IMT-2000 Radio Access Systems

FDMA-TDMA
The Digital Enhanced Cordless Communication (DECT)
Contents

- DECT an IMT-2000 member
- DECT history
- DECT properties
- DECT Business Case
Who we are

- A Swiss Capital Equity Holdings (SCEH) company
- Our focus: Consumer Communications equipment
- Our current products: Voice and converged (voice&data) terminals utilizing technologies like DECT, ISDN, PSTN, IP, USB, IrDA, BT, etc.
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DECT Forum
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- http://www.dectweb.com/dectforum/

ETSI Project (EP) DECT
DECT
an IMT-2000 member
DECT and the IMT-2000 family
DECT IMT-2000 domain
DECT IMT-2000 frequency Europe

ERC/DEC/(00)01: “These frequency bands should be made available by 1 January 2002, subject to geographically spread market demand and national licensing schemes to all IMT-2000 members”
DECT history
DECT Parents (standards)

DECT standardisation started 1989

**Contributors since:**
Adherent, Alcatel, Ascom, Bosch, BT, Canon, CorTec, CSELT, Dosch&Amand, Deutsche Telecom, Ericsson, France Telecom, Hagenuk, Italtel, Lucent, Motorola, National Semiconductors, Nokia, Nortel, Olivetti, Philips, R&S, RTX, S3, Siemens, Sigos, Simbyonlics, Telecom Italia, Tele Denmark, Telia, VLSI, … many others
DECT Parents (industry)
DECT Life cycle

Data rate of up to 704 Kbs per single carrier

US version of DECT - PWT produced

1988

Development

1992

Excitement

1995-1996

Marketing

Hype

DECT becomes member of IMT-2000

2 Mbps added per single carrier

2001

Maturity

DECT 10 - 20 Mbps

History
DECT Birth Certificate

1992

DECT Base Standard published
ETS(EN) 300 175: DECT Common Interface (8 parts)

- Excellent Voice
- Powerful Data
- Rich Services
- Reliable Security
DECT rebirth

1999

DECT becomes member of IMT-2000 family

2 Mbps
DECT properties
Technology properties

- A Multi-carrier, i.e. FDMA-TDMA system (10 ms frame/24 full-12 double slots/TDD)
- Maximum peak transmit power 250 mW per carrier
- Single/Multi-cell architecture - Seamless Handover
- Dynamic Channel Selection (DCS) for re-use of spectrum and interference avoidance
- Power management for interference limitation
DECT Reference model (terminals)

UMTS core, cdma2000, IP (xDSL, CATV, fiber)

Wireless Relay Station

Cell 3

Cell 1

Cell 2

Base Station

Portables

All-via-Base Station and/or Portable-to-Portable (ad hoc) communication
In a uncoordinated deployment scenario, the number of non-interfering one another simultaneous (in-parallel) transactions that can take place at one location determines the system capacity.
DCS - efficient re-use of spectrum (2)

A frame - 24 full simplex slots

10 DECT carriers -> 120 simultaneous voice calls; >60 256 Kbps data calls
DECT services - VOICE Telephony

- 10 years of development experience - millions of terminals shipped
  - Excellent voice quality
  - Low cost
  - Reliability
  - Customer awareness
DECT services - VOICE Telephony

- Standard real-time two-way speech 3.1 kHz telephony teleservice Speech coding algorithm conforming to ITU-T G.726 for 32 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM)
- Core NWK access: PSTN, ISDN, IP, GSM, UMTS
- Seamless Handover
- Range: 50m through walls and floors, 300m in free space, 15km achieved for RLL
- Multi-handset (free calls), rich supplementary services - CLIP & Co., PP-to-PP communication (Walki-Talki), etc.
DECT Services - DATA

- Various data rate speeds optimized for various applications
  - Low - Home automation: white appliances, control devices, meters, surveillance systems
  - Medium - Internet, multimedia messaging, printing
  - High - Entertainment: video, audio; File transfer

- Build upon the experience of the voice telephony - low cost, reliability

- Secure
DECT Packet Radio Service (DPRS)(1)

- Focus on cable replacement, data networking, combined with voice to provide true multimedia
- Access: Ethernet, IP, PPP, V.24, indirect USB, UMTS core
- Connection oriented (QoS) with connection establishment time <50ms and fast suspend and resume
- Base assisted and Ad hoc communication
- Range: 50m through walls and floors, 300m in free space
DECT Packet Radio Service (DPRS)\(^{(2)}\)

- Data Rates: For the user the date rate on the top of the technology matters (user data rate) - not the data rate on the air.

- DECT IMT-2000: up to **2.5 Mbps user data rate** (single carrier \(\pi/8\)-D8PSK modulation) <standardized>.

- All Users of one (single radio) Base station share this 2.5 Mbps.

- At one location (e.g. apartments building - 5 closely located neighbors) as may carriers allocated to DECT as many simultaneously operating BS can provide each up to 2.5 Mbps.
DECT Packet Radio Service (DPRS)\(^{(3)}\)

Today: up to \textbf{843.2 Kbps user data rate} (double slot - single B-sub-field - single zero blind slot radio - GFSK modulation)

<table>
<thead>
<tr>
<th>BOM:</th>
<th>average FP $40 - PP (USB) $27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Including:</td>
<td>Chip ($6), Zero blind slot radio ($6), USB and Ethernet controllers, Flash, plastics, ... <strong>ALL !!!</strong></td>
</tr>
</tbody>
</table>

- Display will add substantially - a full graphic, 200 x 160 pixel, 4 gray scale, 10 lines - around $20 plus
DECT Packet Radio Service (DPRS)\(^{(4)}\)

- **Beyond IMT-2000**: up to **15 Mbps** (single and wide carrier 64-QAM modulation) \(<under\ standardization\ -\ 2001>\)
- BOM (only connecting modules - no additional components as e.g. display) - not more than the BOM for today’s 802.11b or HomeRF
- One BS can handle simultaneously for example 2 high quality (16:9) stereo video channels + 1 CD quality audio channel + 2 multimedia messaging channels (MPEG4 like) + 2 voice calls + 1 2Mbps Internet channel
DECT - UMTS interworking
DECT IMT-2000 Related Standards (1)

- **ETSI EN 300 175 DECT; Common Interface (CI)** - *The 8 part DECT base standard*
- **ETSI EN 300 176 DECT; Digital Enhanced Cordless Telecommunications (DECT); Approval test specification*
- **ETSI EN 301 908-10 Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 10: Harmonized standard for IMT-2000 FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive*
- **ETSI TR 101 178 DECT; A high level guide to the DECT standardization**
DECT IMT-2000 Related Standards (2)

- EN 300 444 DECT; Generic Access Profile (GAP) - The basic voice profile
- EN 301 649 DECT; DECT Packet Radio Service (DPRS) - The basic data profile
- TS 101 863 DECT; DECT/UMTS Interworking Profile (IWP);
  Part 1: General description and overview
  Part 2: CN-FP interworking
  Part 3: 3,1 KHz speech service
  Part 4: Supplementary services
  Part 5: SMS point to point and cell broadcast
  Part 6: Packet switched data
DECT
business case
The DECT IMT-2000 Business Case

One Technology

Low Price

3G services under the roof

Multimedia Services (voice+data)
3G services in the home (DECT)

Why should we care?
- Fixed and low mobility users will not disappear any soon
- Service Revenue comes with customers
- Unique Services have the same price everywhere
- Early service deployment - home NWKs are already here

Unlicensed Vs. Licensed band
- Can licensed band serve the home user?
3G services in the office (DECT)

Why should we care?

- Business workers will most likely be the early adopters of 3G
- Convergence between 3G and Office Service will be very attractive
- Outsourcing the IT services - sources for new revenue

Multi-mode Terminals

- 3G services at any place - Revenue ... Revenue ... Revenue --- Happy Customer
DECT for public use

Local spots
- ADDS-ON to an existing 3G network (e.g. UMTS, cdma2000) - taking out the burden - redirecting traffic
- Early testing of user attitude to new 3G services

Utilizing
- DECT effectiveness in high-density areas
- 10 years experience: Low cost terminals, quick time to market for services that need <840 Kbps