

Wireless Mobile Communication

Lecture 4

- Modern Wireless Communication System

Topics to be Covered

- Various Generations of Communication Systems.
- Coverage Aspect of Next Generation Mobile Communication Systems.
- Transmission Capacity.

First Generation Cellular Systems and Services

1970s	Developments of radio and computer technologies for 800/900 MHz mobile communications
1976	WARC (World Administrative Radio Conference) allocates spectrum for cellular radio
1979	NTT (Nippon Telephone & Telegraph) introduces the first cellular system in Japan
1981	NMT (Nordic Mobile Telephone) 900 system introduced by Ericsson Radio System AB and deployed in Scandinavia
1984	AMPS (Advanced Mobile Phone Service) introduced by AT&T in North America

Second Generation Cellular Systems and Services

1982	CEPT (Conference Europeenne des Post et Telecommunications) established GSM to define future Pan-European Cellular Radio Standards
1990	Interim Standard IS-54 (USDC) adopted by TIA (Telecommunications Industry Association)
1990	Interim Standard IS-19B (NAMPS) adopted by TIA
1991	Japanese PDC (Personal Digital Cellular) system standardized by the MPT (Ministry of Posts and Telecommunications)
1992	Phase I GSM system is operational
1993	Interim Standard IS-95 (CDMA) adopted by TIA
1994	Interim Standard IS-136 adopted by TIA
1995	PCS Licenses issued in North America
1996	Phase II GSM operational
1997	North American PCS deploys GSM, IS-54, IS-95
1999	IS-54: North America IS-95: North America, Hong Kong, Israel, Japan, China, etc GSM: 110 countries

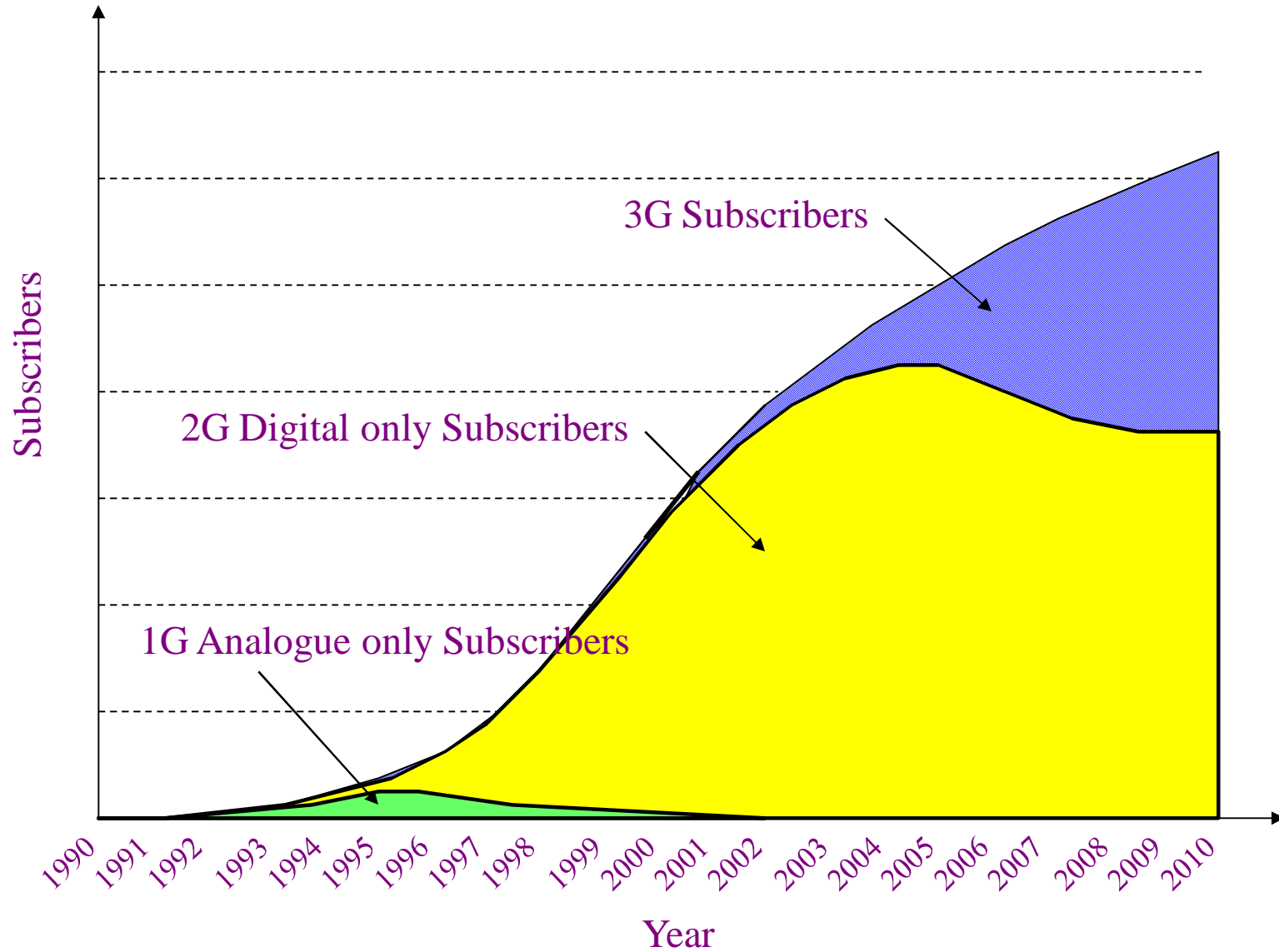
Third Generation Cellular Systems and Services (1/2)

- **IMT-2000 (International Mobile Telecommunications-2000):**
 - Fulfill one's dream of anywhere, anytime communications a reality.
- **Key Features of IMT-2000 include:**
 - High degree of commonality of design worldwide;
 - Compatibility of services within IMT-2000 and with the fixed networks;
 - High quality;
 - Small terminal for worldwide use;
 - Worldwide roaming capability;
 - Capability for multimedia applications, and a wide range of services and terminals.

Third Generation Cellular Systems and Services (2/2)

- **Important Component of IMT-2000 is ability to provide high bearer rate capabilities:**
 - 2 Mbps for fixed environment;
 - 384 Kbps for indoor/outdoor and pedestrian environments;
 - 144 kbps for vehicular environment.
- **Standardization Work:**
 - Release 1999 specifications
 - In processing
- **Scheduled Service:**
 - Started in October 2001 in Japan (W-CDMA)

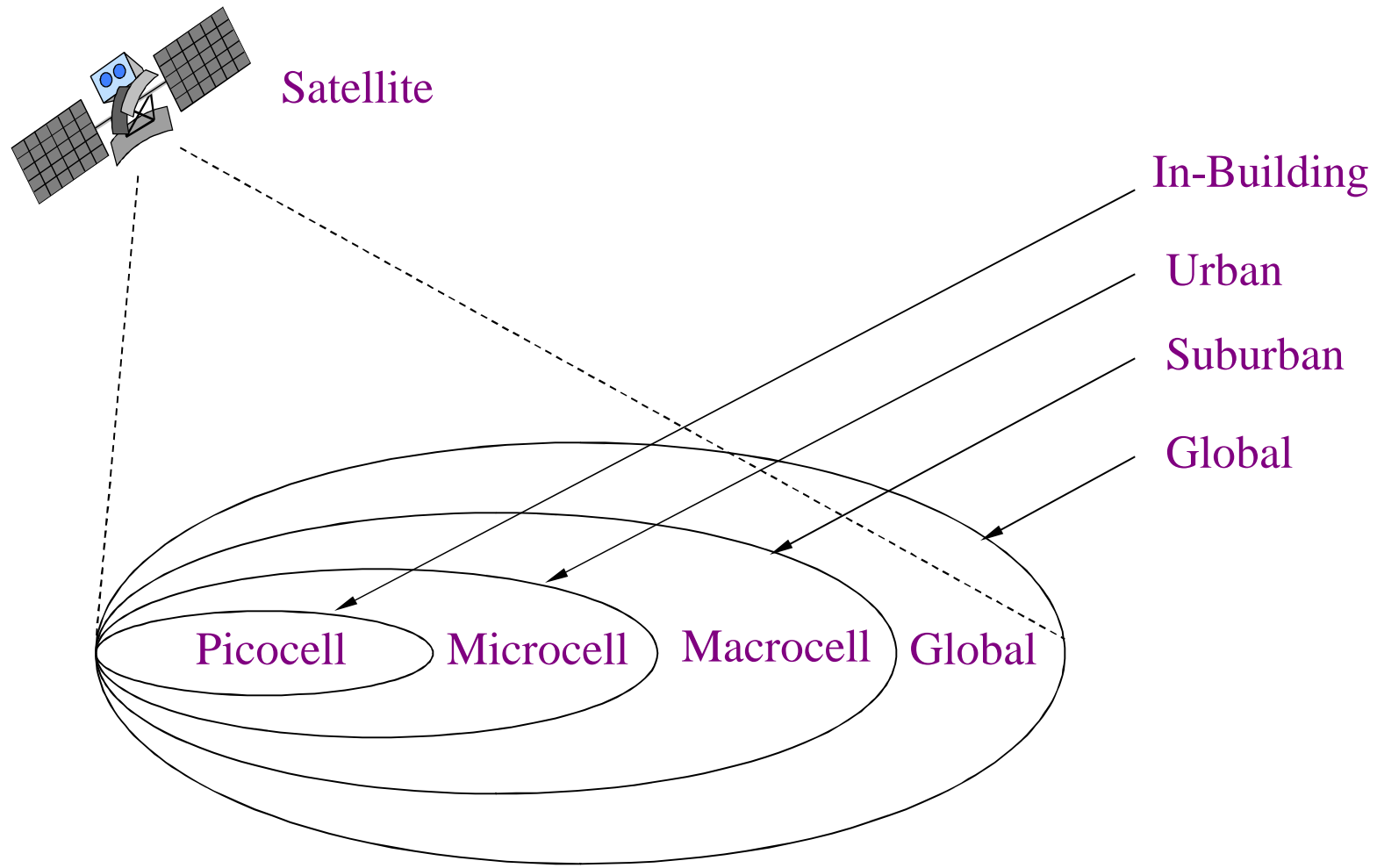
Subscriber Growth



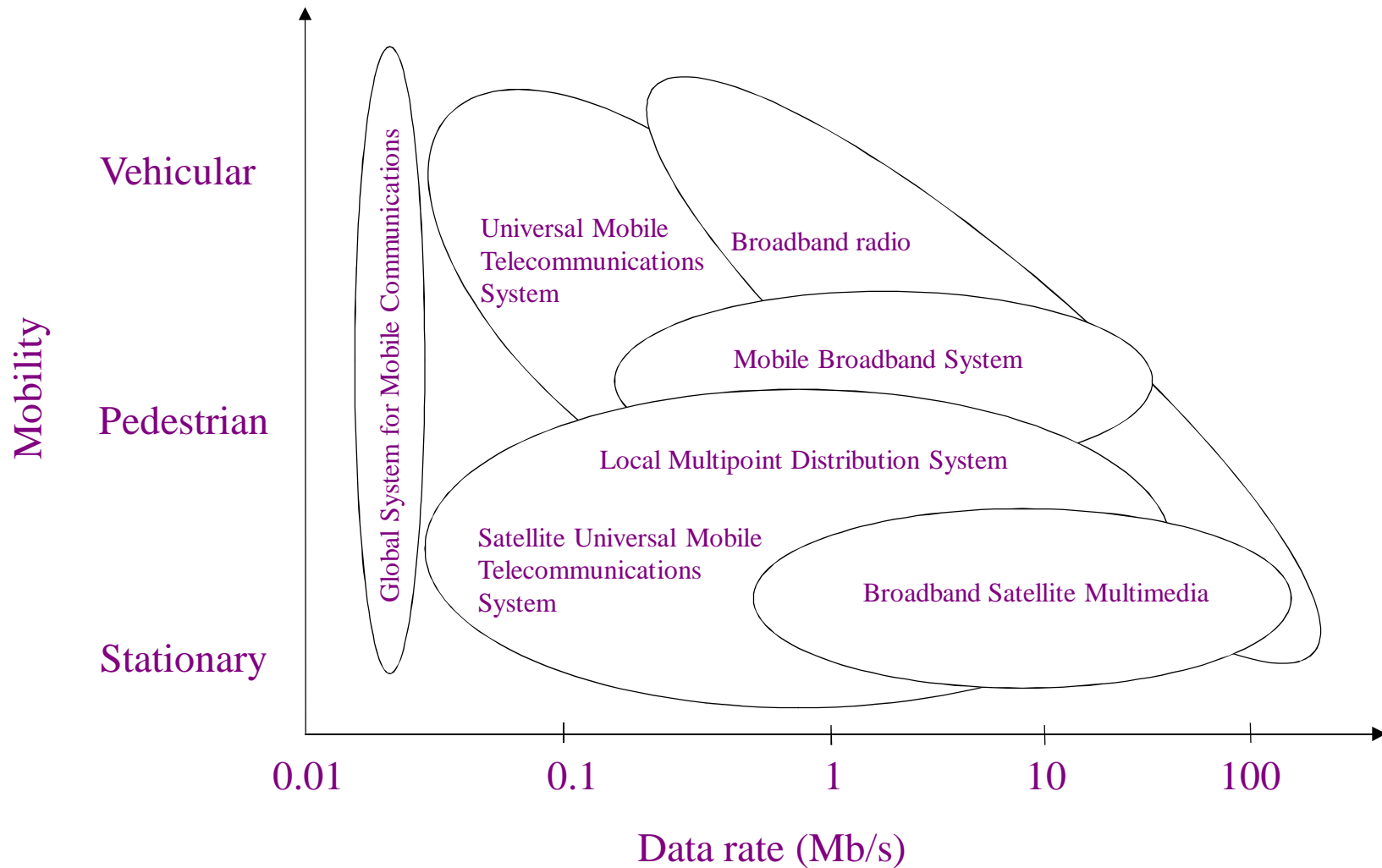
China Leads World in Mobile Phone Users

- Total Mobile Users > 800 million
- Total Analogue Users > 70 million
- ZDNet UK reports that the number of mobile phone users in China reached 167 million in April, 2002, a rise of 6 million subscribers on March, 2002.
- The US, which is the second biggest market, has 136 million subscribers.
- Mobile phones are the preferred mode of communication in Japan, with 56.8 million subscribers as of the end of March, 2003.

Coverage Aspect of Next Generation Mobile Communication Systems



Transmission Capacity



Transmission capacity as a function of mobility in some radio access systems