Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Computer Systems and Network Engineering

Final Examination
Year 2, Semester 2 (2018)
**Regular Intake**

# IE2040 - Advanced Internetworking

Duration: 2 Hours

October 2018

Instructions to Candidates:

- This paper is preceded by 10 minutes reading period. The supervisor will indicate when answering may commence.
- This paper has 4 questions.
- Answer all questions in the booklet given.
- The total marks for the paper is 100.
- This paper contains 4 pages, including the cover page.
- Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

## Question 1 (25 marks)

a) Briefly explain the usefulness of VLAN Trunking Protocol (VTP), as the number of switches with VLANs increases on a business network.

(4 marks)

b) A switch can be configured in one of three VTP modes. Briefly describe the following VTP modes.

i) VTP Server
ii) VTP Client
iii) VTP Transparent

(6 marks)

c) The legacy routing model for inter-VLAN routing is used in network indicated in following Figure 2.1. It is observed that this network is not functioning as expected. You are required to analyse the configurations to find the issue/s and recommend a solution to fix the identified issue/s.

(5 marks)

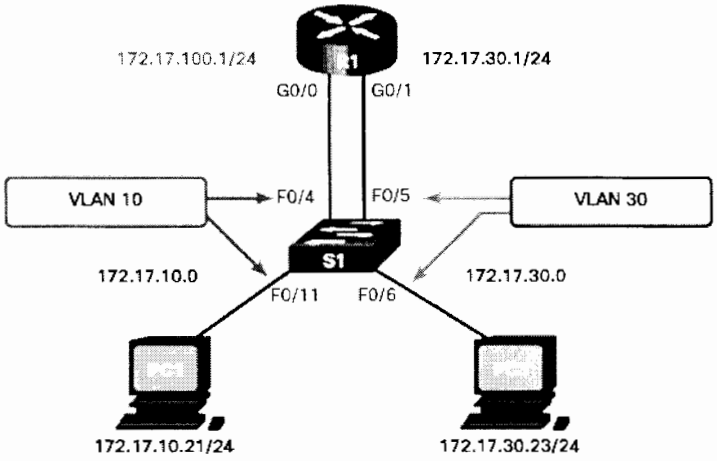


**Figure 2.1**

d) Describe the advantages of using EtherChannel for link aggregation.

(5 marks)

e) Using an example, explain how a first hop router redundancy protocol prevents a single point of failure at the default gateway.

(5 marks)

## Question 2 (25 marks)

a) Switched networks commonly have redundant paths and even redundant links between the same two devices. Redundant paths eliminate a single point of failure in order to improve reliability and availability of networks. However, redundant paths in a switched Ethernet network may cause both physical and logical Layer 2 loops. Describe three (3) primary issues that can be caused due to such logical layer 2 loops.

(6 marks)

b) The following Figure 3.1 shows a LAN topology with bridges to interconnect different LAN segments. Spanning tree algorithm is used for deciding the forwarding path. Bridge IDs of B1, B2, B3, B4 and B4 are 100, 200, 300, 400 and 500 respectively. Assume all links have the same cost.

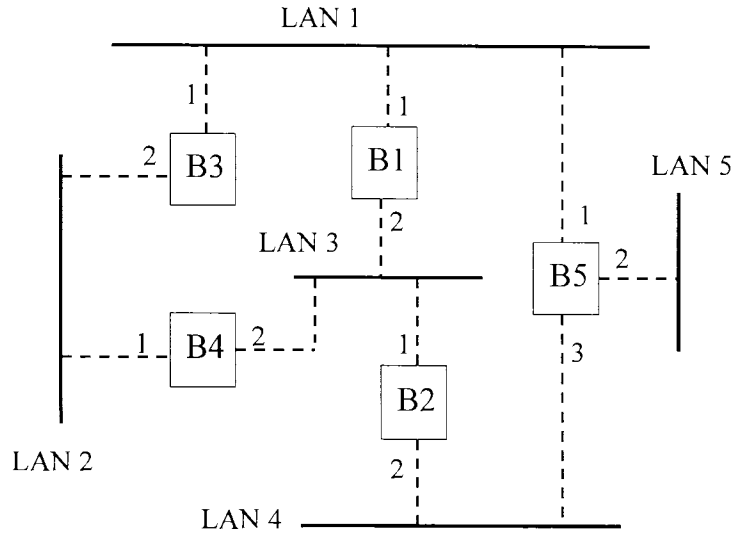


**Figure 3.1**

i) Compute the resulting spanning tree. Clearly indicate root bridge, roots ports, designated ports and blocked ports (alternate ports).

(6 marks)

ii) Specify the path followed by a frame from LAN segment 5 to LAN segment 2.

(3 marks)

c) Describe the purpose of using dynamic routing protocols.

(4 marks)

d) Compare Routing Information Protocol (RIP) version 2 and Enhanced Interior Gateway Routing Protocol (EIGRP) based on following Characteristics.

i) Speed of Convergence
ii) Scalability (Size of the network)
iii) Support for classless IP addressing
iv) Bandwidth usage
v) Memory and processing power usage
vi) Implementation and maintenance easiness

(6 marks)

## Question 3 (25 marks)

a) Identify four features of Open Shortest Path First (OSPF) routing protocol.

(4 marks)

b) In OSPF, dividing the topology into multiple areas allow OSPF configured routers to consume less memory and processing power.

Do you agree with the above statement? Justify your answer by explaining why the statement is correct or incorrect.

(6 marks)

c) Briefly explain how OSPF uses Designated Router (DR) and Backup Designated Router (BDR) operations to overcome the extensive flooding of Link State Advertisements (LSAs) in multi-access network segments.

(5 marks)

d) Enhanced Interior Gateway Routing Protocol (EIGRP) uses the terms, partial and bounded, when referring to its updates. Briefly explain what is meant by partial and bounded updates in EIGRP and advantage of using this update mechanism.

(5 marks)

e) Using an example, explain how feasible successors are selected by EIGRP routers.

(5 marks)

## Question 4 (25 marks)

a) Using the following IPv6 address clearly explain how omitting leading 0s rule and omitting all 0 segments rule can be used to reduce the notation of an IPv6 address (abbreviate/compressed the address).

FE80:0000:0000:0100:0000:0000:0000:0123

(4 marks)

b) Briefly explain three limitations of IPv4 which led to the development of IPv6.

(6 marks)

c) A device has a 48bit MAC address 39-A7-94-07-CB-D0. Create a 64 bit interface ID to be used in IPv6 addressing with the help of IEEE Extended Unique Identifier (EUI) process. Clearly show how you calculate the EUI-64 bit interface ID.

(5 marks)

d) The campus wired Local Area Networks (LANs) use a hierarchical design model to break the design up into modular groups or layers. Identify the three (3) layers in hierarchical network and describe the functionality of each layer.

(6 marks)

e) When designing a network, it is important to select the proper hardware to meet current network requirements. Recommend factors to be considered when selecting switches for an enterprise network.

(4 marks)

--END OF PAPER--