DT153G Network Technology A

Laboratory Assignment II

Lennart Franked*

October 1, 2020

Contents

Aids Packet Tracer, Course literature, dictionary and lecture materials.

Maximum points 30

Questions 5

Introduction

This laboratory assignment is part of the second half of the course Network Technology A.

---

*E-post: lennart.franked@miun.se.

1 Examination

Always motivate your unique answers, show all your calculations and give proper references on all your answers. Failure to do this will result in an F on the assignment even though your answers may be correct. This assignment is to be performed individually and all the answers must be written in your own words such that you show that you have understood both the question and your answer. This assignment will be checked against Urkund, which is an anti-plagiarism tool. The grade on this assignment will be pass (P) or fail (F). If you get an F or Fx you will be given the chance to supplement your assignment. When Fx you will have one week to make the necessary corrections, if F you will have to redo the assignment and it will be graded at the next planned grading for that assignment. In order to get full score on a question, all parts must be done correctly.

1.1 Preliminary grade

The following grading criteria applies: $F < 50\% \leq Fx < 60\% \leq P$, and you must have a fully working network. That is, a computer in the LAN should be able to access the loopback interface in the router topology.

2 Aim

After completion of laboratory assignment II you will have shown that you

- have the knowledge to setup and configure a network containing VLAN, Routing Protocols, Access Control Lists, DHCP and NAT.

3 Reading instructions

Before starting laboratory assignment 2, you should first have finished reading all the chapters in CCNA Routing and Switching Essentials.

4 Tasks

Note that not all the necessary steps have been mentioned in the assignment description. Some parts have been consciously left out, to cover troubleshooting.

4.1 Addressing

(5p) 1. The supernet of the network is: 64.0.0.0/8. Using the information found in Table 1 on the next page, answer the following.

Table 1: subnet-ranges

Subnets
64.2.0.0-7/? (Administration Network)
64.40 - 47.0.0/?(Guest network)
64.48 - 55.0.0/?
64.56 - 63.0.0/?
64.64 - 71.0.0/?
64.72 - 79.0.0/?
64.80 - 87.0.0/?
64.88 - 95.0.0/?
64.96 - 103.0.0/?

(a) What is a suitable network mask for the subnets listed in Table 1?

(b) Complete the address documentation found at Table 2 on page 6. As always use as small subnets as possible.

(c) Complete the GW vlan address documentation found in Table 3 on page 7.

(10p) 2. Create a simulated environment in Packet Tracer (or set it up in a network lab) over the LAN, see Figure 1 on page 6. Each PC in the topology symbolizes one or several users belonging to a specific subnet. You also need to create the necessary VLANs needed for this topology, see Table 4 on page 9.

    (a) Setup the topology shown in Figure 1 on page 6 *Note that S1 and S3 are Layer 3 switches.* Make sure you perform basic configuration, that is, set hostname, password *(use password 'dt153g' for login, and 'L2' for privilege mode)*, banner and synchrounous logging on all switches and GW.

    (b) Allocate the switchports to the VLANs according to Table 5 on page 9, Table 6 on page 9 and Table 7 on page 9. *Ensure all necessary VLANS exist in the switches*

    (c) Ensure that the trunk links are configured using the correct Native VLAN. See Table 4 on page 9.

    (d) Give each switch an address within the administration subnet.

    (e) Configure GW as a router-on-a-stick to route between the VLANs. *Allocate the last available address of each subnet.*

    (f) Configure the IP-address settings on each PC (except the ones connected to the GUEST VLAN) so that you can test connectivity between the subnetworks later.

    (g) Create an address documentation covering the address's that you assigned the computers, together with the subnet mask and default gateway.

    (h) Configure a DHCP-server on GW that will give out addresses to computers connected to the guest network.

(i) Test connectivity within the LAN.

(5p) 3. Finally you have the LAN working as you want it to. It is now time move our focus over to the WAN-links and out to the 'internet'.

    (a) Connect GW to R1 using a regular FastEthernet connection.

    (b) Give this interface an address within the address range *32.0.0.0/29*.

    (c) Perform basic configuration on R1, and ensure connectivity with GW.

    (d) On GW, configure a static default route out towards R1.

    (e) You really don't want to risk any administration traffic going through, since you are the belt and suspender kind if person. Add an ACL to block all traffic from the administration network that is trying to exit towards R1.

    (f) While you are at it. Create another ACL to restrict the guest network, such that it can only access the WAN, and not the other VLANs.

(5p) 4. Setup the WAN topology according to Figure 2 on page 7.

    (a) Make sure that both the clock rate and bandwidth are set to the correct bandwidth given in the topology.

    (b) Perform basic configurations on routers R2, R3 and R4.

    (c) Setup RIPv2 so that all routers know about the available networks WAN networks (all except 64.0.0.0/8).

    (d) Set a default route out towards Loopback 0 on R4, and propagate this static route through RIPv2 to the rest of the routers. (This will simulate the connection out to the rest of the Internet)

    (e) Setup NAT on GW, where the 64.0.0.0/8 network is the local and the 32.0.0.0/29 network is the public network.

(5p) 5. (a) Make sure you can reach all subnets from the PC's within the LAN (except the guest network of course). Figure 3 on page 8.

    (b) From PC5, confirm that it works to ping the loopback interface.

    (c) Check the NAT-translation on GW, can you find the translation for PC5?

5 Submissions

Before submitting, make sure that your solutions follow the criteria given in section 1. To pass this laboratory assignment, you must submit a laboratory report and an archive file. The archive file must contain:

- Your Packet Tracer file (if you did this assignment at home), or

- The running configurations for all the switches and routers in separate plain text files (S1.conf, S2.conf et. cetera)

The laboratory report must contain five brief summaries about how you solved each question where you motivate your choices. The summaries must be written according to the following rules:

- The summary should cover all the steps taken to finish the task of the questions.

- *DO NOT* just put in a lot of commands, I will check these in your attached configuration files.

- You must show me that you have understood what you did.

- It should be a summary, not an essay, hence try to keep to around 250 words per question.

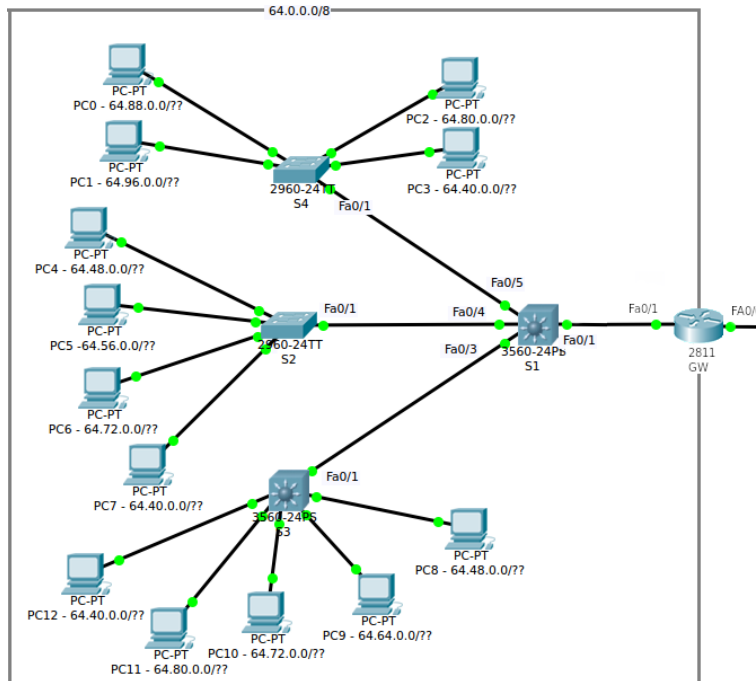As always, your report must be submitted in *PDF-format*.

Figure 1: Logical Topology over LAN

Table 2: L2 Addressing plan

Network ID	Subnet Mask	Usable Address Range	Comment
64.0.0.0	255.0.0.0	64.0.0.1 - 64.255.255.254	Given Address Range
64.2.0.0			Administration network (five addresses are needed)
64.40.0.0			Guest network
64.48.0.0			Third Subnet
64.56.0.0			Forth Subnet
64.64.0.0			Fifth Subnet
64.72.0.0			Sixth Subnet
64.80.0.0			Seventh Subnet
64.88.0.0			Eighth Subnet
64.96.0.0			Ninth Subnet
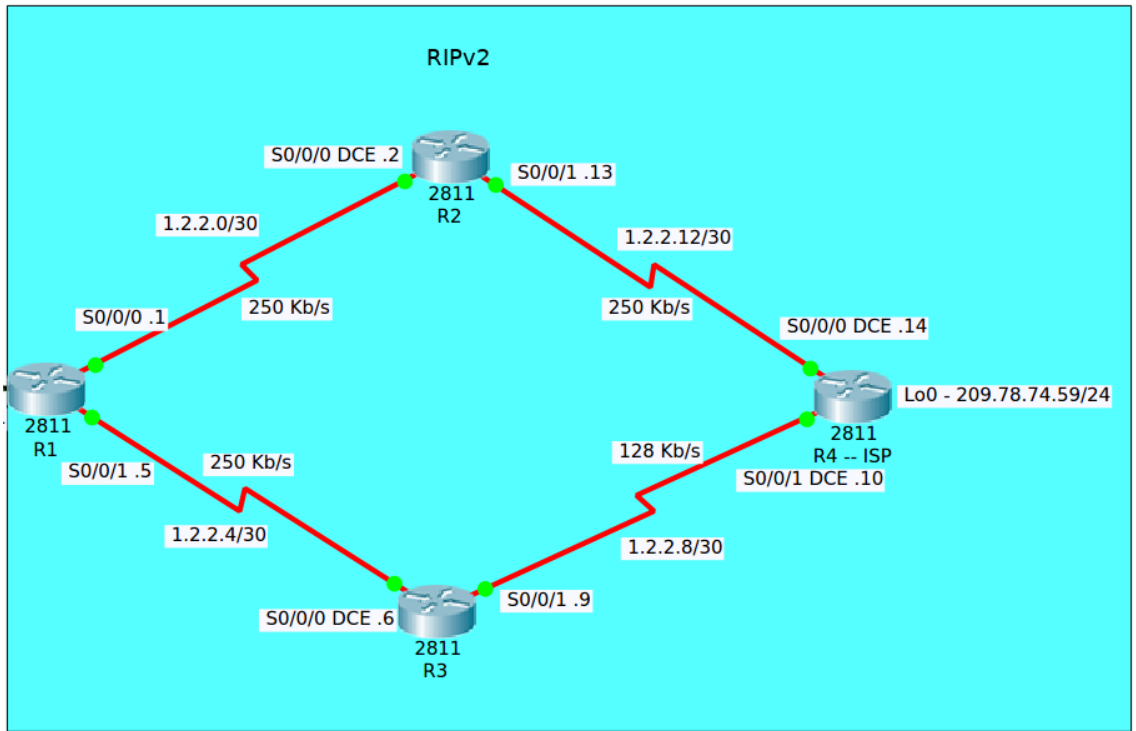
Figure 2: WAN Topology

Table 3: L2 Addressing plan II GW

Device	Interface	IP-address	Comment
GW	VLAN 02		Administration IP-address
	VLAN 40		Last available IP-address in subnet
	VLAN 48		Last available IP-address in subnet
	VLAN 56		Last available IP-address in subnet
	VLAN 64		Last available IP-address in subnet
	VLAN 72		Last available IP-address in subnet
	VLAN 80		Last available IP-address in subnet
	VLAN 88		Last available IP-address in subnet
	VLAN 96		Last available IP-address in subnet
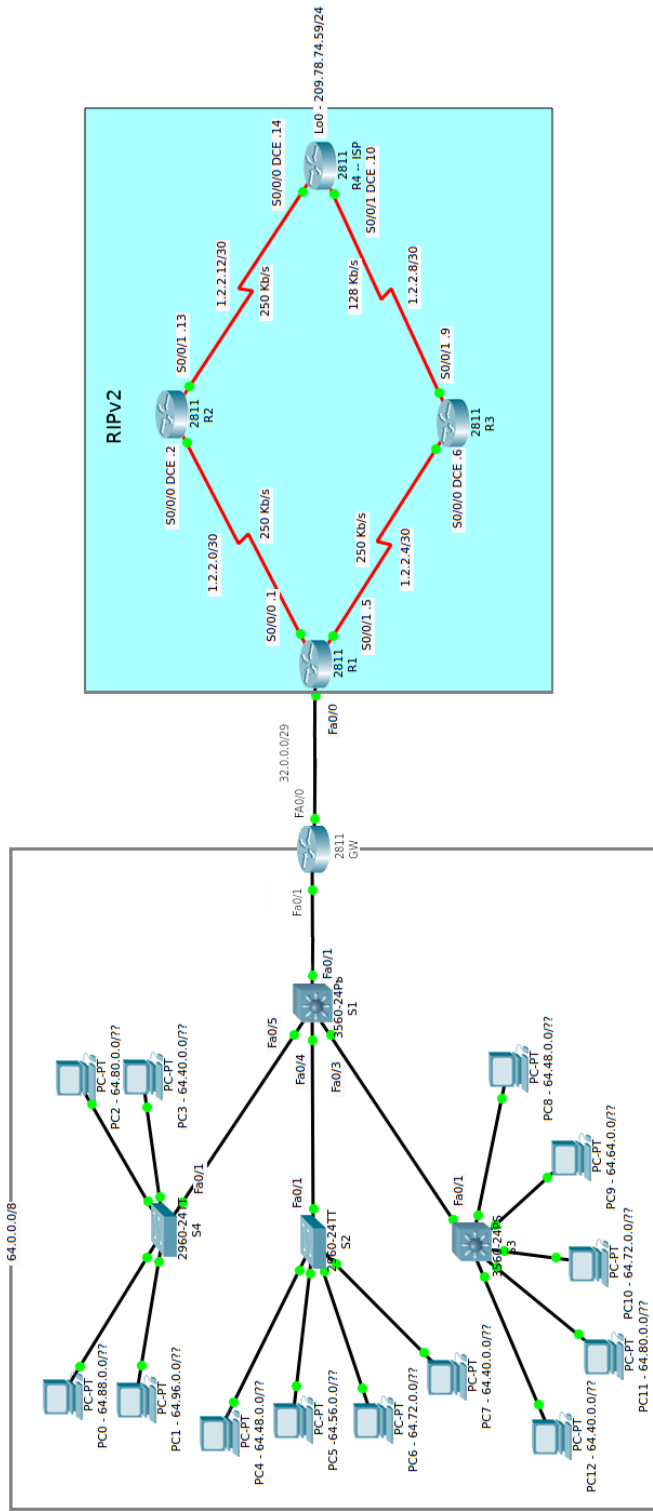
Figure 3: Complete Topology for L2

Table 4: VLAN Table

VLAN ID	Comment
01	Default
02	Administration
03	Native
40	Network 64.40.0.0/??
48	Network 64.48.0.0/??
56	Network 64.56.0.0/??
64	Network 64.64.0.0/??
72	Network 64.72.0.0/??
80	Network 64.80.0.0/??
88	Network 64.88.0.0/??
96	Network 64.96.0.0/??

Table 5: S4 – VLAN Port Allocation

VLAN ID	Switchports
96	Fa0/2 - Fa0/6
88	Fa0/7 - Fa0/14
80	Fa0/15 - Fa0/20
40	Fa0/21 - Fa0/24

Table 6: S2 – VLAN Port Allocation

VLAN ID	Switchports
48	Fa0/2 - Fa0/6
56	Fa0/7 - Fa0/14
72	Fa0/15 - Fa0/20
40	Fa0/21 - Fa0/24

Table 7: S3 – VLAN Port Allocation

VLAN ID	Switchports
48	Fa0/2 - Fa0/4
64	Fa0/5 - Fa0/8
72	Fa0/9 - Fa0/12
80	Fa0/13 - Fa0/20
40	Fa0/21 - Fa0/24