



Global System for Mobile

GSM

Daffodil International University



Wireless Communication - The beginning

- The origins of mobile communications quickly followed the invention of radio in the late 1800s.
- The first applications of mobile radio were related to the navigation and safety of ships at sea.
- As radio concepts developed, radio was used more and more as a communications tool.



GSM History

- Developed by Group Speciale Mobile (founded 1982).
- Replacing the incompatible analog system
- Presently the responsibility of GSM standardization resides with special mobile group under ETSI (European telecommunication Standards Institute)
- Under ETSI, GSM is named as Global System for Mobile communication



GSM Services

- 1 Tele-services
- 2 Bearer or Data Services
- 3 Supplementary services



Tele Services

- Telecommunication services that enable voice communication via mobile phones
- Offered Services
 - Mobile telephony
 - Emergency calling



Bearer Services

- Include various data services for information transfer between GSM and other networks like PSTN, ISDN etc at rates from 300 to 9600 bps
- Short Message Service (SMS) up to 160 character alphanumeric data transmission to/from the mobile terminal
- Voice mailbox
- Electronic Message



Supplementary Services

Call related services :

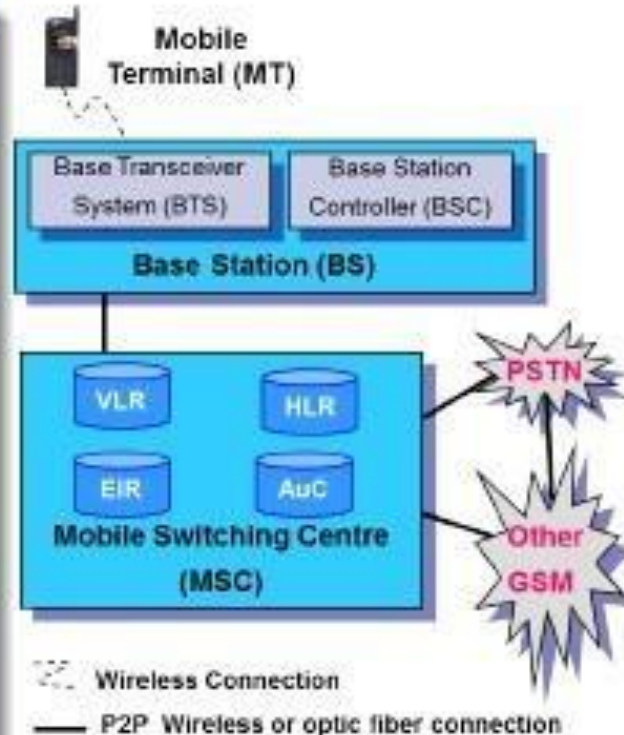
- Call Waiting- Notification of an incoming call while on the handset
- Call Hold- Put a caller on hold to take another call
- Call Barring- All calls, outgoing calls, or incoming calls
- Call Forwarding- Calls can be sent to various numbers defined by the user
- Multi Party Call Conferencing - Link multiple calls together
- CLIP Caller line identification presentation
- CLIR Caller line identification restriction
- CUG Closed user group



GSM Network

Network components

- Mobile Station (MS)
 - Mobile Equipment (ME)
 - Subscriber Identity Module (SIM)
- Base Station Subsystem (BSS)
 - Base Transceiver Station (BTS)
 - Base Station Controller (BSC)
- Network Switching Subsystem (NSS)
 - Mobile Switching Center (MSC)
 - Home Location Register (HLR)
 - Visitor Location Register (VLR)
 - Authentication Center (AUC)
 - Equipment Identity Register (EIR)





GSM

1 GSM Introduction

2 GSM Architecture

- Mobile Station
- Base Station Subsystem (BSS)
- Mobile Switching Center (MSC)

3 GSM Specification

4 Cell Structure

5 Access Method

6 Call Routing

7 Handovers

8 Security

9 Summary

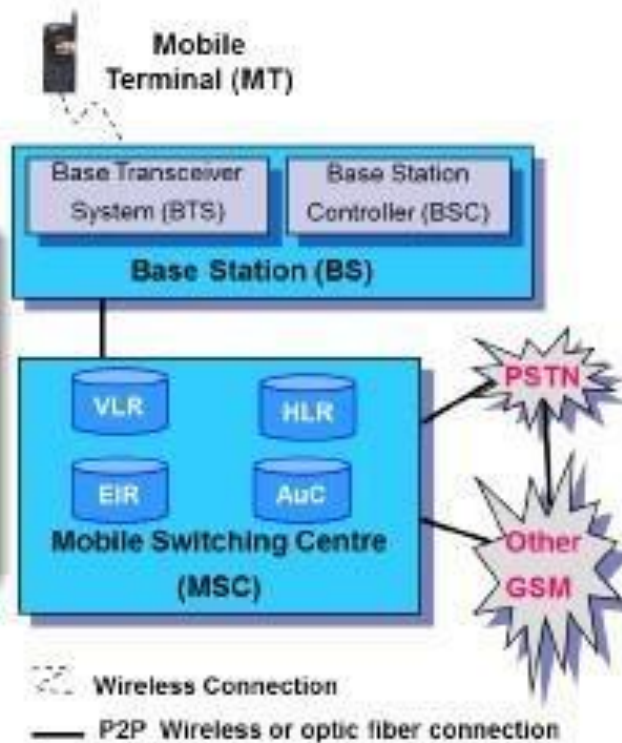


Mobile Station

Mobile Station (MS)

The Mobile Station is made up of two entities:

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

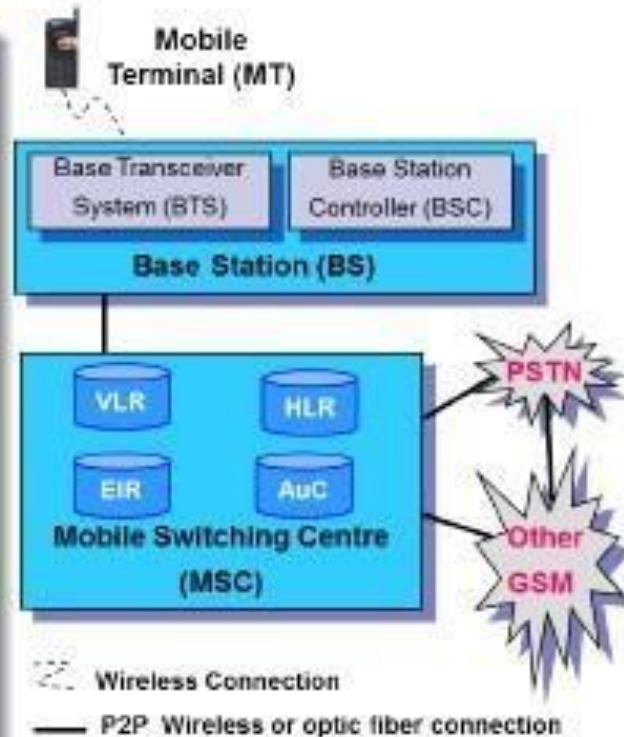




Mobile Station

Mobile Equipment

- 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 optimum handover
- Power level : 0.8W 20 W
- Typically 160 character long SMS.





Mobile Station

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
- Encoded network identification details
- Protected by a password or PIN
- Can be moved from phone to phone contains key information to activate the phone





GSM

1 GSM Introduction

2 GSM Architecture

- Mobile Station
- Base Station Subsystem (BSS)
- Mobile Switching Center (MSC)

3 GSM Specification

4 Cell Structure

5 Access Method

6 Call Routing

7 Handovers

8 Security

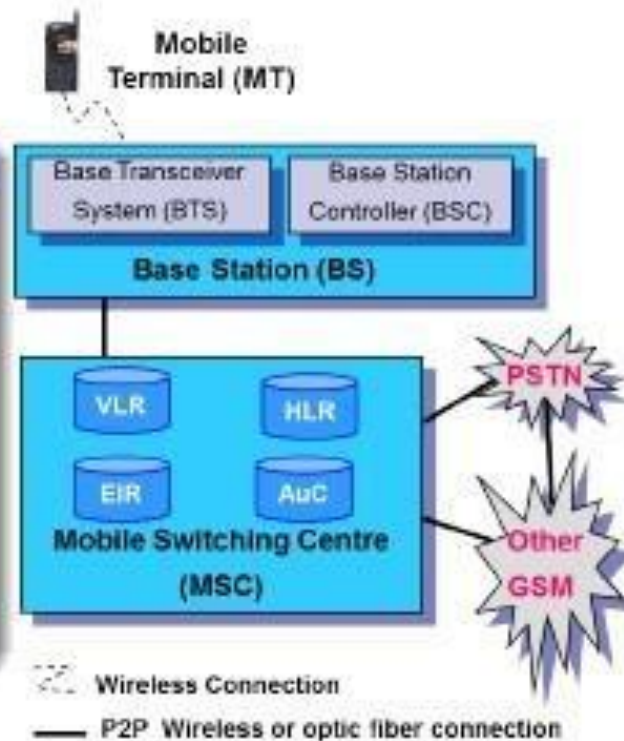
9 Summary

Base Station Subsystem (BSS)

Base Station Subsystem (BSS)

Base Station Subsystem is composed of two parts that communicate across the standardized Abis interface allowing operation between components made by different suppliers

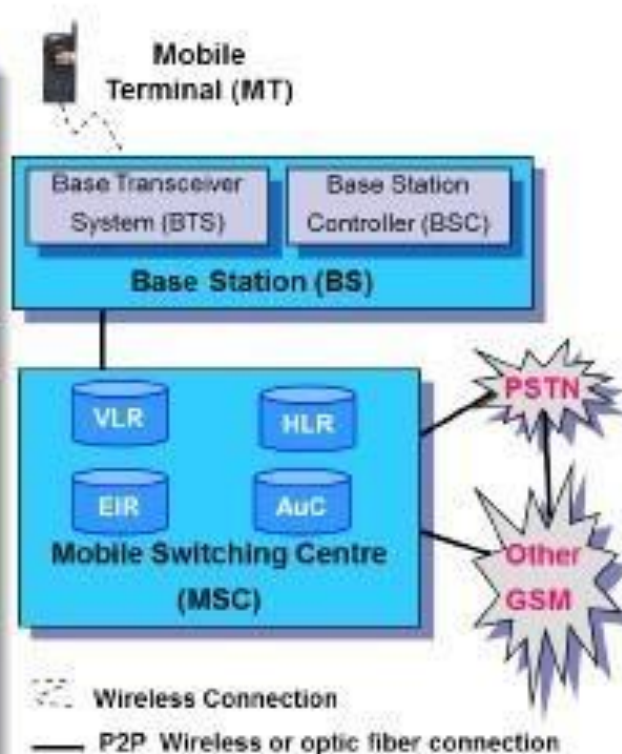
- Base Transceiver Station (BTS)
- Base Station Controller (BSC)



Base Station Subsystem (BSS)

Base Station Controller (BSC)

- Manages Radio resources for BTS
- Assigns Frequency and time slots for all MSs in its area
- Handles call set up
- Transcoding and rate adaptation functionality
- Handover for each MS
- Radio Power control
- It communicates with MSC and BTS





GSM

1 GSM Introduction

2 GSM Architecture

- Mobile Station
- Base Station Subsystem (BSS)
- Mobile Switching Center (MSC)

3 GSM Specification

4 Cell Structure

5 Access Method

6 Call Routing

7 Handovers

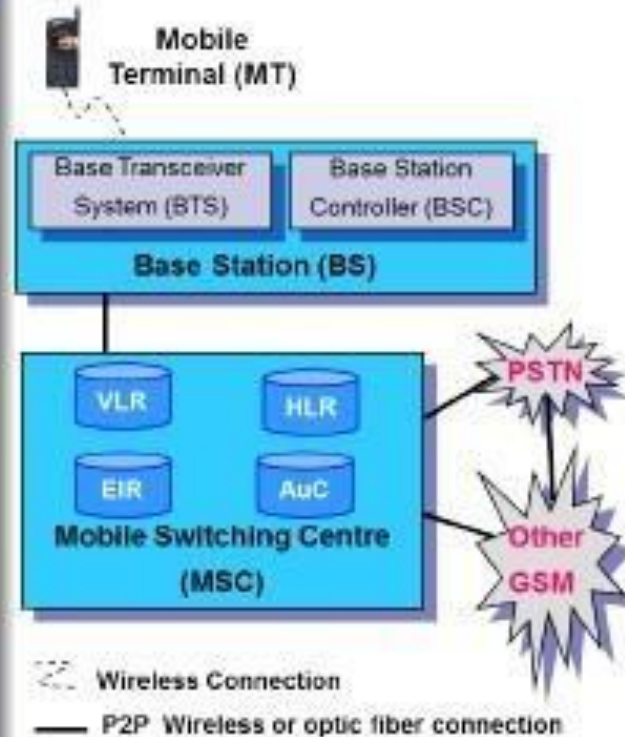
8 Security

9 Summary

Mobile Switching Center (MSC)

Mobile Switching Center (MSC)

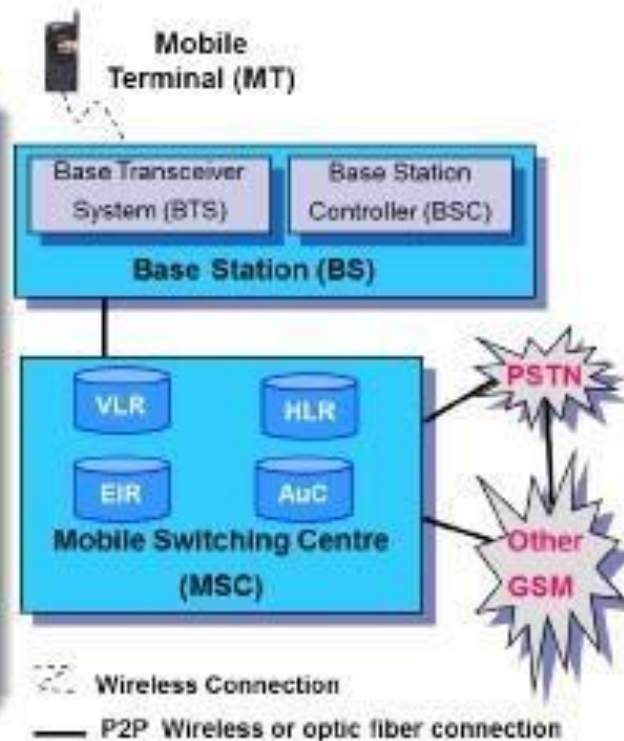
- Heart of the network
- Manages communication between GSM and other networks
- Call setup function and basic switching
- Call routing
- Billing information and collection
- Mobility management
- MSC does gateway function while its customer roams to other network by using HLR/VLR.



Mobile Switching Center (MSC)

Home Location Registers (HLR)

- Permanent database about mobile subscribers in a large service area (generally one per GSM network operator) database contains
- IMSI, MSISDN, prepaid/postpaid, and
- roaming restrictions, supplementary services.

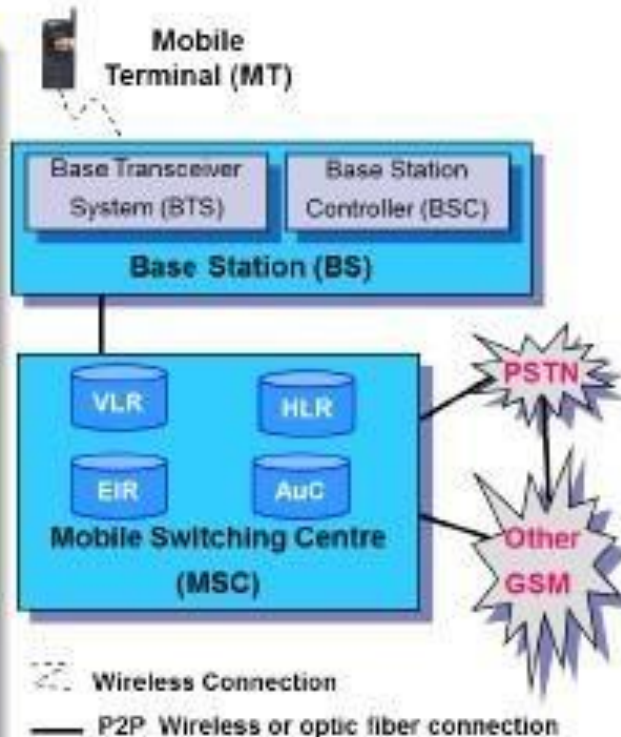




Mobile Switching Center (MSC)

Visitor Location Registers (VLR)

- Temporary database which updates whenever new MS enters its area, by HLR database
- Controls those mobiles roaming in its area
- Reduces number of queries to HLR
- Database contains :IMSI, TMSI, MSISDN, MSRN, Location Area, authentication key

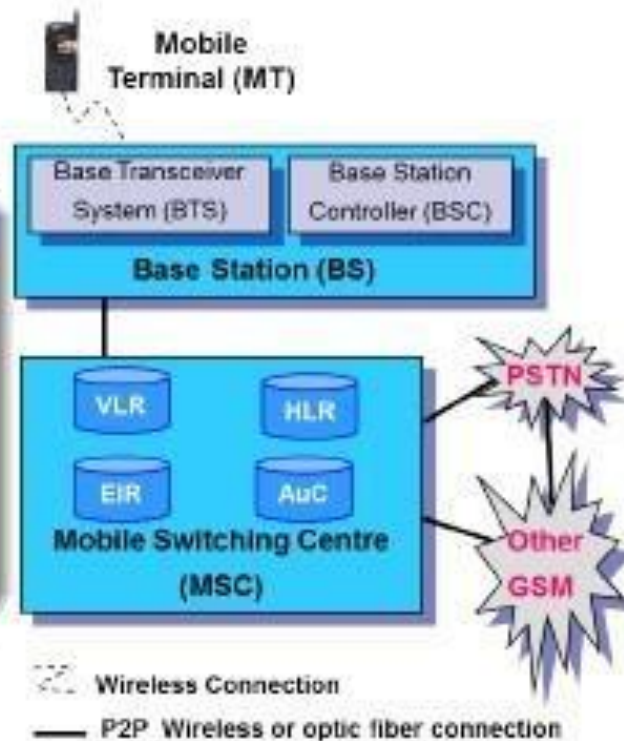




Mobile Switching Center (MSC)

Authentication Center (AUC)

- Protects against unauthorized users in air interface
- Maintains authentication keys and algorithms and provides security triplets
- Generally associated with HLR

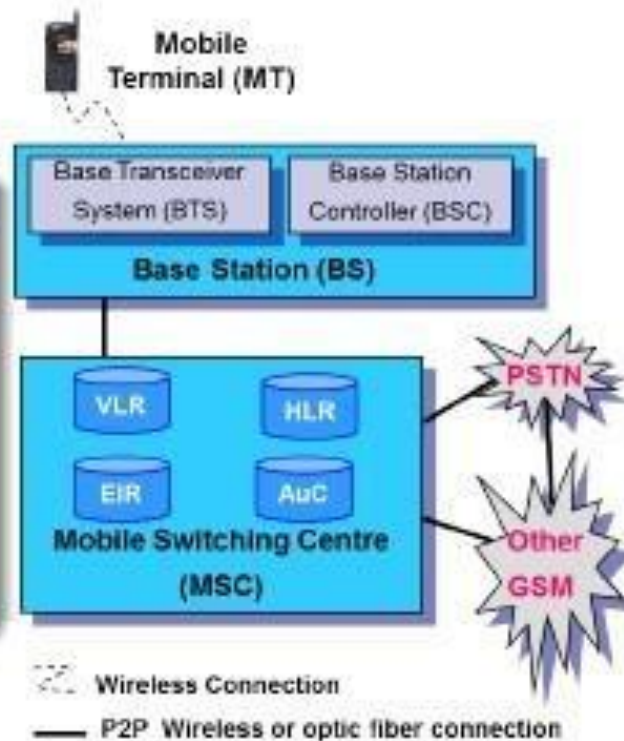




Mobile Switching Center (MSC)

Equipment Identity Register (EIR)

- Database that is used to track handsets using the IMEI
- Made up of three sub-classes: The White List, The Black List and the Gray List
- Only one EIR per PLMN (Public Land Mobile Network)



Summary

Thank You