# 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:** |
| **Trung Kien Nguyen** | **104053642** |
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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)

*Yes, because both switches are on the same subnet.*

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

*Yes, because they are directly connected by a copper straight-through connection.*

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

*No, because PC-B is in another VLAN ID. (VLAN 20 instead of VLAN 10)*

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

*Yes, because PC-A is in VLAN 10.*

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

*No, because the two PCs are not in the same VLAN.*

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)

*Two: 192.168.10.0/24 (GigabitEthernet0/0/1)*

*192.168.20.0/24 (GigabitEthernet0/0/0)*

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

*Yes, because of the trunking port between the switches that makes they are accessible to each others.*

* + 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)

*Yes, because they are not in the same VLAN, so the Router1 is needed for connection between them.*

* + 1. 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 directly connected by a copper straight-through connection.*

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)

*One: 192.168.20.0/24 (GigabitEthernet0/0/0)*

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

*Yes, because of the trunking port between the switches.*

* + 1. 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 the R1 that controls inter-VLAN interactions now cannot connect with S3.*

**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)

*Four: 192.168.1.0/24 (GigabitEthernet0/0/1.99)*

*192.160.10.0/24 (GigabitEthernet0/0/1.10)*

*192.160.20.0/24 (GigabitEthernet0/0/1.20)*

*209.165.200.224/27 (Loopback0)*

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

*Yes, S3 can ping PC-A.*

*Yes, this traffic traverse R1.*

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

*Yes, S3 can ping PC-B.*

*Yes, this traffic traverse R1.*

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

*Yes, S4 can ping PC-A.*

*Yes, this traffic traverse R1.*

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

*Yes, PC-A can ping PC-B.*

*Yes, this traffic traverse R1.*

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

*It is a way to test the inter-VLAN connections.*

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)

*One: 209.165.200.224/27 (Loopback0)*

**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)
       1. *Creating a new local network on the switch.*
       2. *Helping the switch to route packets between the networks.*
       3. *Allowing remote access and management of the switch.*
    2. On a layer 2 switch, what is the purpose of configuring a default gateway?   
       (2 marks)

*The switch firstly connects to the default gateway. The switch will forward IP packets with destination IP addresses outside the local network to the default gateway.*

* + 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)

*It should be 192.168.10.1*

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)

*The two used approaches are legacy inter-VLAN routing and router-on-a-stick inter-VLAN routing.*

|  |  |
| --- | --- |
| ***Legacy inter-VLAN routing*** | ***Router-on-a-stick (or trunk-based) inter-VLAN routing*** |
| *It uses the ports of the router to connect the VLANs, such as VLAN 10 would be connected to GigabitEthernet0/0/1 and VLAN 20 would be connected to GigabitEthernet 0/0/0.* | *It uses a trunked port that is only connected to the router and would use subinterfaces to manage the VLAN-tagged traffic.* |

* + 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)

*R1 uses subinterfaces using dot1q encapsulation over a trunked connection to S3.*

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

*The major benefit is that the number of VLANs is not limited to the number of ports on the router, so the router only needs to have one port.*

* + 1. Are there any disadvantages to using “router-on-a-stick” inter-vlan routing as compared to the per-interface approach?   
       (2 marks)

*Congestion would be the biggest problem, it is because if the port is a Gigabit Ethernet port, then all VLANs would have to share that bandwidth which would cause congestion. This routing approach is also much more complex than a layer 3 switching approach.*

* + 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)

*This table also contains Local (L) routes which are addresses set on the device.*

**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)

*3 networks missing on the router, R&D (192.168.10.0/24), Engineering (192.168.20.0/24) and 192.168.1.0/24*

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

*There were no networks that shouldn’t exist on the router.*

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)

*There are 2 issues:*

*The ip address of GigabitEthernet 0/0/1.10 should be 192.168.10.1 255.255.255.0 (not 192.168.11.1 255.255.255.0)*

*The GigabitEthernet 0/0/1 was administratively down (solve by running “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)

*Yes, VLAN 20 (Engineering) was missing.*

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

*No, GigabitEthernet1/0/7 was 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)

*Yes, VLAN 10 (R&D) was missing*

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

*No, GigabitEthernet1/0/24 was assigned to 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)

*GigabitEthernet1/0/5 and GigabitEthernet1/0/11 should operate in trunking mode.*

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

*GigabitEthernet1/0/5 should operate in trunking mode.*

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

*In S3, GigabitEthernet1/0/5 was in access mode, instead of trunking mode.*

**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* | *G0/0/1 was down* | *Use “show ip int brief” command* | *Go to configure mode (“conf t”)*  *Use “int g0/0/1”*  *“no shutdown”* |
| *R1* | *Sub interface g0/0/1.10 didn’t have the correct ip address* | *Use “show ip route” command* | *Go to configure mode (“conf t”)*  *Use “int g0/0/1.10”*  *“ip address 192.168.10.1 255.255.255.0”* |
| *S3* | *No trunk defined* | *Use “show int trunk” command* | *Go to configure mode (“conf t”)*  *Use “int g1/0/5”*  *“Switchport mode dynamic desirable”*  *“Switchport mode trunk”*  *Use “int g1/0/11”*  *“Switchport mode dynamic desirable”*  *“Switchport mode trunk”* |
| *S3* | *VLAN 10 has no assigned port* | *Use “show vlan brief” command* | *Go to configure mode (“conf t”)*  *Use “int g1/0/7”*  *“switchport mode access”*  *“switchport access vlan 10”* |

**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)

*Yes, thay can ping each other.*

*No, because both switches are on the same subnet.*

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

*Yes, because the R1 has been correctly configured and it’s a trunk based inter-VLAN routing.*

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

*Yes, because the R1 has been correctly configured and it’s a trunk based inter-VLAN routing.*

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)

*It’s 192.168.10.1*

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

*It’s 192.168.20.1*

* + 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)

*Yes, because the R1 interfaces are correctly configured.*

*Yes, because the two PCs are not in the same VLAN, so the R1 is necessary.*