



Sri Lanka Institute of Information Technology

**B. Sc. Special Honours Degree
in Information Technology**

Final Examination
Year 2, Semester 2
November -2017

**EC244 - Data Communications & Computer
Networks II**

Duration: 3 Hours

Instructions to Candidates:

- ◆ This paper has 5 Questions.
- ◆ This paper contains 8 pages and the cover page.
- ◆ Total marks 100.
- ◆ Some useful commands are given at the end of the paper.

Question 1)

(20 marks)

```
Transmission Control Protocol, Src Port: https (443), Dst Port: 49766 (49766), Seq: 1363, Ack: 2868, Len: 0
Source port: https (443)
Destination port: 49766 (49766)
[Stream index: 43]
Sequence number: 1363 (relative sequence number)
Acknowledgement number: 2868 (relative ack number)
Header length: 20 bytes
Flags: 0x10 (ACK)
  000. .... = Reserved: Not set
  ...0 .... = Nonce: Not set
  .... 0... = Congestion window Reduced (CWR): Not set
  .... .0.. = ECN-Echo: Not set
  .... ..0. = Urgent: Not set
  .... ...1 = Acknowledgement: Set
  .... .... 0... = Push: Not set
  .... .... .0. = Reset: Not set
  .... .... ..0. = Syn: Not set
  .... .... ...0 = Fin: Not set
Window size: 10220
Checksum: 0x5977 [validation disabled]
  [Good Checksum: False]
  [Bad Checksum: False]
[SEQ/ACK analysis]
```

Figure 1. Wireshark output of a TCP header.

Answer the following questions by analyzing the TCP header in Figure 1.

1. Write down whether this segment was sent by a client or a server. (2 marks)
2. What is the application layer protocol used by the sender? (2 marks)
3. What is the last byte (byte no.) received by the sender of this segment? (2 marks)
4. What is the current capacity/size of the receive buffer of the sender of this segment? (2 marks)
5. What type of TCP segment is this? Answer by observing the values of the six Control fields? (2 mark)
6. How many option Bytes are available? (2 mark)
7. Briefly explain the usage of sequence numbers and explain how they are generated. (2 mark)
8. What is the maximum possible size of a TCP header? (2 marks)
9. Briefly describe the usage of Window Scaling Factor option value? (2 marks)
10. Using appropriate values of a TCP header, illustrate how urgent data transfers are facilitated by TCP. (2 marks)

Question 2)**(20 marks)**

1. Referencing to the following diagram, write down the states labeled as 1 to 10. (Use numbers 1 to 10 in your answer). (10 marks)

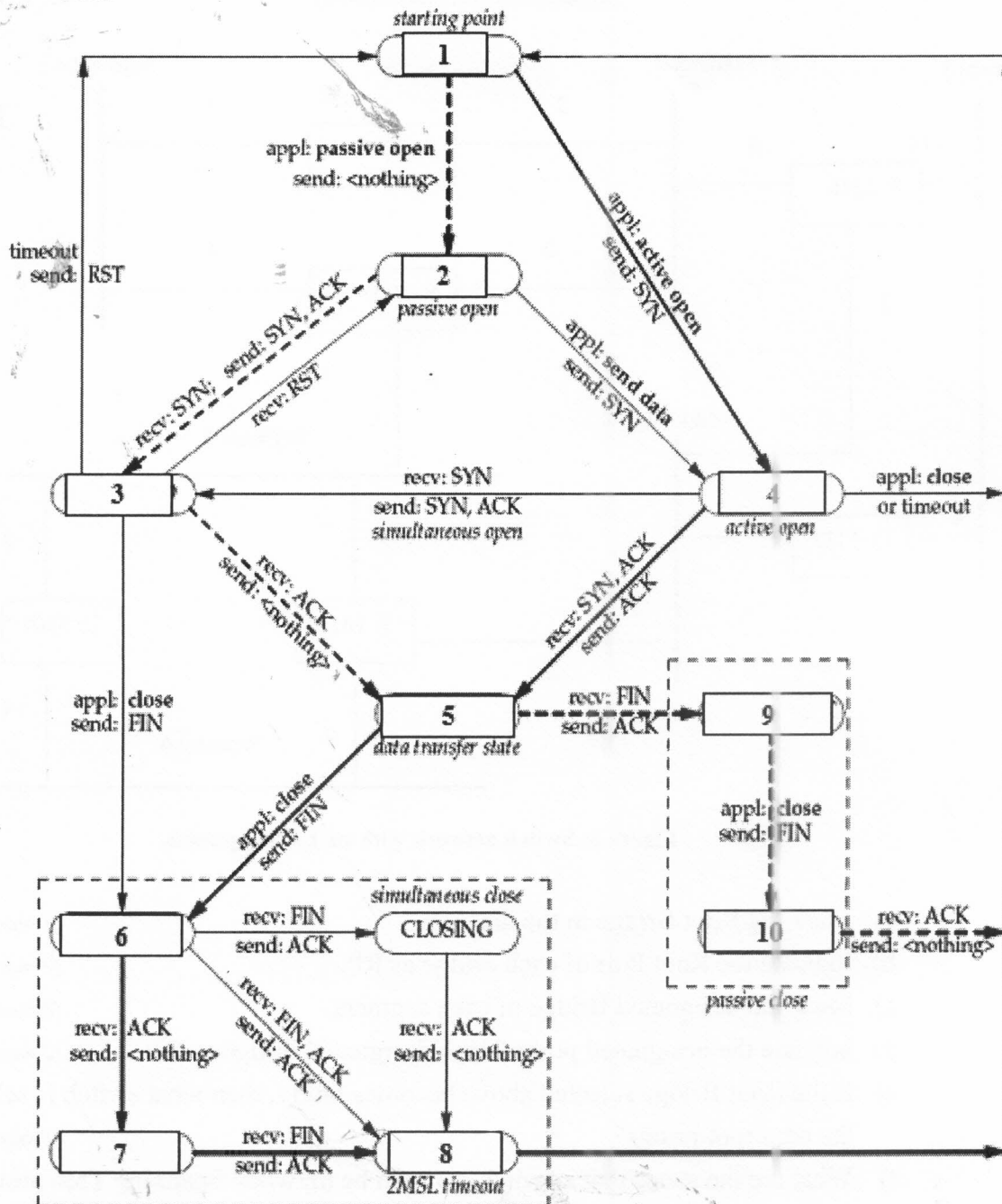


Figure 2: TCP state Transition Diagram.

2. The following diagram shows a switched network. Bridge IDs of each switch and path costs are given in the diagram. Draw this diagram in your answer booklet and answer the following questions.

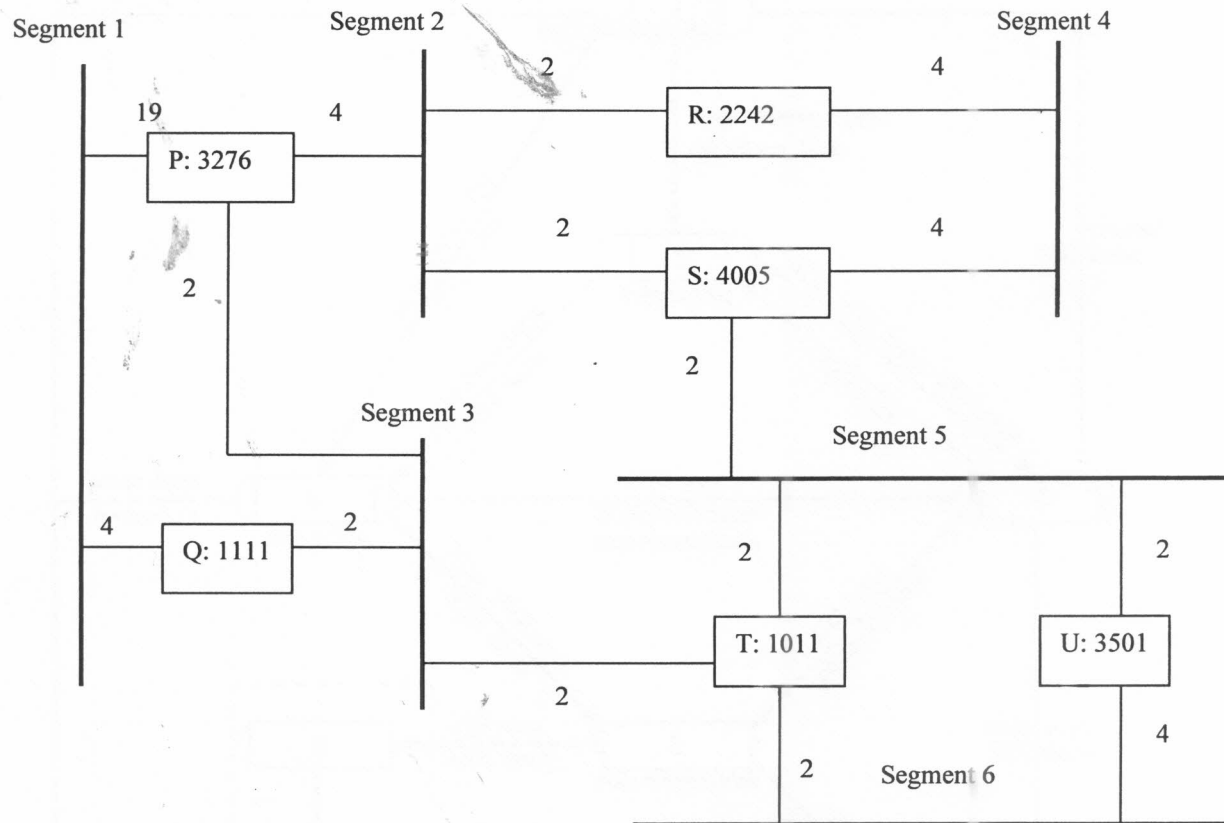


Figure 3: Switch network with six LAN segments.

- Mark the Root Bridge in the diagram. (1 mark)
- Indicate the Root Port of each bridge as RP. (2 marks)
- Mark the designated Bridge of each segment. (2 marks)
- Indicate the designated port of each designated bridge as DP. (2 marks)
- If the Root Bridge selected above becomes faulty, then what switch is selected as the next root bridge? (1 mark)
- What are the states that a switch port can be in, when Spanning Tree protocol is running? (2 marks)

Question 3)**(20 marks)**

1. Consider the network diagram with Cisco devices illustrated in Figure 4. Write the commands to perform the following tasks. Indicate relevant prompt in your answer.

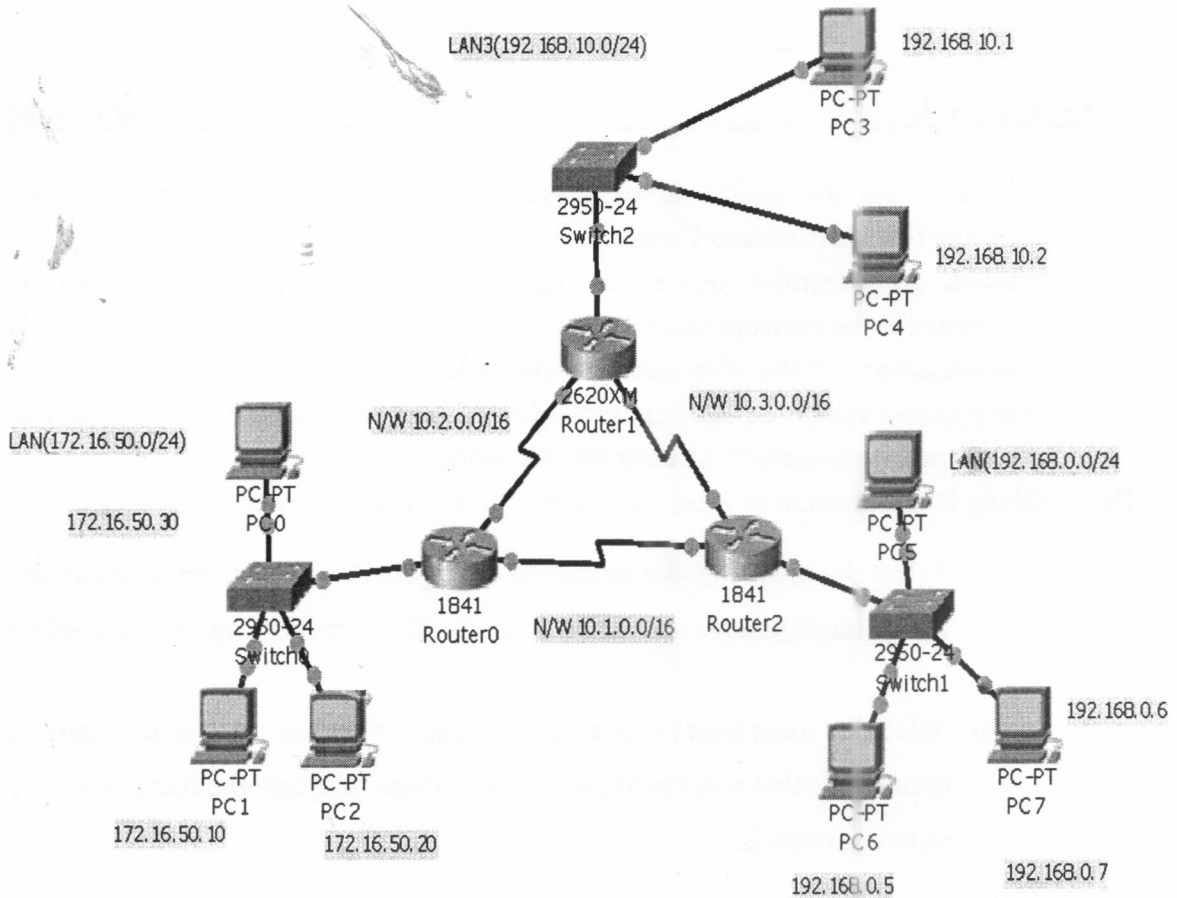


Figure 4: Autonomous Network System.

- From user mode of Router2, entry to the privilege mode. (1 mark)
- Entry to the configuration mode of Router2 (1 mark)
- Change the hostname of Router2 as 'METRO'. (1 marks)
- Configure privilege level password for Router2. (1 mark)
- Configure a suitable IP address to the 'serial 0' interface and configure the clock rate as 200000 to the same interface in Router2. (3 marks)
- Assume that 'Ethernet 0' interface is already configured. Configure EIGRP on Router2. Autonomous System No: 100. (3 marks)
- Display the routing configuration of Router? (1 mark)
- Save the running configuration. (1 mark)

2. Explain the usage of Autonomous System number in EIGRP. (1 mark)
3. Compare Distance Vector routing protocol and Link State routing protocol. (4 marks)
4. Which type of routing protocol is best suited for the network shown in Figure 4? Justify your answer. (3 marks)

Question 4)

(20 marks)

1. Explain what are the additional parameters used by Extended Access Control Lists when compared to Standard Access Control Lists. (2 Marks)
2. A network administrator wants to implement ACL security considering the following requirements for the network shown in Figure 5.
 - I. Ron cannot access the Web server in Sheffield Network.
 - II. Harry cannot access Telnet Server in Manchester Network, but he can access all the other servers and computers in Manchester Network.
 - III. Ginny is not allowed to access any well-known server in outside networks.
 - a) Select the most suitable routers to configure Access Control Lists to satisfy the above requirements and write down the ACLs indicating the name of router. (6 marks)
 - b) Select the most suitable interfaces to apply the above ACLs and write down commands that you could use to apply them. Indicate the router and interface with your commands. (3 marks)

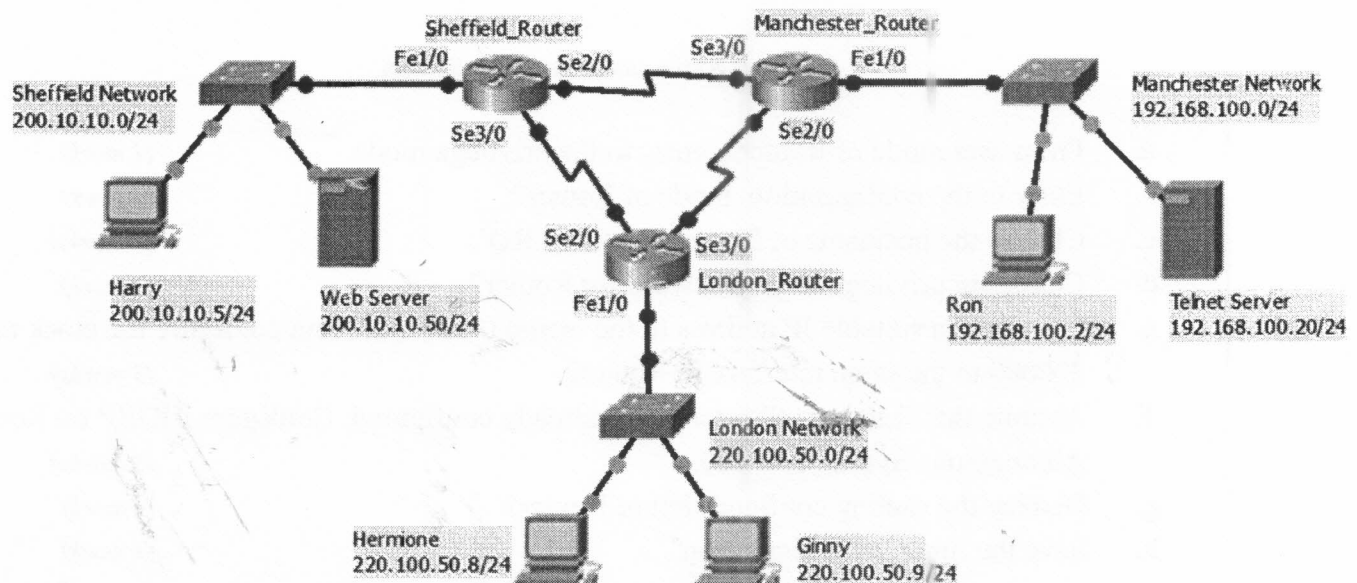


Figure 5.

3. Network administrator configured following ACL statements. Explain what will happen after the following configurations executed? (4 Marks)
 London_Router(config)#access-list 120 deny tcp 192.168.100.2 0.0.0.0 220.100.50.9 0.0.0.0 eq 80
 London_Router(config)#interface fastEthernet 1/0
 London_Router(config-if)#ip access-group 120 out
4. What are the advantages of Named ACL over Standard ACL? (2 Marks)
5. What is the advantage of De-Militarized Zone? (1 Mark)
6. Name two servers placed in DMZ? (2 Marks)

Question 5

(20 Marks)

1. Figure 6 shows an IP Packet/ Datagram, which has arrived with the following information in the header. (In hexadecimal)

←
 4A00 012C 000B 0000 1006 0000 7C4B 0306 B40C 0F01

VER 4 bits	HLEN 4 bits	Service type 8 bits	Total length 16 bits	
Identification 16 bits			Flags 3 bits	Fragmentation offset 13 bits
Time to live 8 bits		Protocol 8 bits	Header checksum 16 bits	
Source IP Address				
Destination IP Address				
Option				

Figure 6: IP Header

- a) Find the size of the IP header? (in Bytes) (1 Marks)
- b) Find the size of the Option field? (in Bytes) (1 Marks)
- c) Find the size of the Data field? (in Bytes) (2 Marks)
- d) How many more routers can the IP packet Pass? (2 Marks)
- e) Find the identification number of the packet? (2 Marks)

2. An IP packet contains 4300 bytes. Identification number of this IP packet is 24,300. Ethernet protocol is used in the Data Link Layer and the MTU of the Ethernet frame is 1500 bytes. (Fragmentation should occur to transfer this IP packet through data link layer.)

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- a) How many IP Fragments are created? (1 mark)
 - b) What is the identification number of the last fragment? (1 mark)
 - c) What is the value of M bit and fragmentation offset of the second fragment? (2 marks)
 - d) If fragmentation offset value is 0 and M bit value is 1, then what can you say about this fragment? (2 marks)
 - e) If an IP fragment has arrived with an offset value of 185. How many bytes were in the previous fragment? (2 marks)
3. Briefly explain the operation of ARP and RARP protocols. (4 marks)

USEFUL COMMANDS FOR DATACOMMUNICATIONS AND COMPUTER NETWORKS II

Standard IP Access List and Extended Access list Configuration Commands

Command	Configuration Mode and Description
access-list <i>access-list-number</i> { deny permit } <i>source</i> [<i>source-wildcard</i>] [log]	Global command for standard numbered access lists
access-list <i>access-list-number</i> { deny permit } <i>source</i> [<i>source-wildcard</i>] <i>destination</i> [<i>destination-wildcard</i>] [log]	Global command for extended numbered access lists
ip access-group { <i>number</i> <i>name</i> [in out] }	Interface subcommand to enable access lists
access-list <i>access-list-number</i> { permit deny } <i>protocol</i> <i>source</i> <i>source-wildcard</i> [<i>operator</i> <i>port</i>] <i>destination</i> <i>destination-wildcard</i> [<i>operator</i> <i>port</i>] [established] [log]	Extended IP Access-list configuration
ip access-group <i>access-list-number</i> { in out }	Activates the extended list on an interface

End of Paper