3G Wireless Overview
ITS 437

3G Definitions
- ITU recommendations for UMTS 2000
  - minimum mobile data rates: 144kbps
  - target mobile data rates: 384kbps
  - indoor/short-range rates: 2Mbps
- Delivery
  - cell-based terrestrial
  - MSS (mobile satellite systems)
- Global frequency plan

1G (AMPS) US Spectrum
- 832 channels (2 frequencies per channel)
  - Forward 869-894 MHz
  - Reverse 824-849 MHz
  - Forward/Reverse Spacing: 45MHz
  - Adjacent Channel Spacing: 30kHz
  - 21 Control Channels per group
- Cell Sizes: 2-20km

2G Systems and Frequencies
- Advanced mobile phone service (AMPS)
  - 824 to 849 MHz and 869 to 894
- Digital-advanced mobile phone service (D-AMPS)
  - 824 to 849 MHz and 869 to 894
- Global system for mobile communications (GSM)
  - 450 MHz, 890 to 960 MHz, 1.8 GHz, 1.9 GHz
**2G Systems**

- Personal communications service (PCS) — 1.9 GHz
- iDen (Nextel) and other specialized mobile radio (SMR)
  - 816 MHz to 866 MHz
- Cellular digital packet data (CDPD)
  - 824 to 894 MHz, 1.8 GHz to 1.9 GHz

**ITU 3G Recommendations**

**ITU IMT-2000 Air Interface Recommendations**

- Wide-Band CDMA
  - 5 MHz channels
- CDMA Multi Carrier
  - 1.25 and 3.75 MHz channels
- CDMA TDD
  - Used for unpaired spectrum
- TDMA (UWC-136 based on EDGE)
  - 30kHz, 200kHz, and 1.6MHz Carriers

**2G/3G US Allocations (Proposed)**
EDGE

- Based on GSM/GPRS channel structure
  - 200kHz channels
  - Add 8-PSK as a modulation option
  - per-slot data rates from 10kbps to 60kbps
  - per-channel data rates from 80kbps to 480kbps
**cdma2000**

- **1XMC**
  - Small changes over IS95; doubles data rates
- **3XMC**
  - 3.75 MHz channels (3 IS95 channels), similar (but incompatible) to W-CDMA
- **HDR**
  - Adds 8-PSK and 16-QAM modulation to increase data rates

**W-CDMA**

- 5MHz channels
- Variable chipping rates (4 to 128)
- Maximum data rate of 4Mbps under ideal conditions
- Deployed as 3G standard in Japan (DoCoMo and J-Phone)
- UMTS in Europe