Group Assignment 1 - Group Lab Activity 1

TNE10006/TNE60006 S2 2022

**Assignment Weight:**   
7.5%

**Assignment Points:**   
100

**Submission Due Date:**

By the start of Lab Session Week 7.

**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. Your group discussion time will be in the last 20 minutes of the lab session in Collaborate Ultra, Breakout groups.
3. Discuss and answer the questions in Group Assignment 1 in your breakout group.
4. Organise for your group to meet again to complete all the questions.
5. Each group will submit one completed Group Assignment 1
6. Submit Group Assignment 1, in the Canvas shell, under the Group Lab Activity 1
7. Late penalties will apply for submission after the due date.

**Group Assignment 1 Questions:**

* Section 1: Lab SU-5a Configuring Per-Interface Inter-VLAN Routing (15 marks)
* Section 2: Lab SU-5b – Configuring 802.1Q Trunk-Based Inter-VLAN Routing (9 marks)
* Section 3: Reflection on Labs SU-5a and SU-5b (26 marks)
* Section 4: Troubleshoot Inter-VLAN Routing Configuration (10 marks)
* Section 5: Verify VLAN Configuration, Port Assignment and Trunking (16 marks)
* Section 6: Troubleshooting and Re-configuration Commands (18 marks)
* Section 7: Connectivity Scenarios (6 marks)

**Group Assignment 1:**

|  |  |
| --- | --- |
| **Group Members** | |
| **Name** | **Student Id:** |
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**Section 1: Lab SU-5a Connectivity Scenarios (15 marks)**

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

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

**Ans.**

**Yes, S3 and S4 pinged each other because they connected with each other by the same port Gi1/0/5 which is a trunk port and at the same time they were in the same VLAN 10.**

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

**Ans.**

**Yes, S3 was able to ping PC-A because they were in the same VLAN which is VLAN 10**

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

**Ans.**

**S3 was unable to ping PC B because they were not in the same VLAN, and their IP addresses were different and subnet ID are different.**

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

**Ans.**

**Yes, S4 would be able to ping PC-A as they are both on the same VLAN which is VLAN 10, and their subnet ID are also same.**

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

**Ans.**

**No, PC A would not ping PC B because they were on a different VLAN, and their subnet ID are also different.**

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

* + 1. How many directly connected networks (C) were there in R1’s routing table? If any, list them.   
       (2 marks)

**Ans.**

**There were 2 networks which were directly Connected in R1’s routing table.**

**And they were**

* **192.168.10.0/24**
* **192.168.20.0/24**
  + 1. Would all devices now be able to ping each other? Give reasons for your answer.   
       (2 marks)

**Ans.**

**Yes, they should all be able to ping each other since, the router can send direct packets to different VLAN.**

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

**Ans.**

**Yes, when PC A would ping PC B, this would traverse R1 as they are on different VLANs.**

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

**Ans.**

**It would not. PC-A pings Switch 3 because they are on the same VLAN and connected directly by a port, but this would not traverse traffic in R1.**

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

* + 1. How many directly connected (C) networks would there be in R1’s routing table? If any, list them.   
       (2 marks)

**Ans.**

**Only 1 directly connected Network would be there in R1’s routing Table**

**And that is -- 192.168.20.0/24**

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

**Ans.**

**Yes, they would still ping each other as they are on the Same VLAN.**

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

**Ans****.**

**PC-A and PC-B would no longer ping each other, as the link between the S3 and router has been disconnected.**

**Section 2: Lab SU-5b Connectivity Scenarios (9 marks)**

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

* + 1. How many directly connected (C) networks are there in R1’s routing table? If any, list them.  
       (2 marks)

**Ans.**

**4 directly connected Networks**

**These are**

**192.168.1.0/24,**

**192.168.10.0/24,**

**192.168.20.0/24,**

**209.165.200.224/27**

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

**Ans.**

**Yes, S3 would ping PC-A and this would traverse R1**

* + 1. Would S3 ping PC-B? If yes, would this traffic traverse R1?  
       (1 mark)

**Ans.**

**Yes, S3 would ping PC-B and this would traverse R1**

* + 1. Would S4 ping PC-A? If yes, would this traffic traverse R1?  
       (1 mark)

**Ans.**

**Yes, S4 would ping PC-A and this traffic would traverse R1**

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

**Ans.**

**PC-A would ping PC-B and this traffic would traverse R1.**

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

**Ans.**

**To test if the switches were able to receive pings from all three VLANs separately**

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

* + 1. How many directly connected (C) networks would there be in R1’s routing table? If any, list them.   
       (2 marks)

**Ans.**

**1 directly connected network would be there in R1’s routing table.**

**And that is**

**209.165.200.224/27**

**Section 3: Reflection on Labs SU-5a and SU-5b (26 marks)**

**In this section you will need to reflect on what you have learned and apply that knowledge**

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

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

**Ans.**

**The purpose is to create a logical interface that represents a VLAN in all Layer 3 activities.**

* + 1. On a layer 2 switch, what is the purpose of configuring a default gateway?   
       (2 marks)

**Ans.**

**The management IP of the switch it’s configured on the management VLAN.**

**Configuring default gateway is needed to manage the switch from other VLANs**

* + 1. 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?   
       (2 marks)

**Ans.**

**The IP address configured on the router interface connected to the management VLAN**

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

* + 1. In labs SU-5a and SU-5b, you used two different approaches to configuring inter-vlan routing. Explain the difference(s) between the two.   
       (6 marks)

**Ans.**

**The difference between Legacy inter-Vlan routing and Router-on-a-stick is that Legacy uses physical interfaces of multiple routers in order to connect separate VLANs by assigning the switch port as an access port. The access port can only carry traffic for 1 VLAN, so each physical interface on the router is dedicated to carrying traffic for 1 VLAN.**

**On the other hand, a router on a stick requires router VLAN trunking configuration to give 1 physical interface multiple logical interfaces to connect separate VLANs and encapsulation dot1q is configured on the router physical interface to assign a default gateway ip - this is possible as trunking allows more VLANs configured on the interface; it can carry traffic for many VLANs simultaneously.**

* + 1. 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)

**Ans.**

**The port of the switch connecting to the router is configured with trunking enabled. Whilst on the router, a sub-interface for each VLAN the router is connected to over the trunk is configured. For each sub-interface, the VLANs that are connected and which IP address the router will use will be configured respectively to the default gateway.**

* + 1. What are the benefits of using the “router-on-a-stick” topology for inter-vlan routing?  
       (6 marks)

**Ans.**

* **Reduce network infrastructure cost as less router interfaces and less cabling is required.**
* **Router-on-a-stick is a more scalable design, as the amount of VLAN is not limited by the amount of available router interfaces**
  + 1. Are there any disadvantages to using “router-on-a-stick” inter-vlan routing as compared to the per-interface approach?   
       (2 marks)

**Ans.**

* **It is more difficult to set up.**
* **The same port is used to bring traffic into and out of the router between VLANS.**
* **The trunk causes congestion if over 20-30% of the traffic traverses a router interface**
  + 1. 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.  
       (2 marks)

**Ans.**

**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: Troubleshoot Inter-VLAN Routing Configuration (10 marks)**

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

Q1. Regarding R1’s routing table,

* + 1. Were there any networks missing? If so, which networks?   
       (2 marks)

**Ans.**

**The 192.168.1.x /24 networks attached to the Gig sub-interfaces are administratively down**

**In this scenario:**

**• G 0/0/1.1 – 192.168.1.1**

**• G 0/0/1.10 -192.168.1.10**

**• G 0/0/1.20 -192.168.1.20**

* + 1. After all router interfaces were enabled, were there any networks that should not have been present? If so, which networks?   
       (2 marks)

**Ans.**

**No, there were no networks that should not have been present.**

Q2. Regarding R1’s interface configuration

1. Were all interfaces, loopback and sub-interfaces configured correctly? If not, list the configuration issues you found.  
   (6 marks)

**Ans.**

**1. Port GigabitEthernet 0/0/1.10 has the IP Address configured as 192.168.11.1 /24 rather than 192.168.10.1 /24**

**2. Interface GigabitEthernet0/0/1.1 was configured with dot1q encapsulation for VLAN 11, and it needed to be set for VLAN 1 traffic.**

**3. G0/0/1 was administratively down, and needed to be set to “no shutdown”**

**Section 5: Verify VLAN Configuration, Port Assignment and Trunking   
(16 marks)**

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

Q1. Regarding S3’s VLAN Database,

* + 1. Were there any VLANs numbers or names missing in the output? If so, list them.  
       (2 marks)

**Ans.**

**Yes, VLAN 20 - Engineering’ is missing.**

* + 1. Were all access ports assigned to the correct VLANs? If not, list the missing or incorrect assignments.  
       (2 marks)

**Ans.**

**No, Port 0/0/7 is not assigned to VLAN 10.**

Q2. Regarding S4’s VLAN Database,

* + 1. Were there any VLANs numbers or names missing in the output? If so, list them.  
       (2 marks)

**Ans.**

**S4’s VLAN 10 is named “VLAN0010” which is incorrect. It should be named “R&D”**

* + 1. Were all access ports assigned to the correct VLANs? If not, list the missing or incorrect assignments.  
       (2 marks)

**Ans.**

**No, all access ports were not assigned to the correct VLANs.**

**Port 24 was assigned to the VLAN 10 instead of VLAN 20.**

Q3. Regarding Trunking configuration,

* + 1. Based on the topology diagram, which port(s) on S3 should operate in trunking mode?   
       (2 marks)

**Ans.**

**GigabitEthernet 1/0/5**

**GigabitEthernet 1/0/11**

* + 1. Based on the topology diagram, which port(s) on S4 should operate in trunking mode?   
       (2 marks)

**Ans.**

**GigabitEthernet 1/0/5**

* + 1. Were all ports that should operate in truncking mode configured correctly? If not, list the configuration issues you found  
       (4 marks)

**Ans.**

**Not all ports operated in trunking mode as they were configured incorrectly.**

**GigabitEthernet 1/0/5 on S3 was set up as an access port when it should have been a trunking port according to the topology.**

**On S4 the trunking port was configured correctly.**

**Section 6: Troubleshooting and Re-configuration Commands (18 marks)**

Q1. 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.  
(3 marks for each correct issue)

|  |  |  |  |
| --- | --- | --- | --- |
| **Device** | **Configuration Issue** | **Troubleshooting Command(s)** | **Re-Configuration Command(s)** |
| R1 | Gi0/0/1 is administratively down | R1# show ip interface brief | R1(config)# interface g0/0/1  R1(config)# no shutdown |
| R1 | Gi 0/0/1.10 is assigned the wrong ip address (192.168.11.1) | R1# show ip interface brief | R1(config)# int g0/0/1.10  R1(config-subif)# ip address 192.168.10.1 255.255.255.0 |
| R1 | Gi 0/0/1.1 dot1q  encapsulation was  set for VLAN 11  traffic, when it  needed to be set for  VLAN 1 | R1# show run | R1(config)#int g0/0/1.1  R1(config-subif)# no  encapsulation dot1Q  R1(config-subif)# encapsulation  dot1Q 1  R1(config-subif)# ip address  192.168.1.1 255.255.255.0 |
| S3 | VLAN 20 is missing | S3 show vlan brief | S3(config)# vlan 20  S3(config-vlan) # name  Engineering |
| S3 | Trunk 5 not configured | S3# show ip interface brief  S3# show vlan brief | S3(config)# int g1/0/7  S3(config-if) # switchport mode access  S3(config-if) # switchport access vlan 10 |
| S3 | Port 11 is not operating in Trunking mode | S3# show interface trunk  S3# show vlan brief | S3(config)#interface g1/0/11  S3(config-if) # no shutdown |
| S3 | Int vlan 1 | S3#show ip int brief | S3(config)# int vlan 1  S3(config-if)# no shutdown |
| S4 | Gi 1/0/24 set to vlan  20 | S4#show vlan brief | S4(config)#int gi 1/0/24  S4(config-if)# switchport mode access  S4(config-if)# switchport access vlan 20 |
| S4 | Int vlan 1 | S4# show ip int brief | S4(config)#int vlan 1  S4(config-if)# no shutdown |

**Section 7: Connectivity Scenarios (6 marks)**

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

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

**Ans.**

**Yes, the ping will not traverse R1 because both switches belong to interface VLAN 1**

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

**Ans.**

**S3 can ping the router’s sub-interfaces and loopback interface, as the connected port, interface GigabitEthernet1/0/11 is operating in trunking mode and the router’s sub-interfaces have the correct dot1q encapsulation VLAN ID configured.**

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

**Ans.**

**S4 can ping the router’s sub-interfaces and loopback interface, as interface**

**GigabitEthernet1/0/5 on S4 is operating in trunking mode, as is Switch 3’s connection**

**with the router. The router’s sub-interfaces also have the correct dot1q encapsulation**

**VLAN ID configured.**

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

* + 1. What IP address would you configure on PC-A as the Default Gateway?   
       (1 mark)

**Ans.**

**PC-A would have 192.168.10.1 configured as the Default Gateway**

* + 1. What IP address would you configure on PC-B as the Default Gateway?   
       (1 mark)

**Ans.**

**PC-B would have 192.168.20.1 configured as the Default Gateway**

* + 1. 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)

**Ans.**

**PC-A and PC-B would ping each other and this would traffic traverse traverse R1, because both PCs are in different VLANs and a layer 3 device such as a router is required for Inter-VLAN communication.**