



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

End-Semester 7 Examination in Engineering: August 2015

**Module Number: EE7245      Module Name: Design and Management of Networks**

**[Three Hours]**

**[Answer all questions, each question does not carry equal marks]**

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- Q1 a) i) State what is meant by dynamic routing.  
ii) Classify dynamic routing protocols used in computer networks. [2.0 Marks]
- b) List two Link state routing protocols and two distance vector routing protocols. [2.0 Marks]
- c) Discuss the advantages and disadvantages of distance vector routing algorithms. [2.0 Marks]
- d) i) Explain what is meant by Network Management.  
ii) Explain the importance of having a network management system in an enterprise networks. [2.5 Marks]
- e) i) Explain the function of a network Firewall.  
ii) Determine the most suitable location to place a network firewall in a network, using the network diagrams. [1.5 Marks]
- f) There is a medium level Internet Café with 25-40 PCs. All PCs need connect with the Internet and their main function is to offer Internet access to customers. There is an authentication server, a charging system and a file server inside the local area network (LAN) and they are not exposed to the Internet.  
Explain how to enable the security of this network by only allowing the Internet access and not allowing the external access to the authentication server, the charging system and the file server. [2.0 Marks]
- Q2 a) Briefly explain the term "Network Address Translation (NAT)" using diagrams. [1.5 Marks]
- b) Explain which "Private Address Range" is used in IPv4 addresses by listing the private address range of each IP class. [2.0 Marks]
- c) "IPv4 is saved by both NAT and Private Addressing concepts" Explain. [2.5 Marks]

- d) ABC is a small business company with 3 departments. There is an Internet Leased Line (ILL) to connect the company LAN with the Internet. The IT head of the company has requested from a newly recruited engineer to do a proper design for the company. The following information is provided.

Each department has at least Fifty (50) PCs.

203.115.10.0/30 is the network address of ILL WAN link and 203.115.10.1/30 is the company side IP.

With the ILL, ABC company has requested Eight (8) public IPs. IP block 203.115.100.64/29 is received by the Internet Service Provider (ISP).

Answer the following questions based on above information.

- i) Design the LAN based on provided Information.  
**Note:** Explain how PCs are connected to the LAN and how to increase the security between the departments. Define the IP Plan and VLANs clearly.
- ii) All PCs are needed to be connected to the Internet. Using diagrams, explain how you do this. Consider the following important aspects when answering.  
How does ILL connect with the LAN? What additional equipment are required?  
Which NAT configuration does suit for this requirement?  
How does the LAN route the traffic to WAN?  
What is the best routing configuration for this requirement?
- iii) The company web server and the mail server run in the same premises. Explain how these servers are connected to the LAN and the WAN. Provide the answers for the following important aspects.  
What is the best NAT configuration for this requirement?  
Explain how the IPs are translated from the web and the mail server according to the above mentioned NAT scenario.  
How to enable the security to servers.  
What additional devices are needed for a better security?  
What traffic/ports/services should be provided or facilitated?  
What traffic/ports/services should be provided or facilitated towards the mail server?
- iv) Draw the complete network diagram with all IP details for the above design.  
**Note:** No need to draw all PCs.

[13.0 Marks]

- Q3 a) Briefly explain the following terms related to Cloud Computing.
- Private Cloud
  - Public Cloud
  - Infrastructure as a Service (IaaS)
  - Storage Area Network (SAN)

[5.0 Marks]

b) Briefly explain the advantages of Cloud Computing [2.0 Marks]

c) Briefly explain the function of intrusion prevention system (IPS) and intrusion detection system (IDS) in local area networks. [2.0 Marks]

Q4 a) Assume that the link between Router-B and Router-C fails in the Figure Q4 a). Explain in detail what will happen next?

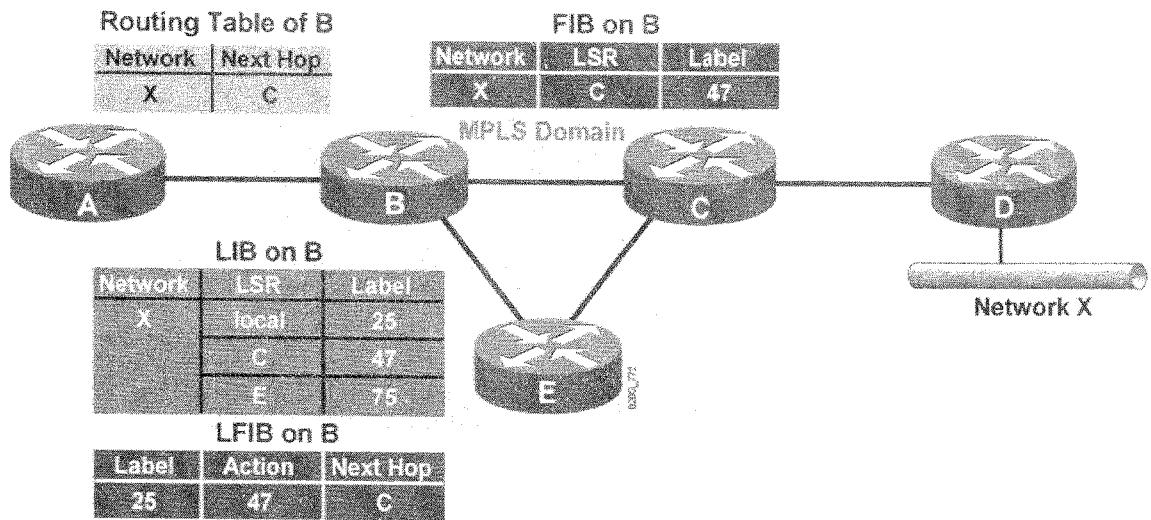


Figure Q4 a)

[5.0 Marks]

- b) The connectivity requirements between Company - A and Company - B are,
- A-Central and B-Central should be able to communicate.
  - A-Central should be able to communicate with Site A-1 and Site A-2.
  - B-Central, should be able to communicate with Site B-1 and Site B-2.
  - A-Central should not be able to communicate with Site B-1 and Site B-2.
  - B-Central should not be able to communicate with Site A-1 and Site A-2.
  - Site A-1 and Site A-2 should not be able to communicate with Site B-1 and Site B-2.

Referring the Figure Q4 b), provide the appropriate import and export route-target values to achieve the above mentioned connectivity requirements.

[2.5 Marks]

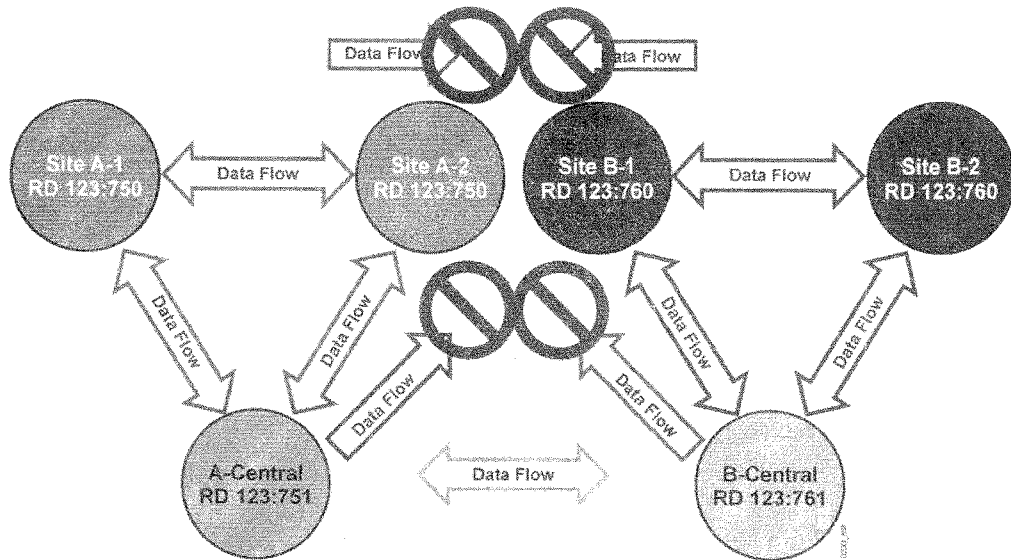


Figure Q4 b)

- c) Complete the missing information on the architecture of edge label switching routers (LSR) shown in Figure Q4 c).

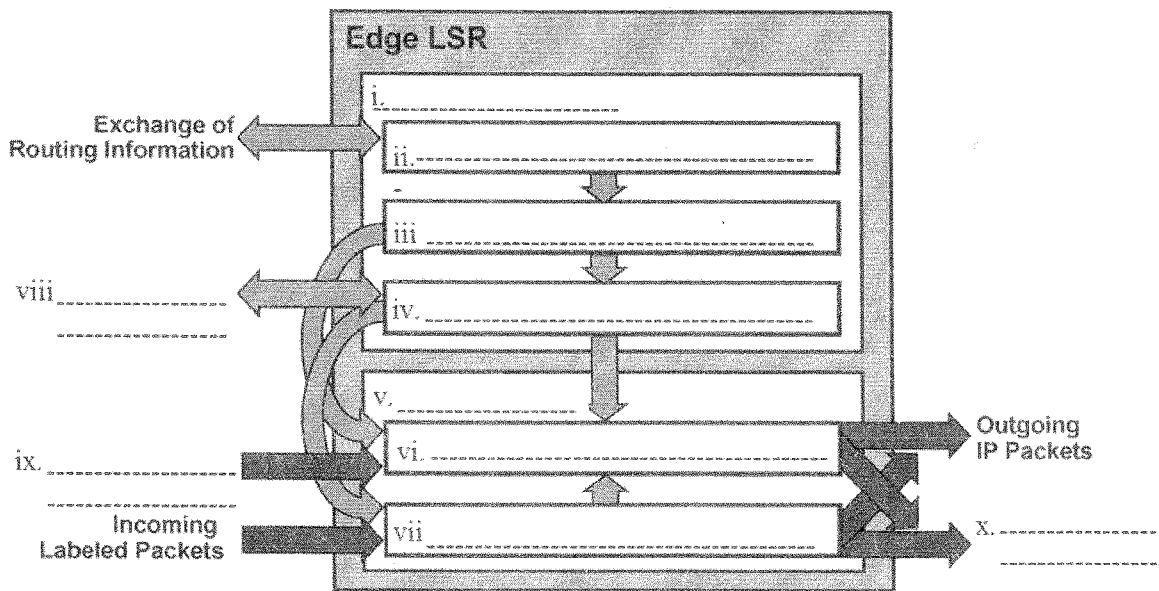


Figure Q4 c)

[2.5 Marks]