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Digitalne izboljšane brezvrvične telekomunikacije (DECT) - Zahteve za prometno zmogljivost in za spekter večnamenskih in večstoritvenih aplikacij DECT-a, ki so v istem frekvenčnem pasu

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

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Foreword

This ETSI Technical Report (ETR) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI).

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1 Scope

This ETSI Technical Report (ETR) describes the traffic capacity and the spectrum requirements for multisystem and multi-service Digital Enhanced Cordless Telecommunications (DECT) applications coexisting on a common frequency band. Configurations for typical DECT applications, and relevant mixes of these, including residential, office, public and Radio in the Local Loop (RLL) applications, are defined and the traffic capacity is analysed, mainly by advanced simulations. These results are used together with relevant deployment scenarios to estimate spectrum requirements for reliable services, specifically for a public multi-operator licensing regime. Recommendations are given on conflict solving rules that conserve the high spectrum efficiency gain of shared spectrum while maintaining control of the service quality in one's own system. These recommendations cover synchronization, directional gain antennas, traffic limits per DECT Radio Fixed Part (RFP), use of Wireless Relay Stations (WRSs), different rules for private and public operators and procedures needed for timely local adjustments where and when the local traffic increases.

2 References

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

[1]	ETS 300 175-1: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".
[2]	ETS 300 175-2: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical Layer".
[3] iT (ETS 300 175-3: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer
[4] https://sta	ETS 300 175-4; "Radio, Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DEC) layer. 6161d20a2683/psist-etr-310-1998
[5]	ETS 300 175-5: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".
[6]	ETS 300 175-6: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing".
[7]	ETS 300 175-7: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".
[8]	ETS 300 175-8: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech coding and transmission".
[9]	ETS 300 175-9: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 9: Public Access Profile (PAP)".
[10]	ETS 300 444: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)".
[11]	TBR 6: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements".

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[12]	ETS 300 765-1: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Radio in the Local Loop (RLL) Access Profile (RAP); Part 1: Basic telephony services".
[13]	ETS 300 765-2, "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Radio in the Local Loop (RLL) Access Profile (RAP); Part 2: Advanced telephony services".
[14]	ETR 178: "Radio Equipment and System (RES); Digital European Cordless Telecommunications (DECT); A high level guide to the DECT standardization".
[15]	ETR 246: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Application of DECT Wireless Relay Station (WRS)".
[16]	ETS 300 700: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); Wireless Relay Station (WRS)".
[17]	ETR 308: "Radio Equipment and Systems (RES); Digital Enhanced Cordless Telecommunications (DECT); Services, facilities and configurations for DECT in the local loop".
[18]	Proceedings of the IEEE 44th Vehicular Technology Conference, (Stockholm June 4-7 1994), Åkerberg, Brouwer, van de Berg, Jager: "DECT technology in the local loop".
[19]	TIA/T1 JTC(AIR)/95.02.02-012R1: "TAG 3 (PACS) Radio Channel System
[20]	TIA/EIA-662: "Personal Wireless Telecommunications - Interoperability Standard (PWT)".
[21]	TIA/EIA-696, "PersonalST Wireless ⁰⁹⁸ Telecommunications Enhanced - Interoperability Standard (PWT+E)3/sist/15e04c54-b69d-45a8-8a88- 6161d20a2683/psist-etr-310-1998
[22]	ETR 042: "Radio Equipment and Systems (RES); Digital European Cordless Telecommunications (DECT); A Guide to DECT features that influence the traffic capacity and the maintenance of high radio link transmission quality, including the results of simulations".
[23]	ETR 139: "Radio Equipment and Systems (RES); Radio in the Local Loop (RLL)".
[24]	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).
[25]	91/287/EEC: "Council Directive of 3 June 1991 on the frequency band to be designated for the coordinated introduction of digital European cordless telecommunications (DECT) into the Community".
[26]	91/288/EEC: "Council Directive of 3 June 1991 on the coordinated introduction of digital European cordless telecommunications (DECT) into the Community".
[27]	TBR 22: "Radio Equipment and Systems (RES); Attachment requirements for terminal equipment for Digital Enhanced Cordless Telecommunications (DECT) Generic Access Profile (GAP) applications".
[28]	90/388/EEC: "Council Directive of 28 June 1990 on competition in the markets for telecommunications services".

3 Definitions and abbreviations

3.1 Definitions

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

antenna diversity: Implies that the RFP for each bearer independently can select different antenna properties such as gain, polarization, coverage patterns, and other features that may effect the practical coverage. A typical example is space diversity, provided by two vertically polarized antennas separated by 10 cm to 20 cm.

bearer: See Medium Access Control (MAC) bearer or bearer service.

broadcast: A simplex point-to-multipoint mode of transmission.

NOTE 1: The transmitter may disregard the presence or absence of receivers.

call: All of the Network (NWK) layer processes involved in one NWK 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 Fixed Part (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).

centrex: An implementation of a private telecommunication network exchange that is not located on the premises of the private network operator. It may be co-located with, or physically a part of a public exchange.

channel: See physical channel. <u>PSIST ETR 310:1998</u>

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cluster: A logical grouping of one or more cells between which bearer handover is possible. A Cluster Control Function (CCF) controls one cluster.

NOTE 4: Internal handover to a cell which is not part of the same cluster can only be done by connection handover.

Cordless Radio Fixed Part (CRFP): A WRS that provides independent bearer control to a PT and FT for relayed connections.

coverage area: The area over which reliable communication can be established and maintained.

double-simplex bearer: The use of two simplex bearers operating in the same direction on two physical channels. These pairs of channels always use the same RF carrier and always use evenly spaced slots (i.e. separated by 0,5 Time Division Multiple Access (TDMA) frame).

A double-simplex bearer only exists as part of a multibearer MAC connection.

down-link: Transmission in the direction FT to PT.

duplex bearer: The use of two simplex bearers operating in opposite directions on two physical channels. These pairs of channels always use the same RF carrier and always use evenly spaced slots (i.e. separated by 0,5 TDMA frame).

End System (ES): A logical grouping that contains application processes and supports telecommunication services.

NOTE 5: From the OSI point of view, end systems are considered as sources and sinks of information.

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external handover: The process of switching a call in progress from one FP to another FP.

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

NOTE 6: A DECT FP contains the logical elements of at least one FT, plus additional implementation specific elements.

Fixed radio Termination (FT): A logical group of functions that contains all of the DECT processes and procedures on the fixed side of the DECT air interface.

NOTE 7: A FT only includes elements that are defined in ETS 300 175, parts 1 to 8 [1] to [8]. This includes radio transmission elements (layer 1) together with a selection of layer 2 and layer 3 elements.

frame: See TDMA frame or DLC frame.

full slot (slot): One 24th of a TDMA frame which is used to support one physical channel.

guard space: The nominal interval between the end of a radio transmission in a given slot, and the start of a radio transmission in the next successive slot.

NOTE 8: This interval is included at the end of every slot, in order to prevent adjacent transmissions from overlapping even when they originate with slightly different timing references (e.g. from different radio end points).

half slot: $\frac{1}{48}$ of a TDMA frame which is used to support one physical channel.

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

NOTE 9: There are two physical forms of handover; intracell handover and inter-cell handover. Intracell handover is always internal inter-cell handover can be internal or external.

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incoming call: A call received at a Portable Part (PP).

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

internal handover: Handover processes that are completely internal to one FT. Internal handover reconnects the call at the lower layers, while maintaining the call at the NWK layer.

NOTE 10: The lower layer reconnection can either be at the DLC layer (see connection handover) or at the MAC layer (see bearer handover).

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

InterWorking Unit (IWU): A unit that is used to interconnect subnetworks.

NOTE 11: The IWU will contain the InterWorking Functions (IWF) necessary to support the required subnetwork interworking.

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

multiframe: A repeating sequence of 16 successive TDMA frames, that allows low rate or sporadic information to be multiplexed (e.g. basic system information or paging).

network (telecommunication network): All the means of providing telecommunication services between a number of locations where the services are accessed via equipment attached to the network.

operator (DECT operator): The individual or entity who or which is responsible for operation of one or more DECT FPs.

NOTE 12: The term does not imply any legal or regulatory conditions, nor does it imply any aspects of ownership.

outgoing call: A call originating from a PP.

paging: The process of broadcasting a message from a DECT FP to one or more DECT PPs.

NOTE 13: Different types of paging message are possible. For example, the {Request paging} message orders the recipient to respond with a call set-up attempt.

paging area: The domain in which the PP will be paged as a part of incoming call establishment.

NOTE 14: In general, the paging area will be equal to the Temporary Portable User Identity (TPUI) domain, since the TPUI is used for paging.

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

NOTE 15: A DECT PP is logically divided into one PT plus one or more portable applications.

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

NOTE 16: A PT only includes elements that are defined in ETS 300 175, parts 1 to 8 [1] to [8]. This includes radio transmission elements (layer 1) together with a selection of layer 2 and layer 3 elements.

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private: An attribute indicating that the application of the so qualified term, e.g. a network, an equipment, a service, is offered to, or is in the interest of, a determined set of users.

NOTE 17: https://standards.iteh.ai/catalog/standards/sist/15e04c54-b69d-45a8-8a88-The term does not include any legal or regulatory aspects, nor does it indicate any aspects of ownership.

public: An attribute indicating that the application of the so qualified term, e.g. a network, an equipment, a service, is offered to, or is in the interest of, the general public.

NOTE 18: The term does not include any legal or regulatory aspects, nor does it indicate any aspects of ownership.

Public Access Profile (PAP): A defined part of this ETS, i.e. ETS 300 175-9 [9] that ensures interoperability between FPs and PPs for public access services.

public access service: A service that provides access to a public network for the general public.

NOTE 19: The term does not imply any legal or regulatory aspect, nor does it imply any aspects of ownership.

radio channel: No defined meaning. See RF channel or physical channel.

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

Repeater Part (REP) : A WRS that relays information within the half frame time interval.

RF carrier (carrier): The centre frequency occupied by one DECT transmission.

RF channel: The nominal range of frequencies (RF spectrum) allocated to the DECT transmissions of a single RF carrier.