無線通訊網路小考 100/10/19 學號：.....姓名：.....

1. Which cellular system in the following belongs to the first, the second and the third generation cellular system? (3% each, 12% total)
   IMT-2000, IS-95, AMPS, GSM.
2. (a) List four key features of IMT-2000. (3% each, 12% total) (b) List three bearer rates of IMT-2000 for different environment. (4% each, 12% total)
3. List the following cells in ascending order of the cell range.
   Global, Picocell, Macrocell, Microcell. (12%)
4. List three kinds of wave propagation. (9%)
5. Explain causes of three types of Propagation Mechanisms. (name 2%, cause 3% for each type, 15% total)
6. Explain (a) path loss; (b) slow fading; (c) fast fading; (d) Frequency Reuse; (e) Reuse Distance; (f) Reuse Pattern; (g) the relative signal strength with hysteresis handoff strategy. (4% each, 28% total)

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1. Which cellular system in the following belongs to the first, the second and the third generation cellular system? (3% each, 12% total)
   IMT-2000, IS-95, AMPS, GSM.

Ans: 1G: AMPS;
2G: IS-95, GSM;
3G: IMT-2000

2. (a) List four key features of IMT-2000. (3% each, 12% total) (b) List three bearer rates of IMT-2000 for different environment. (4% each, 12% total)

Ans:
(a) Key Features of IMT-2000 include:
- High degree of commonality of design worldwide;
- Compatibility of services within IMT-2000 and with the fixed networks;
- High quality;
- Small terminal for worldwide use;
- Worldwide roaming capability;
- Capability for multimedia applications, and a wide range of services and terminals.

(b)
- 2 Mbps for fixed environment;
- 384 Kbps for indoor/outdoor and pedestrian environment;
- 144 kbps for vehicular environment.

3. List the following cells in ascending order of the cell range.
   Global, Picocell, Macrocell, Microcell. (12%)

Ans: Picocell, Microcell, Macrocell, Global.

4. List three kinds of wave propagation. (9%)
   Ans: Ground, Sky and Space waves

5. Explain causes of three types of Propagation Mechanisms. (name 2%, cause 3% for each type, 15% total)
   Ans:
   - Reflection: Propagation wave impinges on an object which is large as compared to wavelength
   - Diffraction: Radio path between transmitter and receiver obstructed by surface with sharp irregular edges
   - Scattering: Objects smaller than the wavelength of the propagation wave

6. Explain (a) path loss; (b) slow fading; (c) fast fading; (d) Frequency Reuse; (e) Reuse Distance; (f) Reuse Pattern; (g) the relative signal strength with hysteresis handoff strategy. (4% each, 28% total)

Ans:

(a) Path Loss: The signal strength decays exponentially with distance *d* between transmitter and receiver; $L_P = \frac{P_t}{P_r}$,

(b) Slow fading is caused by movement over distances large enough to produce gross variations in the overall path between transmitter and receiver.

(c) Fast fading is due to scattering of the signal by object near transmitter.

(d) The same frequency band or channel used in a cell can be “reused” in another cell as long as the cells are far apart and the signal strengths do not interfere with each other.

(e) the distance between the two cells using the same channel

(f) the cluster size or the number of cells per cluster

(g) Handoff occurs only if the new BS is sufficiently stronger (by a margin H) than the current one.