Mittuniversitetet
MID SWEDEN UNIVERSITY

DT153G Network Technology A

Laboratory Assignment II

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Contents

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

Maximum points 30

Questions 5

The Internship – Part IV

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

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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 and DHCP.
- Configure a switch to perform the same functionality as is usually performed by routers.

3 Reading instructions

Before starting laboratory assignment 2, you should first have finished homework assignment II.

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.

Table 1: Age-range per subnet

Year of birth
40 - 47 (Guest network)
48 - 55
56 - 63
64 - 71
72 - 79
80 - 87
88 - 95
96 - (1)03

4.1 Improving the quality of life

The IP-address setup in use, is a bad attempt to give each employee their date of birth as their IP-address. You are not allowed to change this setup, therefore in this lab you need to take this into account while creating the subnets.

By random happenstance, the grouping of employees have been naturally grouped based on their age, hence, everyone in each department are roughly at the same age.

You start by grouping the employees into subnets based on the type of work they have. You see that they are *grouped in age-ranges of eight years.*

Based on this you, need to have at least *seven subnets.* However you should *also have one guest network.* You decide to follow the same style for the guest subnet. Since you also want it to be future-proof, you give the guest network the corresponding age-range 67 to 74, since there will never be any employees within this age-range. *See Table 1. Lastly, you create one administration network* to manage the network devices as well. *In total you now have nine subnets.*

(5p) 1. The format of the addressing scheme is the following: 64.YY.MM.DD/8. Using the information found in Table 1, answer the following.

   (a) What is a suitable network mask for the addressing scheme mentioned 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 SVI address documentation found in Table 3 on page 7.

(10p) 2. Sadly, even though they can be grouped into subnets based on their work, it's not possible to physically group them (I guess the horrendous age-discrimination would be to obvious then). 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 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.

(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.

(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 S1 to route between the VLANs. *Use SVI-interfaces for inter-VLAN routing* Allocate the first available address of each subnet to S1 SVI interface.

(f) Configure the IP-address settings on each PC so that you can test connectivity between the subnetworks later.

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

(h) Configure a DHCP-server on S1 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 to look at how to arrange the WAN-links between the different office locations, and the way out to the Internet.

(a) Connect S1 to R1 using a regular FastEthernet connection.

(b) Configure a *routed port* (Type no switchport in interface configuration) on S1 towards R1 and give this interface an address within the address range *32.0.0.0/29*.

(c) Perform basic configuration on R1, and ensure connectivity with S1.

(d) 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.

(5p) 4. It is now time to setup the WAN-network. This company have offices at 4 locations, and believe it or not, you are not in the main office... 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 (sadly you have no idea what networks lies behind R2, R3 and R4, so in this scenario we will assume there are none).

(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) Create static routes on all routers so they know how to reach the 64.0.0.0/8 network.

(5p) 5. Make sure you can reach all subnets from the PC's within the LAN. To do this, create one extra computer, configure it according to your own birthday, and ping one address in each subnet in the complete topology Figure 3 on page 8.

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).
- 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*.

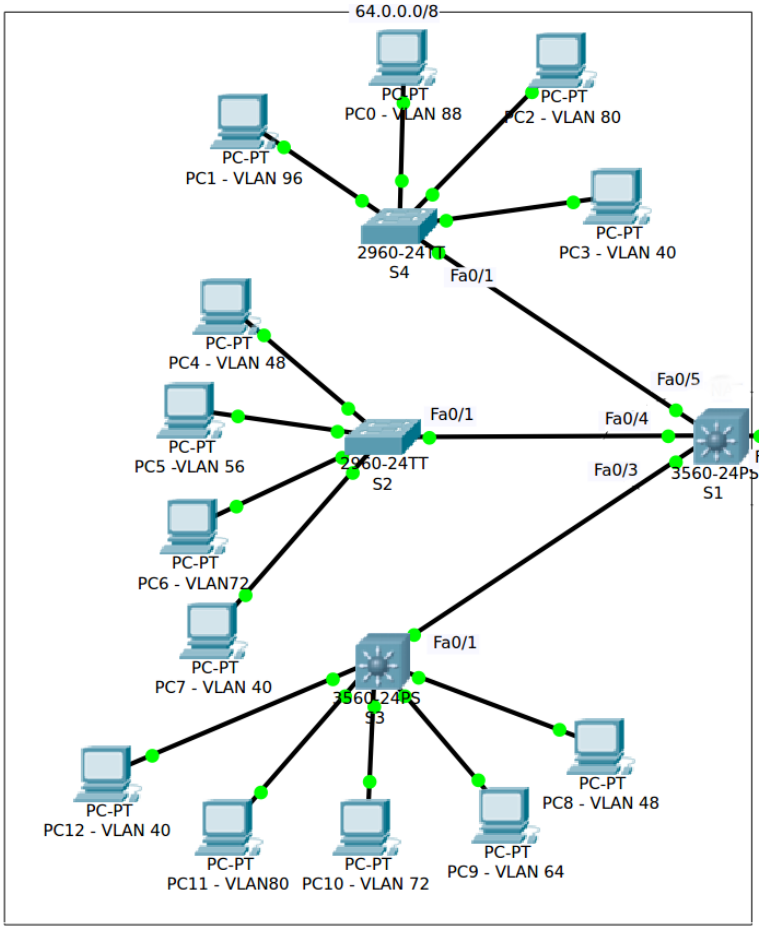

Figure 1: Logical Topology over LAN

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 (four 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

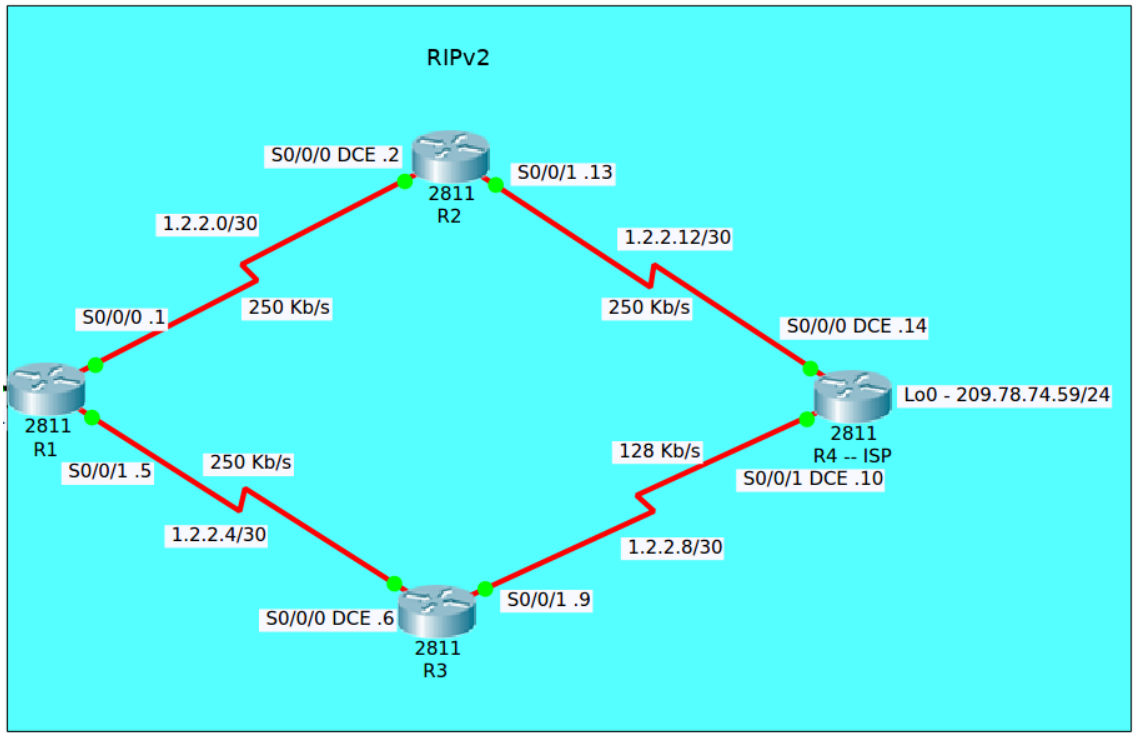

Figure 2: WAN Topology

Table 3: L2 Addressing plan II SVI

Device	Interface	IP-address	Comment
S4	VLAN 02		Administration IP-address
S2	VLAN 02		Administration IP-address
S3	VLAN 02		Administration IP-address
S1	VLAN 02		Administration IP-address
	VLAN 40		First available IP-address in subnet
	VLAN 48		First available IP-address in subnet
	VLAN 56		First available IP-address in subnet
	VLAN 64		First available IP-address in subnet
	VLAN 72		First available IP-address in subnet
	VLAN 80		First available IP-address in subnet
	VLAN 88		First available IP-address in subnet
	VLAN 96		First available IP-address in subnet

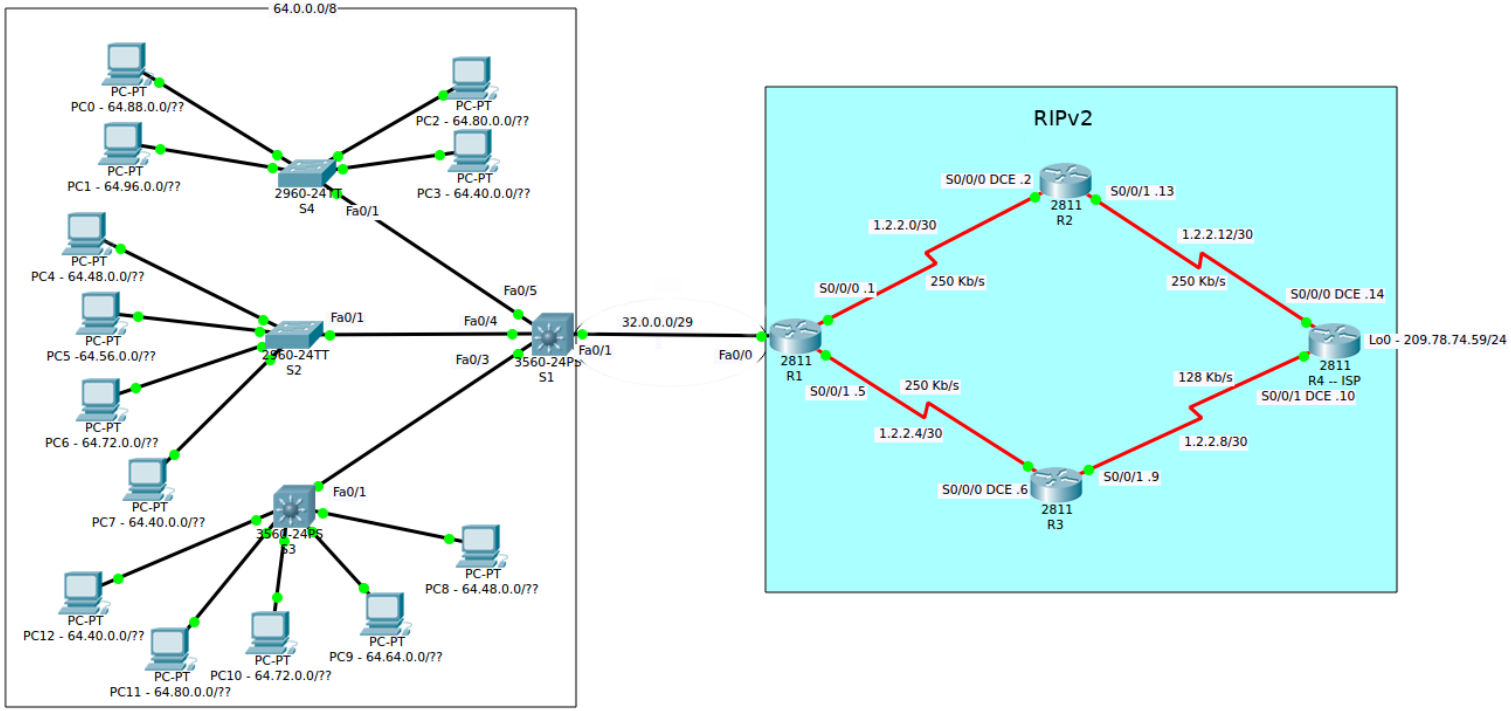

Figure 3: Complete Topology for L2

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