BIRZEIT UNIVERSITY

Department of Electrical and Computer Engineering
ENCS3320-Computer Networks **(Project#2)**
Due date: 14/2/2023

Rules:

1. This is a group project, so you are allowed to work in groups of max 3 students.
2. You are required to use Packet Tracer to implement this project.
3. Important: each **snapshot** should include the date and time of your computer.

Submission:

1. A technical report in pdf format (only pdf format) on moodle (itc.birzeit.edu) that contains **snapshots** with detailed explanation**,** commands, runs, etc.
2. The comments and labels are required to be added to the complete topology for the .pkt file.
3. You are required to submit a compressed file (i.e. .zip file) which contains a .pkt file of the full design; one for fully connected topology without adding the access control list (ACLs)
4. If you are 4-student group, the you have to do Part5 and therefore you have to send an additional .pkt file after applying ACL

Objectives:

1. Learn how to use packet tracer.
2. Learn how to do the IP subnetting and assignment.
3. Learn how to configure HTTP, DNS, and Email servers.
4. Learn how to setup the routing algorithms on your routers.
5. Learn how to setup the VLANs on your switches and routers.
6. Learn how to setup the ACLs.

Topology:

The topology illustrates in **Figure 1** contains the following devices:
1. Routers (**2811**)
2. Switches (**2950-24**)
3. Email server (**Server-PT**)
4. DNS server (**Server-PT**)
5. WEB (HTTP) server (**Server-PT**)
6. PCs (**PC-PT**)

The topology consists of the following sub-networks:
1. Data center (Yellow): 3-servers and 2-switches.
2. Company 1 (Green): 2-PCs and 2-switches.
3. Company 2 (Blue): 2-PCs and 2-switches.

4. Home (Purple): 2-PCs and 1-switch.
5. Core (Orange): 3-routers.

First IP network
195.05.0.0/24 --> Class C
Subnet mask: 255.255.255.0
F. IP: 195.05.0.1
L. IP: 195.05.0.254

Requirements:

Part0: IP assignment and subnetting:

1. You are required to assign the IP addresses of the routers and end devices with respect to one of the student IDs in your group as follows:
   o Assume the ID is 120**12**31 then the IP is 195.**12**.0.0/24.
   o You need to create the required number of subnets using this IP.
2. Note that any solution without including the ID as above **will not be accepted**.

Part1: Building the topology

1. Build the topology using packet tracer based on your IPs found in **Part0** and do the appropriate subnetting.
2. Configure the interfaces of the three routers as instructed in the figure.
3. Configure the switches as instructed in the figure.
4. PCs in the home network (Purple) are getting their IPs in a static manner based on your assigned network IP.
5. PCs in VLANs 10 and 20 (Green and Blue) are getting IPs from router "Router0", i.e. you have to configure DHCP for each VLAN.
6. Servers in VLAN 30 in the data center network (Yellow) are getting their IPs in a static manner based on your assigned network IP.

Part2: Configuring servers and VLANs

1. Three servers are used in this topology: HTTP/WEB server, DNS server, and Email server.
2. Configure the DNS server and WEB server with domain name www.ENCS3320.com.
3. Create your website by modifying the index.html file in the HTTP server. Your website should contain:
   o "ENCS3320-My First Website" in the title
   o "Welcome to our course Computer Networks" (part of the phrase is in Red).
   o Group members' names and IDs
   o Some information about the group members. For instance, projects you have done during different course (programming, electrical, math, etc), skills, hobbies, etc.
   o Try to make the page looks nice
   o Add a link to https://www.netacad.com/courses/packet-tracer

4. Create usernames/passwords for all PCs (PC0, PC1, PC2, PC3, PC4, and PC5) in the email server (birzeit.edu.ps). The usernames are pc0, pc1, pc2, pc3, pc4, and pc5 and their passwords are same for all "123".
5. VLANs 10, 20, and 30 are created in the switches and the sub-interfaces are configured in the routera:
   a. VLAN10 is in the 1st assigned sub-network and Router0 is the gateway.   proi: 3,1,2
   b. VLAN20 is in the 2nd assigned sub-network and Router0 is the gateway.
   c. VLAN30 is in the 3rd assigned sub-network and Router0 is the gateway.
6. Primary and secondary root bridge VLANs are used as illustrated in the figure.
7. Configure the mode (access/trunk) of the switches links based on the connected devices.

Part3: Applying the routing protocols

1. You need to use routing information protocol version 2 (RIPv2) on "Router0".
2. You need to use open shortest path protocol (OSPF) on "Router2".
3. On "Router1", you are required to apply the redistribution of the RIPv2 and OSPF.

Part4: Testing the connectivity

1. Test the connectivity between all PCs. You need to take **snapshots** of the results for ping and tracert commands between all PCs.s
2. Access www.ENCS3320.com from all PCs, take **snapshots** for all cases.
3. Send emails from one PC to other PCs and take **snapshots** at the receiving PCs.
4. Show the outputs of 1,2, and 3 as **snapshots** and record them in your report with detailed explanations.

Part5: Configuring and verifying the ACLs

1. Deny host PC2 from reaching network **VLAN30**. **Verify** your work by sending a ping from PC2 to anything in network **VLAN30**.
2. Deny PC0 to make HTTP request to WEB server. **Verify** your work by accessing your website from PC0 and pinging the WEB server from PC0.
3. Prevent PC0 from accessing PC4 all other traffic is allowed.
4. Show the outputs of 1,2, and 3 as **snapshots** and record them in your report with detailed explanations.

195.02.0.64/26

After analysis: We need 4 subnets from this (origin) 195.02.0.0/24
1st: 195.02.0.0/26 --->>>Right
2nd: 195.02.0.64/26
3rd: 195.02.0.128/26
4th: 195.02.0.192/26
subnet mask: 255.255.255.192

195.02.0.192/26

Area 0

2811
Router0

2811
Router1

2811
Router2

195.02.0.0/24

2950-24
Switch0

IP'S DONE
But its DNS IPs

Primary Root Bridge VLAN 30
Secondary Root Bridge VLAN 10

Primary Root Bridge VLAN 10
Secondary Root Bridge VLAN 20

Primary Root Bridge VLAN 20
Secondary Root Bridge VLAN 10

Area 1

2950-24
Switch4

2950-24
Switch5

2950-24
Switch6

2950-24
Switch1

2950-24
CopySwitch1

2950-24
Switch2

2950-24
Switch3

VLAN 30

VLAN 10

VLAN 20

Server-PT
HTTP Server

Server-PT
DNS-Server

Server-PT
Mail Sever "kfupm.edu.sa"
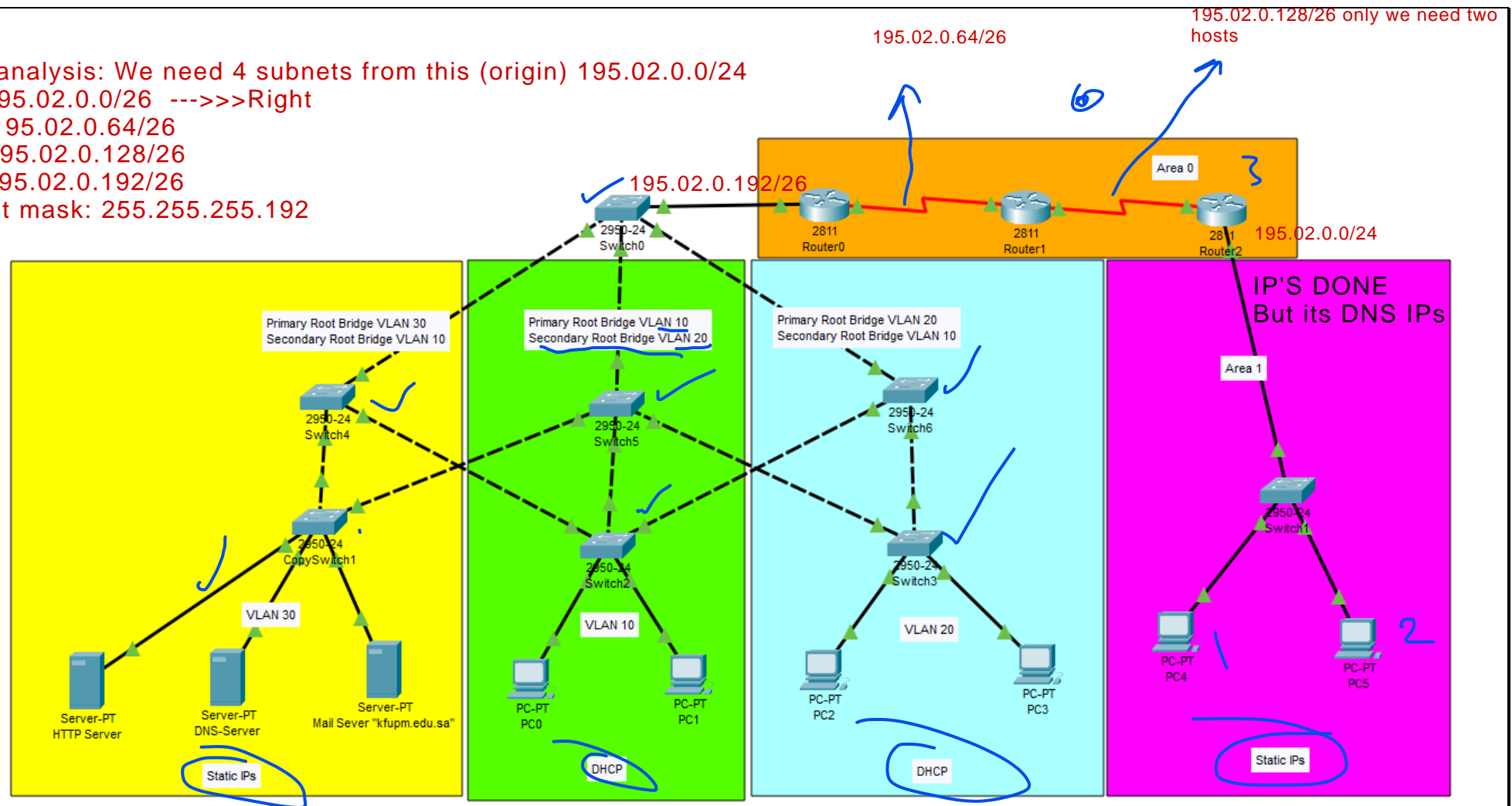
PC-PT
PC0

PC-PT
PC1

PC-PT
PC2

PC-PT
PC3

PC-PT
PC4

PC-PT
PC5

Static IPs

DHCP

DHCP

Static IPs

Figure 1: Network topology

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