

Examrace

Competitive Exams DECT System

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DECT (Digital Enhanced Cordless Telecommunications) system is widely used for residential, and business cordless phone communications. Designed for short-range use as an access mechanism to the main networks, DECT offers cordless voice, fax, data and multimedia communications, wireless local area networks and wireless PBX.

With the flexibility offered by cordless phone communications, DECT has become the major standard for this application and DECT is now in use in over 100 countries worldwide.

DECT Development

The standard for DECT or Digital Enhanced Telecommunications system was developed by members of the European Telecommunications Standards Institute (ETSI) . The first release of the standard was available in 1992 after which much of the work was focussed on inter-working protocols (DECT/GSM, DECT/ISDN, etc) .

As a result of this work, DECT/GSM inter-working has been standardized and the basic GSM services can be provided over the DECT air interface. This enables DECT terminals to inter-work with DECT systems which are connected to the GSM infrastructure. All roaming scenarios based on SIM roaming as described in GSM specifications are applicable.

Along with requirements arising from the growing use of DECT, this work gave rise to a number of extensions to the basic DECT standard. This led to a second release of the standard at the end of 1995. This included facilities including: Emergency call procedures, definition of the Wireless Relay Station (WRS) , and an optional direct portable to portable communication feature.

DECT Air Interface Operation

The most common protected spectrum allocation for DECT is 1 880 MHz to 1 900 MHz, but outside Europe spectrum is also available in 1 900 MHz to 1 920 MHz and in 1 910 MHz to 1 930 MHz (several countries in Latin America) . In addition to these frequencies there is also a reservation in some countries in the band 2 010 MHz to 2 025 MHz.

DECT carriers have been defined for the whole spectrum range 1880 MHz to 1980 MHz and 2010 MHz to 2025 MHz in the ETSI standard. The basic frequency plan for the 1880 to 1900 MHz DECT band provides for ten channels. The additional frequencies beyond this allows for expansion of the basic DECT allocation or allows DECT services to be introduced in countries where the basic DECT frequencies are not available. The use of extended or new frequency allocations does not cause regulatory difficulties for roaming

DECT handsets as it is mandatory for handsets not to start transmission on carrier frequencies others than those informed by the base station in broadcast messages.

The signal is modulated using a form of modulation called Gaussian Frequency Shift Keying (GFSK) and has a BT of 0.5. This provides the optimum spectral usage for the system.

The system uses dynamic channel allocation and is thereby able to reduce the levels of interference, and ensure that links are set up on the least interfered channels. All DECT equipment scans the frequency allocation at least every 30 seconds as a background activity. This produces a list of free and occupied channels along with the available timeslots to be used for the channel selection, should this be required.

Additionally the DECT portable continuously analyses the signals to ensure that the signals originate from the base station to which it is connected and has access rights. The portable locks onto the best base station and checks it can access the base station as detailed in the DECT standard, and the channels with the best signal strength (RSSI- Receive Signal Strength Indication) are used for the radio link as required. This Dynamic Channel Selection and Allocation mechanism guarantees that radio links are always set-up on the least interfered channel available and hence the best performance is obtained.

DECT MC or TDMA or TDD Principle

The DECT radio interface employs a number of techniques in its access methodology. The scheme uses Multi-Carrier, Time Division Multiple Access, Time Division Duplex (MC/TDMA/TDD) .

The basic DECT system has a total of ten possible carrier frequencies between 1880 and 1900 MHz, i.e.. . It is a Multi-Carrier (MC) system.

In addition to this the time dimensions for each carrier is divided to provide timeframes repeating every 10 ms. Each frame consists of 24 timeslots, each of which is individually accessible and may be used for either transmission or reception. For the basic DECT speech service two timeslots-with 5 ms separation-are paired to provide bearer capacity for typically 32 kbps (ADPCM G. 726 coded speech) full duplex connections.

In order to simplify the way DECT can be used when only basic implementations are needed, the allocations of timeslots within the 10 ms timeframe are restricted. The first 12 timeslots are used for downlink transmissions and the remaining 12 are used for the uplink. This reduces the level of complexity, and as this is not needed for basic implementations, it can provide some cost savings.

DECT Codecs

The basic telephony speech quality offered by DECT is very high compared to many other wireless systems. This is the result of the use of the ITU-T Recommendation G. 726 codec that is employed. This is a 32 kbit/s ADPCM speech codec and although it uses 32 kbps,

the quality it affords is high and there is more than sufficient bandwidth within the system to support it.

TDMA Structure

The DECT TDMA structure enables up to 12 simultaneous basic voice connections per transceiver. The system is also able to provide widely varying bandwidths by combining multiple channels into a single bearer. For data transmission purposes error protected net throughput rates of integral multiples of 24 kbps can be achieved. However the DECT standard defines a maximum data rate of 552 kbps with full security.

What is the DECT GAP Profile?

All DECT systems are based on a main standard that is the Common Interface (CI) , which is often used in association with the Generic Access Profile (GAP) . The GAP profile ensures interoperability of equipment from different providers for voice applications. The GAP defines the minimum interoperability requirements including mobility management and security features. It has different requirements on public and private systems. This means that the GAP is effectively the industry standard for a basic fall-back speech service with mobility management. This basic service is not always used, but instead it forms the fallback that is always be available, especially when requested by a roaming phone, etc

DECT Summary

Although DECT has been in use for a number of years now, its flexibility and performance have meant that it is still the major technology used for cordless phones. The standard is maintained by ETSI, and this will enable it to move forward as new requirements appear and technology enables further facilities to be added.

DECT Glossary

- DECT: Digital Enhanced Cordless Telecommunications
- DMAP: DECT Multimedia Access Profile
- DPRS: DECT Packet Radio Service
- FP: Fixed Part-the base station
- GAP: Generic Access Profile
- GSM: Global System for Mobile telecommunications
- IMT-2000: International Mobile Telecommunications 2000
- PP: Portable Part-the handset
- RES: Radio Equipment Systems