

Network Technology and Programming Lab

Assignment 3

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Deadline: 21/04/2024 23:59

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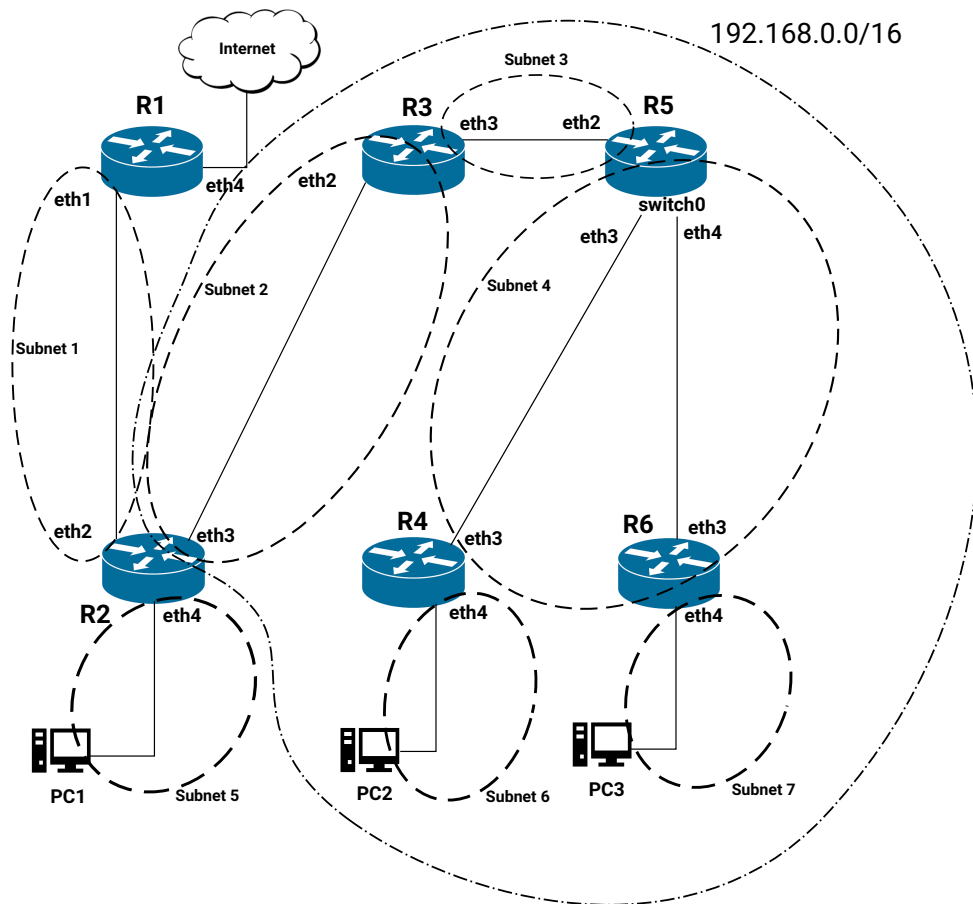


Figure 1: Assignment 3 Topology

Intro

The goal of this assignment is for you to familiarize with routing, subnetting and the CIDR notation. Because you do not have physical access to the lab, the connections have already done for you. For the PC hosts, you can use any available host of the lab. Remember that you can access any network device and host from the management VLAN, as you did in the previous assignments.

In order to avoid losing connectivity with the PC hosts, **do not delete or modify the existing IP configuration.** You can just set an additional IP using the `ip addr add` command. To revert the PC hosts in the initial configuration you can perform a reboot.

The username for the devices with full access is `hy435` and the password `hy435@csd`. For the R1 and the EdgeSwitch 24, a read only account with username `student` and password `hy435@csd` exists.

1. Set up the network

Figure 1 depicts the topology that you will setup in this assignment. Take a good look at it, and comprehend it. You will now build it step-by-step.

Configure **Subnet 1** by setting the interfaces of R1 and R2 accordingly. Do not add any additional routing table entry yet. The details of **Subnet 1** are the following:

Subnet 1: 192.168.21.0/24
R1:eth1 = 192.168.21.4
R2:eth2 = 192.168.21.3

Configure the rest of the subnets in a similar manner:

Subnet 2: 192.168.21.0/30
R3:eth2 = 192.168.21.1
R2:eth3 = 192.168.21.2

Subnet 3: 192.168.20.0/30
R3:eth3 = 192.168.20.1
R5:eth2 = 192.168.20.2

Subnet 4: 192.168.0.0/22

This subnet requires a little extra effort to setup. To reduce the number of different network devices, the interfaces eth3 and eth4 of R5 belong to the same network. However, due to a limitation of the EdgeOS, it is not possible to route traffic to specific interfaces that belong to the same network. To overcome this issue, you can use the switch functionality that the ER-X router provides. The router provides a special interface called **switch0**. Assign to this interface the eth3 and eth4 interfaces. Then assign to the **switch0** an IP and use it a normal interface.

R5:switch0 = 192.168.0.3
R4:eth3 = 192.168.0.1
R6:eth3 = 192.168.0.2

Subnet 5: 147.52.20.148/28
R2:eth4 = 147.52.20.149
PC1 = 147.52.20.150

Subnet 6: 192.168.8.0/24
R4:eth4 = 192.168.8.1
PC2 = 192.168.8.2

Subnet 7: 192.168.9.0/24
R6:eth4 = 192.168.9.1
PC3 = 192.168.9.2

2. Configure the Routing Tables

Now that your network is in place, you will need to configure the routing tables of routers R2 to R6 so that connectivity between all 3 hosts (PC1, PC2, PC3) is accomplished. In addition, PC1 should be able to reach a host on the Internet, whereas PC2 and PC3 should be able to ping **eth4** of R1.

Note that in the R1 you have read-only access, but the routing tables are already configured. If you need additional routing tables on the R1, contact the TAs.

2.1 Roadmap

The network topology that you have to build is quite complex. It is essential to build it in parts and ensure connectivity before moving on. The following roadmap will help you to achieve faster and easier your goal.

1. Configure the IP addresses and the subnets on the routers and hosts
2. Check if PC2 can reach R4. Apply proper routing tables on both host and R4
3. Check if PC3 can reach R6. Apply proper routing tables on both host and R6
4. Check if PC1 can reach R2. Apply proper routing tables on both host and R2
5. Apply routing so PC3 can reach R5
6. Apply routing so PC2 can reach R5
7. Apply routing so PC1 can reach R3
8. Apply routing so R3 and R5 can communicate
9. Apply routing so PC2,3 can reach PC1
10. Apply routing so PC1 can reach the Internet
11. Apply routing so PC2,3 can reach **eth4** of R1

Note that for accessing the equipment configuration interface, you can use the management VLAN. Details how to access the management network are available on the Assignment 1. Do not forget to backup your configuration and restore the default prior leaving the lab.

You can use the description field for the static routes in the GUI interface in order to add a short description for your set up (TIP – DO USE THAT)

Report and submission

- Report in text form all the routing tables of the hosts and the R2-R6
- Report the traceroutes for the following cases:
 - PC2 →PC3
 - PC3 →PC2
 - PC2 →PC1
 - PC3 →PC1
 - PC1 →8.8.8.8
 - PC2 →R1:eth4
 - PC3 →R1:eth4
- Can you ping 8.8.8.8 from PC2 or PC3? **Do not use the public IPs of the PCs, use the static IPs you configured.** Report and explain briefly using screenshots with ip route command.
- Submit also the configurations of the routers

Oral Examination

All the students who have submitted their exercises are requested to attend the oral exam session, in order to present their solutions. A short quiz will also take place during that time. You will need to choose a timeslot for the oral exam using Doodle. More details will be sent to you via email.

Attention

- Each team will only be examined during the timeslot choosed.
- During this session both the Assignments 3 and 4 will be examined.
- Both the timely submission and the oral exam session will contribute to the grading of the assignments.

**The submission deadline is 21/4/2024 23:59 via turnin
Have fun!**