Group Assignment 1 - Group Lab Activity 1

TNE10006/TNE60006 S2 2023

Assignment Weight:

7.5%

Assignment Points:

75

Submission Due Date:

Week 7 Lab session.

Reference Material:

- Lab SU-5a – Configuring Per-Interface Inter-VLAN Routing
- Lab SU-5b – Configuring 802.1Q Trunk-Based Inter-VLAN Routing
- Lab SU-6a – Troubleshooting Inter-VLAN Routing

Instructions:

1. Form a group of 3-4 people amongst the students present in the lab session.

2. Discuss and answer the questions in Group Assignment 1 with your group members.

3. Organise for your group to meet as needed to complete all the questions.

4. Each group will submit one completed Group Assignment 1

5. Submit Group Assignment 1, in the Canvas shell, under the Group Lab Activity 1

6. Late penalties will apply for submission after the due date.

Group Assignment 1 Sections:

Section 1: Lab SU-5a Per-Interface Inter-VLAN Routing Configuration (15 marks)

Section 2: Lab SU-5b 802.1Q Trunk-Based Inter-VLAN Routing Configuration (7 marks)

Section 3: Labs SU-5a and SU-5b Reflection (14 marks)

Section 4: Lab SU-6a Inter-VLAN Routing Troubleshooting (30 marks)

Section 5: Lab SU-6a Connectivity Scenarios (9 marks)

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Section 1: Lab SU-5a Per-Interface Inter-VLAN routing Configuration (15 marks)

Q1. After completing steps 1-3 in **Part 2 Configure Switches with VLANs and Trunking of Lab SU-5a**,

    a) Did S3 and S4 ping each other? Yes/No? If yes, explain why? If no, explain why not.
    (1 mark)

    Yes. They are in the same subnet and Vlan (Vlan 10) connected by a trunk port.

    b) Would S3 ping PC-A? Yes/No? If yes, explain why? If no, explain why not.
    (1 mark)

    Yes. They are in the same subnet and Vlan (Vlan 10).

    c) Would S3 ping PC-B? Yes/No? If yes, explain why? If no explain why not.
    (1 mark)

    No. Because they have different subnet.

    d) Would S4 ping PC-A? Yes/No? If yes, explain why? If no, explain why not.
    (1 mark)

    Yes. They are in the same subnet and Vlan (Vlan 10) connected by a trunk port.

    e) Would PC-A ping PC-B? Yes/No? If yes, explain why? If no explain why not.
    (1 mark)

    No. Because they have different subnet.

Q2. After completing steps 1-3 in **Part 3: Basic Router Configuration of Lab SU-5a**,

    a) How many directly connected networks (C) were there in R1's routing table? If any, list them.
    (2 marks)

    There are 2 directly connected networks (C).
    1. 192.168.10.0/24, GigabitEthernet0/0/1
    2. 192.168.20.0/24, GigabitEthernet0/0/0

    b) Would all devices now be able to ping each other? Give reasons for your answer.
    (2 marks)

Yes, because all the networks are connected to the router through an interface/port.

c) When PC-A pings PC-B, would this traffic traverse R1? Yes/No? If yes, explain why. If no, explain why not.
(1 mark)

Yes, PC-A and PC-B are in different networks which is why the traffic must be routed through the router.

d) When PC-A pings S3, would this traffic traverse R1? Yes/No? If yes, explain why. If no, explain why not.
(1 mark)

The traffic from PC-A will not traverse the Router to get to S3. This is because they are in the same VLAN which means that the traffic does not need to be rerouted through the router/default gateway.

Q3. If you shutdown port Gi0/0/1 on R1,

a) How many directly connected (C) networks would there be in R1's routing table? If any, list them.
(2 marks)

There is only one: 192.168.10.0/24, GigabitEthernet0/0/1

b) Would S3 and S4 still ping each other? Yes/No? If yes, explain why. If no, explain why not.
(1 mark)

Because they are still connected through a trunk port, have the same subnet and VLAN.

c) Would PC-A and PC-B still ping each other? Yes/No? If yes, explain why. If no, explain why not.
(1 mark)

No. Port Gi0/0/1 is disabled so PC with different subnet cannot ping.

Section 2: Lab SU-5b Trunk-Based Inter-VLAN Routing Configuration (7 marks)

Q1. After completing steps 1-4 in **Part 2 Configure Switches with VLANs and Trunking of lab SU-5b**,

a) How many directly connected (C) networks are there in R1's routing table? If any, list them.
(2 marks)

There are 4:

192.168.1.0/24, GigabitEthernet0/0/1.99
192.168.1.0/24, GigabitEthernet0/0/1.10
192.168.20.0/24, GigabitEthernet0/0/1.20
209.165.200.224/27, Loopback0

b) Would S3 ping PC-A? If yes, would this traffic traverse R1?
(1 mark)
S3 will be able to ping PC-A. The traffic will traverse R1 because PC-A and S3 are in different networks. R1 helps two hosts communicate

c) Would PC-A ping PC-B? If yes, would this traffic traverse R1?
(1 mark)
PC-A will be able to ping PC-B. The traffic will traverse R1 because PC-B and PC-A are in different networks.

d) What was the purpose of pinging S3 and S4 using the source option from R1?
(1 mark)

The main purpose is to ensure that the sub interface is operating as intended.

Q2. If you shutdown port Gi0/0/1 on R1,

a) How many directly connected (C) networks would there be in R1's routing table? If any, list them.
(2 marks)

Only one: 209.165.200.224/27, Loopback0

Section 3: Labs SU-5a and SU-5b Reflection
(14 marks)

Q1. Answer the following questions regarding IP settings on layer 2 switches:

a) On a layer 2 switch, what is the purpose of creating an interface VLAN and allocating and IP address to it?
(1 mark)

Creating an interface VLAN and assigning an IP address to it on a layer 2 switch enables remote management, facilitates Layer 3 functionality such as VLAN routing, and enhances network visibility and troubleshooting capabilities.

b) On a layer 2 switch, what is the purpose of configuring a default gateway?
(1 mark)

Configuring a default gateway will allow for inter-VLAN/inter-network communication.

a) Based on what you learned on labs SU-5a and SU-5b, which IP address should be configured as the default gateway IP on layer 2 switches?
(1 mark)

The router's IP address that are in the same network as that of the IP address of the switch's management vlan.

Q2. Answer the following questions regarding inter-vlan routing configuration:

a) Explain the benefits of using the "router-on-a-stick" topology for inter-vlan routing instead of the per-interface routing approach?
(4 marks)

"router-on-a-stick" provides a more efficient, simpler, and flexible solution for inter-VLAN routing in network deployments. Moreover, router-on-a-stick can reduce cost by requiring less physical cable.

b) Are there any disadvantages to using "router-on-a-stick" inter-vlan routing as compared to the per-interface routing approach?
(2 marks)

The disadvantage of router on a stick when compared to other routing method is that it is more complex to setup. No redundancy and bandwidth are shared with multiple VLANs.

c) When configuring a router-on-a-stick topology, the link between the switch and the router must carry traffic for multiple VLANs. How is this achieved on the router? How is this achieved on the switch?

(4 marks)

The link between the switch and the router will be able to carry traffic for multiple VLANS by trunking the access ports in the layer 2 devices assigned to the VLAN.

On the router, it is done by creating multiple vlan connections through multiple sub-interfaces on a single interface, connected to an 802.1Q trunk switchport and packets are encapsulated with IEEE 802.1Q VLAN tags.

d) Other than directly connected (C) networks, did you observe any other type of networks in R1's routing table? If yes, specify what type of networks were there and what do they represent.

(1 mark)

The other type is "L" – local connection represents a connection within the same device. It connects between different interfaces or modules within a single networking device, such as a router, switch, or computer.

Section 4: Lab SU-6a Inter-VLAN Routing Troubleshooting (30 marks)

Q1. Refer to **Part 2 Troubleshoot Inter-VLAN Routing Configuration of Lab SU-6a**,

a) Were there any networks missing from R1's routing table? If so, which networks?

(3 marks)

All networks are missing except for the loopback interface

b) After all relevant R1 interfaces were enabled, were there any networks still missing? were there any networks that should not have been present? If so, specify which networks are missing and which networks should not be present.

(1 mark)

Network 192.168.10.0/24 on port g0/0/1.10 is still missing.
Network 192.168.11.0/24 on port g0/0/1.10 is should not have presented.

c) Were all R1's interfaces, including loopback and sub-interfaces, configured correctly? If not, list the configuration issues you found.
(3 marks)

192.168.11.0/24 is supposed to be 192.168.10.0/24

The encapsulation of dot1q 11 on g0/0/1.1 should be dot1q 1

Q2. Refer to **Part 3 Verify VLAN Configuration and Port Assignments and Trunking of Lab SU-6a**,

a) Were there any VLANs numbers or names missing from S3's VLAN database? If so, list them.
(1 mark)

VLAN 20 Engineering missing from s3.

b) Were all access ports on S3 assigned to the correct VLANs? If not, list the missing or incorrect assignments.
(1 mark)
G1/0/7 is assigned to VLAN 1, it should be assigned to VLAN 10

Were there any VLANs numbers or names missing from S4's VLAN database? If so, list them.
(1 mark)
VLAN 10 R&D missing from s3.

c) Were all access ports on S4 assigned to the correct VLANs? If not, list the missing or incorrect assignments.
(1 mark)
G1/0/24 is assigned to VLAN 1, it should be assigned to VLAN 20.

d) Based on Lab SU-6a topology diagram, which port(s) on S3 should operate in trunking mode?
(2 marks)
Gi1/0/5 and gi1/0/11 should be on trunking mode

e) Based on Lab SU-6a topology diagram, which port(s) on S4 should operate in trunking mode?
(1 mark)

Gi1/0/5 should be on trunking mode

f)   Were all ports that should operate in trunking mode configured correctly? If not, list the configuration issues you found.

(2 marks)

G1/0/5 on S3 was on access mode, it should be on trunk mode.

Gi1/0/5 should be on trunking mode

Q3. Use the table provided to list the configuration issues you found in Lab SU-6a. For each issue, list the troubleshooting command(s) that helped you find it and the configuration command(s) you used to fix it.

(2 marks for each correct issue)

Device	Configuration Issue	Troubleshooting Command(s)	Re-Configuration Command(s)
Router	G0/0/1 is turned off	R1#show ip route	R1(config)# Int gi0/0/1 R1(config)# No shutdown
Router	encapsulation dot1q 11 should be encapsulation dot1q 1	R1#show ip route	R1(config)# Int g0/0/1.1 R1(config)# Encapsulation dot1Q 1 R1(config)#Ip address 192.168.1.1 255.255.255.0
Router	The ip address on g0/0/1.10 is 192.168.11.0	R1# show ip interface brief	R1(config)#int gi0/0/1.10 R1(config)#encapsulation dot1Q 10 R1(config)# 192.168.10.0
Switch 3	G1/0/7 is not assigned to VLAN 10	S3#show vlan brief	S3(config)#int g1/0/7 S3(config-if)#switchport mode access S3(config-if)#switchport access vlan 10
Switch 3	VLAN 1 is not turned on	S3#show ip interface brief	S3(config)#int vlan 1 S3(config-vlan)#no shutdown
Switch 3	G1/0/5 should be on trunk mode	S3# show interface trunk	S3(config)#int g1/0/5 S3(config)#switchport mode

			trunk
Switch 3	VLAN 20 is not on the list of VLANs	S3# show vlan brief	S3(config)# vlan 20 S3(config)# name Engineering

Section 5: Lab SU-6a Connectivity Scenarios (9 marks)

Q1. After fixing all configuration issues in Lab SU-6a,

a)   Can S3 and S4 ping each other? If so, does this traffic traverse R1? Give reasons for your answers.
(1 mark)

S3 and S4 can ping each other and the traffic does not traverse the router because they are in the same VLAN.

b)   Can S3 and S4 ping all router sub-interfaces and loopback interface? Give reasons for your answer.
(1 mark)
S3 and S4 can ping all router sub interface and loopback interface because they are directly connected to the router through the 802.1Q trunk, which allows them to communicate with other networks. Additionally, the switches are also configured with the default gateway.

Q2. If you were to connect PC-A and PC-B to the network as shown in Lab SU-6a Topology Diagram,

a)   What IP address would you configure on PC-A as the Default Gateway?
(1 mark)
192.168.10.1

b)   What IP address would you configure on PC-B as the Default Gateway?
(1 mark)
192.168.20.1

c)   Would PC-A and PC-B be able to ping each other? If so, would this traffic traverse R1? Give reasons for your answers.
(1 mark)
PC-A and PC-B will be able to ping each other, and the traffic will traverse R1 because they are in different VLANs and different network.

Q3. In Lab SU-6a, if you did not configure VLAN 20 on S3,

a)   Would PC-A and PC-B ping each-other? Give reasons for your answer.
(1 mark)
No. Without VLAN 20, S3 cannot send to VLAN 20 or receive message from VLAN 20

b) Would PC-A ping R1's loopback interface? Give reasons for your answer.
(1 mark)

Yes. Because VLAN 10 still on and traffic can still traverse R1.

c) Would PC-B ping R1's loopback interface? Give reasons for your answer.
(1 mark)

No. Because VLAN 20 was not configured and traffic cannot traverse R1.

Q4. In Lab SU-6a, if you did not configure the default gateway on S3 and/or S4,

a) Would PC-A and PC-B ping each-other? Give reasons for your answer.
(1 mark)
No. Traffic cannot traverse R1 due to the default gateway is different from R1.