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Question Paper Code : 61213

M.E./M.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Elective

Computer Science and Engineering

CS 9251/CS 951 — MOBILE COMPUTING

(Common to M.E. Software Engineering, M.E. Network Engineering, M.E. Computer Networking and Engineering, M.E. Computer Networks and M.Tech. Information Technology)

(Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Summarize the fundamental propagation behaviors that radio waves can exhibit depending on their frequency.

2. Why is the international availability of the same ISM bands important?

3. Identify the problems that occur during transmitting data using wireless systems that were made for voice transmissions.

4. Why is a new infrastructure is needed for GPRS but not for HSCSD? Mention the purpose of these new components.

5. Draw a neat diagram of the IEEE 802.11 MAC packet structure.

6. Compare the power management in infrastructure based networks and ad-hoc networks.

7. How does dynamic source routing handle routing? What is the motivation behind dynamic source routing compared to other routing algorithms from fixed networks?

8. Show the steps required for a handover from one foreign agent to another foreign agent including layer 2 and layer 3.

9. Why has a scripting language been added to WML? How can this language help saving bandwidth and reducing delay?

10. What is the reaction of standard TCP in case of packet loss? In what situation does this reaction make sense and why is it quite often problematic in the case of wireless networks and mobility?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Analyze the basic schemes for digital modulation. (8)

(ii) Checkout the strategies of different network operators while migrating towards the 3G systems. Why a single common system not in sight? (8)

Or

(b) (i) What limits the number of simultaneous users in a TDM/FDM system compared to a CDM system? What happens to the transmission quality of connections if the load gets higher in a cell, i.e., how does an additional user influence the other users in the cell? (8)

(ii) Compare the SDMA, TDMA, FDMA and CDMA mechanisms with regard to their idea behind them, terminals, signal separation, advantages and disadvantages. Mention their usefulness. (8)

12. (a) Discuss the GSM system architecture in detail.

Or

(b) (i) Using the best delay class in GPRS and a data rate of 115.2 kbit/s – how many bytes are in transit before a first acknowledgement from the receiver could reach the sender (neglect further delays in the fixed network and receiver system)? Now think of typical web transfer with 10 kbyte average transmission size – how would a standard TCP behave on top of GPRS? Think of congestion avoidance and its relation to the round-trip time. What changes are needed? (8)

(ii) Summarize the main features of third generation mobile phone systems. How do they achieve higher capacities and higher data rates? How does UMTS implement asymmetrical communication and different data rates? (8)

13. (a) (i) Analyze the protocol stack of Bluetooth. (7)

(ii) How do IEEE 802.11, HiperLAN2 and Bluetooth respectively, solve the hidden terminal problem? Discuss. (9)

Or

(b) (i) Summarize your understanding on MAC management in IEEE 802.11. (8)

(ii) Analyze the architectural differences that Wireless networks exhibit. (8)

14. (a) (i) Explain how tunneling works in general and especially for mobile IP using IP-in-IP, minimal, and generic routing encapsulation, respectively. Discuss the advantages and disadvantages of these three methods. (8)

(ii) Why is routing in multi-hop ad-hoc networks complicated, what are the special challenges? Explain. (8)

Or

(b) (i) Summarize your understanding on IP micro-mobility support. (10)

(ii) Compare different ad-hoc routing protocols. (6)

15. (a) (i) Assume a fixed internet connection with a round trip time of 20 ms and an error rate of 10^{-10}. Calculate the upper bound on TCP's bandwidth for a maximum segment size of 1,000 byte. Now two different wireless access networks are added. A WLAN with 2 ms additional one-way delay and an error rate of 10^{-3}, and a GPRS network with an additional RTT of 2 s and an error rate of 10^{-7}. Redo the calculation ignoring the fixed network's error rate. Compare these results with the ones derived from the second formula (use RTO = 5 RTT). Why are some results not realistic? (8)

(ii) Explain the WTA logical architecture. (8)

Or

(b) (i) Summarize the mechanisms for improving the TCP's performance in wireless and mobile environments. (8)

(ii) Explain the WAP 2.0 protocol framework. (8)