

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)

Group Assignment 1 Members Information:

Name	Student ID
Lau Ngoc Quyen	104198996
Nguyen Thuan Khang	104171078
Le Ba Tung	104175915
Nguyen Do Nhat Nam	104061616

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, S3 and S4 can ping each others due to the same connection with the Gi1/0/5 port, which is a trunk port and they were in the same Vlan 10

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

(1 mark)

- Yes, Because they were in the same VLAN, VLAN 10, S3 was able to ping PC-A.

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

(1 mark)

- No, Because PC-B and S3 were not in the same VLAN and had different IP addresses and subnet IDs, S3 was unable to ping PC-B.

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

(1 mark)

- Yes, Since they are on the same VLAN 10 and have the same subnet ID, S4 can definitely ping PC-A.

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

(1 mark)

- No, because PC-A and PC-B were on separate VLANs and had different subnet IDs, PC-A was unable to ping PC-B.

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

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

a)

- In R1's routing table, there were two networks that were directly connected.
They were as follows:
 - 192.168.10.0/24
 - 192.168.20.0/24

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

- Yes, The router can send direct packets to several VLANs, they should all be able to ping one another.

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, since PC-A and PC-B are on separate VLANs, a ping request from PC-A to PC-B would pass successfully through R1.

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

- It wouldn't. Because they are connected via a port and on the same VLAN, PC-A pings Switch 3, but this does not transit traffic in R1.

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)
- In R1's routing table, there would only be one directly connected network. That is 192.168.20.0/24, to be exact.
- b) Would S3 and S4 still ping each other? Yes/No? If yes, explain why. If no, explain why not.
(1 mark)
- Yes, since they are on the same VLAN, they would still ping one another.
- c) Would PC-A and PC-B still ping each other? Yes/No? If yes, explain why. If no, explain why not.
(1 mark)
- Due to the disconnecting of the link between the S3 and router, PC-A and PC-B could no longer ping one another.

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)
- Four networks that are directly connected
 - These are :
 - 209.165.200.224/27
 - 192.168.1.0/24
 - 192.168.10.0/24
 - 192.168.20.0/24
- b) Would S3 ping PC-A? If yes, would this traffic traverse R1?
(1 mark)
- Yes, S3 would ping PC-A, cross R1 in the process.

- c) Would PC-A ping PC-B? If yes, would this traffic traverse R1?
(1 mark)

- Yes, S3 would ping PC-B and this would cross R1

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

- To make sure that the switches were able to receive pings from three others VLANs separately.

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)

- There would be only 1 directly connected network
- IP: 209.165.200.225.

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 an IP address to it?
(1 mark)
- The aim is to provide a logical interface that, for all Layer 3 operations, represents a VLAN.
- b) On a layer 2 switch, what is the purpose of configuring a default gateway?
(1 mark)
- The switch's management IP is set up on the management VLAN. Default gateway configuration is required in order to control the switch from different VLANs.
- c) 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 IP address configured on the router interface connected to the 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” allows multiple VLAN to travel on the same cable to the same trunk port. This reduces the number of cables needed thus reducing the cost.

- b) Are there any disadvantages to using “router-on-a-stick” inter-vlan routing as compared to the per-interface routing approach?

(2 marks)

- Trunk can be a source of congestion and it is more complex to set up “router on a stick”.

- 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)

- Trunking is enabled on the port of the switch that connects to the router. For every VLAN the router is linked to via the trunk, a sub-interface is configured on the router. The router's IP address and the VLANs connected to each sub-interface are set up according to the default gateway for each sub-interface.

- 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)

- Yes, other networks were observable from the R1 routing table. Two types of networks could be seen: variably connections and the local routes belonging to R1 as per previous configuration of IP addresses.

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)

- The networks connected to the gig sub-interfaces at 192.168.1.x /24 are administratively unavailable.
In this instance:
- G 0/0/1.1 - 192.168.1.1
- G 0/0/1.10 – 192.168.10.1
- G 0/0/1.20 – 192.168.20.1

- 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 192.168.11.0/24 should not have been presented.

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

- Everything is configured correctly except the port g0/0/1. The port g0/0/1 has not been turned on. Subinterface g0/0/1.1 is also configured using encapsulation dot1q for vlan 11 instead of vlan 1. IP address assigned to g0/0/1.10 should be 192.168.10.1 not 192.168.11.1.

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)
- Trunk port on g1/0/5 is missing. VLAN 20 Engineering is missing.
- b) Were all access ports on S3 assigned to the correct VLANs? If not, list the missing or incorrect assignments.
(1 mark)
- Port g1/0/7 has not been assigned to VLAN 10.
- c) Were there any VLANs numbers or names missing from S4's VLAN database? If so, list them.
(1 mark)
- VLAN 20's port is missing from S4's VLAN Database. VLAN 10 R&D is missing.
- d) Were all access ports on S4 assigned to the correct VLANs? If not, list the missing or incorrect assignments.
(1 mark)
- No, access port g1/0/24 is wrongly configured with VLAN 10.
- e) Based on Lab SU-6a topology diagram, which port(s) on S3 should operate in trunking mode?
(2 marks)
- S3's port g1/0/11 and port g1/0/5 should operate in trunking mode.
- f) Based on Lab SU-6a topology diagram, which port(s) on S4 should operate in trunking mode?
(1 mark)
- S4's port g1/0/5 should operate in trunking mode.
- g) Were all ports that should operate in trunking mode configured correctly? If not, list the configuration issues you found.
(2 marks)
- S3's port g1/0/5 is not configured correctly with trunk 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)
R1	g0/0/1 is not turned on	show ip int brief	int g0/0/1 no shutdown
R1	IP assigned to g0/0/1.10 should be 192.168.10.1	show ip int brief	int g0/0/1.10 ip addr 192.168.10.1 255.255.255.0
R1	g0/0/1.1 is wrongly configured with VLAN 11 instead of VLAN 1	show ip int brief	int g0/0/1.1 encapsulation dot1q 1 ip addr 192.168.1.1 255.255.255.0
S3	g1/0/5 is not configured correctly as trunk	show int trunk	int g1/0/5 switchport mode trunk

S3	g1/0/7 not assigned to vlan 10 yet	Show vlan brief	int g1/0/7 switchport mode access switchport access vlan 10
S4	g1/0/24 not assigned to the correct vlan 20	show vlan brief	int g1/0/24 switchport mode access switchport access vlan 20
S3+S4	Interface vlan 1 not turned on	show ip int brief	int vlan1 no shutdown

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 can ping S4 through their trunk port so the traffic does not need to go through R1.

- b) Can S3 and S4 ping all router sub-interfaces and loopback interface? Give reasons for your answer.

(1 mark)

- Yes S3 can ping all router sub-interfaces and loopback because its correctly connected to R1 through trunk port g0/0/1.

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)

- PC-A's default gateway would be 192.168.10.1.

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

(1 mark)

- PC-B's default gateway would be 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 can ping PC-B but the traffic has to go through R1 because 2 PCs are in different VLANs.

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 configured on S3, PC-A and PC-B cannot ping each others

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

- No, without a default gateway configured on S3 and/or S4, PC-A and PC-B cannot ping R1's loopback interface.

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

- No, without a default gateway configured on S3 and/or S4, PC-B cannot ping R1's loopback interface because it would not have a route to reach networks outside its own VLAN.

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, without a default gateway configured on S3 and/or S4, PC-A and PC-B cannot ping each other.