UNIVERSITY OF DUBLIN

TRINITY COLLEGE

Faculty of Engineering, Mathematics & Science
School of Computer Science & Statistics

B.A.I. Engineering **Trinity Term 2014**
Junior Sophister Examination

Computer Networks (CS3D3)

12th May 2014 Sports Centre 14:00 – 16:00

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Instructions to Candidates:

- Answer TWO questions
- All questions carry equal marks
- Use diagrams where appropriate

Materials permitted for this examination:

- Non-programmable calculators are permitted for this examination

1.

a) Describe the functionality of the seven layers of the OSI reference model.

(14 marks)

b) A network on the Internet has a subnet mask of 255.255.224.0. What is the maximum number of hosts it can handle?

(6 marks)

c) Describe the functionality provided by the User Datagram Protocol (UDP) and the Transmission Control Protocol (TCP). Which one would you use for file sharing and why?

(12 marks)

d) Explain why is there a need for "handover" to take place in mobile networks. What are the types of handover that can occur in GSM networks? Explain the network entities involved in each case. (12 marks)

e) Make a comparison between Ethernet (802.3) and Wifi (802.11)

(6 marks)

[50 marks]

2.

a) Give two example computer applications for which connection-oriented service is appropriate. Now give two examples for which connectionless service is best.

(8 marks)

b) What is the baud rate of classic 10Mbps Ethernet? Sketch the NRZ-I e for the bit stream 0101000111.

(8 marks)

c) Suppose that instead of using 16 bits for the network part of a class B address originally, 20 bits had been used. How many class B networks would there have been?

(4 marks)

d) Compare the Go-Back-N protocol with the Selective Repeat protocol, with detailed diagrams for each.

(16 marks)

e) Describe the different types of modulation and multiplexing used, drawing diagrams for each.

(14 marks)

[50 marks]

3.

a) Explain in detail how the Parity and Cyclic Redundancy Check (CRC) techniques can detect errors giving examples of each.

(12 marks)

b) Describe the medium access control (MAC) employed in IEEE 802.3 Ethernet Networks. Explain the meaning of the term "slot-time" and show how it is derived. Why is there a need of a "Jam" sequence in the CMSA/CD MAC scheme?

(10 marks)

c) Describe the "slash notation" used in classless interdomain routing (CIDR). If one address in a block is 167.199.170.82/26, find the number of addresses in the network, the first address and the last address.

(12 marks)

d) What are the advantages of 4B5B encoding versus Manchester encoding?

(6 marks)

e) Explain how asynchronous and synchronous transmission work.

(10 marks)

[50 marks]