Department of Electrical and Computer Engineering

ENCS3320-Computer Networks

(Network Layer Project)

Due date: 15/6/2024

Prepared by:

Taleen bayatneh 1211305

Yara khattab 1210520

Miassar shamla 1210519

Sec: 3

Instructor: Imad Tarteer

Part1: Wireshark

Using Wireshark, capture few TCP, DHCP and ICMP packets. Show the packets and explain at least 4 fields of each packet.

TCP:
Transmission Control Protocol (TCP) is a fundamental protocol within the Internet Protocol Suite, which is used to establish and maintain a connection between clients and servers for reliable data transmission over the internet. TCP ensures the orderly and error-free delivery of data packets by providing mechanisms to handle lost packets, out-of-order delivery, and data retransmission. It operates at the transport layer and uses a three-way handshake to establish a connection: SYN (synchronize), SYN-ACK (synchronize-acknowledge), and ACK (acknowledge), ensuring both ends are ready for communication. Once a connection is established, TCP manages the data transfer, breaking down messages into packets, ensuring they are delivered in sequence, and checking for errors. It's responsible for flow control and congestion avoidance, making it a reliable means of sending data across networks.

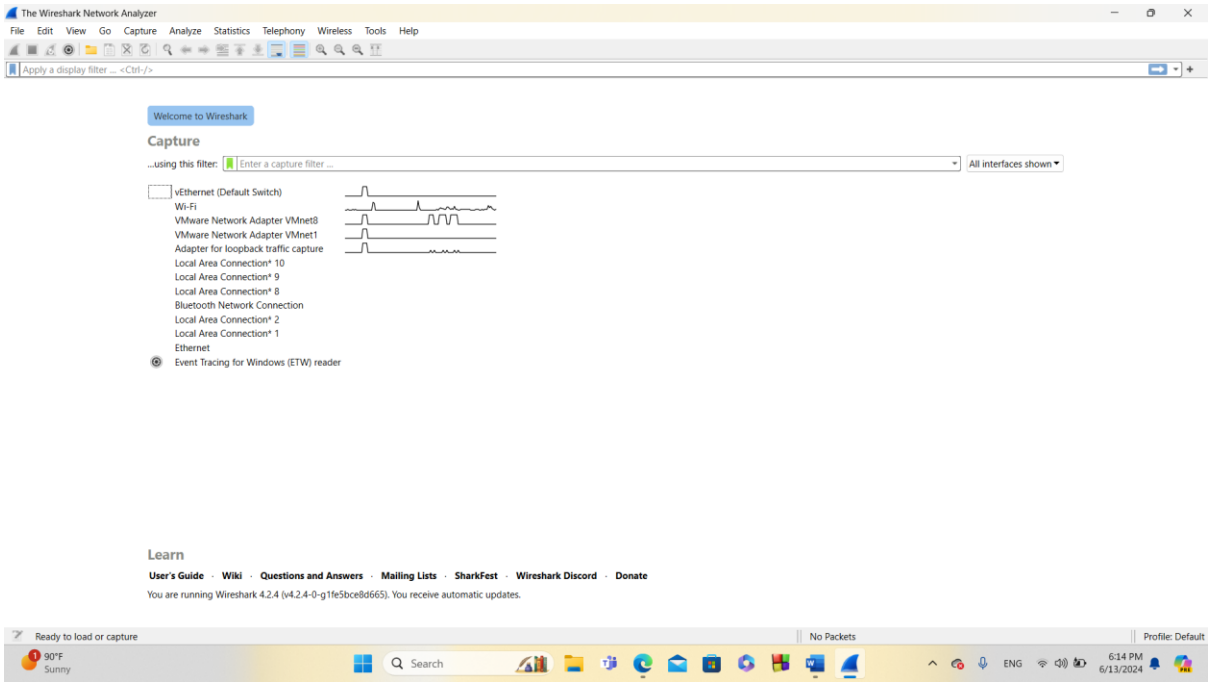
DHCP:
Dynamic Host Configuration Protocol (DHCP) is a client/server protocol commonly used to assign IP addresses and other network configuration parameters to connected devices automatically. Its main function is to streamline the process of network configuration by dynamically allocating and managing IP addresses. DHCP simplifies network administration by centralizing and automating the management of IP addresses. Manual IP address assignment is eliminated, reducing the chances of conflicts and configuration errors. DHCP also enables efficient utilization of IP addresses by dynamically allocating them to devices only when they are needed and reclaiming them when they are no longer in use.

ICMP:
The Internet Control Message Protocol (ICMP) is a network protocol that plays a crucial role in network communication. Its primary function is to facilitate the exchange of error messages and operational information between network devices. ICMP enables the reporting of errors and anomalies that occur during network communication. And provides network diagnostic tools like the "ping" command, widely used for testing network connectivity. It sends Echo Request messages and expects Echo Reply for device reachability. A received reply indicates a responsive device, while no reply suggests network issues or the target device being offline, It also provides various messages to convey network status and feedback. ICMP is used for network management tasks, querying devices and obtaining information like IP addresses and host reachability. It also helps inform devices about network congestion and enables congestion control mechanisms. ICMP plays a crucial role in network monitoring and maintaining network stability.

WireShark:

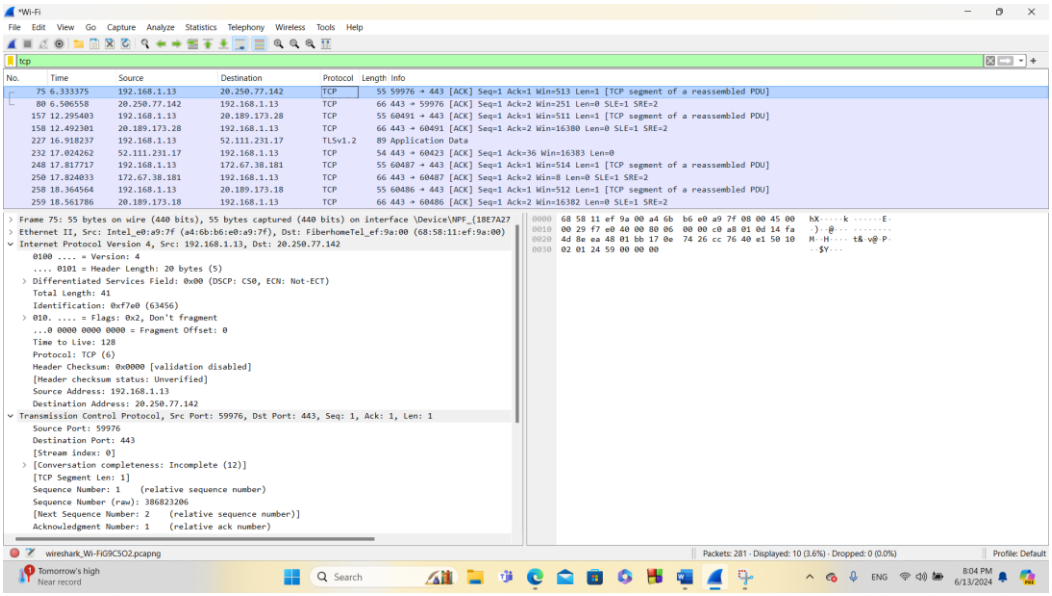
Using the wireshark we want to capture and analyze the traffic of the network, we chose to check
the wireless network via WiFi.

Using wireshark software, sniff DHCP, DNS, and ICMP packets,we will show the series of packets for each service that complete the request and service response, and choose one packet from each service and explain at least 4 field

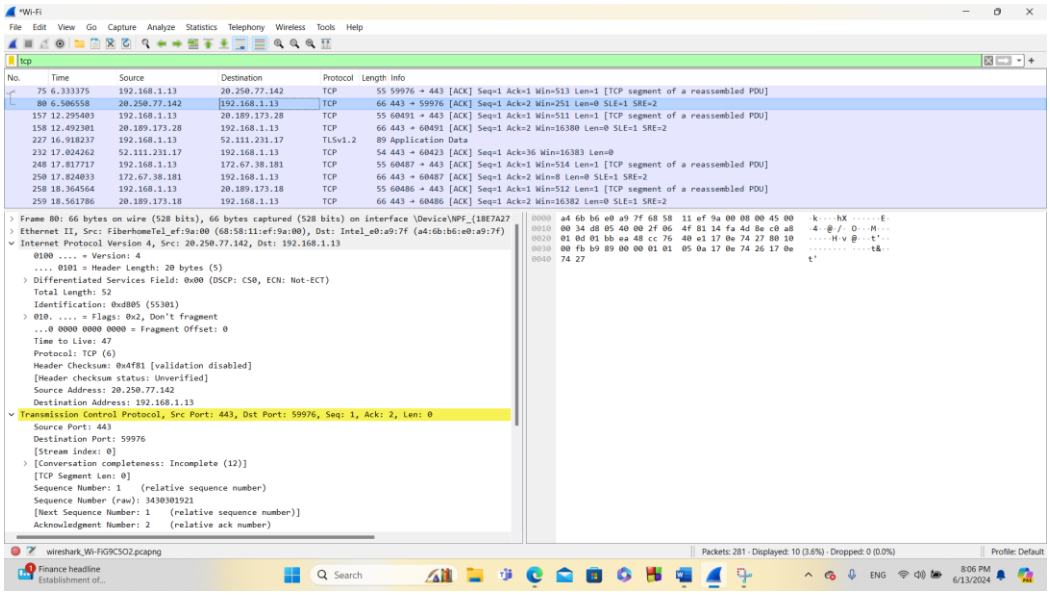


1. TCP:

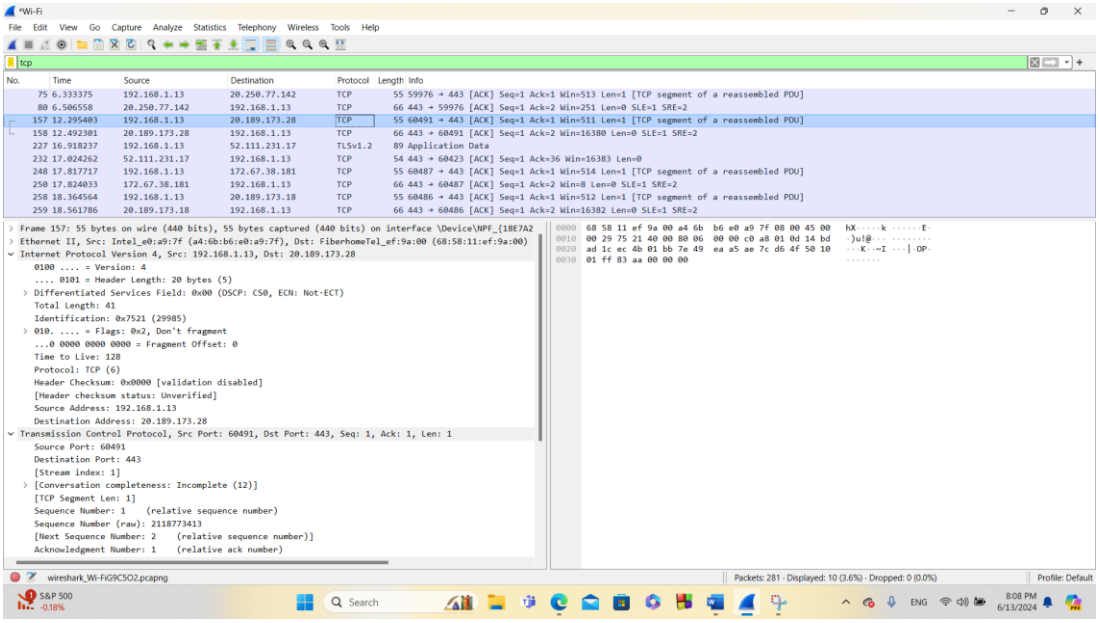
- **Time to live(TTL): 128**
- **Protocol: TCP (6)**
- **Source Address: 192.168.1.13**
- **Destination Address: 20.250.77.142**
- **Source port: 59976**
- **Destination Port: 443**



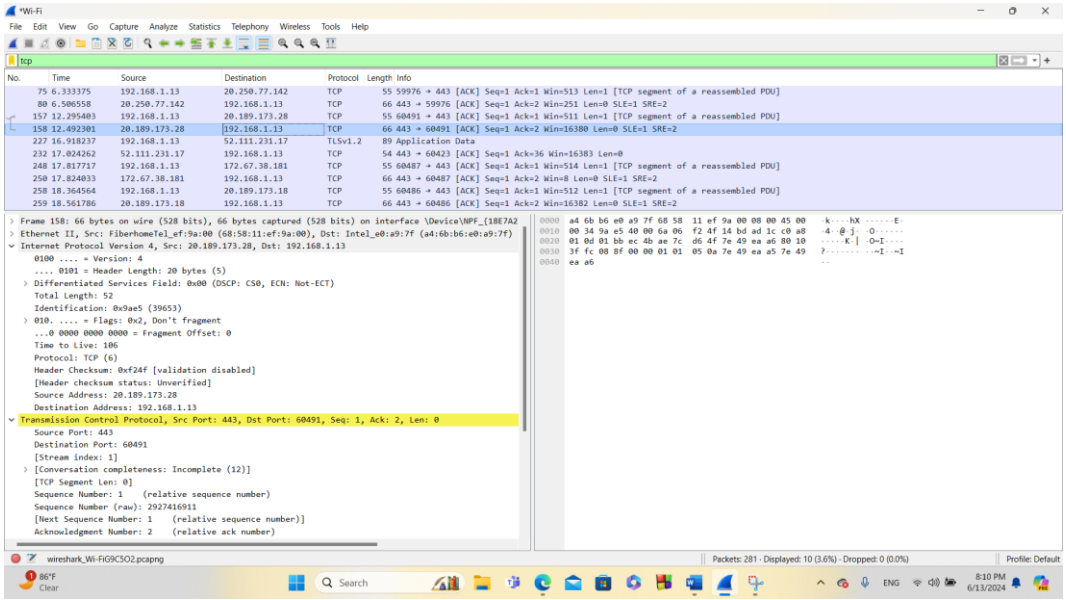
- **Time to live(TTL): 47**
- **Protocol: TCP (6)**
- **Source Address:20.250.77.142**
- **Destination Address: 192.168.1.13**
- **Source port: 443**
- **Destination Port: 59976**



- **Time to live(TTL):128**
- **Protocol: TCP (6)**
- **Source Address:192.168.1.13**
- **Destination Address: 20.189.173.28**
- **Source port: 60491**
- **Destination Port: 443**

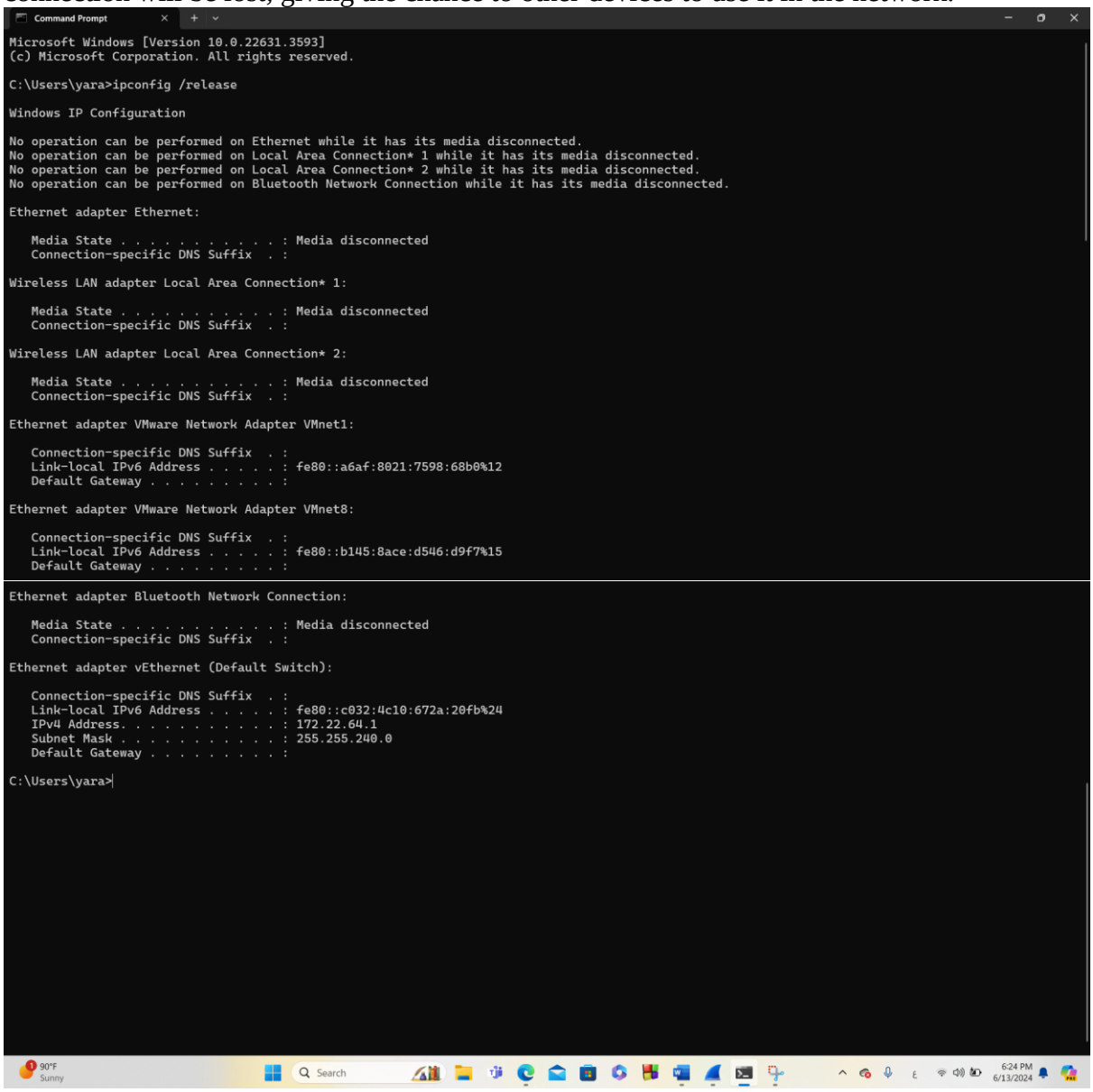


- **Time to live(TTL):106**
- **Protocol: TCP (6)**
- **Source Address: 20.189.173.28**
- **Destination Address: 192.168.1.13**
- **Source port: 443**
- **Destination Port: 60491**

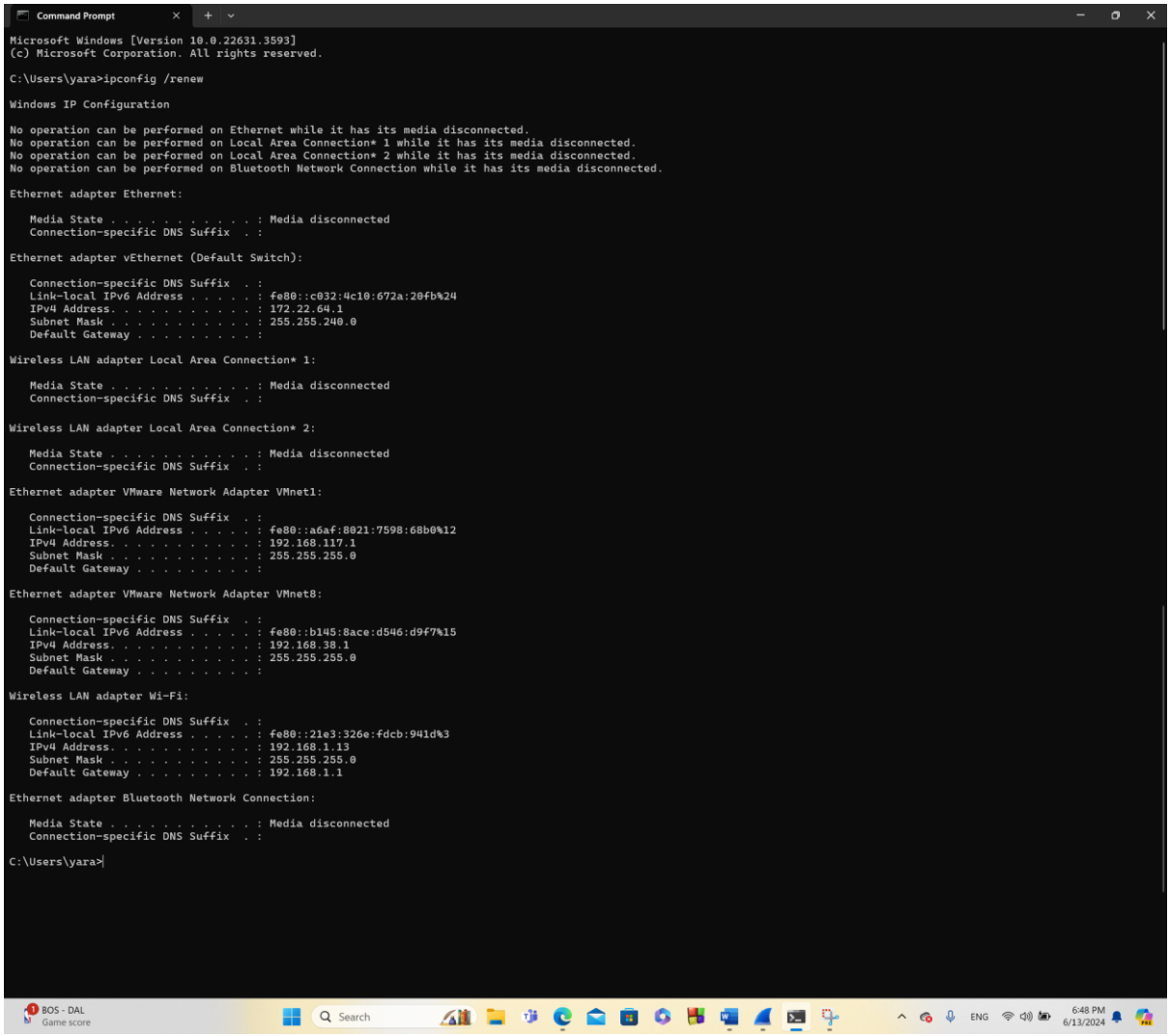


2. DHCP packets:

In cmd we write the command (ipconfig /release) to drop or in other words give up the IP address that was assigned to a network interface obtained from a DHCP server, then the connection will be lost, giving the chance to other devices to use it in the network.



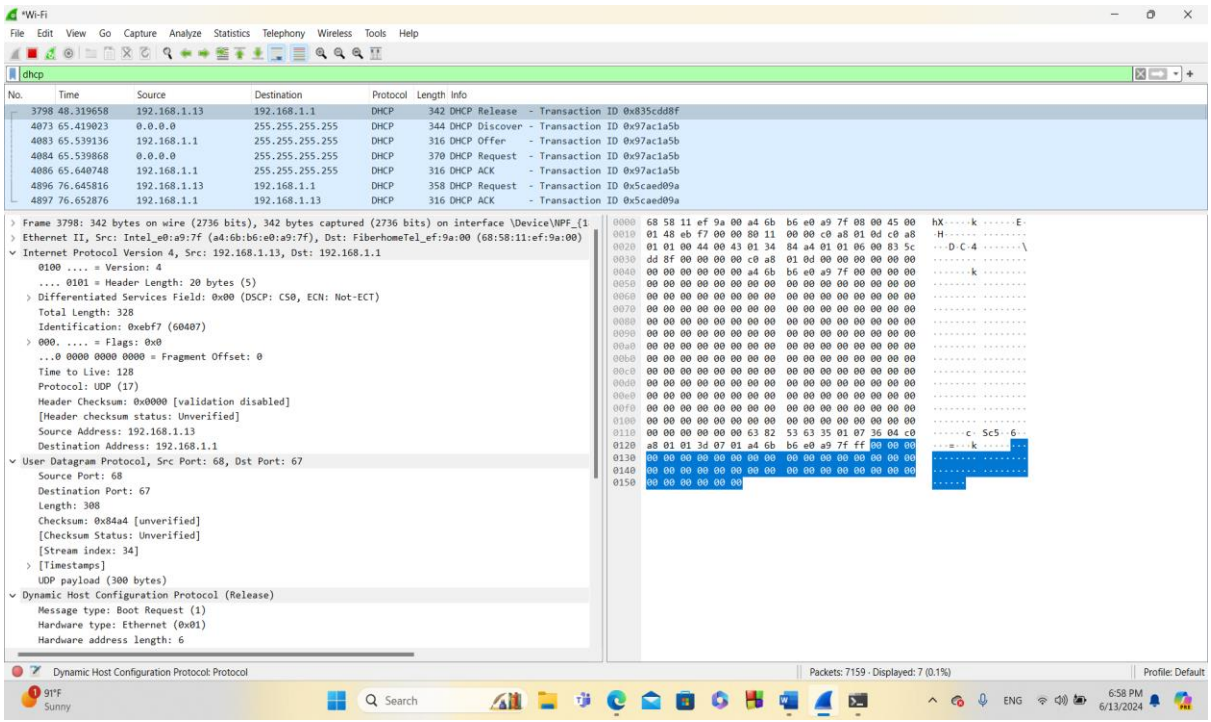
Upon writing in cmd the command (ipconfig /renew) to ask for a new IP address assigned to a network interface, then the connection will be restored. The DHCP server such as a router may renew the existing lease if it is still valid or provide a new IP address if the old has expired.



Release DHCP:

A DHCP client transmits a DHCP Release message to release its IP address. The DHCP server can assign another DHCP client this IP address following receipt of a DHCP Release message.

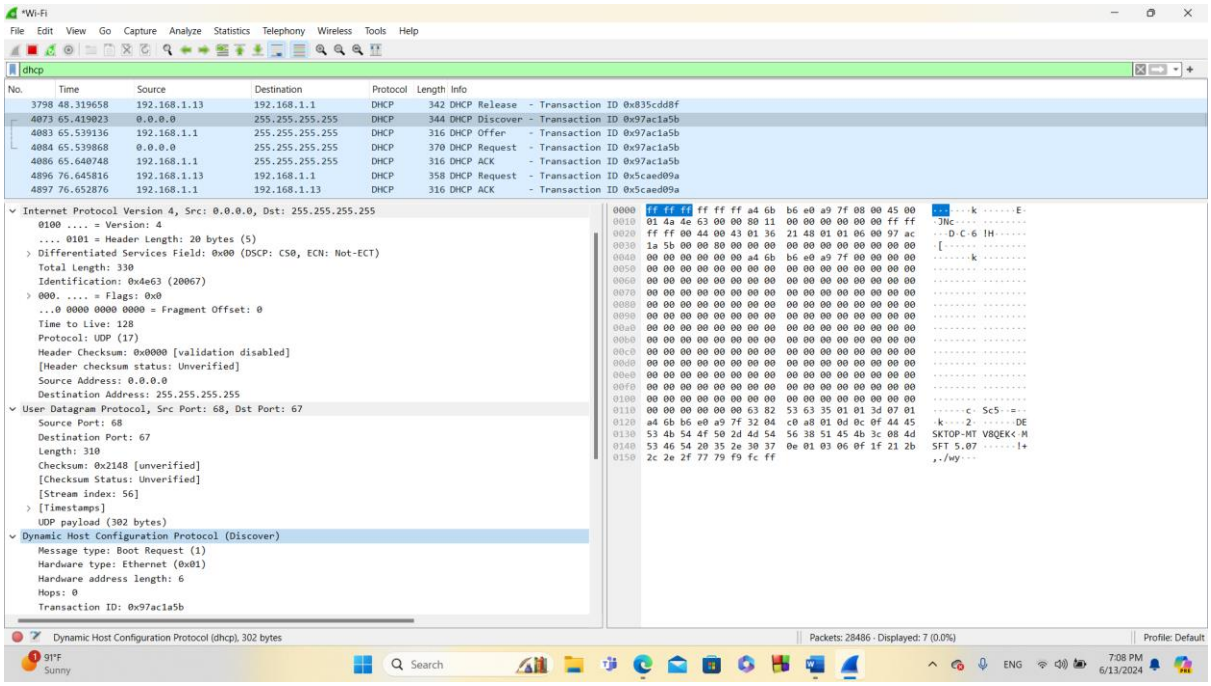
- **Time to live (TTL) : 128**, this shows the max number of routers the packet can go through without being discarded, 128 means it can go through 128 routers before it can be discarded or reaching its destination.
- **Protocol: UDP (17)** , UDP is the user datagram protocol, it has a value of 17 reserved for it and it is a communications protocol that is primarily used to establish low-latency And loss-tolerating connections between applications on the internet, without establishing a dedicated connection.
- **Source Address: 192.168.1.13**, The IP address of a device on the network from which a frame or packet of data comes from originally on a network.
- **Destination Address: 192.168.1.1** This shows the IP address to which a frame or packet of data is sent over a network.
- **Source port: 68**, in general it is the UDP or TCP number used to send data to another program on one end. In our case the source device has port 68 and it is for the DHCP.
- **Destination Port: 67**, the TCP or UDP number used by a program on one side of communication to receive data, 67 is the server side of the DHCP.
- **Length: 308 bytes**, it is the length of the packet, with the header size included and data.



DHCP Discover:

In order to find available DHCP servers on the network, the client sends a broadcast message. The client uses this packet to request IP configuration information

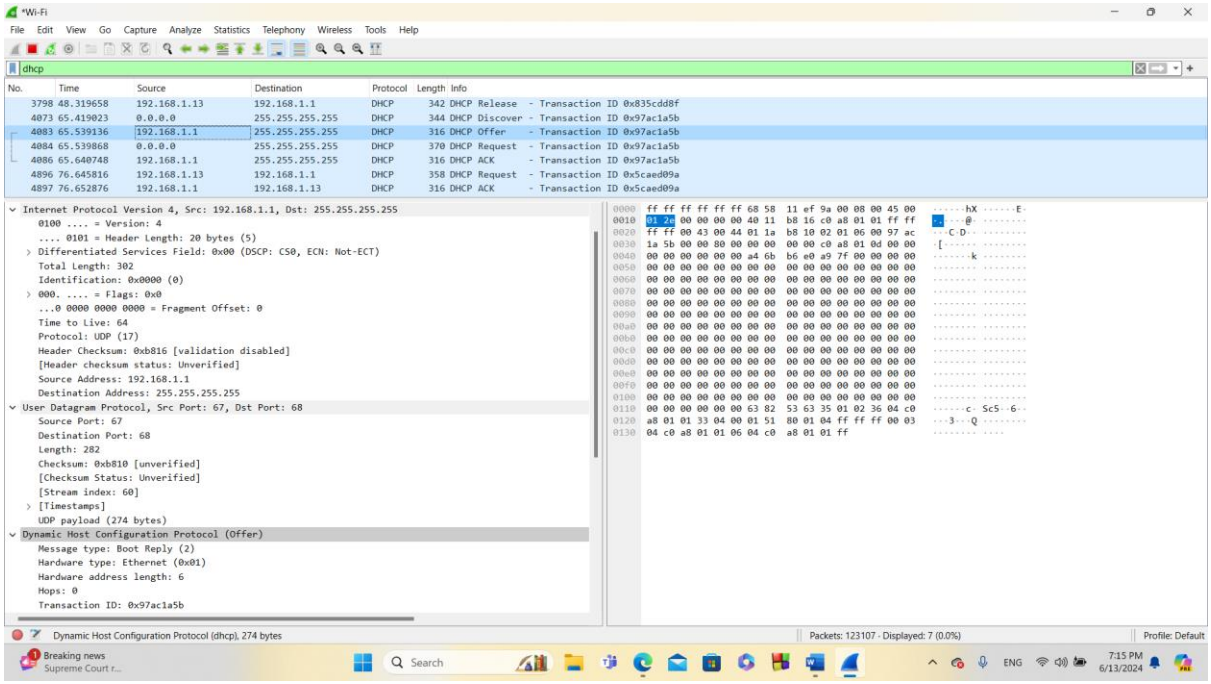
- **Time to live(TTL): 128**
- **Protocol: UDP (17)**
- **Source Address: 0.0.0.0**
- **Destination Address: 255.255.255.255**
- **Source port: 68**
- **Destination Port: 67**
- **Length: 310**



DHCP Offer:

The server sends a unicast DHCP Offer packet in response to the DHCP Discover request. It contains information about IP configuration details, including the IP address, subnet mask, lease
term, and IP address of the client.

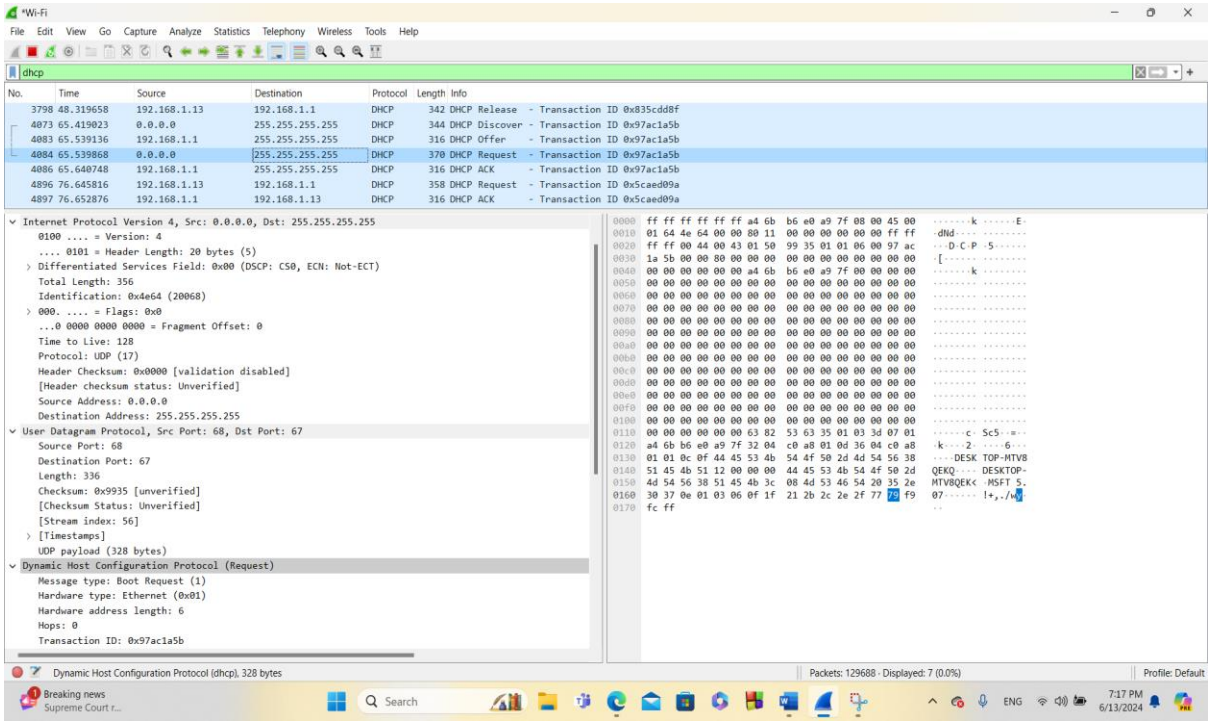
- **Time to live(TTL): 64**
- **Protocol: UDP (17)**
- **Source Address: 192.168.1.1**
- **Destination Address: 255.255.255.255**
- **Source port: 67**
- **Destination Port: 68**
- **Length: 282**



DHCP Request:

The client selects one DHCP Offer and sends a DHCP Request packet to request the offered IP
configuration from that server. This packet may also be broadcast if the client is confirming the
IP configuration.

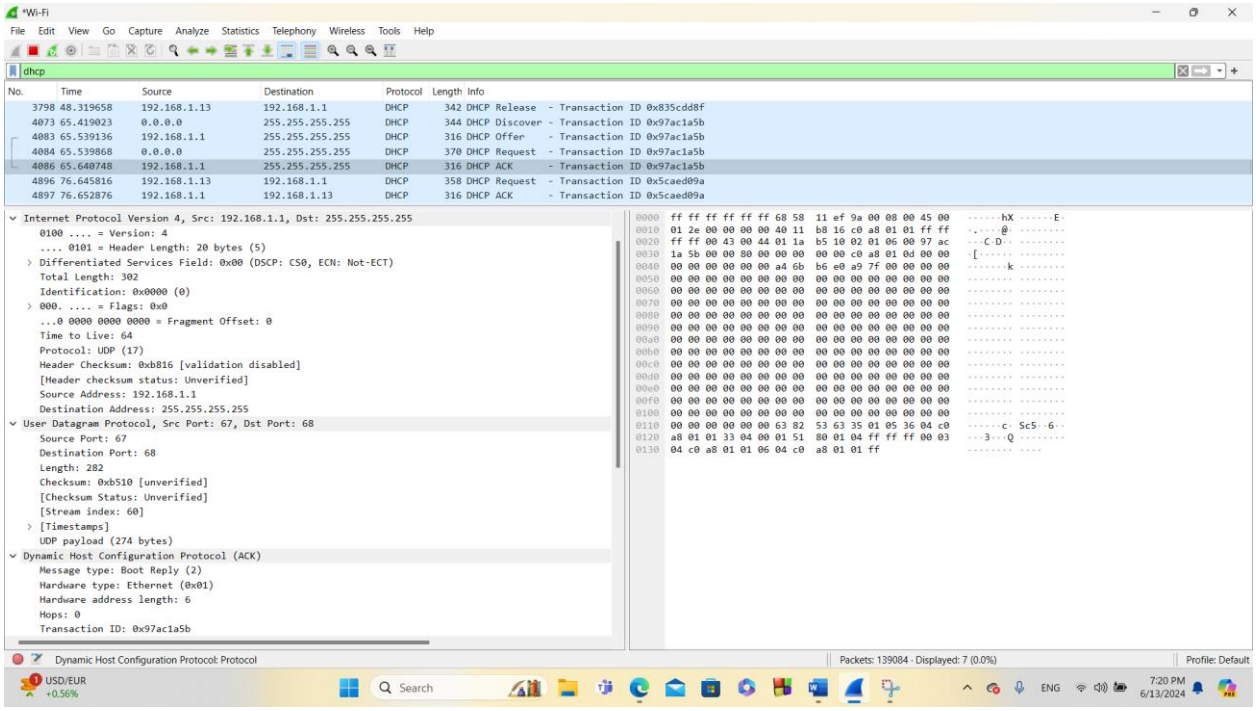
- **Time to live(TTL): 128,**
- **Protocol: UDP (17)**
- **Source Address: 0.0.0.0**
- **Destination Address: 255.255.255.255**
- **Source port: 68**
- **Destination Port: 67**
- **Length: 336**



DHCP Acknowledgment (ACK):

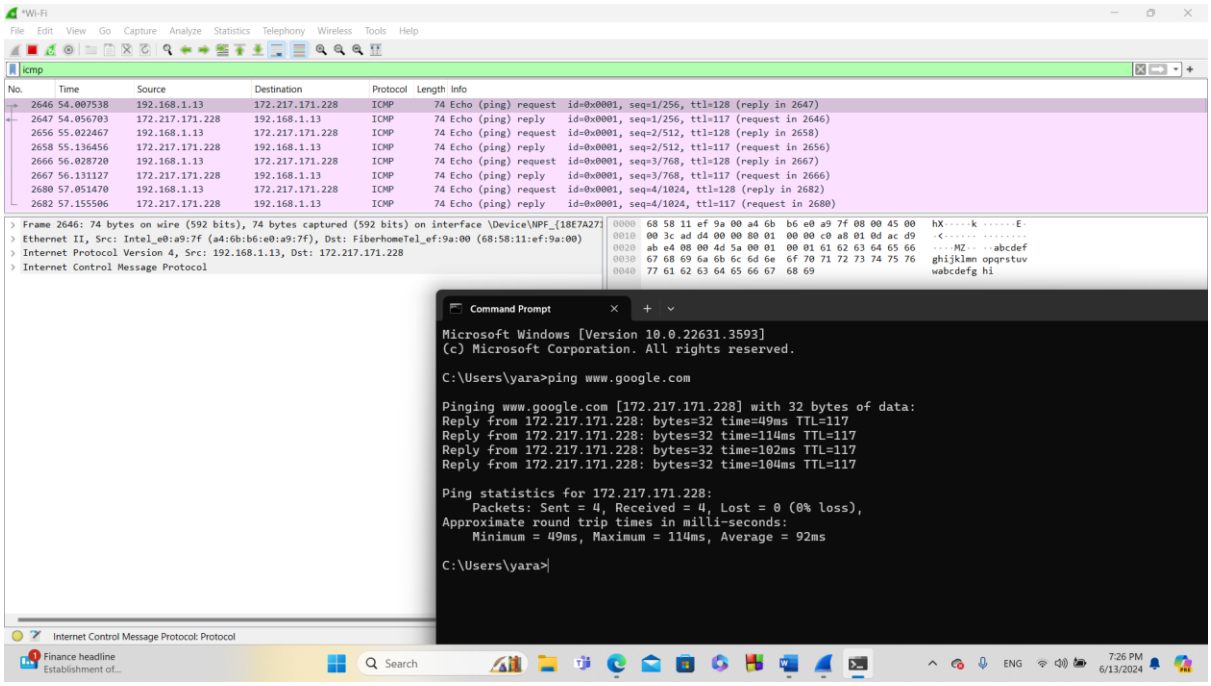
The server sends a DHCP Acknowledgement packet in response to the DHCP Request. It confirms that the client can use the offered IP configuration. Additionally, it could contain configuration options like the default gateway and DNS server addresses.

- **Time to live(TTL): 64**
- **Protocol: UDP (17)**
- **Source Address: 192.168.1.1**
- **Destination Address: 255.255.255.255**
- **Source port: 67**
- **Destination Port: 68**
- **Length: 282**



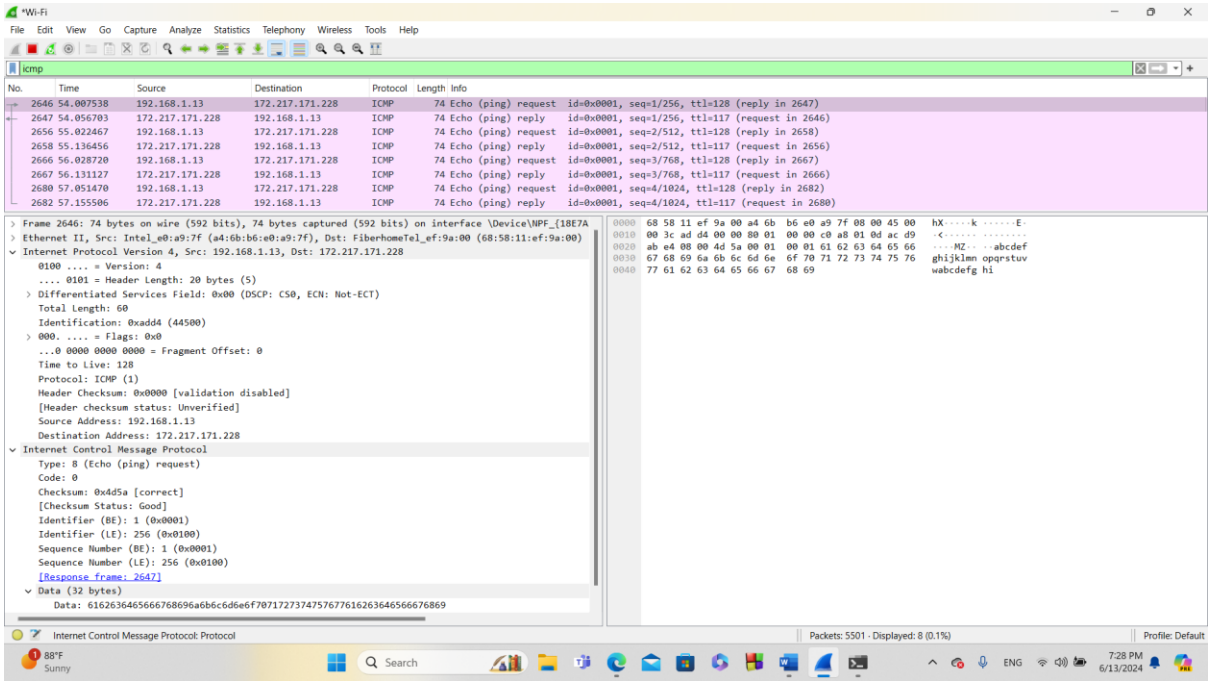
3. ICMP packets:

When using the cmd command “ping www.google.com” This sends an ICMP Echo Request packet to the IP address associated with www.google.com. When it gets to the destination the ICMP will make an echo reply packet to be as a response.



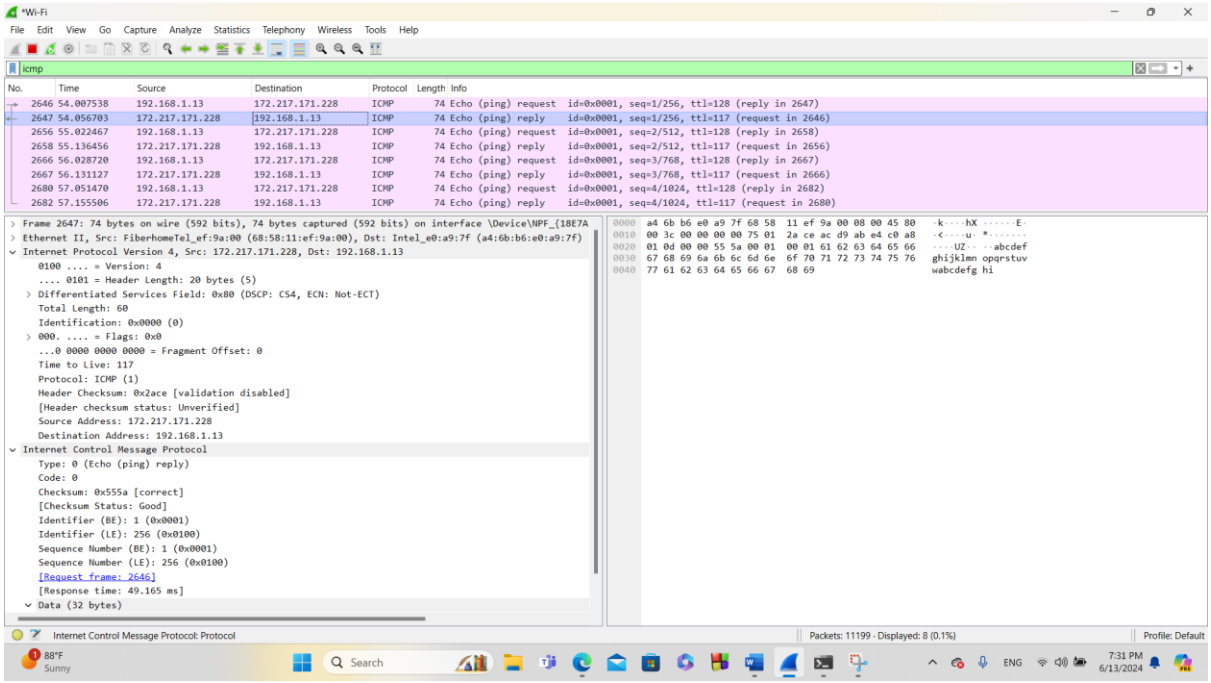
ICMP Echo (Ping) Request :

- **Time to live (TTL) : 128**, this shows the max number of routers the packet can go through without being discarded, 128 means it can go through 128 routers before it can be discarded or reaching its destination.
- **Protocol: ICMP (1)** , Specifies that the packet is using the ICMP protocol, which is responsible for error reporting and network diagnostics.
- **Source Address: 192.168.1.13**, The IP address of a device on the network from which a
  frame or packet of data comes from originally on a network.
- **Destination Address: 172.217.171.228** This shows the IP address to which a frame or packet of data is sent over a network.
- **Data: 32 bytes**, Refers to the payload or content of the ICMP Echo Request packet, which is 32 bytes in this case.



ICMP Echo (Ping) Reply:

- **Time to live(TTL): 117**
- **Protocol: ICMP(1)**
- **Source Address: 172.217.171.228**
- **Destination Address: 192.168.1.13**
- **Data: 32 bytes**



Part2: Packet Tracer

The number id we used: 1210520 yara's number

So the IP is 105.20.4.0/23

105.20.00000100.00000000/23

IP'S:

105.20.00000100.00000000/24 we can have 2 subnet

→ 105.20.00000100.00000000/25 we can have 2 subnet

→105.20.00000100.00000000/26 (62 u. for data center) 105.20.4.0

→105.20.00000100.01000000/26 we can have 2 subnet

→105.20.00000100.01000000/27 (30 u. for company A) 105.20.4.64

→105.20.00000100.01100000/27 (30 u. for company B) 105.20.4.96

→105.20.00000100.10000000/25 we can have 2 subnet

→105.20.00000100.10000000/26 we can have 2 subnet

→105.20.00000100.10000000/27 (30 u. for office 2) 105.20.4.128

→105.20.00000100.10100000/27 we can have 2 subnet

→105.20.00000100.10100000/28 (14 u. for office 1) 105.20.4.160

→105.20.00000100.10110000/28 we can have 4 subnet

→105.20.00000100.10110000/30 (link 1) 105.20.4.176

→105.20.00000100.10110100/30 (link 2) 105.20.4.180

→105.20.00000100.10111000/30 (link 3) 105.20.4.184

→105.20.00000100.10111100/30 (link 4) 105.20.4.188

→105.20.00000100.11000000/26 we can have 2 subnet

→105.20.00000100.11000000/27 we can have 2 subnet

→105.20.00000100.11000000/28 we can have 4 subnet

→105.20.00000100.11000000/30 (link 5) 105.20.4.192

Subnet	Subnet Mask "using the slash notation"	Network IP	Broadcast IP	First IP	Last IP	Maximum number of IPs in this subnet
Data Center	255.255.255.192/26	105.20.4.0	105.20.4.63	105.20.4.1	105.20.4.62	$2^6 - 2 = 62$
Company A	255.255.255.224/27	105.20.4.64	105.20.4.95	105.20.4.65	105.20.4.94	$2^5 - 2 = 30$
Company B	255.255.255.224/27	105.20.4.96	105.20.4.127	105.20.4.97	105.20.4.126	$2^5 - 2 = 30$
Office 2	255.255.255.224/27	105.20.4.128	105.20.4.159	105.20.4.129	105.20.4.158	$2^5 - 2 = 30$
Office 1	255.255.255.240/28	105.20.4.160	105.20.4.175	105.20.4.161	105.20.4.174	$2^4 - 2 = 14$
R1-R2 Link 1	255.255.255.252/30	105.20.4.176	105.20.4.179	105.20.4.177	105.20.4.178	$2^2 - 2 = 2$
R2-R3 Link 2	255.255.255.252/30	105.20.4.180	105.20.4.183	105.20.4.181	105.20.4.182	$2^2 - 2 = 2$
R3-R4 Link 3	255.255.255.252/30	105.20.4.184	105.20.4.187	105.20.4.185	105.20.4.186	$2^2 - 2 = 2$
R4-R1 Link 4	255.255.255.252/30	105.20.4.188	105.20.4.191	105.20.4.189	105.20.4.190	$2^2 - 2 = 2$
R4-R5 Link 5	255.255.255.252/30	105.20.4.192	105.20.4.195	105.20.4.193	105.20.4.194	$2^2 - 2 = 2$

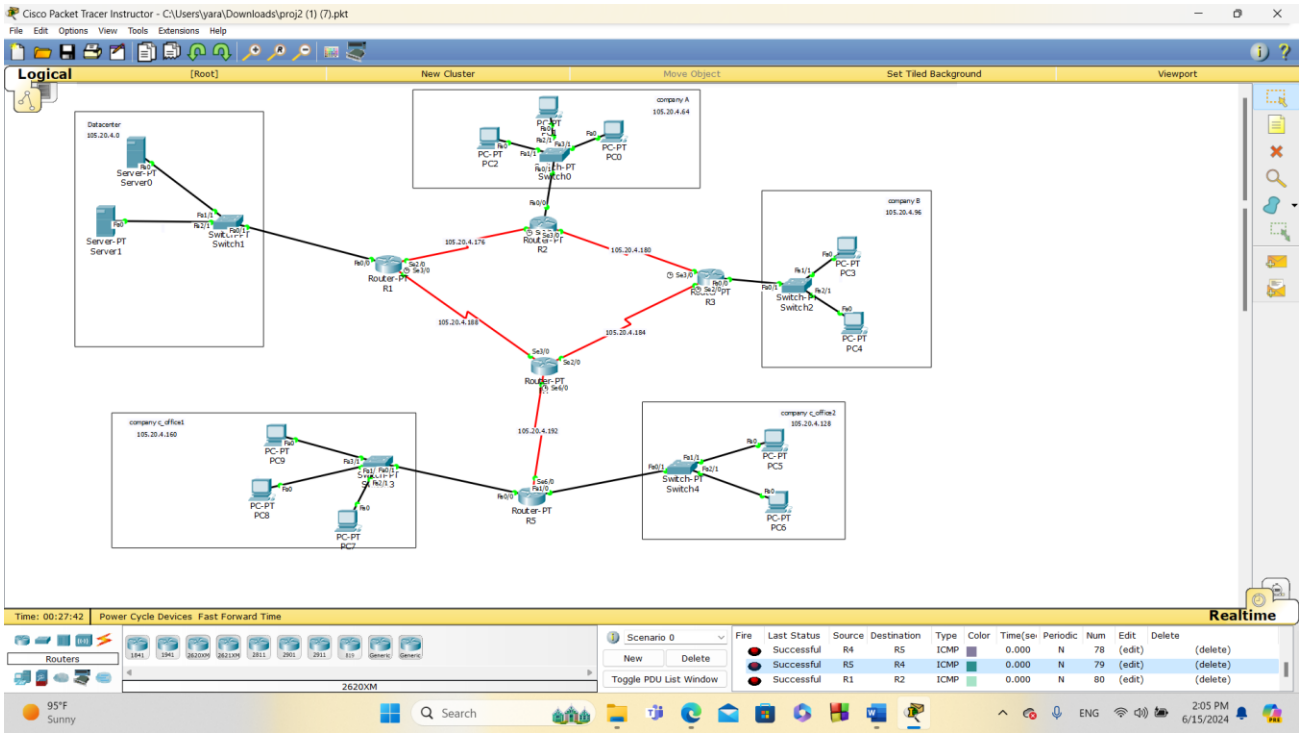
Table 1: Subnetting details

Network	Number of End Devices (PCs and Servers)
Data Center	50
Company A	26
Company B	29
Company C Office 1	10
Company C Office 2	15

Table 2: Number of hosts (PCs and Servers) per network **excluding** the router interface

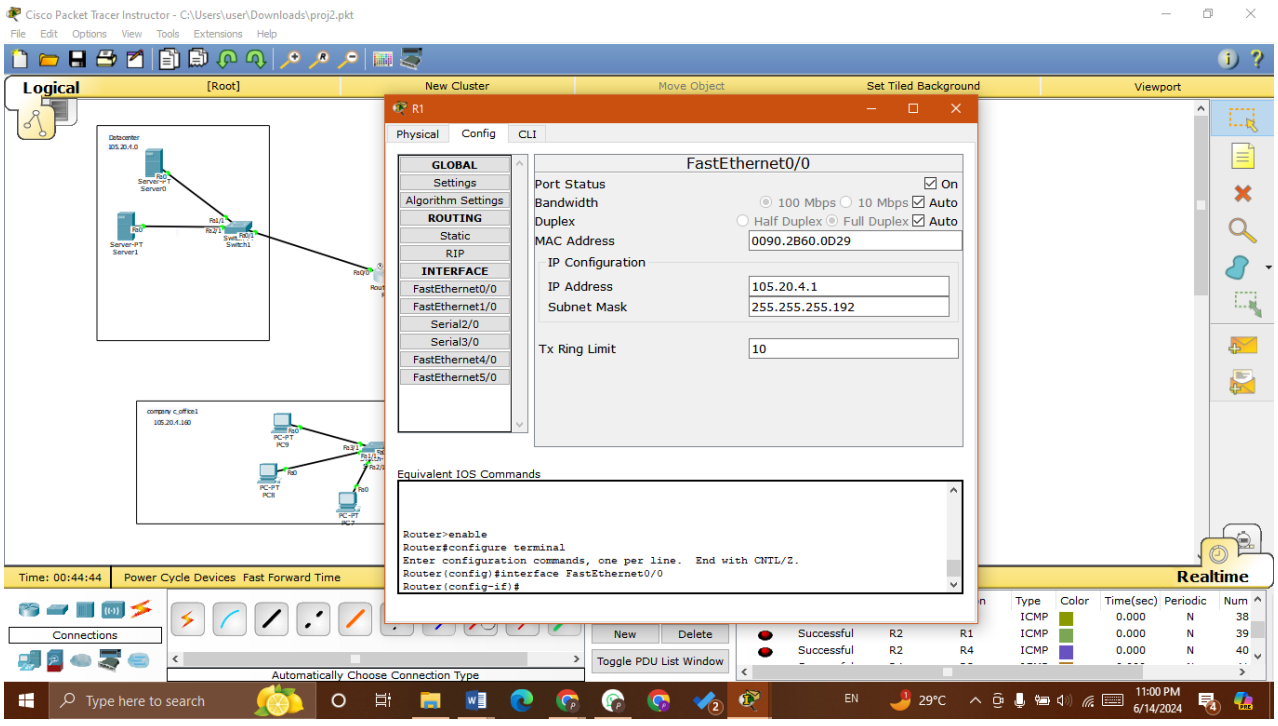
1- Topology:

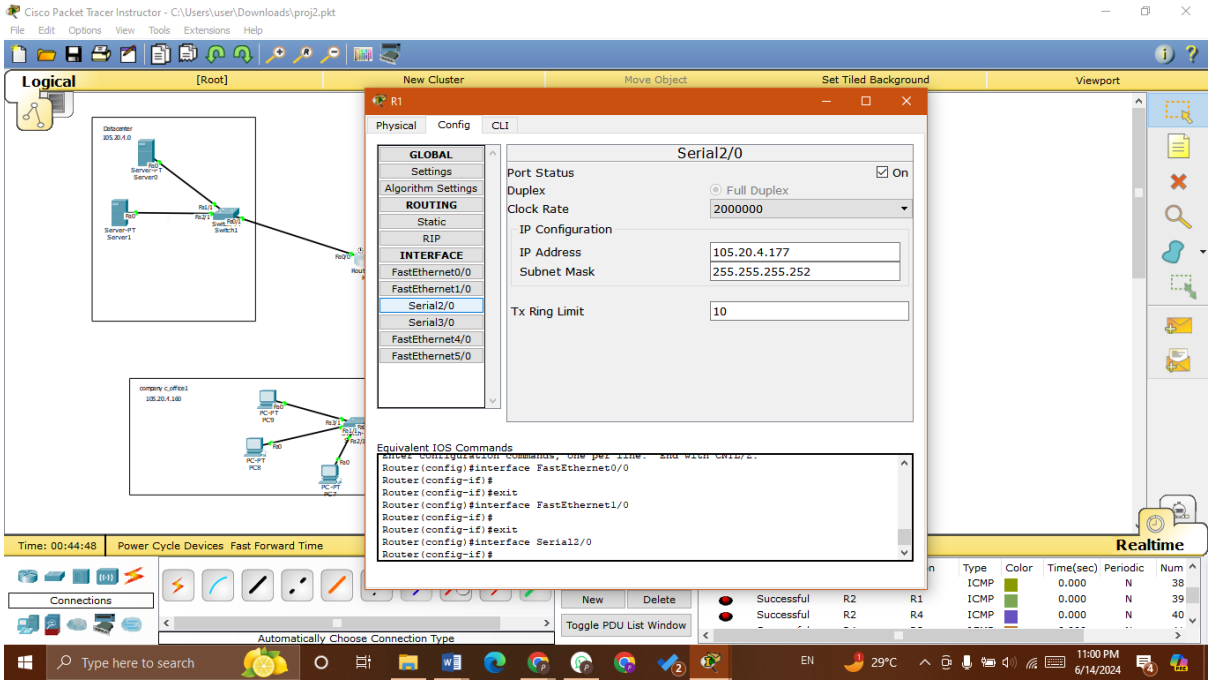
Build the topology:

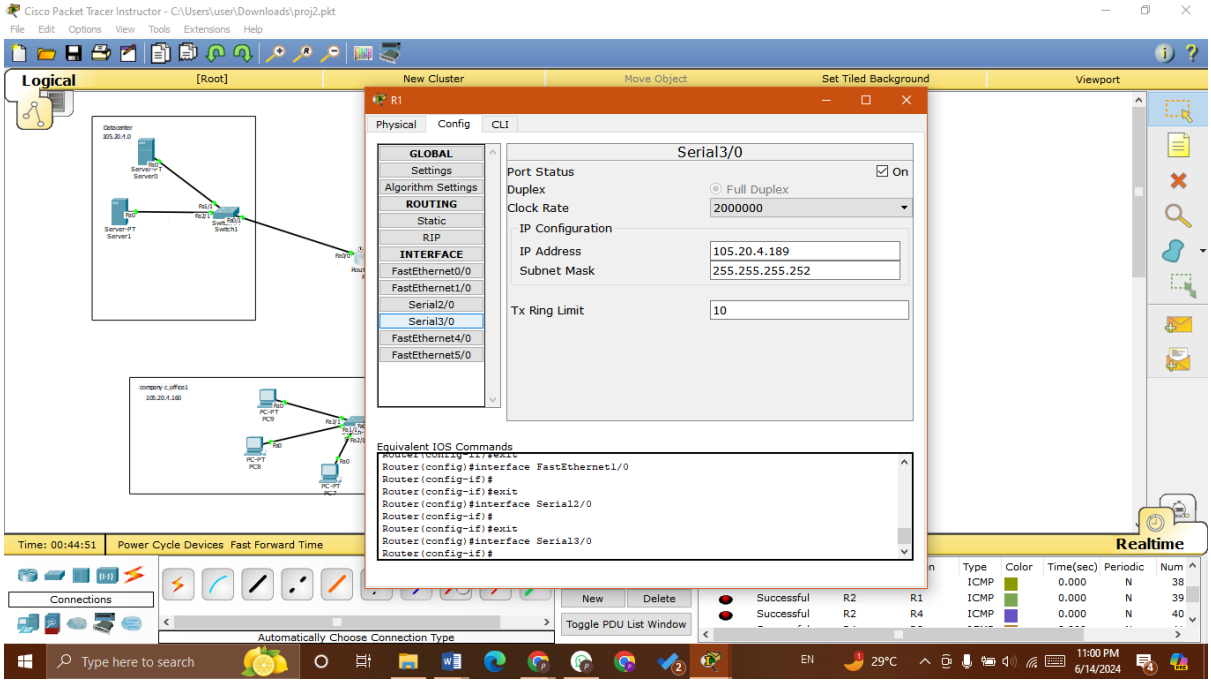


Configure the interfaces of all routers:

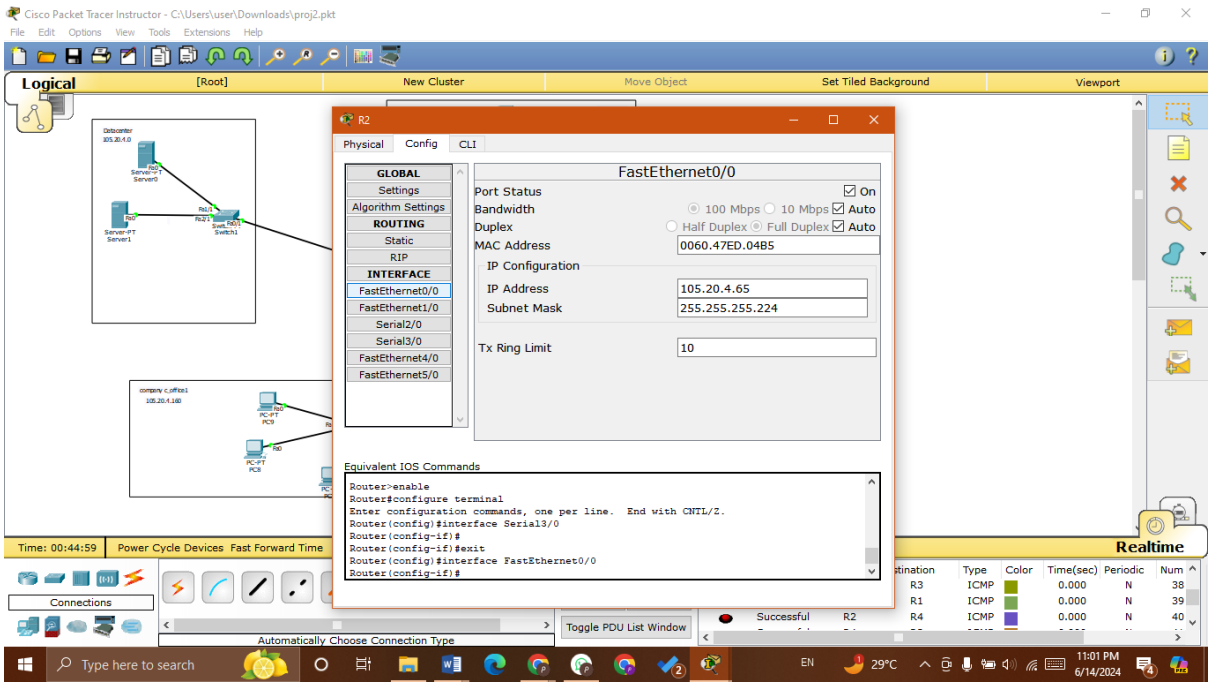
For R1➔

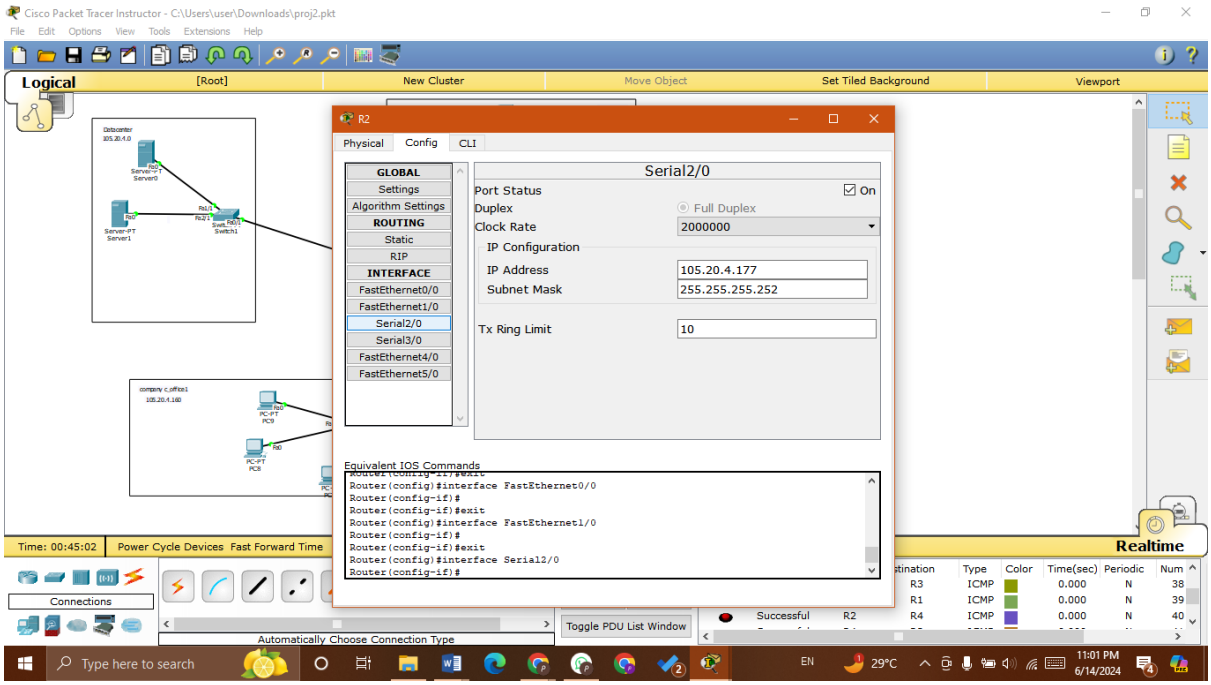


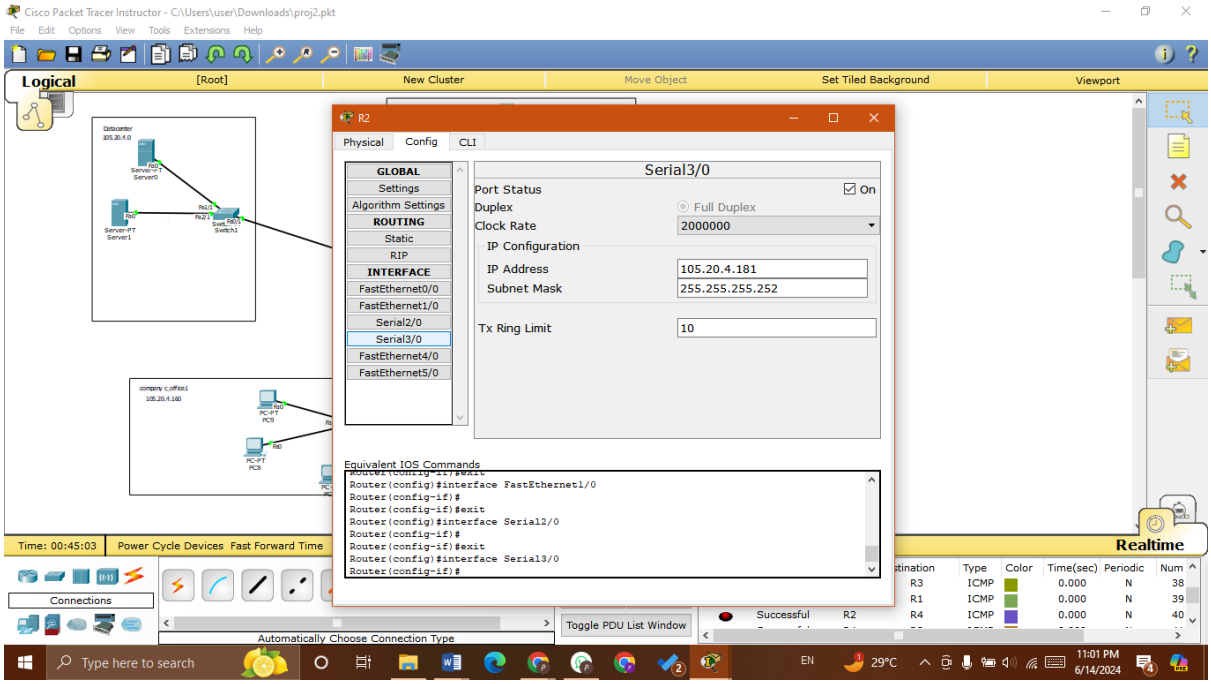

Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R1
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.177
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Time: 00:44:48
Power Cycle Devices Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
New
Delete
Toggle PDU List Window
Type here to search
29°C
11:00 PM
6/14/2024


Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R1
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial3/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.189
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Time: 00:44:51
Power Cycle Devices Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
New
Delete
Toggle PDU List Window
Type here to search
29°C
11:00 PM
6/14/2024

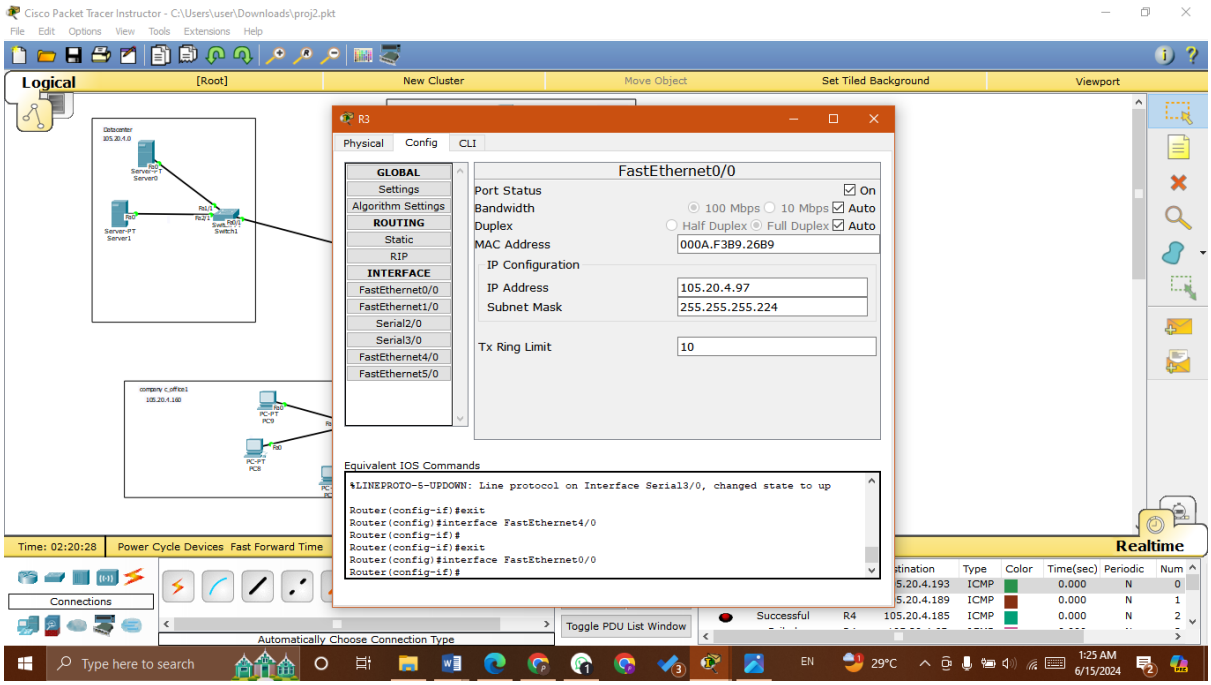
For R2➔

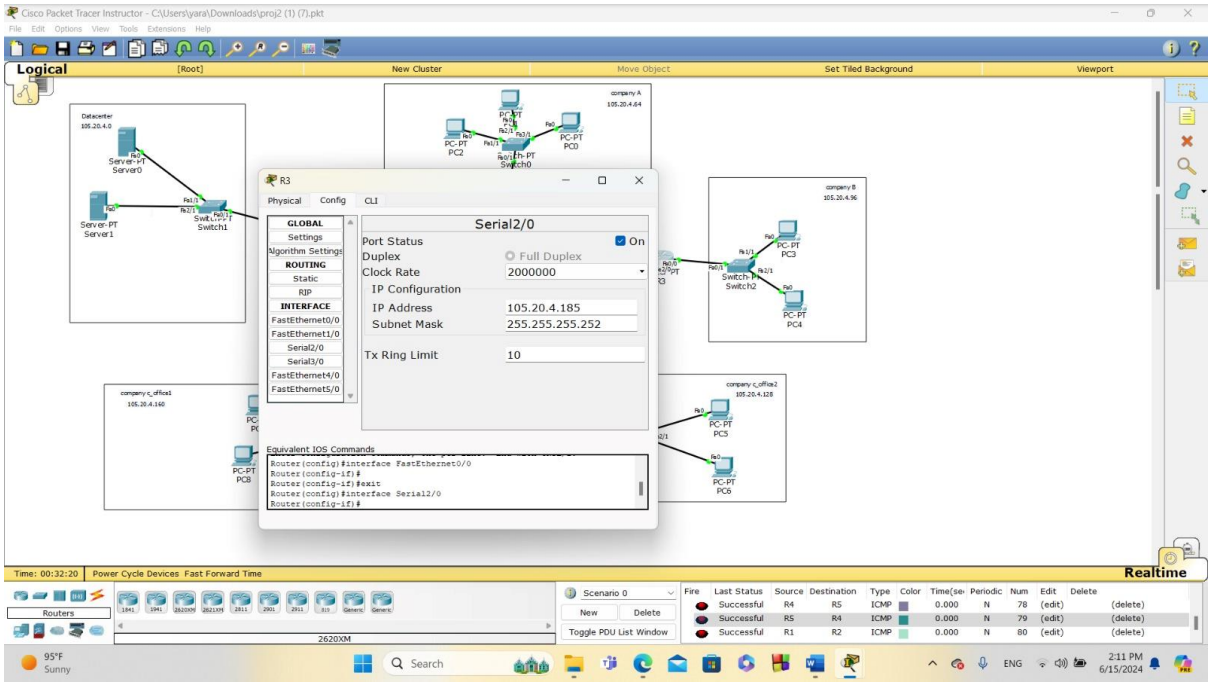

R2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0060.47ED.04B5
IP Configuration
IP Address
105.20.4.65
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Time: 00:44:59
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Type here to search
11:01 PM
6/14/2024

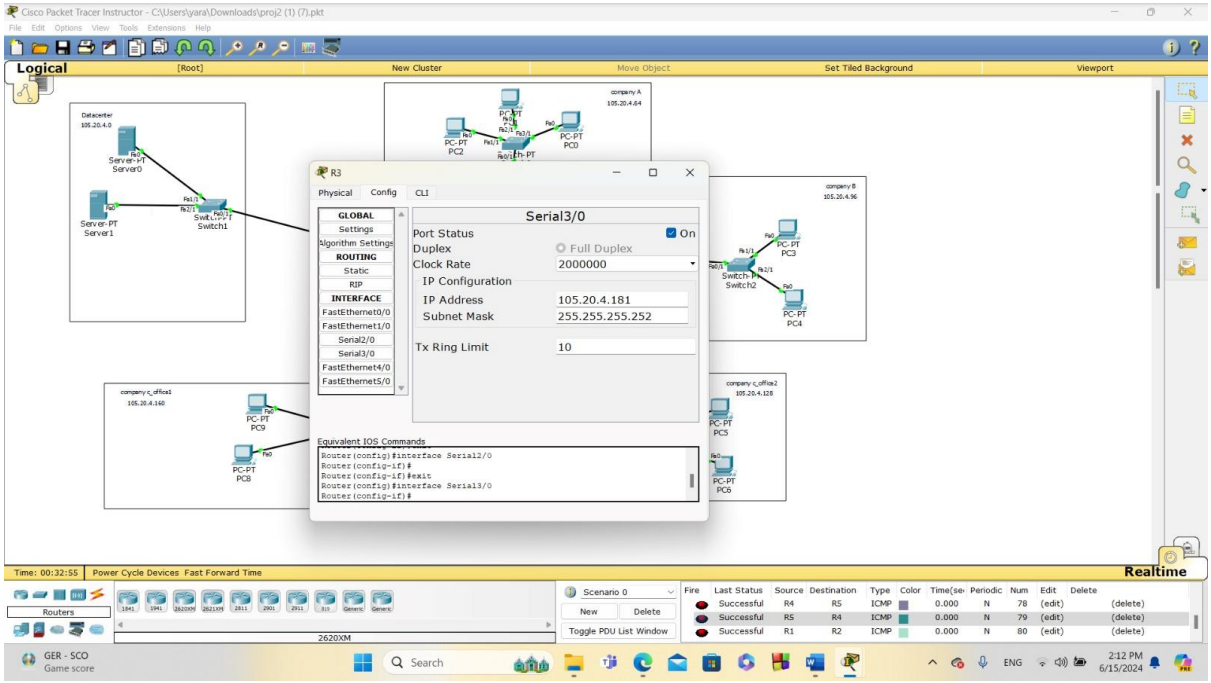

R2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.177
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Time: 00:45:02
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Type here to search
11:01 PM
6/14/2024


Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R2
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial3/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.181
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Time: 00:45:03
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Successful
R2
R4
ICMP
Type here to search
29°C
11:01 PM
6/14/2024

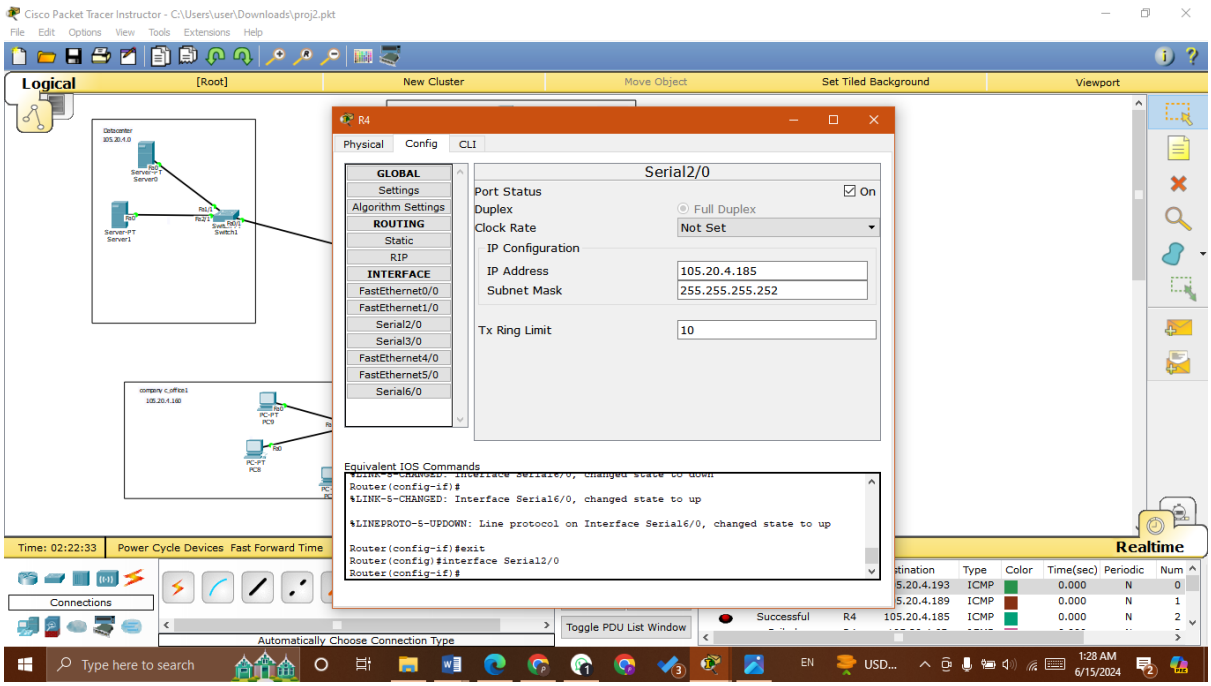
For R3➔

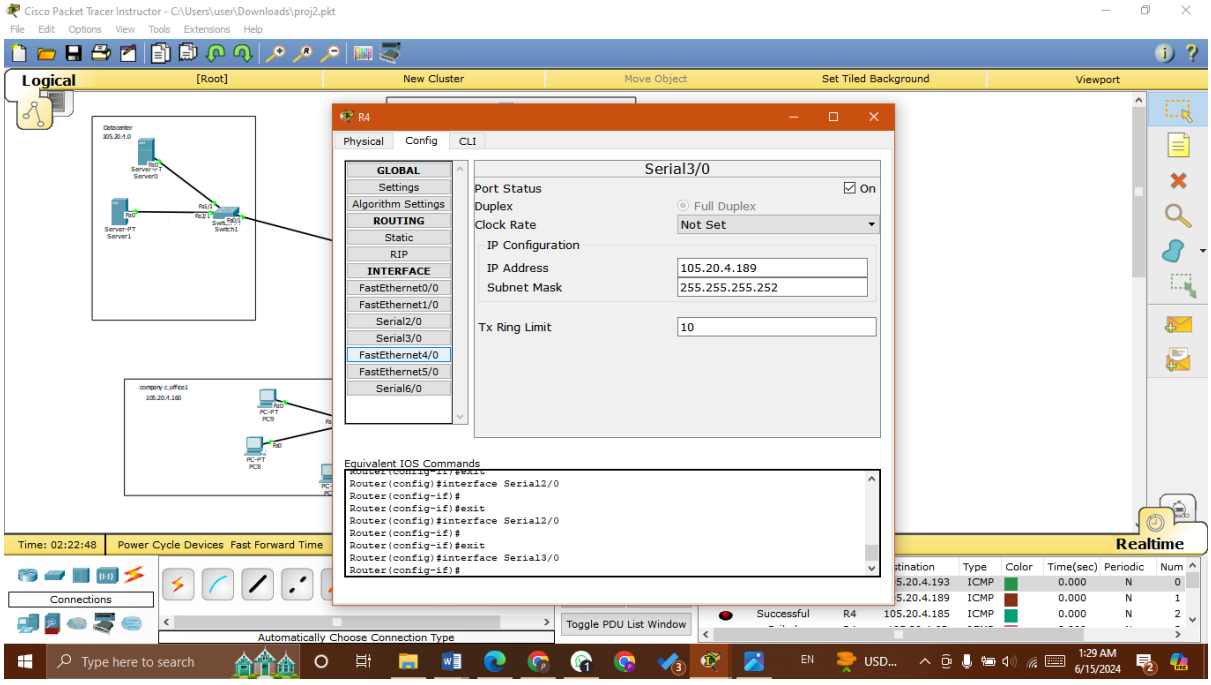

Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R3
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
000A.F3B9.26B9
IP Configuration
IP Address
105.20.4.97
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Time: 02:20:28
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Successful
R4
105.20.4.185
ICMP
Type here to search
29°C
1:25 AM
6/15/2024

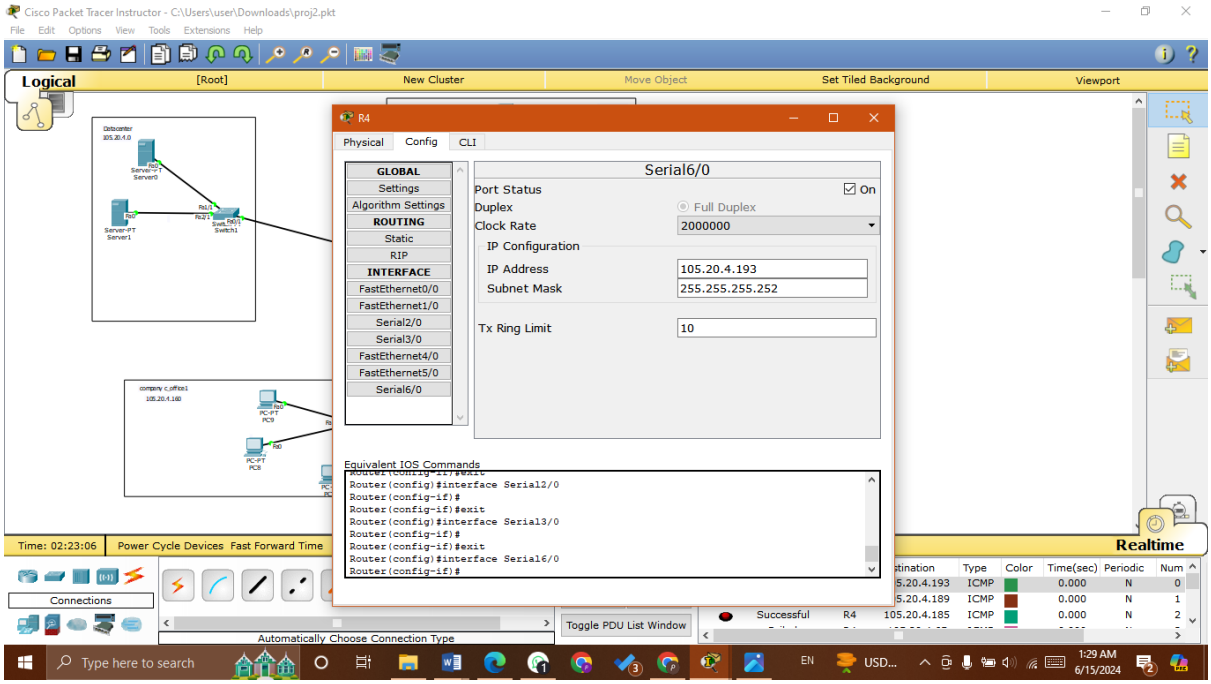

Cisco Packet Tracer Instructor - C:\Users\yara\Downloads\proj2 (1) (7).pkt
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R3
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.185
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Time: 00:32:20
Power Cycle Devices
Fast Forward Time
Realtime
Routers
2620XM
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(se
Periodic
Num
Edit
Delete
Successful
R4
R5
ICMP
0.000
N
78
(edit)
(delete)
Successful
R5
R4
ICMP
0.000
N
79
(edit)
(delete)
Successful
R1
R2
ICMP
0.000
N
80
(edit)
(delete)
95°F
Sunny
Search
ENG
2:11 PM
6/15/2024


Cisco Packet Tracer Instructor - C:\Users\yara\Downloads\proj2 (1) (7).pkt
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R3
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial3/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.181
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Time: 00:32:55
Power Cycle Devices
Fast Forward Time
Realtime
Routers
2620XM
Scenario 0
New
Delete
Toggle PDU List Window
Fire
Last Status
Source
Destination
Type
Color
Time(se
Periodic
Num
Edit
Delete
Successful
R4
R5
ICMP
0.000
N
78
(edit)
(delete)
Successful
R5
R4
ICMP
0.000
N
79
(edit)
(delete)
Successful
R1
R2
ICMP
0.000
N
80
(edit)
(delete)
GER - SCO
Game score
Search
ENG
2:12 PM
6/15/2024

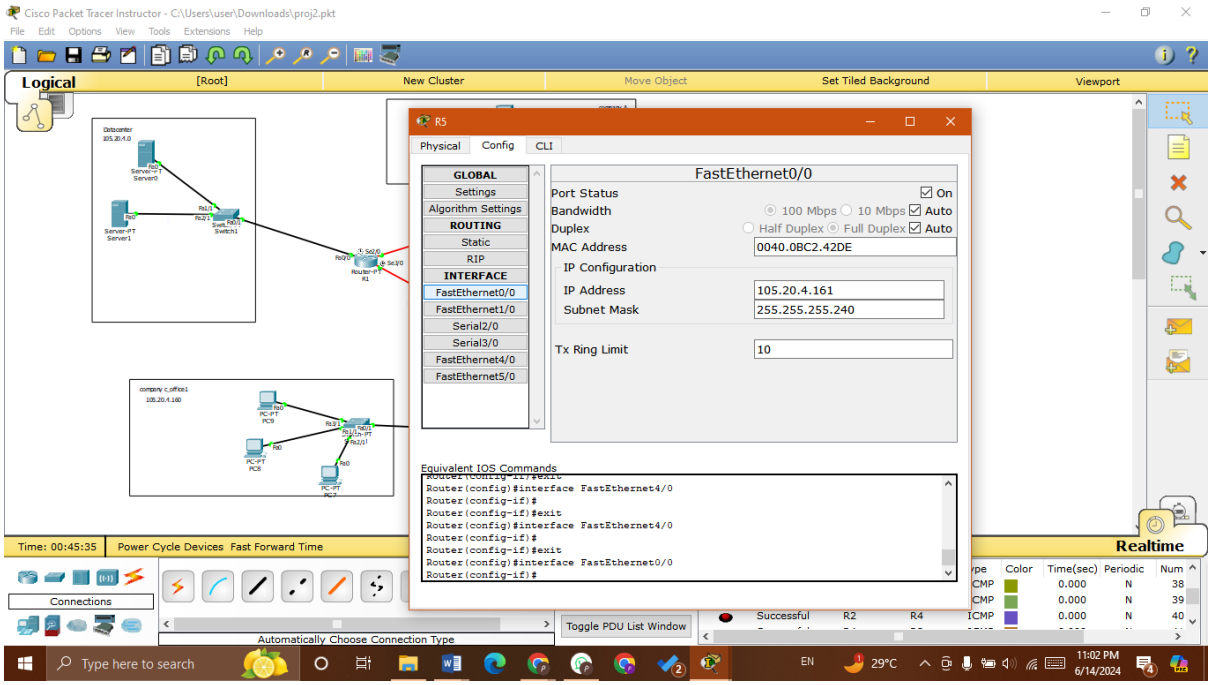
For R4➔

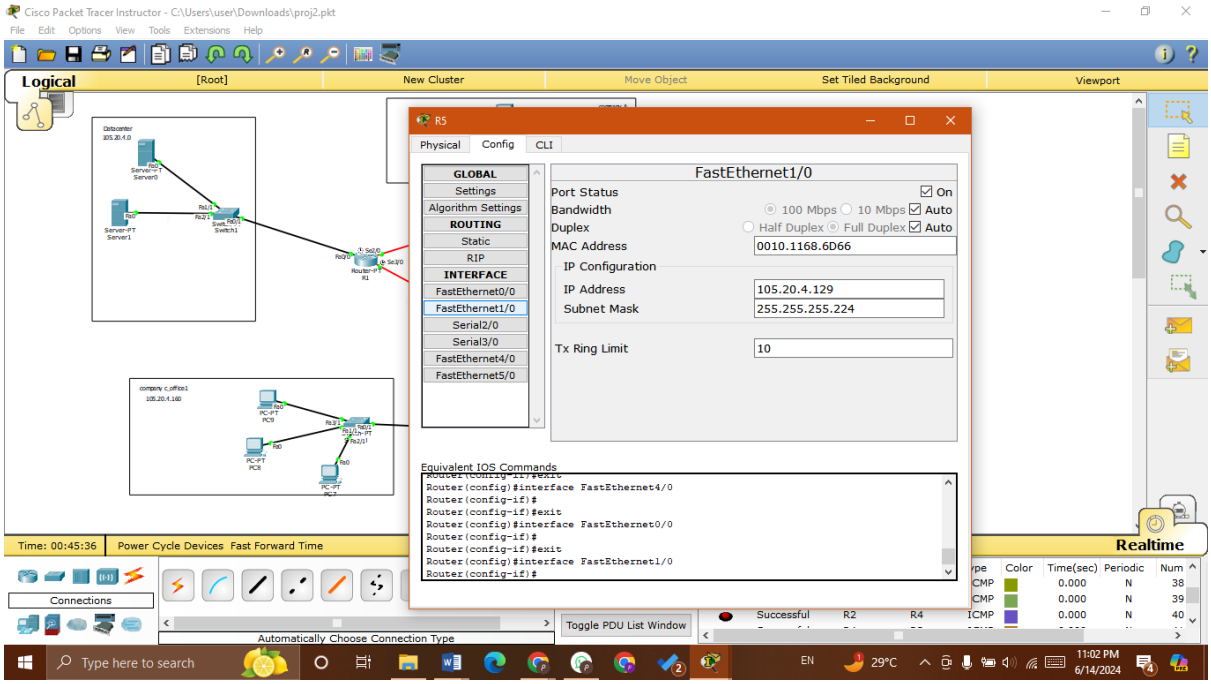

R4
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial6/0
Serial2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
Not Set
IP Configuration
IP Address
105.20.4.185
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
%LINK-5-CHANGED: Interface Serial6/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial6/0, changed state to up
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Realtime
Time: 02:22:33
Power Cycle Devices
Fast Forward Time
Connections
Toggle PDU List Window
Automatically Choose Connection Type
Type here to search
1:28 AM
6/15/2024

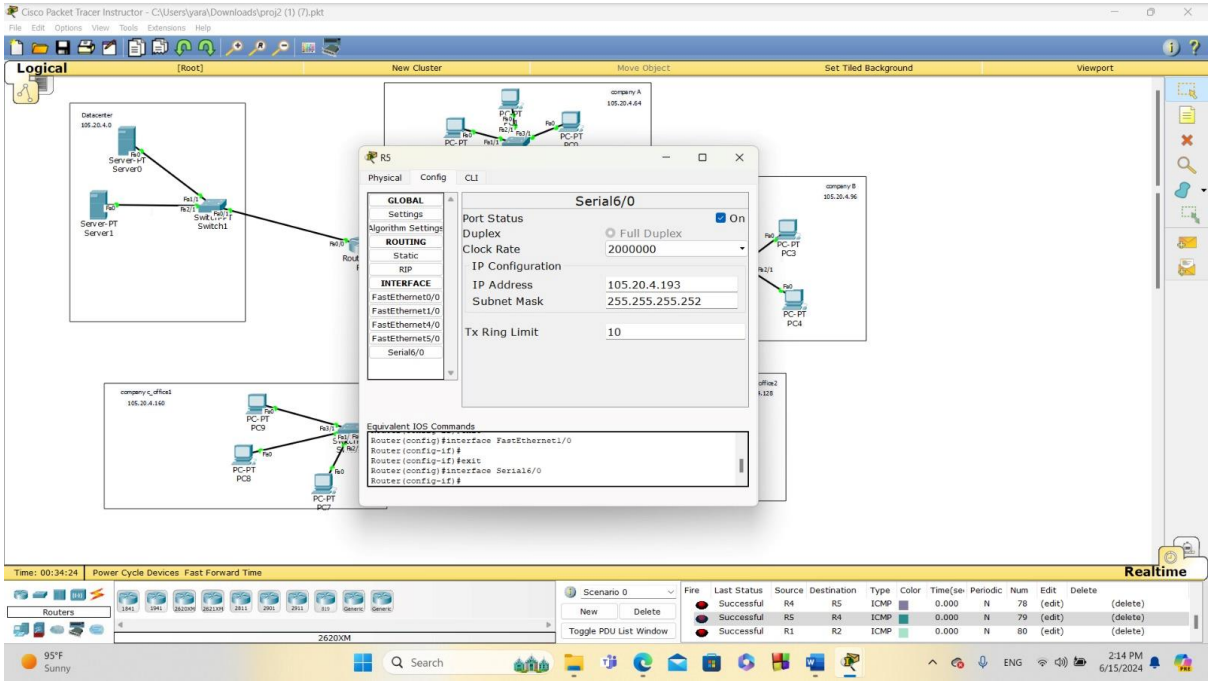

R4
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial6/0
Serial3/0
Port Status
On
Duplex
Full Duplex
Clock Rate
Not Set
IP Configuration
IP Address
105.20.4.189
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Realtime
Time: 02:22:48
Power Cycle Devices
Fast Forward Time
Connections
Toggle PDU List Window
Automatically Choose Connection Type
Type here to search
1:29 AM
6/15/2024


Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R4
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
Serial6/0
Serial6/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.193
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface Serial2/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial6/0
Router(config-if)#
Time: 02:23:06
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Type here to search
1:29 AM
6/15/2024

For R5➔

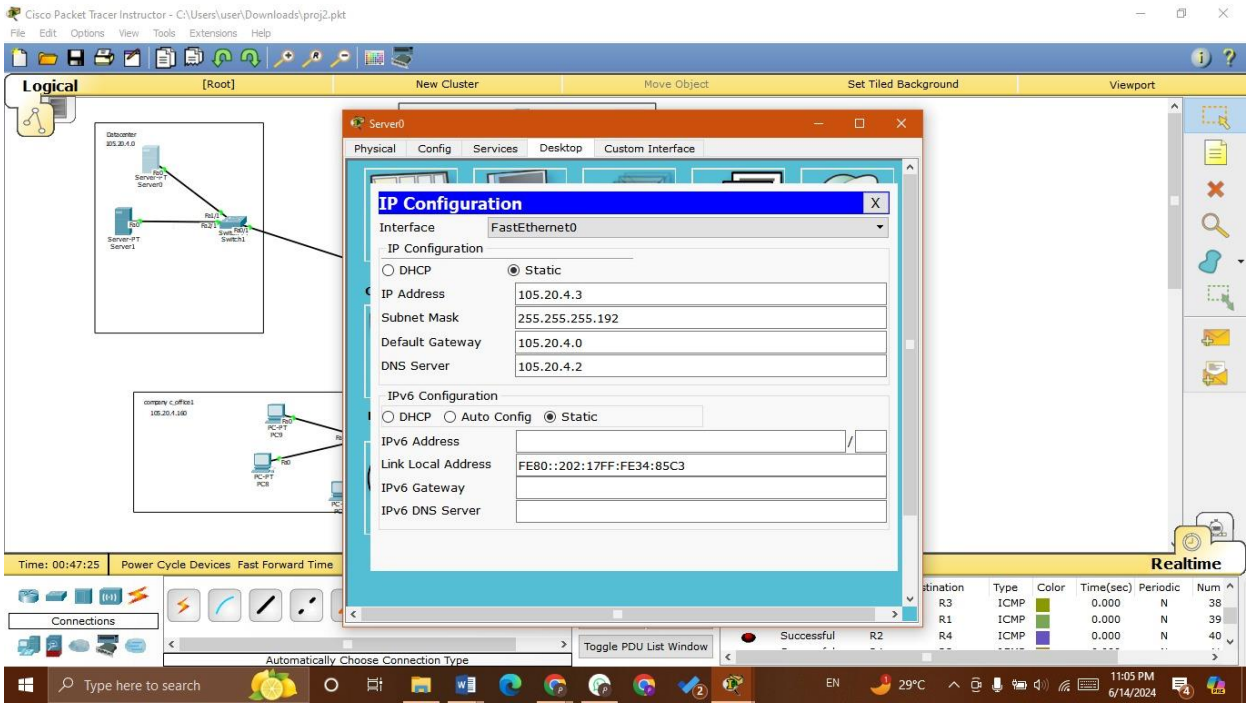

Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R5
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
FastEthernet0/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0040.0BC2.42DE
IP Configuration
IP Address
105.20.4.161
Subnet Mask
255.255.255.240
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet4/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet4/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Time: 00:45:35
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Type here to search
11:02 PM
6/14/2024


Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R5
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
Serial2/0
Serial3/0
FastEthernet4/0
FastEthernet5/0
FastEthernet1/0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0010.1168.6D66
IP Configuration
IP Address
105.20.4.129
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet4/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet1/0
Router(config-if)#
Time: 00:45:36
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Type here to search
EN
29°C
11:02 PM
6/14/2024

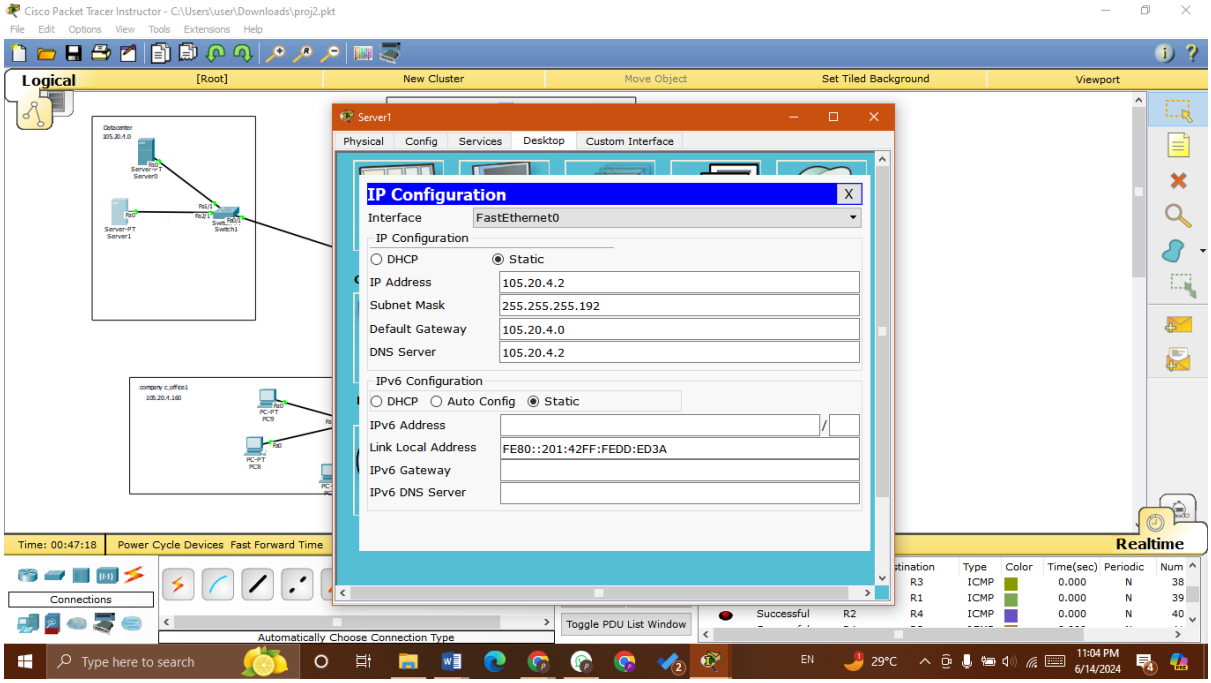

Cisco Packet Tracer Instructor - C:\Users\yara\Downloads\proj2 (1) (7).pkt
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
R5
Physical
Config
CLI
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0
FastEthernet1/0
FastEthernet4/0
FastEthernet5/0
Serial6/0
Serial6/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IP Address
105.20.4.193
Subnet Mask
255.255.255.252
Tx Ring Limit
10
Equivalent IOS Commands
Router(config)#interface FastEthernet1/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial6/0
Router(config-if)#
Time: 00:34:24
Power Cycle Devices
Fast Forward Time
Realtime
Routers
2620XM
Scenario 0
New
Delete
Toggle PDU List Window
Search
ENG
2:14 PM
6/15/2024

End devices:

Server0-HTTP(data center)➔

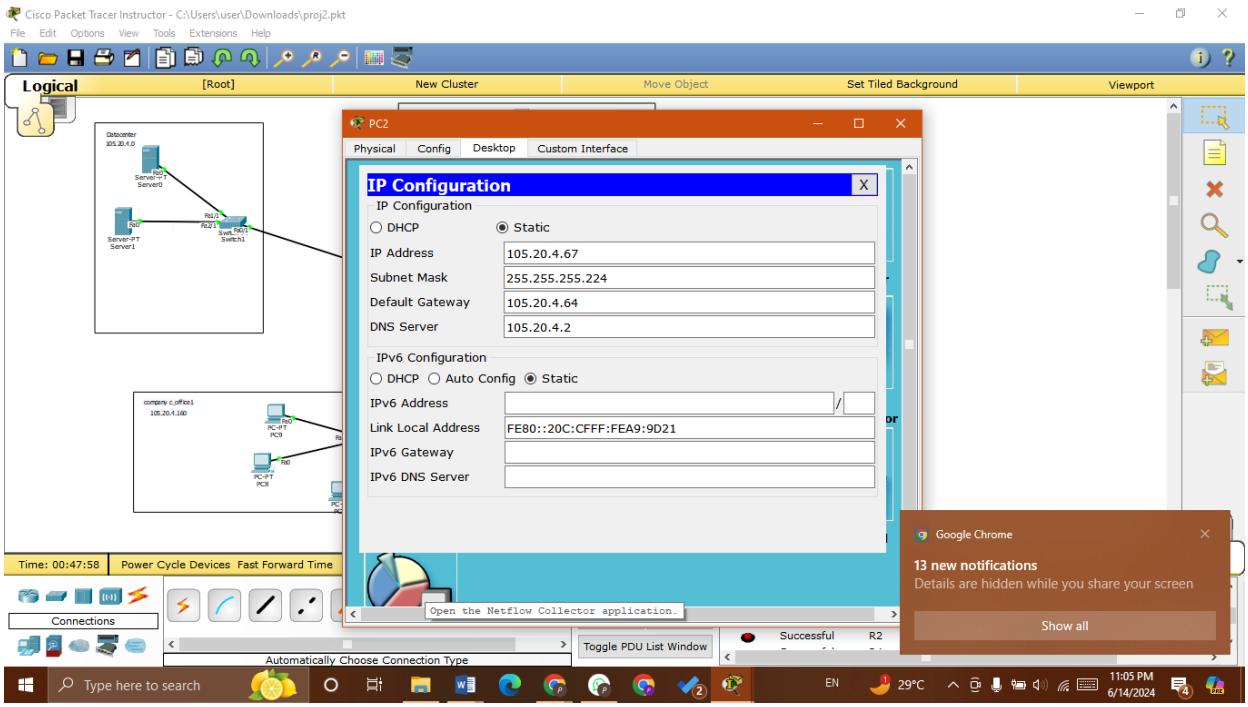


Server1-DNS(data center)➔

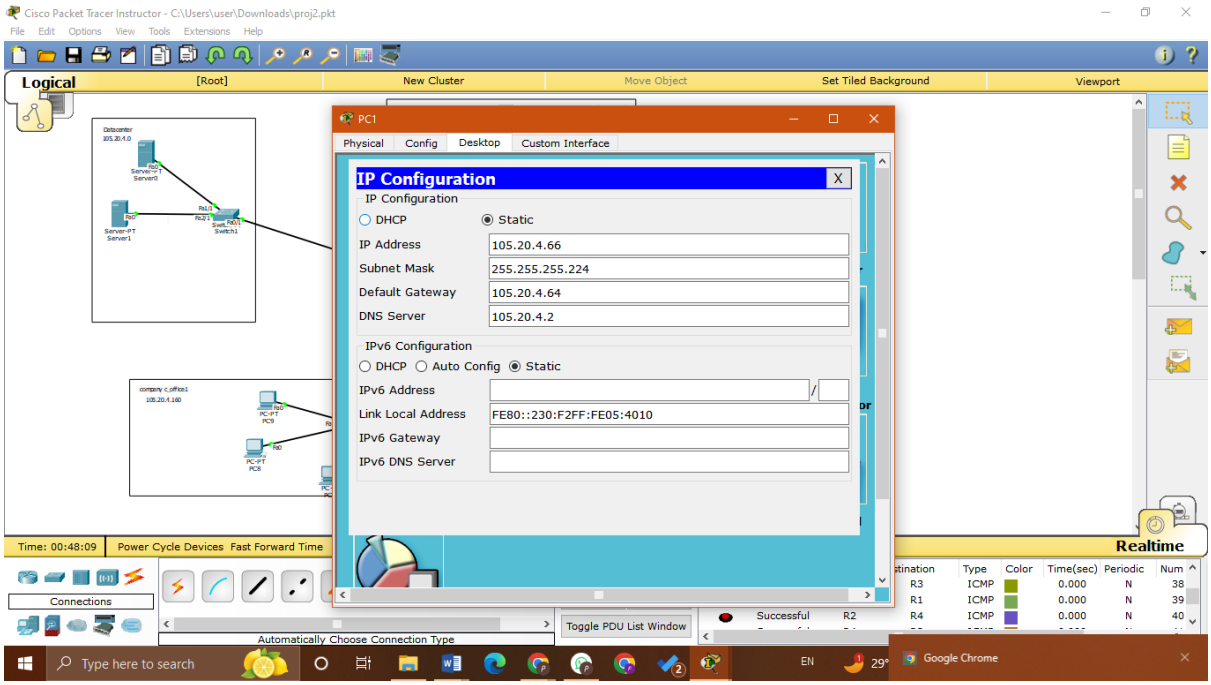


Company A:

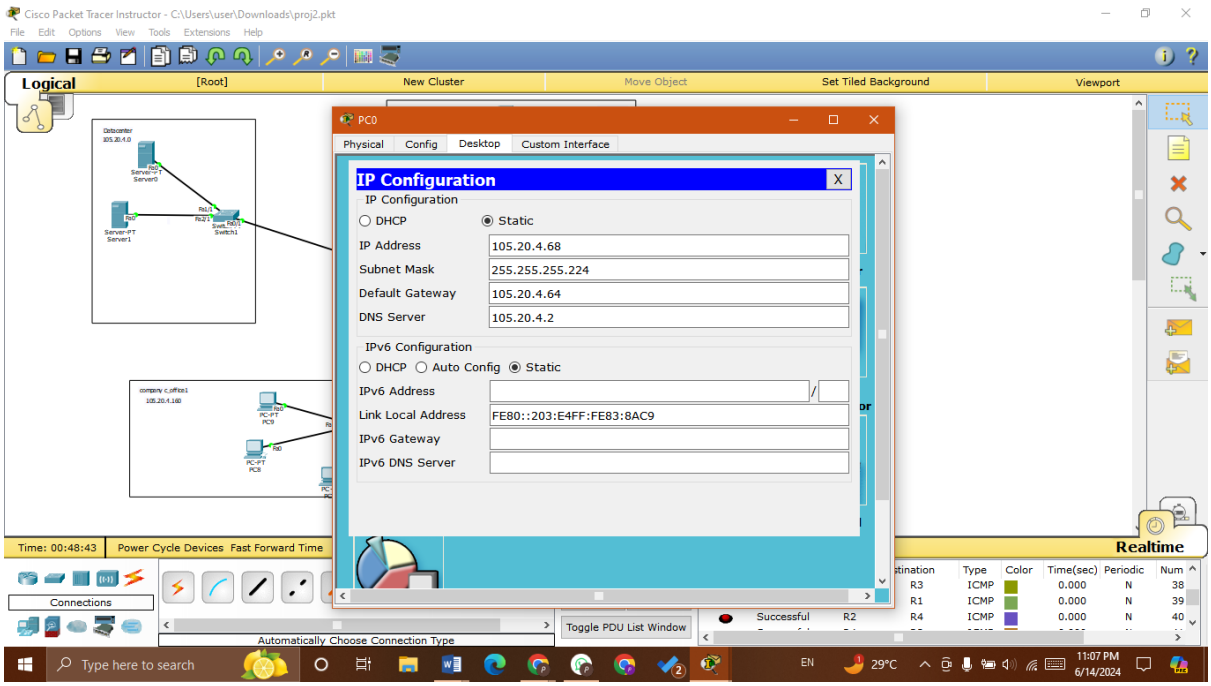
PC2➔



PC1➔

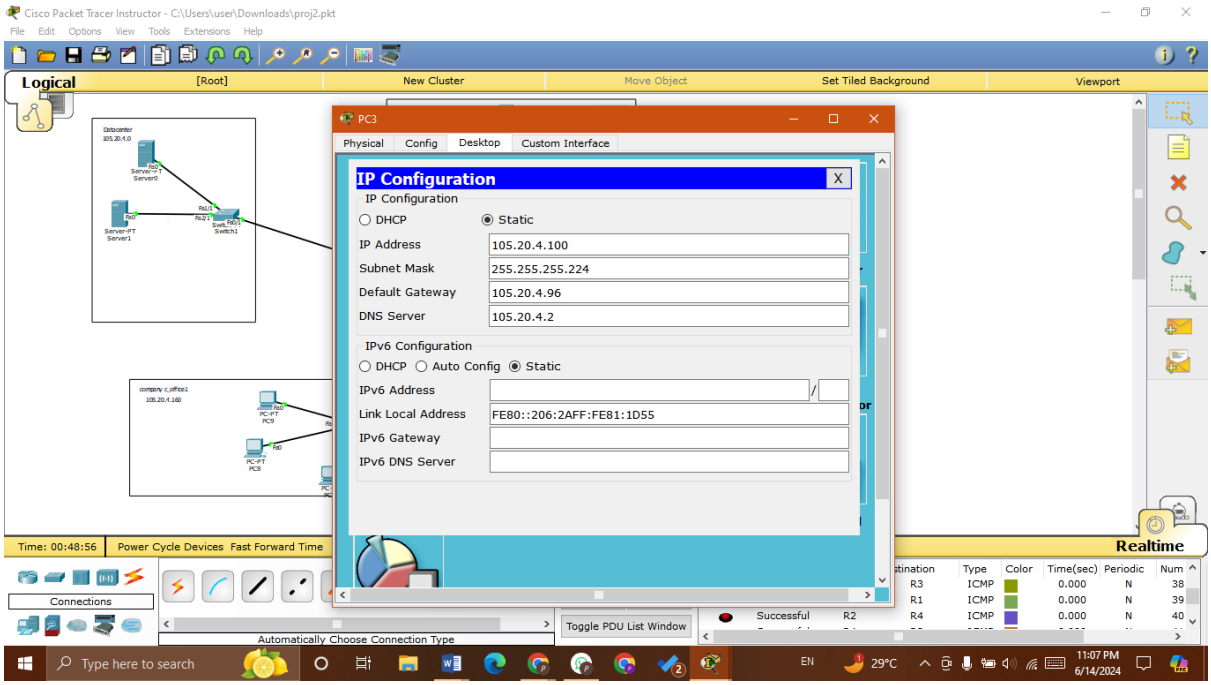


PC0➔

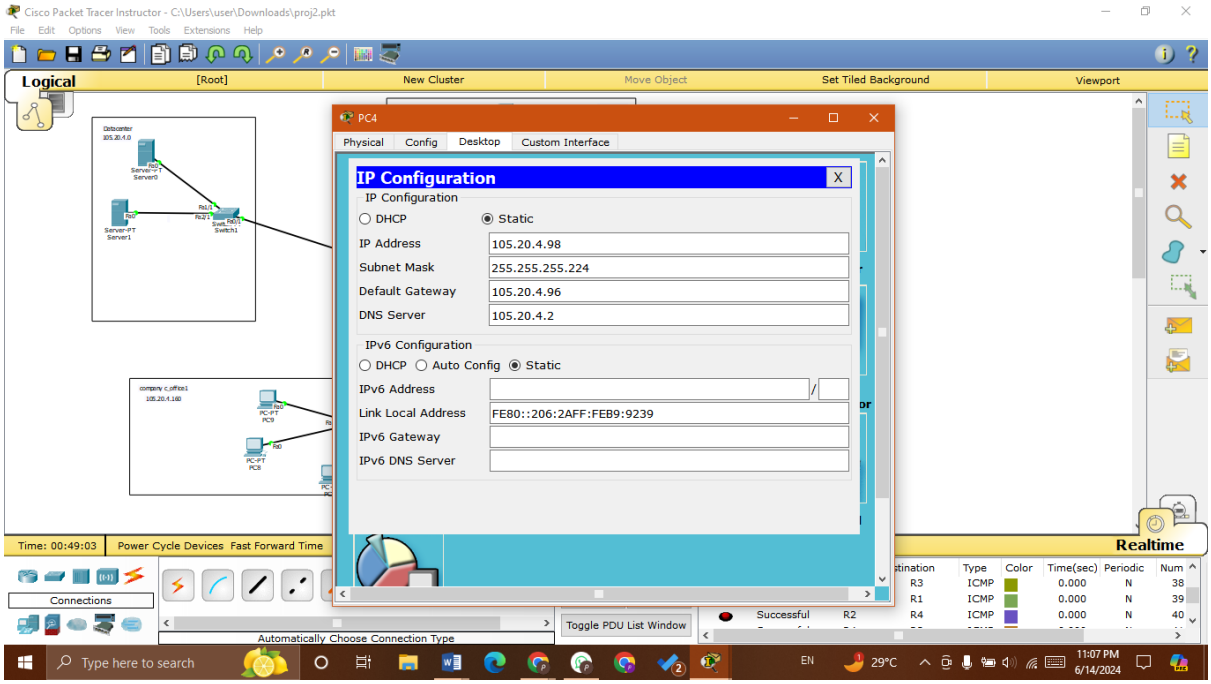

PC0
Physical
Config
Desktop
Custom Interface
IP Configuration
IP Configuration
DHCP
Static
IP Address
105.20.4.68
Subnet Mask
255.255.255.224
Default Gateway
105.20.4.64
DNS Server
105.20.4.2
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::203:E4FF:FE83:8AC9
IPv6 Gateway
IPv6 DNS Server
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Time: 00:48:43
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Type here to search
29°C
11:07 PM
6/14/2024

Company B:

PC3➔

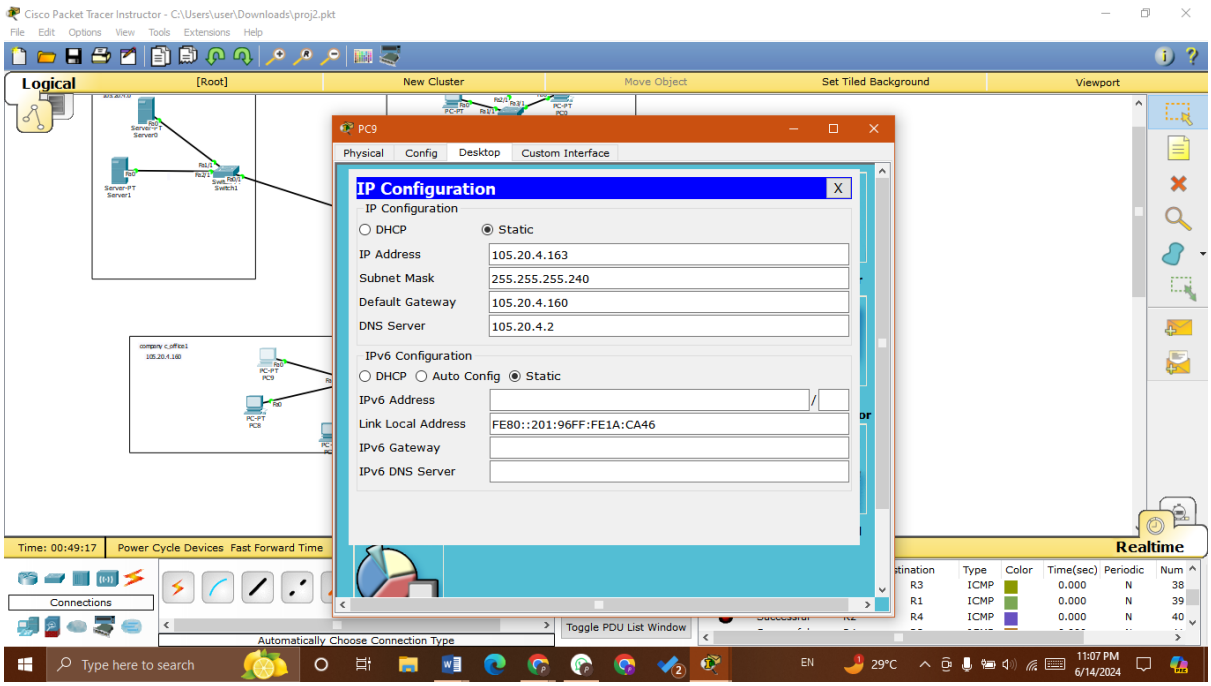


PC4➔

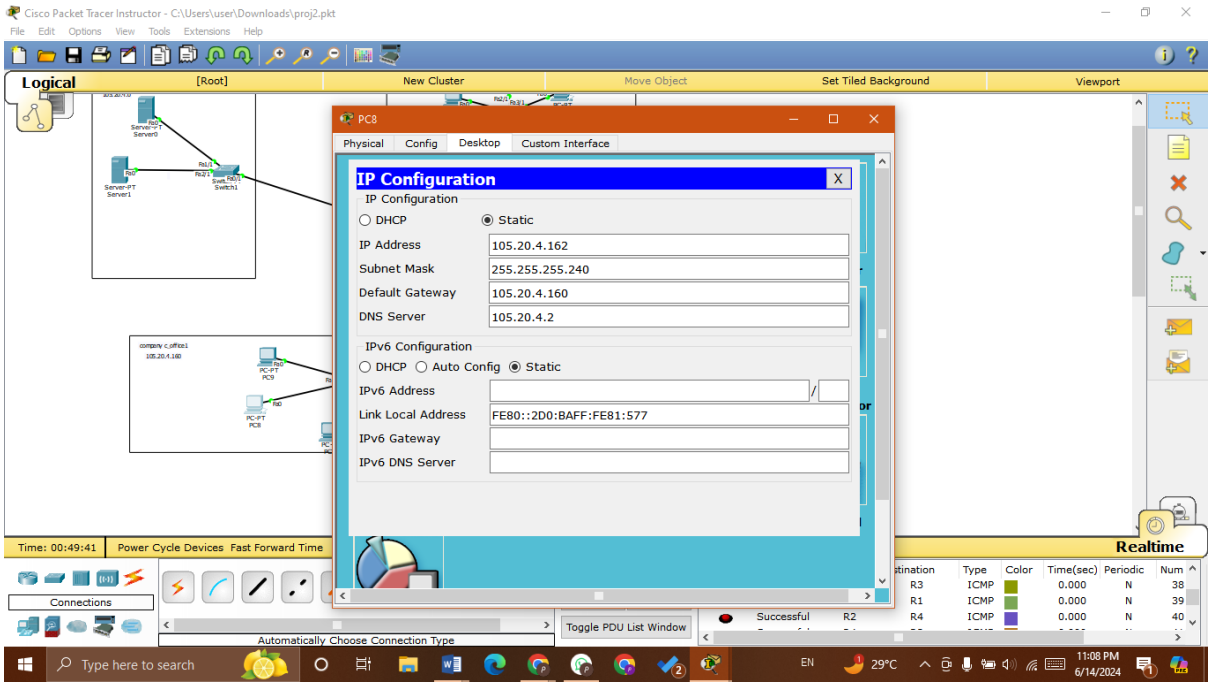


Company C_office1:

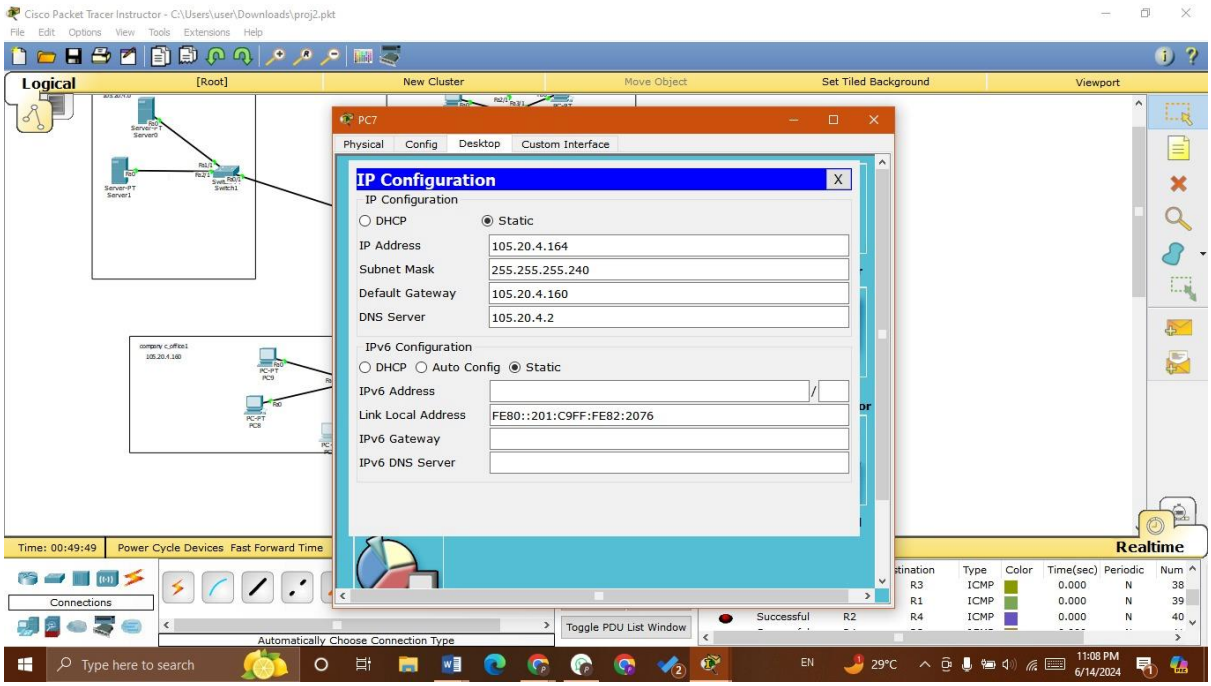
PC9➔



PC8➔

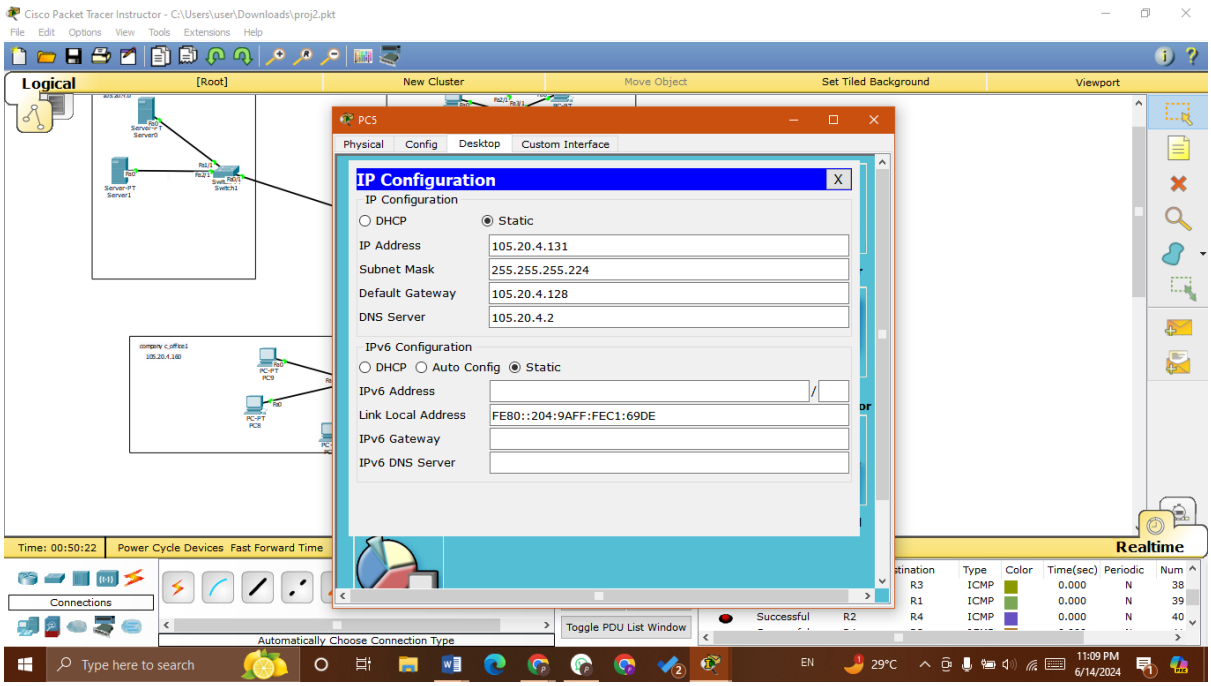


PC7➔

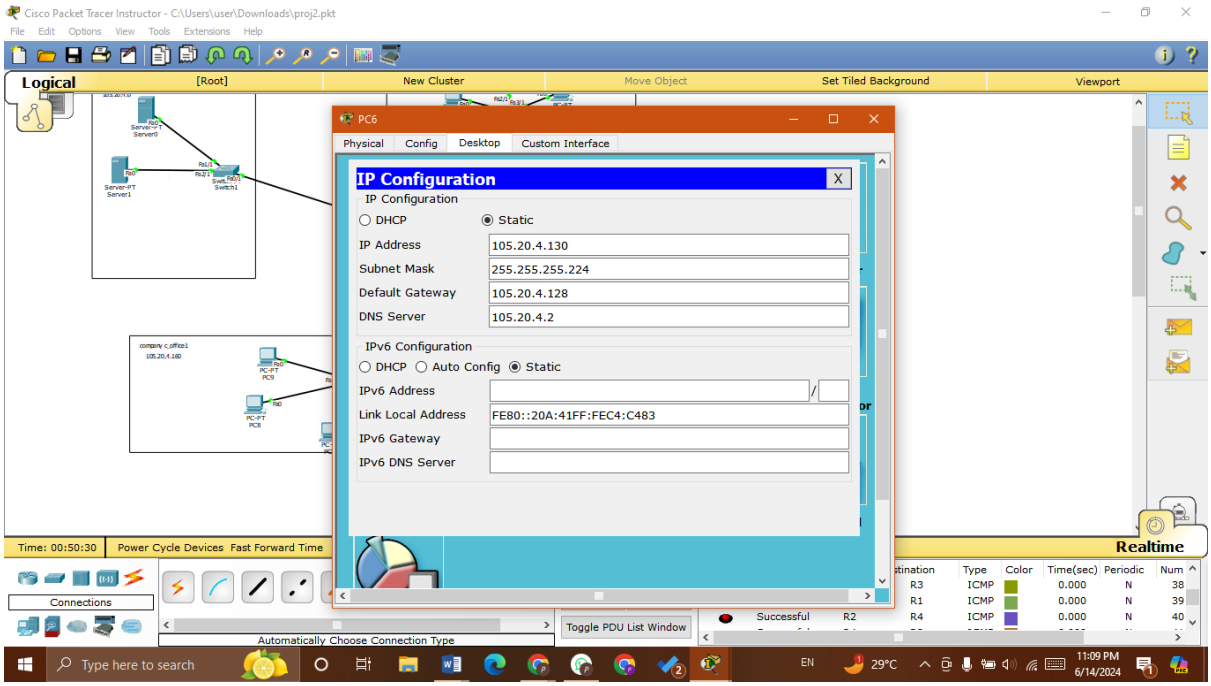

Cisco Packet Tracer Instructor - C:\Users\user\Downloads\proj2.pkt
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
PC7
Physical
Config
Desktop
Custom Interface
IP Configuration
IP Configuration
DHCP
Static
IP Address
105.20.4.164
Subnet Mask
255.255.255.240
Default Gateway
105.20.4.160
DNS Server
105.20.4.2
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address
FE80::201:C9FF:FE82:2076
IPv6 Gateway
IPv6 DNS Server
Time: 00:49:49
Power Cycle Devices
Fast Forward Time
Realtime
Connections
Automatically Choose Connection Type
Toggle PDU List Window
Successful
R2
Type
Color
Time(sec)
Periodic
Num
R3 ICMP 0.000 N 38
R1 ICMP 0.000 N 39
R4 ICMP 0.000 N 40
Type here to search
EN
29°C
11:08 PM
6/14/2024

Company C_office2:

PC5➔

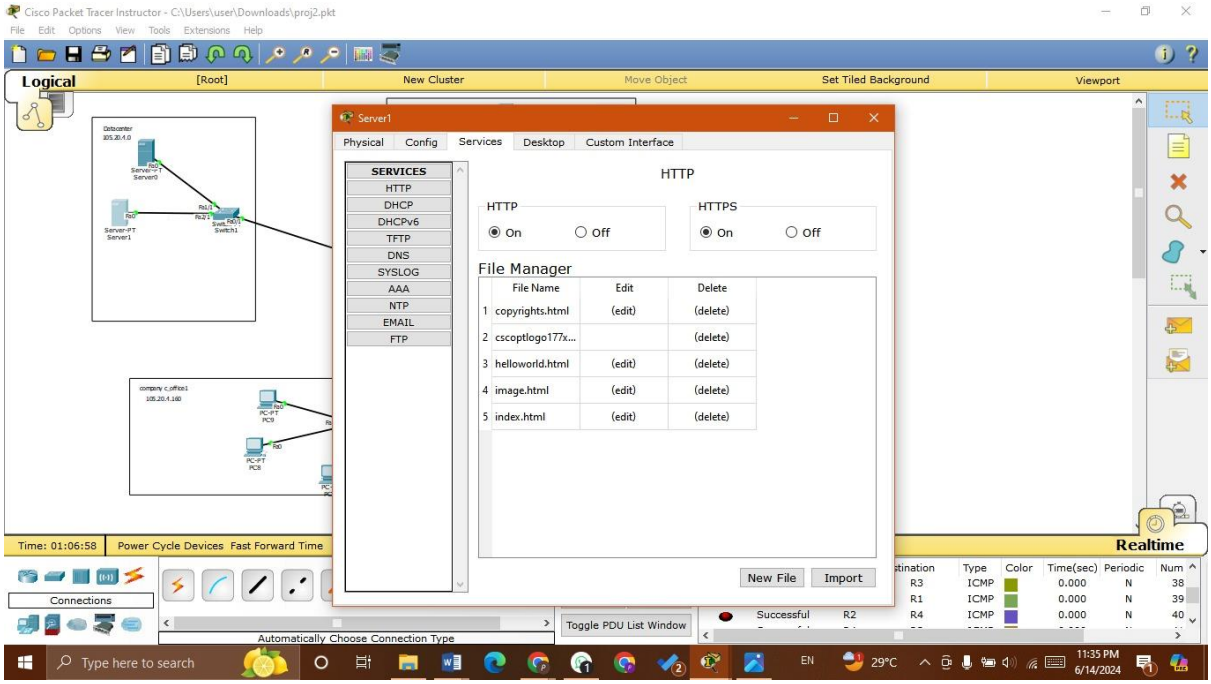


PC6➔

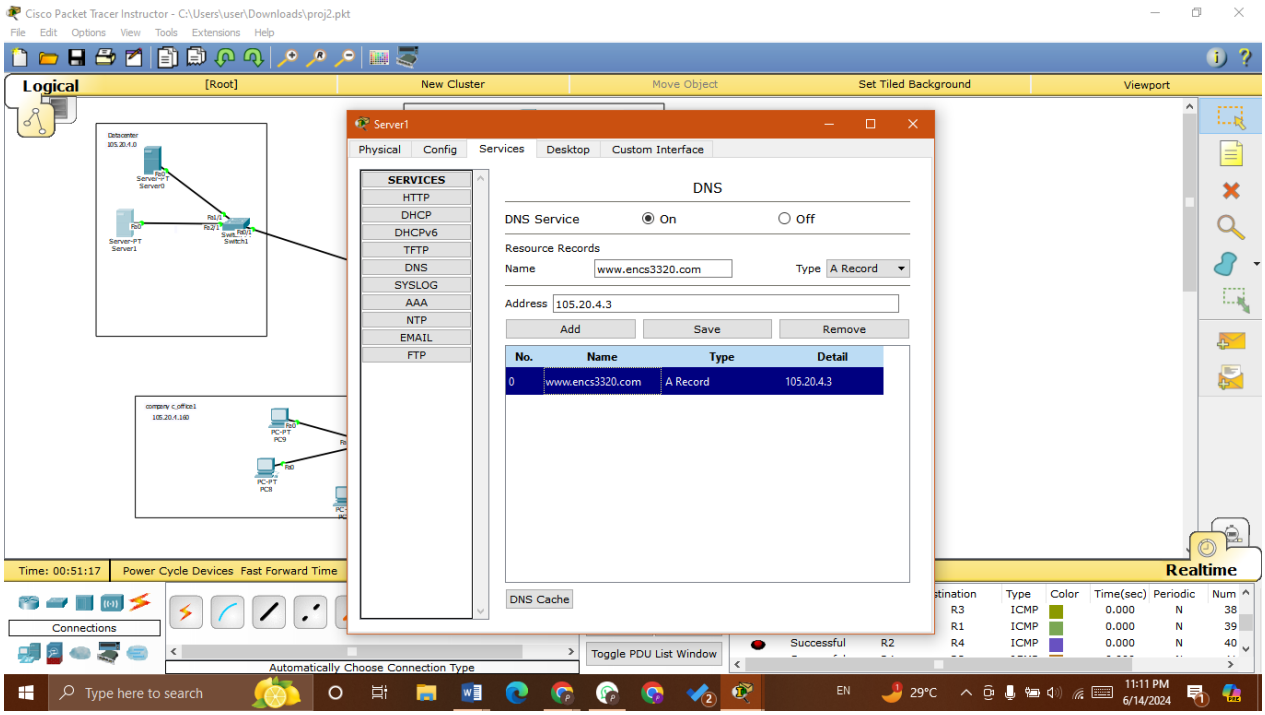


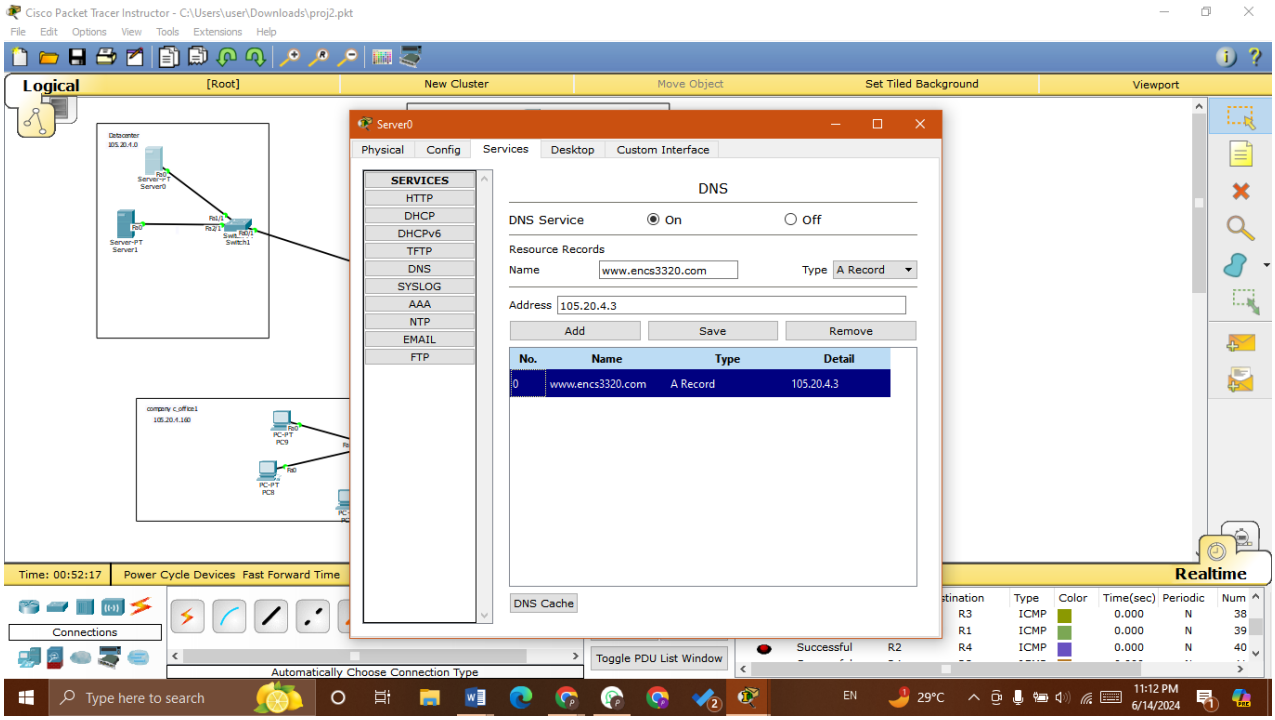
2- Configuring servers

1.Two servers are used in this topology: HTTP/WEB server and DNS server in Data Center network



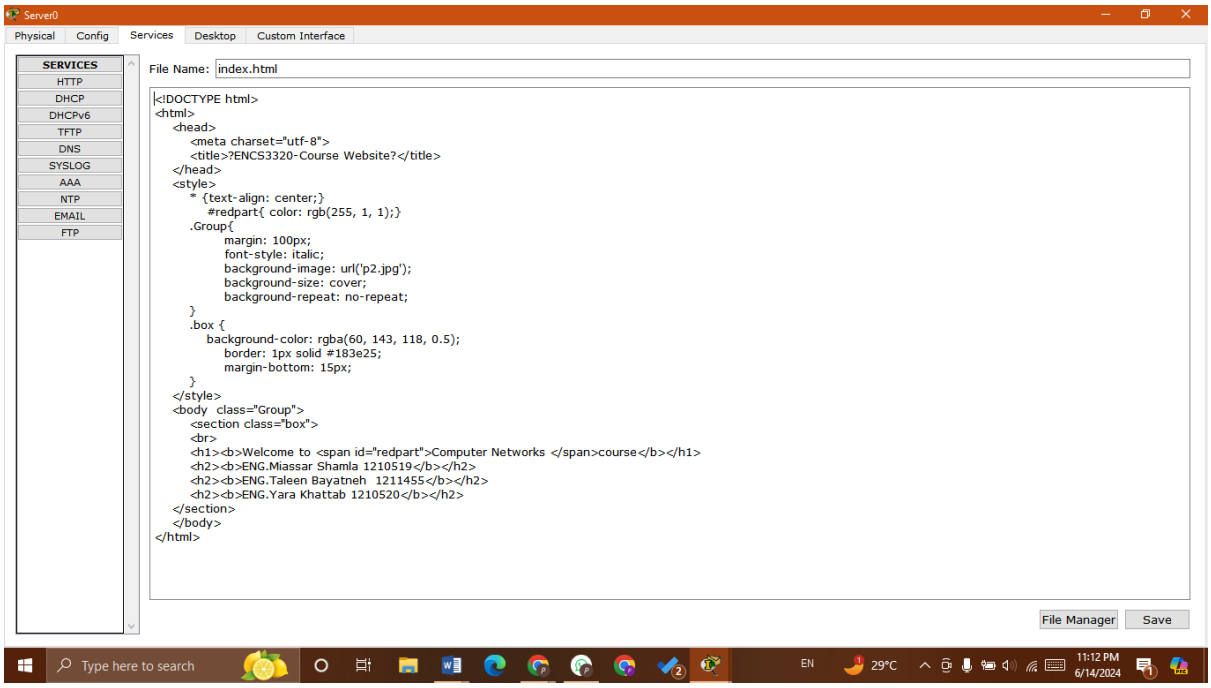
2.Configure the DNS server and WEB server with domain name www.ENCS3320.com

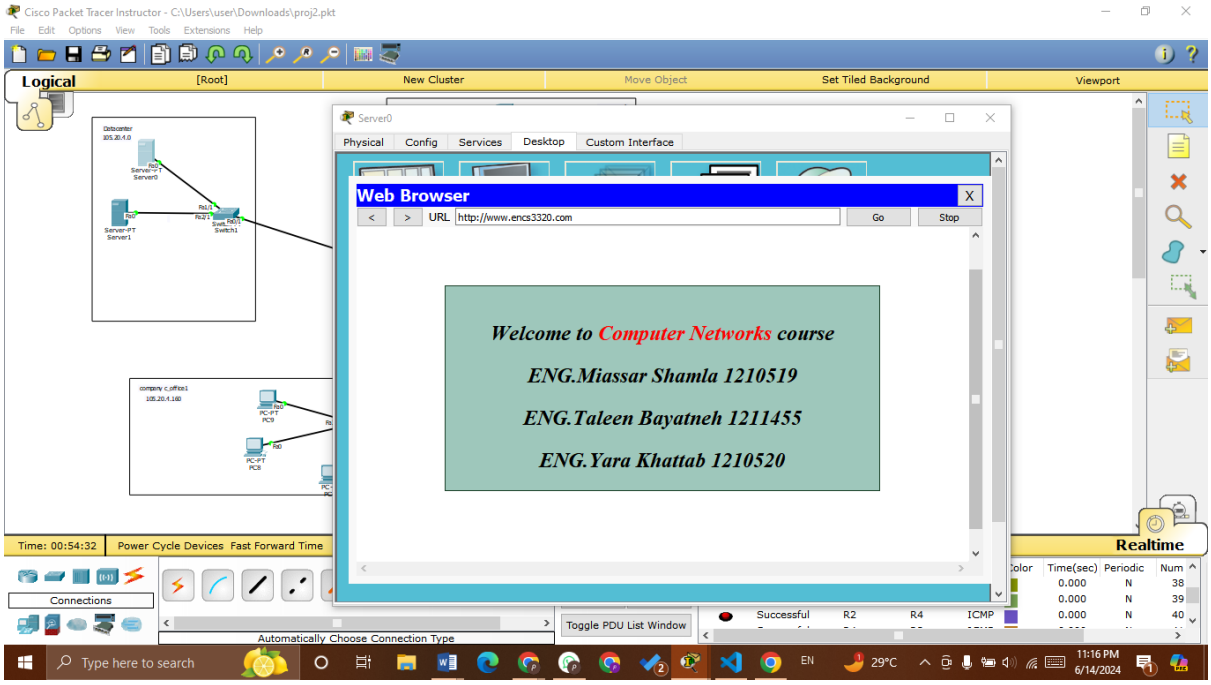


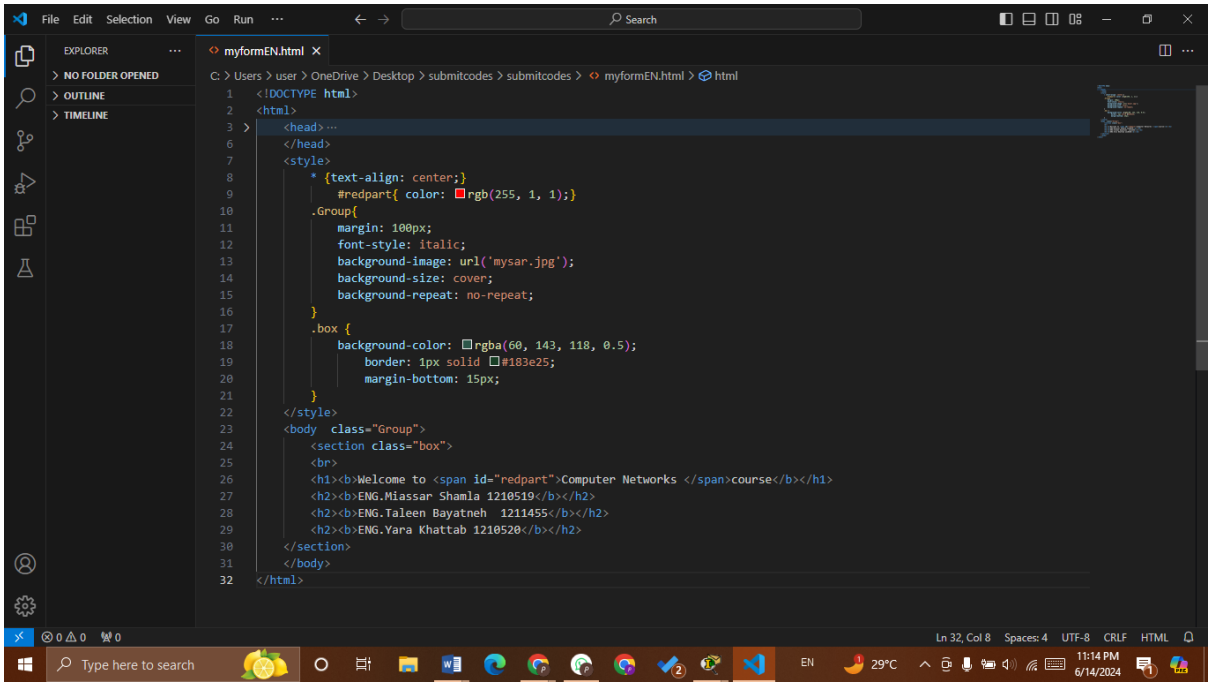


3.Create your website by modifying the index.html file in the HTTP server. Your website should contain:

- "ENCS3320-Course Website" in the title.
- "Welcome to **Computer Networks course**" (part of the phrase is in **Red**).
- Group members' names and IDs.






File Edit Selection View Go Run
Search
EXPLORER
NO FOLDER OPENED
OUTLINE
TIMELINE
myformEN.html
C: > Users > user > OneDrive > Desktop > submitcodes > submitcodes > myformEN.html > html
<!DOCTYPE html>
<html>
<head> ···
</head>
<style>
* {text-align: center;}
#redpart{ color: rgb(255, 1, 1);}
.Group{
margin: 100px;
font-style: italic;
background-image: url('mysar.jpg');
background-size: cover;
background-repeat: no-repeat;
}
.box {
background-color: rgba(60, 143, 118, 0.5);
border: 1px solid #183e25;
margin-bottom: 15px;
}
</style>
<body class="Group">
<section class="box">

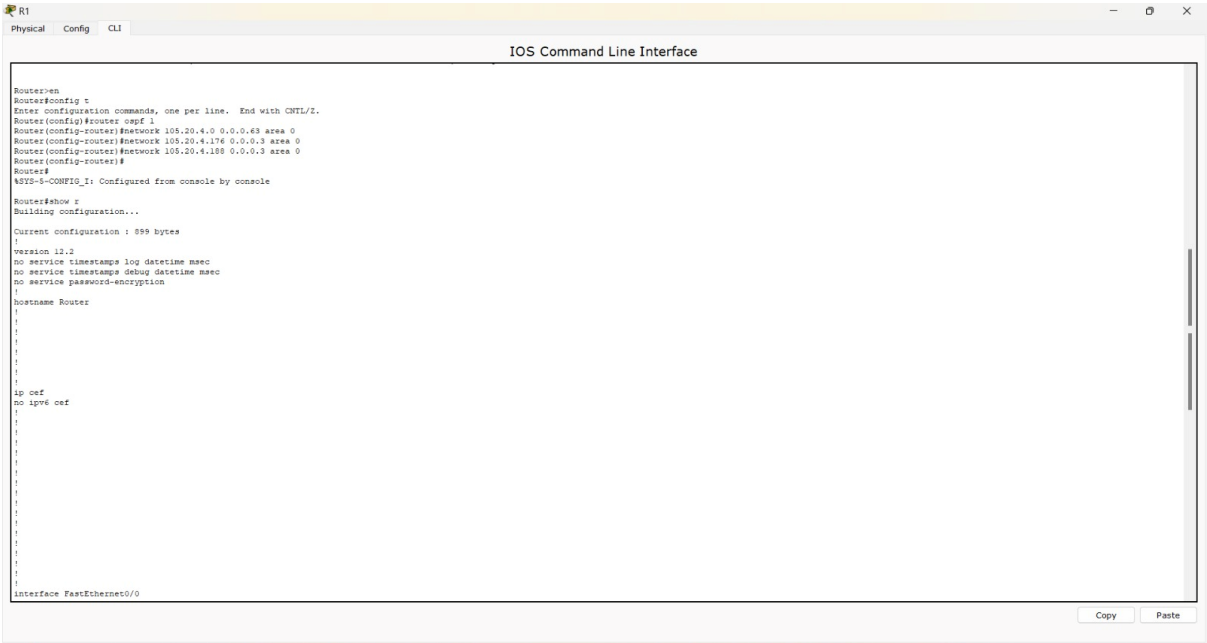
<h1>Welcome to Computer Networks course</h1>
<h2>ENG.Miassar Shamla 1210519</h2>
<h2>ENG.Taleen Bayatneh 1211455</h2>
<h2>ENG.Yara Khattab 1210520</h2>
</section>
</body>
</html>
Ln 32, Col 8 Spaces: 4 UTF-8 CRLF HTML
Type here to search
EN
29°C
11:14 PM
6/14/2024

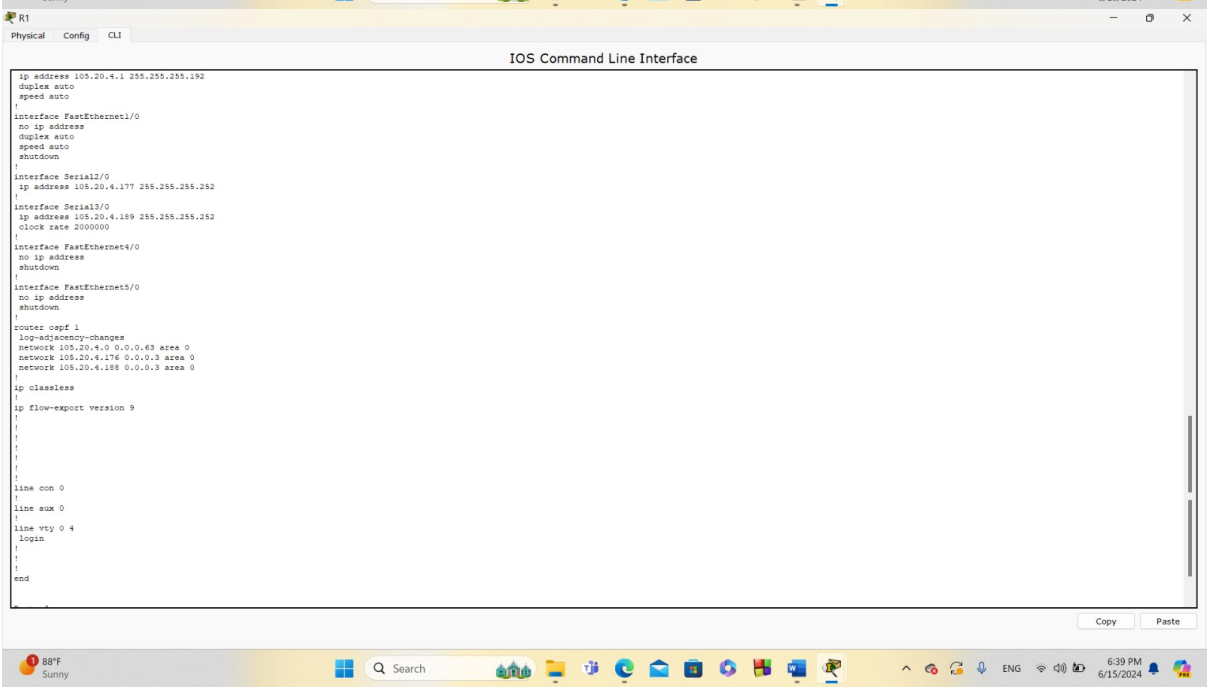

"ENCS3320-Course Website"
File C:/Users/user/OneDrive/Desktop/submitcodes/submitcodes/myformEN.html
Welcome to Computer Networks course
ENG.Miassar Shamla 1210519
ENG.Taleen Bayatneh 1211455
ENG.Yara Khattab 1210520
Type here to search
EN
Earn...
1:35 AM
6/15/2024

3: Routing Protocols

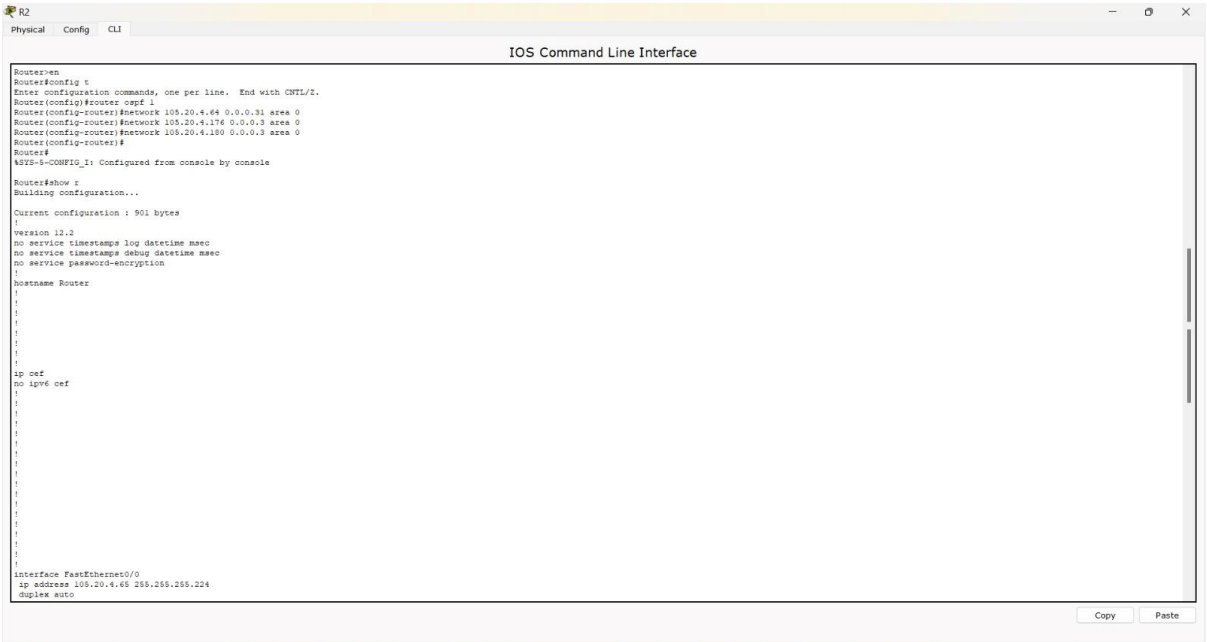
Use single area open shortest path first protocol (OSPF) on all routers.

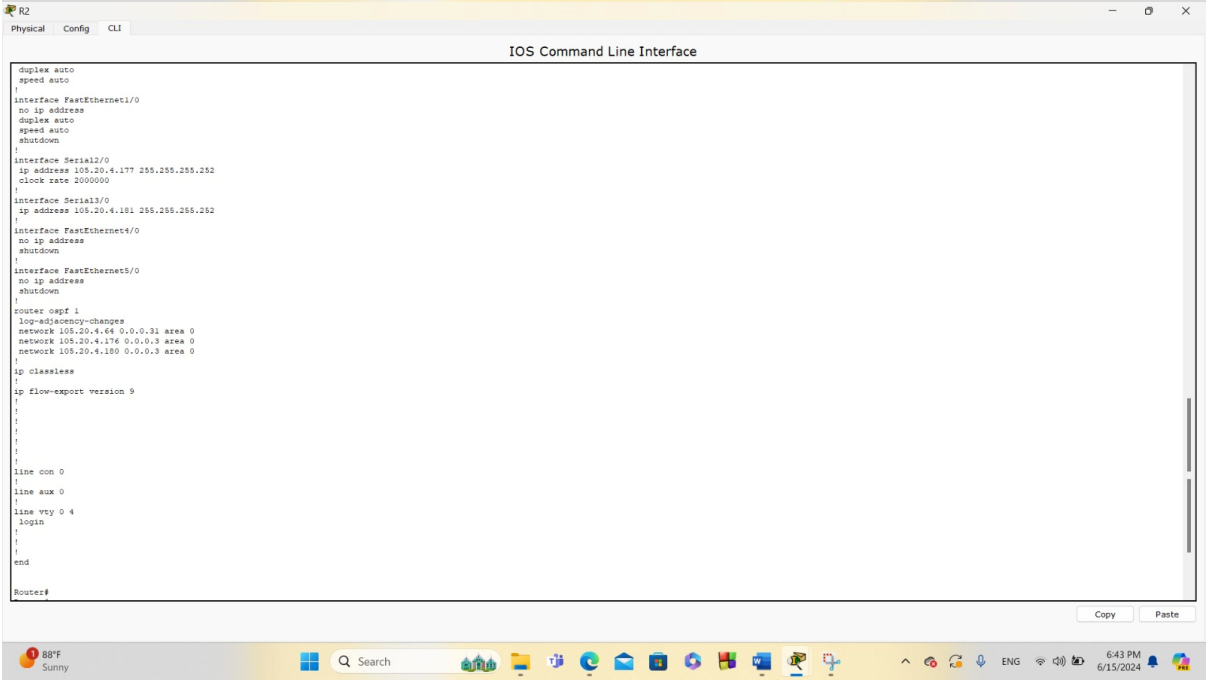
Router R1 →



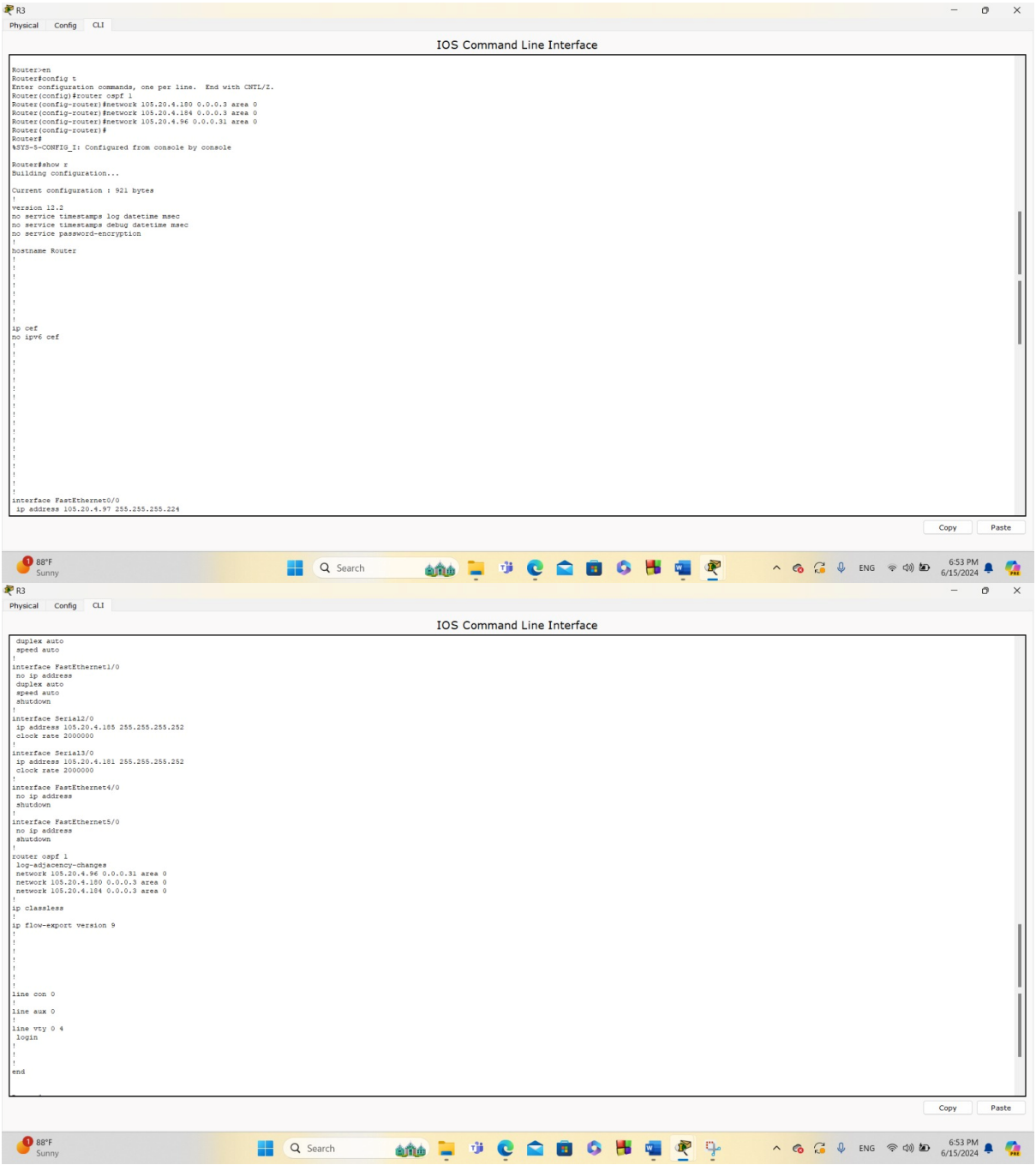


Router R2 →

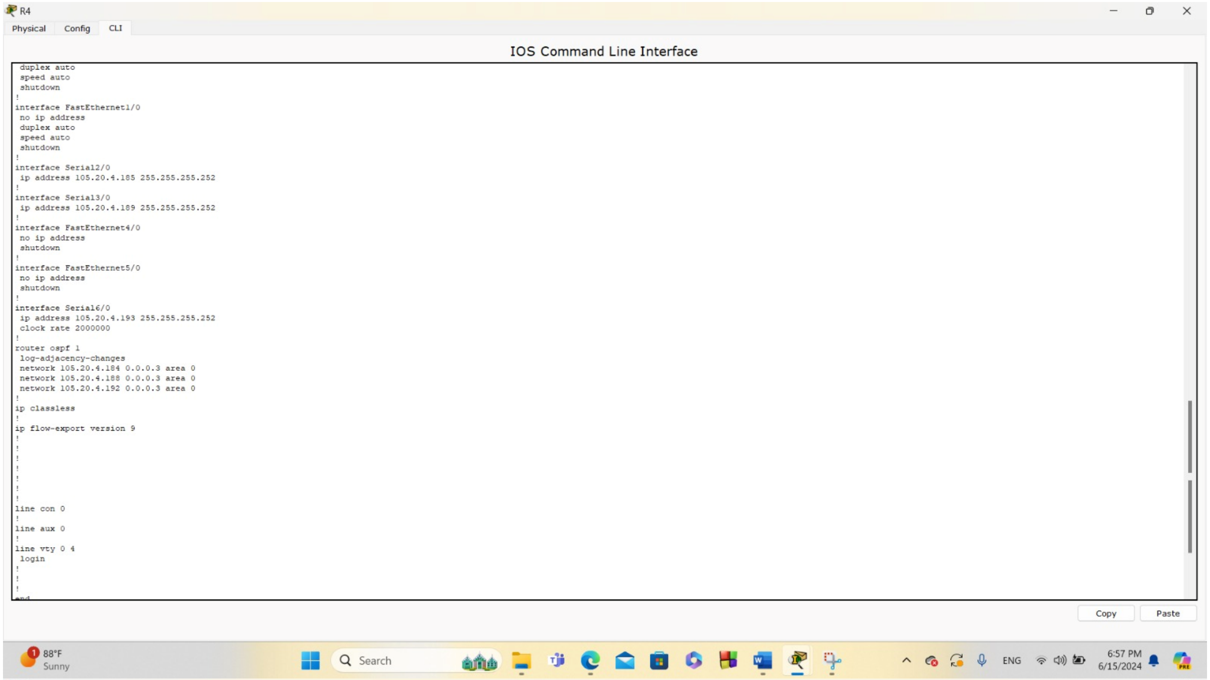

R2
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 105.20.4.64 0.0.0.31 area 0
Router(config-router)#network 105.20.4.176 0.0.0.3 area 0
Router(config-router)#network 105.20.4.180 0.0.0.3 area 0
Router(config-router)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show r
Building configuration...
Current configuration : 901 bytes
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
hostname Router
ip cef
no ipv6 cef
interface FastEthernet0/0
ip address 105.20.4.65 255.255.255.224
duplex auto
Copy
Paste
88°F
Sunny
Search
ENG
6:42 PM
6/15/2024

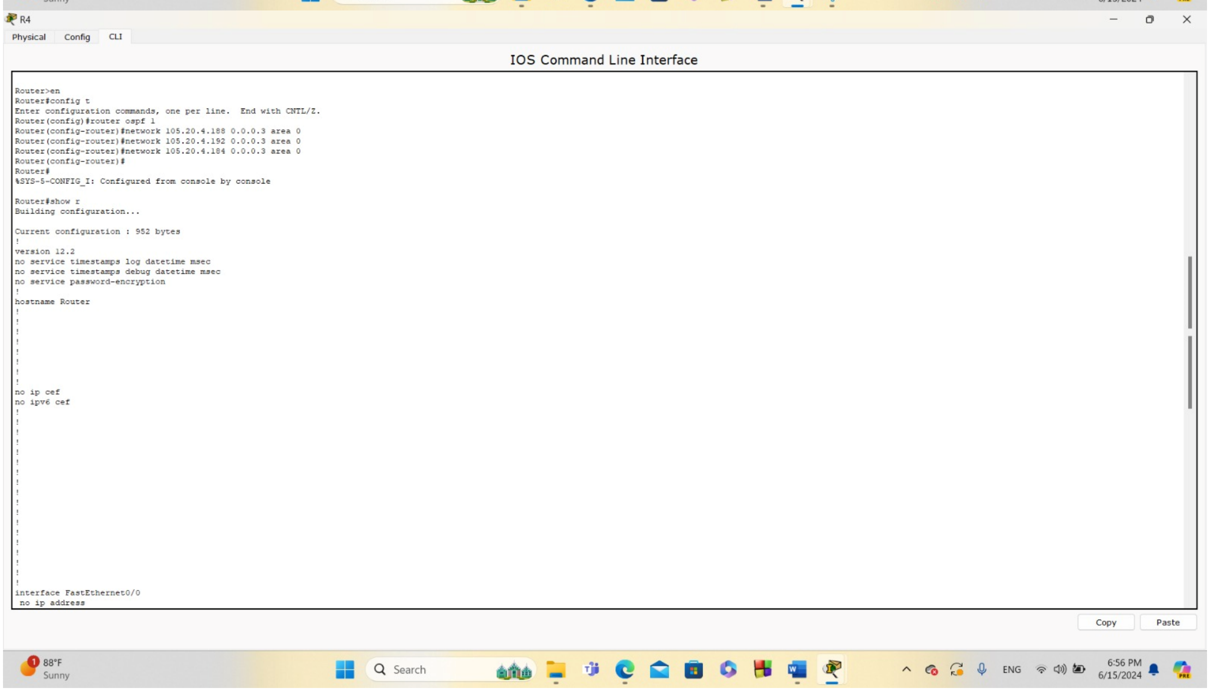

R2
Physical
Config
CLI
IOS Command Line Interface
duplex auto
speed auto
interface FastEthernet1/0
no ip address
duplex auto
speed auto
shutdown
interface Serial2/0
ip address 105.20.4.177 255.255.255.252
clock rate 2000000
interface Serial3/0
ip address 105.20.4.181 255.255.255.252
interface FastEthernet4/0
no ip address
shutdown
interface FastEthernet5/0
no ip address
shutdown
router ospf 1
log-adjacency-changes
network 105.20.4.64 0.0.0.31 area 0
network 105.20.4.176 0.0.0.3 area 0
network 105.20.4.180 0.0.0.3 area 0
ip classless
ip flow-export version 9
line con 0
line aux 0
line vty 0 4
login
end
Router#
Copy
Paste
88°F
Sunny
Search
ENG
6:43 PM
6/15/2024

Router R3→

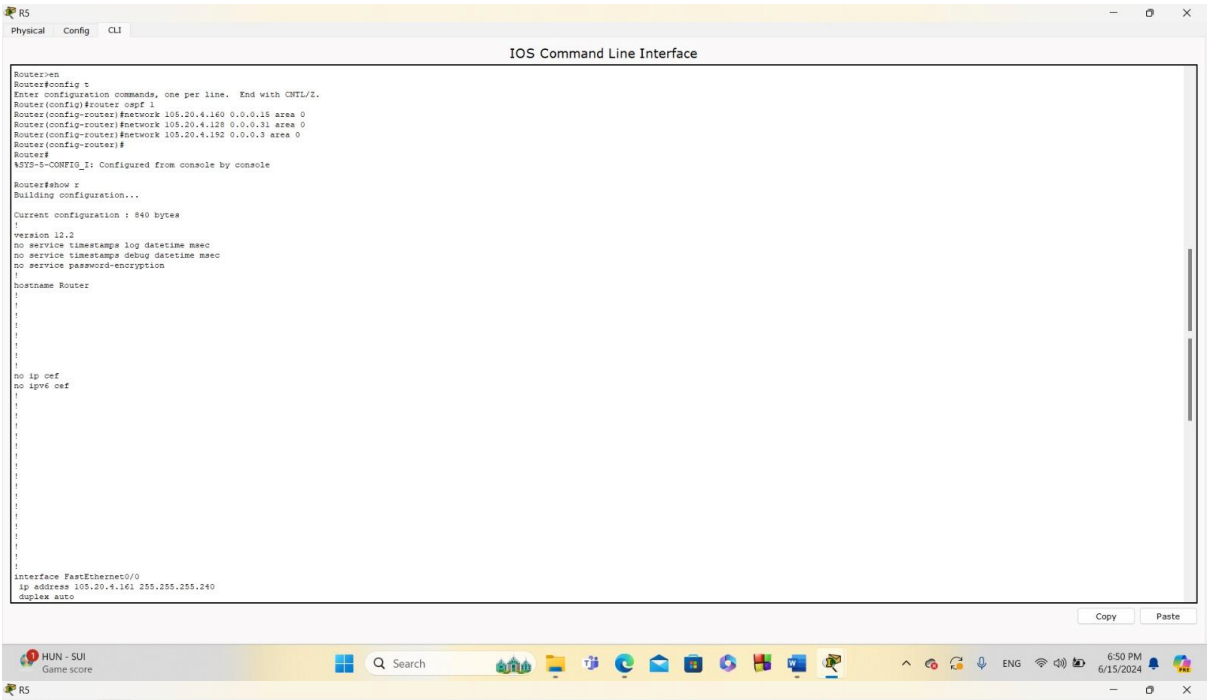

R3
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 105.20.4.180 0.0.0.3 area 0
Router(config-router)#network 105.20.4.184 0.0.0.3 area 0
Router(config-router)#network 105.20.4.96 0.0.0.31 area 0
Router(config-router)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show r
Building configuration...
Current configuration : 921 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
ip cef
no ipv6 cef
!
interface FastEthernet0/0
 ip address 105.20.4.97 255.255.255.224
Copy
Paste
88°F
Sunny
Search
ENG
6:53 PM
6/15/2024
R3
Physical
Config
CLI
IOS Command Line Interface
 duplex auto
 speed auto
!
interface FastEthernet1/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial2/0
 ip address 105.20.4.185 255.255.255.252
 clock rate 2000000
!
interface Serial3/0
 ip address 105.20.4.181 255.255.255.252
 clock rate 2000000
!
interface FastEthernet4/0
 no ip address
 shutdown
!
interface FastEthernet5/0
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 network 105.20.4.96 0.0.0.31 area 0
 network 105.20.4.180 0.0.0.3 area 0
 network 105.20.4.184 0.0.0.3 area 0
!
ip classless
!
ip flow-export version 9
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
end
Copy
Paste
88°F
Sunny
Search
ENG
6:53 PM
6/15/2024

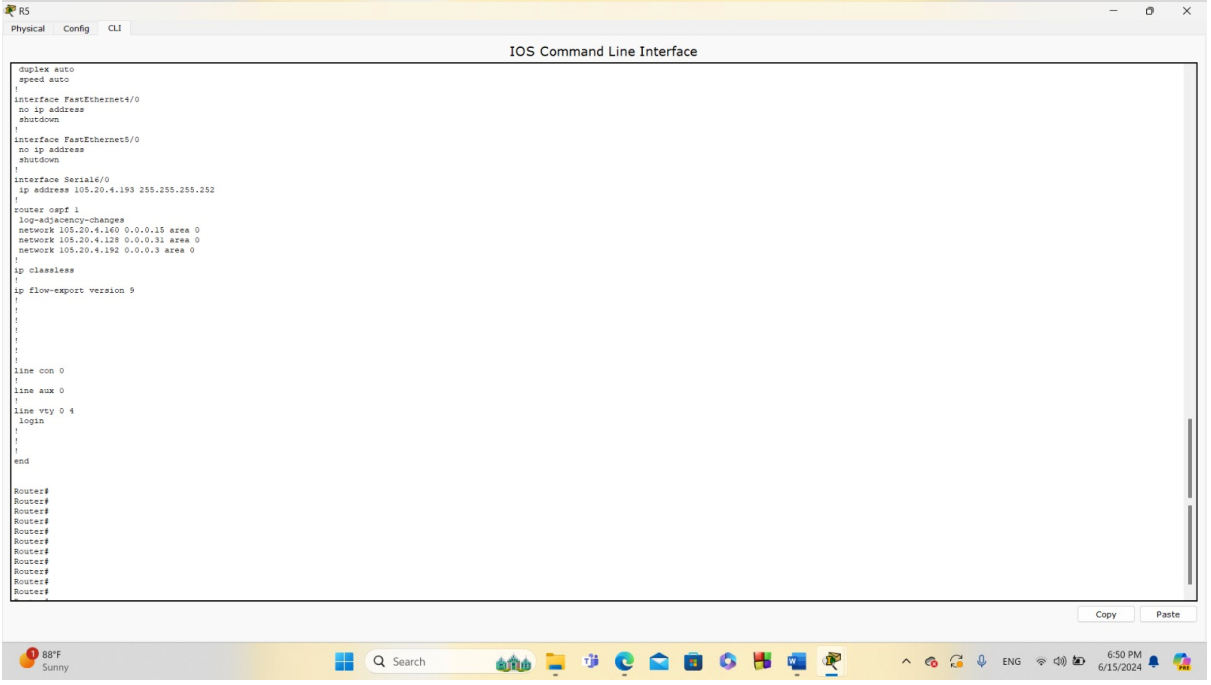
Router R4 →


R4
Physical
Config
CLI
IOS Command Line Interface
duplex auto
speed auto
shutdown
!
interface FastEthernet1/0
no ip address
duplex auto
speed auto
shutdown
!
interface Serial2/0
ip address 105.20.4.185 255.255.255.252
!
interface Serial3/0
ip address 105.20.4.189 255.255.255.252
!
interface FastEthernet4/0
no ip address
shutdown
!
interface FastEthernet5/0
no ip address
shutdown
!
interface Serial6/0
ip address 105.20.4.193 255.255.255.252
clock rate 2000000
!
router ospf 1
log-adjacency-changes
network 105.20.4.184 0.0.0.3 area 0
network 105.20.4.188 0.0.0.3 area 0
network 105.20.4.192 0.0.0.3 area 0
!
ip classless
!
ip flow-export version 9
!
line con 0
!
line aux 0
!
line vty 0 4
login
!
Copy
Paste
88°F
Sunny
Search
ENG
6:57 PM
6/15/2024


R4
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 105.20.4.188 0.0.0.3 area 0
Router(config-router)#network 105.20.4.192 0.0.0.3 area 0
Router(config-router)#network 105.20.4.184 0.0.0.3 area 0
Router(config-router)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show r
Building configuration...
Current configuration : 952 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Router
!
no ip cef
no ipv6 cef
!
interface FastEthernet0/0
no ip address
Copy
Paste
88°F
Sunny
Search
ENG
6:56 PM
6/15/2024

Router R5→

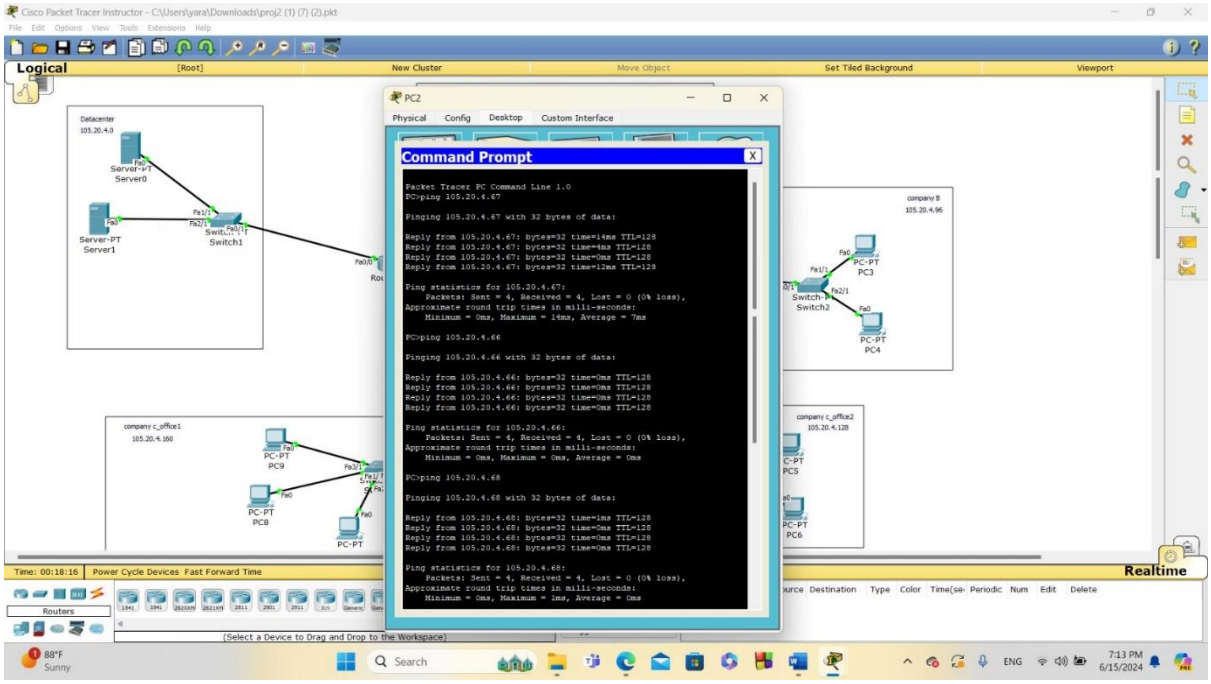

R5
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 105.20.4.160 0.0.0.15 area 0
Router(config-router)#network 105.20.4.128 0.0.0.31 area 0
Router(config-router)#network 105.20.4.192 0.0.0.3 area 0
Router(config-router)#
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#show r
Building configuration...
Current configuration : 840 bytes
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
hostname Router
no ip cef
no ipv6 cef
interface FastEthernet0/0
ip address 105.20.4.161 255.255.255.240
duplex auto
Copy
Paste
HUN - SUI
Game score
Search
ENG
6:50 PM
6/15/2024


R5
Physical
Config
CLI
IOS Command Line Interface
duplex auto
speed auto
interface FastEthernet4/0
no ip address
shutdown
interface FastEthernet5/0
no ip address
shutdown
interface Serial6/0
ip address 105.20.4.193 255.255.255.252
router ospf 1
log-adjacency-changes
network 105.20.4.160 0.0.0.15 area 0
network 105.20.4.128 0.0.0.31 area 0
network 105.20.4.192 0.0.0.3 area 0
ip classless
ip flow-export version 9
line con 0
line aux 0
line vty 0 4
login
end
Router#
Copy
Paste
88°F
Sunny
Search
ENG
6:50 PM
6/15/2024

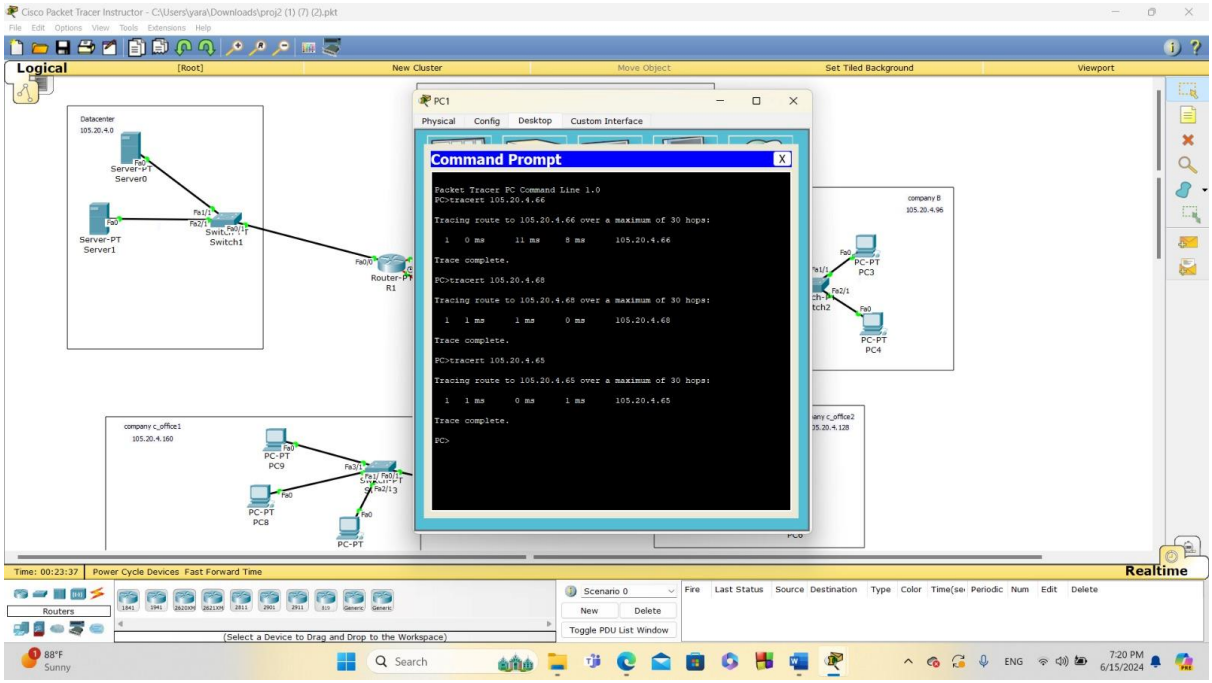
4: Testing and Troubleshooting:

1. Test the connectivity between all PCs. You need to make **snapshots** of the results for ping and tracert commands between all PCs.

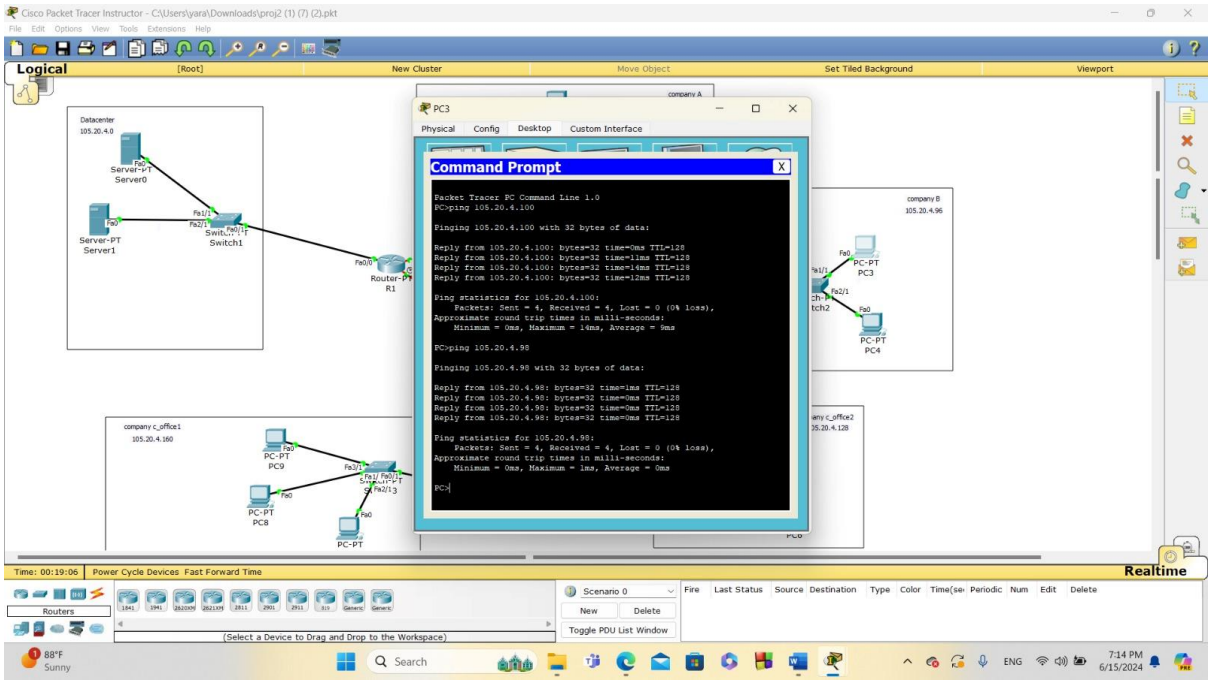
Company A
ping:



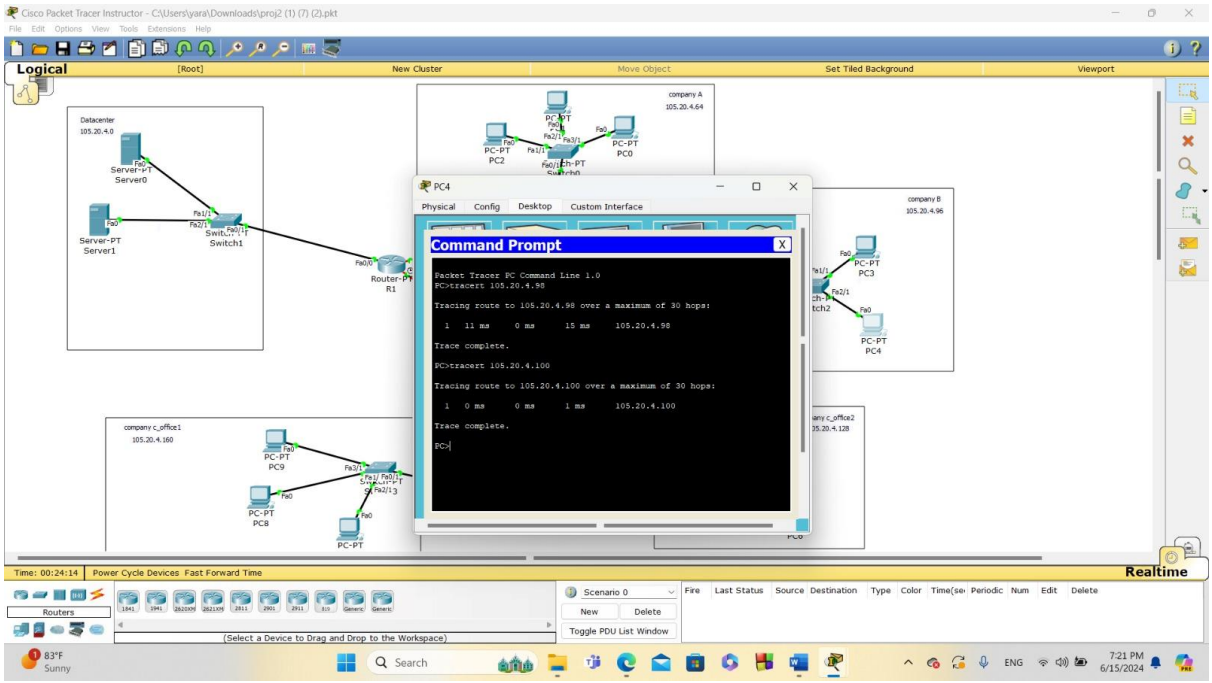
Trace:



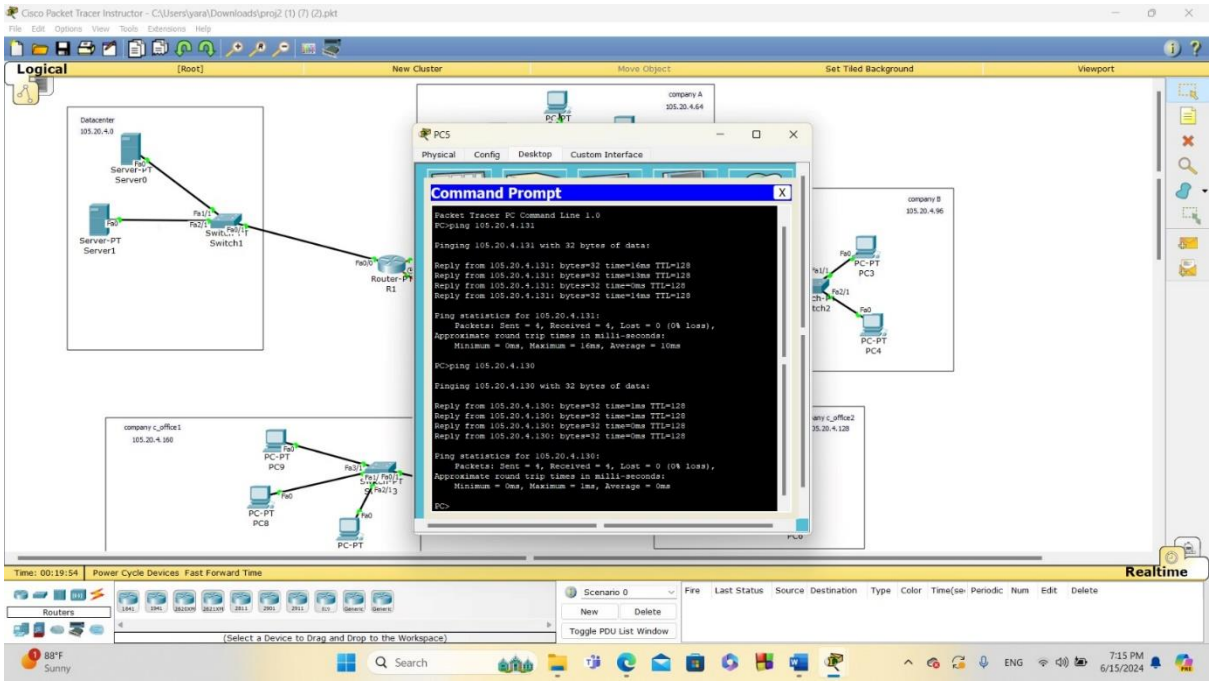
Company B
ping:



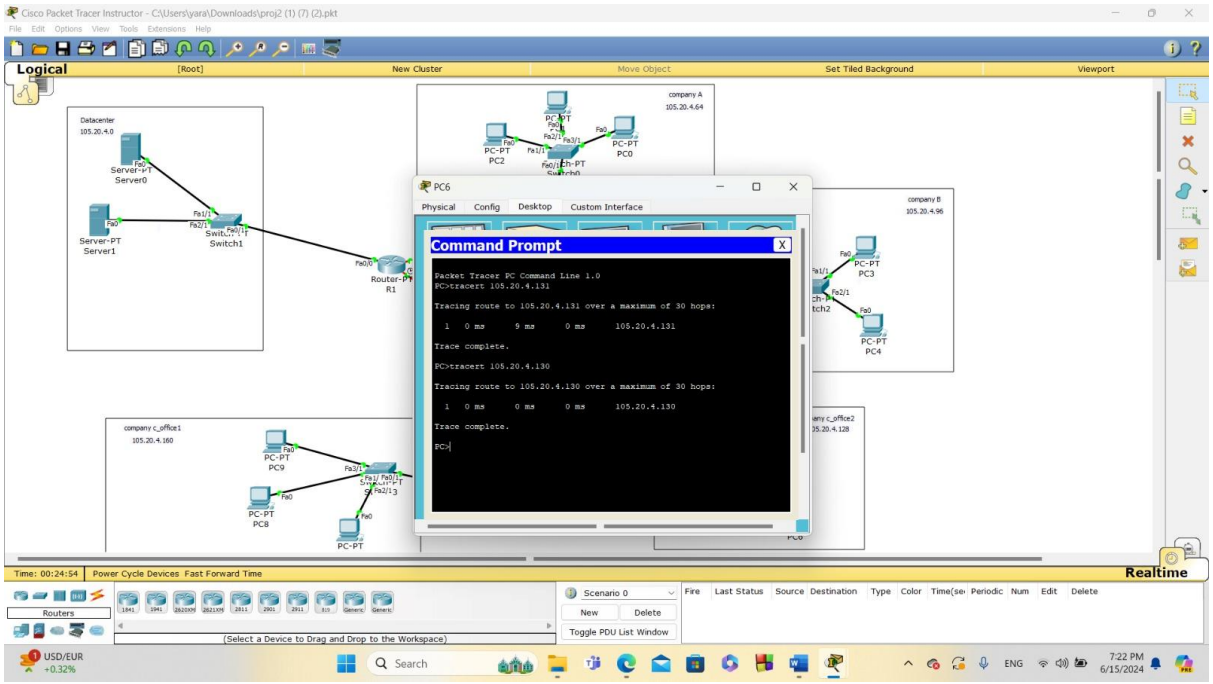
Trace:



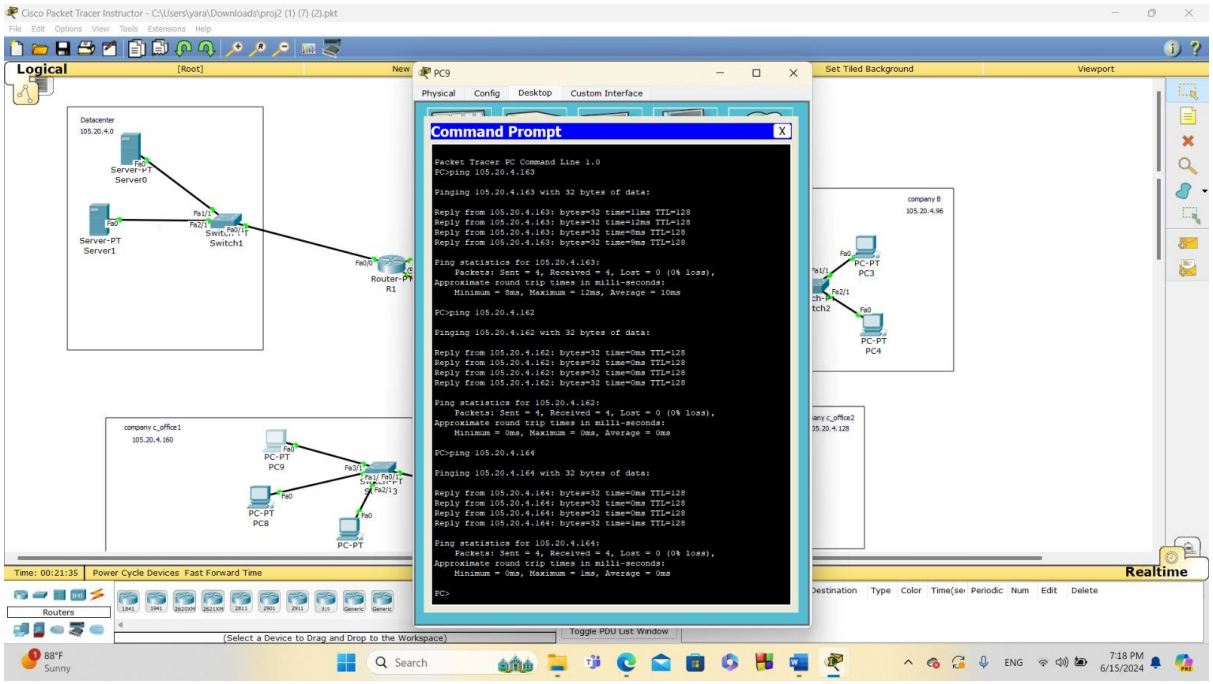
Company C office 2
ping:



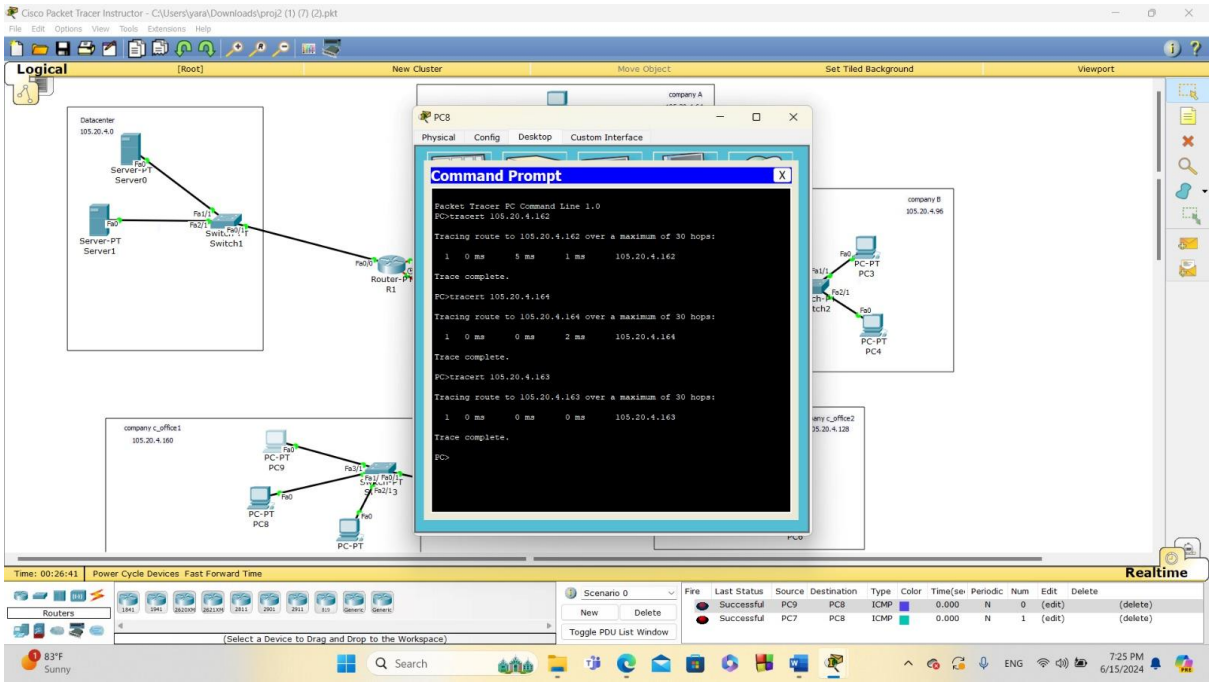
Trace:



Company C office 1
ping:



Trace:



2. Access www.ENCS3320.com from all PCs, make **snapshots** for all cases.