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LY IT-1

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* ASSIGNMENT-1 *

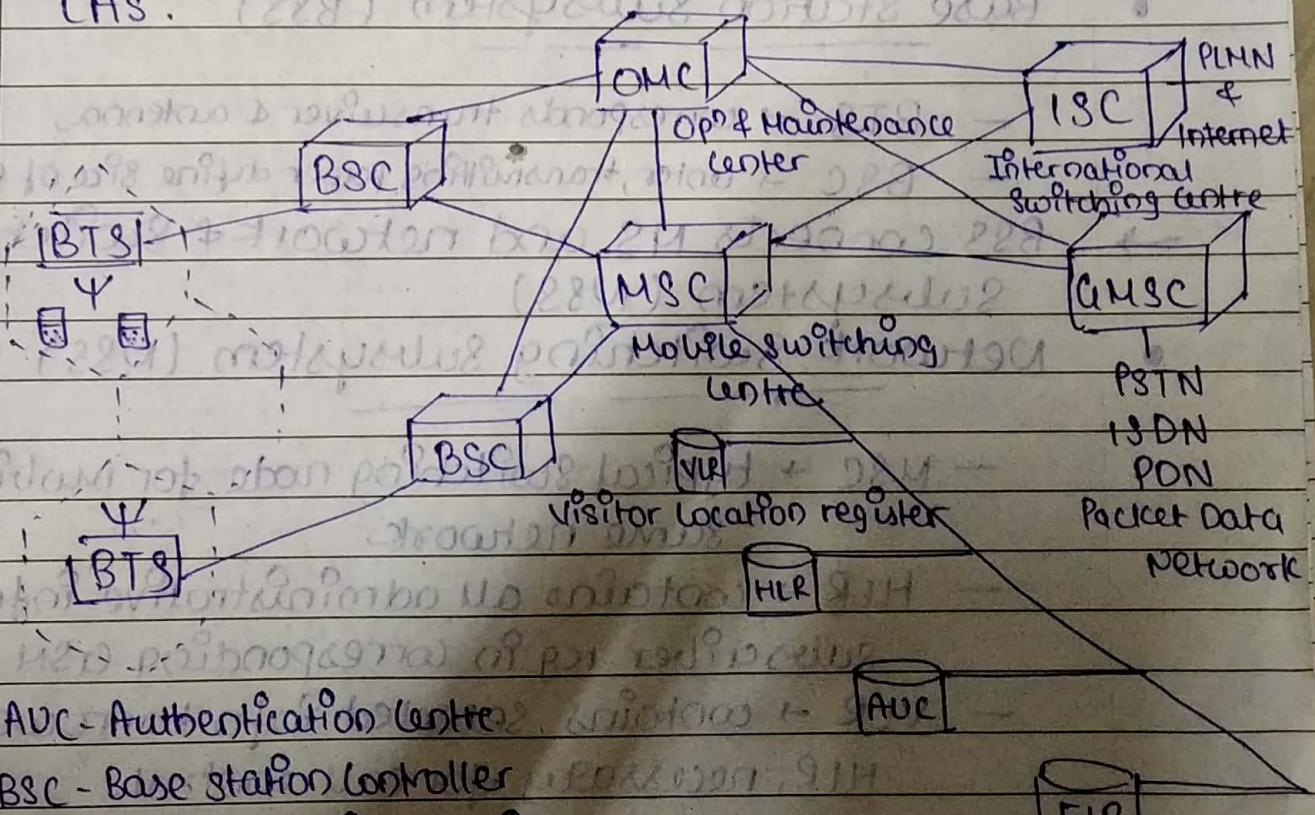
1. Explain GSM architecture & role of its component

→ In system, it consists at minimum one administrative region assigned to one MSC.

→ Administrative region is commonly known as PLMN (Public land Mobile Network).

→ Each administrative region is subdivided into one or many location area (LA)

→ For each LA, there will be at least one BSC while cells in one BSC can belong to diff^{n} LAs.



AUC - Authentication Centre

BSC - Base station Controller

BTS - Base transceiver station

EIR - Equip. Identity Register

GMSC - Gateway MSC

HLR - Home Loc. register

PSTN - Public Switched telephone network

ISDN - Integrated System Digital Network

Vinayak, S.V.I.T.

→ Cells are formed by radio area covered by BTS. Several BTS are controlled by 1 BSC

→ Traffic from MS is routed through MSC. Calls originating from or terminated in fixed network or other mobile networks is handled by GMSC

⇒ GSM network can be divided into:-

• Mobile Station (MS)

– Mobile equipment (ME)
– Subscriber Identity Module (SIM)

→ Terminals distinguished by their power & app.

• Base Station Subsystem (BSS)

– BTS → corresponds transceiver & antennas
– BSC → center, transmitting power define size of cell.

→ BSS connects MS and network & Switching Subsystem (NSS)

• Network Switching Subsystem (NSS)

– MSC → typical switching node for mobiles of same network
– HLR → contains all administrative info of each subscriber reg in corresponding GSM network
– VLR → contains selected info borrowed from HLR, necessary for call control
– AUC
– EIR

- Operation & Support Subsystem (OSS)

→ Controls & monitors GSM system.
→ OSS is connected to diff components of NSS, to BSC & also in charge of controlling the traffic load of BSS.

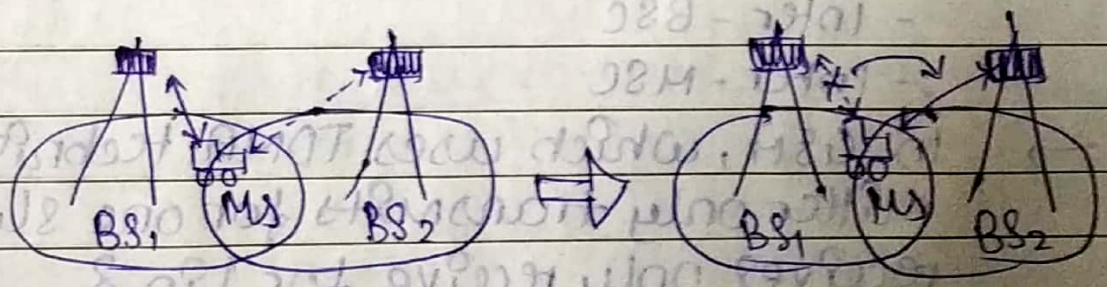
2. What is handoff and Roaming?

→ Handoff is critical process and if performed incorrectly handover can result in loss of call.
→ Dropped calls are particularly annoying to users and if no. of dropped calls rises, customer dissatisfaction inc & they are likely to change to another network.
⇒ Types of GSM handover:
- Intra-BTS
- Inter-BTS Intra BSC
- Inter-BSC
- Inter-MSC

→ In GSM, which uses TDMA techniques the transmitter only transmits for one slot in 8, similar receiver only receive for 1 in 8.
→ As a result the RF section of mobile could be idle for 6 slots out of total 8.
→ In addition to this, when mobile comm with particular BTS, one of responses it makes is to send out a list of radio channels of beacon

(BCCH)
freq of neighboring BTSs via Broadcast channel.
→ Mobile scans these & reports back quality of link to BTS.
→ The network knows quality of link betn mobile and BTS as well as strength of local BTSs as reported back by mobile.
→ If network decides that it is necessary for mobile to hand over. It informs BTS & mobile of the change.
→ A key ele? of GSM handover is timing & sync.

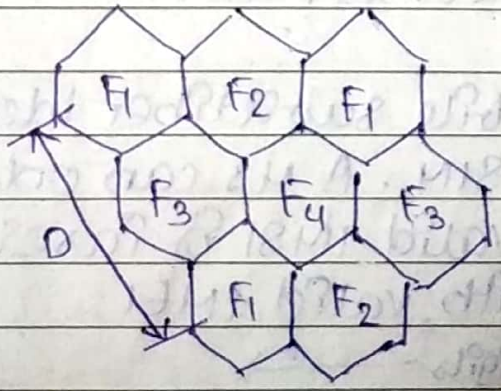
• Roaming.
→ In wireless telecomm?, roaming is general term that refers to extending of connectivity service in loc? that is diff? from home loc? where services was registered.
→ Roaming ensures that wireless devices keeps connected to network, without losing connection.



Before handoff After handoff.

3. What is frequency reuse? Explain with diagram

→ To serve 100 of thousands of users, freq must be reused and this is done through cells
→ The area to be covered and subdivided into radio zones or cells.
→ BS is at center of the cell.
→ When moving from 1 cell to another during an ongoing conv^n, auto channel change occurs.
→ The phenomenon is called handover.
→ The regular repetition of freq in cell results in clustering of cell. The cluster generated in this way can consume whole freq band.



K=4.

→ To avoid any co-channel interference two neighbouring cells never use same frequency.
→ Only at distance D (freq reuse dist), same freq from set can be reused.
→ Size of cluster (K), is no. of cell in cluster.

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4. Explain different GSM identifiers.

→ • International Mobile Station Equipment Identity.

→ IMEI uniquely identifies MS internationally. It is kind of serial number.

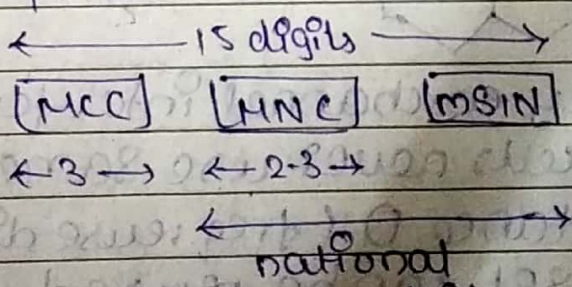
→ IMEI is allocated by equip manufacturer & registered by network operator, who stores it in the EIR.

→ Parts of an IMEI:

- Type approval code (TAC): 6 decimal, centrally assigned
- Finally assembly code (FAC): 6 decimal, manufacturer.
- Serial number (SNR): 6 decimal, manuf' assigned.
- Spare (SP): 1 decimal place.

• International Mobile subscriber Identity (IMSI)

→ It is stored in SIM. A MS can only be operated if a SIM with valid IMSI is inserted into equipment with valid IMEI.



• Mobile Subscriber ISDN Number (MSISDN)

→ The real telephone number of MS is MSISDN.

→ It is assigned, such that MS set can have

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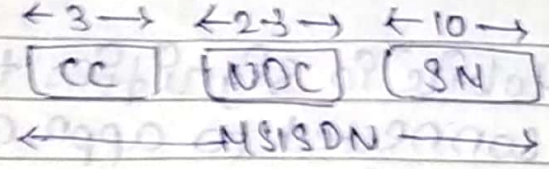
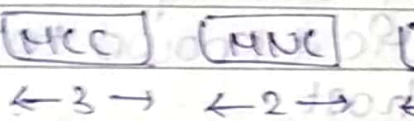
Several MSISDNs depending on SIM.



CC - Country code
NDC - National dest° code
SN - Subscriber number.

- Location area identity (LAI)

→ Each LA in PLMN has own identifier LAI which is structured hoierchically & unique.



LAC - Location area code

- Mobile station roaming number (MSRN)

→ When subscriber is roaming in another networks a temp ISDN no. assigned to used called MSRN.

- Temporary Mobile Subscriber Identity (TMSI)

→ It is temp assigned to by VLR used in place of IMSI for identification & addr of Mobile station.

- Local Mobile Subscriber Identity (LMSI)

→ assigned by VLR & stored in HLR & used as a searching key for faster db assess.

- Cell Identifier (CI)

→ Within an LA, every cell has unique cell identifier together with an LAI, cell can be uniquely identified through Globally cell identity (LAI & CI)

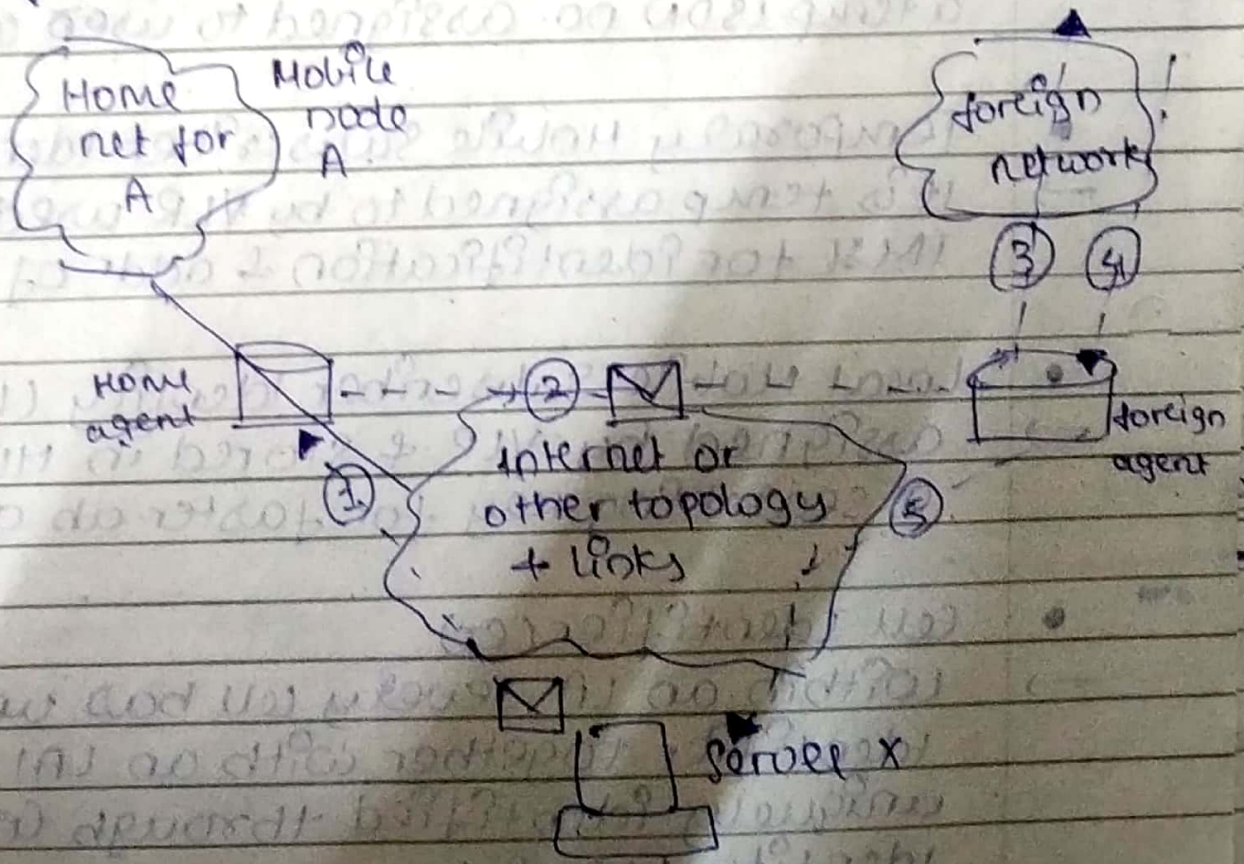
5. Explain operation of Mobile IP.

→ The term "Mobile" in signifies that, while a user is connected to appn across internet and the user's point of attachments changes dynamically, all connections are maintained despite change in underlying network property.

→ Mobile IP allows mobile node to use 2 IP add called home add & care of add.

→ Home add is static & known to everybody as identity of host.

→ The care of address changes at each new point of attachment & can be thought of as Mobile node's loc? specific address.



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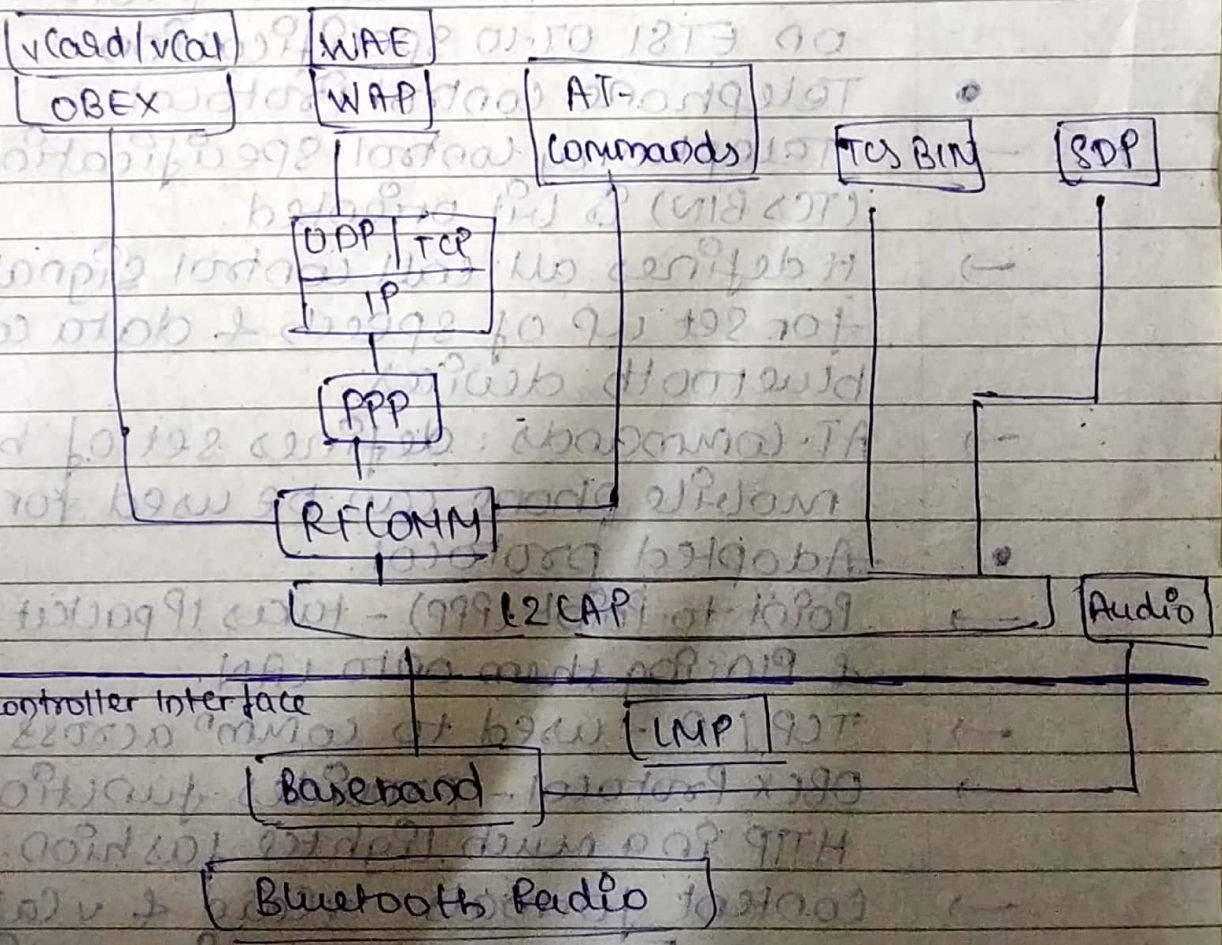
⇒ Operations

- Discovery - A mobile node uses discovery procedure to identify prospective home agents & foreign agents.
- Registration - A mobile uses this to inform home agent of its care of address.
- Tunneling - It is used to forward IP datagram from home to care of address.

6. Draw & Explain Bluetooth Protocol Architecture.

→



→ Bluetooth protocol stack can be thought of as a comb° of multiple app° specific stacks.

→ It uses connectionless (ACL) and connection oriented (SCO) links.

• Bluetooth core Protocols:

→ Comprises of baseband, Link Manage Protocol, L2CAP & Service discovery Protocol.

→ Baseband allows physical RF link betn bluetooth units forming a piconet.

• Cable Replacement Protocol:

→ This protocol has only one member is Radio freq communication (RFCOMM)

→ It is serial line comm protocol & is based on ETSI 07.10 specification.

• Telephone control Protocol.

→ Telephony control specification Binary (TCS BIN) is bit oriented.

→ It defines all call control signalling protocol for set up of speech & data calls betn bluetooth devices.

→ AT-commands: defines set of by which mobile phone can be used for fax.

• Adopted protocol.

→ Point-to-Point (PPP) - takes IP packet to PPP layer & placing them onto LAN.

→ TCP/IP - used to comm across Internet

→ OBEX Protocol - provides functionality of HTTP in a much lighter fashion.

→ Content formats - vCard & vCal defines format of an electronic bussiness card & personal cal entries developed by versit consortium.