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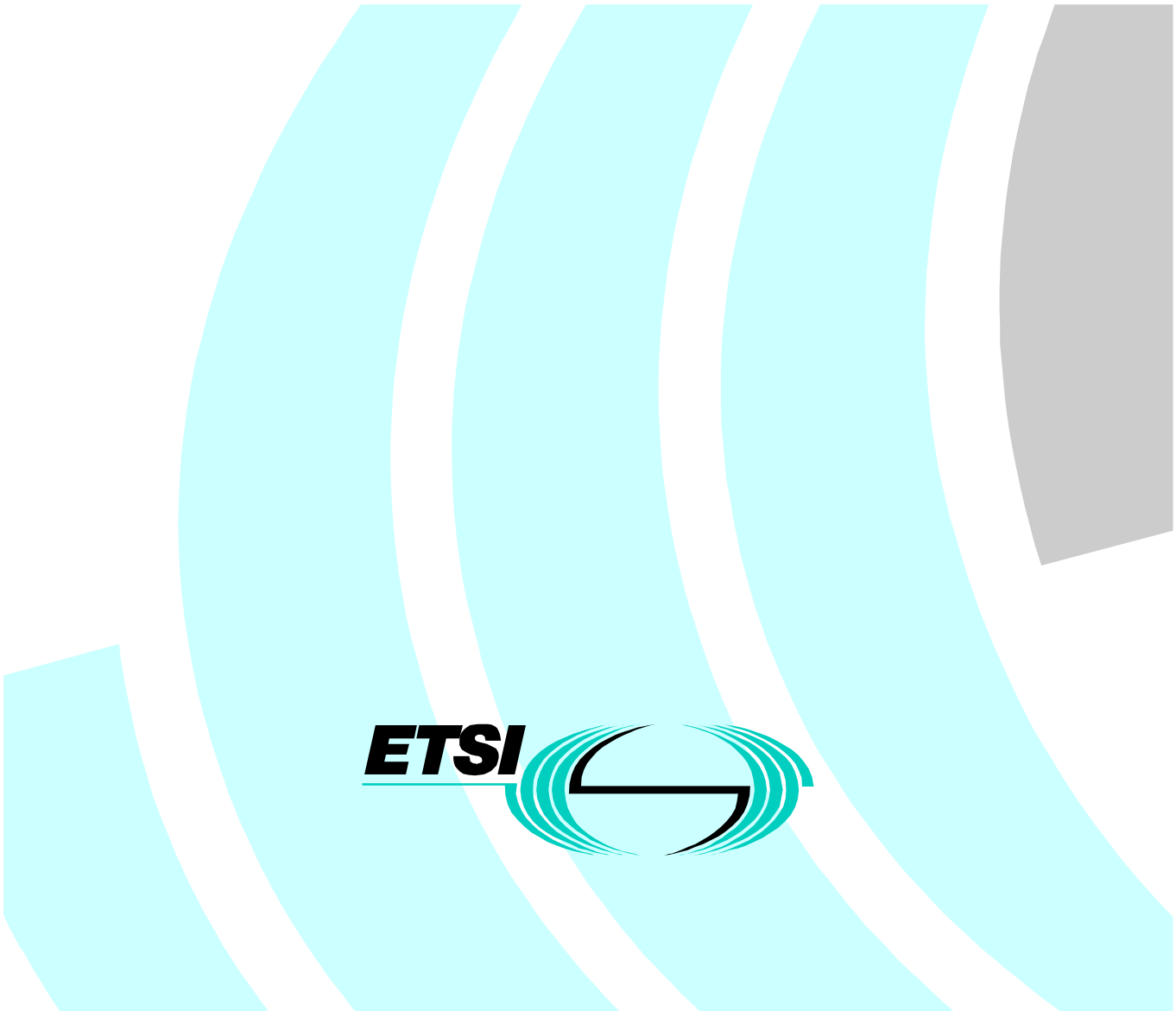
Technical Report

Digital Enhanced Cordless Telecommunications (DECT); Data services overview



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Foreword

This Technical Report (TR) has been produced by ETSI Project Digital Enhanced Cordless Telecommunications (DECT).

TRs are informative documents resulting from ETSI studies. A TR may be used to publish material which is either of an informative nature, relating to the use or the application of ENs or TSs, or which is immature and not yet suitable for formal adoption as an EN or a TS.

1 Scope

The present document describes the objectives, structure and content of the Digital European Cordless Telecommunications (DECT) Data Services Profiles (DSPs), which define a set of profile standards for systems conforming to the DECT standard. They are a family of profile standards which build upon, and extend, each other, aimed at the general connection of terminals offering non-voice services between themselves or to other communications network, both public and private, via a DECT Fixed Part (FP).

The present document also describes possible user scenarios in wireless mobile computing. These scenarios have formed the guidelines of the DECT DSPs.

2 References

For the purposes of this Technical Report (TR) the following references apply:

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

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

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

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

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

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

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

[8] ETSI EN 300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech coding and transmission".

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

[10] ETSI EN 300 757: "Digital Enhanced Cordless Telecommunications (DECT); Low Rate Messaging Service (LRMS) including Short Messaging Service (SMS)".

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

[12] ETSI EN 301 649: "Digital Enhanced Cordless Telecommunications (DECT); DECT Packet Radio Service (DPRS)".

[13] ETSI ETR 043: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Services and facilities requirements specification".

[14] ETSI TR 101 178: "Digital Enhanced Cordless Telecommunications (DECT); A High Level Guide to the DECT Standardization".

[15] ITU-R Recommendation M.1457: "Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000)".

[16] ETSI TS 101 948: "Digital Enhanced Cordless Telecommunications (DECT); DECT derivative for implementation in the 2,45 GHz ISM Band (DECT-ISM)".

3 Definitions and abbreviations

3.1 Definitions

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

authentication: process whereby a DECT subscriber is positively verified to be a legitimate user of a particular Fixed Part (FP) and vice versa

frame relay: transmission of a Service Data Unit (SDU) with frame boundaries maintained but without notification of correct or otherwise receipt of that SDU

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

IMT-2000: International Mobile Telecommunications, Third Generation Mobile Systems.

IMT-FT: International Mobile Telecommunications, FDMA/TDMA
This is the DECT family member of IMT-2000.

interoperability: ability of a FP from one manufacturer and a Portable Part (PP) from another manufacturer to communicate, exclusively by means of reliance on a common protocol profile

mobile computing: use of portable computer type equipment in different locations

on-line media: availability of a wide range of copyright material, such as encyclopaedias, maps, directories, timetables and newspapers, to users for access via telecommunications networks

Personal Intelligent Communicator (PIC): hand held computer, possibly with a pen based user interface, and the ability to communicate via data networks

Portable Part (PP): 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.

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

teleservices: type of telecommunications services that provides the complete capability, including terminal equipment functions, for communication between users, according to protocols that are established by agreement

terminal mobility: ability to access a set of communications services, associated with a specific terminal, in different locations

3.2 Abbreviations

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

DECT CI	Digital Enhanced Cordless Telecommunications Common Interface
DPRS	DECT Packet Radio Service
DSP	Data Services Profile
FP	Fixed Part
GAP	Generic Access Profile
GSM	Global System for Mobile communication
IDBS	Isochronous Data Bearer Service
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LRMS	Low Rate Messaging Service
PABX	Private Automatic Branch eXchange

PAD	Packet Assembly/Disassembly
PDA	Personal Digital Assistant
PIC	Personal Intelligent Communicator
PIN	Personal Identification Number
PP	Portable Part
SDU	Service Data Unit
SMS	Short Message Service
TCP/IP	Transmission Control Protocol/Internet Protocol
WAN	Wide Area Network

4 User scenarios

The following clauses describe user scenarios related to wireless data communication. The purpose of these clauses is to give a background for user requirements and an introduction to the services and facilities that the DECT DSPs are aiming to support.

4.1 Multimedia residential cordless

Figure 1 shows a typical multimedia residential cordless application.

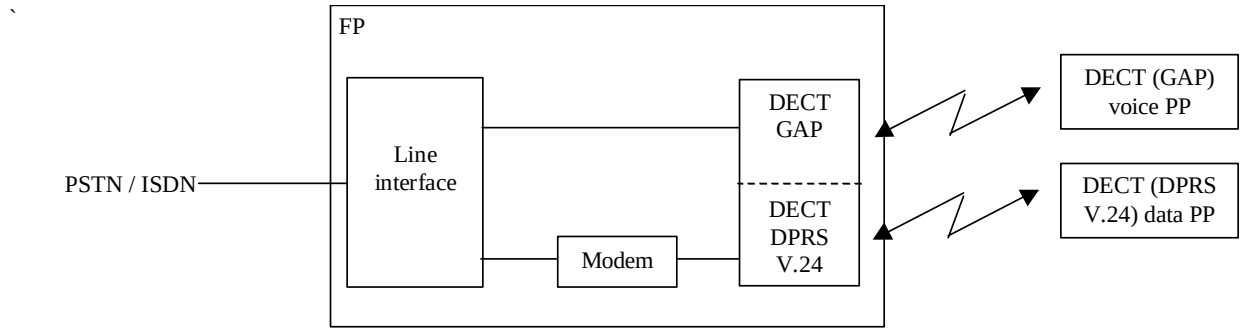

Figure 1

A FP is connected to a telephone line (PSTN or ISDN). The FP supports DECT voice terminals as well as DECT data terminals. If a call is set-up with a DECT data terminal, the internet can be accessed with a modem build into the FP.

Typical data terminals in this application are:

- devices for accessing the internet;
- plugs which can be connected to standard PCs.

4.2 Data cord replacement

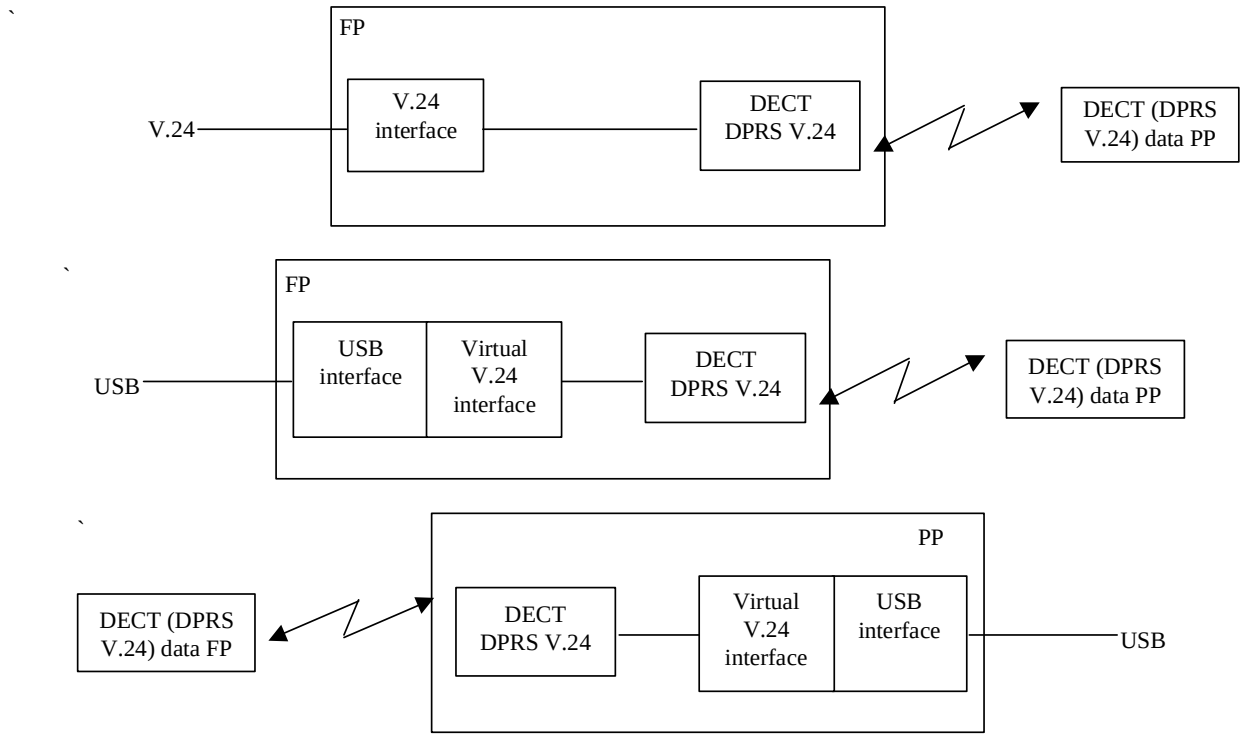

Figure 2

Typical data terminals in this application are:

- devices for accessing the internet;
- plugs which can be connected to standard PCs;
- bar-code readers.

4.3 Wireless Local Area Network (LAN)

A wireless LAN can extend or even substitute for a standard wired LAN. The wireless LAN will function as a wired LAN does, using the same network protocols as wired LANs today (e.g. TCP/IP). The users of wireless LANs can be organizations which:

- need local terminal mobility;
- need to be flexible in re-configuring their LAN;
- require a temporary LAN;
- are situated in buildings where the installation of extra cabling is costly, disruptive or forbidden (such as historic buildings or those containing asbestos).

Relevant applications will include those running on most LANs today (such as Office productivity tools, Internet browsers and e-mail applications) and new applications specially designed for mobile terminals. The new opportunities offered by cordless terminal mobility will create brand new markets for information technology.

It is extremely important that the wireless LAN is at least as dependable as a wired LAN. The reason for this is the dependency placed on LANs to work without failure in modern businesses. This means that the wireless LAN has to give the user a very high degree of confidence that it will avoid corruption of data and deliver a minimum level of throughput in all places where coverage is defined.

The addition of data services to a wireless PABX can offer value added services with very little additional complexity and can use the same installed set of base stations that already provide speech services. In particular, services such as fax and access to files stored on a LAN can be provided. There is also the possibility of adding new cordless services such as cordless data entry and inventory control.

An infrastructure that can offer both wireless speech and data services over the same infrastructure will offer extremely flexible and cost effective solutions to users for whom staff mobility is a requirement.

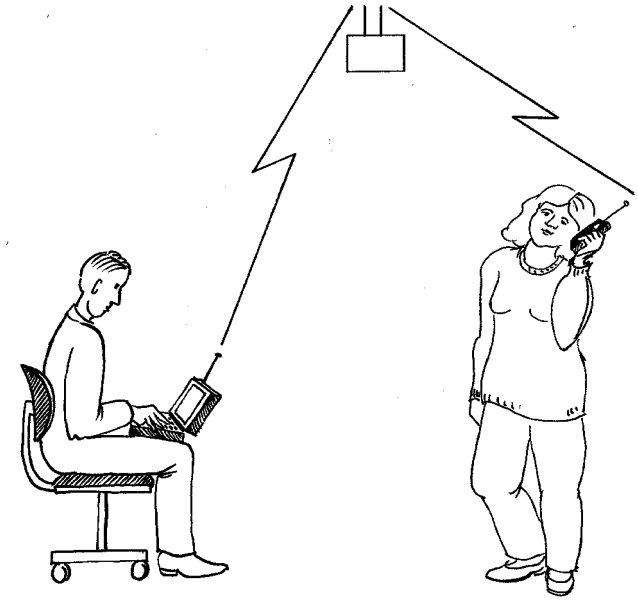

Figure 3

Another important scenario is when roaming between networks such as LANs or PABXs is needed, the user is allowed to continue to use his network identity or "address" when moving between different networks. For instance, this would make it possible for an employee of a large company to travel from the main office to a branch office, still being connected via the local networks to his/her home networks, receiving electronic mail and retrieving documents from his or her home server. In this scenario, additional functions such as roaming and authentication procedures have to be supported by the wireless networks.

The scope of the mobility offered to the user is increased in this scenario. Therefore, applications, which are specially designed for mobile terminals, will be able to offer even greater added value than in the scenario in clause 4.1.1.

Roaming between wireless LANs/PABXs allows users' speech and data services to be available and automatically re-routed to them as they move between different LAN/PABX sites either within one company or between several companies. This can make possible enormous cost savings to user organizations as the productivity of their employees is increased.

4.4 SMS messaging on a Private Automatic Branch Exchange (PABX)

The Short Message Service Mobile Terminated (SMS-MT) can be used to send messages to individual DECT terminals, or to a group of DECT terminals. Typical applications are:

- contacting people with a busy meeting schedule;
- patient alarms in hospitals, which send a pre-programmed message directly to the health care worker in charge;
- sensors in factory equipment, which send a pre-programmed message directly to an engineer.

The Short Message Service Mobile Originated (SMS-MO) can be used to send messages from an individual DECT terminal to an operator. Typical applications are:

- a DECT terminal can be equipped with a push button or non-movement alarm. In case of an emergency, a message will be send to on operator;
- manually entering an SMS message on a DECT terminal, and sending it to the SMS service centre for forwarding to another DECT terminal.

4.5 Voice over IP

Voice over IP is possible in several ways using DPRS. To be able to support Voice over IP, IP must be supported. There are several ways in DPRS to transport IP, so Voice over IP can be done in as many ways.

Using DPRS V.24 interworking, the protocol architecture looks as follows:

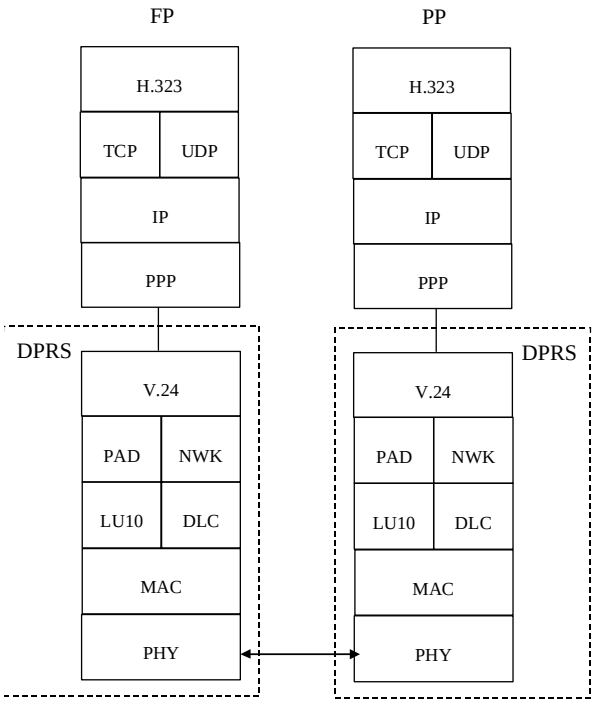

Figure 4

Using DPRS ethernet interworking, the protocol picture looks as follows:

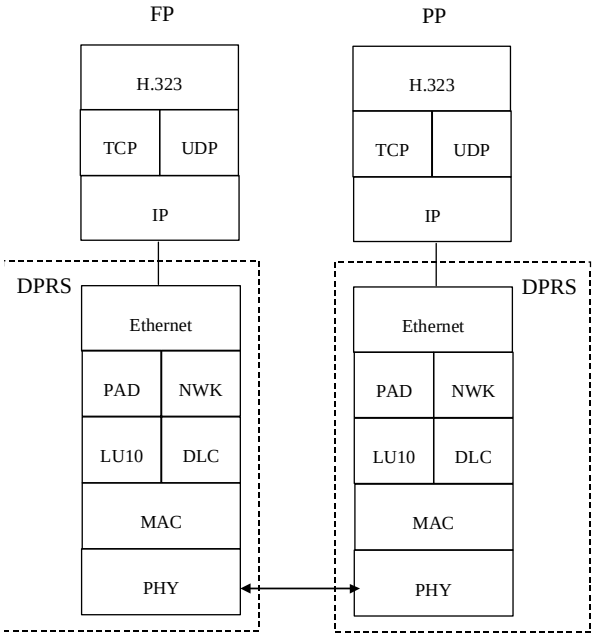

Figure 5

Using DPRS PPP interworking, the protocol picture looks as follows:

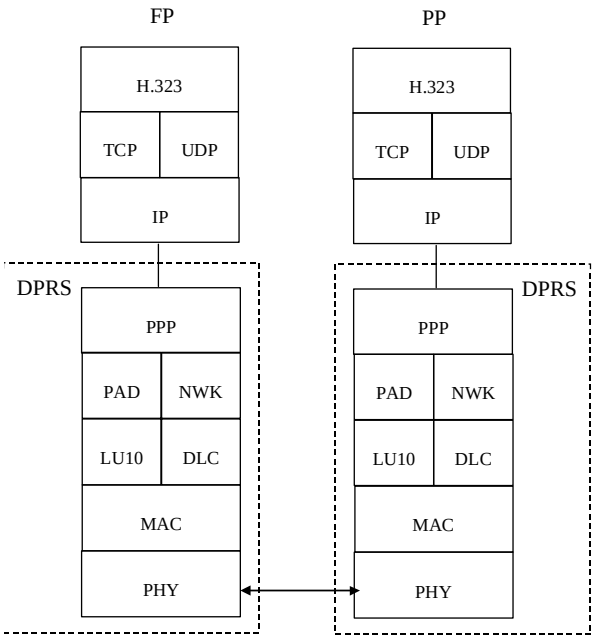

Figure 6

Using DPRS IP interworking, the protocol picture looks as follows:

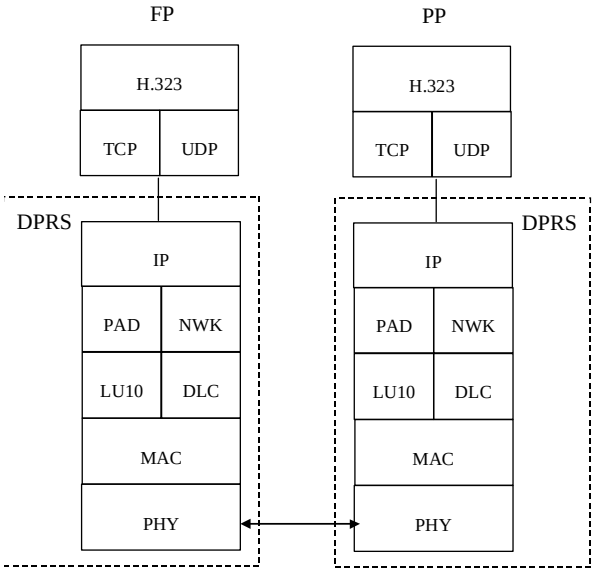

Figure 7

5 User requirements for wireless data networks

This clause lists some requirements for wireless access to data networks. Not all of these requirements must necessarily be met for a wireless data network to be able to function in a given environment. Nevertheless the more of these requirements can be met, the more versatile and acceptable the wireless network will be.

The requirements are:

1) a reliable system that will keep on functioning even under severe conditions;
2) very strong security features to avoid unauthorized access and eavesdropping;
3) mobility support to cater for terminal mobility in public and private environments;
4) throughput high enough to support relevant applications;
5) the ability to support multimedia, in particular voice and data, using the same infrastructure;
6) interoperability between equipment from different manufacturers;
7) small and light user kit;
8) the ability to use equipment designed for private use in a public environment without hardware modifications.

In the remainder of the present document it will be shown how DECT can meet these requirements.

6 DECT features essential to the DECT DSPs

This clause describes some features of the DECT standard that are important for the data services outlined in clause 4.

6.1 General

The DECT standard was developed by ETSI for a wide range of high-density cordless applications, both private and public.

The standard (see EN 300 175-2 [2]) has defined radio frequency carrier positions for a wide range of frequency allocations:

- 1 880 MHz to 1 900 MHz (Available Europe and most other parts of the world);
- 1 900 MHz to 1 920 MHz (China);
- 1 910 MHz to 1 930 MHz (Latin America);
- 1 885 MHz to 1 980 MHz and 2 010 MHz to 2 025 MHz (IMT-2000 spectrum allocation. Applies to IMT-FT(DECT) [15] being a member of the IMT-2000 family. Applies to the parts of national spectrum allocated for TDD operation);
- 2 400 MHz to 2 483,5 MHz (Worldwide 2,4 GHz ISM band. Applies to the DECT derivative DECT-ISM [16].

Throughout its life-cycle, the DECT standard has been envisaged as a multi-media telecommunications system, supporting both telephony and data transmission (see ETR 043 [13]), and its design has reflected the needs of this application from the earliest development phases As a result, the DECT CI standard EN 300 175, parts 1 [1] to 8 [8] contains a number of features specifically required for data services, upon which the DSPs are based.

6.2 Traffic capacity

6.2.1 Data services

A DECT single radio end point is able to support an error corrected, net sustainable, throughput of up to 2 Mbit/s [14]. This can be achieved with a single 8-level modulation DECT radio by using 23 of the 24 available time slots to transmit data from a FP to a PP or vice versa. This capacity can be dynamically varied during a data transfer. The corresponding net sustainable throughput for 2-level and 4-level modulation is up to 0,55 MHz and 1,3 MHz respectively.

The above throughput values are further increased by implementing multiple radio end points and/or Distributed Communications (see figure 14).

DECT base stations in multi-cell enterprise applications are traditionally slot and frame synchronized. Newer multi-cell applications with base stations attached to a LAN may be non-synchronized or synchronized. Synchronization is not required for DECT base stations to coexist and interwork in a system. Non-synchronization will not change the maximum throughput indicated above of a DECT endpoint, but in a multi-cell scenario, the total available interference limited traffic in a local area will be maximized with locally synchronized base stations.

6.2.2 Combined speech and data services

Speech is still the most important service for mobility applications. Therefore, in a majority of cases of mobile data applications, also a mobile speech service is required.

DECT provides very efficient use of spectrum and of base station capacity for combined speech and packet data services. The main reasons for this rather unique property are the following:

- the dynamic channel procedure applies in a consistent way to both circuit switched and packet switched services, providing mutually non-interfering radio bearer selections;
- the bearers for a data connection are assigned as multiples of simplex bearer pairs, where each pair is congruent in the time/frequency domain with a duplex bearer for speech. Therefore radio resources for mixed data and speech calls can be packed in the time/frequency domain as efficiently as for speech calls only;
- each single bearer pair for data can be a duplex pair (a duplex bearer) or a unidirectional pair (a double simplex bearer). The number of, and type of, simplex bearer pairs for transfer of a packet is dynamically allocated and if required varied during the transmission of the packet;
- in the same local environment data and speech calls may be accessed by common and/or separate base stations;

- in a common base station the resources are utilized very efficiently. A DECT single radio (non-blind slot) base station (or PP) has a capacity of 12 simultaneously active simplex bearer pairs. One pair corresponds to 1 Erlang(E) of speech traffic. Suppose 8 users of DECT speech service (typically 150 mE each) are located within the range of one base station. Then the average load will be 1,2 E. This is a typical loading in an enterprise environment. Thus in average 90 % of the bearers in speech base station infrastructure are available to packet data. This will not affect the speech service, since packet bearers can be released as soon as more capacity is required for speech bearers. Planning for a very dense speech service (100 % penetration) with 25 users per base station, still leaves 70 % of the full capacity for packet data.

6.3 Security

Security will be a major issue when wireless access is applied to data networks. A company installing a wireless LAN will demand wireless access to be comparable to wired access with respect to avoiding unauthorized access and eavesdropping.

Security will also be crucial in a public access environment if public confidence is to be maintained.

A number of powerful security services have been specified within DECT (see EN 300 175-7 [7]). These are:

- authentication of a PT by an FT. This uses an authentication key which is known both to the PT and the FT. A session authentication key is computed from the authentication key, which means that the authentication key itself does not need to be revealed to visited networks;

- authentication of an FT by a PT. This is a PT initiated service that enables a PT to authenticate an FT through which it is making or receiving a call. The authentication mechanism is the reverse of the authentication of a PT;

- mutual authentication enables a PT and the FT through which a call is connected to continuously authenticate each other;

- data confidentiality provides for the encryption of the user data and certain control data over the air interface between a PT and an FT. Both the PT and the FT establish a common cipher key. With this key a key stream for encrypting data is generated. The cipher key may be fixed, or generated on a per call basis;

- the user authentication service allows an FT to authenticate a user in a manner similar to the on-line Personal Identification Number (PIN) verification provided by banking systems.

All these functions have been designed in such a way that sensitive information, such as cipher keys, is never transmitted over the air interface.

6.4 Mobility

DECT contains comprehensive, powerful, standardized support for mobility, including both local-area mobility and roaming between networks, both public and private. The location definition and registration procedures permits greater flexibility in the partitioning of networks. Standardized procedures provide identity and subscription management, service negotiation and other features necessary to provide a truly mobile service. A wide range of identity and address types support access information, access request, equipment identification, paging and billing.

At the same time it is important to understand that DECT is a network access technology, providing the user with uniform access to a variety of possible wired networks. These networks may themselves have some degree of support for mobile users, which can be effectively inter-worked to DECT. The degree of mobility support available in the fixed network will of course limit the mobility service which the user can get, but it is unlikely that DECT will be the limiting factor.

7 The DECT DSPs

The DECT DSPs make use of the powerful mechanisms for data transmission provided by the DECT CI standard EN 300 175, parts 1 [1] to 8 [8]. This is achieved through the interworking of data directly into the data transmission mechanisms of DECT, giving digital transmission between the attached network and the user equipment. Compared to modem solutions using a voice channel, the DECT DSPs, exploiting the full capabilities of the DECT CI standard, provide higher throughput, lower bit error rate, better reliability, improved spectrum usage and better battery economy. Compatibility with the Generic Access Profile (GAP), EN 300 444 [9], wherever appropriate, ensures that integrated voice/data systems may be implemented efficiently.

This clause describes the DECT DSPs, and how these profiles may cater for the user requirements raised in clause 4.

7.1 Objective of the DECT DSPs

The objective of the DECT DSPs is to make possible inter-operability between FPs and PPs conforming to DECT and servicing a range of non-voice applications. To do so, they have to provide a clear and unambiguous definition of the protocol procedures, messages and information elements invoked to provide specified services. A number of specific services are defined to cover a wide range of applications.

In particular, the DECT DSPs seek to accomplish the following objectives:

- ensure that the complexity of equipment resulting from the support for inter-operability is kept low through restriction upon options;
- provide levels of functionality appropriate to the target application areas, whilst providing smooth upgrade paths with backward compatibility;
- serve different application areas with as small a number of closely related profile standards as possible;
- separate the development of the different parts of the profiles corresponding to the different application areas and services from each other as far as possible in order to allow standards development to respond effectively to market evolution without restricting technological innovation;
- make possible the implementation of multiple services (including voice and data) in the same equipment without conflict or confusion.

7.2 Description of services

The DECT DSPs are structured into a number of separate standards, each of which defines the aspects of the individual profile invoked to provide a different type or level of service. The result is a family tree of related standards. The service characteristics are summarized below and are described in more detail in the relevant standards themselves.

7.2.1 Service types

The following data service profiles have been defined:

- DECT Packet Radio Service (DPRS), providing either V.24, ethernet, PPP or IP interworking;
- Low Rate Messaging Service (LRMS). LRMS provides short message transfer or paging. This may be done either unacknowledged or acknowledged. This service transfers the data using the signalling channel (A-channel) only;
- Isosynchronous Data Bearer Service (IDBS), providing a transparent and isochronous connection of synchronous data streams optimized for interworking application requiring continuous data streams.

7.2.2 Mobility support

Since equipment conforming to the DECT DSPs will be used in many different contexts, with different degrees of network flexibility and user requirements for mobility, two classes of mobility support are defined:

- Class 1: Local area applications, for which terminals are pre-registered off-air with one or more specific FPs by the user, with parameters installed according to a profile-defined list, definition of the service and user parameters at the moment of service request is therefore implicit in the user identity (see clause 4.1.1);
- Class 2: Roaming applications, both public and private, for which terminals may move between FPs within a given domain and for which association of service parameters is explicit at the time of service request (see clauses 4.1.2 and 4.2).

8 Profile implementation

8.1 DPRS

The DECT Packet Radio Service (DPRS) is defined in EN 301 649 [12]. It is the basis of profiles, which define more specific applications (Application Specific Access Profiles ASAPs), aimed at the connection of terminals supporting packet data services to a fixed infrastructure, both private and public.

The DPRS standard defines a basic service, with the service classes 1 or 2. Service class 1 provides for applications in closed user groups, whereas service class 2 is intended for use in private and public roaming applications.

Annexes to the DPRS standard contain the conventions for interworking of the frame-relay and character oriented services.

The DPRS standard defines the additional requirements on the Physical Layer (PHL), Medium Access Control (MAC) layer, Data Link Control (DLC) layer and Network (NWK) layer of DECT. It also specifies Management Entity (ME) requirements, which ensure the efficient use of the DECT spectrum.

8.1.1 DPRS ASAP V.24

The scope of the DPRS ASAP for V.24 Interworking is to define a data Application Specific Access Profile (ASAP) intended for enterprise, small office and home office (SOHO), and, home (residential/private) markets combining a selection of V.24 Interworking DECT-DPRS (EN 301 649 [12]) data services.

Typical applications for this profile are those which require or work together with a V.24 interface.

The V.24 ASAP is suitable for the following environments.

8.1.1.1 Enterprise

A typical enterprise scenario for this profile can be the wireless PC-access to a Modem (or ISDN-TA)-Farm via a corporate DECT network.

8.1.1.2 Small office and home office (SOHO)

Typical SOHO applications for this profile are:

- the wireless PC-access to one or several modems (or ISDN-TAs) for one or more PCs;
- wireless PC-to-PC direct communication;
- wireless synchronization between a PDA and a PC.

8.1.1.3 Home (residential private)

Typical Home applications for this profile are:

- the wireless PC-access to a modem (or ISDN-TA) for one or more PCs especially for Internet access anywhere in the home;
- wireless PC-to-PC direct communication.

8.1.2 DPRS ASAP Ethernet

The scope of the DPRS ASAP for Ethernet-Interworking is to define a data Application Specific Access Profile (ASAP) intended for enterprise, small office and home office (SOHO) and Home (residential/private) markets combining a selection of Ethernet Interworking DECT-DPRS (EN 301 649 [12]) data services.

The Ethernet ASAP is suitable for the following environments.

8.1.2.1 Enterprise

Contrary to the Residential/Private environment, the Enterprise environment is characterized by a controlled distribution, installation and use of especially dedicated terminals. Depending on their role such terminal may be divided in 3 broader groups: wireless extension to wired corporate LAN, on-site professional mobile data applications, and, isolated cable replacement.

Independently from the group terminals belongs to some common characteristics of the terminals could be noted:

- the end-user terminal is used for a specific business process by a (limited) number of employees;
- the terminals are mostly not personal terminals, but are shared by multiple employees;
- the terminals are often based on standard IT technology, but have been adapted to meet specific requirements. They are often ruggedised, have long standby and operating times (at least one work-shift, or 8 hours), and are light weight and easy to carry;
- the terminals are often designed to carry out the transaction(s) as quickly as possible. User interfaces are tailored towards the specific applications;
- the terminals need to exchange information, in real time;
- possible re-usage of the already installed cordless phone infrastructure.

Scenario 1

The application scenario of DECT terminals used as Wireless Extension of wired corporate LAN is similar to the Scenario 2 of the Residential/private environment described bellow. It is based on the fact that all today's enterprises have already installed and operational some sort of wired LAN. In this regard it may be envisaged for example the provision of wireless connection spots like meeting rooms, "mobile rooms" (i.e. mobile offices) where for example a number of Laptops could be provided for with wireless access to the corporate wired LAN.

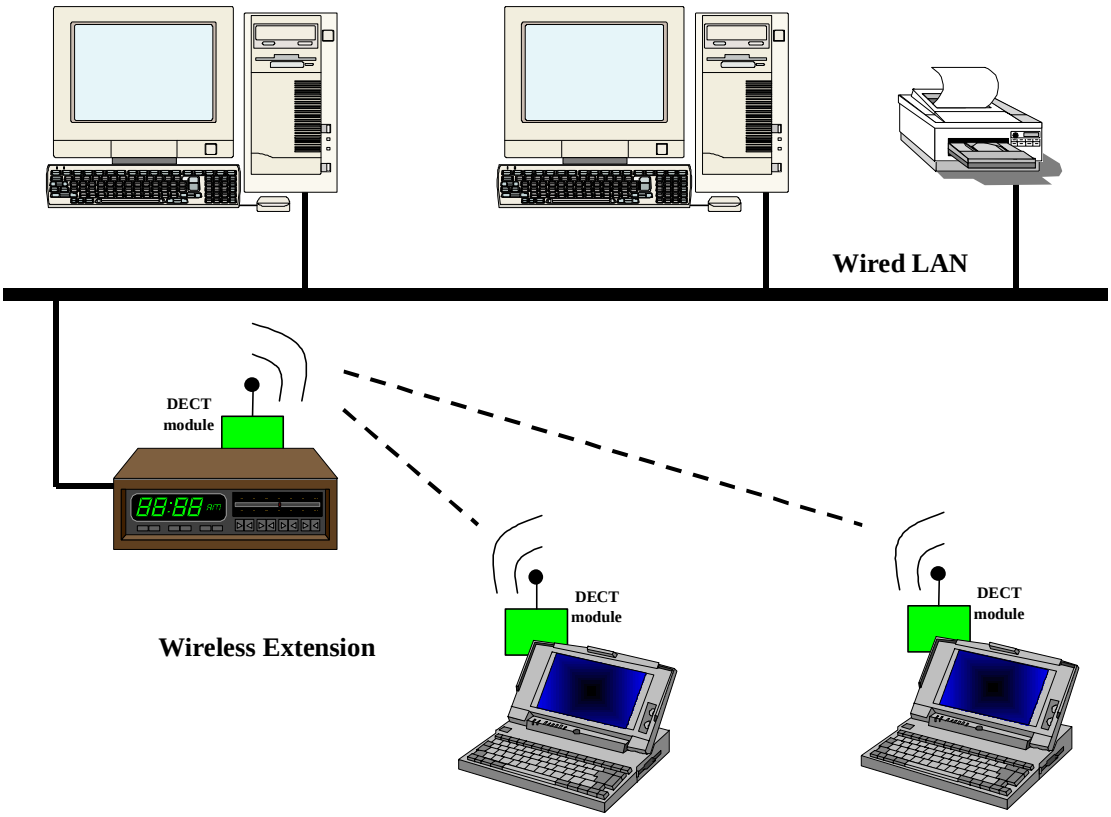

Figure 8: Wireless Ethernet (LAN) Extension to Wired LAN without Distributed Communication - FT implemented as a Router

Another example is the formation of local wireless LAN for wireless control of a set of industrial devices.

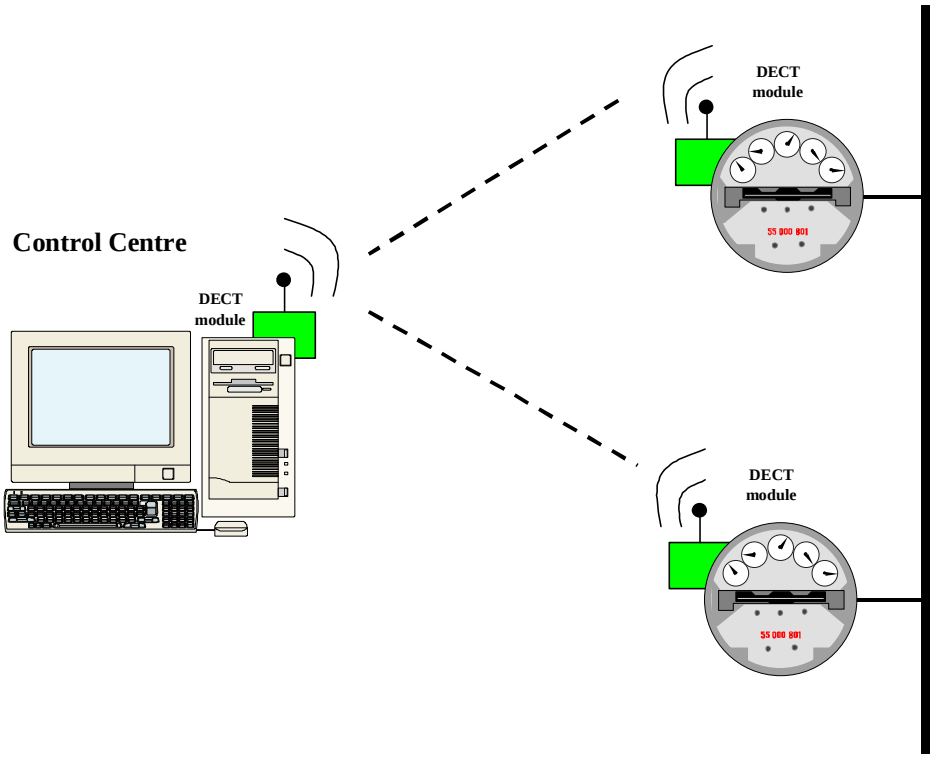

Figure 9: Wireless LAN for remote retrieval of information from a system of sensors

Scenario 2

The application scenario of DECT terminals used as On-site professional mobile data applications may be applied to satisfy different professional requirements. Some examples of On-site Mobile Professional Data Applications:

- Hospital Applications (entering or retrieving patient information). Patient information can be retrieved or entered at bed side;
- Hospitality Applications (order entry, access to guest information, access to tasks that need to be carried out). Hotel employees are by nature of their jobs highly mobile - by providing electronic access while mobile, many jobs can be streamlined or carried out more efficiently;
- Point-of-sale Applications (order entry, credit card processing, checking available stock). Examples are the restaurant business, where by reducing the distance and time that employees need to walk, employees can work more efficiently. Also in the retail business examples can be found where mobile sales points can be used, and where customers are served on the spot;
- Inventory Applications (bar-code reading, etc). By updating stock information real-time, significant savings can be achieved by reducing the inventory. Other examples are dispatch display on forklift trucks, order picking information, etc. For order picking applications, voice assistance can be useful so that the employees can keep their hands-free for handling the goods;
- (Generic) Information Retrieval Applications (for example, a service engineer in a factory needs to get access to the central control application to retrieve some information).

In figure 10 an example of re-usage of the already installed cordless phone infrastructure (a PABX) is depicted where cordless tablets are added providing in addition to the usual cordless voice services the possibilities for remote data storage and retrieval.

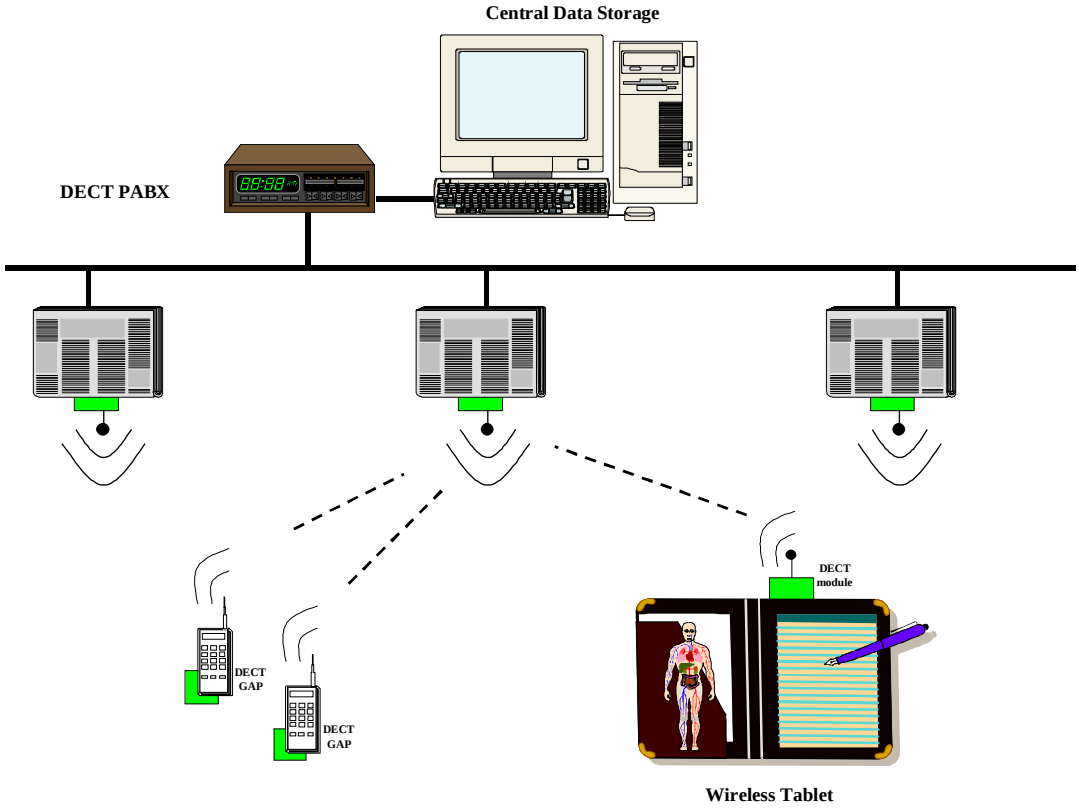

Figure 10: A Wireless Tablet added to a PABX as an On-site professional mobile data application

Scenario 3

In this scenario the requirements of this ASAP are applied to terminals providing an Isolated cable replacement for remote access to different devices. Examples could be replacement of cable between a Wired LAN and a Copy Machine, Printer or another peripheral, or, adding a wireless Entrance control camera.

8.1.2.2 Small office and home office (SOHO)

The SOHO environment may be considered in most of the case as either a minimized replica of the Enterprise environment, or, as a magnified replica of the Residential private environment, therefore all of the examples given in the relevant for the Enterprise and for the Residential private environments may be applied.

8.1.2.3 Home (residential private)

The residential/private environment is characterized by uncontrolled distribution and use in the Home of a selection of one or more devices of varying type. Initially such a Home is expected to have one external line (PSTN, ISDN, xDSL, Cable) and one or 2 PCs with basic peripherals, e.g. a printer, and, possibly a Laptop brought home, from time to time, from the office. Home user needs will be basically aiming towards internal connection between the PC(s) and the peripherals and external connection to the Internet. Use of more than one external line, some of which will be dedicated to data only, and internal connection of multiple, including non-communication, devices is to be expected in the near future.

Two typical applications of the Ethernet ASAP can be envisaged in the residential/private environment.

Scenario 1

In this scenario the ASAP is applied as a simple physical carrier replacement in a home LAN where most of the LAN physical carriers are ordinary Ethernet cables and only one, or a few, are replaced by DECT connection(s).

In such a model DECT PT and FT are designed as add-on modules to existing LAN terminals like PCs, Routers, Hubs, etc. Most likely they do not represent very sophisticated devices, i.e. simple on-air transport mechanism of LAN data units is provided. As today's Set-top boxes (xDSL and Cable) are very often provided with an Ethernet connection, a typical implementation in this case will be replacement of the cable that would connect the PC to the Set-top box for Internet surfing. The maximum throughput of such an Ethernet cable replacement implementation will be up to 552 kbit/s when the 2 level modulation scheme has been used and up to 2 Mbit/s with the 8 level scheme.

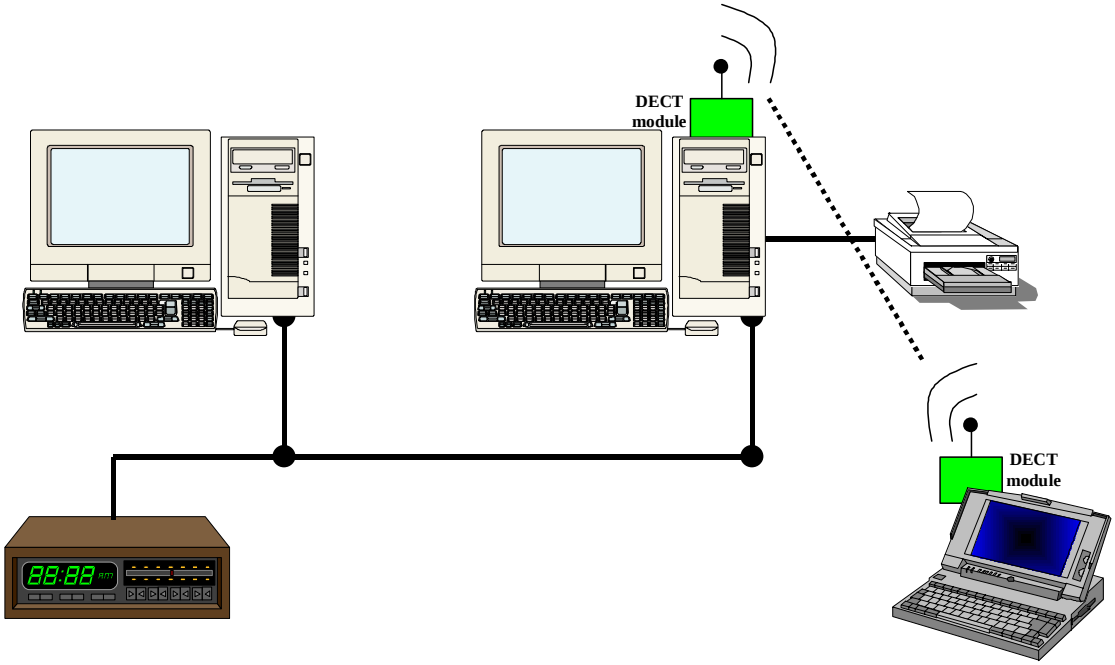

Figure 11: Adding a wireless connection of an office laptop to an existing wired Home LAN

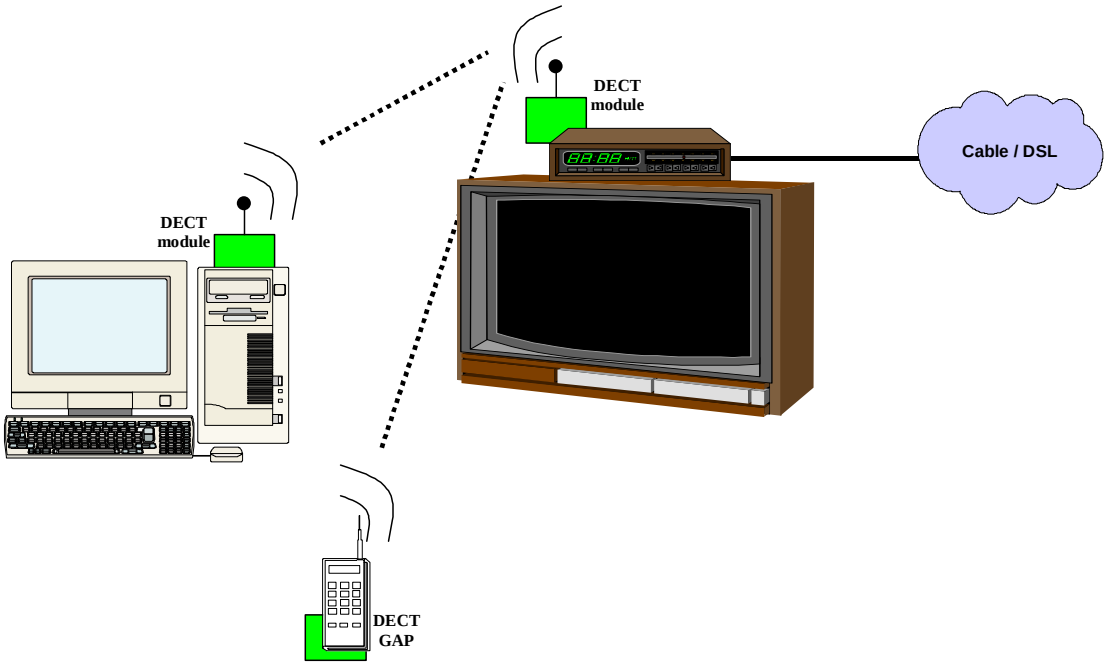

Figure 12: Wireless Ethernet connection to a set-top box (e.g. cable or xDSL modem); voice capability may be additionally introduced

Scenario 2

In this scenario the ASAP is applied to build a Wireless LAN where most of the LAN physical carriers are replaced by DECT connections and a few may still be ordinary Ethernet cables.

In such a model the DECT FT is either designed as a more complex Ethernet device, e.g. a Router or Gateway, or, as a module being part of the PC which plays the role of the Server in the home LAN. Various devices could be envisaged to be connected, ranging from PCs and peripherals through digital cameras, various home electrical appliances, sensors and controls. In many cases connection to an external network will be provided as well. Voice capabilities either using voice over IP or Circuit switched could be expected as well. The maximum throughput per on air Ethernet connection will be up to 552 kbit/s when the 2 level modulation scheme has been used and up to 2 Mbit/s with the 8 level scheme; if the optional Distributed Communication feature is used the wireless LAN system throughput will be 10 times higher.

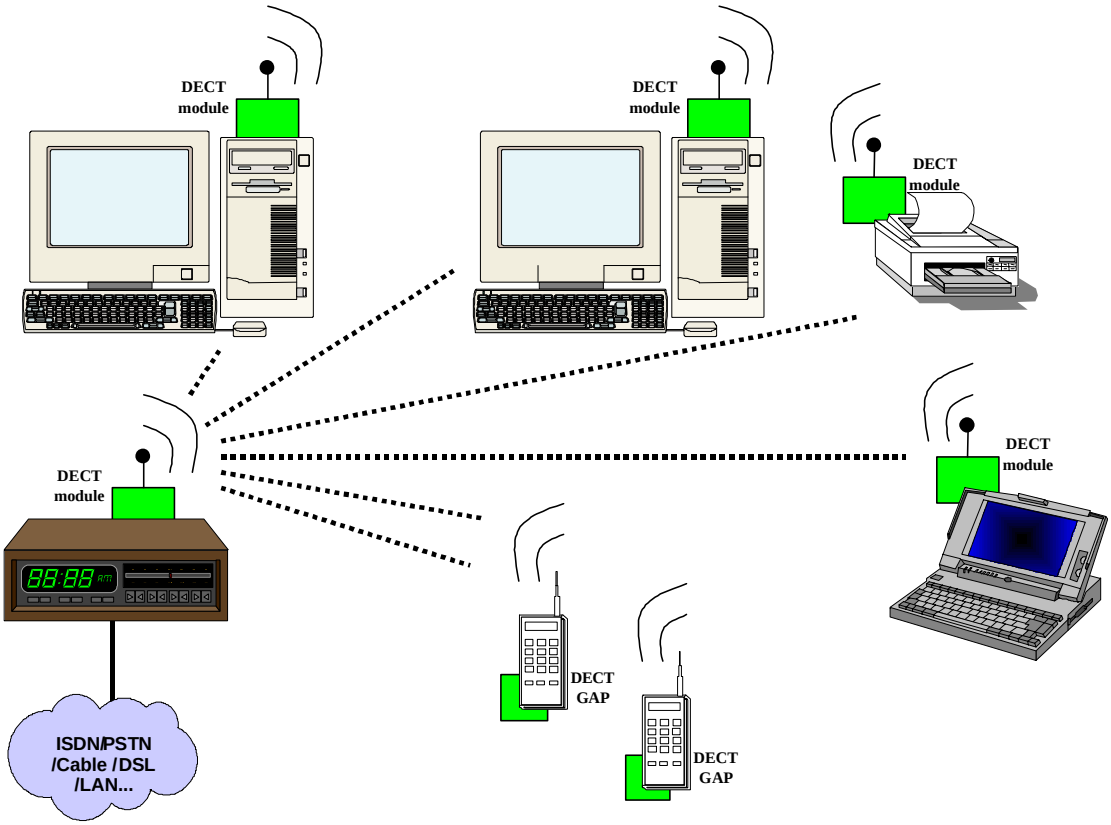

Figure 13: Wireless Ethernet (LAN) without distributed communication - FT implemented as a router (including Gateway); voice capability

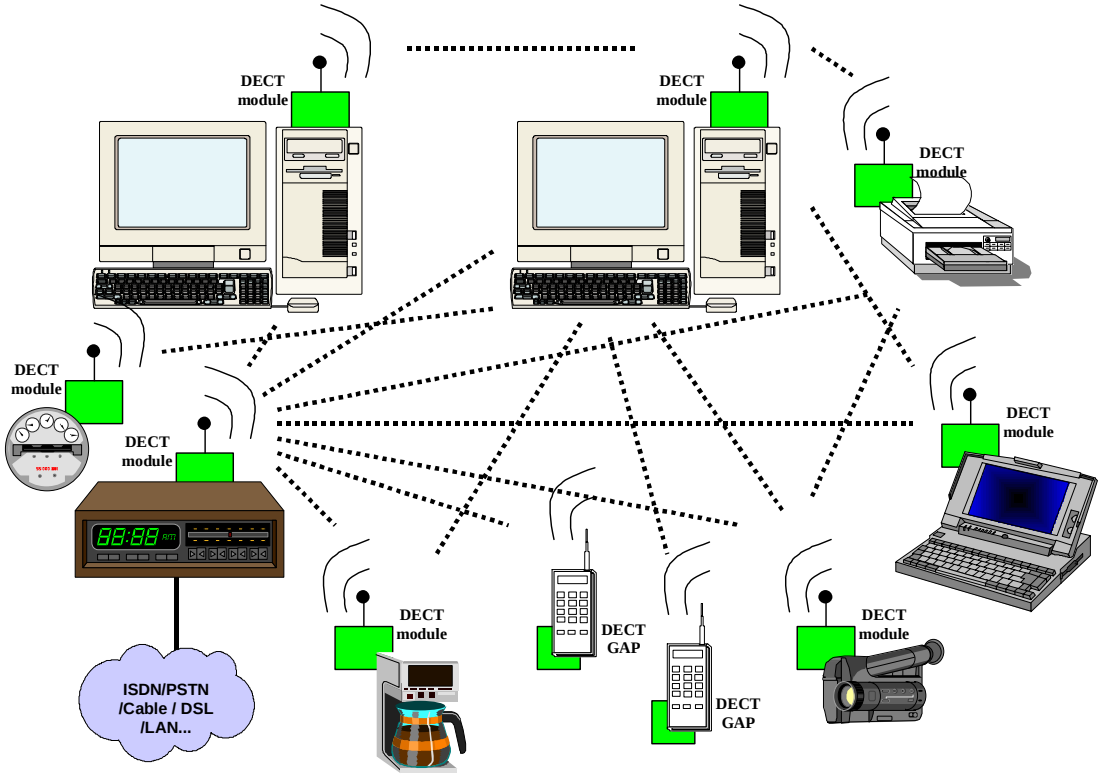

Figure 14: Wireless Ethernet (LAN) with Distributed Communication - FT implemented as a Router (including Gateway); Voice capability; All possible direct connections not shown

8.2 LRMS including SMS

The Low Rate Messaging Service (LRMS) is defined in EN 300 757 [10]. It provides a means for the slow, acknowledged or unacknowledged, transfer of multimedia message objects, including the Short Message Service (SMS). It provides both point-to-point and point-to-multipoint messaging. This service may be used for private and public roaming applications.

The LRMS standard defines the requirements on the Physical (PHL), Medium Access Control (MAC), Data Link Control (DLC) and Network (NWK) layers of DECT. The standard also specifies management entity requirements and generic interworking conventions, which ensure the efficient use of the DECT spectrum.

The standard further mandates how to implement a GSM like Short Message Service (SMS), Point to Point (PTP), which uses a sub-set of the Low Rate Messaging Service (LRMS) mentioned before as a bearer service. SMS-PTP includes the following two services:

- SMS Mobile Originated (SMS-MO), for transport of short messages from PT to FT;
- SMS Mobile Terminated (SMS-MT), for transport of short messages from FT to PT.

The Short Message Service, Cell Broadcast is outside the scope of the present document.

In order to facilitate re-use of existing GSM Service Centres, the LRMS standard applies the upper GSM protocols up-to and including the GSM SMS-RP protocol. Therefore, interworking functions handling the encapsulation of GSM SMS-RP messages are specified.

8.3 IDBS

Isochronous Data Bearer Service (IDBS) is defined in EN 301 238 [11]. It is suitable for transparent transfer of isochronous data streams. Video telephony, video conferencing and secure telephone services (end-to-end encrypted) over external networks can be considered as applications of IDBS.

The IDBS standard defines an unprotected service offering an unrestricted digital 32 kbit/s data bearer service, strongly based on the Generic Access Profile (GAP) (defined in EN 300 444 [9]). An unprotected single bearer, multi-rate, rate adaptation service to interwork to synchronous ITU-T Recommendations V.series interfaces is also defined.

Annex A: Bibliography

- ETSI EN 301 650: "Digital Enhanced Cordless Telecommunications (DECT); DECT Multimedia Access Profile (DMAP); Application Specific Access Profile (ASAP)".

History

Document history		
V1.2.1	May 2001	Publication