



**Faculty of Engineering & Technology
Electrical & Computer Engineering Department**

Computer Networks ENCS3320

Project2 Report

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Section: 3

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Abstract:

The aim of this project is to provide a comprehensive tutorial on how to effectively use Packet Tracer, a network simulation tool, and to teach the reader a range of essential networking skills. Specifically, the project focuses on teaching the reader how to perform IP subnetting and assignment, configure HTTP, DNS, and Email servers, set up routing algorithms on routers, configure VLANs on switches and routers, and set up ACLs. By following the step-by-step instructions provided in the tutorial, the reader will gain a comprehensive understanding of how to use Packet Tracer to build and manage networks, and will be well-equipped to apply these skills in a range of real-world scenarios.

Table of Contents

Theory	3
Part0: IP assignment and subnetting	3
Part1: Building the topology	4
Part2: Configuring servers and VLANs	5
Part3: Applying the routing protocols	6
Part4: Testing the connectivity	7
Procedure:	8

Theory

Part0: IP assignment and subnetting

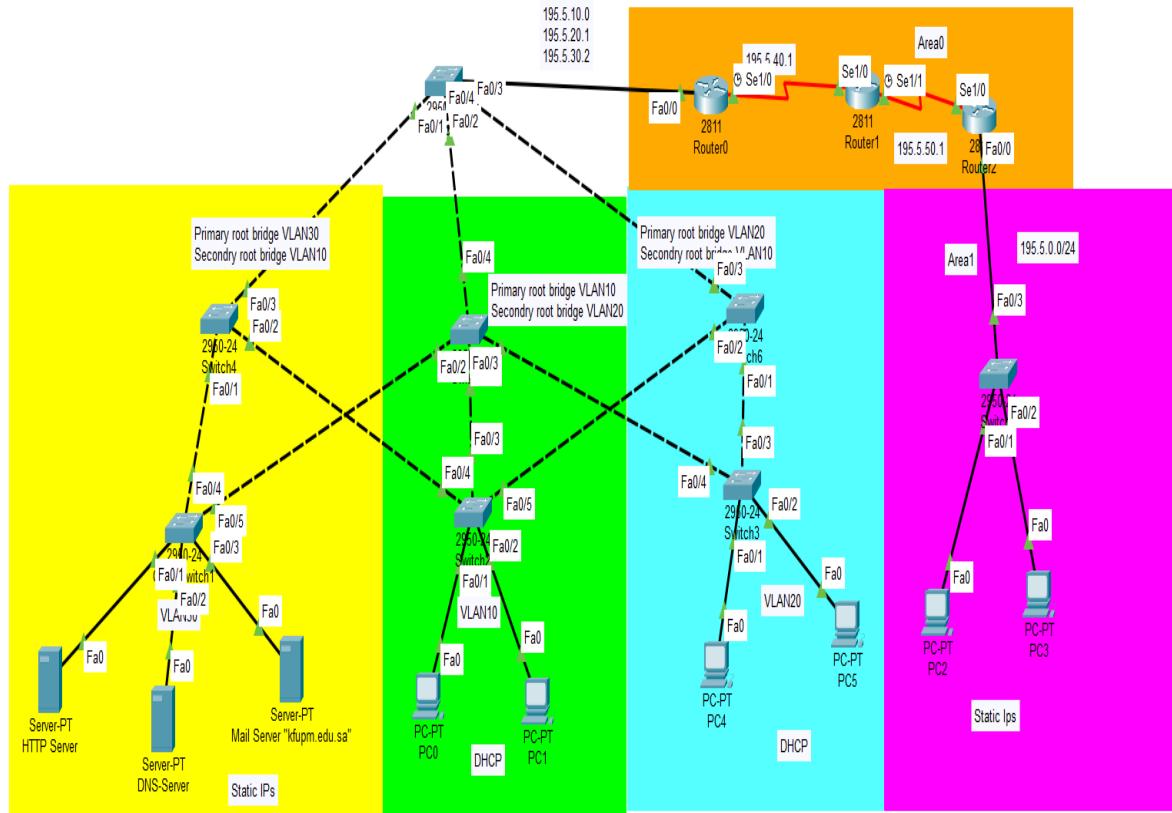
One of the student ID is 1200549,

So the IP is 195.5.0.0/24

Part1: Building the topology

This part is describing the steps for building a network topology using the Cisco Packet Tracer software. The topology includes three routers, switches, PCs, and servers, which are organized into four VLANs (virtual local area networks): a home network (Purple), two user VLANs (Green and Blue), and a server VLAN (Yellow).

We Use the IP addresses assigned in Part 0 to perform subnetting and create the network topology. We configure the interfaces of the three routers according to the instructions in the figure. We configure the switches based on the instructions in the figure. We Assign static IP addresses to PCs in the home network (Purple) using the assigned network IP. We Configure DHCP on "Router0" to assign dynamic IP addresses to PCs in VLANs 10 and 20 (Green and Blue). Assign static IP addresses to servers in VLAN 30 in the data center network (Yellow) using the assigned network IP.



Part2: Configuring servers and VLANs

the project involves configuring servers and VLANs. In this topology, three servers are used: HTTP/WEB server, DNS server, and Email server. The DNS and WEB servers are configured with the domain name www.ENCS3320.com. The HTTP server is then modified to create a website that contains information about the group members, their projects, skills, and hobbies. A link to <https://www.netacad.com/courses/packet-tracer> is also added. Usernames and passwords are created for all PCs in the email server. VLANs 10, 20, and 30 are created in the switches, and sub-interfaces are configured in the router. VLAN10, VLAN20, and VLAN30 are assigned to the 1st, 2nd, and 3rd sub-networks respectively, with Router0 as the gateway. The mode (access/trunk) of the switches links is then configured based on the connected devices. Understanding how to configure servers and VLANs is crucial in network design and management, as it enables network administrators to segment their network into smaller, more manageable parts and configure the various servers required for network communication and resource sharing.

Part3: Applying the routing protocols

In this section of the project, we will apply routing protocols to the network using Packet Tracer. Specifically, we will configure the following protocols on the designated routers:

- On "Router0", we will use Routing Information Protocol version 2 (RIPv2) to enable dynamic routing. RIPv2 is a simple protocol that uses hop count as the metric to determine the best path to a destination network.
- On "Router2", we will use Open Shortest Path First (OSPF), which is a more advanced routing protocol that uses a hierarchical structure and a more sophisticated algorithm to determine the best path to a destination network.
- On "Router1", we will apply the redistribution of the RIPv2 and OSPF protocols. Redistributing the routing information between RIPv2 and OSPF will enable the routers to share routing information between the two protocols and provide connectivity between the networks.

By configuring these routing protocols on the designated routers, we will be able to provide a reliable and efficient routing solution for the network.

Part4: Testing the connectivity

To ensure the network is properly configured and connected, various tests were conducted on the topology. First, the connectivity between all PCs was tested using the ping and tracert commands. Snapshots of the results were taken for all PC pairs to verify successful communication.

Next, the website www.ENCS3320.com was accessed from all PCs to test connectivity to the HTTP/WEB server. Snapshots were taken for all cases to confirm successful access.

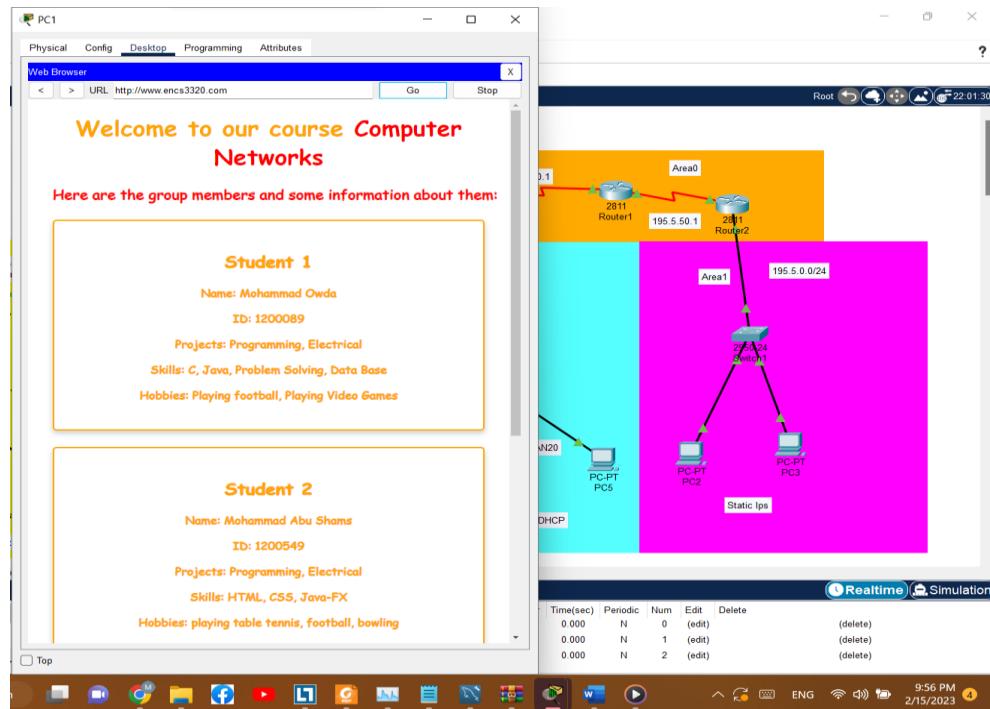
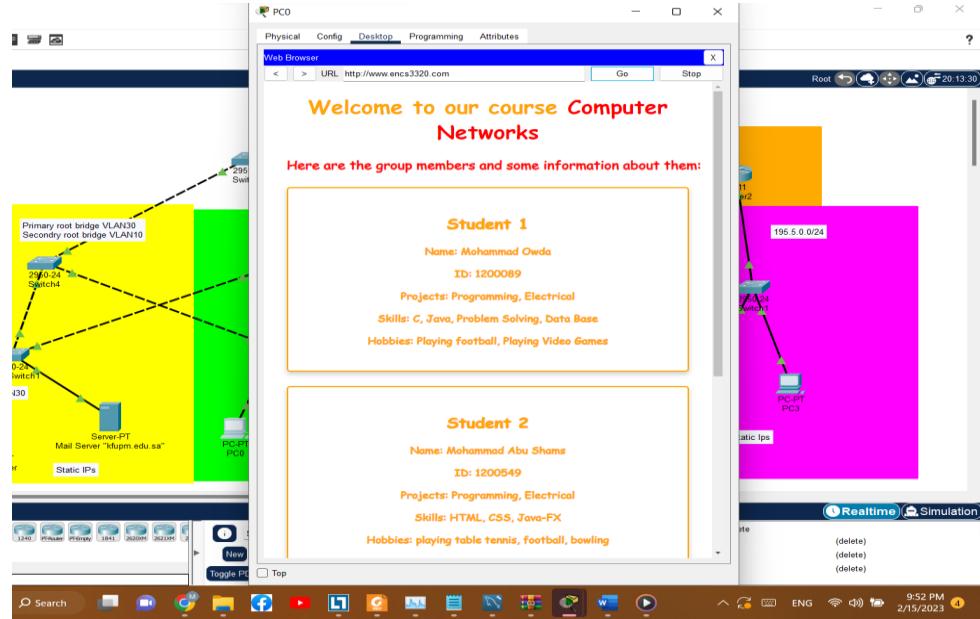
Email functionality was also tested by sending emails from one PC to other PCs using the Email server configured earlier. Snapshots were taken at the receiving PCs to verify the successful receipt of emails.

All the results of the tests were recorded in the report with detailed explanations, accompanied by the corresponding snapshots. This ensured that the objectives of the project were met and that the network topology was fully functional.

Procedure:

Testing the connectivity:

Accessing www.encs3320.com:



PC4

Physical Config Desktop Programming Attributes

Web Browser URL: http://www.encts3320.com Go Stop

Welcome to our course Computer Networks

Here are the group members and some information about them:

Student 1

Name: Mohammad Owda
ID: 1200089
Projects: Programming, Electrical
Skills: C, Java, Problem Solving, Data Base
Hobbies: Playing football, Playing Video Games

Student 2

Name: Mohammad Abu Shams
ID: 1200549
Projects: Programming, Electrical
Skills: HTML, CSS, Java-FX
Hobbies: playing table tennis, football, bowling

Area0: Router1 (2811), 195.5.50.1, Router2 (2811), 195.5.50.1

Area1: Router2 (2811), 195.5.0.0/24, Switch1 (2812), 2910, PC2, PC3

PCs: PC-PT PC5, PC-PT PC2, PC-PT PC3

Static IPs: Static Ips

Time(sec)	Periodic	Num	Edit	Delete
0.000	N	0	(edit)	(delete)
0.000	N	1	(edit)	(delete)
0.000	N	2	(edit)	(delete)

Realtime Simulation

9:57 PM 2/15/2023

PC5

Physical Config Desktop Programming Attributes

Web Browser URL: http://www.encts3320.com Go Stop

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Area1: Router2 (2811), 195.5.0.0/24, Switch1 (2812), 2910, PC2, PC3

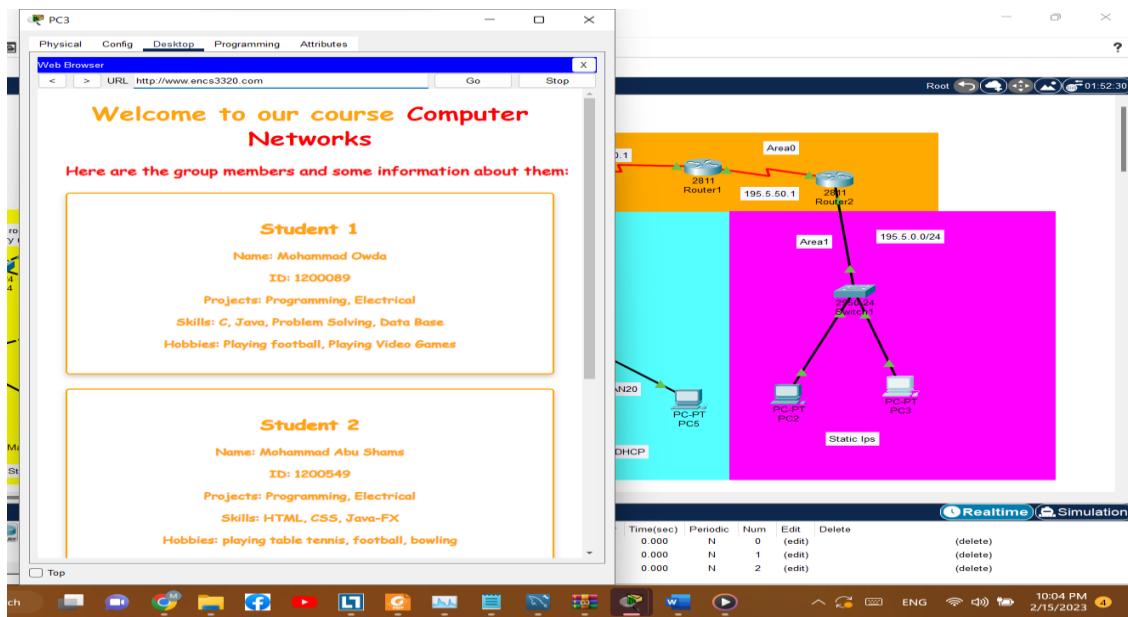
PCs: PC-PT PC5, PC-PT PC2, PC-PT PC3

Static IPs: Static Ips

Time(sec)	Periodic	Num	Edit	Delete
0.000	N	0	(edit)	(delete)
0.000	N	1	(edit)	(delete)
0.000	N	2	(edit)	(delete)

Realtime Simulation

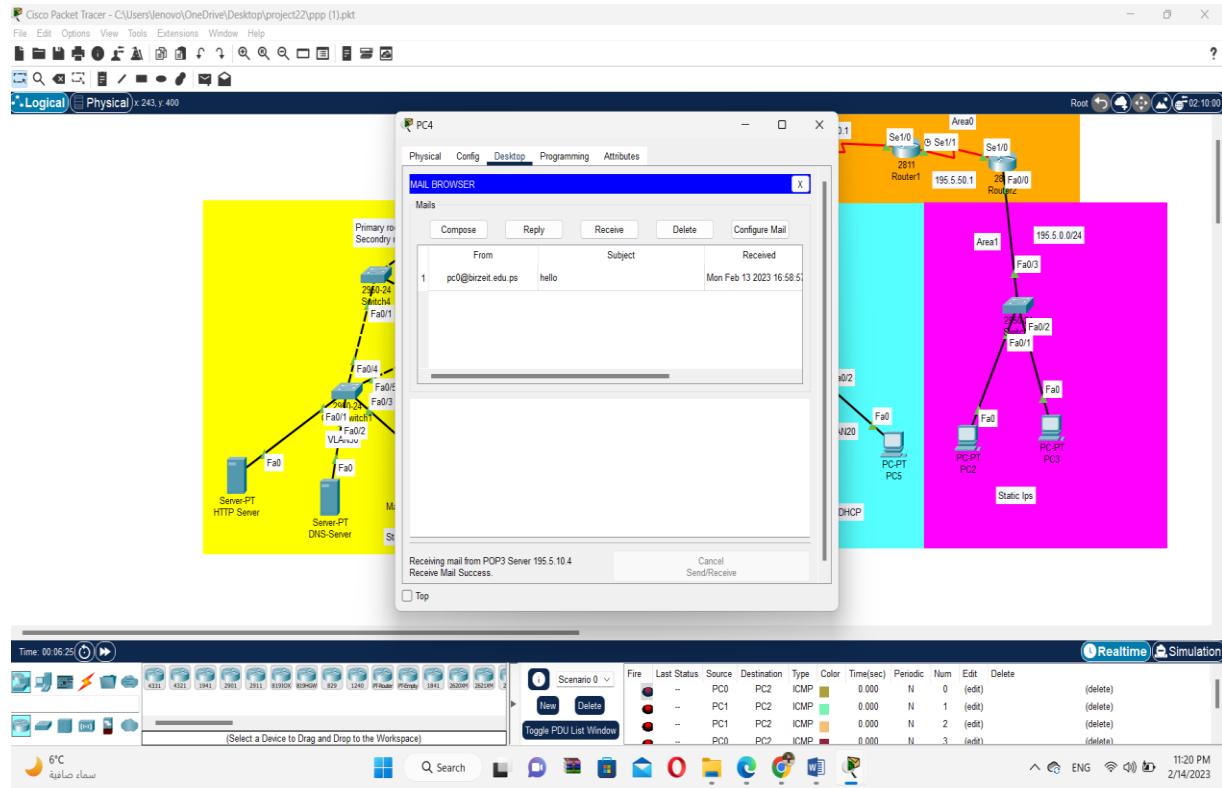
10:01 PM 2/15/2023



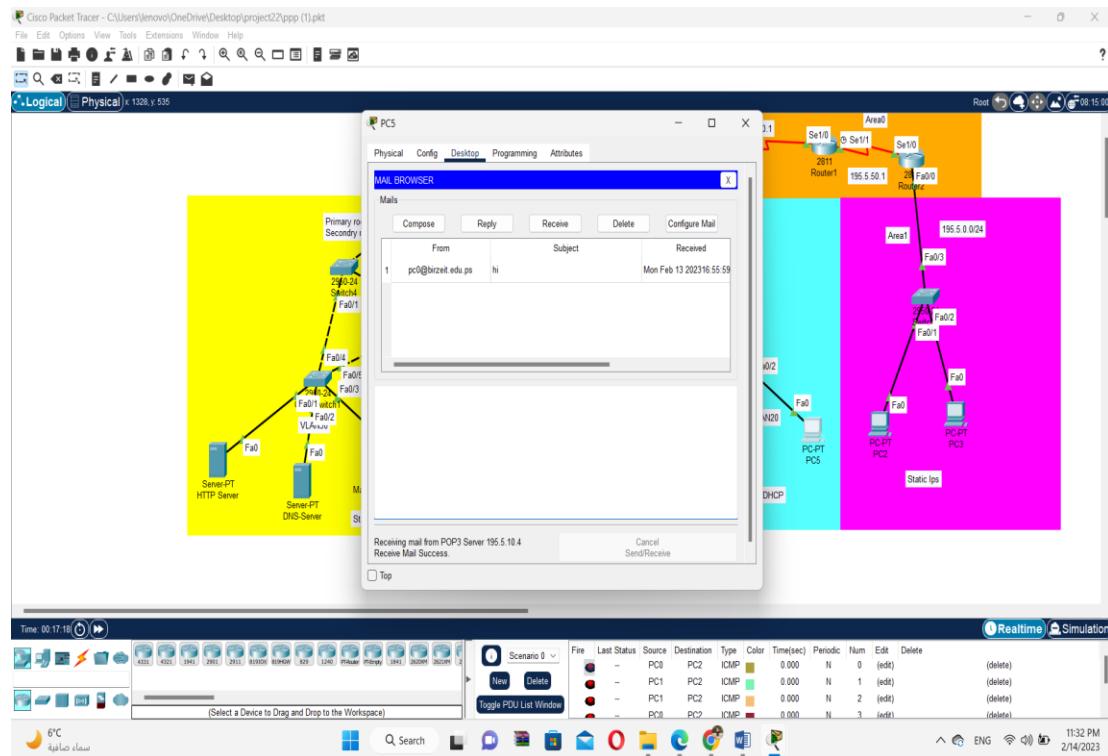
This is the HTML page in that's requested from the PCs through www.encts3320.com which we get the IP of this host name from the DNS server which map the host name to the IP

Sending Emails to PCs:

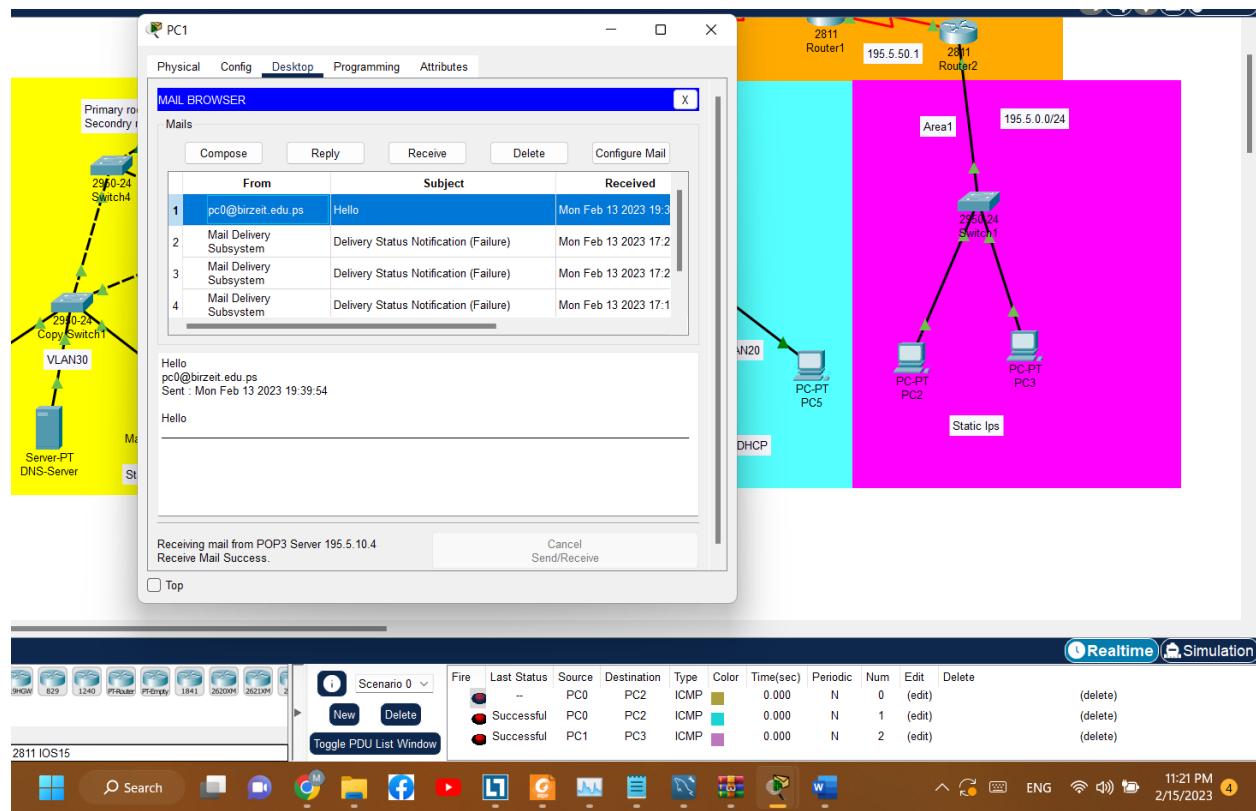
Send email from PC0 to PC4



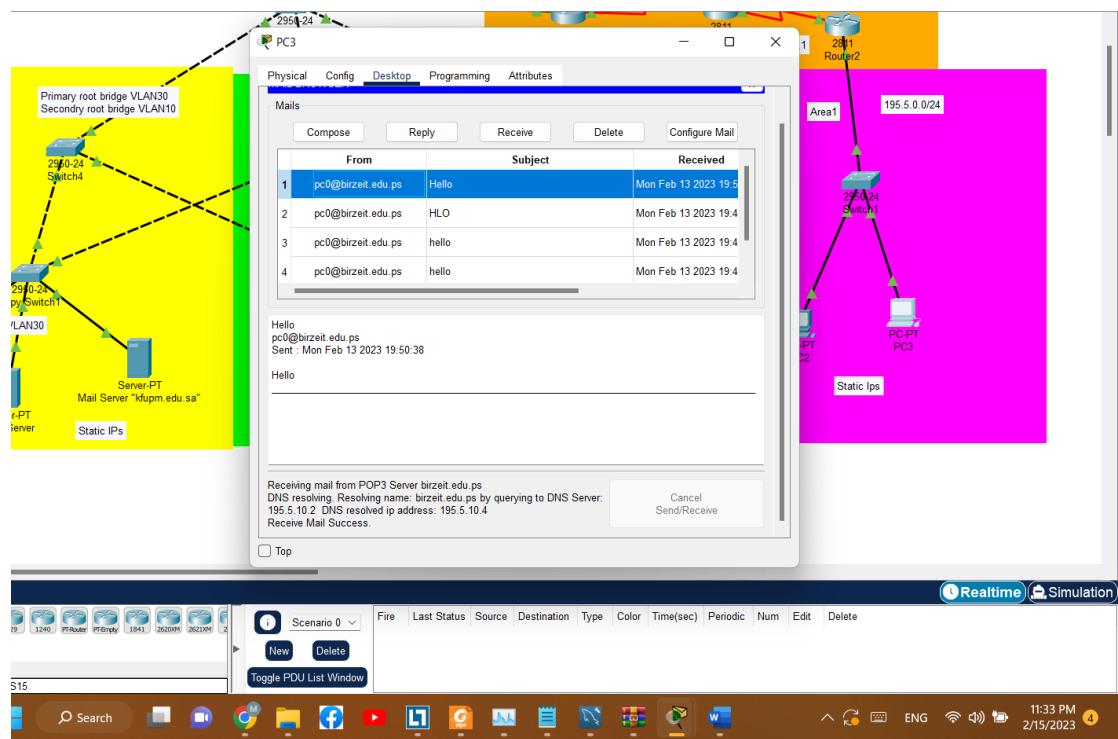
Send email PC0 to PC5:



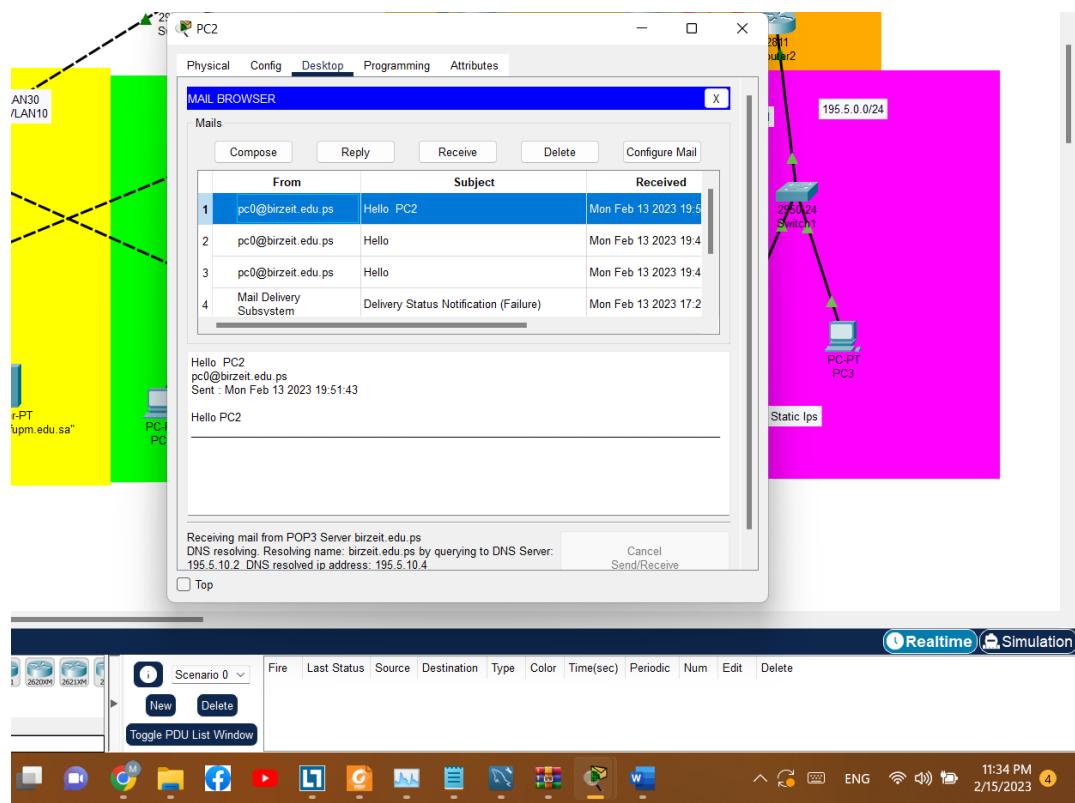
Send Email from PC0 to PC1:



Send Email from PC0 to PC3:



Send Email from PC0 to PC2:



Ping Between PCs:

Ping from PC3 to PC1 and PC0:

The screenshot shows a network monitoring application interface with a command prompt window open. The command prompt window displays ping results for two hosts, 195.5.30.3 and 195.5.30.2. The main window lists traffic entries with columns for Fire, Last Status, Source, Destination, Type, Color, Time(sec), Periodic, Num, Edit, and Delete.

Command Prompt

```
C:\>
C:\>
C:\>
C:\>ping 195.5.30.3

Pinging 195.5.30.3 with 32 bytes of data:

Reply from 195.5.30.3: bytes=32 time=17ms TTL=125
Reply from 195.5.30.3: bytes=32 time=3ms TTL=125
Reply from 195.5.30.3: bytes=32 time=20ms TTL=125
Reply from 195.5.30.3: bytes=32 time=11ms TTL=125

Ping statistics for 195.5.30.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 20ms, Average = 12ms

C:\>ping 195.5.30.2

Pinging 195.5.30.2 with 32 bytes of data:

Reply from 195.5.30.2: bytes=32 time=22ms TTL=125
Reply from 195.5.30.2: bytes=32 time=20ms TTL=125
Reply from 195.5.30.2: bytes=32 time=10ms TTL=125
Reply from 195.5.30.2: bytes=32 time=15ms TTL=125

Ping statistics for 195.5.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 10ms, Maximum = 22ms, Average = 16ms

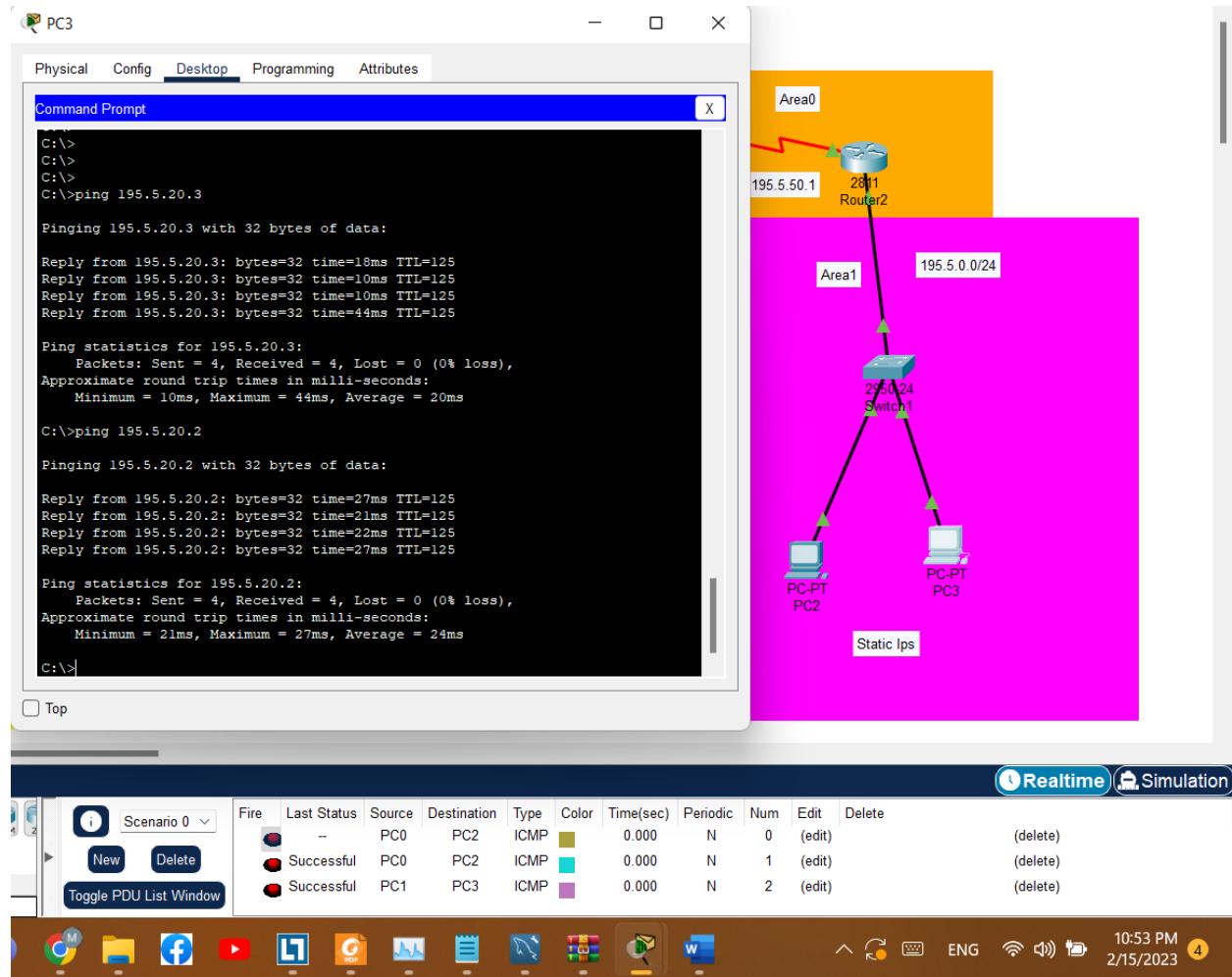
C:\>
```

Top

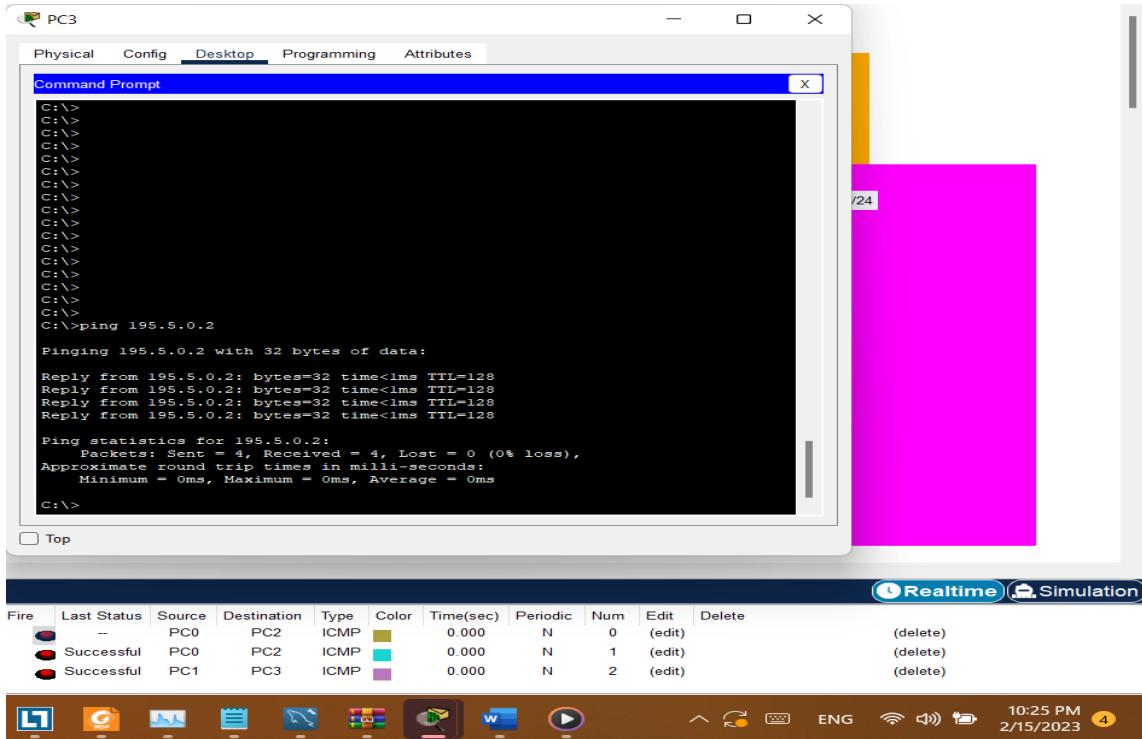
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
●	--	PC0	PC2	ICMP	Yellow	0.000	N	0	(edit)	(delete)
●	Successful	PC0	PC2	ICMP	Cyan	0.000	N	1	(edit)	(delete)
●	Successful	PC1	PC3	ICMP	Purple	0.000	N	2	(edit)	(delete)

Realtime Simulation 10:24 PM 2/15/2023

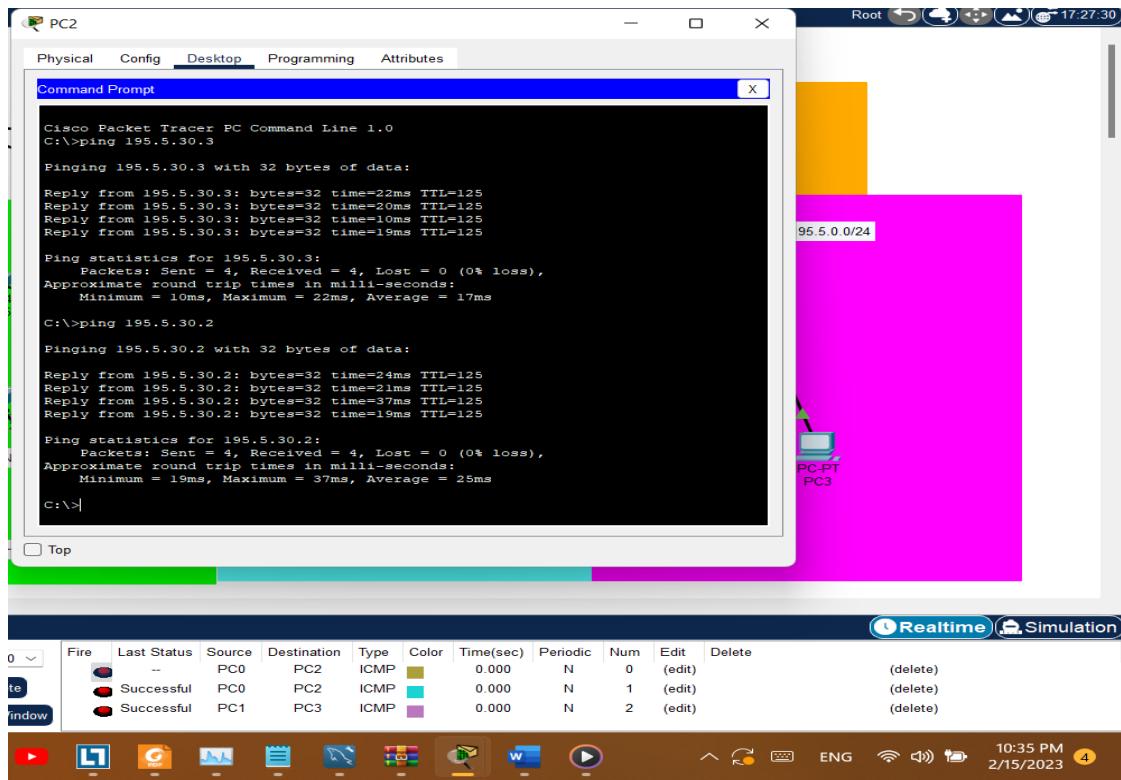
Ping from PC3 to PC4 and PC5:



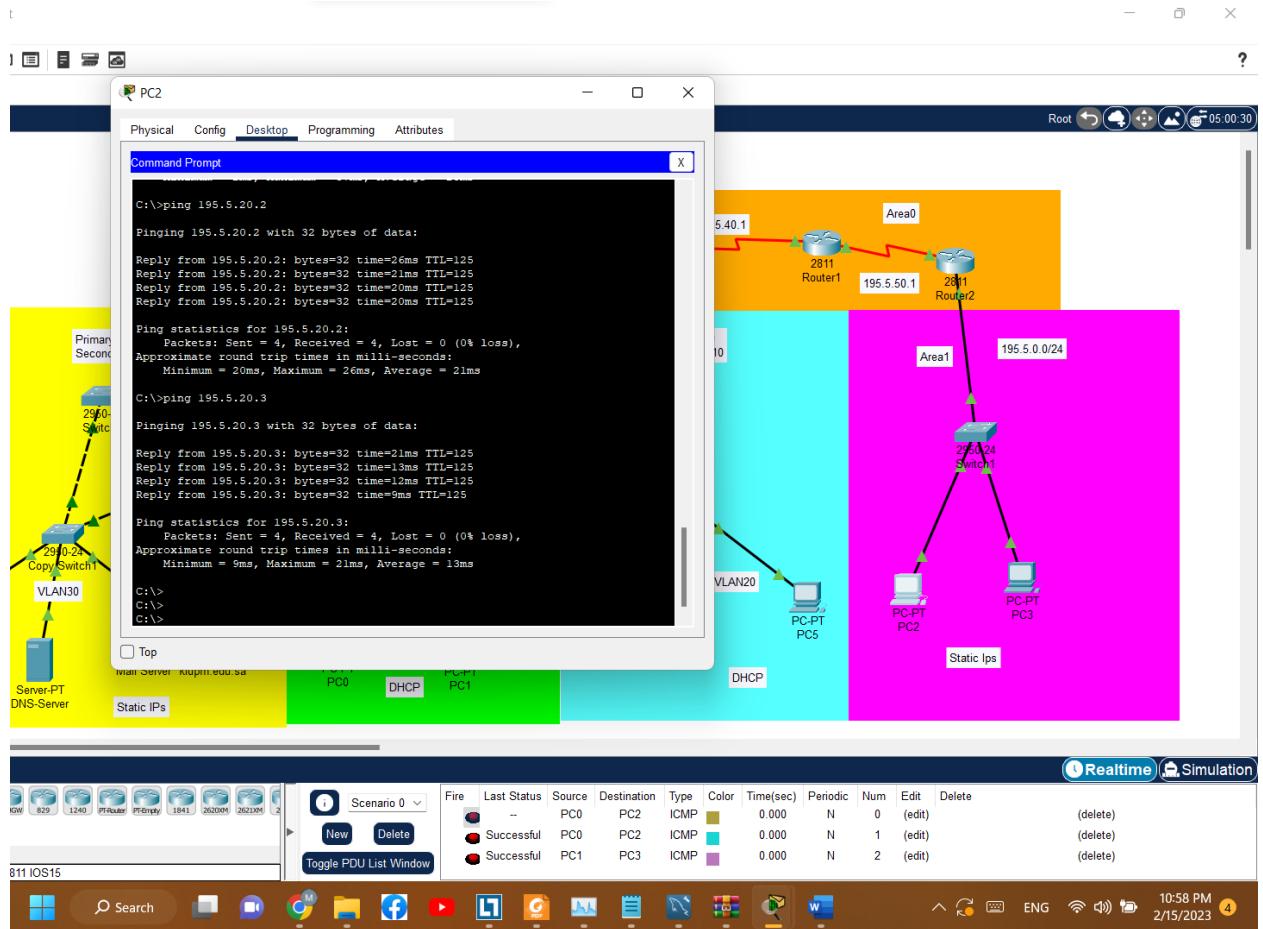
Ping from PC3 to PC2:



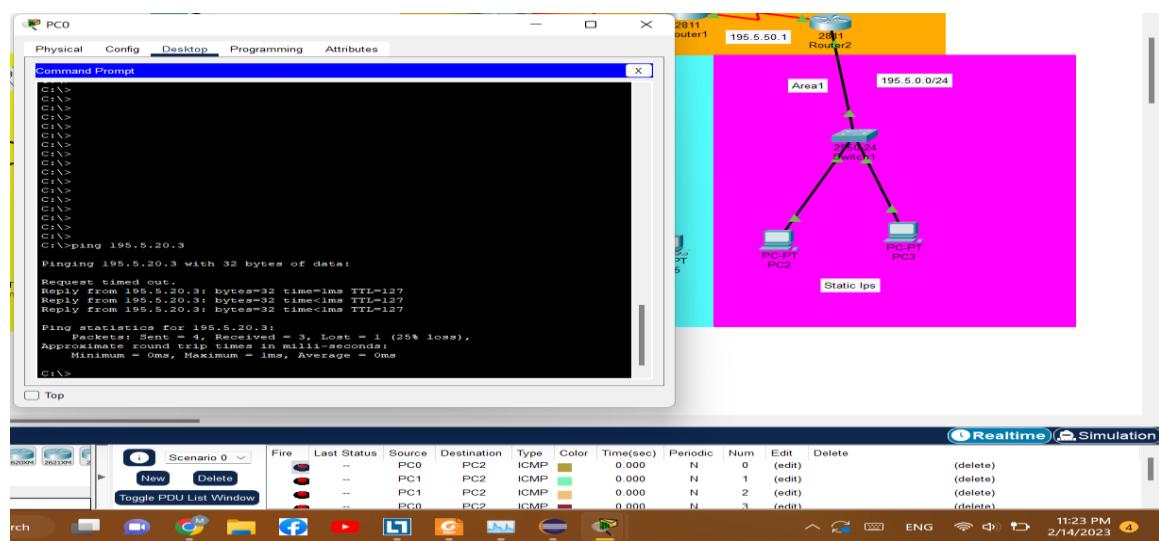
Ping from PC2 to PC0 and PC1:

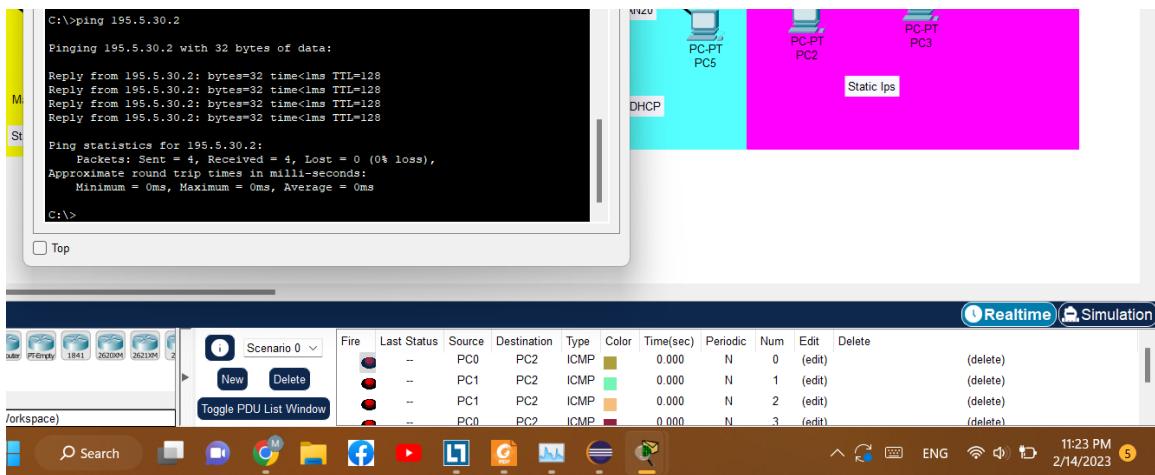


Ping from PC2 to PC4 and PC5:

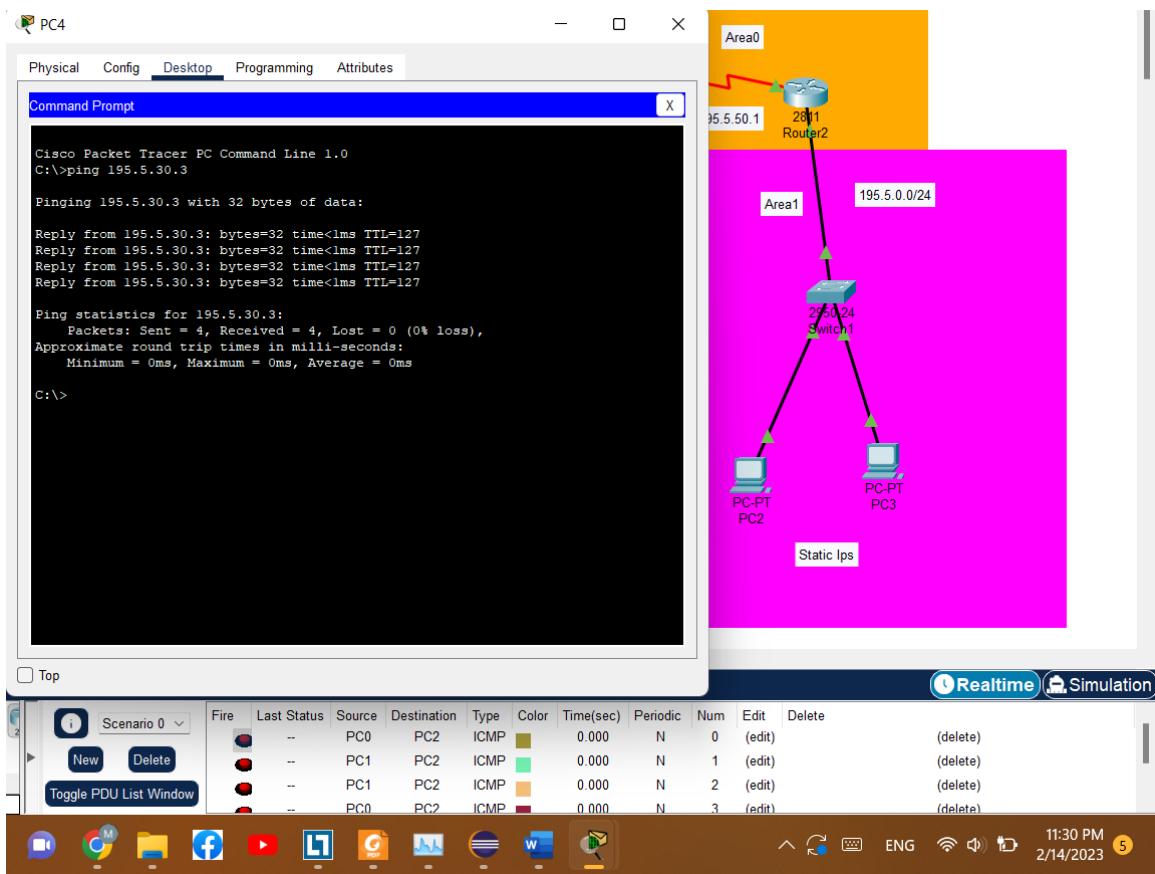


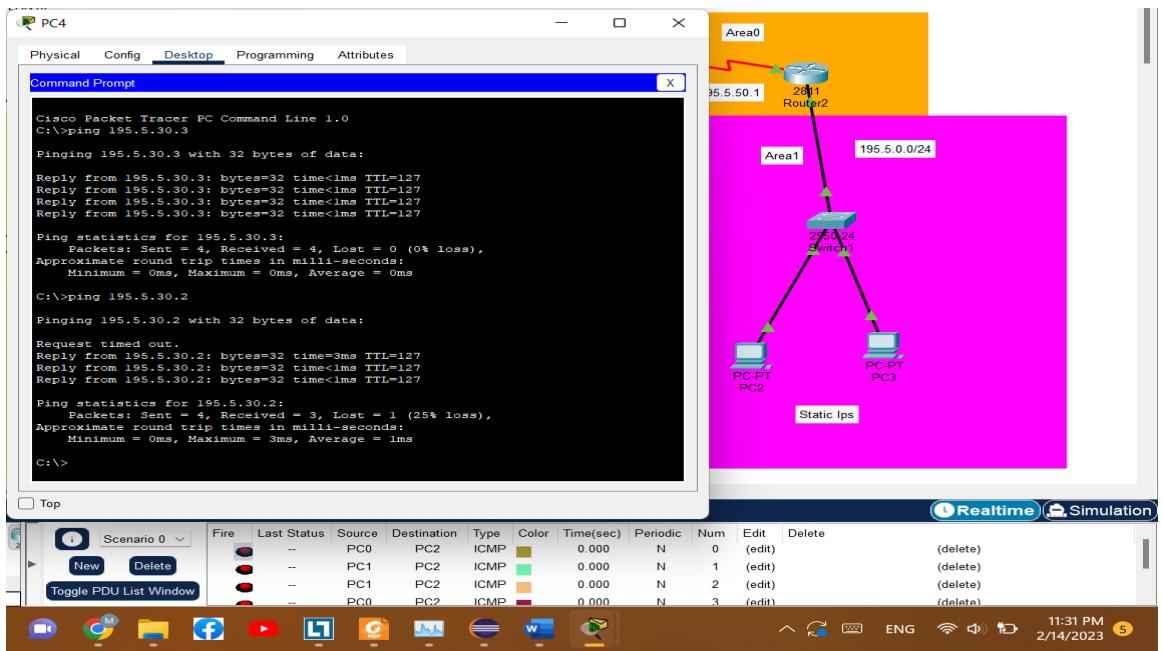
Ping from PC0 to PC4 and PC5



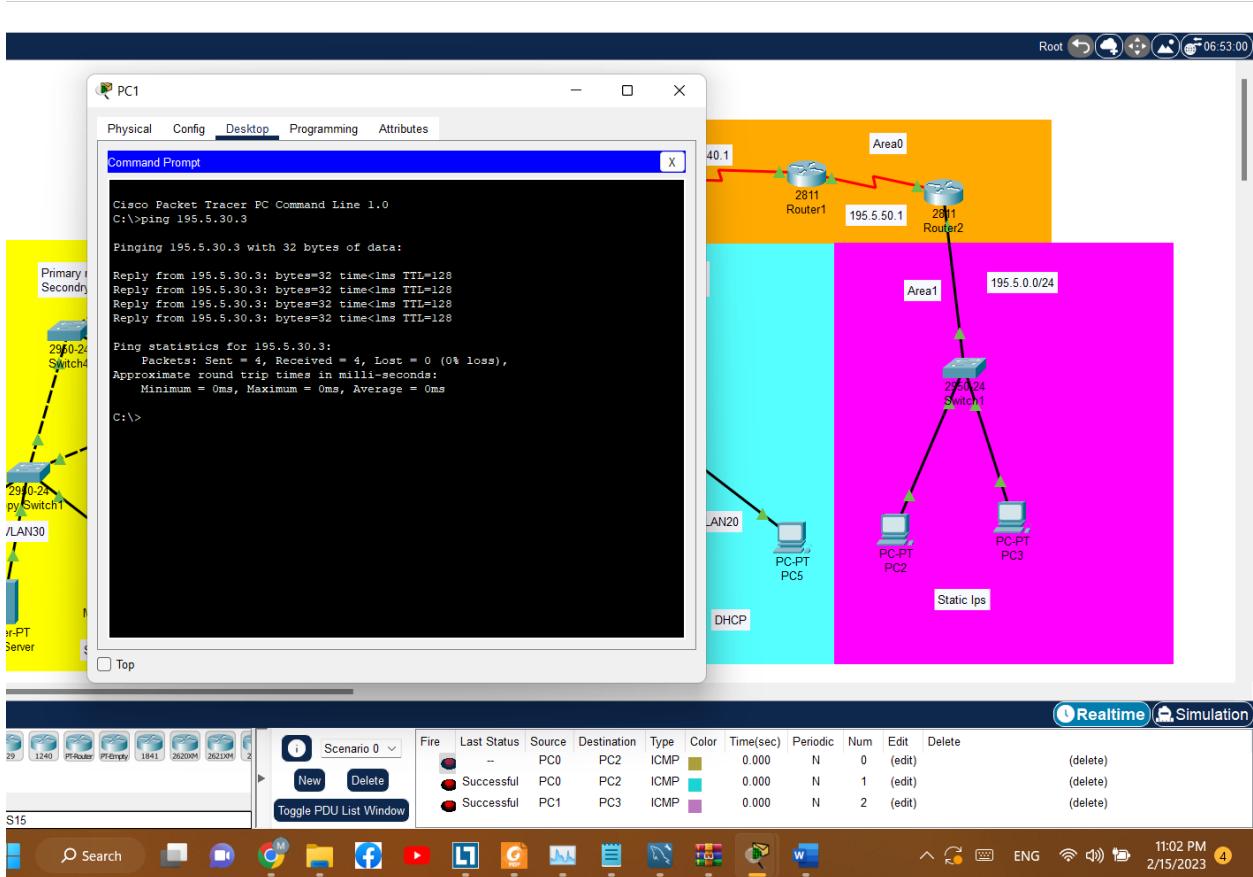


Ping From PC4 to PC1 and PC0

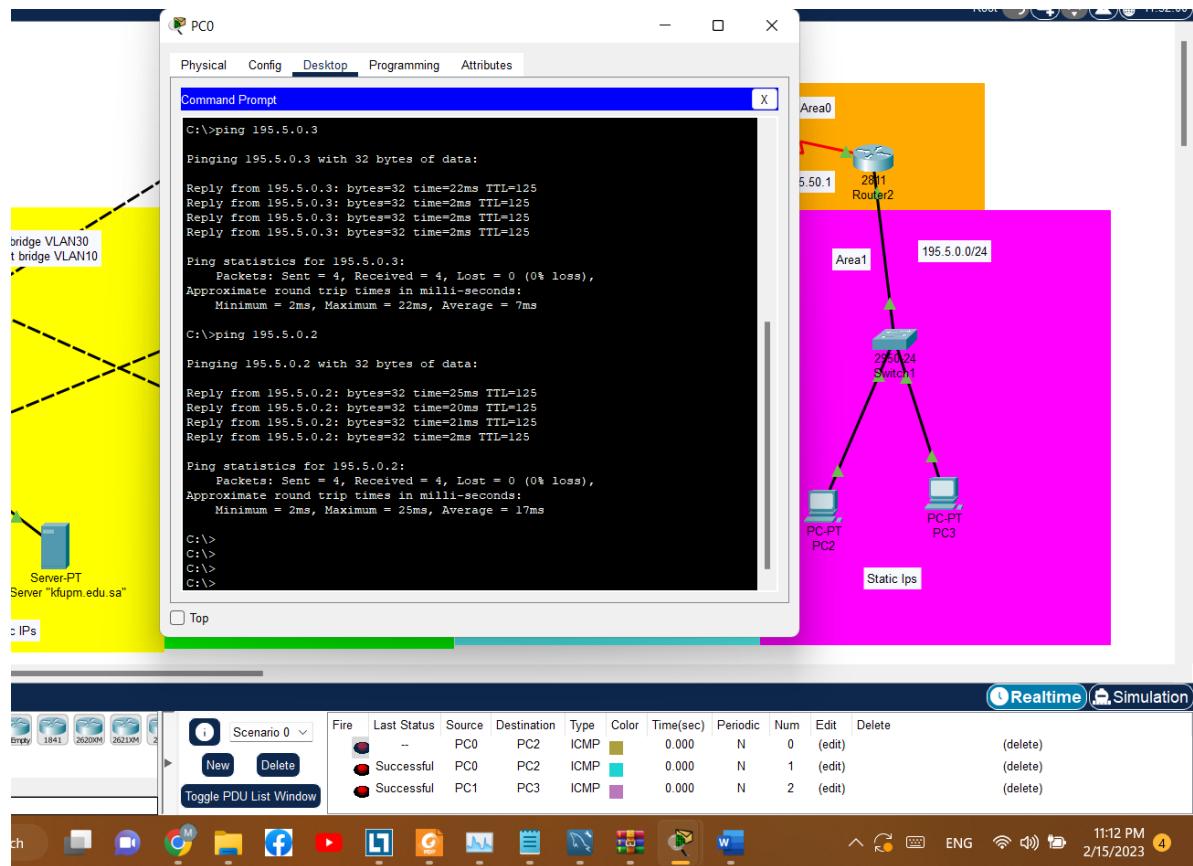




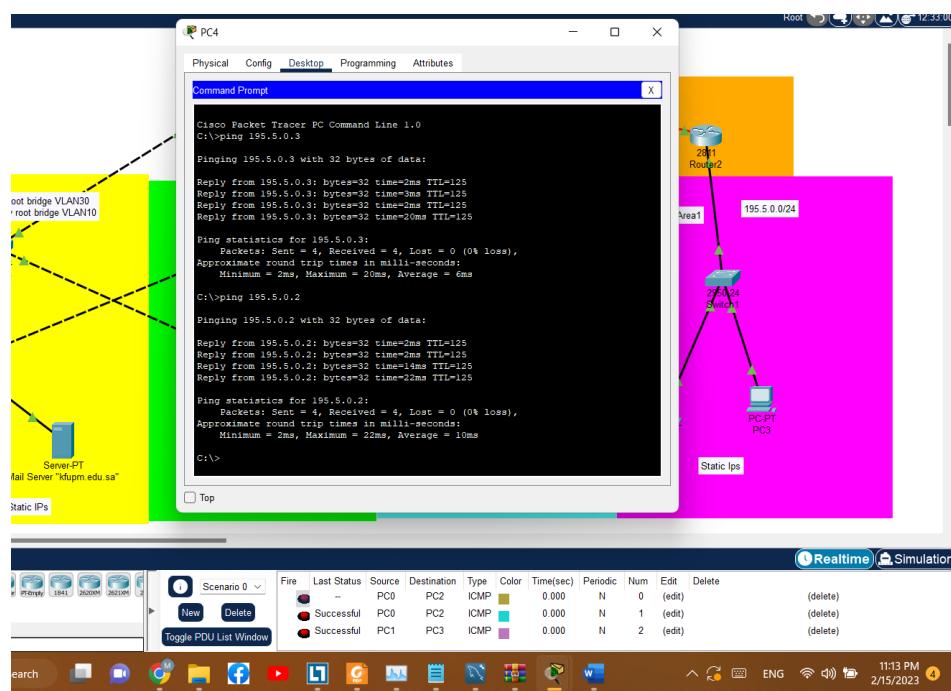
Ping From PC1 to PC0:



Ping from PC0 to PC2 and PC3:

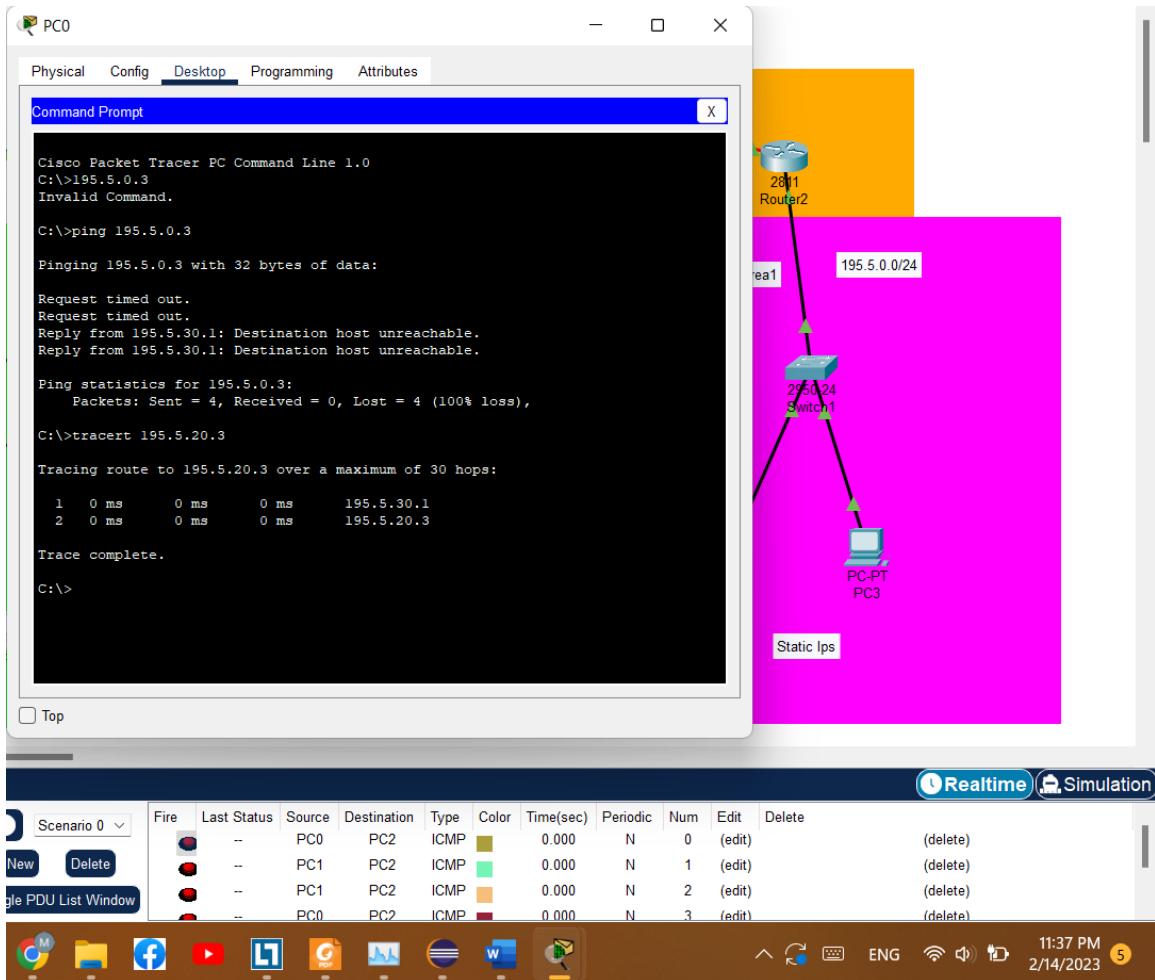


Ping from PC4 to PC2 and PC3:

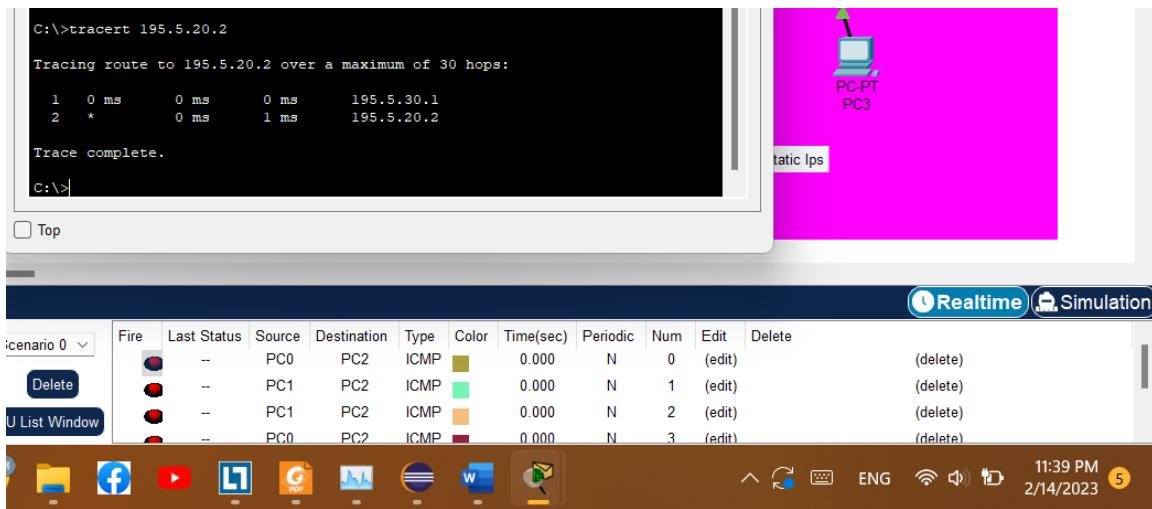


TraceRt between PCs:

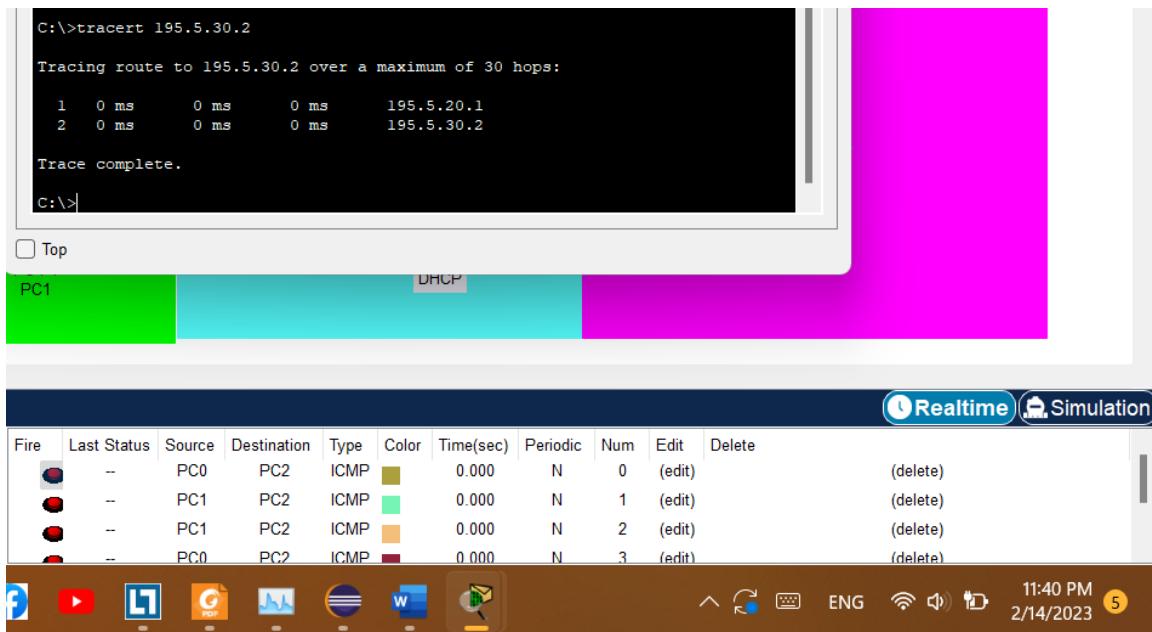
From PC0 to PC4:



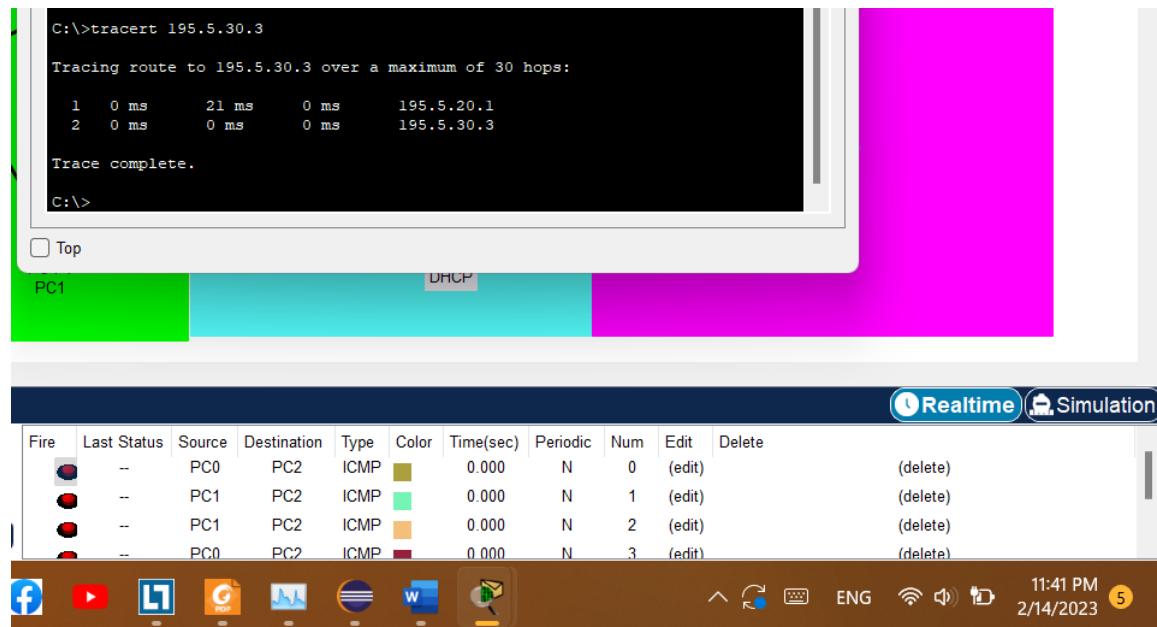
From PC0 to PC5



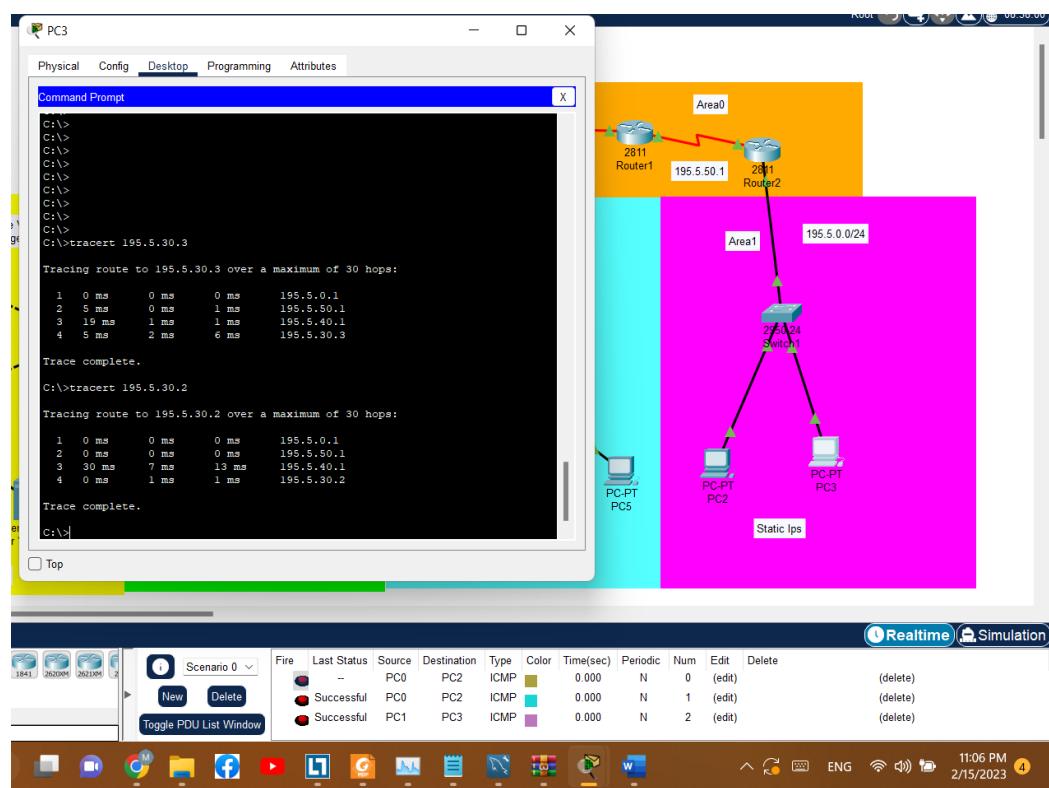
From PC4 to PC1



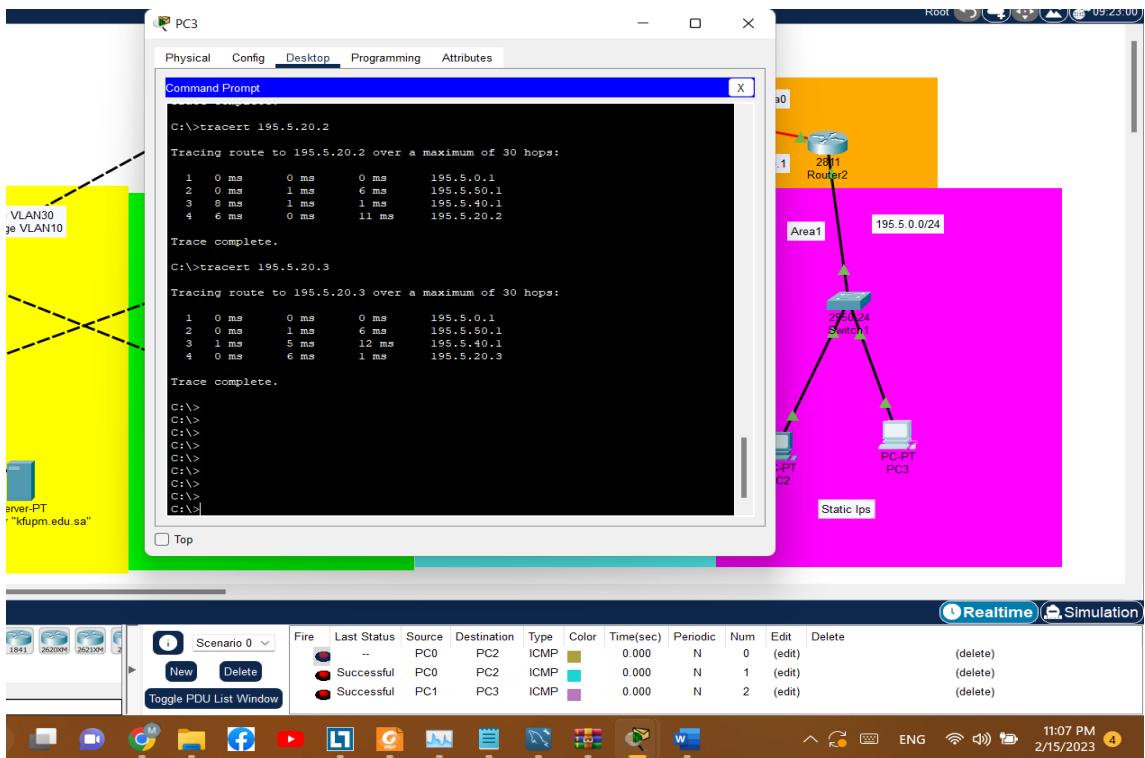
From PC4 to PC0:



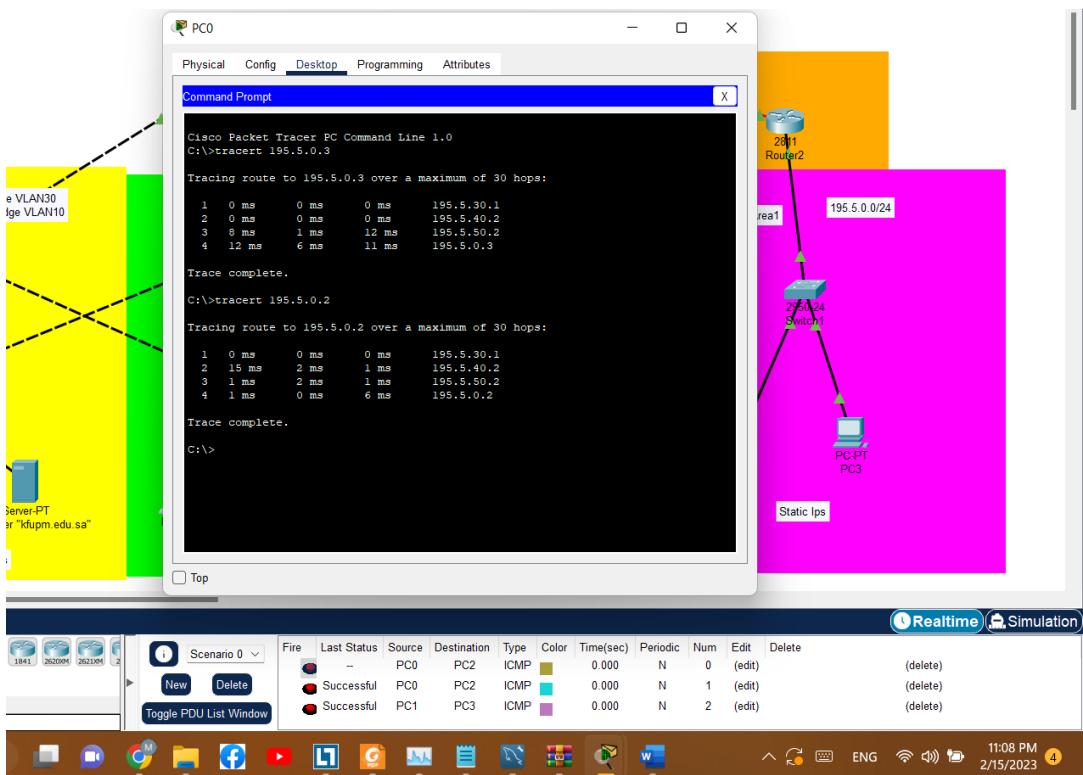
From PC3 to PC0 and PC1:



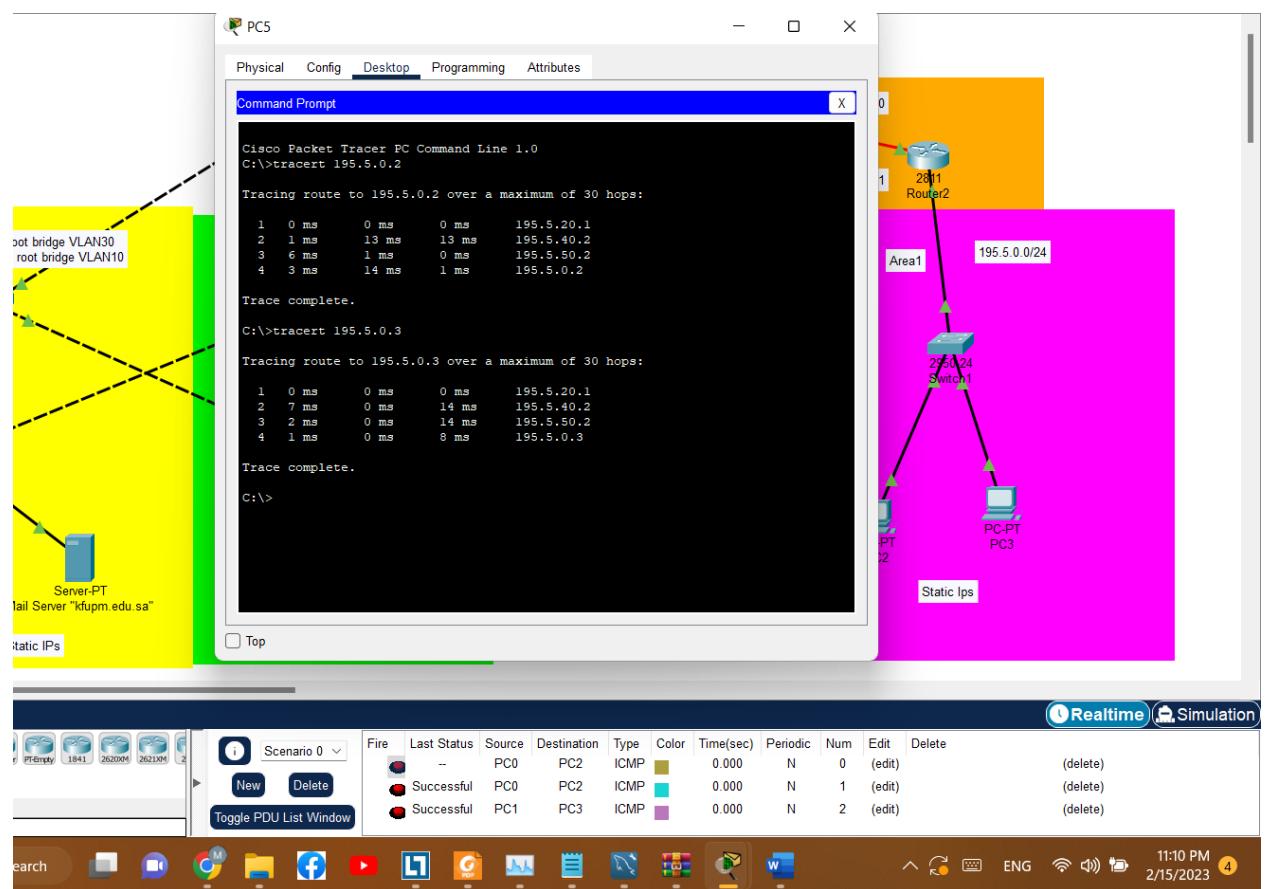
From PC3 to PC4 and PC5:



From PC0 to PC2 and PC3:



From PC5 to PC2 and PC3:



Conclusion:

Through this project, we learned a great deal about computer networking and gained practical skills that can be applied to real-world scenarios. I started by learning how to use Packet Tracer, a powerful network simulation tool used for creating, configuring, and troubleshooting virtual networks. I then delved into the fundamental concepts of IP subnetting and assignment, which enabled me to assign IP addresses to network devices. Next, I learned how to configure HTTP, DNS, and email servers, essential services used for communication and information sharing in a network. Moving on, I explored the basics of routing algorithms and learned how to configure them on routers to enable dynamic routing. I then set up VLANs on switches and routers to segment a network into smaller, more manageable parts, and set up Access Control Lists (ACLs) to control network traffic and restrict access to network resources. By achieving these objectives, I gained a deeper understanding of computer networking and acquired practical skills that will undoubtedly be useful in my future endeavors in this exciting and rapidly-evolving field.