Mobile Cellular Networks.

- G = Generation
- Re-use of frequencies
- Single hop wideread wireless connectivity
- Cell size: highly variable, tech dependent, varies with number of users.

↳ Service Usage Phases

- Mobile unit init / regist
- Mobile-originated call
- Paging
- Call accepted
- Ongoing call
- Handoff

→ Cell: Pros / Cons

Each cell handles interferences, coverage area, etc. locally. Channel reservation and cell planning (size, freq.)

Advantages: > capacity, > num. users, < power, reliability

Disadvantages: needs interconnection networks between cells, support handovers, handle inter-call interference.

→ 1G: Mobile Voice

Advanced mobile phone service, frequency reuse exploited. Uses frequency division multiple access. Poor battery life, interference, limited num users, no roaming.

→ 2G: Global System for mobile communications (GSM)

Digital traffic channels, encryption, error detection and connection, channel-access.

↳ Architecture:

Geographic area covered by network is divided into smaller areas called cells. Each cell is served by a base station (BS) which connects the device to the network.

BS: Base station controller (BSC) + Base station transmitter. They are connected to Mobile switching center (MSC)

MSC: manages the calls and connections as well as auth. They are interconnected to each other and to the Public network (PSTN), the Gateway Mobile Switching Center (GMSC)

HLR: Home location register stores info about GSM network subscribers and location.

VLR: Visitor location register: temporary info of subscribers and location

AuC: Authentication Center (encrypt, session keys)

EiR: Equipment Identity Register provides security mechanisms and list of mobile equipments.

↳ SIM (Subscriber Identity module)

Info about user id, pin, subscription info, etc

SIM card + GSM terminal = access to GSM services.

↳ Types of handover (GSM)

- Intra-cell (change channel)
- Inter-cell (change channel + cell)
- Inter-BSC, Intra MSC (before + different BSCs)
- Inter MSC (different MSCs)

↳ SMS (Short message service)

Transmission of messages <160 chars

Through signaling channels

Variety of apps.

→ 2.5 G (General Packet Radio Service)

Packet switching tech for internet.

↳ GPRS architecture

- SGSN → serving GPRS support
- GGSN → gateway GPRS support, functions (gateway, routing, mobility management, session management, security, auth., billing, SMS).
- Transmission Plane → packets by tunnel mechanism
- Control Plane → GTP tunnel management (UDP/IP

- Radio interface (master - slave)

→ 3G (Universal Mobile Telecommunication Service)

Oriented towards generalized service diffusion, multimedi
every where.

↳ IMS (IP multimedia subsystem)

network architecture that enables the delivery of multimedia services with QoS but security and QoS with Internet and many device support.

Architecture: Border Functions: access and nw border security. QoS and admission, media and signal adaptation.

Core Functions: Subscriber management, session switching, routing

APP Functions: Access to legacy apps, SIP apps, brokering

→ 4G (long Term Evolution (LTE) / Evolved Packet Core (EPC))

Deployed Globally, all packet switched network, high throughput and QoS, wireless retransmissions of lost data

↳ Network

PGW: Packet delivery network gateway connects LTE network to IP networks.

SGW: Serving Gateway routes packets to/from AP

eNode B : Enhanced node B is wireless AP.