100 Wireless Final

1. (a) What is channel allocation? (4%) (b) Describe how three basic channel allocation schemes work. (name 2%, operation 2%) (total 16%)

2. Which cellular system (UMTS, AMPS, GSM, CDMA2000) belongs to 1G, 2G and 3G respectively? (2*4=8%)

3. Draw a figure to show 10 components of GSM Infrastructure. (2*10= 20%)

4. Describe the differences among IMSI, TMSI and IMSEI. (8%)

5. Draw a figure to show 7 components (not in GSM) of UMTS-Network Reference Architecture. (2*7= 14%)

6. (a) Compare hard handoff to soft handoff. (2*2=4%) (b) Which type(s) of multiple access schemes follow each kind of handoff? (6%) (10% total)

7. Explain (a) registration process (8%) and (b) packet forwarding process (6%) of Mobile IP (14% total)

8. Compare DSR to AODV for routing in ad hoc network. (12%)

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1. (a) What is channel allocation? (4%) (b) Describe how three basic channel allocation schemes work. (name 2%, operation 2%) (total 16%)

Ans: (a) A given radio spectrum is to be divided into a set of disjointed channels that can be used simultaneously (2%) while minimizing interference in adjacent channel by allocating channels appropriately (2%)

(b) Fixed Channel Allocation (FCA): a set of channels is permanently allocated to each cell. (name 2%, operation 2%)

Dynamic Channel Allocation (DCA): all channels are kept in a central pool and are assigned dynamically to new calls as they arrive in the system. After each call is completed, the channel is returned to the central pool.

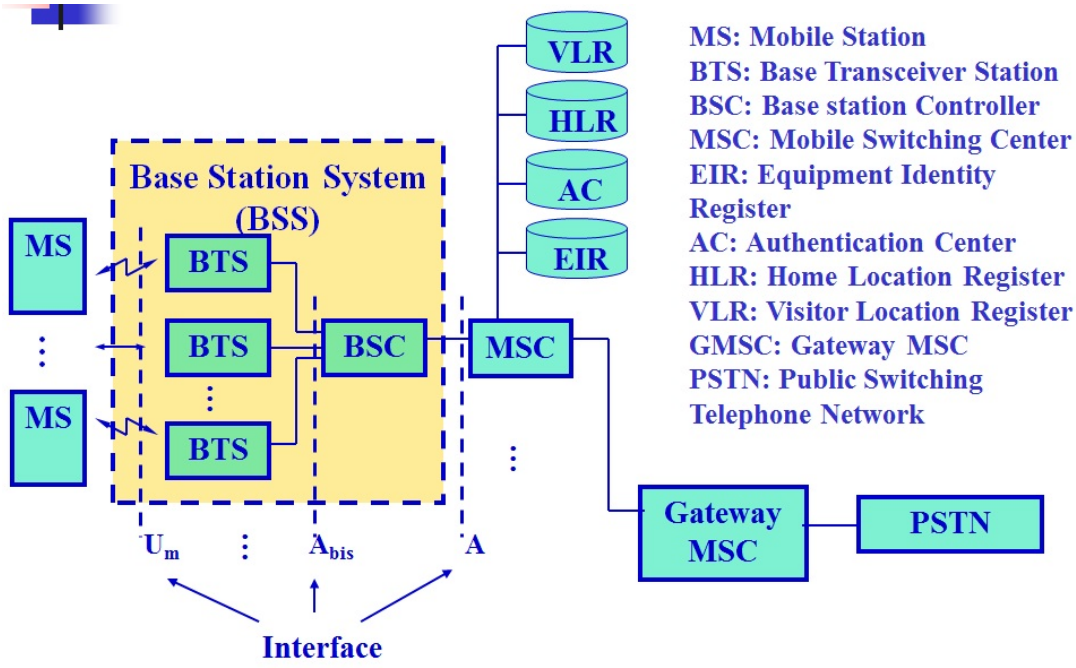
Hybrid Channel Allocation (HCA): the combination of both FCA and DCA techniques. The total number of channels available for service is divided into fixed and dynamic sets.

2. Which cellular system (UMTS, AMPS, GSM, CDMA2000) belongs to 1G, 2G and 3G respectively? (2*4=8%)

Ans: 1G: AMPS; 2G: GSM; 3G: UMTS, CDMA2000 (2% each)

3. Draw a figure to show 10 components of GSM Infrastructure. (2*10= 20%)

Ans:



4. Describe the differences among IMSI, TMSI and IMSEI. (8%)

Ans:

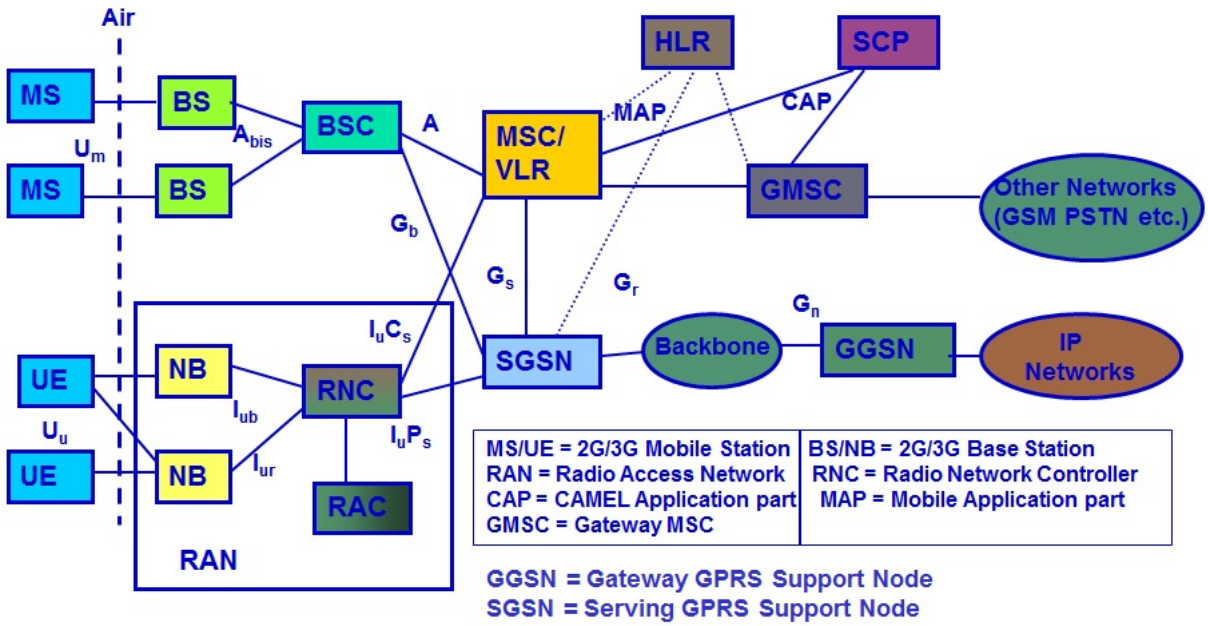
International Mobile Subscriber Identity (IMSI): identify the country (1%) in which the mobile system resides, the mobile network, (1%) and the mobile subscriber (1%)

Temporary Mobile Subscriber Identity (TMSI): This value is sent over the air interface (1%) in place of the IMSI (1%) for purposes of security (1%)

International MS Equipment Identity (IMSEI): IMSEI is assigned to each GSM unit (1%) at the factory (1%)

5. Draw a figure to show 7 components (not in GSM) of UMTS-Network Reference Architecture. (2*7= 14%)

Ans:



UE, NB, RNC, SGSN, GGSN, Backbone, IP Networks (2% each)

6. (a) Compare hard handoff to soft handoff. (2*2=4%) (b) Which type(s) of multiple access schemes follow each kind of handoff? (6%) (10% total)

Ans:

(a) Hard Handoff (*break before make*)

- Releasing current resources from the prior BS before acquiring resources from the next BS (2%)

Soft Handoff (*make before break*)

- It is possible for the MS to communicate simultaneously with the prior BS as well as the new BS (2%)

(b) Hard Handoff => FDMA,TDMA (2% each)

Soft Handoff => CDMA (2%)

7. Explain (a) registration process (8%) and (b) packet forwarding process (6%) of ***Mobile IP*** (14% total)

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Ans:

(a)

- Whenever a MS moves to a new network, the MS detects the FA of the new network, by sensing the periodic beacon signals which FA transmits (2%)
- MS can also itself send *agent solicitation messages* to which FA responds (2%)
- When FA detects a new MS, it allocates a CoA (care of address) to the MS, using dynamic host configuration protocol (DHCP) (2%)
- Once MS receives CoA, it registers its CoA with its HA and the time limit binding for its validity (2%)

(b)

- A message sent from an arbitrary source to the MS at the home address is received by the HA (2%)
- Binding is checked, the CoA of the MS is encapsulated in the packet and forwarded to the network (2%)
- If CoA of the FA is used, then packet reaches FA, it decapsulates packet and passes to MS at the link layer (2%)

8. Compare DSR to AODV for routing in ad hoc network. (12%)

Ans:

DSR

- By using DSR algorithm to create a route, source node at first checks its route cache to determine whether it already has a route to the destination, if it has, it will use this route. (2%)
- If it does not have such a route, it initiates route discovery by broadcasting a route request packet. This route request contains the destination address. (2%)
- A reply is generated when the route request reaches either destination, or an intermediate node whose route cache contains an unexpired route to the destination. (2%)

AODV

- For AODV, source node broadcasts a route request packet (RREQ) to its neighbors, which then forwards the request to their neighbors, and so on, until either destination or a node with “fresh enough” route to destination is located. (2%)
- During the process of forwarding the RREQ, nodes record in their route tables the address of the neighbor from which the first copy of the broadcast packet is received, thereby establishing a reverse path. (2%)
- The main difference between the DSR and AODV is that DSR uses source routing and AODV uses forwarding tables at each node. (2%)