

CS 898T Mobile and Wireless Networks Mid-term Exam - Name: _____
Spring 2004

Part 1: (34 points - 2 points for each problem)

- (D) 1. Which frequency allocation is not used for mobile phone systems?
(A) 890 MHz - 960 MHz (B) 1800 MHz - 2200 MHz
(C) 1420 MHz - 1520 MHz (D) 2400 MHz - 2500 MHz
- (C) 2. The frequency of 15 cm wavelength is
(A) 20 MHz (B) 200 MHz (C) 2 GHz (D) 20 GHz
- (B) 3. TETRA is a standard for
(A) cordless phone (B) trunked radio (C) mobile phone (D) LAN
- (B) 4. The antenna size for a W-CDMA device which uses the 2 GHz frequency band is
(A) 2 cm (B) 4 cm (C) 6 cm (D) 10 cm
- (A) 5. Which wave does the short wave broadcast use?
(A) sky wave (B) ground wave (C) line-of-sight (D) none of the above
- (C) 6. Radio waves will be deflected randomly when it collides an obstacle of the order of the wavelength or less. This effect is
(A) refraction (B) reflection (C) scattering (D) diffraction
- (A) 7. Which is a not a phase shift keying scheme?
(A) MSK (B) QPSK (C) QAM (D) none of the above
- (B) 8. A medium can carry 5 Mbaud. Which scheme can achieve the 20 Mbps transfer rate?
(A) QPSK (B) QAM-16 (C) QAM-64 (D) QAM-128
- (D) 9. Which does not use MCM?
(A) IEEE 802.11g (B) digital television (C) ADSL (D) none of the above
- (B) 10. Which is not the disadvantage of cellular systems?
(A) infrastructure needed (B) local interference (C) frequency planning (D) none of the above
- (D) 11. Which statement about cellular systems using CDM is true?
(A) It needs elaborate channel allocation schemes. (B) It needs complex frequency planning.
(C) The cell size is fixed. (D) none of the above
- (D) 12. Which needs most complicated power control for senders?
(A) SDMA (B) TDMA (C) FDMA (D) CDMA
- (C) 13. Which scheme is a combination of CDMA and TDMA?
(A) DAMA (B) PRMA (C) SAMA (D) none of the above
- (A) 14. Which is not a reservation mechanism?
(A) RDMA (B) PRMA (C) DAMA (D) none of the above
- (D) 15. Which is not security components used in GSM?
(A) SIM (B) EIR (C) AuC (D) none of the above
- (B) 16. UMTS uses a constant chipping rate of 3.84 Mchps/s. A channel use the spreading factor 16. What is the transfer rate?
(A) 120 kbps (B) 240 kbps (C) 480 kbps (D) 960 kbps
- (A) 17. Which technology used in UMTS does W-CDMA belong to?
(A) IMT-DS (B) IMT-TC (C) IMT-MC (D) none of the above

Part 2: (68 points)

1. Briefly explain these terminologies. If they are acronyms, also write what they stand for. (12 points)

(a) DECT

(b) GTP

(c) UTMS

(d) OVSF

2. (a) What is FHSS? Name a telecommunication systems which use FHSS?

(b) What is DSSS? Name a telecommunication systems which use DSSS?

(6 points)

3. Complete the following table listing the seven layers in the OSI 7-Layer Reference Model. Then, identify three of the four layers used in the TCP/IP protocol suite. Finally, identify where the following protocols belong: MAC, GTP, RLC, PDCP, HTTP. (8 points)

Layer	Layer Name	TCP/IP suite	Protocol
7	Application Layer		
6			
5			
4			
3			
2			
1	Physical Layer		

4. (a) What is digital modulation? Why is digital modulation required?
(b) What is analog modulation?
(c) Why a baseband signal cannot be directly transmitted in a wireless system?
(9 points)

5. What is CDMA? What is a good code for CDMA? List three advantages of CDMA. (7 points)

6. Consider a sender A wants to send the data bit 0 with key = 010011. Consider a sender B wants to send the data bit 1 with key = 110101. Assume we code a binary 0 as -1, a binary 1 as +1. Both signals are transmitted at the same time. The noise to the transmitted signal is (-1, 0, +1, 0, -1, +1). What signal is received by a receiver? What can the receiver detect for sender A and B respectively?
(7 points)

7. (a) Describe the problems when CSMA/CD is applied to wireless networks.
(b) What method could solve the problems? Describe how it works.
(9 points)

8. Describe authentication and encryption of GSM. (8 points)