TNE10006 Assignment 1 Group 5

Networks and switching (Swinburne University of Technology (Vietnam))

Group Assignment 1 - Group Lab Activity 1

TNE10006/TNE60006 S1 2023

Assignment Weight:

7.5%

Assignment Points:

75

Submission Due Date:

By the start of 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 again 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 because they are trunked and 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 are in the same VLAN 10

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

No because they are on different VLAN

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

Yes because they are in the same VLAN 10

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

No because they are on different VLAN

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)
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 because inter-vlan is set up

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 because they are in different VLAN so they need R1 to route

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

No because they are in the same VLAN

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)

192.168.20.0/24

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

Yes because they are still in the same VLAN 10 and trunked

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 because PC-A can't send packet to R1 to route to PC-B

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)
192.168.1.0/24, 192.168.10.0/24, 192.168.20.0/24, 209.165.200.0/24

b) Would S3 ping PC-A? If yes, would this traffic traverse R1?
(1 mark)

Yes. No it wouldn't traverse R1

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

d) What was the purpose of pinging S3 and S4 using the source option from R1?
(1 mark)
To ensure that the specific sub interface that was pinged are 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)

209.165.200.0/24

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)

To manage and config remotely and to enable VLAN routing

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

For inter-VLAN Routing, access remote network or manage access

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 default gateway IP should be 192.168.10.1

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)

Efficient Use of Router Resources: It optimizes router resources because multiple logical subinterfaces can be configured on a single physical interface

Ease of Management: Managing a single router interface and multiple logical subinterfaces is generally simpler than configuring and maintaining multiple physical interfaces on the router

Scalable: "Router-on-a-stick" is highly scalable because you can add more VLANs without requiring additional physical router interfaces.

IP Address Conservation: Using a single router interface conserves IP addresses, as you only need one IP address for the router's physical interface

Performance Considerations: In some cases, a single router interface with multiple subinterfaces may offer better performance compared to a router with multiple physical

interfaces because traffic doesn't need to traverse multiple physical ports, which can introduce additional latency.

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

Redundancy: Per-interface routing can offer more straightforward redundancy options, such as High Availability (HA) configurations with multiple physical router interfaces. "Router-on-a-stick" configurations may require additional complexity to achieve the same level of redundancy.

Fault Isolation: When a problem occurs on a shared "router-on-a-stick" interface, it can affect multiple VLANs.

Shared Bandwidth: In a "router-on-a-stick" configuration, all VLANs share the bandwidth of the single physical interface.

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)

On a router, it is through subinterfaces and 802.1Q tagging.

On a switch, it is through trunking and VLAN assignment.

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) No

Section 4: Validate and Troubleshoot Inter-VLAN Routing (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)

192.168.1.0/24, 192.168.10.0/24, 192.168.20.0/24

b) After all relevant R1 interfaces were enabled, were there any networks that should not have been present? If so, which networks?
(1 mark)
No

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

Interface g0/0/1.1 is assigned to VLAN 11 instead of VLAN 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 name Engineering

b) Were all access ports on S3 assigned to the correct VLANs? If not, list the missing or incorrect assignments.
(1 mark)

Gi1/0/7 needs to be assigned to the VLAN 10

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

VLAN 10 missing name R&D

d) Were all access ports on S4 assigned to the correct VLANs? If not, list the missing or incorrect assignments.
(1 mark)

g1/0/24 needs to be assigned to the VLAN 20 instead of 10

e) Based on Lab SU-6a topology diagram, which port(s) on S3 should operate in trunking mode?
(2 marks)
g1/0/5, g1/0/11

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

g1/0/5

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

All trunk ports configured correctly

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	Missin groute to interface g0/0/1	Show ip route Show ip interface brief	R1(config)# interface g0/0/1 R1(config-if)# no shutdown
S3	Missing VLAN 20 name Engineering	Show vlan brief	S3(config)# vlan 20 S3(config-vlan)# name Engineering
S3	Gi1/0/7 needs to be assigned to the VLAN 10	Show vlan brief	S3(config)# interface g1/0/7 S3(config-if)# switchport mode access S3(config-if)# switchport access vlan 10
S4	VLAN 10 missing name R&D	Show vlan brief	S4(config)# vlan 10 S4(config-vlan)# name R&D
S4	g1/0/24 needs to be assigned to the VLAN 20 instead of 10	Show vlan brief	S4(config)# interface g1/0/24 S4(config-if)# switchport access vlan 20
S3	g1/0/5 not trunked	Show interface trunk	S1(config)# interface g1/0/5 S1(configs-if)# switchport mode trunk
R1	Interface g0/0/1.1 is	Show run | section interface	R1(config)# interface g0/0/1.1

	assigned to VLAN 11 instead of VLAN 1		R1(config-if)# encapsulation dot1q 1

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)

Yes. No because they are trunk and directly connected

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

Yes because all 3 devices are trunked and inter-VLAN routing is set up

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)

Yes. Yes it would traverse R1 because they are in different VLAN so it is required R1 to route the package

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 because they are not in the same network and without VLAN 20 there is no route from PC-B to R1

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

Yes, because PC-A is in VLAN 10 , which is routed to R1, and inter-VLAN route is set up

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

No because they are not in the same network and without VLAN 20 there is no route from PC-B to 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)
Yes, because there is inter-VLAN route and both PCs have default gateway set up