/mappings necessary for the support of basic telephony services specified in ETS 300 370 [1] apply. The DECT access network interworking/mappings for DECT and ISDN interworking specified in ETS 300 434-1 [3] and ETS 300 434-2 [4] also apply.

ETS 300 787 [19] specifies 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 [2].

Handover between a Base Transceiver Station (BTS) and RFP, as well as handover between RFPs connected to different FPs (i.e. external handover), is outside the scope of ETS 300 787 [19].

A.3 DECT access to GSM via ISDN stage 2

ETS 300 788 [20] defines the functional capabilities and information flows for provision of GSM basic services via the DECT air interface for the DSS1+ case. This Stage 2 description identifies the functional entities involved in the service and the information flows between them. It is specified according to the methodology specified in CCITT Recommendation Q.65 [30]. The specification of information flows within the global network (e.g. between MSCs, Home Location Register (HLR) and Visitor Location Register (VLR)) is beyond the scope of this ETS.

The core features covered by this standard are:

- outgoing calls;
- emergency calls;
- incoming calls;
- location updating, location cancellation;
- International Mobile Subscriber Identity (IMSI) attach/detach;
- Temporary Mobile Subscriber Identity (TMSI) reallocation procedure (temporary identity assign);
- IMSI authentication;
- ciphering;
- identity request.

Conformance to ETS 300 788 [20] will be met by conforming to the stage 3 ETSSs, and therefore no method of testing is provided for this ETS.

A.4 DECT access to GSM via ISDN - future work

Stage 3 of this interworking specification can not be started until stable version of DSS.1+ is available from SPS5. SPS5 is considering DSS1+ alpha and beta interfaces. The alpha interface will fulfil the requirements of ETS 300 787 [19] and ETS 300 788 [20] and CTM phase 1. The beta-interface will include extra mobility management for private-public network roaming and will be an add-on to the alpha-interface.

The future work items related to stage 3 of DECT access to GSM via ISDN are shown in table A.2.

Table A.2

Topic	Document number
DECT Access to GSM via ISDN+, bearer services and SMS	DE/RES-03065 [34]
DECT Access to GSM via ISDN+, basic call and mobility management	DE/RES-03066 [35]
DECT Access to GSM via ISDN+, GSM supplementary services	DE/RES-03067 [36]

Annex B: Dual mode terminals

A dual mode terminal consists of a GSM part and a DECT part, in a common implementation. The parts will share plastic casing, display, keypad and battery, and possibly radio parts in the case of Digital Cellular System 1 800 (DCS 1800)/DECT dual mode handsets. From cost point of view it is estimated that a dual-mode handset will be slightly more expensive to manufacture than a similar unit containing only a GSM part.

The GSM part accesses the GSM PLMN, and the services of this fixed network via the GSM air interface. The DECT part may access one or more of the following via a DECT common interface:

- 1) fixed networks (e.g. Public Switched Telephone Network (PSTN)) using GAP for PSTN services;
- 2) GSM PLMN using GIP for GSM services;
- 3) ISDN fixed network and ISDN services using the DECT-ISDN interworking profile (IAP) for ISDN services;
- 4) CTM services using CAP.

Type approval of dual mode DECT/GSM terminals will be dealt with in TBR 39 [28] which will be based on two new ETRs:

- integration based on dual mode terminals (DTR/RES-03095 [38]);
- advanced integration of dual mode terminals (DTR/RES-03096 [39]).

TBR 39 [28] will cover both DECT/GSM and DECT/DCS 1800 cases, as well as dual-mode, dual-band DECT/GSM-DCS 1800 terminals. TBR 39 [28] will add further requirements to those in TBR 6 [22], TBR 10 [23], TBR 22 [26] and TBR 36 [27] (DECT TBRs) and TBR 19 [24] and TBR 20 [25] (GSM Phase 2 TBRs).

The two new ETRs will focus on protection of spectrum and protection of networks. Regarding protection of spectrum the issues are, for example, frequency masks and spurious emissions. Regarding protection of networks, the issue is how to change network automatically without causing unnecessary signalling related to roaming and handover.

Further work will focus on issues such as further algorithms for selecting radio access, external handover between DECT and GSM, having both modes active simultaneously (e.g. receiving SMS whilst making a DECT call), and network aspects associated with dual mode terminals.

Annex C: Future work on A-interface interworking

There are three DECT work items on, or related to, enhanced bearer services. They will be based on GSM Phase 2+. Changes to the GSM A-interface may be considered (see table C.1).

Table C.1

Topic	Document number
DECT/GSM enhanced bearer services up to 64 kbit/s	DE/RES-03079 [37]
DECT/GSM interworking to HSCSD	DE/RES-03098 [41]
DECT/GSM interworking to GPRS	DE/RES-03097 [40]

Annex D: Scenarios

This annex contains some examples of applications of DECT/GSM interworking.

NOTE: There are many regulatory issues associated with these scenarios for DECT/GSM integration. DECT for private use is covered by an European Commission (EC) directive, but DECT for provision of public services is a different matter. It is not the purpose of this ETR to describe the regulatory issues, only to highlight their existence.

D.1 DECT/GSM dual mode terminal without network interconnection

A hybrid DECT/GSM system based on dual mode terminals only and no interworking is shown in figure D.1.

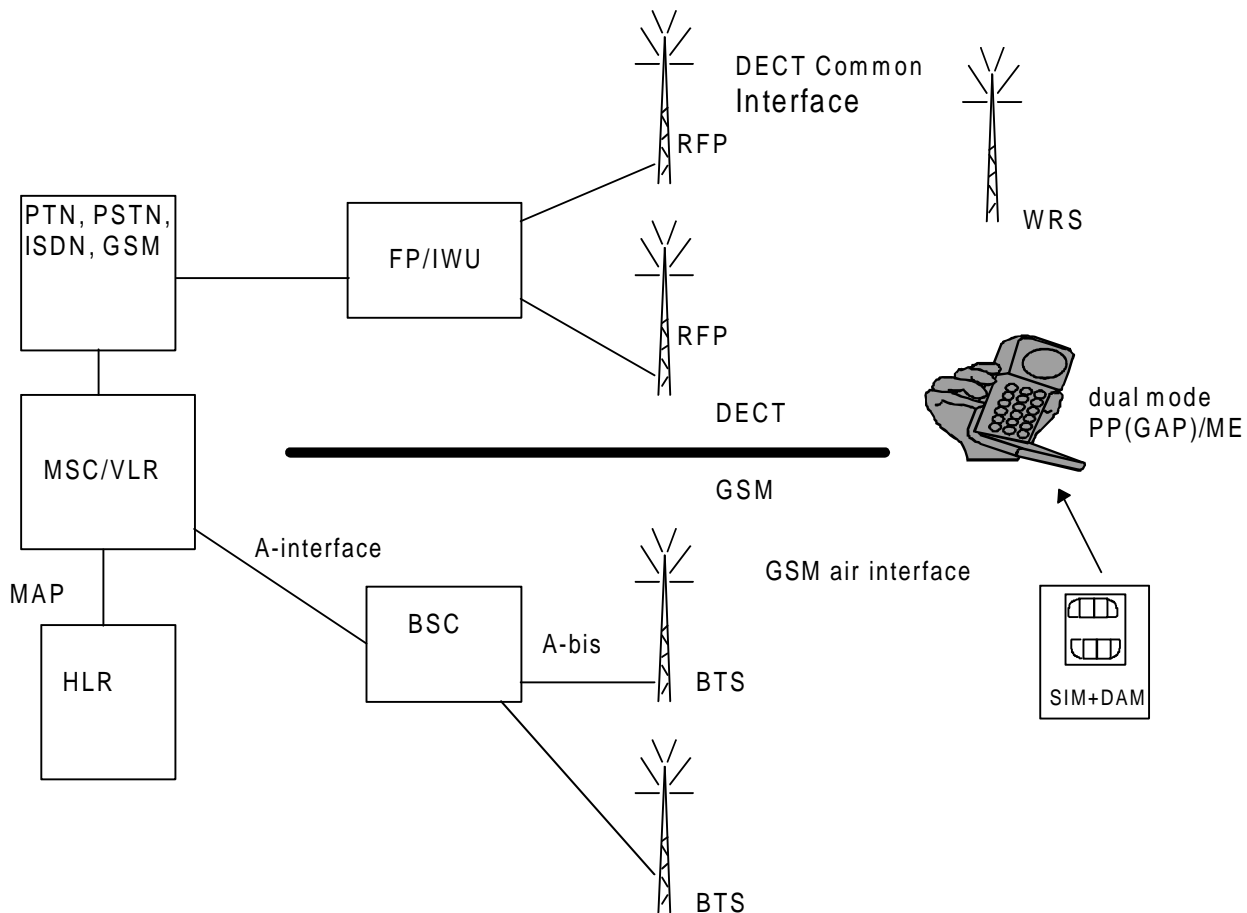


Figure D.1: DECT/GSM dual mode terminal without network interconnection

There is no interconnection of the DECT system to the GSM PLMN and the dual mode terminal operates with both networks independently and therefore has two subscriptions. The DECT part of the terminal is a GAP PP.

This early scenario would allow a user to have, for example, a residential DECT cordless terminal or business PBX terminal combined with a GSM terminal into a single unit. The user may arrange for calls to be forwarded between the two subscriptions.

D.2 DECT enhancement to GSM PLMNs

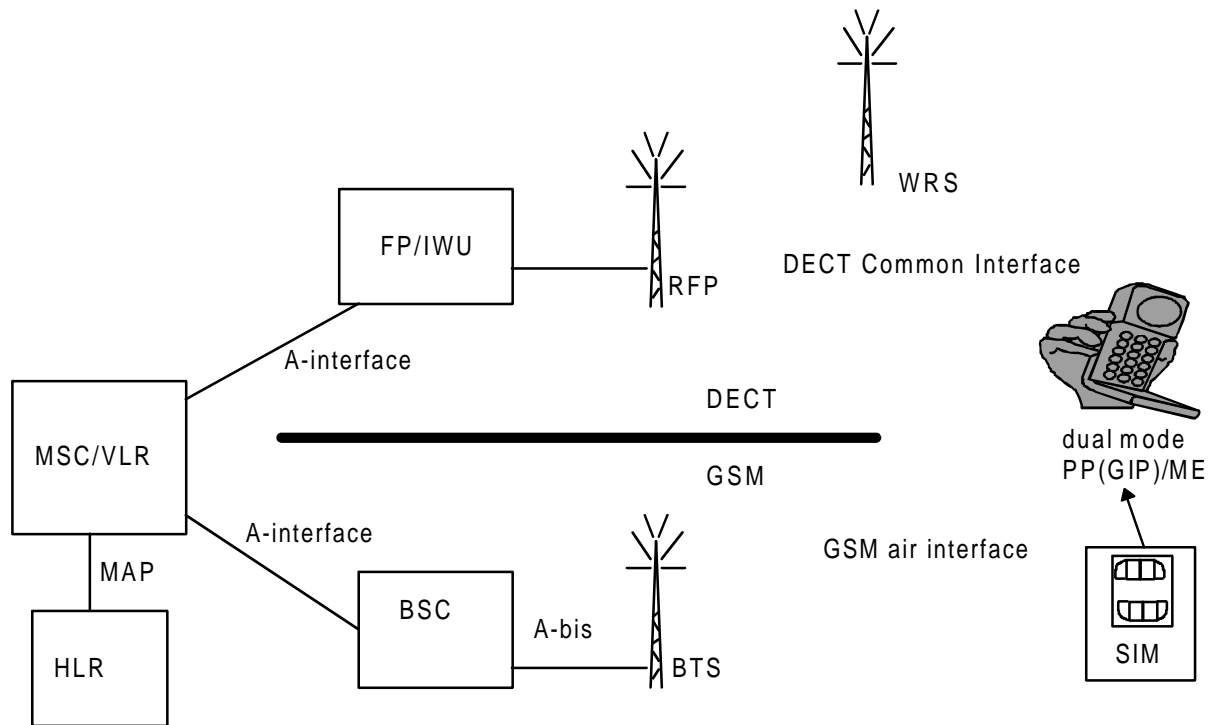


Figure D.2: DECT enhancement to GSM PLMNs

The GSM operator can add capacity in high density areas (e.g. wireless office) or where higher data rate services not provided by GSM are required. An attraction is that DECT requires no cell planning because it uses Dynamic Channel Assignment, and is very low power so that many DECT RFPs can be employed within the same building. Each DECT RFP supports 12 simultaneous voice channels. The capacity of DECT can be as high as 10 000 Erlang per km² per floor. DECT RFPs are also expected to be much less expensive than GSM Base Station Systems (BSS). DECT Wireless Relay Stations (WRSs) may also be used to further improve coverage without a wired connection. Better speech quality and higher data rates are further attractions.

In this basic scenario, the DECT FP is interconnected to the MSC by the A-interface. The user has a GSM subscription and a dual mode terminal and may roam between FPs and BTSs. Handover (involving the MSC) is possible between RFPs connected to different FPs, but there is currently no standard for handover between a RFP and BTS. The DECT part of the dual mode terminal is a GIP compliant PP. Both parts access the same subscription (single SIM).

The same DECT installation may also be used for fixed access to the PLMN using Cordless Terminal Adapters (CTAs) complying to the Radio Local Loop (RLL) Access Profile (RAP).

D.3 Cordless PBX with inter-PBX roaming

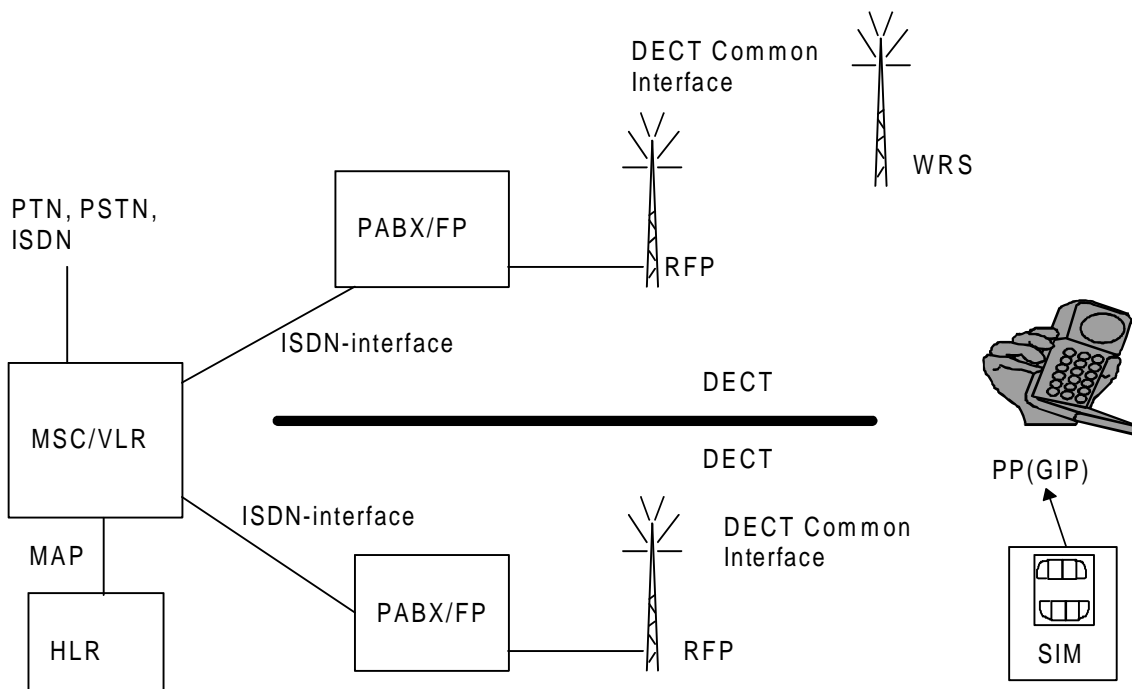


Figure D.3: Cordless PBX with inter-PBX roaming

The DECT PBX is connected to a GSM MSC using the DSS1+ interface. Traffic is carried by the GSM PLMN. Inter-PBX mobility is provided by the GSM HLR/VLR. The terminal is a GIP compliant PP.

This scenario may be extended with a dual mode terminal, so that when "on-site" the call is made via a DECT FP (wireless PBX) and when "off-site" via GSM (i.e. scenario D.2 with the A-interface replaced by an ISDN interface).

D.4 DECT public pedestrian service with wide area roaming

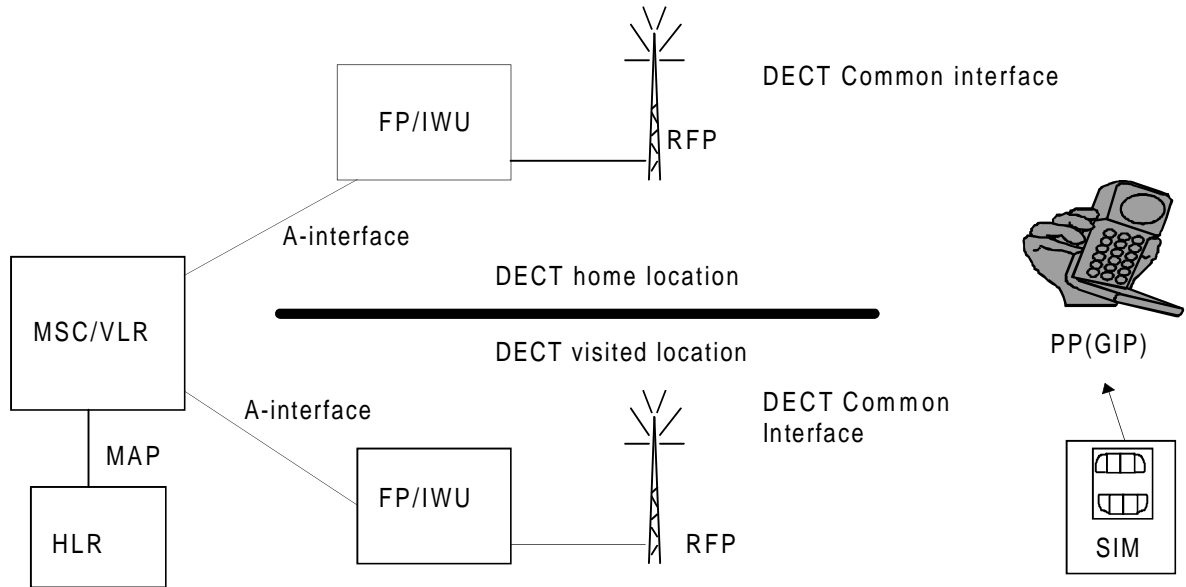


Figure D.4: DECT public pedestrian service with wide area roaming

The FP is connected to the MSC by the A-interface. Local mobility is provided by the DECT system. Wide area mobility is provided by the GSM HLR/VLR. The terminal is a GIP compliant PP.

Such a service might use existing public pedestrian service sites (e.g. in shopping centres, metro stations) but subscribers would have incoming call capability and mobility.

This scenario may also be extended using dual mode terminals.

D.5 Mobility between public & private networks

In this advanced scenario, a roaming agreement exists between the GSM operator and DECT system owners. The DECT system may be a single FP/RFP (e.g. residential environment) or wireless PBX with multiple RFPs (e.g. office environment). The user has a DECT or GSM subscription with either party. The user may roam seamlessly between the GSM PLMN and the DECT system. The terminal is a dual mode GSM ME and GIP compliant PP. A SIM or DECT Authentication Module (DAM) is used, depending on whether the subscription is with a DECT or GSM operator. This may be a migration stage towards UMTS.

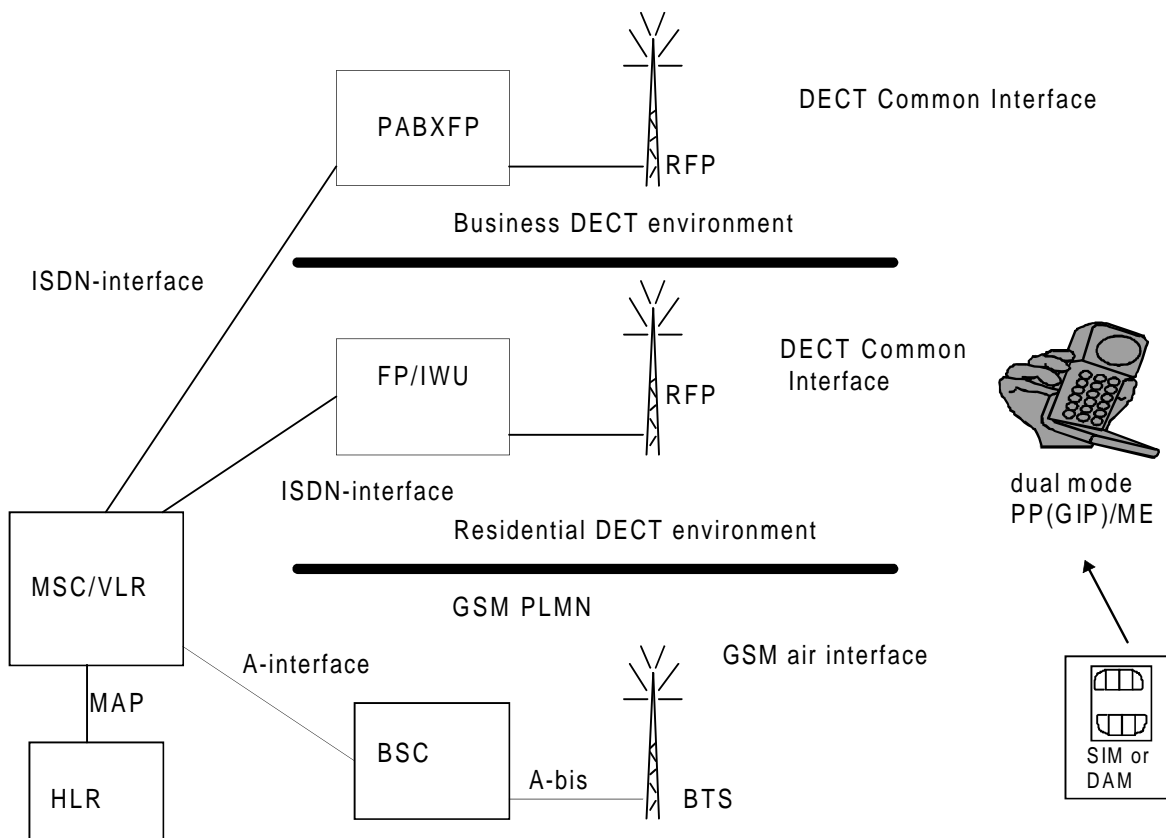


Figure D.5: Mobility between public and private networks

History

Document history	
December 1996	First Edition