



PRINCE MOHAMMAD BIN FAHD UNIVERSITY

College of Computer Engineering & Science

ITAP 2431: Network Management

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Project: VLAN, VTP and Router on a stick

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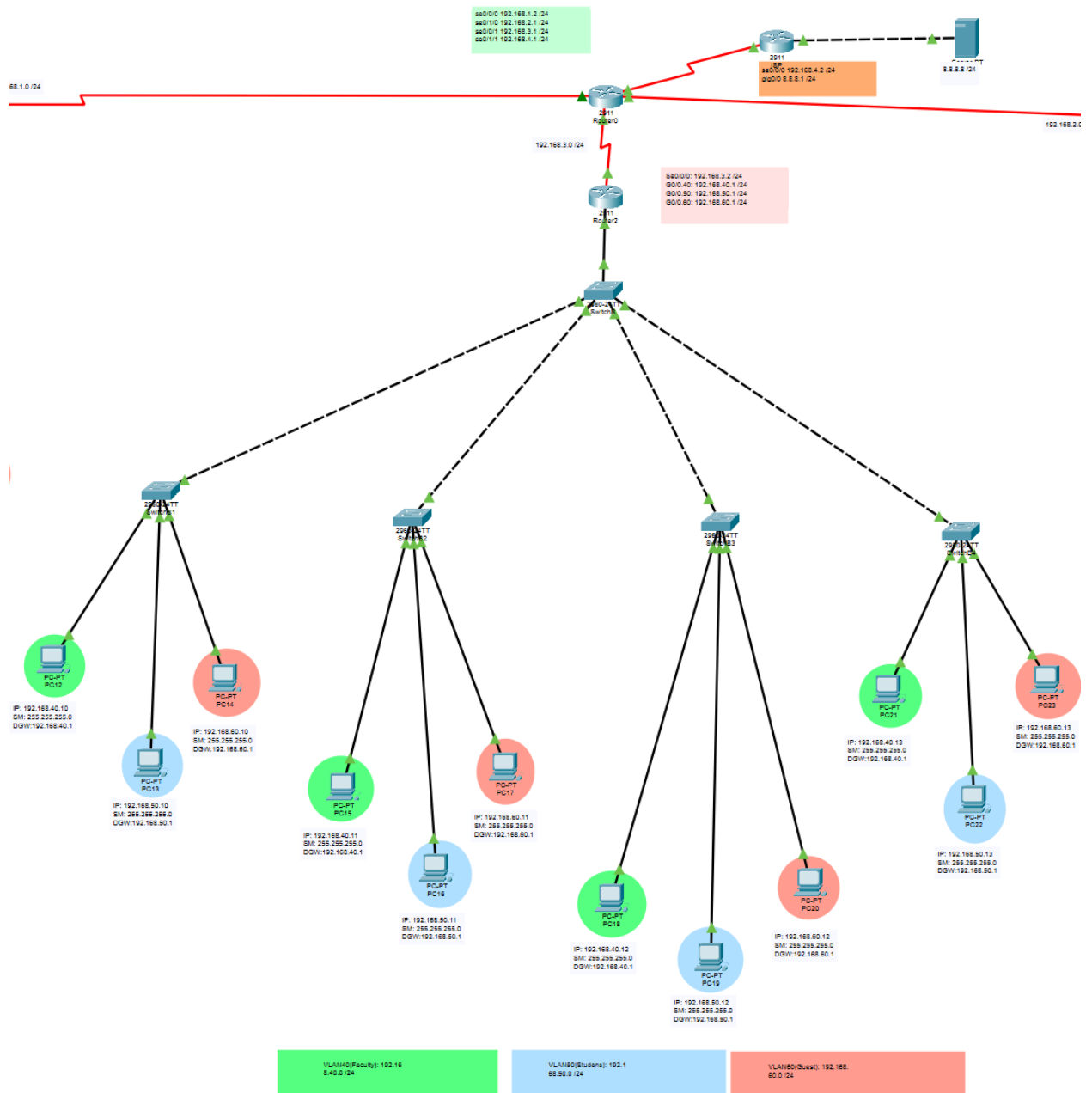
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## 1. Components & Topology:

In order to recreate a router on a stick topology on Cisco Packet Tracer using VLANs, our group used the following devices:

- 4 Routers
- 15 Switches
- 36 PCs

These devices were connected as shown below:



Note that each color corresponds to a different VLAN.

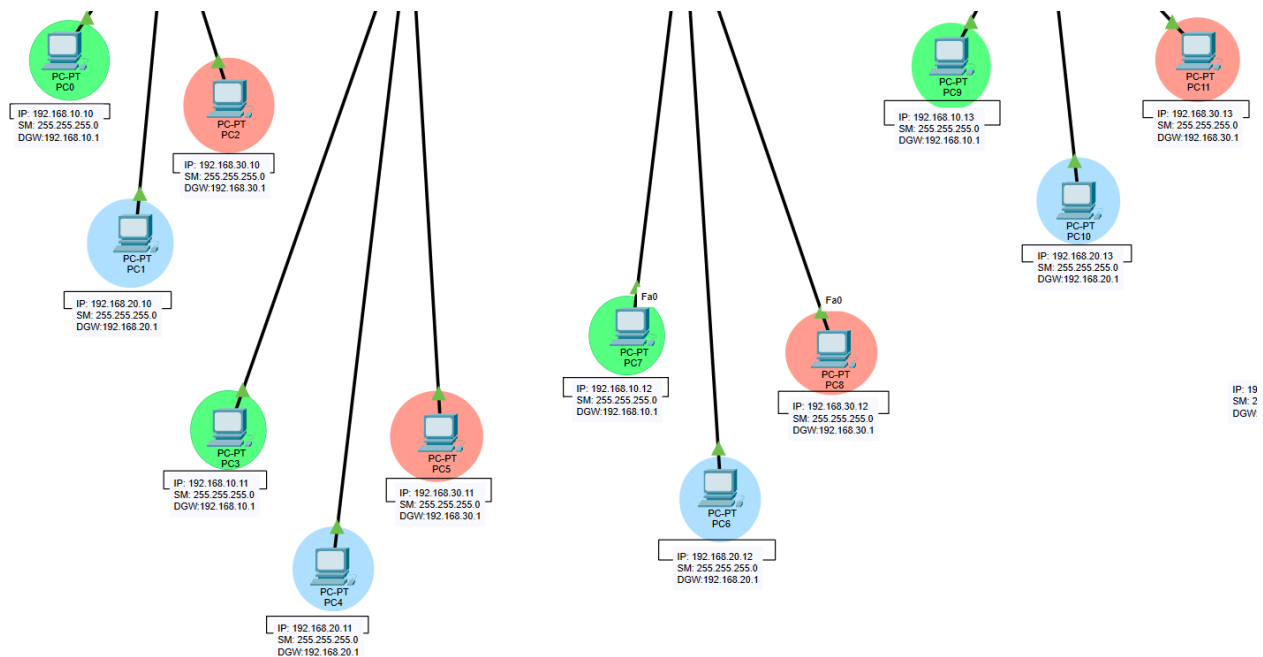
## i. VLANs:

As shown above, we implemented three distinct VLANs:

- Faculty (VLAN 10/40/70) [green]
- Students (VLAN 20/50/80) [blue]
- Guest (VLAN 30/60/90) [red]

## ii. IP Addresses:

Each individual PC was assigned a unique IP address corresponding to the network it has been assigned to:



For example, note in the above diagram that all green PCs are assigned onto network 192.169.10.0. Thus, each of the green PCs is given a host IP address from the ones available on that network such as 192.168.10.10 and 192.168.10.11.

## 2. Connectivity:

PCs within the same network can transmit to each other. In order to establish communication between PCs in different networks, we configured the VLANs as shown below:

VLAN	Name	Status	Ports
1	default	active	Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24 Gig0/1, Gig0/2
10	Faculty	active	Fa0/2
20	Students	active	Fa0/3
30	Guest	active	Fa0/4

Note that these configurations were placed onto the switches' interfaces as needed.

### i. Trunking:

In order to enable transmission between VLANs, we made the ports trunking as seen below:

```
Switch#show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Fa0/1	on	802.1q	trunking	1
Fa0/2	on	802.1q	trunking	1
Fa0/3	on	802.1q	trunking	1

### ii. VLAN Routing:

In order to establish connectivity between the routers via the following VLAN routing:

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	unassigned	YES	manual	up	up
GigabitEthernet0/0.10	192.168.10.1	YES	manual	up	up
GigabitEthernet0/0.20	192.168.20.1	YES	manual	up	up
GigabitEthernet0/0.30	192.168.30.1	YES	manual	up	up

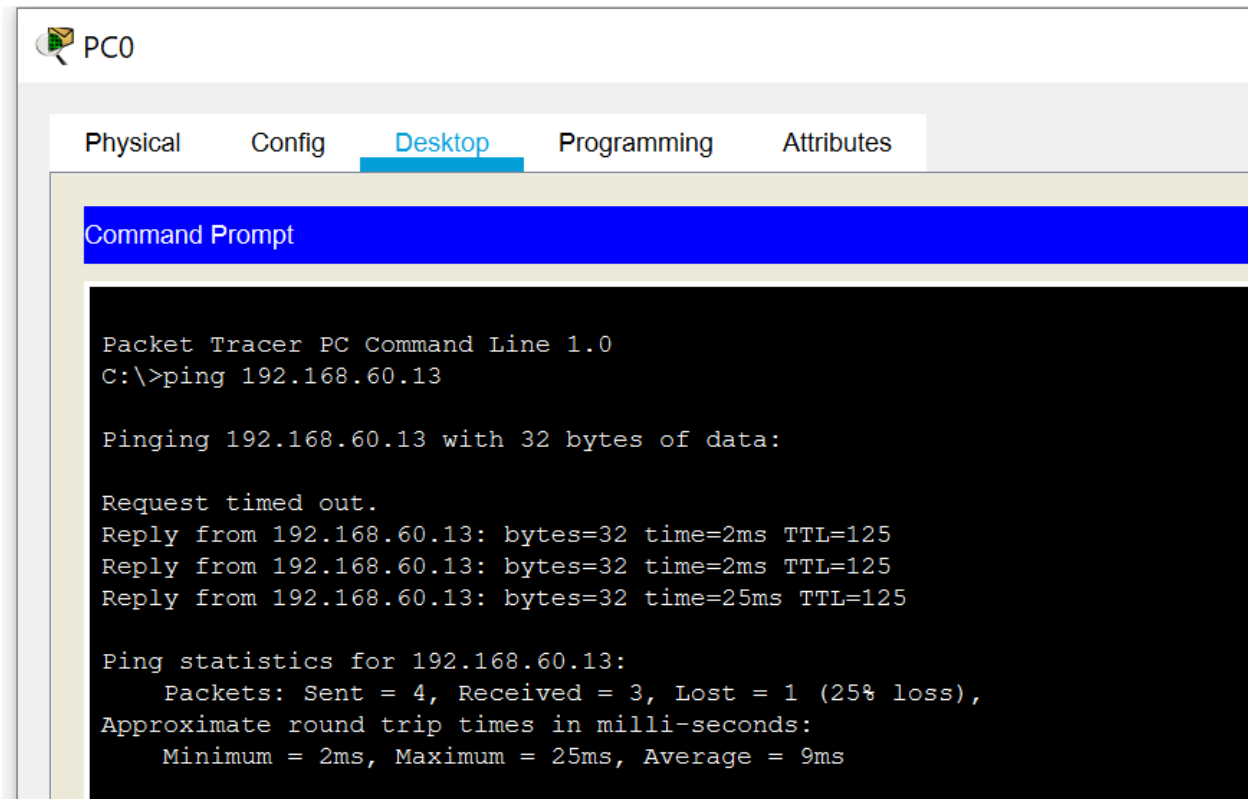
### iii. Routing Information Protocol:

Finally, we used RIP on the routers in order for them to find the fastest routes between networks:

```
R    8.0.0.0/8 [120/2] via 192.168.1.2, 00:00:20, Serial0/0/0
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.1.0/24 is directly connected, Serial0/0/0
L    192.168.1.1/32 is directly connected, Serial0/0/0
R    192.168.2.0/24 [120/1] via 192.168.1.2, 00:00:20, Serial0/0/0
R    192.168.3.0/24 [120/1] via 192.168.1.2, 00:00:20, Serial0/0/0
```

### 3. Communication Testing:

After establishing all the necessary connections and configuring protocols and addresses, we tested the network's communication by pinging PCs as shown below:



The screenshot shows the Packet Tracer interface for PC0. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The command prompt shows the execution of a ping command to 192.168.60.13. The output indicates that the ping was successful, with 3 packets received out of 4 sent, resulting in a 25% loss. The round trip times are 2ms, 2ms, and 25ms, with an average of 9ms.

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.60.13

Pinging 192.168.60.13 with 32 bytes of data:

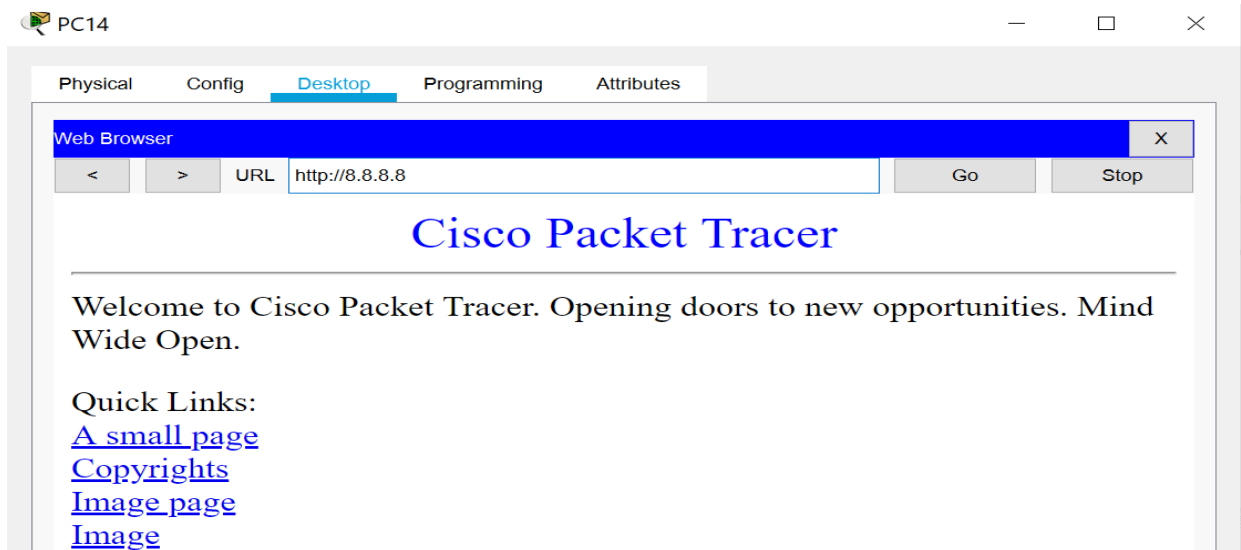
Request timed out.
Reply from 192.168.60.13: bytes=32 time=2ms TTL=125
Reply from 192.168.60.13: bytes=32 time=2ms TTL=125
Reply from 192.168.60.13: bytes=32 time=25ms TTL=125

Ping statistics for 192.168.60.13:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 25ms, Average = 9ms
```

We found that all PCs are able to communicate with other PCs, regardless of whether they are on the same network. This means we have properly established the correct routing information and protocols onto this topology

### 4. Server:

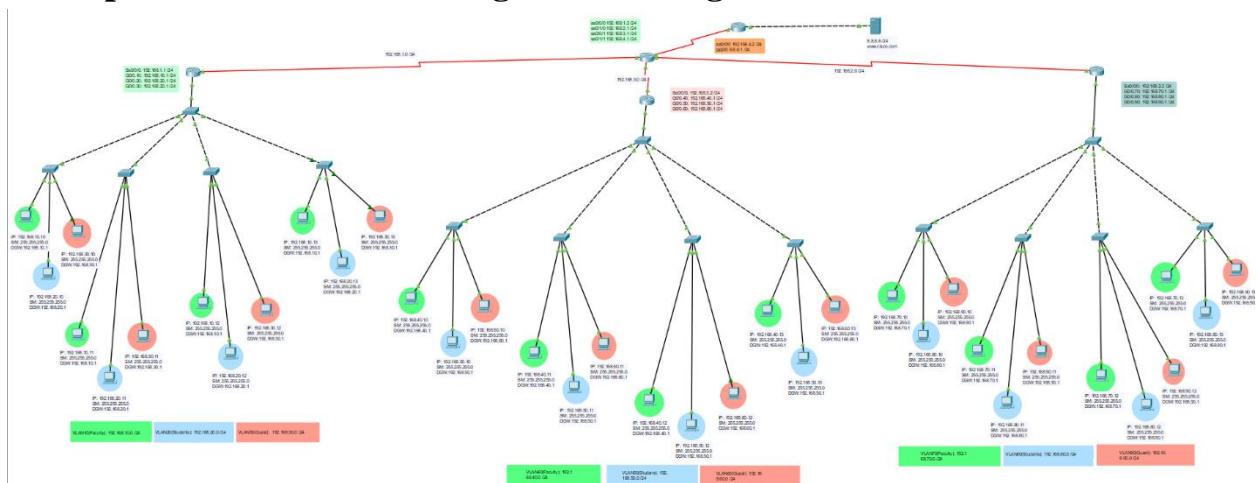
Finally, we assigned an IP address onto the server (8.8.8.8/24) and configured the DNS to resolve the following website:



## 5. Software used to simulate the network:

Cisco Packet Tracer

## 6. Snapshot of the network diagram to configure:



## 7. Technical specification of Routers and Switches used:

Routers: 2911

Switches: 2960-24TT

## **8. Roles and responsibility of each member:**

Abdulrahman Aleid: preparation of the topology and configuration of main routers, the server and first sub node tree.

Mohamed Albaqshi: configuration of the second sub node tree and power point slid preparation.

Waleed R. Alhindi: configuration of the third sub node tree and report preparation.

## **9. Commands configured at each router and switches:**

This part was included in the .txt file because it took a big space of the report.

## **10. Reference:**

<https://www.youtube.com/watch?v=qwJlypSanLc>