

Introduction to PCS

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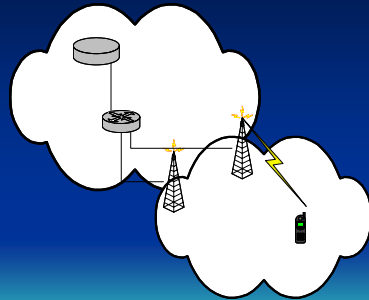
PCS

- Wireless access
- Personal mobility services
- A small terminal
- Enable communications at any time, at any place, and in any form

PCS systems

- Widespread vehicular and pedestrian services (high tier):
 - GSM, IS-136 TDMA based DAMPS, PDC, IS-95 CDMAOne
- Cordless access applications (low tier)
 - CT2, DECT, PACS, PHS
- Wideband wireless systems
 - Cdma2000 (evolved from cdmaOne), W-CDMA (Europe), SCDMA (China/Europe)

PCS architecture



AMPS

- First cellular system, 1970s, analog cellular system, been available since 1983
- FDMA
- 50 MHz, 824-849 MHz, 869-894 MHz
- 832 full-duplex channels using 1664 discrete frequencies

GSM

- Combine TDMA and CDMA
- A frequency carrier is divided into 8 time slots where the speech coding rate is 13 Kbps
- The GSM air interface has been evolved into Enhanced Data Rate for GSM Evolution (EDGE) with variable data rate and link adaptation

IS-136 DCS

- North American TDMA (NA-TDMA)
- The successor to IS-54
- Every frequency carrier supports 3 voice channels, where speech coding rate is 7.95 Kbps
- The same frequency spacing with AMPS
- Capacity: 3 times of AMPS

IS-95 DCS

- Based on CDMA
- CDMA optimizes the utilization of the frequency bandwidth by equalizing signal-to-noise ratio among all the users
- Bandwidth: 1.25MHz
- Speech coding rate: 13Kbps or 8Kbps
- Capacity: 10 times of AMPS

CT2

- Available since 1989
- 40 FDMA channels with a 32 Kbps speech coding rate
- Max transmit power: 10 mW
- Data transmission rate: 2.4 Kbps through the speech codec and up to 4.8 Kbps with an increased error rate
- CT2 doesn't support *handoff*

DECT

- Been published in 1992
- Support a *picocell* design
- TDMA, 12 voice channels per frequency carrier
- Sleep mode
- Time slot transfer (move a conversation from one time slot to another)
- Seamless handoff

PHS

- TDMA
- Each frequency carrier supports 4 multiplexed channels
- 1895-1918.1 MHz, 77 channels, each with 300 KHz
- Speech coding rate : 32 Kbps
- Handoff is option
- Supports G3 fax at 4.2 to 7.8 Kbps and full-duplex modem with transmission speeds up to 9.6 Kbps

PACS

- TDMA, 8 voice channels per frequency carrier, speech coding rate is 32 Kbps
- IS-41-like protocol
- Supports both circuit-based and packet-based access protocol

3G

- 1G: AMPS
- 2G: GSM, IS-136, IS-95, the low-tier system, been designed primarily for speech, low-bit-rate data services
- 3G: better system capacity, high-speed wireless Internet access, wireless multimedia services
- New network technologies (ATM) backbone, network management and service are integrated into the existing 2G core networks
- Air interfaces: W-CDMA, cdma2000