Réseaux/Networks

TP3

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Packet Tracer - Designing and Implementing a VLSM Addressing Scheme

Ex1/ Part1/Step1/

Step 1: Determine the number of subnets needed.

You will subnet the network address 192.168.72.0/24 . The network has the following requirements:

- Sw1 LAN will require 7 host IP addresses
- Sw2 LAN will require 15 host IP addresses
- Sw3 LAN will require 29 host IP addresses
- Sw4 LAN will require 58 host IP addresses

How many subnets are needed in the network topology?

5 subnets.

Ex1/ Part1/Step2/

Step 2: Determine the subnet mask information for each subnet.

a. Which subnet mask will accommodate the number of IP addresses required for Sw1 255.255.255.240 ?
   How many usable host addresses will this subnet support? usable host addresses:14 Total host addresses :16

b. Which subnet mask will accommodate the number of IP addresses required for Sw2 255.255.255.224 ?
   How many usable host addresses will this subnet support? usable host addresses:30 Total host addresses :32

c. Which subnet mask will accommodate the number of IP addresses required for Sw3 255.255.255.224 ?
   How many usable host addresses will this subnet support? usable host addresses:30 Total host addresses :32

d. Which subnet mask will accommodate the number of IP addresses required for Sw4 255.255.255.192 ?
   How many usable host addresses will this subnet support? usable host addresses:62 Total host addresses :64

e. Which subnet mask will accommodate the number of IP addresses required for the connection between Remote-Site1 and Remote-Site2 ? 255.255.255.252
   usable host addresses:2
   Total host addresses :4

Part 2: Design the VLSM Addressing Scheme

Ex1/ Part2/Step1/

Step 1: Divide the 192.168.72.0/24 network based on the number of hosts per subnet.

a. Use the first subnet to accommodate the largest LAN.
b. Use the second subnet to accommodate the second largest LAN.
c. Use the third subnet to accommodate the third largest LAN.
d. Use the fourth subnet to accommodate the fourth largest LAN.
e. Use the fifth subnet to accommodate the connection between Remote-Site1 and Remote-Site2 .

Ex1/ Part2/Step2/

Complete the **Subnet Table**, listing the subnet descriptions (e.g. Sw1 LAN), number of hosts needed, then network address for the subnet, the first usable host address, and the broadcast address. Repeat until all addresses are listed.

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Broadcast Address
Sw4	58	192.168.72.0/26	192.168.72.1	192.168.72.63
Sw3	29	192.168.72.64/27	192.168.72.65	192.168.72.95
Sw2	15	192.168.72.96/27	192.168.72.97	192.168.72.127
Sw1	7	192.168.72.128/28	192.168.72.129	192.168.72.143
Remote Site1 &Site2	2	192.168.72.144/30	192.168.72.145	192.168.72.147

Ex1/ Part2/Step3/

Step 3: Document the addressing scheme.

a. Assign the first usable IP addresses to Romote-Site1 for the two LAN links and the WAN link.

b. Assign the first usable IP addresses to Remote-Site2 for the two LANs links. Assign the last usable IP address for the WAN link.

c. Assign the second usable IP addresses to the switches.

d. Assign the last usable IP addresses to the hosts.

Ex1/ Part2/Step3/a

```
Remote-Sitel#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Remote-Sitel(config)#int g0/0
Remote-Sitel(config-if)#ip add 192.168.72.129 255.255.255.240
Remote-Sitel(config-if)#no shut

Remote-Sitel(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
int g0/1
Remote-Sitel(config-if)#ip add 192.168.72.97 255.255.255.224
Remote-Sitel(config-if)#no shot
                        ^
% Invalid input detected at '^' marker.

Remote-Sitel(config-if)#no shut

Remote-Sitel(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
Remote-Sitel(config-if)#
Remote-Sitel(config-if)#int s0/0/0
Remote-Sitel(config-if)#
Remote-Sitel(config-if)#ip address 192.168.72.145 255.255.255.252
Remote-Sitel(config-if)#clock rate 128000
Remote-Sitel(config-if)#no shut
```

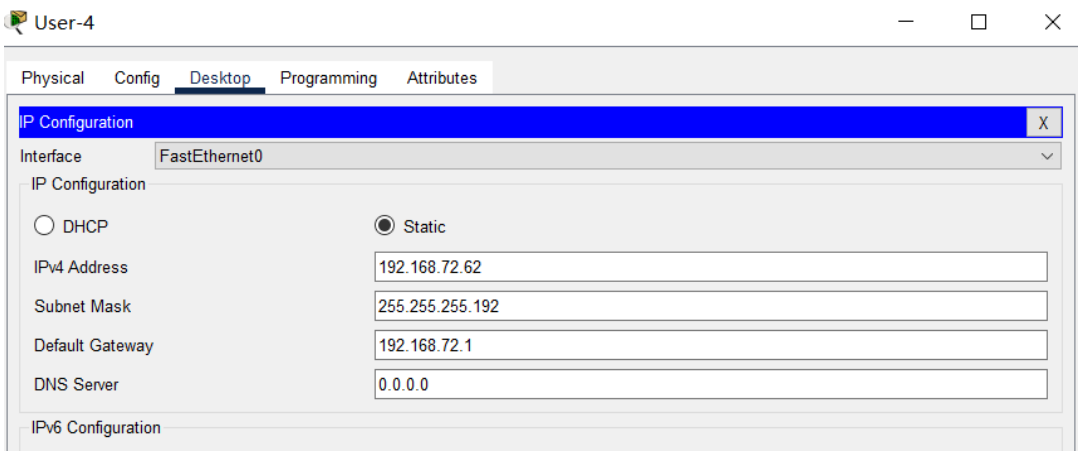
Ex1/ Part2/Step3/b

```
Remote-Site2>en
Remote-Site2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Remote-Site2(config)#int g0/1
Remote-Site2(config-if)#ip address 192.168.72.1 255.255.255.192
Remote-Site2(config-if)#no shut
Remote-Site2(config-if)#ip address 192.168.72.65 255.255.255.224
% 192.168.72.64 overlaps with GigabitEthernet0/0
Remote-Site2(config-if)#no shut
Remote-Site2(config-if)#int s0/0/0
Remote-Site2(config-if)#ip address 192.168.72.146 255.255.255.252
Remote-Site2(config-if)#no shut
Remote-Site2(config-if)#
Remote-Site2(config-if)#
```

Ex1/ Part2/Step3/c

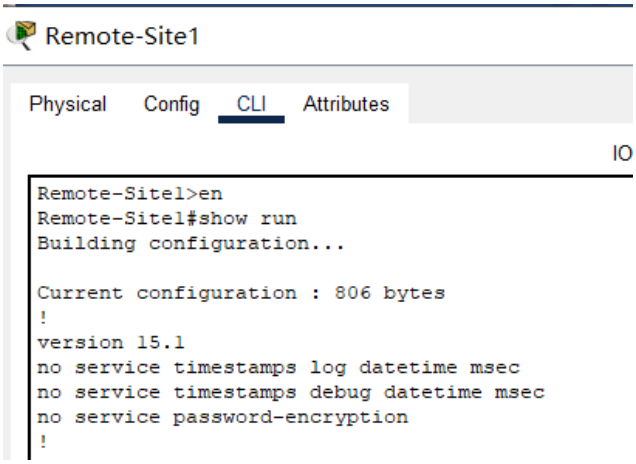
```
Sw3#
Sw3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Sw3(config)#int vlan1
Sw3(config-if)#ip add 192.168.72.66 255.255.255.224
Sw3(config-if)#no shut

Sw3(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
ip def 192.168.72.65
Sw3(config)#ip def 192.168.72.65
```

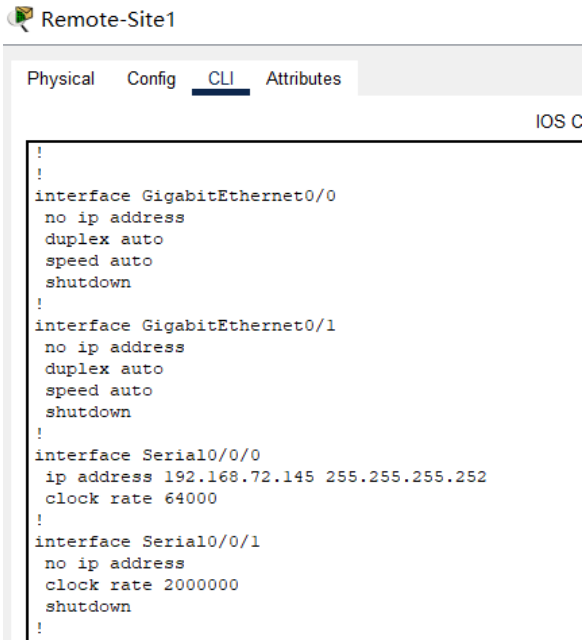
Ex1/ Part2/Step3/d



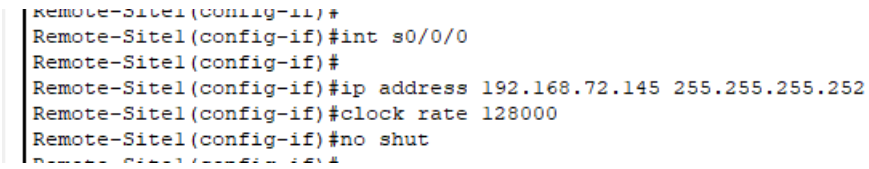
Ex1/ Part3/Step1/

Step 1: Configure IP addressing on Remote-Site1 **LAN interfaces.**






```
Remote-Site1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Remote-Site1(config)#int g0/0
Remote-Site1(config-if)#ip add 192.168.72.129 255.255.255.240
Remote-Site1(config-if)#no shut

Remote-Site1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
int g0/1
Remote-Site1(config-if)#ip add 192.168.72.97 255.255.255.224
Remote-Site1(config-if)#no shot
                         ^
% Invalid input detected at '^' marker.

Remote-Site1(config-if)#no shut

Remote-Site1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up
```



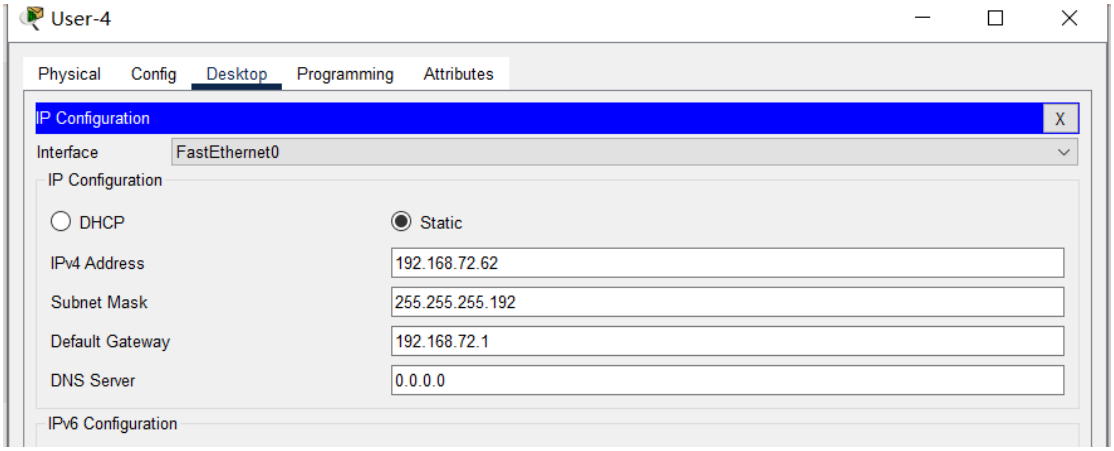
Ex1/ Part3/Step2/

Step 2: Configure IP addressing on Sw3 **, including the default gateway.**

```
Sw3>en
Sw3#show run
Building configuration...

Current configuration : 1083 bytes
!
version 15.0
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
Sw3#
Sw3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Sw3(config)#int vlan1
Sw3(config-if)#ip add 192.168.72.66 255.255.255.224
Sw3(config-if)#no shut

Sw3(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
ip def 192.168.72.65
Sw3(config)#ip def 192.168.72.65
```

Ex1/ Part3/Step3/

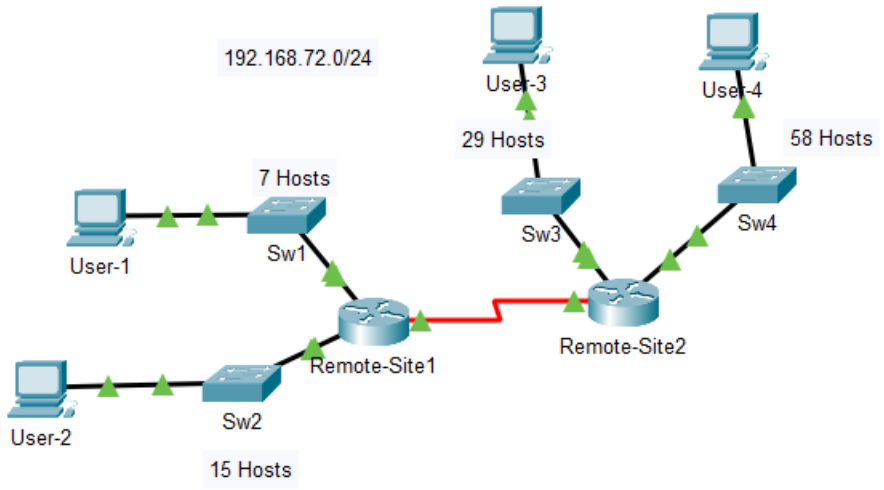
Step 3: Configure IP addressing on User-4 **, including the default gateway.**



Ex1/ Part3/Step4/

Step 4: Verify connectivity.

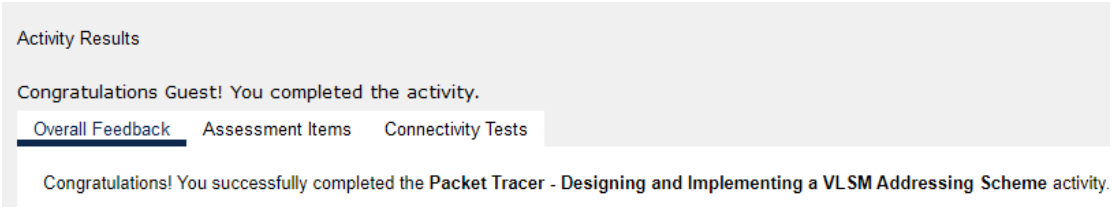
You can only verify connectivity from Remote-Site1 , Sw3 , and User-4 . However, you should be able to ping every IP address listed in the **Addressing Table**.




```
C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

```
C:\>ping 192.168.72.94

Pinging 192.168.72.94 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.94: bytes=32 time<1ms TTL=127
Reply from 192.168.72.94: bytes=32 time<1ms TTL=127
Reply from 192.168.72.94: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.72.94:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.72.126

Pinging 192.168.72.126 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.126: bytes=32 time=10ms TTL=126
Reply from 192.168.72.126: bytes=32 time=8ms TTL=126
Reply from 192.168.72.126: bytes=32 time=15ms TTL=126

Ping statistics for 192.168.72.126:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 8ms, Maximum = 15ms, Average = 11ms
```

Ex1/Activity Results

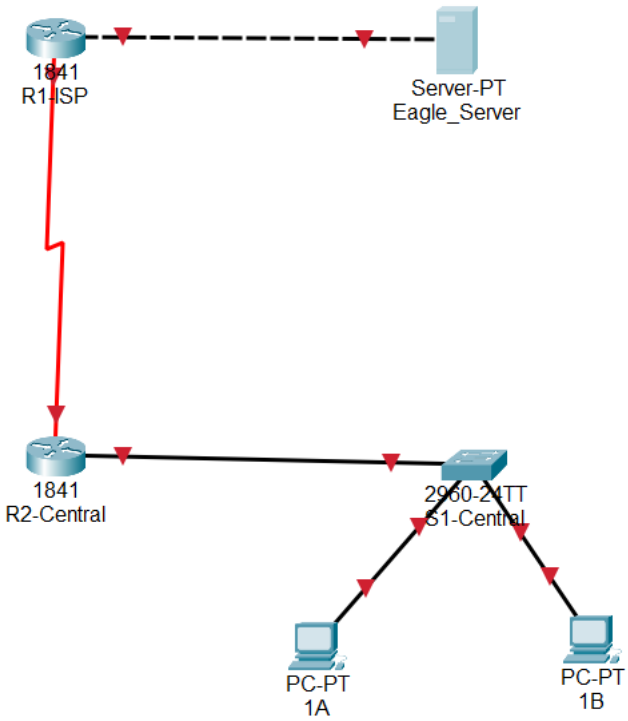


Skills Integration Challenge-Configuring and Testing the Lab Network

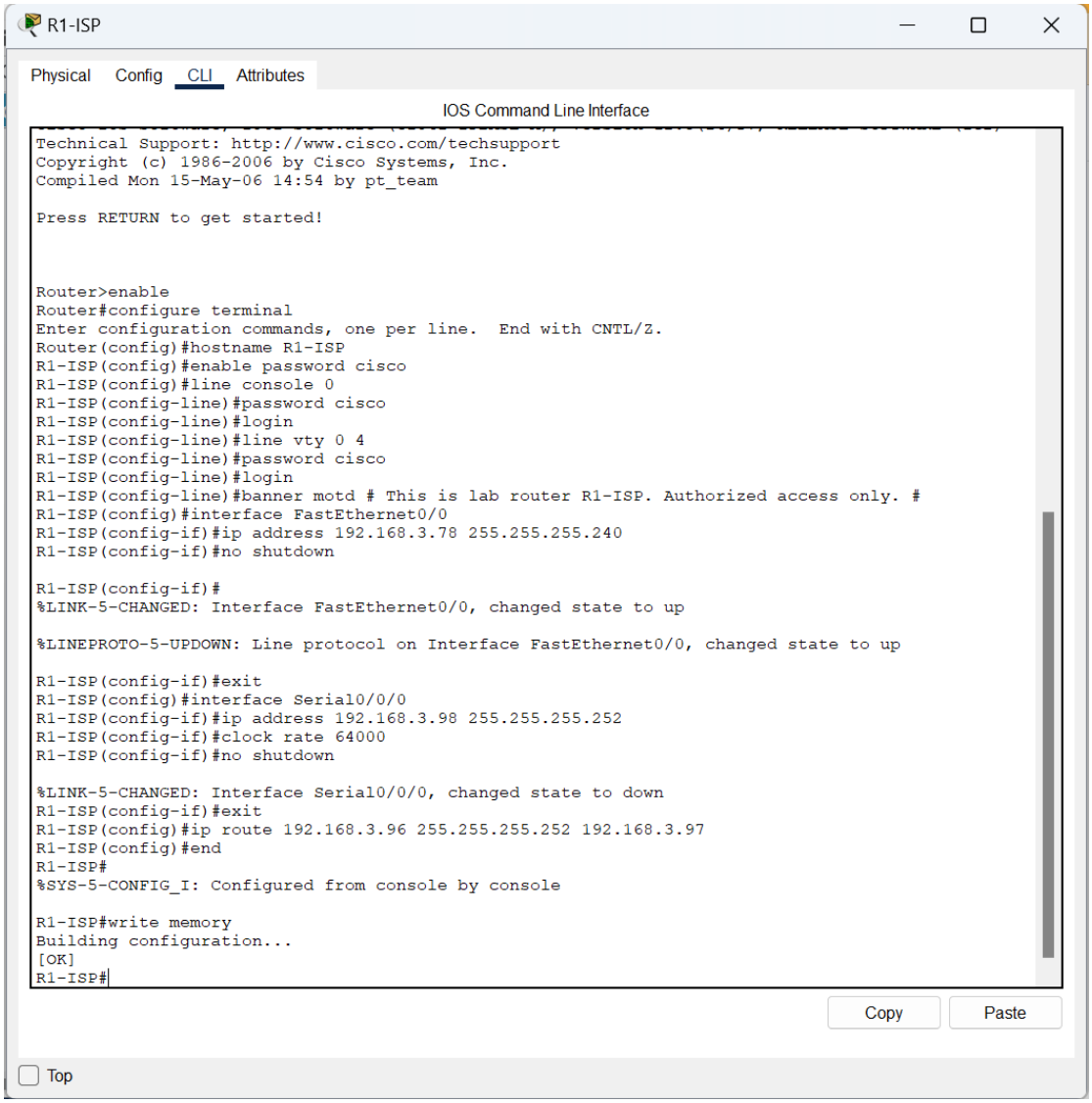
Ex2/ Task1/ Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1-ISP	Fa0/0	192.168.3.78	255.255.255.240	N/A
	S0/0/0	192.168.3.98	255.255.255.252	N/A
R2-Central	Fa0/0	192.168.3.30	255.255.255.224	N/A
	S0/0/0	192.168.3.97	255.255.255.252	N/A
PC 1A	NIC	192.168.3.1	255.255.255.224	192.168.3.30
PC 1B	NIC	192.168.3.2	255.255.255.224	192.168.3.30
Eagle Server	NIC	192.168.3.77	255.255.255.240	192.168.3.3
S1-Central	VLAN1	192.168.3.29	255.255.255.224	N/A

Ex2/ Task1/

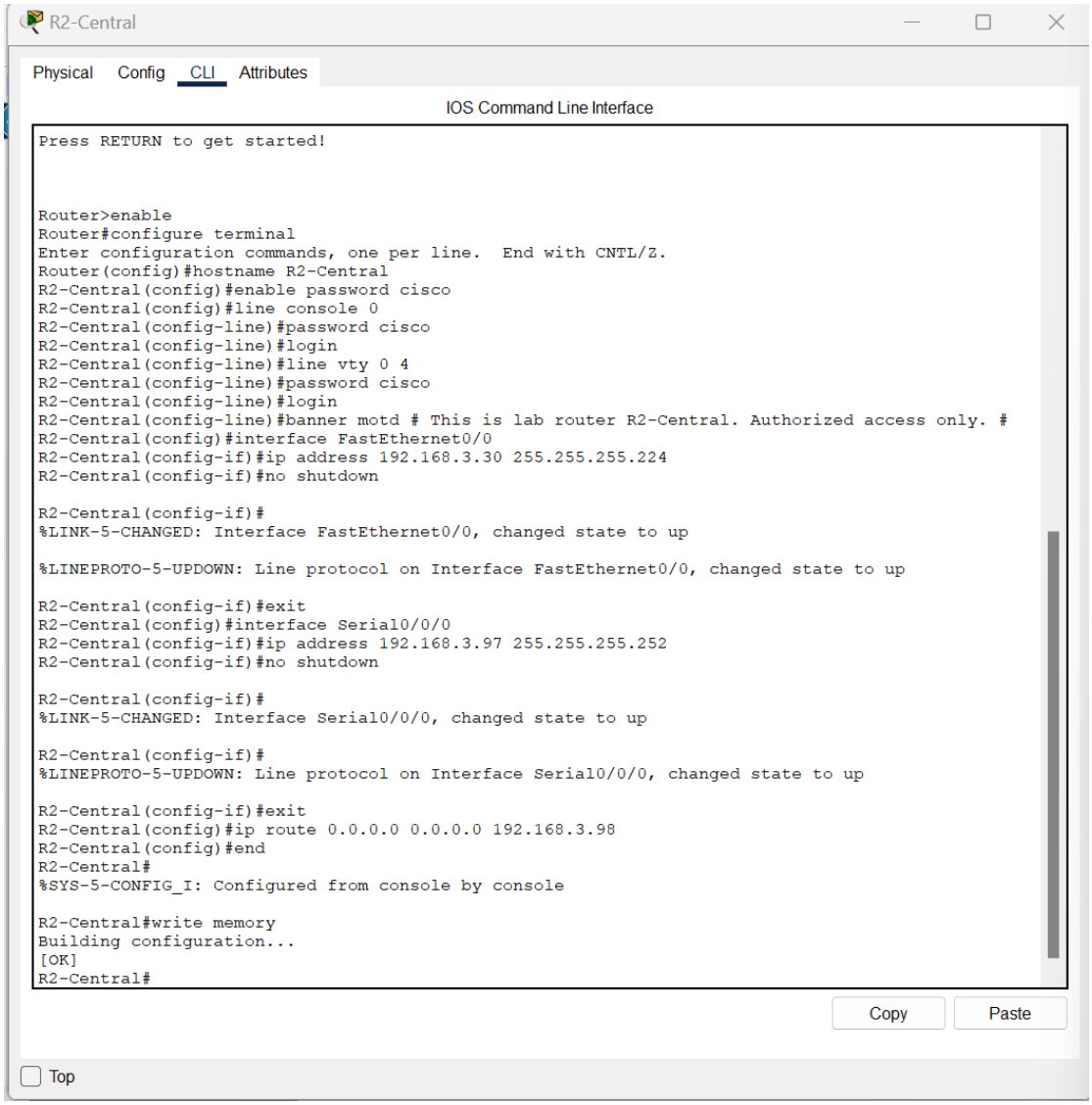


Ex2/ Task2/R1-ISP

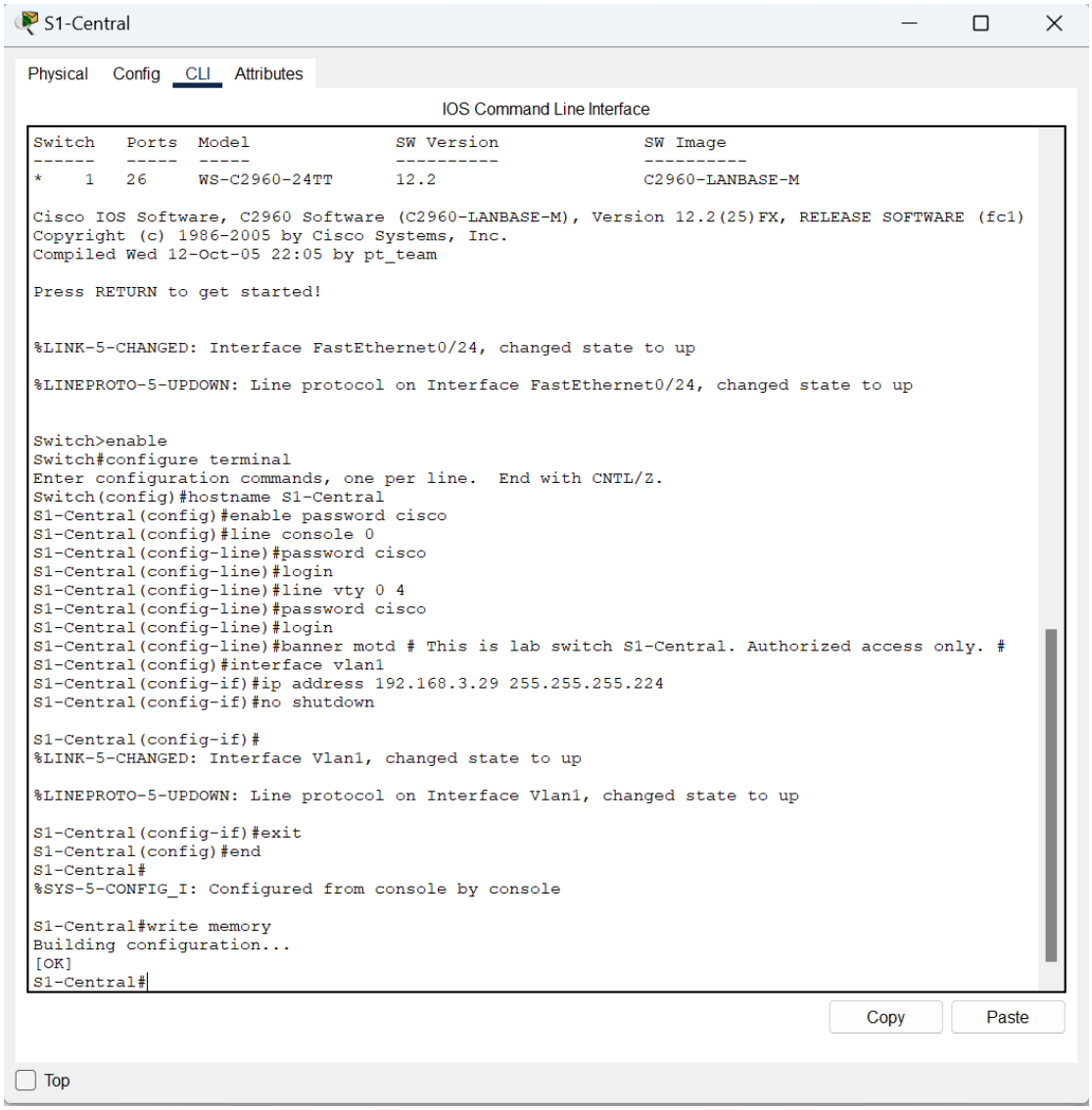



```
R1-ISP#show ip route static
R1-ISP#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.3.64/28 is directly connected, FastEthernet0/0
C       192.168.3.96/30 is directly connected, Serial0/0/0

R1-ISP#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1-ISP(config)#ip route 192.168.3.0 255.255.255.224 192.168.3.97
R1-ISP(config)#end
R1-ISP#
%SYS-5-CONFIG_I: Configured from console by console

R1-ISP#write memory
Building configuration...
[OK]
R1-ISP#
```

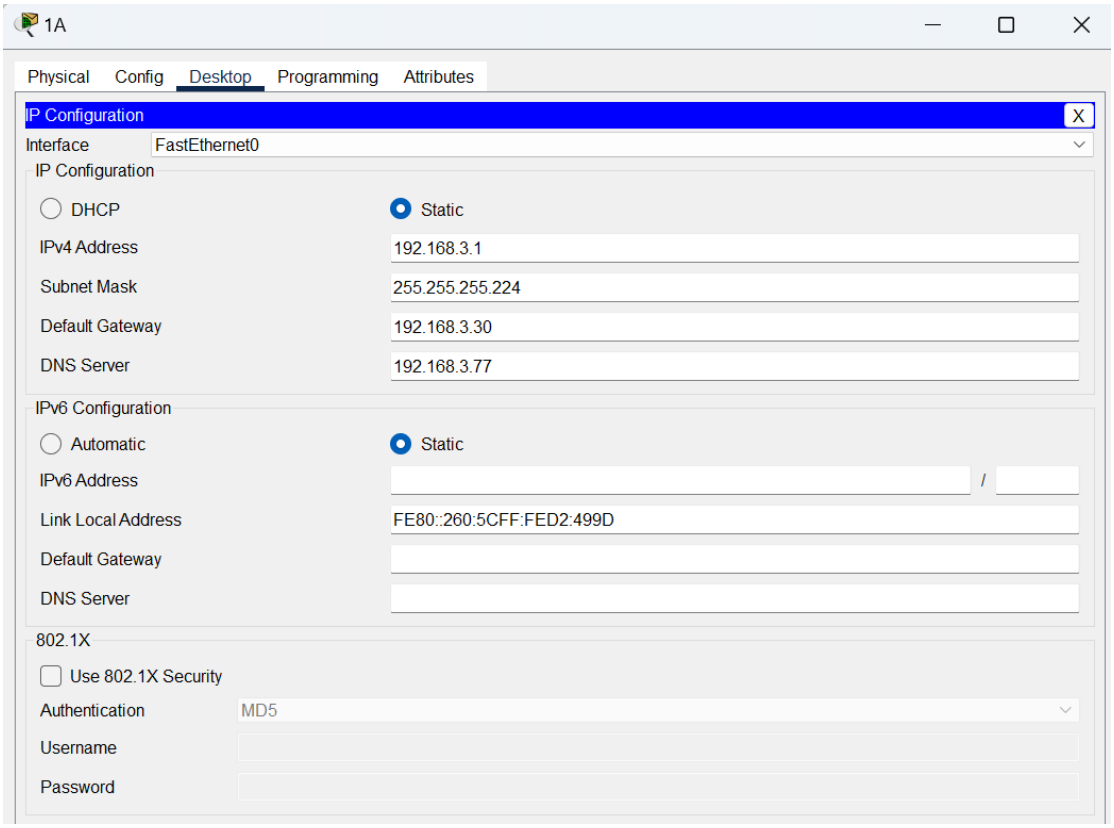
Ex2/ Task2/R2-Central



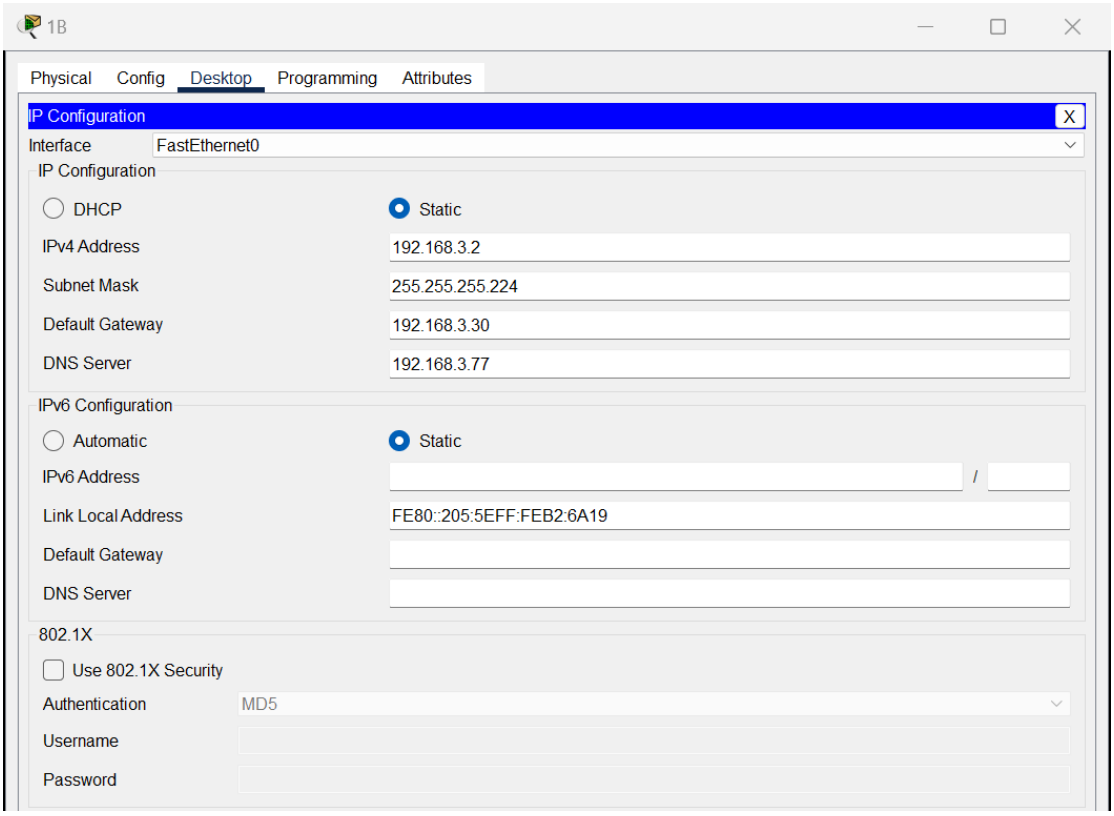
Ex2/ Task2/ S1-Central



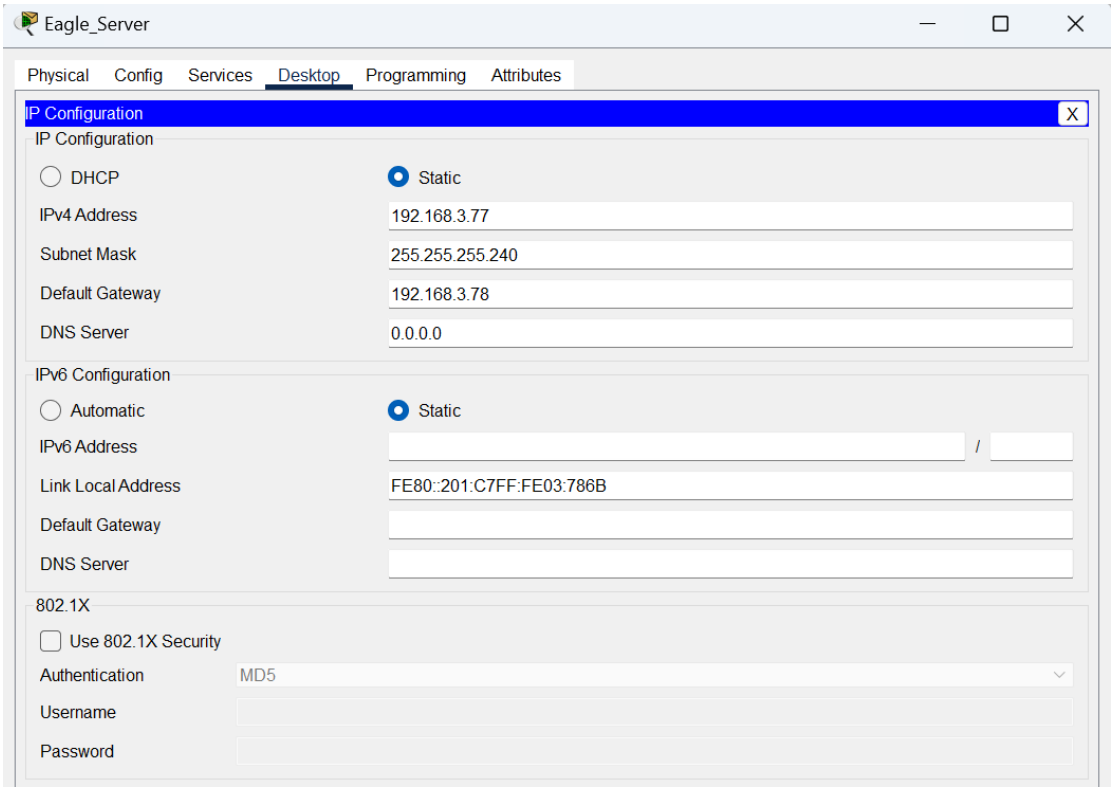
Ex2/ Task2/PC-1A



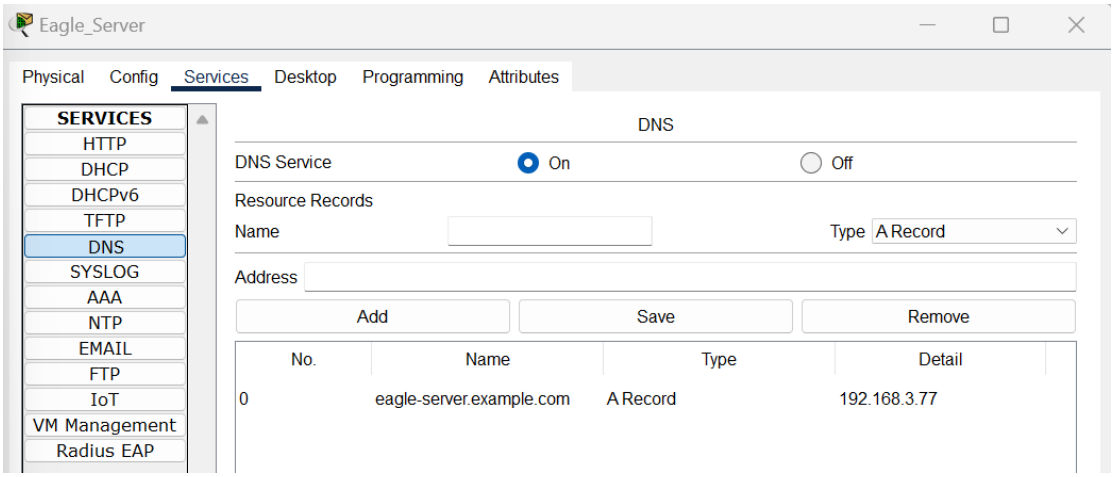
Ex2/ Task2/PC-1B

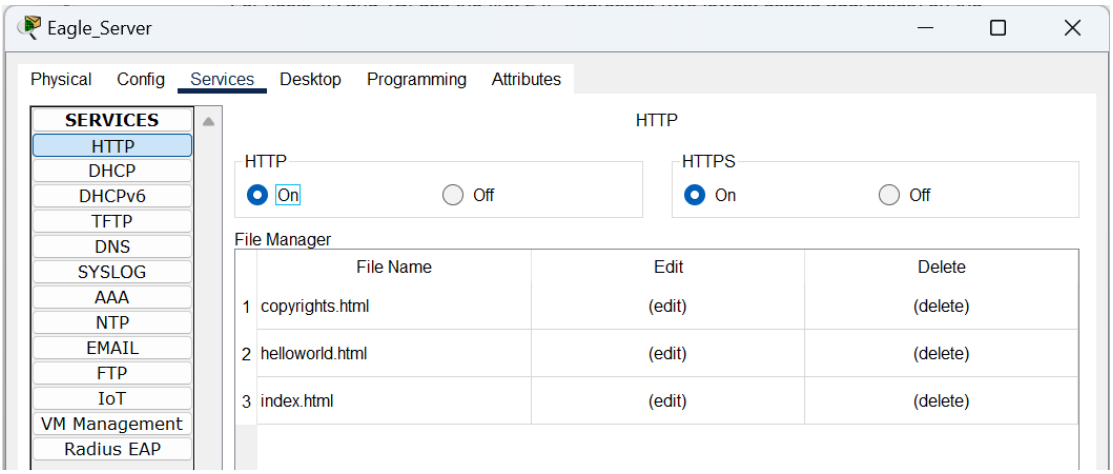


Ex2/ Task2/ Eagle_Server

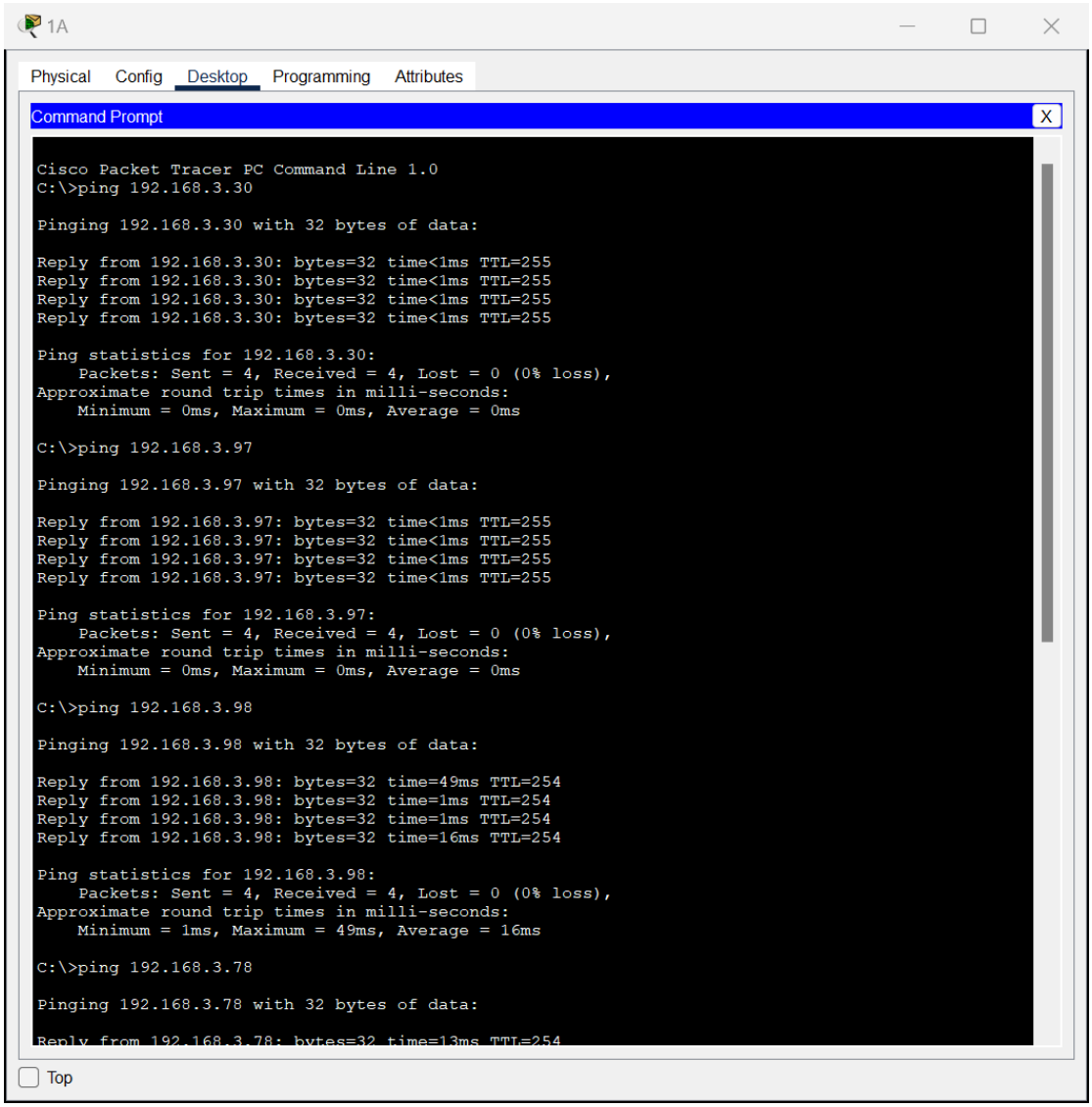


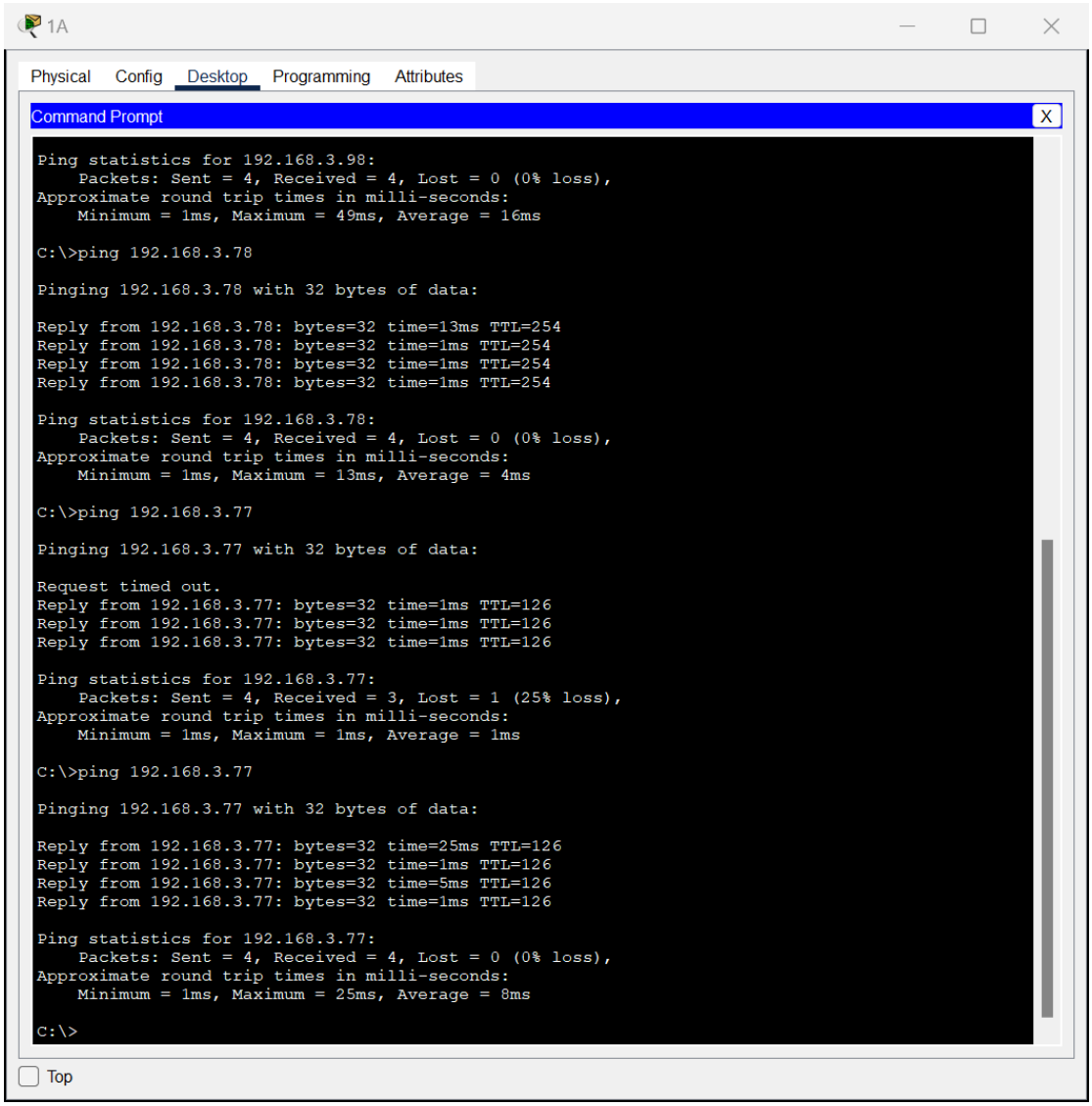
Ex2/ Task2/DNS&HTTP

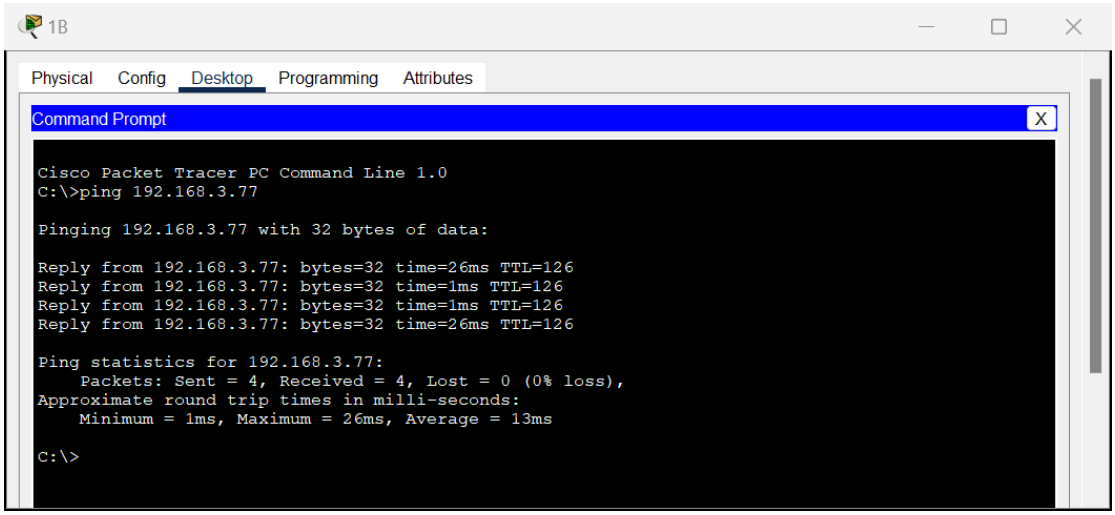




Ex2/ Task3/1-Test connectivity







Ex2/ Task3/ 2-Test management connections using Telnet.

R1-ISP

IOS Command Line Interface

```
User Access Verification

Password:

R1-ISP>enable
Password:
R1-ISP#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R1-ISP(config)#username user secret cisco
R1-ISP(config)#line vty 0 4
R1-ISP(config-line)#password cisco
R1-ISP(config-line)#login local
R1-ISP(config-line)#transport input telnet
R1-ISP(config-line)#exit
R1-ISP(config)#exit
R1-ISP#
%SYS-5-CONFIG_I: Configured from console by console

R1-ISP#write memory
Building configuration...
[OK]
R1-ISP#
```

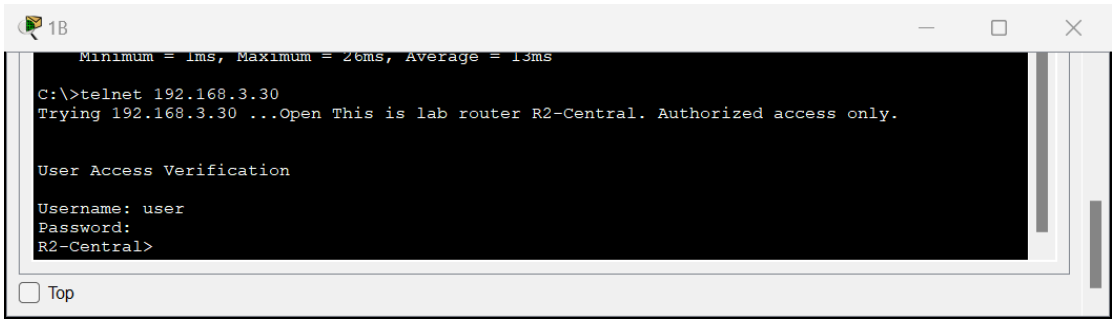
R2-Central

```
R2-Central>enable
Password:
R2-Central#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2-Central(config)#Router(config)# username [username] secret [password]
                          ^
% Invalid input detected at '^' marker.

R2-Central(config)#username user secret cisco
R2-Central(config)#line vty 0 4
R2-Central(config-line)# password cisco
R2-Central(config-line)#login local
R2-Central(config-line)#transport input telnet
R2-Central(config-line)#exit
R2-Central(config)#exit
R2-Central#
%SYS-5-CONFIG_I: Configured from console by console

R2-Central#write memory
Building configuration...
[OK]
R2-Central#
```

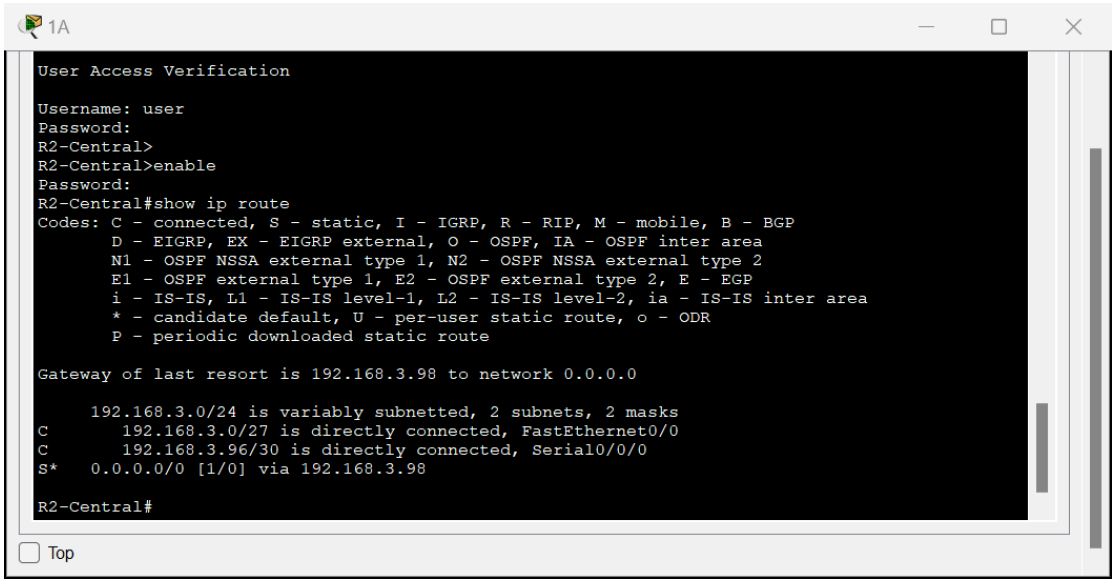
1A

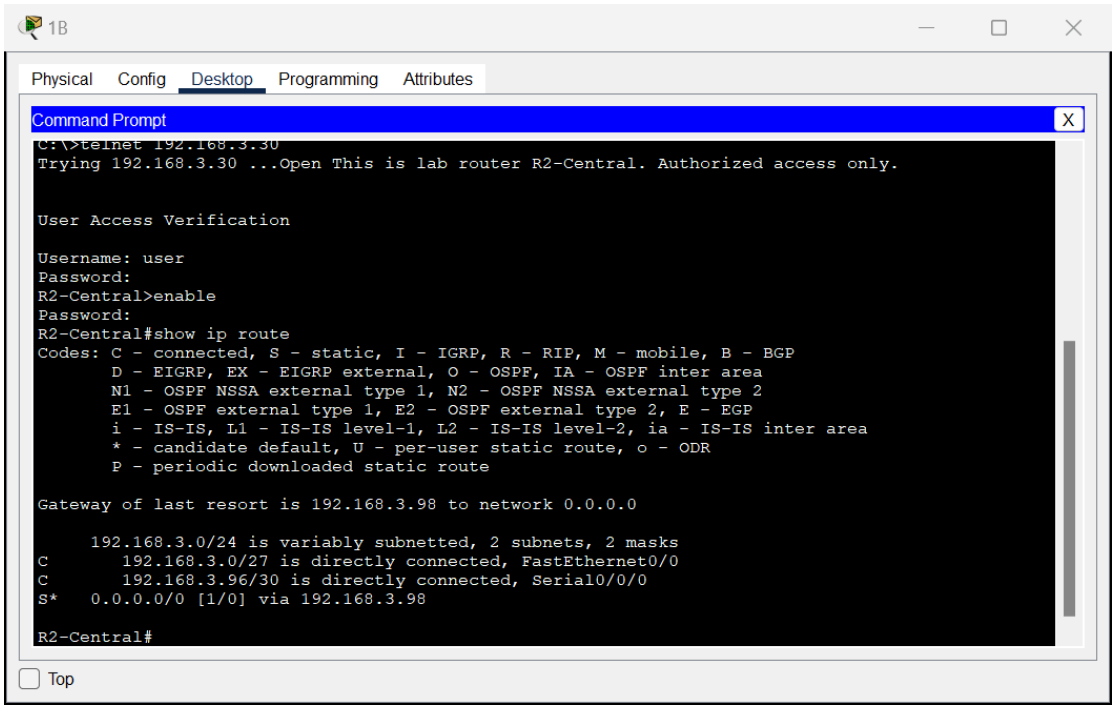
```
Ping statistics for 192.168.3.77:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 25ms, Average = 8ms

C:\>telnet 192.168.3.30
Trying 192.168.3.30 ...Open This is lab router R2-Central. Authorized access only.


User Access Verification

Username: user
Password:
R2-Central>
```

Top

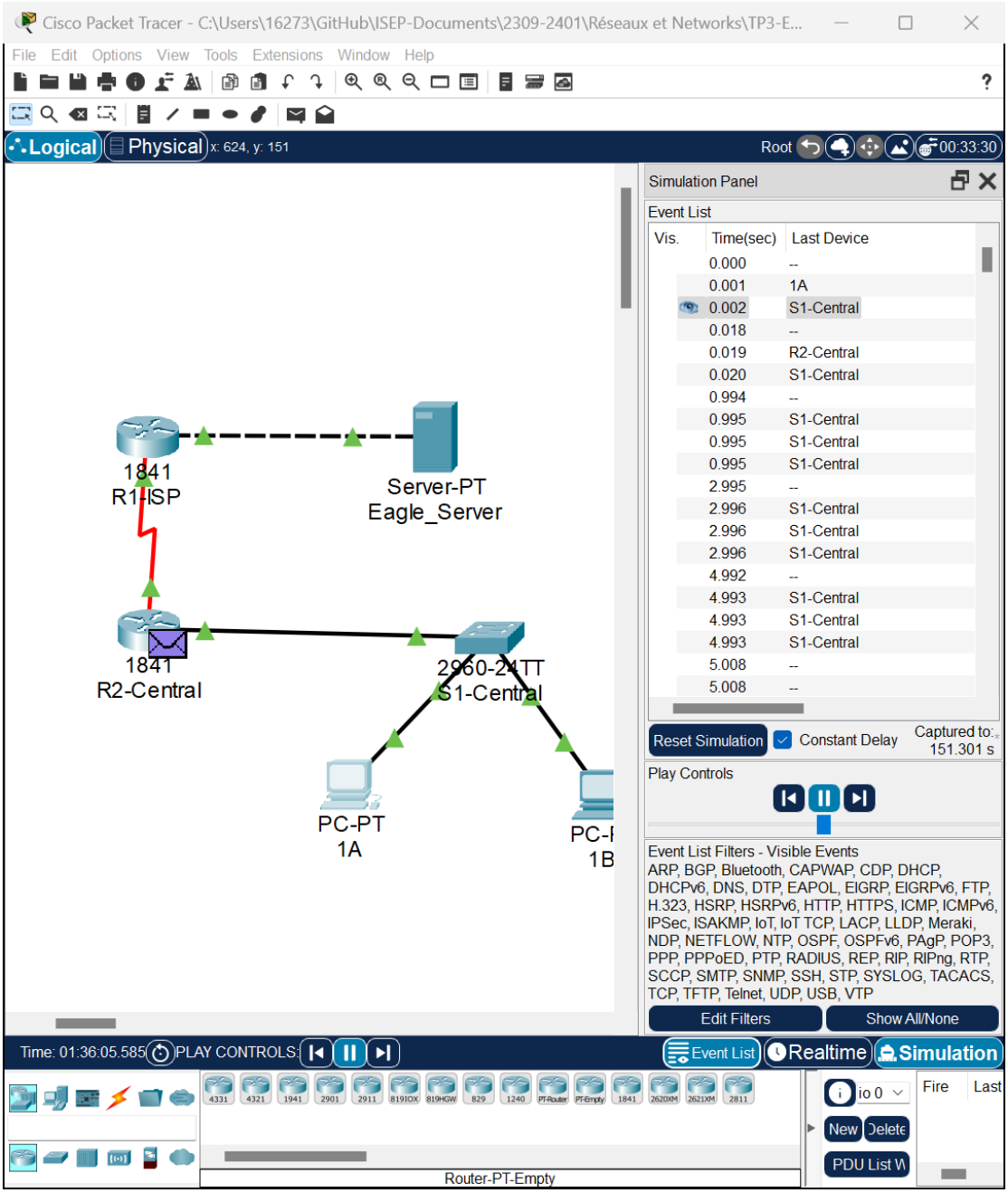


Ex2/ Task3/ 3-Check routing table.





Ex2/ Task3/ 4- Protocol visualization in simulation mode



Ex2/ Task3/ 5- Analyze protocol behavior

ARP Request Analysis:

Function: The Address Resolution Protocol (ARP) is used to map network layer IP addresses to link layer MAC addresses.

- Algorithm Steps: When a device wants to communicate with another

device on the same local network but doesn't know its MAC address, it generates an ARP broadcast request.

- The ARP request contains the sender's IP and MAC addresses and the target device's IP address, but the target's MAC address field is empty, as that's the information it's seeking.
- All devices on the network receive this ARP request, but only the device with the matching IP address will respond.
- The target device sends back an ARP reply containing its MAC address.
- Upon receiving the ARP reply, the requesting device stores the IP-to-MAC address mapping in its ARP cache for future use.

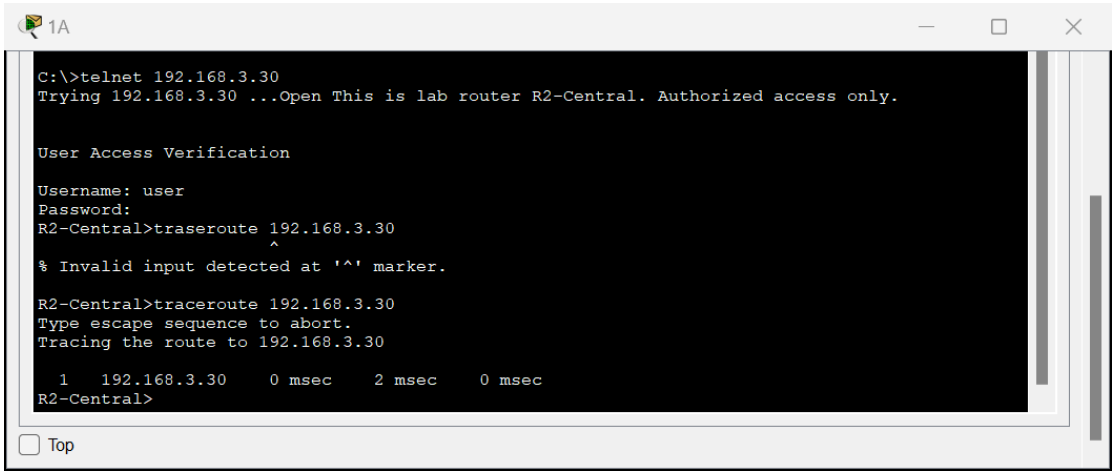
ICMP Message Analysis:

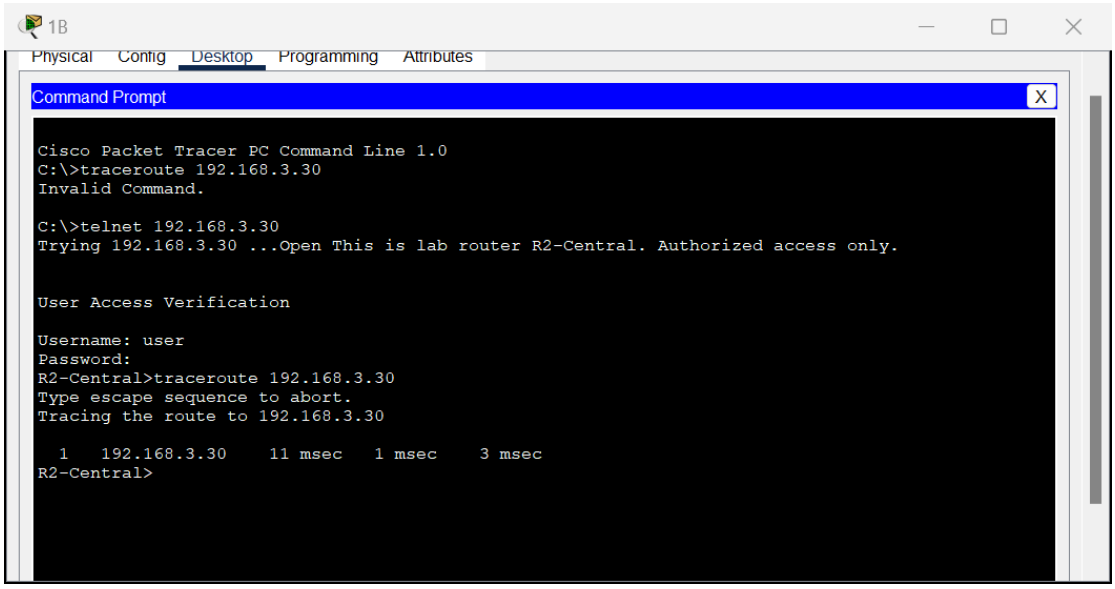
Function: The Internet Control Message Protocol (ICMP) is used primarily for conveying problems in network communications, such as echo requests and replies generated by the ping command.

- Algorithm Steps: When you ping from one device to another, it sends out an ICMP echo request.
- The target device, upon receiving the echo request, generates an ICMP echo reply.
- If the echo request fails to reach the target (e.g., due to TTL expiration or problems along the path), devices on the network will send ICMP error messages back to the originating device, such as destination unreachable or timeout information.

- How to Analyze in Packet Tracer:
- In simulation mode, generate ARP or ICMP traffic (e.g., by using the ping command on a PC).
- Observe the event list for ARP request and ICMP message events.
- Step through each event to watch the behavior of the packet within the network.
- Analyze the detailed information window of the packets, which will show source IP, destination IP, source MAC, destination MAC (for ARP), and the specific type of ICMP message.
- For ARP requests, note how the response is returned to the requester and how the MAC address is added to the ARP table.
- For ICMP, observe how ping requests receive responses or how error messages are generated when the destination is unreachable.

Ex2/ Task3/ 6- Use the traceroute command.





Ex2/Activity Results

In this network configuration and management experiment, we successfully established a basic network environment through a series of steps, and tested and managed it. The core part of the experiment involves IP address allocation, routing configuration, connection testing and remote management practice. The following are the key links and gains from the experiment:

- **Address assignment:**

  IP addresses are assigned to each device based on the network design diagram, including router interfaces, switch virtual interfaces, servers, and PCs.

- **Static routing configuration:**

  Since the PC cannot ping route R1 after the network connection is set up, a static route is set up on the router. This is to ensure that devices in the network can communicate with each other, especially devices

that are not in the same subnet.

- **Connectivity test:**

  The network connectivity was tested using the ping and Telnet commands to verify the correctness of the network configuration and whether the communication between devices was normal.

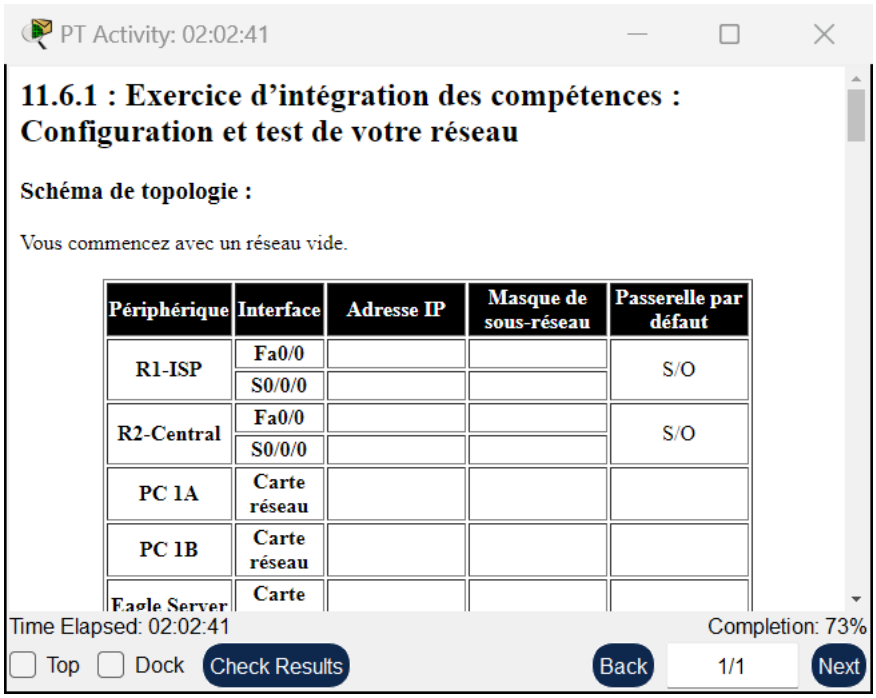
- **Remote management:**

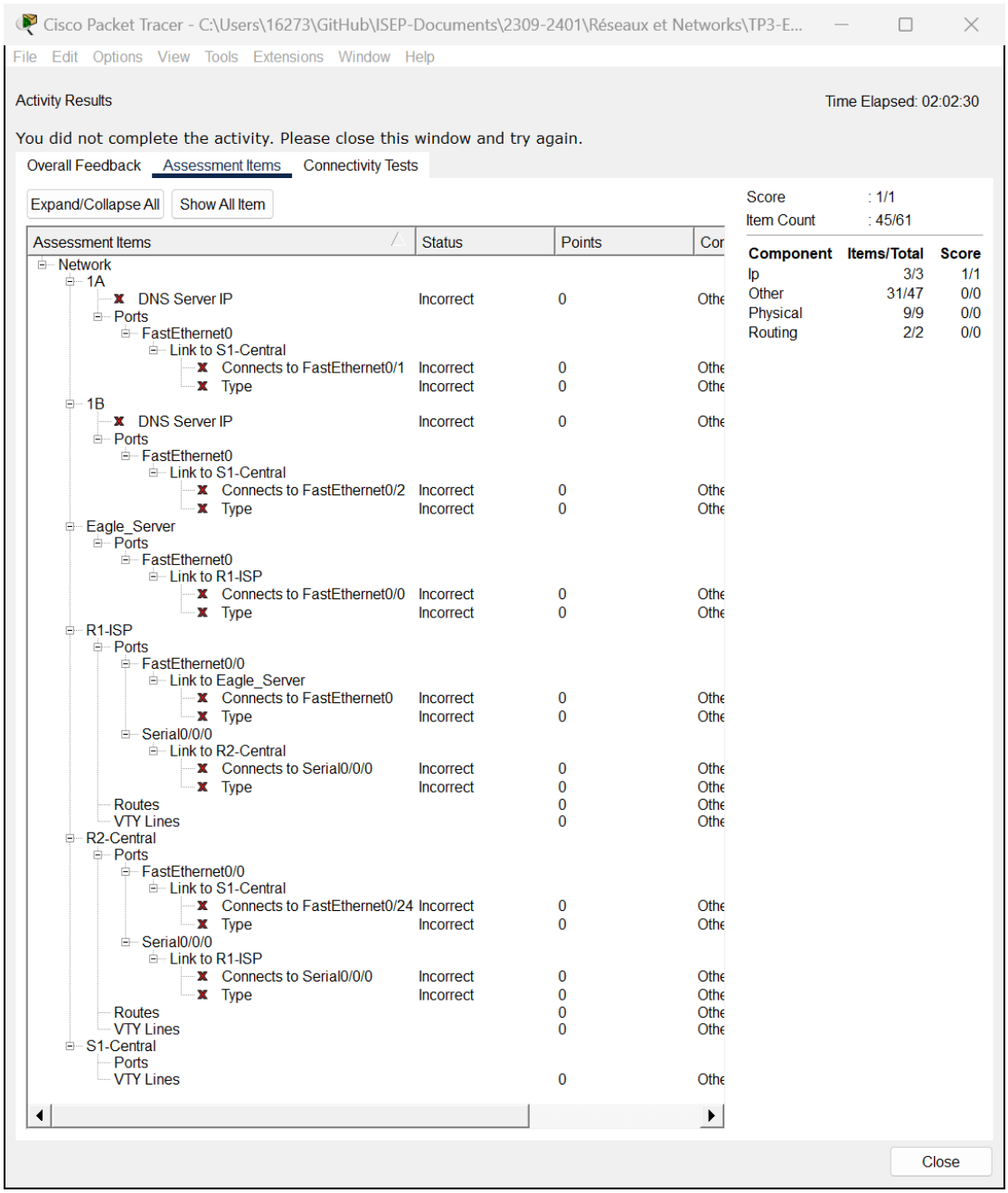
  The process of using Telnet to remotely manage network devices, which includes access to routers and configuration management.

- **Protocol behavior observations:**

  In simulation mode, we also observed the behavior of protocols such as DNS, HTTP, Telnet, TCP, UDP, ICMP and ARP.

- All the errors reported in the activity results are related to the connection port and type, so it is considered to be a system file identification problem that cannot be solved by individuals.


PT Activity: 02:02:41
11.6.1 : Exercice d'intégration des compétences : Configuration et test de votre réseau
Schéma de topologie :
Vous commencez avec un réseau vide.
Périphérique
Interface
Adresse IP
Masque de sous-réseau
Passerelle par défaut
R1-ISP
Fa0/0
S0/0/0
S/O
R2-Central
Fa0/0
S0/0/0
S/O
PC 1A
Carte réseau
PC 1B
Carte réseau
Eagle Server
Carte
Time Elapsed: 02:02:41
Completion: 73%
Top
Dock
Check Results
Back
1/1
Next


Cisco Packet Tracer - C:\Users\16273\GitHub\ISEP-Documents\2309-2401\Réseaux et Networks\TP3-E...
File Edit Options View Tools Extensions Window Help
Activity Results
Time Elapsed: 02:02:30
You did not complete the activity. Please close this window and try again.
Overall Feedback
Assessment Items
Connectivity Tests
Expand/Collapse All
Show All Item
Assessment Items
Status
Points
Cor
Network
1A
DNS Server IP Incorrect 0 Othe
Ports
FastEthernet0
Link to S1-Central
Connects to FastEthernet0/1 Incorrect 0 Othe
Type Incorrect 0 Othe
1B
DNS Server IP Incorrect 0 Othe
Ports
FastEthernet0
Link to S1-Central
Connects to FastEthernet0/2 Incorrect 0 Othe
Type Incorrect 0 Othe
Eagle_Server
Ports
FastEthernet0
Link to R1-ISP
Connects to FastEthernet0/0 Incorrect 0 Othe
Type Incorrect 0 Othe
R1-ISP
Ports
FastEthernet0/0
Link to Eagle_Server
Connects to FastEthernet0 Incorrect 0 Othe
Type Incorrect 0 Othe
Serial0/0/0
Link to R2-Central
Connects to Serial0/0/0 Incorrect 0 Othe
Type Incorrect 0 Othe
Routes 0 Othe
VTY Lines 0 Othe
R2-Central
Ports
FastEthernet0/0
Link to S1-Central
Connects to FastEthernet0/24 Incorrect 0 Othe
Type Incorrect 0 Othe
Serial0/0/0
Link to R1-ISP
Connects to Serial0/0/0 Incorrect 0 Othe
Type Incorrect 0 Othe
Routes 0 Othe
VTY Lines 0 Othe
S1-Central
Ports
VTY Lines 0 Othe
Score : 1/1
Item Count : 45/61
Component Items/Total Score
Ip 3/3 1/1
Other 31/47 0/0
Physical 9/9 0/0
Routing 2/2 0/0
Close

Packet Tracer-

Implementing a Subnetted IPv6 Addressing Scheme

Ex3/Part1/Step 1/Subnet Table

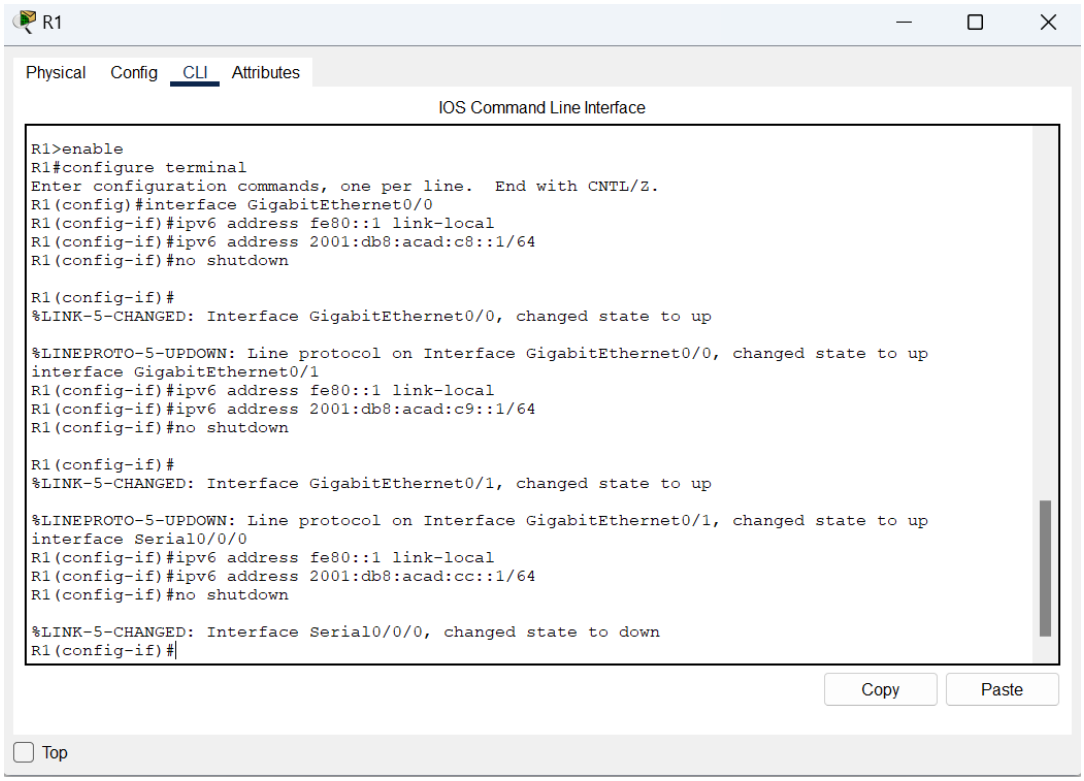
Subnet Description	Subnet Address
R1 G0/0 LAN	2001:DB8:ACAD:00C8::0/64
R1 G0/1 LAN	2001:db8:acad:00c9::0/64
R2 G0/0 LAN	2001:db8:acad:00ca::0/64
R2 G0/1 LAN	2001:db8:acad:00cb::0/64
WAN Link	2001:db8:acad:00cc::0/64

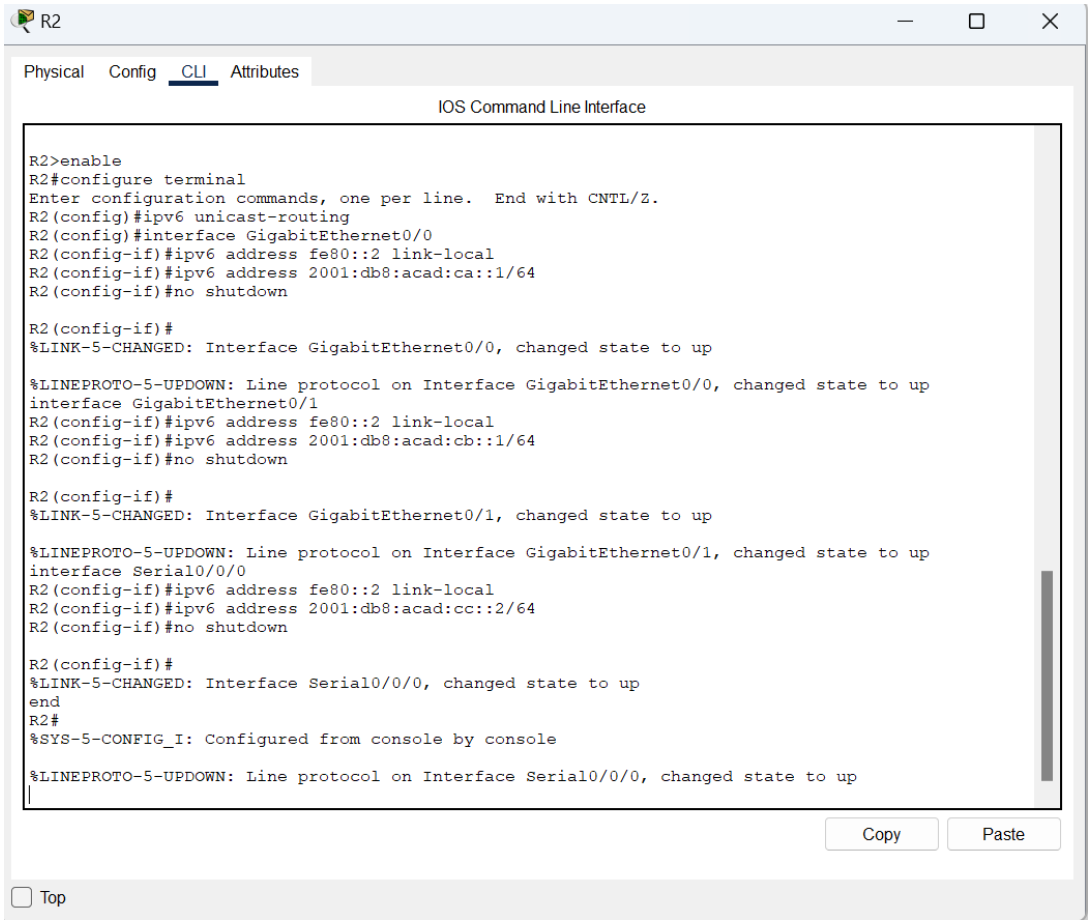
For hexadecimal, 10→a, 11→b, 12→c.

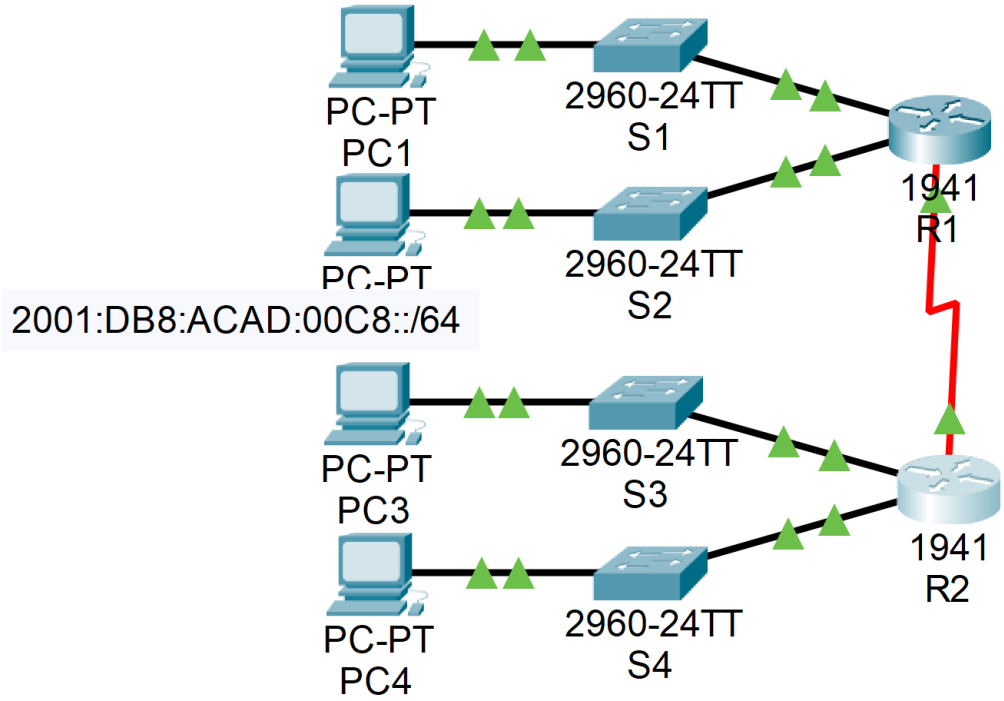
Ex3/Part1/Step 2/abc/Addressing Table

Device	Interface	IPv6 Address	Link-Local
R1	G0/0	2001:db8:acad:00c8::1/64	FE80::1
	G0/1	2001:db8:acad:00c9::1/64	FE80::1
	S0/0/0	2001:db8:acad:00cc::1/64	FE80::1
R2	G0/0	2001:db8:acad:00ca::1/64	FE80::2
	G0/1	2001:db8:acad:00cb::1/64	FE80::2
	S0/0/0	2001:db8:acad:00cc::2/64	FE80::2
PC1	NIC	Auto Config	
PC2	NIC	Auto Config	
PC3	NIC	Auto Config	
PC4	NIC	Auto Config	

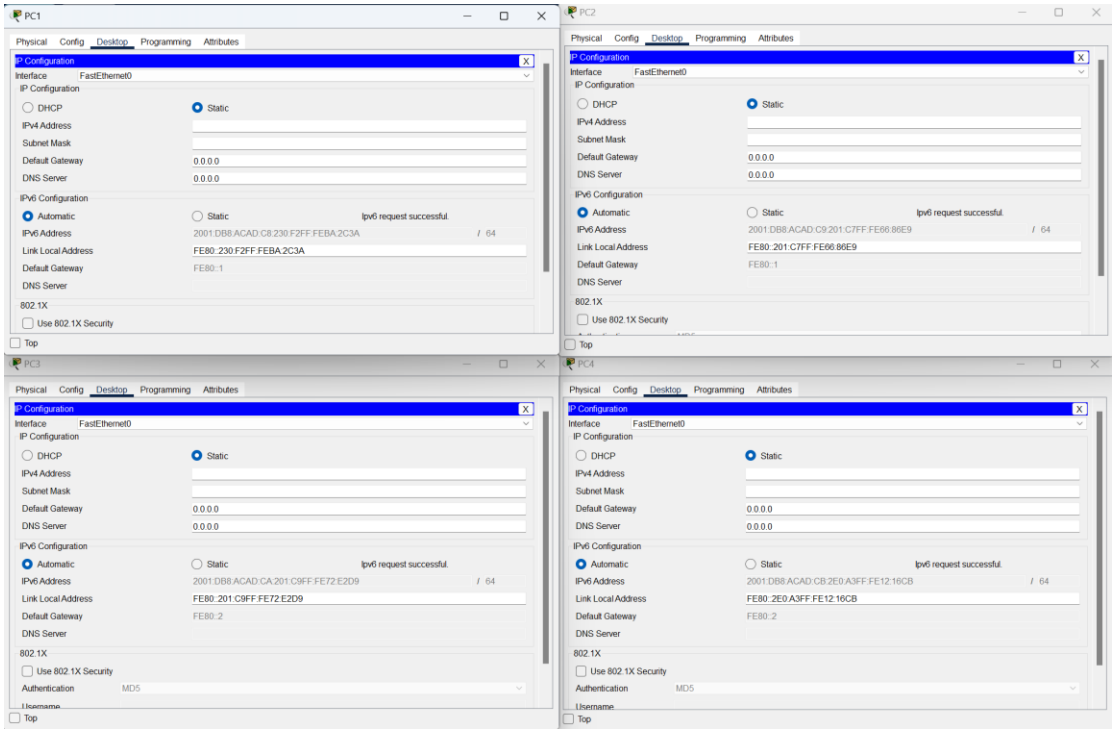
Ex3/ Part2/ Step 1





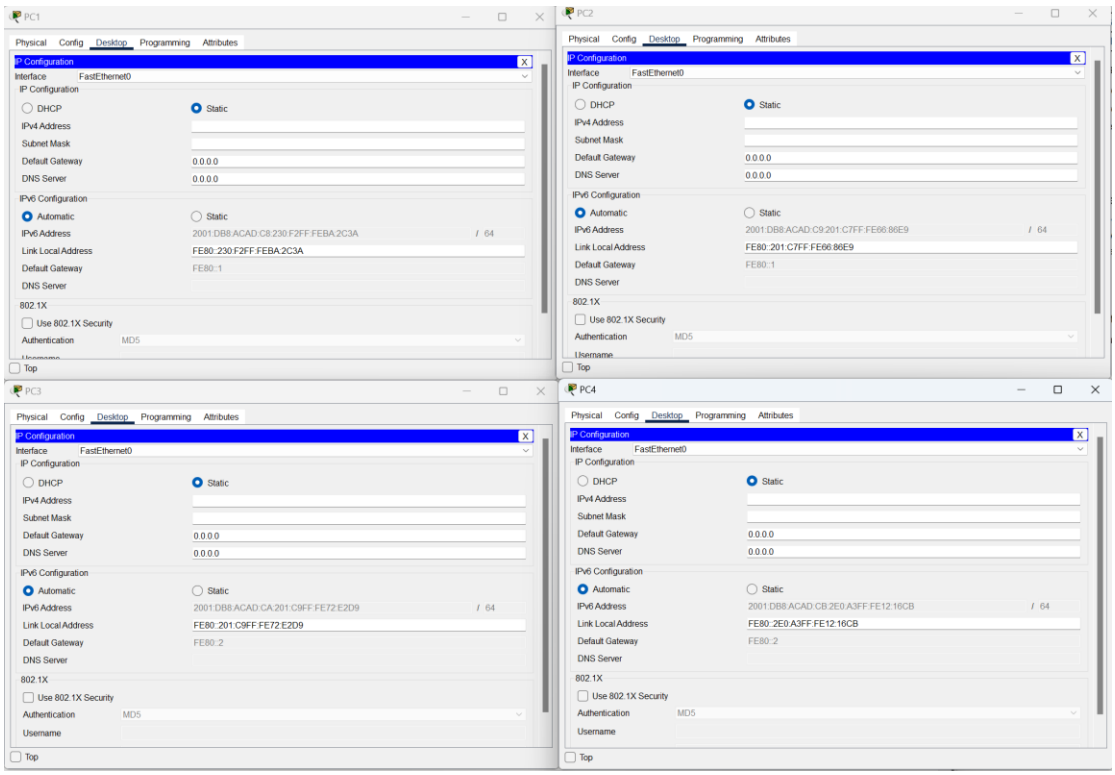


Ex3/ Part2/ Step 2

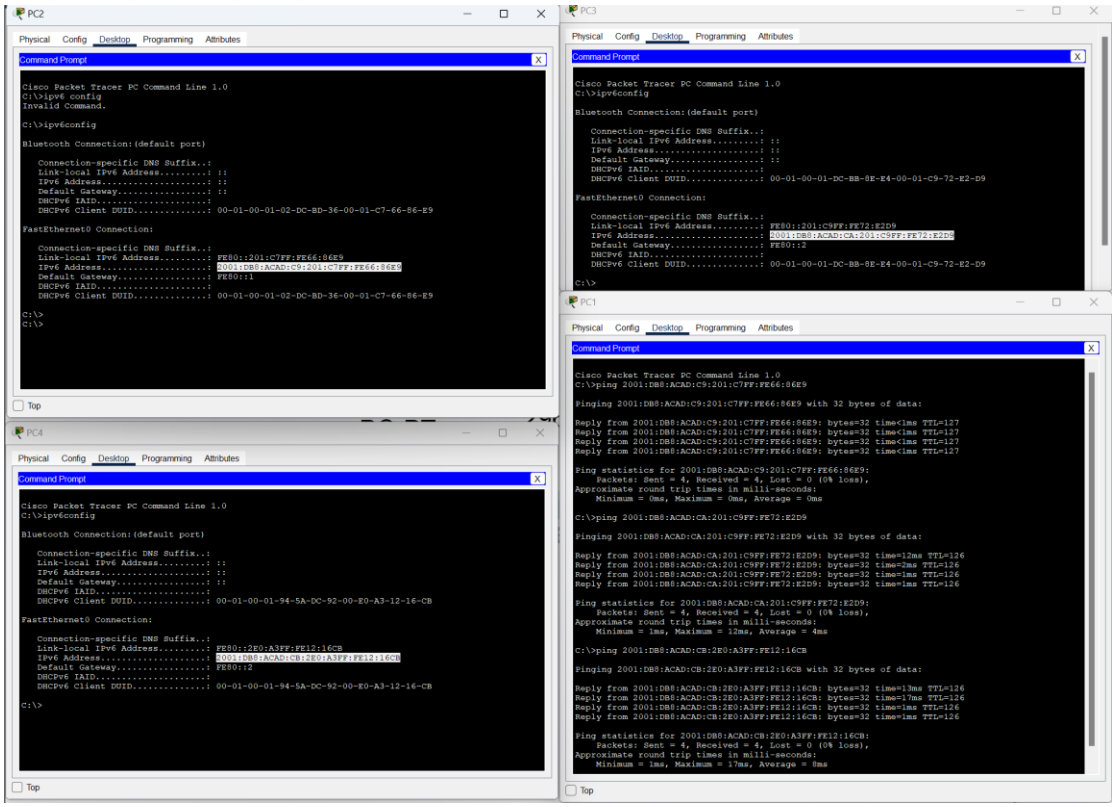


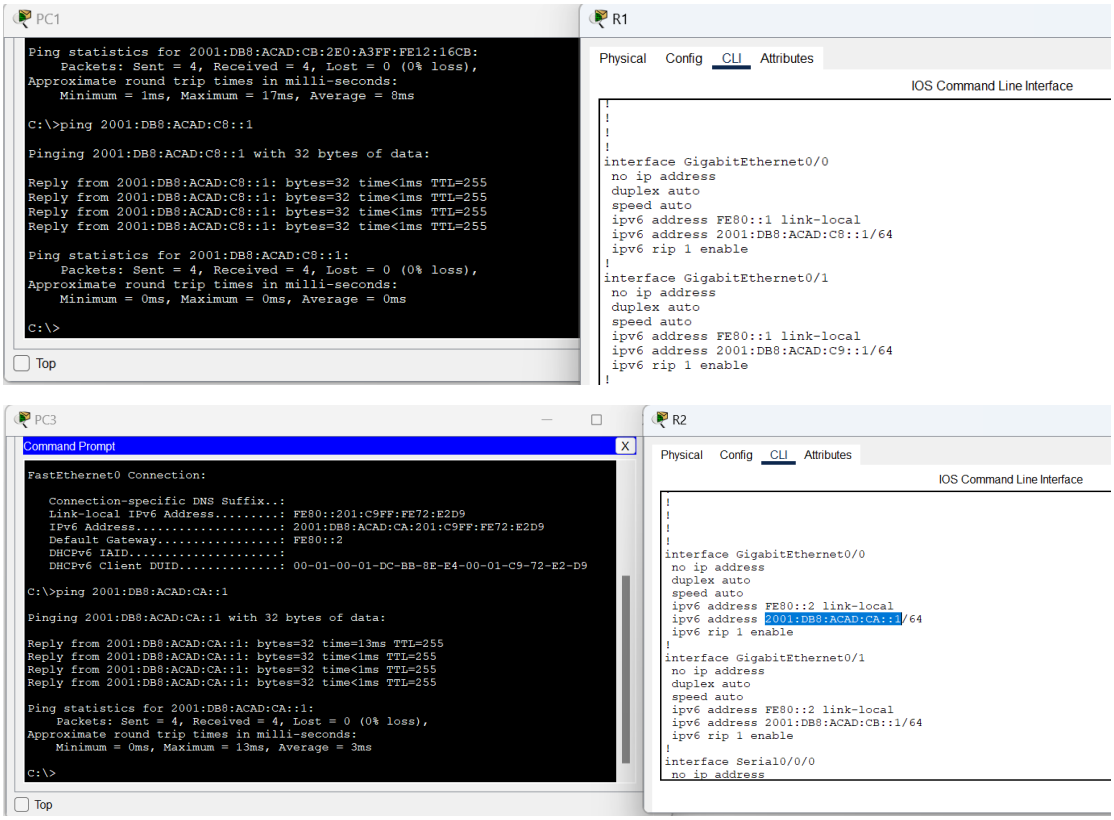

```
R1(config-if)#exit
R1(config)#ipv6 unicast-routing
R1(config)#
```

```
R2>enable
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#ipv6 unicast-routing
R2(config)#
```



Ex3/ Part2/ Step 3

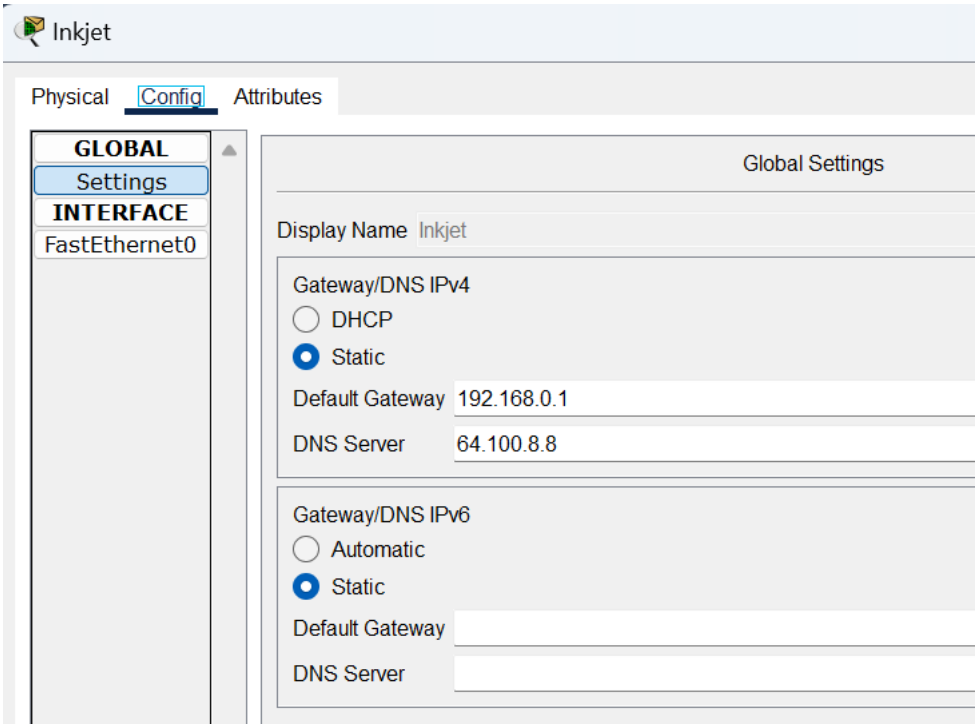




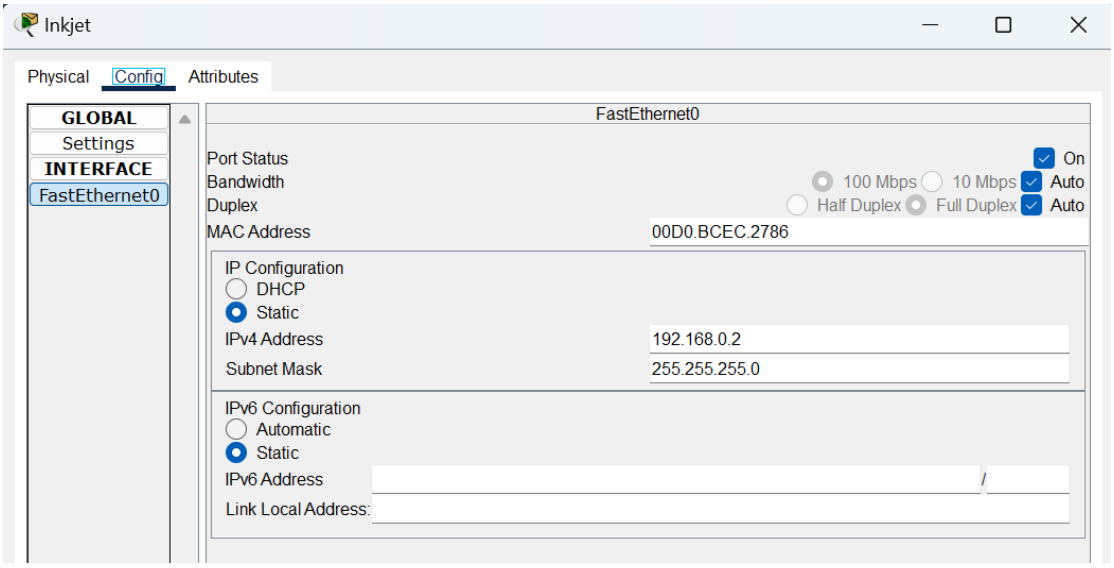
Ex3/Activity Results

Packet Tracer - DHCP and DNS Servers

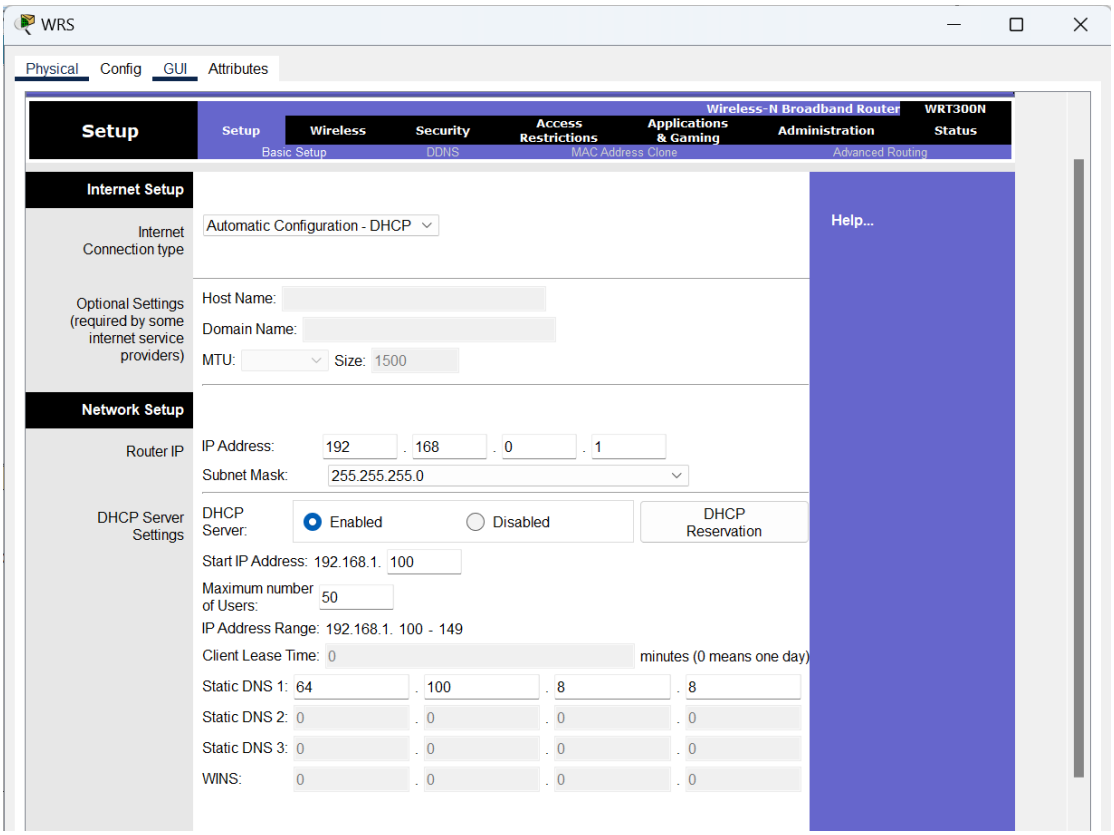
Ex4/ Part 1/Step1/ab



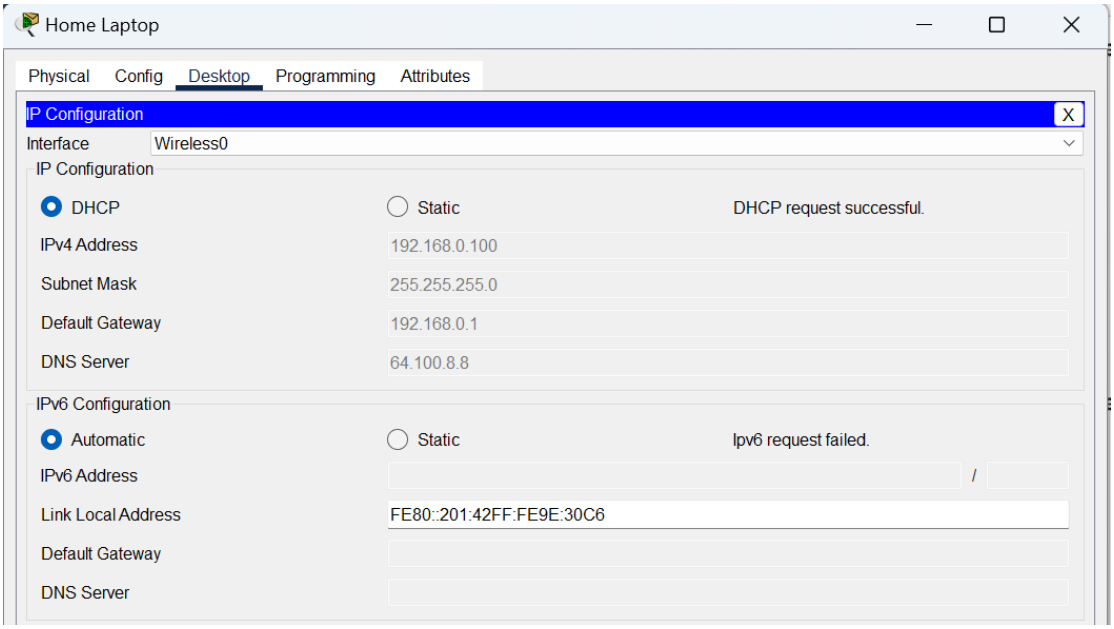
Ex4/ Part 1/Step1/cd



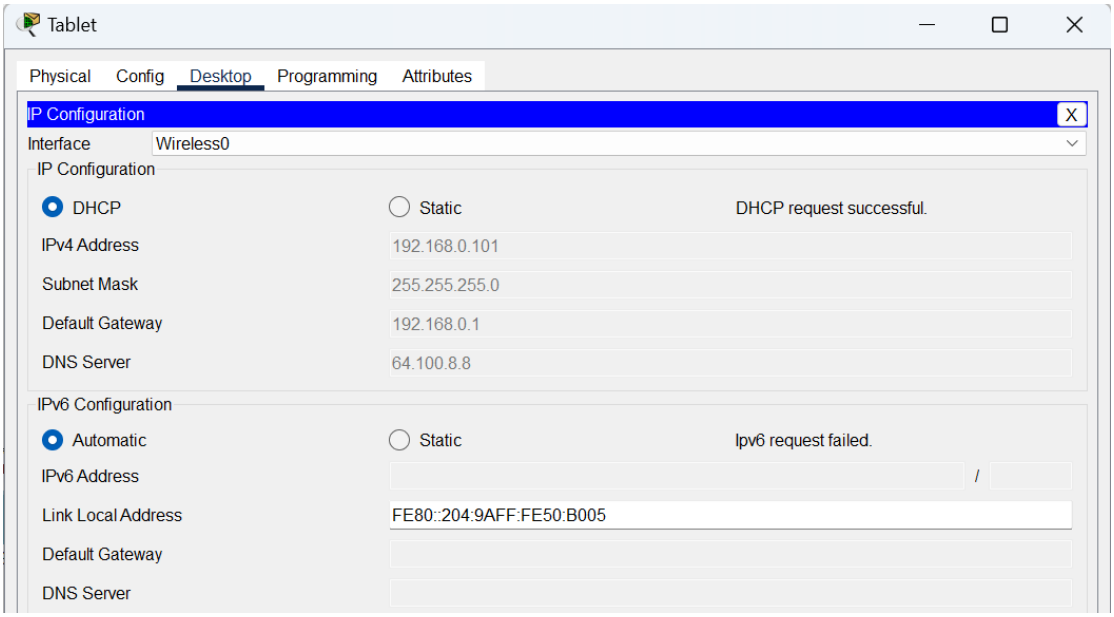
Ex4/ Part 1/Step2/abc



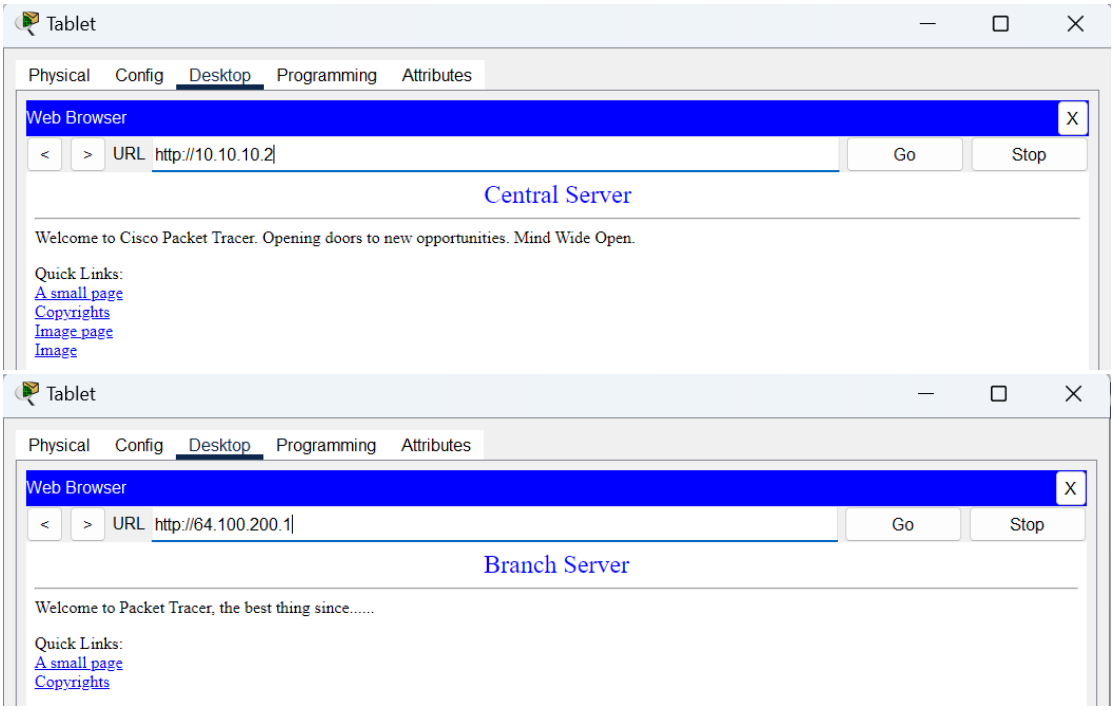
Ex4/ Part 1/Step3/abcd



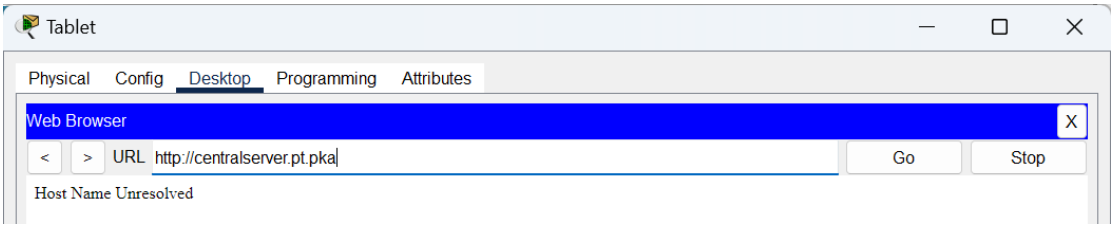
Ex4/ Part 1/Step4/abc

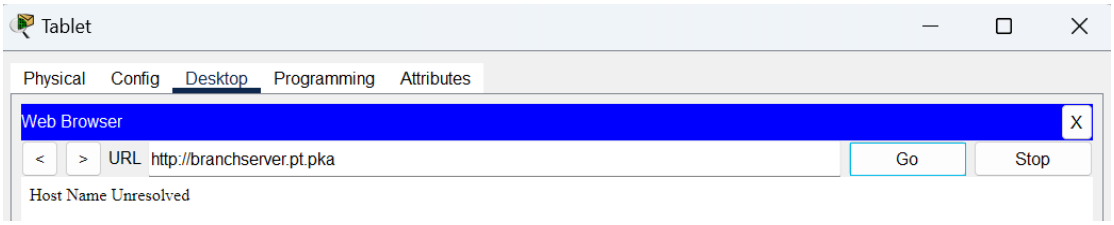


Ex4/ Part 1/Step5/ab

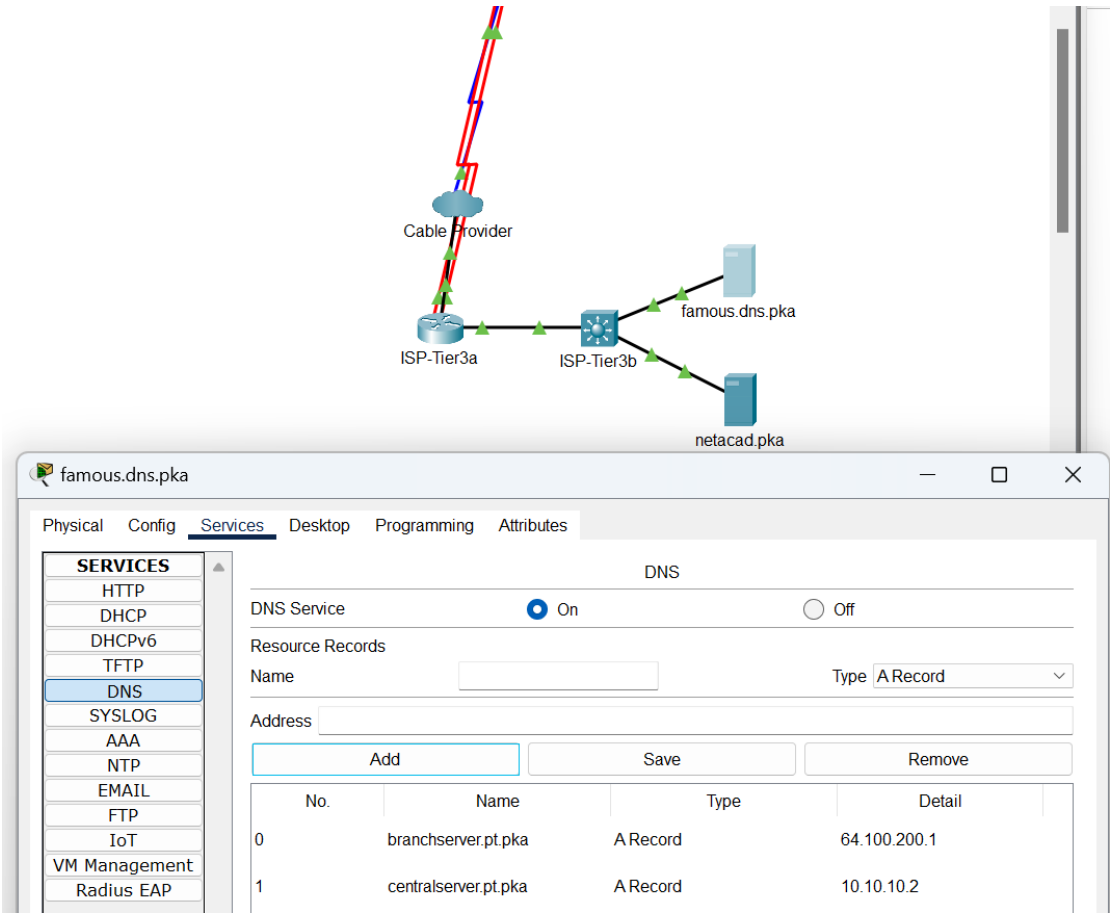


Ex4/ Part 1/Step5/c

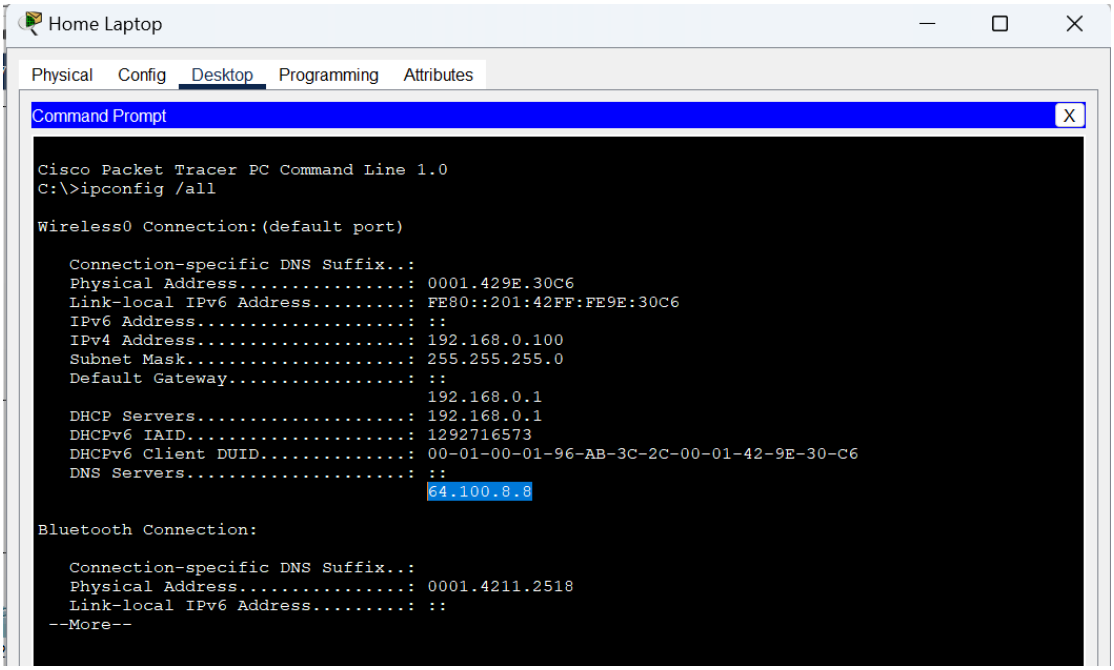




Ex4/ Part 2/Step1/abcde



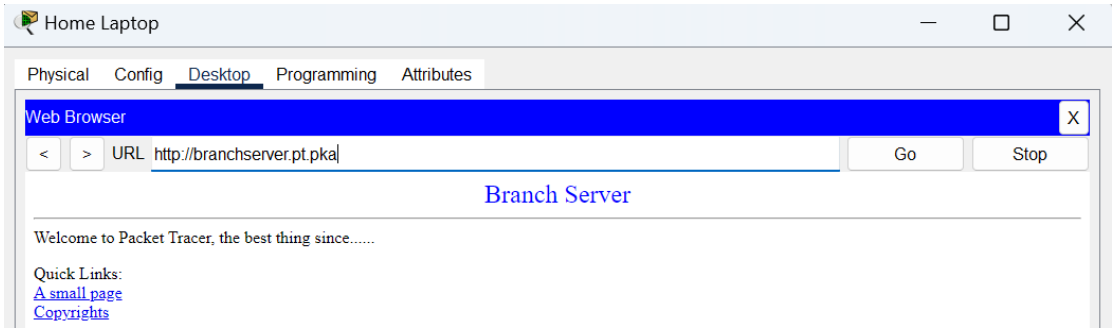
Ex4/ Part 2/Step2/ab



Ex4/ Part 2/Step2/c

```
C:\>ping 64.100.8.8

Pinging 64.100.8.8 with 32 bytes of data:

Reply from 64.100.8.8: bytes=32 time=28ms TTL=125
Reply from 64.100.8.8: bytes=32 time=19ms TTL=125
Reply from 64.100.8.8: bytes=32 time=15ms TTL=125
Reply from 64.100.8.8: bytes=32 time=15ms TTL=125

Ping statistics for 64.100.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 15ms, Maximum = 28ms, Average = 19ms

C:\>nslookup centralserver.pt.pka

Server: [64.100.8.8]
Address:  64.100.8.8

Non-authoritative answer:
Name:   centralserver.pt.pka
Address:   10.10.10.2

C:\>nslookup branchserver.pt.pka

Server: [64.100.8.8]
Address:  64.100.8.8

Non-authoritative answer:
Name:   branchserver.pt.pka
Address:   64.100.200.1
```

Ex4/ Part 2/Step2/d



Ex4/Activity Results