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Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM integration based on dual-mode terminals

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Foreword

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

Introduction

The primary objective of this document is to examine the technical issues relating to dual mode (combined Digital Enhanced Cordless Telecommunications/Global System for Mobile communications (DECT/GSM)) terminals in order to guide future work in this area.

The substantive clauses of this document are as follows:

Clause 5 examines the various configurations and scenarios foreseen for Dual Mode Terminals (DMTs). The following aspects are considered:

- the constraints resulting from the radio system architecture employed;

- the different combinations of subscription types that may be used;

- the possible network configurations which may be used to support a dual mode service;

- the different service packages that an operator may provide to its customers.

Clauses 6, 7, 8 and 9 attempt to identify the technical areas that has to be addressed by the TBR for DMTs.

Clause 6 addresses the requirements for protection of the spectrum.

Clause 7 addresses the requirements for protection of the network.

Clause 8 examines general protocol issues which need consideration in order to ensure interoperability.

Clause 9 considers the telephony requirements which have to be met.

Clause 10 concludes on type approval aspects basic DMTs.

1   Scope

To investigate radio and network aspects and clarifying the possibilities as well as the problems related to dual-mode terminals. This document focuses on possible early implementations and will form the basis for the first edition of TBR 39 [28] in the sense that it identifies how basic Dual Mode Terminals (DMTs) can be type approved using existing TBRs. For Global System for Mobile communications (GSM), both phase 1 and phase 2 specifications are considered.

Basic DMTs are considered to comprise of both Digital Enhanced Cordless Telecommunications (DECT) and GSM parts of which only one at the time is to be active. Advanced dual-mode terminals, where the DECT and GSM parts are further integrated or where the DECT and GSM parts can be active at the same time, will be considered in DTR/DECT-010096 [35].

The same considerations apply for dual-mode DECT/DCS1800 terminals and for DECT/GSM/DCS1800 dual mode/dual band terminals. The term GSM is considered to cover all the frequency bands, and combinations of frequency bands allowed for GSM type equipment, i.e. P-GSM, E-GSM, R-GSM, DCS1800 or dual band GSM/DCS.

NOTE: A terminal comprising multiple GSM parts operating on different frequency bands is considered as a dual band terminal. A terminal comprising both DECT and GSM parts is referred to as a DMT. A dual mode/dual band terminal is a terminal comprising a DECT part and a GSM/DCS1800 dual band part.

This document states the assumptions to be made for the first edition of TBR 39 [28] and attempts to identify if further dual mode standardization is needed.

2   References

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References may be made to:

a)   specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b)   all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c)   all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d)   publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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

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

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

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

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

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

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

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

[9]   ETS 300 085 (1990): "Integrated Services Digital Network (ISDN); 3,1 kHz telephony teleservice Attachment requirements for handset terminals" (Candidate NET 33).

[10]   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)".

[11]   ETS 300 434-2: "Digital Enhanced Cordless Telecommunications (DECT) and Integrated Services Digital Network (ISDN) interworking for end system configuration; Part 2: Access profile".

[12]   ETS 300 444: "Digital European Cordless Telecommunications (DECT); Generic Access Profile (GAP)".

[13]   ETS 300 535: "Digital cellular telecommunications system (Phase 2); Functions related to Mobile Station (MS) in idle mode (GSM 03.22)".

[14]   GSM TS 03.50: "European digital cellular telecommunications system (Phase 1); Transmission Planning Aspects of the Speech Service in the GSM PLMN System".

[15]   ETS 300 540: "Digital cellular telecommunications system (Phase 2); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system (GSM 03.50)".

[16]   ETS 300 577: "Digital cellular telecommunications system (Phase 2); Radio transmission and reception (GSM 05.05)".

[17]   GSM TS 11.10: "European digital cellular telecommunications system (Phase 1); Mobile Station Conformity Specification".

[18]   ETS 300 607: "Digital cellular telecommunication system (Phase 2); Mobile Station (MS) conformance specification; (GSM 11.10)".

[19]   ETS 300 824: "Digital Enhanced Cordless Telecommunications (DECT); Cordless Terminal Mobility (CTM); CTM Access Profile (CAP)".

[20]   TBR 5: "European digital cellular telecommunications system; Attachment requirements for Global System for Mobile communications (GSM) mobile stations; Access".

[21]   TBR 6: "Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements".

[22]   TBR 9: "European digital cellular telecommunications system; Attachment requirements for Global System for Mobile communications (GSM) mobile stations; Telephony".

[23]   TBR 10: "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: "Attachment requirements for terminal equipment for Digital Enhanced Cordless Telecommunications (DECT) Generic Access Profile (GAP) applications".

[27]   TBR 31: "Digital cellular telecommunications system (Phase 2); Attachment requirements for mobile stations in the DCS 1 800 band and additional GSM 900 band; Access".

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[28]   TBR 39:   "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM dual-mode terminals".

NOTE: TBR 39 will be produced in 2 editions, edition 1 will cover terminal type 2 (and may include terminal type 1), and edition 2 will include terminal types 3, 4 and 5.

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

[30]   ETR 159: "Digital European Cordless Telecommunications (DECT); Wide area mobility using the Global System for Mobile communications (GSM)".

[31]   ETR 246: "Digital European Cordless Telecommunications (DECT); Application of DECT Wireless Relay Station (WRS)".

[32]   ETR 308: "Digital Enhanced Cordless Telecommunications (DECT); Services, facilities and configurations for DECT in the local loop".

[33]   ETR 310: "Digital Enhanced Cordless Telecommunications (DECT); Traffic capacity and spectrum requirements for multi-system and multi-service DECT applications co-existing in a common frequency band".

[34]   ETR 341: "Digital Enhanced Cordless Telecommunications / Global System for Mobile communications (DECT/GSM) interworking profile; Profile overview".

[35]   DTR/DECT-010096: "Digital Enhanced Cordless Telecommunications (DECT); Global System for Mobile communications (GSM); DECT/GSM advanced integration of dual-mode terminals".

[36]   89/336/EEC: "Council Directive of 3 May 1989 on the approximation of laws of the Member States relating to Electromagnetic Compatibility (Official Journal L139 of 23/5/89)".

[37]   91/263/EEC: "Council Directive of 29 April 1991 on the approximation of the laws of the Member States concerning telecommunications terminal equipment, including the mutual recognition of their conformity" (Terminal Directive).

[38]   CCITT Recommendation P.79 (1989): "Calculation of loudness ratings for telephone sets".

3   Abbreviations and definitions

3.1   Abbreviations

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

ADPCM	Adaptive Differential Pulse Code Modulation
ARI	Access Rights Identifier
BSS	Base Station System
CAP	CTM Access Profile
CTM	Cordless Terminal Mobility
DAM	DECT Authentication Module
DECT	Digital Enhanced Cordless Telecommunications
DMT	Dual Mode Terminal
DFS	DECT Fixed System
DPS	DECT Portable System
FP	Fixed Part
FT	Fixed radio Termination
GAP	Generic Access Profile
GIP	DECT/GSM Interworking Profile
GSM	Global System for Mobile communications
IAP	ISDN Access Profile
IMEI	International Mobile Equipment Identity

IPEI	International Portable Equipment Identity
ISDN	Integrated Services Digital Network
LAI	Local Area Identifier
LE	Local Exchange
LSTR	Listener Sidetone Ratio
MM	Mobility Management
MMI	Man-Machine Interface
MSC	Mobile Switching Centre
NTP	Network Termination Point
PABX	Private Automatic Branch Exchange
PLMN	Public Land Mobile Network
PP	Portable Part
PT	Portable radio Termination
RFP	Radio Fixed Part
SIM	Subscriber Identity Module
SMS	Short Message Service
WAM	Wide Area Mobility
WRS	Wireless Relay Station

3.2   Definitions

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

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

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NOTE 1: Authentication is generally performed at call set-up, but may also be done at any other time (e.g. during a call).

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call: All of the NWK layer processes involved in one network layer peer-to-peer association.

NOTE 2: Call may sometimes be used to refer to processes of all layers, since lower layer processes are implicitly required.

cell: The domain served by a single antenna(e) system (including a leaky feeder) of one FP.

NOTE 3: A cell may include more than one source of radiated Radio Frequency (RF) energy (i.e. more than one radio end point).

dual band terminal: A terminal comprising multiple GSM parts operating on different frequency bands. For example a terminal comprising of GSM and DCS1800 parts.

Dual Mode Terminal (DMT): A terminal comprising both DECT and GSM parts.

dual mode/dual band terminal: A terminal comprising both DECT and multiple GSM parts operating on different frequency bands. It is considered as a terminal comprising both DECT and dual band (e.g. GSM/DCS1800) parts.

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

location registration: The process by which the terminal informs the network of its presence within a particular location area.

Network Termination Point (NTP): Is the point that defines the border between the equipment provided by the network operator and the customer premises equipment.

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

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

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

NOTE 4: Subscription registration is usually required before a user can make or receive calls.

subscription load/modify: A procedure of loading subscription registration data in a PP or CTA in real-time over the air interface.

Wireless Relay Station (WRS): a physical grouping that combines elements of both Portable radio Terminations (PTs) and Fixed radio Terminations (FTs) to relay information on a physical channel from one DECT termination to a physical channel to another DECT termination.

NOTE 5: The DECT termination can be a PT or an FT or another WRS.

3.3   GSM abbreviations and definitions

Definition and specific GSM abbreviations may be found in ETR 100 [29].

4   Terminology used in this document

DECT and GSM standards often use different terminology for equivalent functions. Since this document will be read by both experts in GSM and experts in DECT, this clause tries to clarify some of the vocabulary used. Similar DECT and GSM definitions are not necessarily strictly equivalent, it has been chosen sometimes to use general formulations. If dual mode standards are to be produced, a common terminology needs to be defined.

Exact GSM terminology can be found in GSM 03.22 (ETS 300 535 [13]). The DECT terminology can be found in the DECT CI specifications (ETS 300 175, parts 1 to 8 [1] - [8]).

Table 1: Comparison of DECT and GSM terminology as used with respect to DMTs

DECT term	GSM term	Explanation
PP	Mobile station	The combination of mobile termination equipment, subscription identity equipment and any required terminal equipment. Often through this document the word "terminal" is used for those terms.
RFP	Base station	The physical equipment providing the elementary part of coverage. The word "cell" is not used in DECT, but often through this document the word "cell" is used for the coverage area of a RFP/base station.
Active unlocked scan	Network search	The process by which a terminal scans all possible frequencies for available networks (Public Land Mobile Networks (PLMNs) in GSM). Often through this document the word "scanning" is used for those terms.
	Network selection	The process by which a terminal chooses a network. In GSM a Mobile Station manually or automatically chooses a network (PLMN in GSM) from a list of those detected during Network search. In DECT this process is implementation dependant and uses the active unlocked scan. Often through this document the words "network selection".
Location area	Location area	A group of cells all of whose broadcast location identities are the same.
Location registration	Location update	The process by which the terminal informs the network of its presence within a particular location area. Both terms are used through the document.
Attach/Detach	Attach/detach	Attach is the process whereby a terminal within coverage area of a system to which it has access rights, notifies the system that it is operative. The reverse process is detach, which reports the terminal as inoperative (note).
Idle locked	Idle mode	The state a terminal is in when it is operational but is not in any transaction with the network (call, location update, etc.).
Active locked	Dedicated mode	The state a terminal is in when it has started a transaction with the network.
NOTE: There is no procedure over the air interface for detach indication in Generic Access Profile (GAP).		