Mobile Computing and Communication

GSM – Global System for Mobile Communication

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GSM Services

GSM provides three main categories of services.

(i) Bearer services

(ii) Teleservices (iii) Supplementary services

Bearer services

Bearer services give the subscribers the capability to send and receive data to/from remote computers or mobile phones.

Teleservices

GSM provides both the voice-oriented teleservices and the non-voice teleservices

- **Telephony**
- **Emergency number**
- **Short message services**
- **Fax**

Supplementary services

GSM provides certain supplementary services such as user identification, call redirection, and forwarding of ongoing calls.

System Architecture of GSM

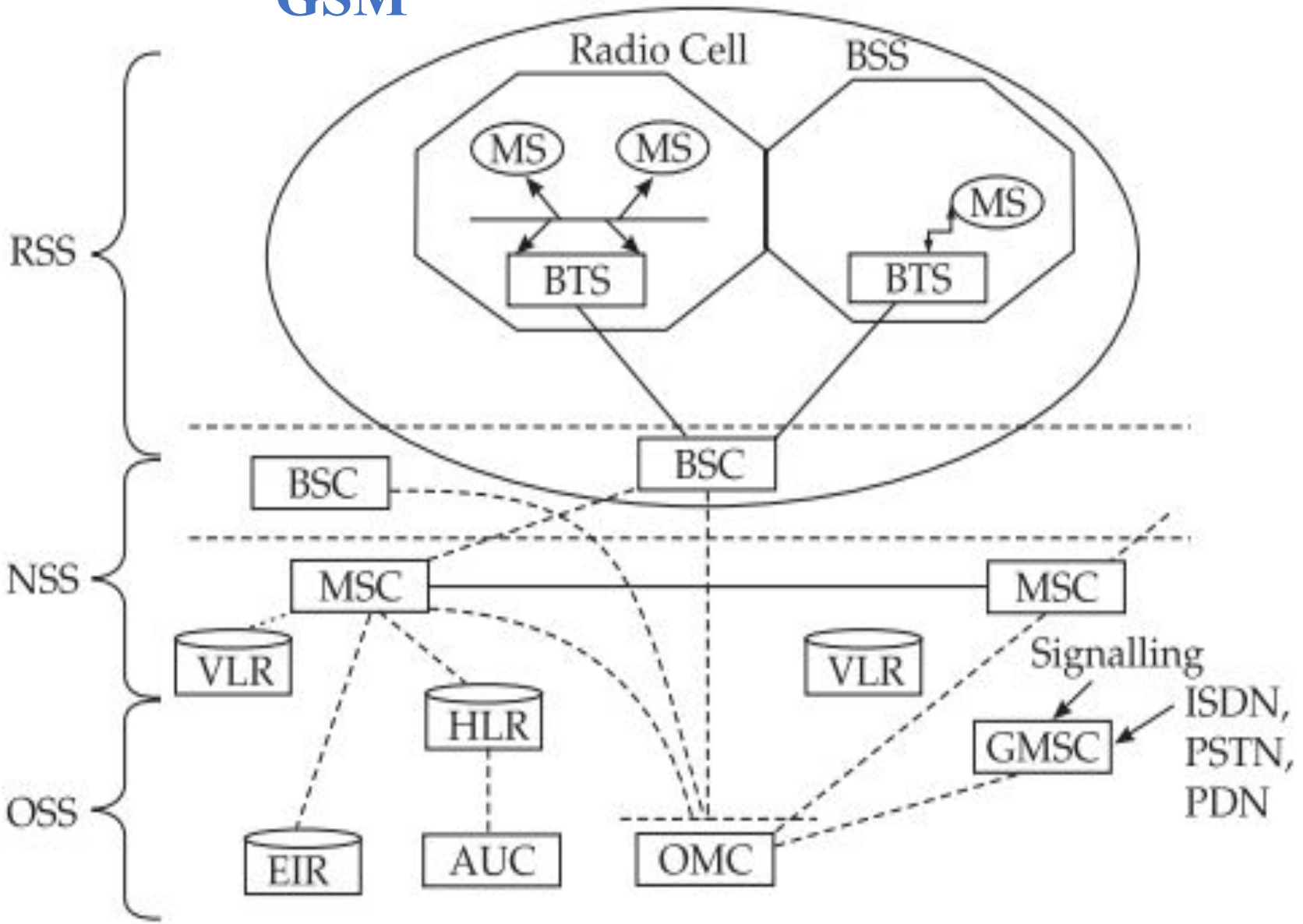
A GSM system consists of three main subsystems:

(i) Radio Subsystem (RSS)

(ii) Networking and Switching Subsystem (NSS)

(iii) Operation Subsystem (OSS)

System Architecture of GSM



Radio subsystem (RSS)

- Mobile Station (MS)
- Base Station Subsystem (BSS)
- Base Transceiver Station BTS)
- Base Station Controller (BSC)

Mobile Station (MS)

A mobile station (MS) or cell phone contains two major components

1. The subscriber identity module (SIM)
2. The mobile device.

The SIM is a removable smart card. Each mobile device has a unique identifier that is known as its IMEI (International Mobile Equipment Identity).

Base Station Subsystem (BSS)

A GSM network comprises many BSSs.
Each BSS consists of a Base Station Controller (BSC) and several Base Transceiver Stations (BTSs).

Base Transceiver Station (BTS)

A BTS comprises all radio equipment such as antenna, signal processors and amplifiers that are necessary for radio transmission.

Base Station Controller (BSC)

A BSC manages the radio resource of the BTSs in the sense that

it assigns frequency and time slots for all MSs in the area.

Network and switching subsystem (NSS)

NSS connects the wireless networks to the standard public networks and carries out usage-based charging, accounting, and also handles roaming.

Mobile Switching Center (MSC)

Home Location Register (HLR)

Visitor Location Register VLR)

Mobile Switching Center (MSC)

An MSC can be considered to form the heart of a GSM network.

An MSC sets up connections to other MSCs and to other networks such as Public Data Network (PDN).

An MSC is responsible for the connection setup, connection release, and call handoff to other MSCs. A Gateway MSC (GMSC) is responsible for gateway functions, while a customer roams to other networks.

Home Location Registers (HLRs)

A HLR stores in a database important information that is specific to each subscriber.

The information contains subscriber's IMSI, pre/post paid, user's current location, etc.

Visitor Location Register (VLR)

It is essentially a temporary database that is updated whenever a new MS enters its area by roaming.

Operation subsystem (OSS)

The operation subsystem contains all the functions necessary for network operation and maintenance.

Operation and Maintenance Centre (OMC)

Authentication Centre (AuC) Equipment

Identity Register (EIR)

Operation and Maintenance Centre (OMC)

It supervises all other network entities. Its functions are traffic monitoring, subscribers, security management and accounting billing.

Authentication Centre (AuC)

It protects against intruders targeting the air interface. The AuC stores information concerned with security features such as user authentication and encryption.

Equipment Identity Register (EIR)

It is essentially a database that is used to track handsets using the IMEI. It helps to block calls from stolen, unauthorized, or defective mobiles.