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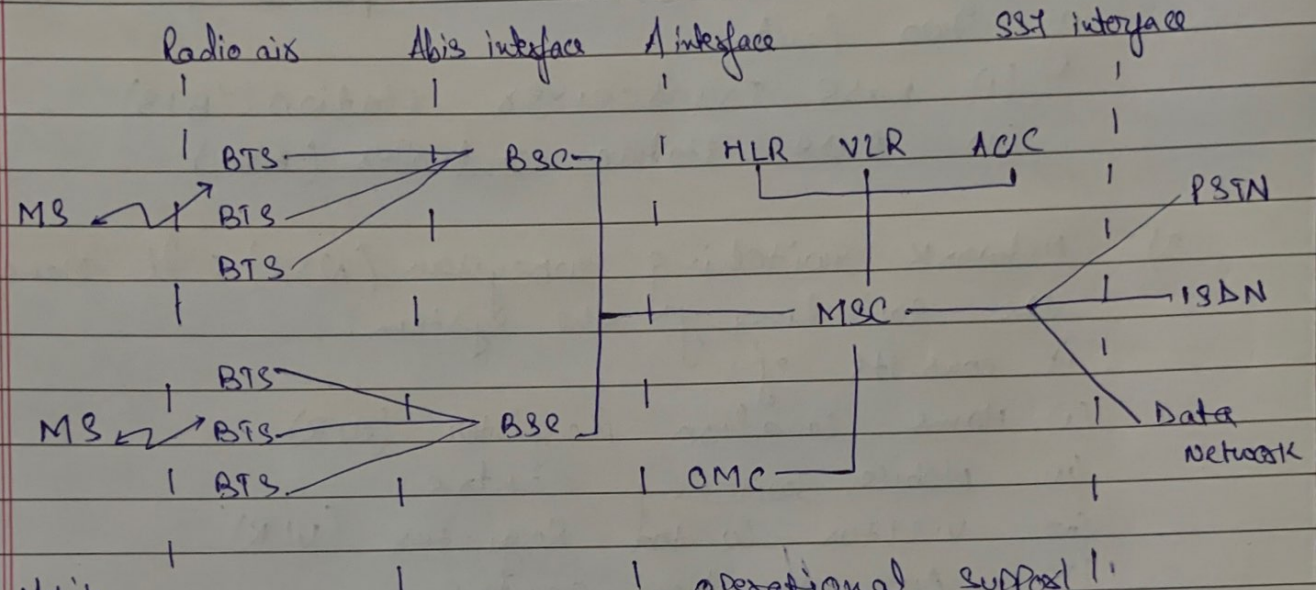
Paper : ~~CSEN4262~~ CSEN4246



GSM Architecture.

The GSM architecture consists of three major interconnected sub system that interact with themselves and with users through certain network interface.
The subsystem are
BSS (Base station subsystem)
NSS (Network switching subsystem)
OSS (operational support sub system)
MS (Mobile Station)

1) Mobile Station (MS) : it is made up of 2 element
   (i) Mobile equipment
   (ii) Subscriber identity module (sim)

2) Base station subsystem (BSS) : Provides and manages radio transmission paths. It consists of two part.
   (i) Base Transceiver station (BTS)
   (ii) Base station controller (BSC)

3) Network switching subsystem (NSS) : It manages the switching of the system.
   it consists of
   (i) Home location Register (HLR)
   (ii) Mobile switching centre
   (iii) visitor located Register (VLR)
   (iv) Authentication centre
   (v) Equipment identity Registery (EIR)

4) Operational support subsystem (OSS) : It support the operation & maintainnence of GSM.

(3) A location area is a set of base stations that are grouped together to optimize Signaling. each location area has a unique location area identity numbers.
the mobile station also performes location upating in order to indicate its current location when it moves to new location area of a different public land mobile network, this location update message is sent to the new MSC/VLR which gives the location information to the subscribes HLR. If the mobile station is authorised in new MSC/VLR, the subscribes & HLR cancels the registration of the mobile station with the old MSC/VLR.

(4) IMSI attached Procedure are:

(1) the MS will send the channel request message to the BSS

(2) the BSS respond on the AGCH

(3) the MS Immediately switches to the assigned SDCCH

(4) the BSS will acknowledge the message.

(5) the BSS forward the location update request to the MSC/VLR

(6) The MSC/VLR forward the IMSI to the HLR

(7) The HLR will forward the IMSI to the authentication centre.

(8) The AuC generate the triplets & sends them.

(9) The HLR validates the IMSI by ensuring it is allowed on the network

(10) The MSC/VLR stores the SRES & the Kc & forwards the RAND to the BSS

(11) The BSS sends the MS an authentication request message.

(12) The MS uses the RAND to calculate the SRES.

(13) The MSC/VLR compares SRES generated by AuC with the SRES by the MS.

(14) The MSC/VLR forwards the Kc for the MS to BSS.

(15) The MS immediately switches the cipher mode using the A5 encryption algorithm.

(1) Paging is the one to one communication between the mobile & the base station Paging is a procedure the network uses to find out a subscriber's location before actual call is established. Paging is used to alert the mobile station of an incoming call. Paging is initiated by the NSS.

(2) frequency reuse is the scheme in which allocation and reuse of channels throughout a coverage region is done. Each cellular base station is allocated a group of radio channels of frequency sub-bands to be used within a small geographical area known as cell. The shape of the cell is Hexagonal. The process of selecting and allocating the frequency sub bands for all the cellular base station within a system is called frequency reuse.

$$S = KN$$

$$\text{frequency Reuse factor} = 1/N$$

S = Total no of duplex channels available to use.
K = channels allocated to each cell ($K < S$)
N = total no of cells or cluster size.