Mobile Communication Systems: DECT
Digital Enhanced Cordless Telecommunication

Overview

DECT (Digital European Cordless Telephone) standardized by ETSI (ETS 300.175-x) for cordless telephones
- standard describes air interface between base-station and mobile phone
- DECT has been renamed for international marketing reasons into "Digital Enhanced Cordless Telecommunication"

Characteristics
- frequency: 1880-1900 MHz
- channels: 120 full duplex
- duplex mechanism: TDD (Time Division Duplex) with 10 ms frame length
- multiplexing scheme: FDMA with 10 carrier frequencies, TDMA with 2x 12 slots
- modulation: digital, Gaussian Minimum Shift Key (GMSK)
- power: 10 mW average (max. 250 mW)
- range: aprox. 50 m in buildings, 300 m open space
System architecture

- PA - Portable Application
- PT - Portable radio Transmission
- FT - Fixed radio Transmission
- HDB - Home Data Base
- VDB - Visitor Data Base

Reference model

- close to the OSI reference model
- management plane over all layers
- several services in C(ontrol)- and U(ser)-plane
DECT layers I

- **Physical layer**
  - modulation/demodulation
  - generation of the physical channel structure with a guaranteed throughput
  - controlling of radio transmission
    - channel assignment on request of the MAC layer
    - detection of incoming signals
    - sender/receiver synchronization
    - collecting status information for the management plane

- **MAC layer**
  - maintaining basic services, activating/deactivating physical channels
  - multiplexing of logical channels
    - e.g., C: signaling, I: user data, P: paging, Q: broadcast
  - segmentation/reassembly
  - error control/error correction

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**DECT time multiplex frame**

1 frame = 10 ms

12 down slots, 12 up slots

420 bit + 52 µs guard time ("60 bit") in 0.4167 ms

A: network control
B: user data
X: transmission quality

25.6 kbit/s
duplex bearer

32 kbit/s
unprotected mode

DATA
DECT TDD

Data link control layer
- creation and keeping up reliable connections between the mobile terminal and base station
- two DLC protocols for the control plane (C-Plane)
  - Lb protocol - connectionless broadcast service: paging functionality
  - Lc+LAPC protocol - point to point similar to LAPD within ISDN: in-call signaling, adapted to the underlying MAC service
- several services specified for the user plane (U-Plane)
  - null-service: offers unmodified MAC services
  - frame relay: simple packet transmission
  - frame switching: time-bounded packet transmission
  - error correcting transmission: uses FEC, for delay critical, time-bounded services
  - bandwidth adaptive transmission
  - „Escape“ service: for further enhancements of the standard
DECT layers III

- **Network layer**
  - similar to ISDN (Q.931) and GSM (04.08)
  - offers services to request, check, reserve, control, and release resources at the base station and mobile terminal
  - resources
    - necessary for a wireless connection
    - necessary for the connection of the DECT system to the fixed network
  - main tasks
    - call control: setup, release, negotiation, control
    - call independent services: call forwarding, accounting, call redirecting
    - mobility management: identity management, authentication, management of the location register

Enhancements of the standard

Several „DECT Application Profiles“ in addition to the DECT specification

- **GAP (Generic Access Profile)** standardized by ETSI in 1997
  - assures interoperability between DECT equipment of different manufacturers
  - minimal requirements for voice communication

- **DECT/GSM Interworking Profile (GIP)**: connection to GSM
- **ISDN Interworking Profiles (IAP, IIP)**: connection to ISDN
- **Radio Local Loop Access Profile (RAP)**: public telephone service