TNE20003 – Internet and Cybersecurity for Engineering Applications

Portfolio Task – Lab 2
Distinction Task

Aims:

- To subnet a network according to the given class address and network diagram
- Build and implement an addressed network according to the given network diagram below with addressing based on your subnetting in PT
- Achieve successful end-to-end connectivity of the addressed network implemented in PT

Preparation:

- View "IP Subnetting" & "IP address and subnetting task-1" & "Network Addressing & Subnetting"
- Using Self-Directed learning find out about Default Gateways
    - What are they?
    - What are they used for?
    - How do you implement them?
    - Which device(s) are they placed on?
- Using Self-Directed learning find out about static routes
    - What are they?
    - What are they used for?
    - How do you implement them?
    - Which device(s) are they placed on?
- Static routes are vital for you to be able to achieve end-to-end Connectivity.

Task Completion

- Upon completion of this task you are required to sit the online assessment relating to this lab under the “Quizzes” tab in Canvas. You will be awarded the grade if and only if you meet the requirements. If you do not meet the requirement you will be required to sit the online test for the lower grade. For example if you did the test for a D and did not get the 80% on the 2 attempts then you may take the test for a C.

Due Date:

- IT is advised that you complete the test at the end of the lab. If you do not then the absolute deadline is before the beginning of the lab in the following week.

Task 1.

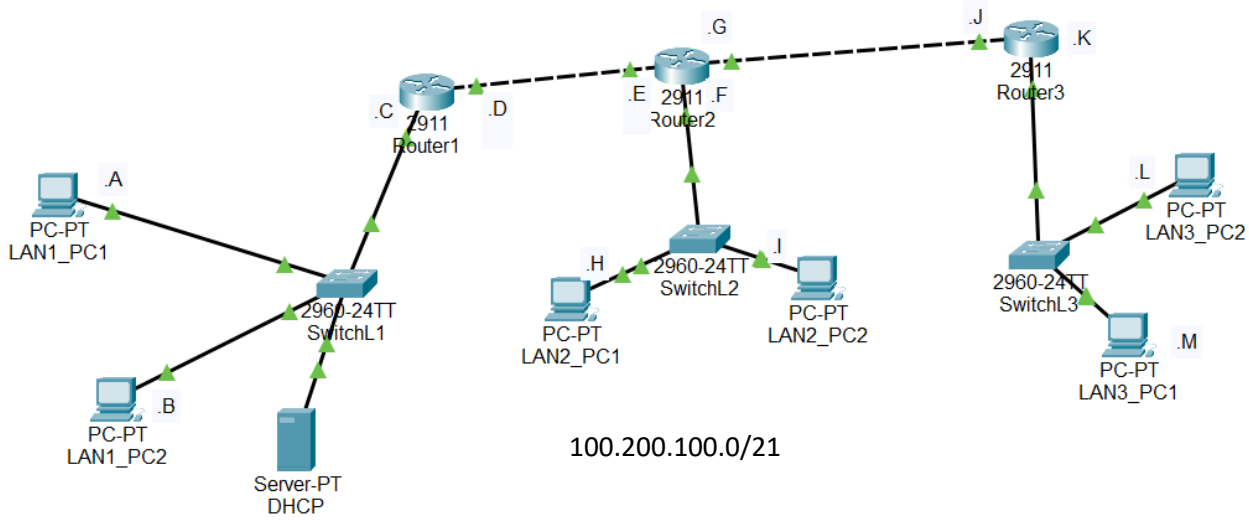
Subnet and Address a Network According to Provided Requirements

In this task, you will

- Undertake the subnetting needed for the network shown in the diagram below and provide addressing for each network/subnetwork in the diagram below.

Instructions

1. Using the examples provided in the documents under the tutorial section under modules on Canvas for this unit, carry out the relevant subnetting to completely address the network shown below.



Some things you may want to consider are:

What class of network is the given address? class A

How many networks are shown in the diagram? Identify them on the diagram. 5 networks:

R1-R2, R2-R3, LAN 1, LAN 2, LAN 3

How many host addresses are possible per network/subnetwork?

We need 5 networks -> 3 network bits need to be borrowed from the host portion (2^3 =8 > 5) -> host bits = 32 - 21 - 3 = 8 -> number of usable host per subnet = 2^8 - 2 = 254 addresses

You must complete the subnetting before class and upload it to Canvas. Your lab instructor will check your solution and advise you of any problems.

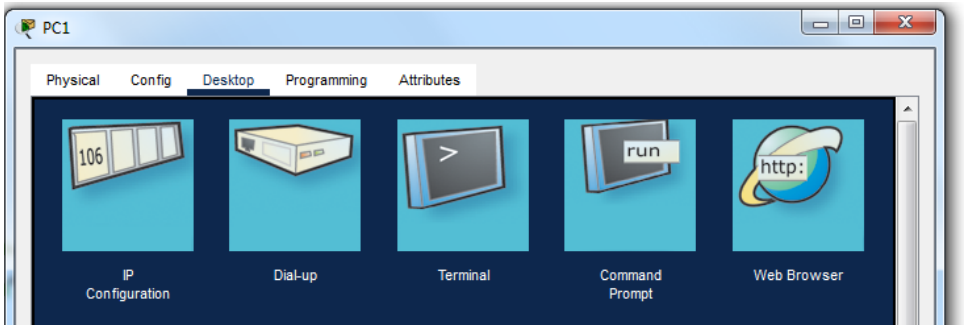
Task 2.

Build your newly addressed network on PT

- Refer to Lab2 P if you need help on how to implement the network.

Instructions:

1. Carry out some basic connectivity tests.
    a. Click on Lan1_PC1 and choose "**desktop"** and then click on the **"command prompt"**



    b. In the **"command prompt"** window type **"ping Router1.C"** ping 100.200.100.4

    c. Note what is displayed. Did the ping work?

    Yes, LAN1_PC1 can ping interface C of R1 because they are in the same network (LAN 1).

    d. In the **"command prompt"** window type **"ping LAN1_PC2"** ping 100.200.100.2

    e. Note what is displayed. Did the ping work?

    Yes, LAN1_PC1 can ping LAN1_PC2 because they are in the same network (LAN1)

f. In the **"command prompt"** window type **"ping Router1.D"**

ping 100.200.103.1

g. Note what is displayed. Did the ping work?

No, LAN1_PC1 can not ping interface D of R1 because they are in different network (LAN1_PC1 in LAN 1 network but interface D R1 in point-to-point Link 1 network).

2. Communicating to **Router1.D**

a. From task 1 above you should remember that you were not able to ping Router1.D from either LAN1_PC1 or LAN1_PC2, but you were able to ping Router1.C.

b. On Router1 issue the following command to enable you to see the **ICMP** traffic that is sent when you generate a ping or traceroute. Click on **Router1** and choose **CLI** tab at the top. Press enter, then follow the commands in the graphic below:

```
Router1>ena
Router1#debug ip icmp
ICMP packet debugging is on
Router1#
Router1#
```

Note that to move from the viewer mode (Router1>) to the enable mode (Router1#) you need to type the word **enable**.

c. Go to LAN1_PC1 and enter the following command **ping Router1.C -n 10**. This will send 10 ping packets to that n/w address. Then click on **Router1** and look at the CLI screen. What do you see???

10 identical lines: ICMP: echo reply sent, src 100.200.100.4, dst 100.200.100.1

d. This output shows that the ping packets are being sent by the PC and are arriving at **Router1**. In **Router1** hit enter a few times to enable you to separate the actions of the previous activity with the next one.

e. Now go back to LAN1_PC1 and enter the following command **ping Router1.D -n 10**. This will send 10 ping packets to that n/w address. Then click on **Router1** and look at the screen. What do you see???

Nothing appears on R1 CLI

f. What is different between steps c) and e) that might explain the different outcomes???

In step c, there is a connection verification between devices in the same network. The ping will be successful.
In step e , there is a connection verification between devices in different networks. The ping will be unsuccessful.

- You will need to investigate the reason for this outcome and troubleshoot it to find the solution and then implement the solution at each of the PCs on the 3 LANs.

The reason for this outcome is because the devices are in different subnets. To let the devices from different subnets ping each other, the default gateway must be configured in each of the end devices.

2. Once you can successfully communicate across **Router1** to the address of Router1.D, then we can look at communicating to the end PCs of LAN2 and LAN3.

- More self-directed learning will be required to determine how the packets can be transferred through the routers to the correct destinations.
- Note that there are 2 possible ways of achieving this outcome. Please use the method outlined in the "preparation" part of this lab.

Firstly, config the default gateway on all PCs with the ip of the interface on router that point to the PC's LAN. Then,
config the static routes on all routers with the command syntax: ip route {destination network address} {subnet mask} {ip of exit interface}

3. Once you have implemented the method in 2 above issue a ping from LAN1_PC2 to LAN2_PC1 and then LAN3_PC2.

- Comment on the outcome of the ping.

the successful ping (refer to packet tracer file I provided)

4. Now issue the command "**tracert"** from LAN1_PC2 to LAN2_PC2.

- Comment on the outcome of the tracert command.

The tracing route will be : the packet will come to interface on R1 pointing to LAN 1 which is LAN1_PC2 default gateway -> R2 interface pointing to R1 -> LAN2_PC2

5. You should also investigate issuing a traceroute between all endpoints (ie PCs in different LANs) of your network and record your findings.

all end devices in the network can ping each other (refer to the packet tracer file I provided)

~~~~~ End of Lab ~~~~~