

UNIVERSITY OF BOLTON

SCHOOL OF CREATIVE TECHNOLOGIES

COMPUTER NETWORKS AND SECURITY

SEMESTER ONE EXAMINATIONS 2022/2023

NETWORK MANAGEMENT

MODULE NO: SEC6206

Date: Monday 9th January 2023 Time: 14:00 – 16:00

INSTRUCTIONS TO CANDIDATES:

There are **SIX** questions on this paper.

Answer **ANY FOUR** questions.

All questions carry equal marks.

You may use a calculator to aid you in answering appropriate questions.

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Question 1

1b) With the aid of a diagram evaluate the architecture of a typical flow monitoring solution used in data networks.

[12 marks]

1a) A key aspect of network management is monitoring the flow of traffic through devices. Define what a flow is and provide details on five of the seven unique keys.

[7 Marks]

1c) Contrast the differences between Netflow/IPFIX, SNMP and sFLOW

[6 marks]

Question 2

2a) Give a critical analysis of the various elements of an SNMP protocol stack. In particular include layers involved at both the ends and across the network. Your description of the end system should include the interaction of SMI, ASN.1 and BER. You may use diagrams to help with your discussion

[10 Marks]

2b) Explain in detail how you would remotely retrieve data from managed devices such as a Router and Switch using SNMP commands at the command line prompt. If you wanted to traverse a group of OID's what command would you use?

[10 Marks]

2c) The Management Information Base (MIB) is one of the fundamental elements of Network Management systems. Give an descriptive account of the MIB structure, it's role and details about interface and RMON areas.

[5 Marks]

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Question 3

- 3a) With regard to IP traffic flows: Explain in detail the process of fragmentation and why it is important. Provide the solution to a 3000 byte packet traversing the following network from a host in Network A through WAN B and onto Network C:



[15 marks]

- 3b) In a multi-vendor environment that contains various versions of SNMP and non-SNMP devices, show how these problems can be overcome and accommodated with an SNMP Management system.

[4 Marks]

- 3c) One of the driving forces behind NETCONF is the need for a programmatic cross-vendor interface to manipulate configuration state and data which are stored in a network wide configuration data base – often referred to as *Generate Everything*. Critically evaluate the difference between the *Generate Everything* approach and the *Network is a record* approach to configuration management

[6 marks]

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Question 4

4a) For the most part, network traffic across the Internet is *bursty* meaning that congestion is a natural element of networking. With the aid of diagrams or graphs critically contrast the differences between TCP Reno and TCP TAHOE
[9 Marks]

4b) Most of the TCP Algorithms are made up of several congestion control policies discuss why we need these policies and critically contrast at least two of the congestion policies using graphs, packet flow diagram to help support your discussion.

[16 Marks]

Question 5

5a) What is SNMP, MIB, Inform, trap and set request? Evaluate the Components and states ports are used in SNMP? Support your answer with examples.
[15 marks]

5b) A local business, Barm Buzz, has a mixed vendor network that consists of Cisco switches, VYOS routers, and several Linux servers which are managed by CLI only. Lately the organisations IT Support service have seen a increase in calls with a significant number of complaints relating to a slow response in retrieving client data – especially during the sales process. You must outline your approach to monitoring and measuring the performance of this network, including servers. Your methodology must be able to show whether the problem is related to the Network Entities or the servers.

[10 marks]

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Question 6

- 6a) Critically appraise what a Network Management System consists of. Include the various functions and features of the Telecommunications Management Network (TMN). Include also the impact of SNMP on the ITU standards. Give practical examples of management systems used at different levels of the management structure.

[10 Marks]

- 6b) Given the network topology below in figure 1 provide a discussion on what Bandwidth-delay-product means and provide a calculated example showing how many packets will D have transmitted before B starts receiving the first packet sent by D assuming that D is sending its data in 500byte packets?

Assume that data travels through the links at 2.4×10^8 m/s.

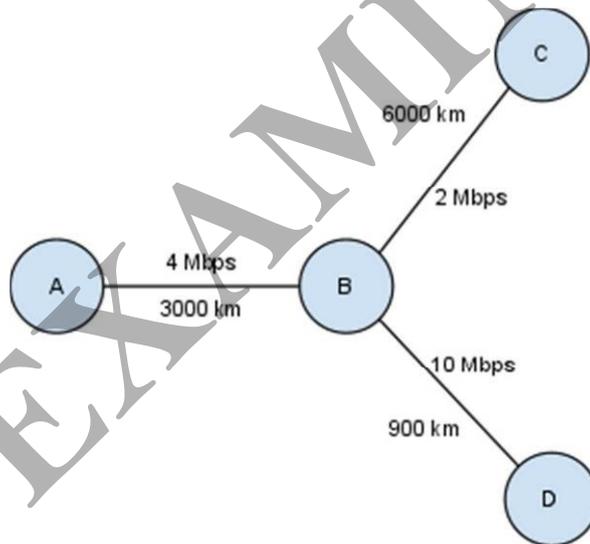


Figure 1 Network Topology. Assume that data travels through the links at 2.4×10^8 m/s

[15 Marks]**END OF QUESTIONS**