Basic Principles of Next Generation Networks and Applications.

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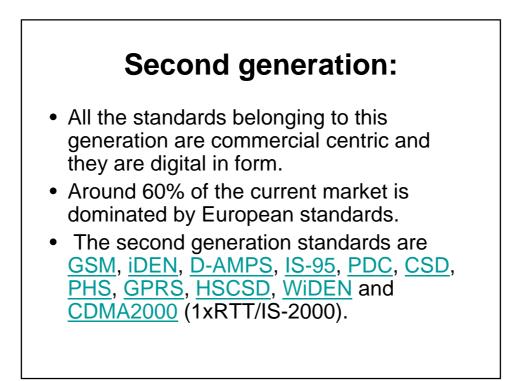
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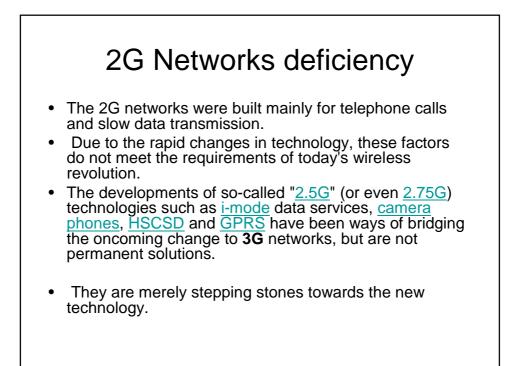
- Introduction
- Background of mobile wireless technologies
- Building blocks of 3G and 4G
- Standards
- Challenges
- Conclusion

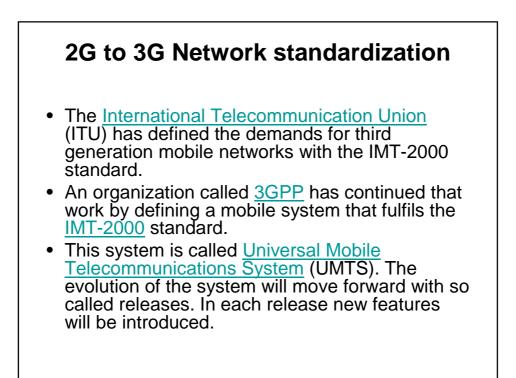
Background of mobile systems

First generation networks:

- Almost all of the systems from this generation were analog systems.
- voice was considered to be the main traffic.
- These systems could often be listened to by third parties.
- some of the standards are <u>NMT</u>, <u>AMPS</u>, <u>Hicap</u>, <u>CDPD</u>, <u>Mobitex</u>, <u>DataTac</u>



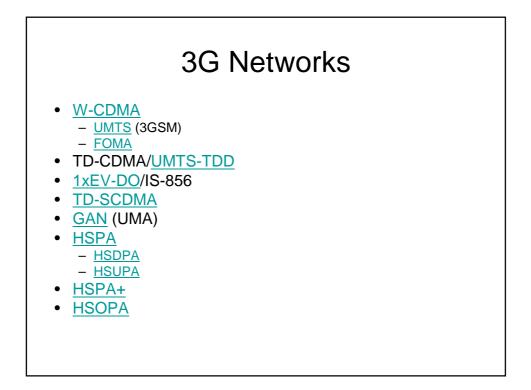


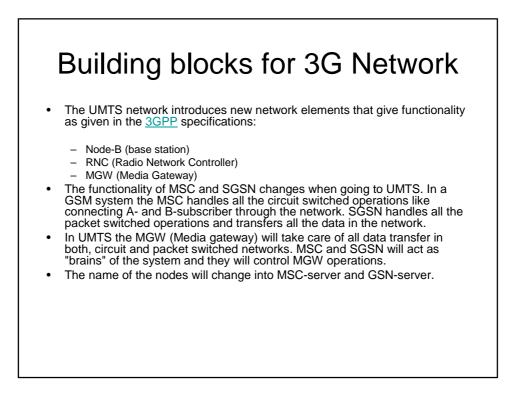


3G is third-generation technology

 in the context of mobile phone standards. The services associated with 3G provide the ability to transfer simultaneously both voice data (a telephone call) and nonvoice data (such as <u>downloading</u> <u>information</u>, exchanging <u>email</u>, and <u>instant</u> <u>messaging</u>). In marketing 3G services, <u>video telephony</u> has often been suggested as the <u>killer application</u> for 3G.

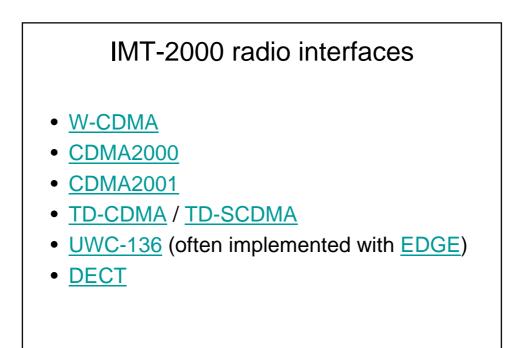


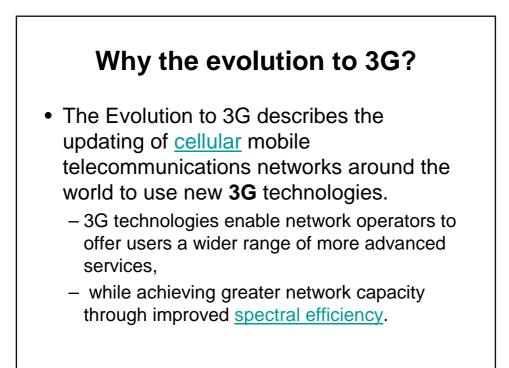


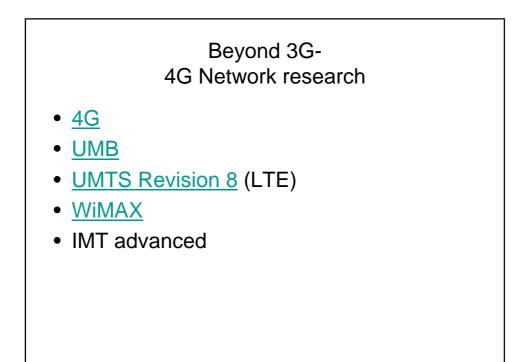


3G challenges

- Even though 3G has successfully been introduced to European and Asian mobile users, there are some issues that are debated by 3G providers and users:
 - 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
 - Member State support to the financially troubled operators
 - Health aspects of the effects of electromagnetic waves
 - Expense 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,

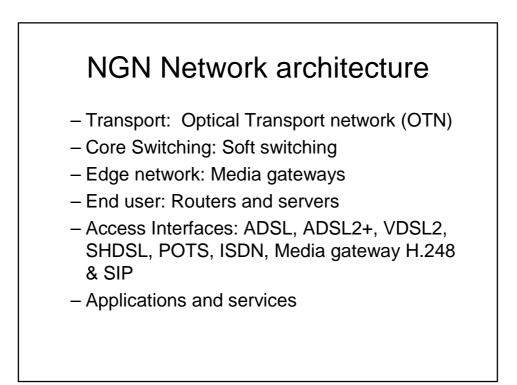


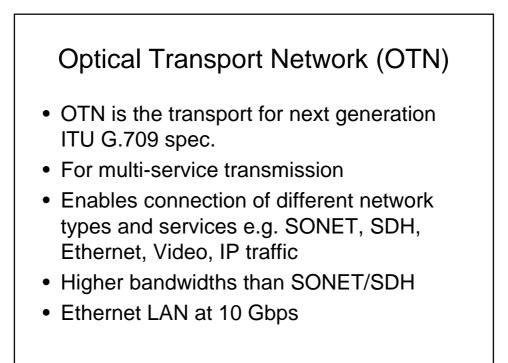


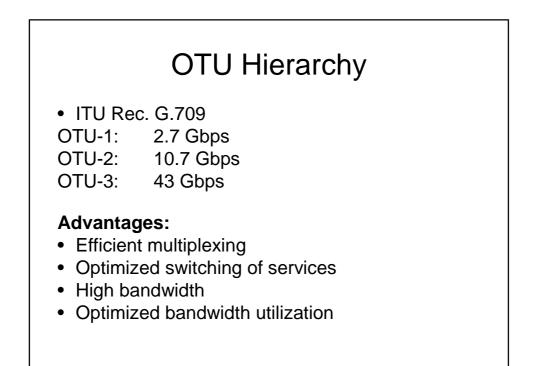


Requirements for NGN /4G

- Security on the air interface
- · Security standards
- High speed
- Optimized data transport
- High QoS standards with support for Laptops, wifi, Wimax, Cellular, RFID...
- Guaranteed quality standards for TV, video, speech, data

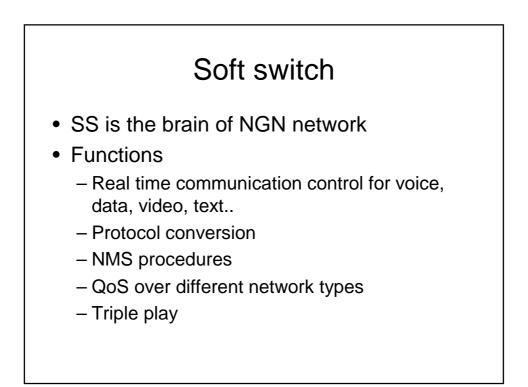


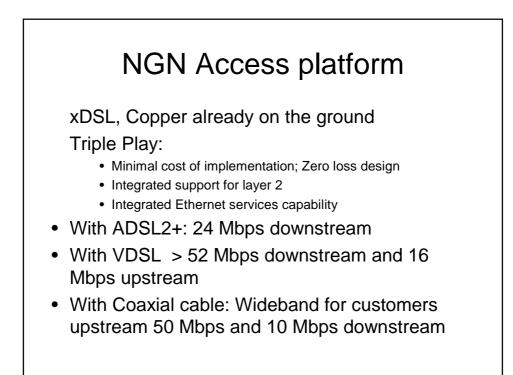


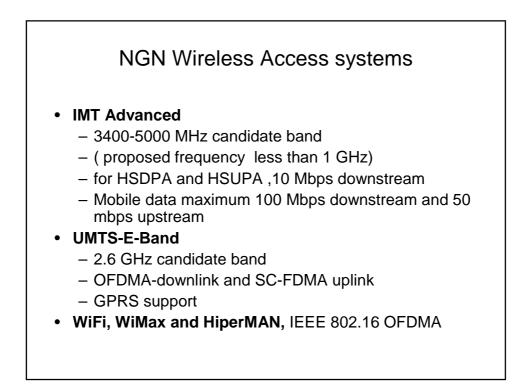


OTN uses

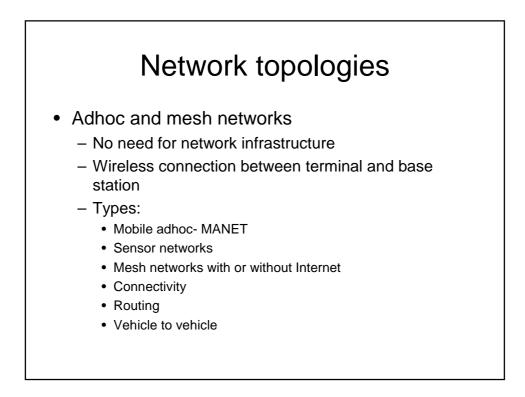
- Metro- Wavelength Division Multiplexing
 Used in the inner city metro network
- OED- Optical Edge Devices
 - Used in connecting premises or university campuses
- ON- Optical Networks
 - for connection of clients in the LAN network







4G Air Interfaces Data rates < 100 Mbps for wide area application For hot spots: 1 Gbps at a bandwidth of 100 MHz Use of multi-carrier antennas Need of advanced coding algorithms Need for adaptive multi-carrier modulation and coding methods Need for cognitive radio systems

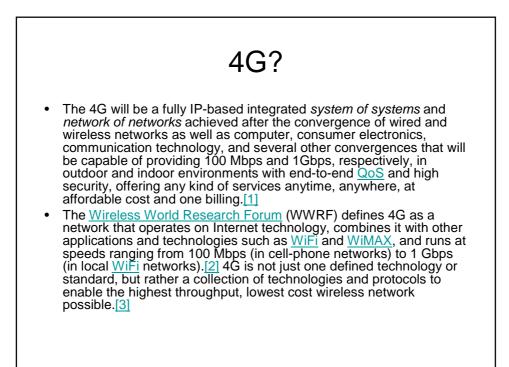


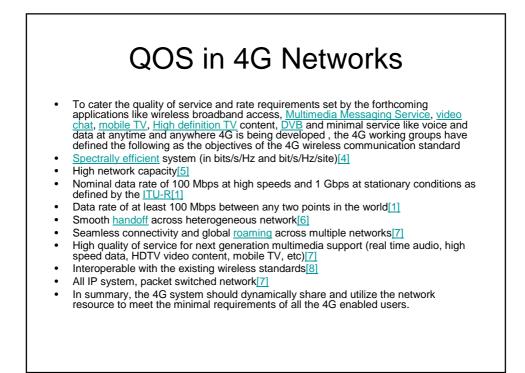
Cognitive radio

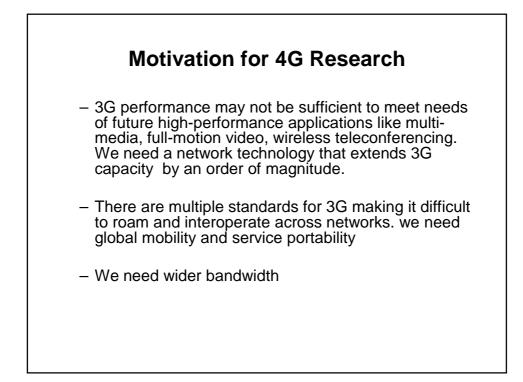
- To eliminate interference problems
- The terminal analyses the situation
- Inbuilt boosting protocol for
 - Distributed reception
 - Boosting stations
 - Interference temperature

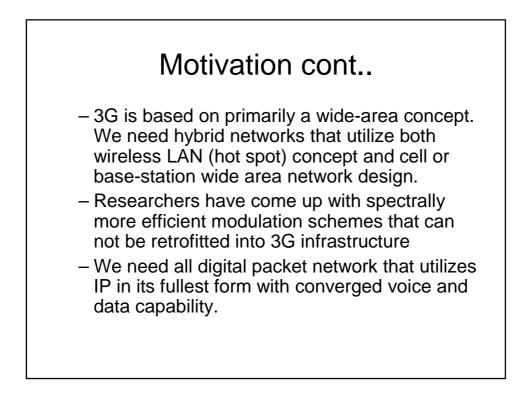
NGN services

- VoIP
- Streaming video
- Internet
- SMS
- Video telephony
- Mobility services etc

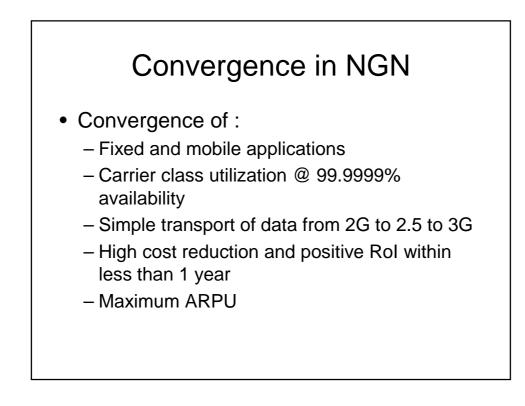


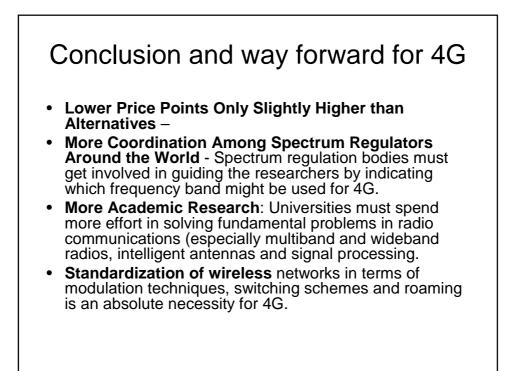


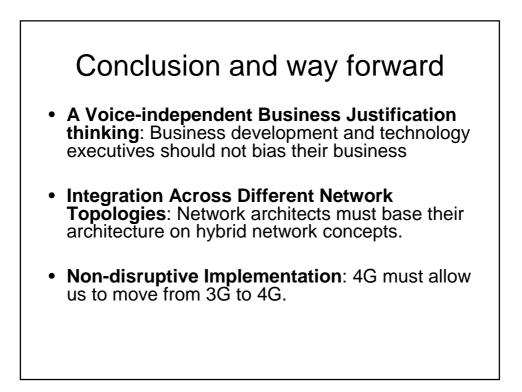




	3G (including 2.5G, sub3G)	4G
	Predominantly voice driven - data was always add on	Converged data and voice over IP
Network Architecture	Wide area cell-based	Hybrid - Integration of Wireless LAN (WiFi, Bluetooth) and wide area
Speeds	384 Kbps to 2 Mbps	20 to 100 Mbps in mobile mode
Frequency Band	Dependent on country or continent (1800-2400 MHz)	Higher frequency bands (2- 8 GHz)
Bandwidth	5-20 MHz	100 MHz (or more)
Switching Design Basis	Circuit and Packet	All digital with packetized voice
Access Technologies	W-CDMA, 1xRTT, Edge	OFDM and MC-CDMA (Multi Carrier CDMA)
Forward Error Correction	Convolutional rate 1/2, 1/3	Concatenated coding scheme
Component Design	Optimized antenna design, multi-band adapters	Smarter Antennas, software multiband and wideband radios
IP	A number of air link protocols, including IP 5.0	All IP (IP6.0)







References:

- 1. Development of IMT-2000 systems ; ITU
- 2.Deployment of IMT-2000 systems; ITU
- 3.Guidelines for a smooth transition from 2g to IMT 2000; ITU
- 4. ITU Radio standards; ITU-R