EVOLUTION FROM 3G TO 4G AND BEYOND 5G

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OVERVIEW

- INTRODUCTION TO WIRELESS COMMUNICATION
- TYPES OF WIRELESS COMMUNICATION NETWORKS
- WIRELESS APPLICATIONS AND SERVICES
- EVOLUTION FROM 1G TO 5G SYSTEM
- COMPARISON BETWEEN 3G, 4G AND 5G
- CONCLUSION
INTRODUCTION TO WIRELESS COMMUNICATION

Our ultimate goal is to communicate with any type of information with anyone, at anytime, from anywhere. This is possible with the aid of WIRELESS TECHNOLOGY.
TYPES OF WIRELESS COMMUNICATION NETWORKS

1. CELLULAR NETWORK

Evolved from mobile telephone as voice conversation and communication tools for private and business uses

2. WIRELESS LOCAL AREA NETWORK

Emerged from computer network. It helps business user to expand their service areas by using LAN (faster data transport)
MULTIPLE ACCESS APPROACHES AND NETWORKS IN MULTINETWORK
WIRELESS APPLICATIONS AND SERVICES

WIRELESS APPLICATION

Wireless applications are those which use free space as the transmission medium and do not involve cabling like fibre or copper.
WIRELESS APPLICATIONS AND SERVICES (CONT’D)

WIRELESS SERVICES

1) Voice Data

2) Video and multimedia applications and services
   - VHF, Microwave TV Transmission, Millimeter Wave Data Transmission, Cellular Telephony Services, Wireless Video Telephony and Video Conferencing, Wireless PBX, Wireless Broadband Internet and Internet Access, HDTV, Digital Audio Broadcasting (DAB) or Hi-Fi Sound, Wireless Geo-Location Services, Wireless E-Mail, PCs Interactive Applications using WPANs, WLANs & WMANs networks
SOLUTION OFFERED BY WIRELESS TECHNOLOGIES

- Wireless solutions for business and industry including: -
  - Department stores, and warehouse.
  - Trucking and movement of goods
  - Car rental billing and tracking
SOLUTION OFFERED BY WIRELESS TECHNOLOGIES (CONT’D)

- Wireless solutions for schools
  - In the classroom
  - Remote schools
  - Mobile access for students and student services

- Wireless solutions for people on the go
  - Real Estate Agents
  - Stock Brokers
  - Doctors
  - Service personnel
  - Airplane Pilots
SOLUTION OFFERED BY WIRELESS TECHNOLOGIES (CONT’D)

- Wireless solutions for the home
  - Personal Area Networks for the home
  - Personal and home security

- Wireless solutions for police and emergency vehicles
  - Reducing respond time
  - Increasing efficiency
  - Health care services
  - E911 services
EVOLUTION FROM 1G TO 5G SYSTEM
1G WIRELESS SYSTEM

- Developed in 1980s and completed in early 1990’s
- 1G was old analog system and supported the 1\textsuperscript{st} generation of analog cell phones speed up to 2.4kbps
- Advance mobile phone system (AMPS) was first launched by the US and is a 1G mobile system
- Allows users to make voice calls in 1 country
2G WIRELESS SYSTEM

- Fielded in the late 1980s and finished in the late 1990s
- Planned for voice transmission with digital signal and the speeds up to 64kbps
- 2G was the digital handsets that we are used today, with 2.5G representing handsets with data capabilities over GPRS
3G WIRELESS SYSTEM

- Developed in the late 1990s until present day

- Japan is the first country having introduced 3G nationally, and in Japan the transition to 3G is being largely completed during 2005/2006
3G WIRELESS SYSTEM (CONT’D)

- Services include:
  - Global roaming
  - Superior voice quality and video conference
  - Data always add-on services (e-mail, personal organizer, etc.)
  - Information for web surfing, music, news, corporate intranet, transportation service etc.
  - Purchasing – on-line shopping / banking, ticketing, gambling, games, etc.
3G WIRELESS SYSTEM (CONT’D)

- Transmission speeds from 125kbps to 2Mbps
- In 2005, 3G is ready to live up to its performance in computer networking (WCDMA, WLAN and Bluetooth) and mobile devices area (cell phone and GPS)
3G: Applications, Services and Market

According to Nokia, 3G applications can be divided into:

- Wireless Advertising
- Mobile Information
- Business Solutions
- Mobile Transactions
- Mobile Entertainment
- Person-to-Person Communications
- Bearer Entrance and Periodics
3G: Applications, Services and Market
Difference between regular TDMA and W-CDMA
Difference between regular CDMA and W-CDMA
ISSUES ON 3G WIRELESS SYSTEM

- High input fees for the 3G service licenses
- Great differences in the licensing terms
- Current high debt of many telecommunication companies, making it more of a challenge to build the necessary infrastructure for 3G
- Health aspects of the effects of electromagnetic waves
- Expense and bulk of 3G phones
- Lack of 2G mobile user buy-in for 3G wireless service
- Lack of coverage because it is still new service
- High prices of 3G mobile services in some countries
4G WIRELESS SYSTEM

- 4G is a research item for next-generation wide-area cellular radio, where you have 1G, 2G, 3G and then 4G [and 5G]
- 4G is a conceptual framework and a discussion point to address future needs of a high speed wireless network
- It offer both cellular and broadband multimedia services everywhere
- Expected to emerged around 2010 - 2015
4G WIRELESS SYSTEM (CONT’D)

- 4G should be able to provided very smooth global roaming ubiquitously with lower cost

- Theoretically, 4G is set to deliver 100mbps to a roaming mobile device globally, and up to 1Gbps to a stationary device. With this in mind, it allows for video conferencing, streaming picture perfect video (i.e. tele-medicine, tele-geo processing application etc.)

- 4G will bring almost perfect real world wireless or called “WWWW: World Wide Wide Wireless Web
GLOBAL 4G WIRELESS SYSTEM

Present
- Cellular
- Wireless LAN
- Broadcasting

Future
- Global wireless system connected by internet technology
- 2G/3G Cellular
- 4G cellular
- Broadcasting
- Wireless LAN (hot spot)
5G WIRELESS SYSTEM

- 5G is a completed wireless communication with almost no limitation; somehow people called it REAL wireless world

- 5G wireless system is only theory and not real
EVOLUTION OF CELLULAR SYSTEM

- Narrowband Era
  - 1G
  - 2G
  - Analog, AMPS, TACS, NTT
  - ~2.4kbps, ~64kbps

- Wideband Era
  - 2G
  - Digital IS95, IS136, GSM, PDC
  - IMT-2000
  - ~2Mbps

- Broadband Era
  - 3G
  - ~1Gbps
  - 4G
  - Broadband wireless
  - ~1Gbps

- Service type:
  - Voice
  - Multimedia
EVOLUTION OF MOBILE RADIO GENERATION

1st generation (1985)
Analog (900 MHz)
- Telephony services
- Local/national roaming
- New system, same service
- Incentives:
  - Digital technology benefits, i.e., security, reliability, capacity, automatic roaming, etc.

2nd generation (1992)
Digital (900 MHz + 1800 MHz)
- Digital technology
- Speech, security
- Local/national and international roaming
- GSM 2+ (1995)
  - Good quality speech
  - Data (SMS)
  - Packet communications
  - Higher rate data, etc.
- Incentives:
  - Now system and new services
  - Bigger and bigger radio pipes only

3rd generation (2002)
Digital (2 GHz)
- Capacity
- Speech and data
- High-bit rate services
- Mixed services
- Multitude of systems
- Seamless convergence
- Incentives:
  - Global mobility (VHE)
  - Personal numbering
  - Flexibl billing
  - Inexpensive services
  - etc.

Personal services on the move
COMPARISON BETWEEN 3G, 4G AND 5G
CONCLUSION

Wireless systems becoming an important infrastructure in our society. A virtual global system is a good solution that can efficiently connect many dedicated wireless systems including 2G to 4G cellular systems, wireless LAN, broadcasting systems, etc.
THANK YOU