

G 6151

M.E. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Communication Systems

CO 1651 – MOBILE COMMUNICATION NETWORKS

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the main reasons for using cellular systems?
2. If 40 MHz of total spectrum is allocated for a duplex wireless cellular system and each simplex channel has 25 kHz RF bandwidth. Find the number of duplex channels and the total number of channels per cell site. If $N = 3$, cell reuse is used.
3. Assume a receiver is located 10 km from a 50 W transmitter. The carrier frequency is 6 GHz and free space propagation is assumed $G_t = 1$ and $G_r = 1$. Find the power at the receiver.
4. How can higher data rates be achieved in standard GSM, how is this possible with the additional schemes GPRS and EDGE?
5. What is MSC? And what are its key functions?
6. What are the main services offered by the signalling system - 7?
7. What are the advantages and dis-advantages of wireless local area networks?
8. Compare IEEE 802.11, HIPER LAN with regard to their ad-hoc capabilities.
9. What are the functions of authentication and encryption in GSM?
10. Define routing energy efficiency.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the evolution of the first, second and third generation wireless networks. (8)
- (ii) Draw the block diagram of the basic cellular system and explain the function of base station, mobile station and Mobile Telephone Switching Office. (8)

Or

- (b) (i) In a US AMPS cellular operator is allocated 12.5 MHz for each simplex, band and if B_t is 12.5 MHz, B_{guard} is 10 kHz and B_c is 30 kHz, find the number of channels available in an FDMA system. (2)
- (ii) Compare the number of channels, efficiency and performance of the FDMA, TDMA and CDMA techniques. (14)
12. (a) (i) Explain the small scale propagation model and large scale propagation model in radio wave propagation and list the three basic propagation mechanisms. (4 + 2 = 6)
- (ii) What are the basic types of error correction and detection codes? And explain each type briefly. (2 + 8 = 10)

Or

- (b) (i) Differentiate between hard hand-off and soft-hand-off. (3)
- (ii) What is the advantage of controlling the transmitting power of the mobile station by base station? And explain the forward link and reverse link concept in mobile communication. (2 + 4 = 6)
- (iii) Explain the common air protocols in AMPS, IS - 95 and GSM. (7)
13. (a) (i) Draw the functional architecture of a GSM system and explain the function of each unit. (12)
- (ii) What is MAP? Explain. (4)

Or

- (b) (i) Explain the functions of Call and Network-Management Procedures. (8)
- (ii) What are the key roles of signalling interfaces and network entities relation? Explain. (8)
14. (a) (i) What are the basic differences between wireless WANs and wired WANs and what are the common features? (6)
- (ii) Why is the PHY layer in IEEE 802.11 subdivided? And explain its protocol architecture and management. (2 + 8 = 10)

Or

- (b) (i) Draw the protocol architecture of Hyper-LAN system and explain. (10)
- (ii) What are the advantages and problems of forwarding mechanisms in adhoc networks regarding security, power saving and network stability? (6)
15. (a) (i) Explain the various security services in wireless networks. (6)
- (ii) What is encryption and authentication? And explain the security in group communication. (3 + 7 = 10)

Or

- (b) Explain the following :
- (i) Trust Establishment and Management (6)
- (ii) Energy - aware security mechanisms and (5)
- (iii) Security on data fusion. (5)
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