MAHAMAYA POLYTEHNIC OF IT HATHRAS

UPSKILLING CONTENT FOR STUDENT

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GSM Architecture

CONTENT

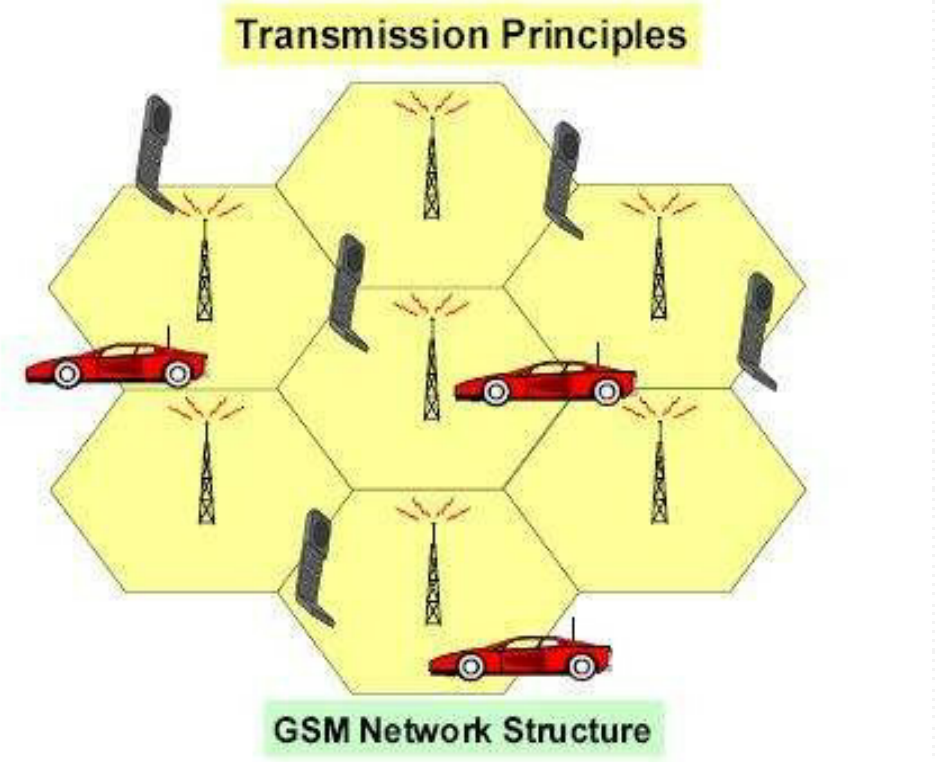
- What is GSM?
- Network structure
- GSM system architecture
  - Mobile Station (MS)
  - Base Station Subsystem (BSS)
  - Network Switching Subsystem (NSS)
- Characteristics

What is GSM?

- The Global System for Mobile communications is a digital cellular communications system.
- Based on digital technology.
- The standardized system had to meet certain criteria's:
  - Spectrum efficiency
  - International roaming
  - Low mobile and base stations costs
  - Good subjective voice quality
  - Ability to support new services

Network structure

- Cell
- Location area
- MSC service area
- PLMN service area
- GSM service area

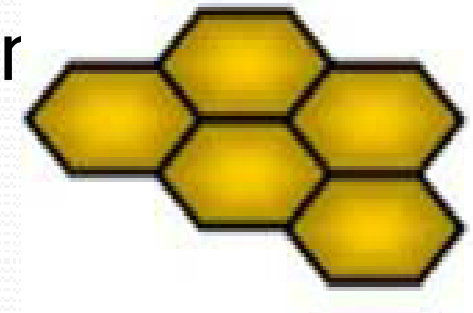


Cell

A cell is the basic unit of a cellular system and is defined as the radio coverage given by one BTS.

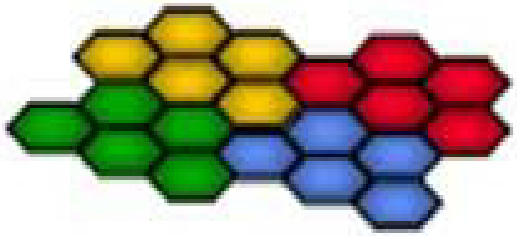
Location area

- A group of cells served by one or more BSC.
- Within the network, a subscribers' location is known by the LA which they are in.
- The identity of the LA in which an MS is currently located is stored ir



MSC Service Area

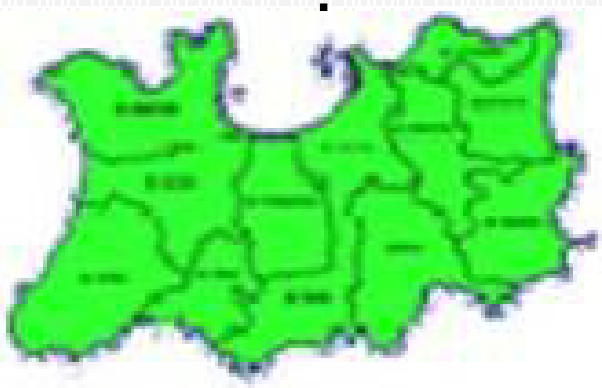
An MSC Service Area is made up of LAs and represents the geographical part of the network controlled by one MSC.



PLMN service area

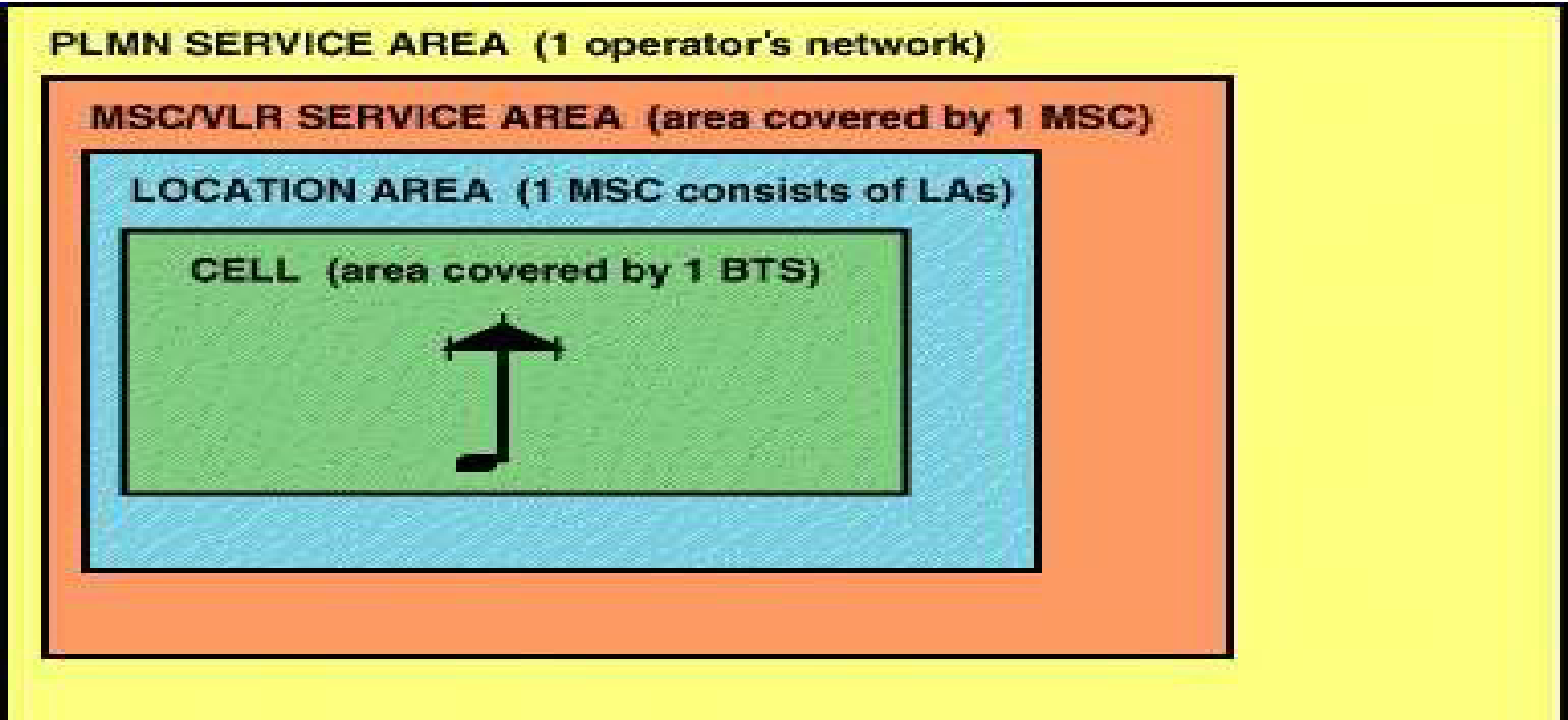
A PLMN service area is the entire set of cells served by one network operator.

Defined as the area in which an operator offers radio coverage and access to it



GSM service area

The GSM service area is the entire geographical area in which a subscriber can gain access to a GSM network



GSM system architecture

- Mobile Station (MS)
- Base Station Subsystem (BSS)
- Network Switching Subsystem(NSS)

Mobile Station (MS)

The Mobile Station is made up of two entities:

1. Mobile Equipment (ME)
2. Subscriber Identity Module (SIM)

Mobile Equipment (ME)

- Portable, vehicle mounted, hand held device.
- Uniquely identified by an **IMEI** (International Mobile Equipment Identity).
- Voice and data transmission.
- Monitoring power and signal quality of surrounding cells for optii
- Power level : 0.8W – 20 W
- 160 character long SMS.

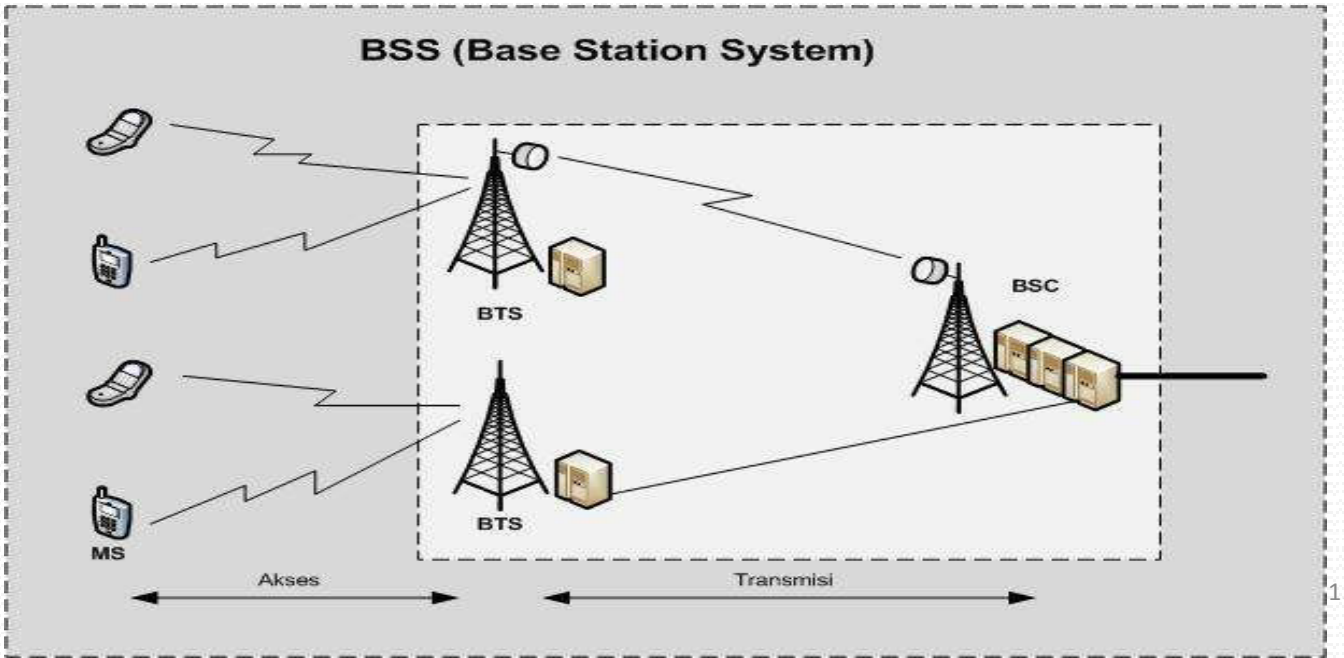
Subscriber Identity Module (SIM)

- Smart card contains the International Mobile Subscriber Identity (**IMSI**)
- Allows user to send and receive calls and receive other subscribed services
- Protected by a password or PIN
- Can be moved from phone to phone – contains key information to activate the phone

Base Station Subsystem (BSS)

It consists of 2 major hardware components:

- Base Transceiver Station (BTS)
- Base Station Controller (BSC)



Base Transceiver Station (BTS)

- The BTS contains the RF components that provide the air interface for a particular cell .
- Encodes, encrypts, multiplexes, modulates and feeds the RF signals to the antenna.
- Communicates with Mobile station and BSC.
- Consists of Transceivers (TRX) units.

Base Station Controller (BSC)

- Provides the control for the BSS.
- Communicates directly with the MSC.
- May control single or multiple BTS.
- In charge of handovers, frequency hopping, exchange functions and control of power level of BTS.

Network Switching Subsystem(NSS)

The system contains the following functional units

- Mobile Switching Center (MSC)
- Home Location Register (HLR)
- Visitor Location Register (VLR)
- Authentication Center (AUC)
- Equipment Identity Register (EIR)
- Operation and maintenance center (OMC)

Mobile Switching Center (MSC)

- Central component of NSS.
- MSC performs the switching functions.
- Each MSC provides service to MS located within a defined geographic coverage area.

Home Location Register (HLR)

- Stores information about each subscriber that belongs to its MSC in permanent and temporary fashion.
- As soon as mobile subscriber leaves its current local area, the information in the HLR is updated.
- Database contains IMSI, prepaid/postpaid, roaming restrictions and supplementary services.

Visitor Location Register (VLR)

• The Visitor Location Register (VLR) contains the information about subscriber parameters and location information for all mobile subscribers currently located in the geographical area controlled by that VLR.

• Authentication Center (AUC)

• It is used for security purposes.

• Authentication is a process to verify the subscriber SIM. AUC & HLR collectively authenticate the subscribers.

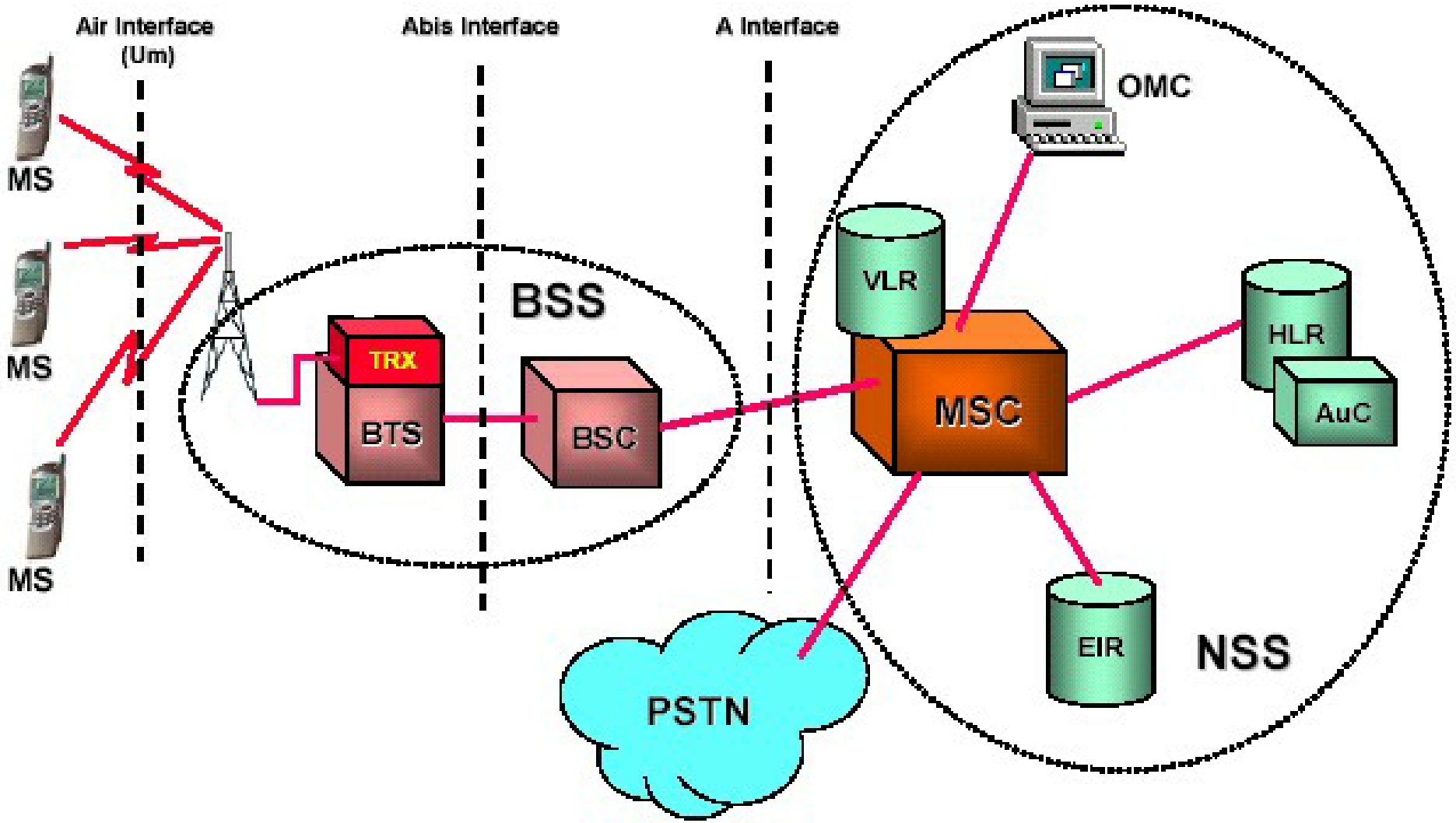
Equipment identity register (EIR)

- Stores all devices identifications registered for this network.
- Database that is used to track handsets using the IMEI.
  - White or Valid list
  - Grey or Monitored list
  - Black or prohibited list

Operation and maintenance center (OMC)

- The Operation and maintenance Center (OMC) is the centralized maintenance and diagnostic heart of the base station system (BSS).
- It allows the network provider to operate, administer , and
monitor the functioning of the BSS.

GSM Architecture Overview



Characteristics

- Fully digital system using 900,1800 MHz frequency band.
- User/terminal authentication for fraud control.
- Full international roaming capability.
- Low speed data services (up to 9.6 Kb/s).
- Compatibility with ISDN.
- Support of Short Message Service (SMS).

THANK YOU!!!