100-2 Wireless Final

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

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

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

4. (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)

5. Describe AODV routing in ad hoc network. (8%)

6. List and compare two modes of WLAN. (10% total)

7. What are the frequency band and highest data rate supported by (a) 802.11a (2%) (b) 802.11b (2%) (c) 802.11g (2%) (d) Bluetooth (2%, 8% total)?

8. What is Bluetooth piconet? (2%) Which devices are contained there and how they work? (4%) What is scatternet? (2%, 10% total)

9. What are two types of the existing ad hoc routing protocols? Explain them. (8%)

10. List two advantages and limitations of the sensor network. (8%)

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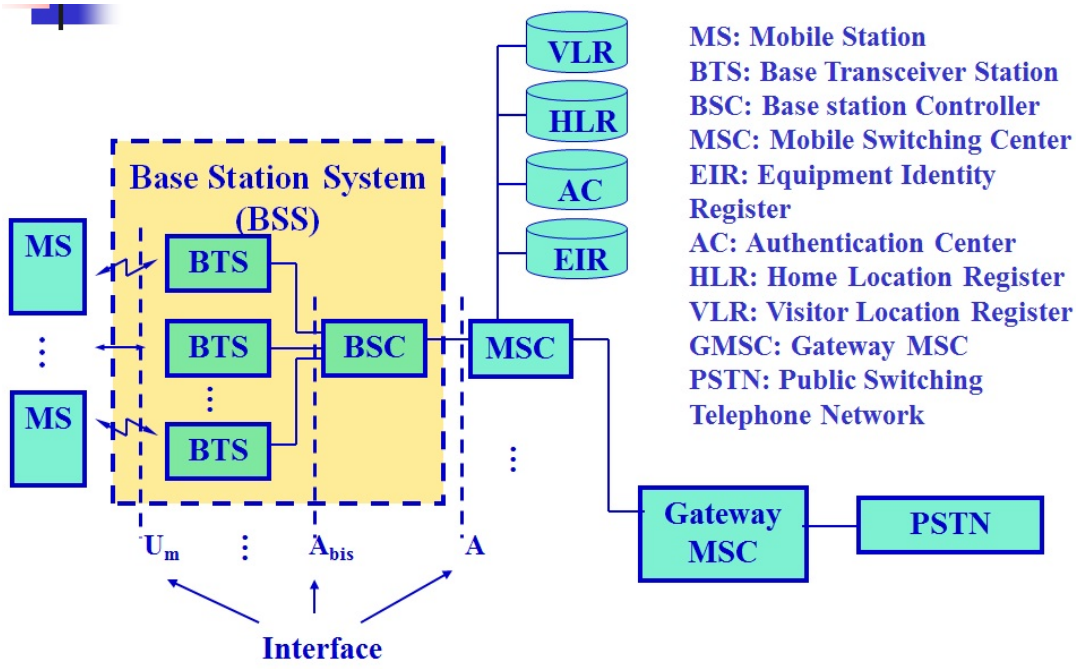
1. Which cellular system (UMTS, AMPS, GSM, CDMA2000) belongs to 1G, 2G and 3G respectively? (2*4=8%)

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

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

Ans:



3. 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%)

4. (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

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the new BS (2%)

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

5. Describe AODV routing in ad hoc network. (8%)

Ans:

- For AODV, source node broadcasts a route request packet (RREQ) to its neighbors (2%), 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%)
- AODV uses forwarding tables at each node. (2%)

6. List and Compare two modes of WLAN. (10% total)

a. Infrastructure WLAN: (2%)
   - Forms a stationary infrastructure consisting of one or more cells with a control module for each cell (2%)
   - Within a cell, there may be a number of stationary end systems
   - Nomadic stations can move from one cell to another

b. Ad Hoc Networking (2%)
   - Temporary peer-to-peer network set up to meet immediate need; (2%)
   - A peer collection of stations with range of each other may dynamically configure themselves into a temporary network (2%)
   - No infrastructure for an ad hoc network

7. (a) 802.11a (2%)
   in the 5-GHz band (1%)
   at data rate up to 54 Mbps (1%)
   (b) 802.11b (2%)
   in the 2.4-GHz band
   at data rate 5.5 and 11 Mbps
   (c) 802.11g (2%)
   in the 2.4-GHz band
   at data rate up to 54 Mbps
   (d) Bluetooth (2%)
   in the 2.4-GHz band
   at data rate up to 720Kbps

8. (10%)
   - piconet: the basic networking unit (2%)

- one master + 1~7 active slaves (4%)
- Master:
  - determining channel and timing (2%)
- scatternet: a device in one piconet may also exist as part of another piconet as either a master or slave in each piconet (2%)

9. What are two types of the existing ad hoc routing protocols? Explain them. (8%)

Ans:

- Proactive: when a packet needs to be forwarded, the route is already known
- Reactive: Determine a route only when there is data to send

10. List two advantages and limitations of the sensor network. (8%)

Advantages:

- Ease of deployment
- Extended range
- Fault tolerance
- Mobility (some)

Limitations:

- Low-bandwidth
- Error-prone transmissions
- Need for collision-free channel access
- Limited amount of energy available
- Derive energy from personal batteries
- Usually sensors placed where it is difficult to replace their batteries