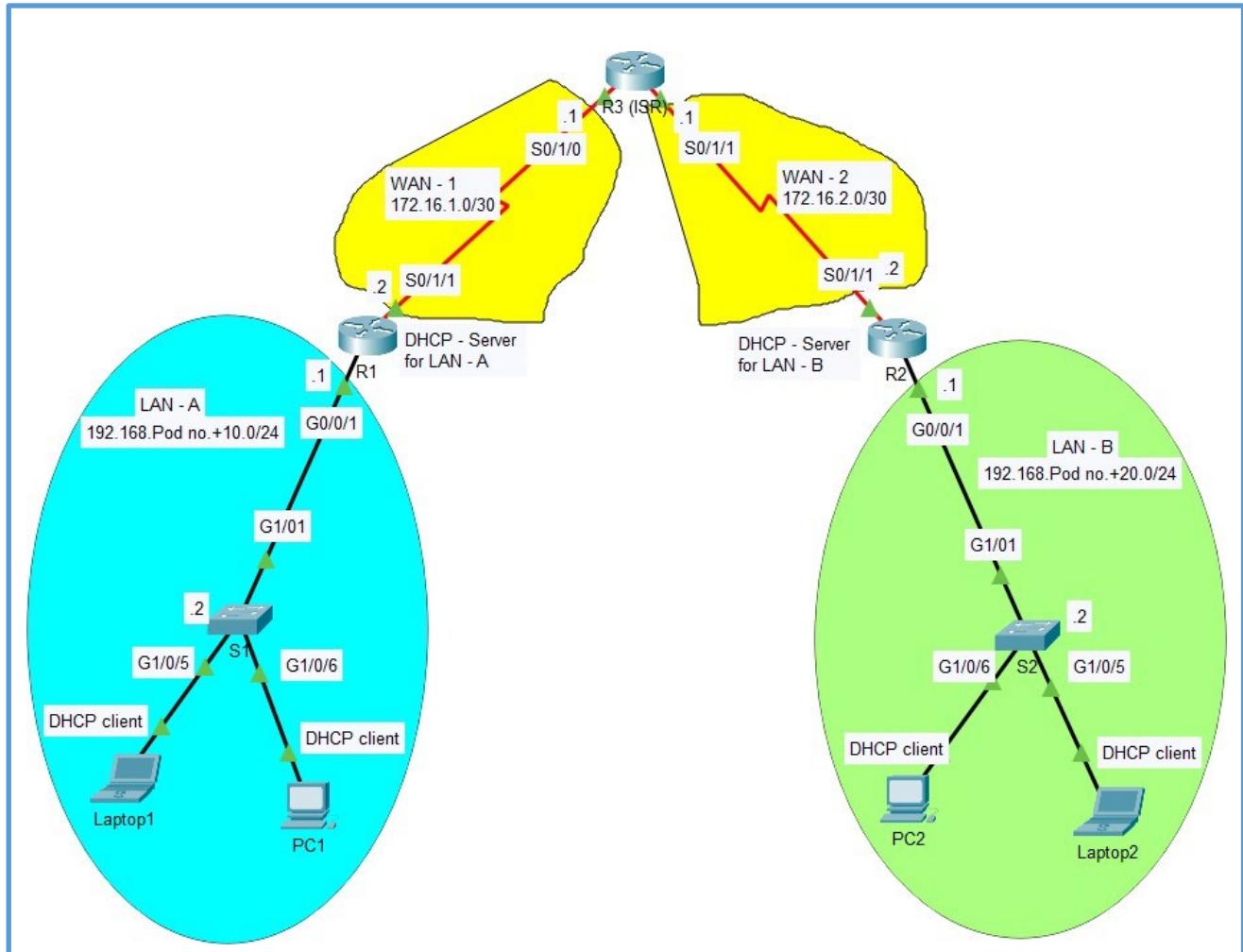


PART – 1

Lab Activity – DHCP Server Configuration (Local):

- There are two LANs and two WANs in the topology below. Please build the following topology on the physical pod/rack in the lab room.



Required Resources:

- Two Layer-3/Multilayer Switch (Cisco Catalyst 1000 Series with Cisco IOS Release 15.1+ image)
- Three Routers (Cisco 4221 with Cisco IOS Release 17.6+ image)
- Two Laptops (Windows with Terminal Emulation Program)
- Two Desktops (Windows with Terminal Emulation Program)
- Cables:
 - Console cables to configure the Cisco IOS devices through the console port.
 - Ethernet cables as shown in the topology.

Addressing Table:

Device	Interface	IP Address	Subnet Mask / CIDR	Default Gateway
S1	VLAN1	192.168.Pod no.+10.2	255.255.255.0	192.168.Pod no.+10.1
S2	VLAN1	192.168.Pod no.+20.2	255.255.255.0	192.168.Pod no.+20.1
R1 (DHCP Server)	G0/0/1	192.168.Pod no.+10.1	255.255.255.0	N/A
	S0/1/1	172.16.1.2	/30	N/A
R2 (DHCP Sever)	G0/0/1	192.168.Pod no.+20.1	255.255.255.0	N/A
	S0/1/1	172.16.2.2	/30	N/A
R3 (ISR)	S0/1/0	172.16.1.1	/30	N/A
	S0/1/1	172.16.2.1	/30	N/A
PC1	NIC		DHCP client	
Laptop1	NIC		DHCP client	
PC2	NIC		DHCP client	
Laptop2	NIC		DHCP client	

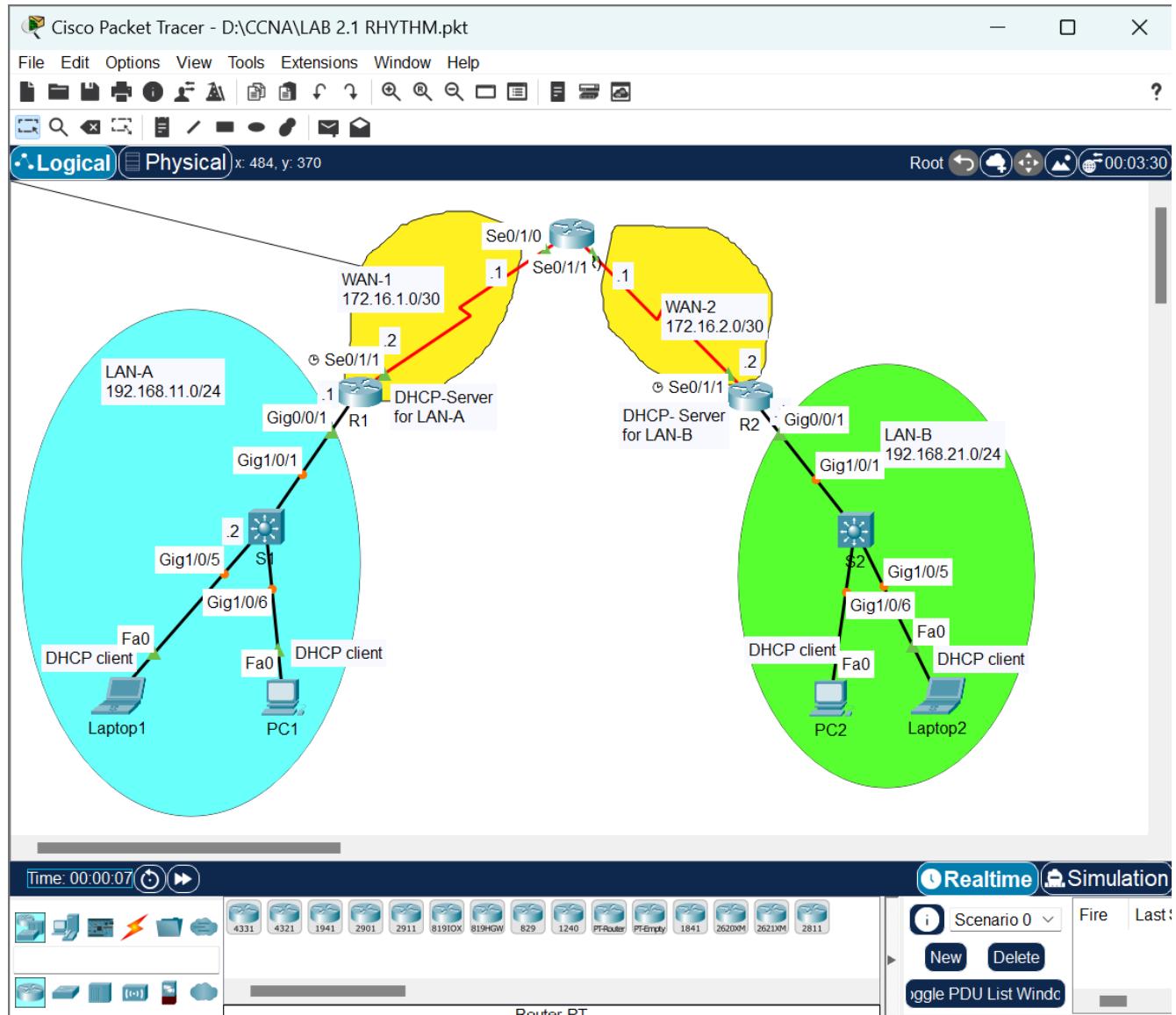
Lab Description:

- In this lab, please build a LAN and WAN based simple network.
 - LAN - A with one switch and two hosts
 - LAN - B with one switch and two hosts
 - WAN – 1 between R1 and R3-ISR
 - WAN – 2 between R2 and R3-ISR
- You are also required to do basic configuration on the following devices:
 - Switches:
 - Hostnames
 - SVI
 - Default gateway
 - DNS lookup (disable)
 - PCs and Laptops:
 - IP addressing
 - Default gateway
 - Routers:
 - Hostnames
 - IP addressing
 - DNS lookup (disable)

Instructions:

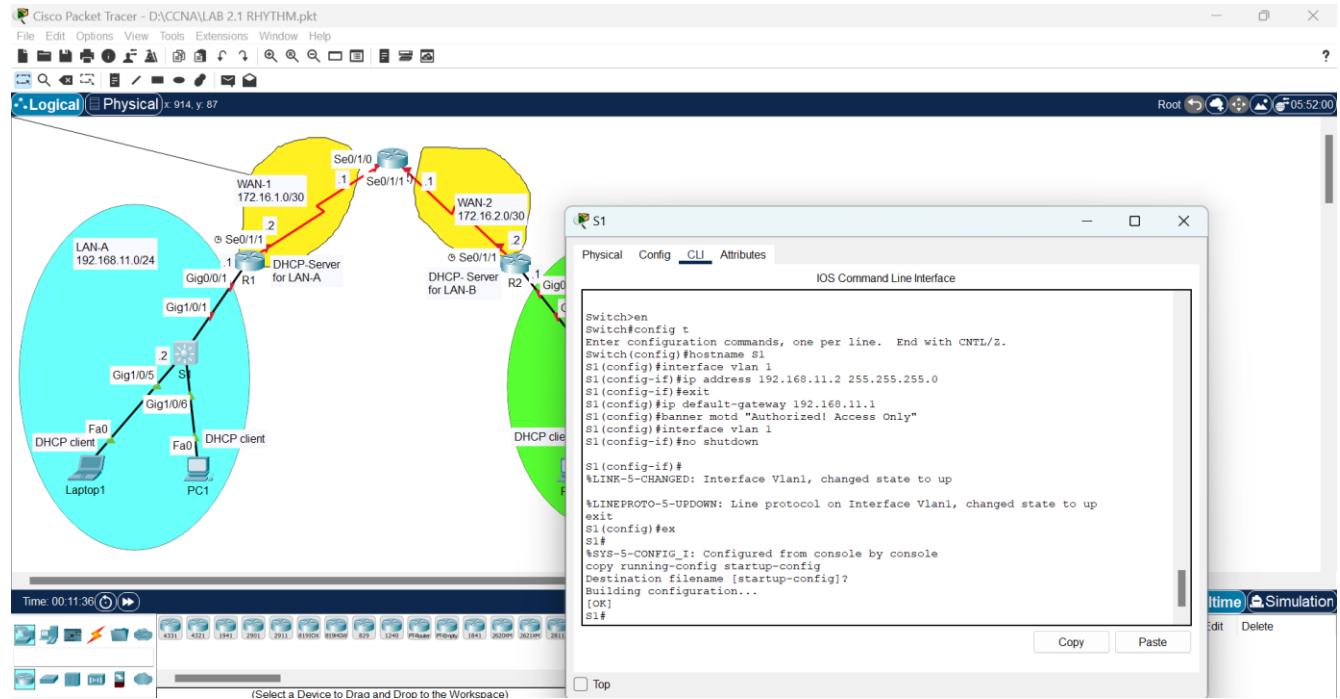
Step 1: Set up the network topology.

- Develop the topology on the physical pod by using all the devices illustrated above and cabling them all together:
 - Turn on the devices.
 - Connect the switch with the default gateway.
 - Connect the PCs and laptops with their respective switches.
 - Make sure all the lights between switches and hosts are green.

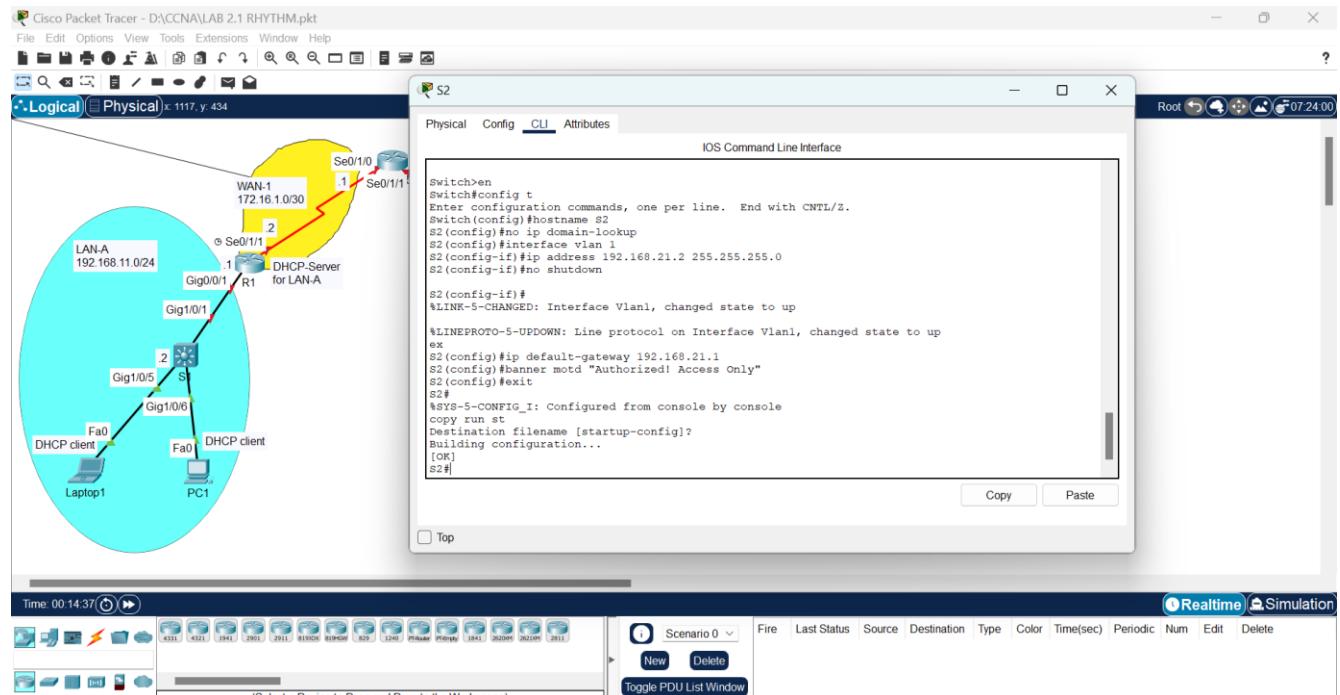


Step 2: Configure and verify basic switch settings on all switches:

S1

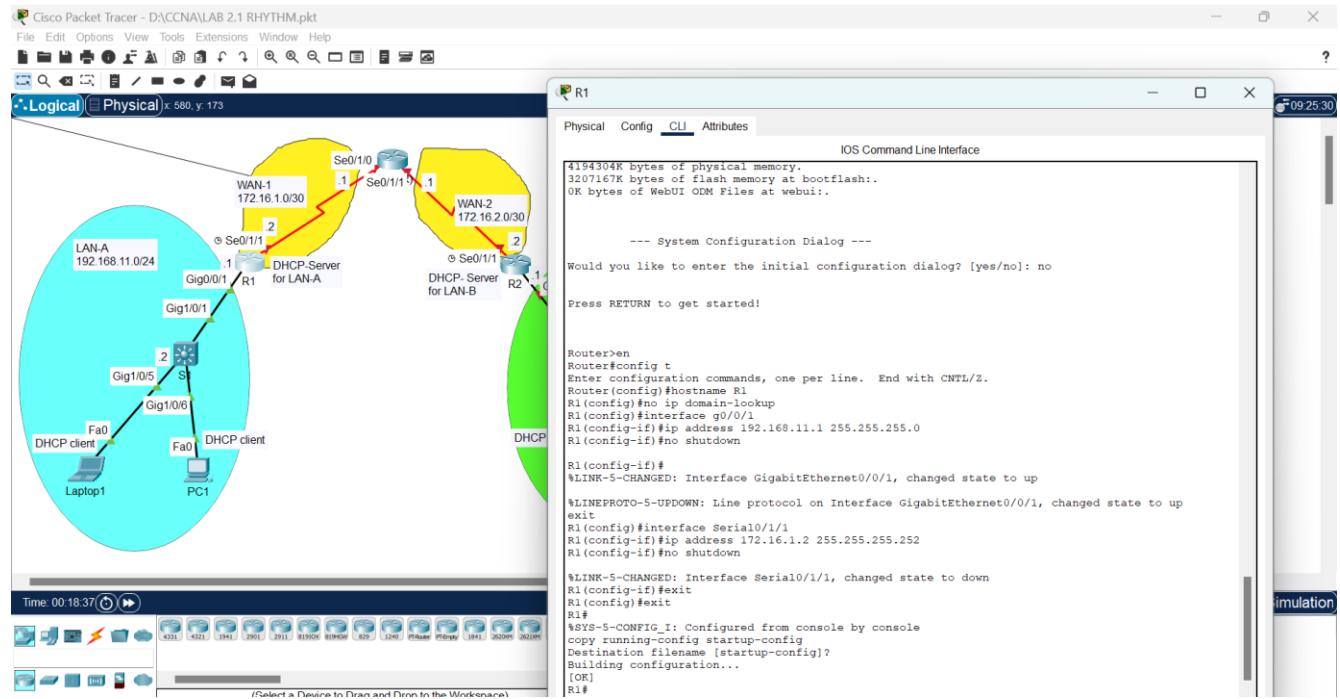


S2

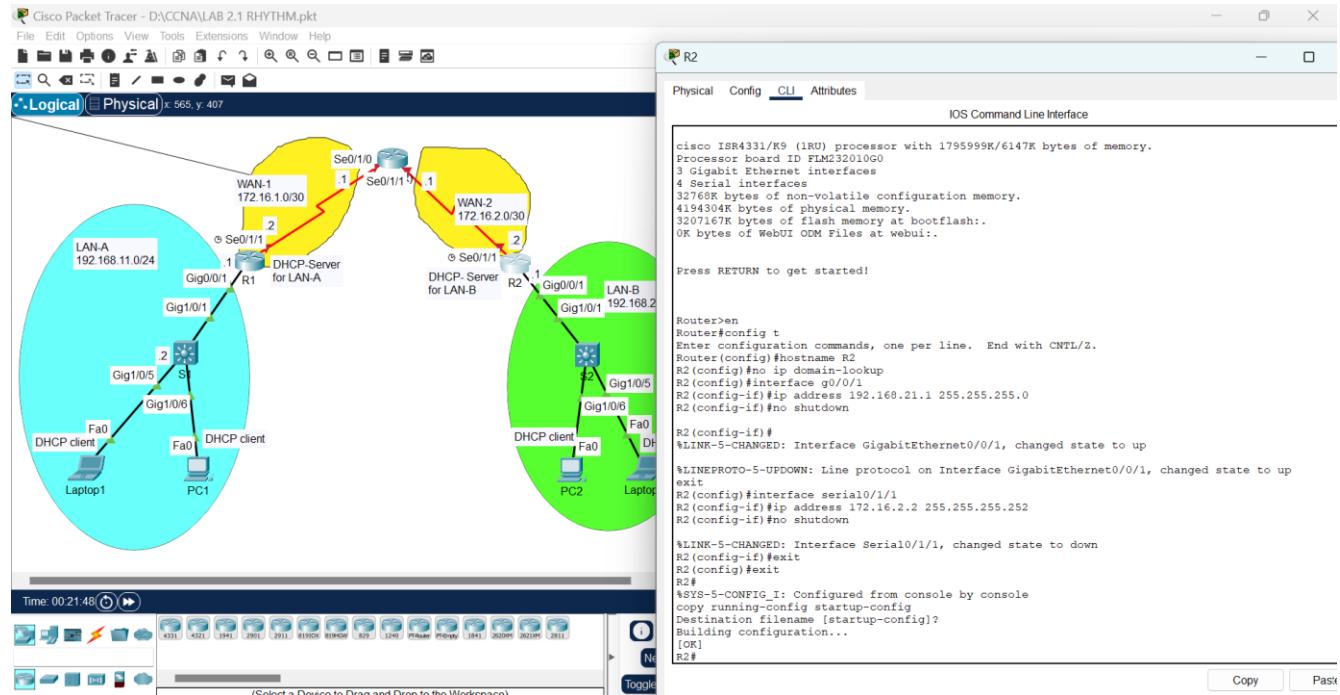


Step 3: Configure and verify basic router settings on all routers:

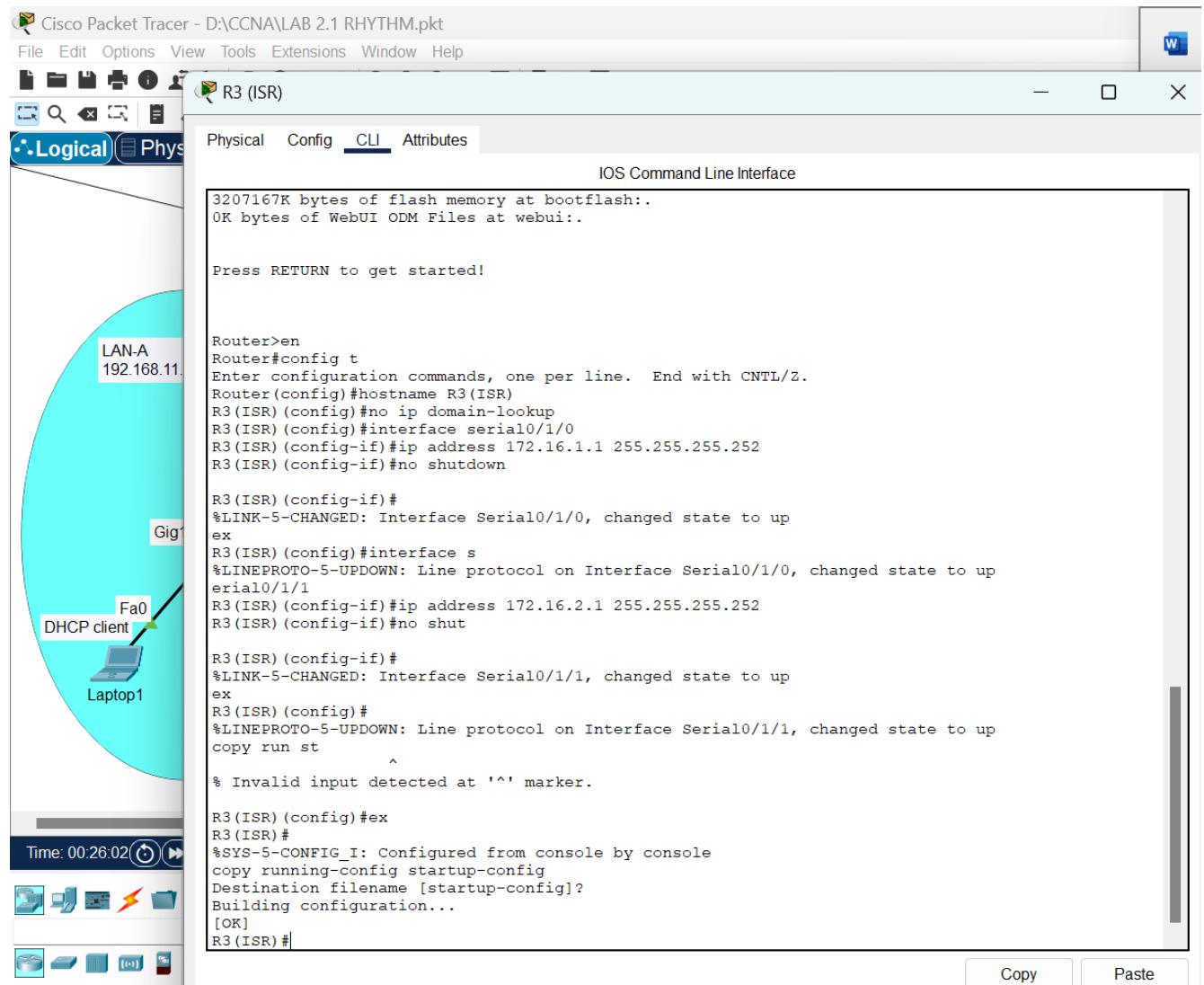
R1



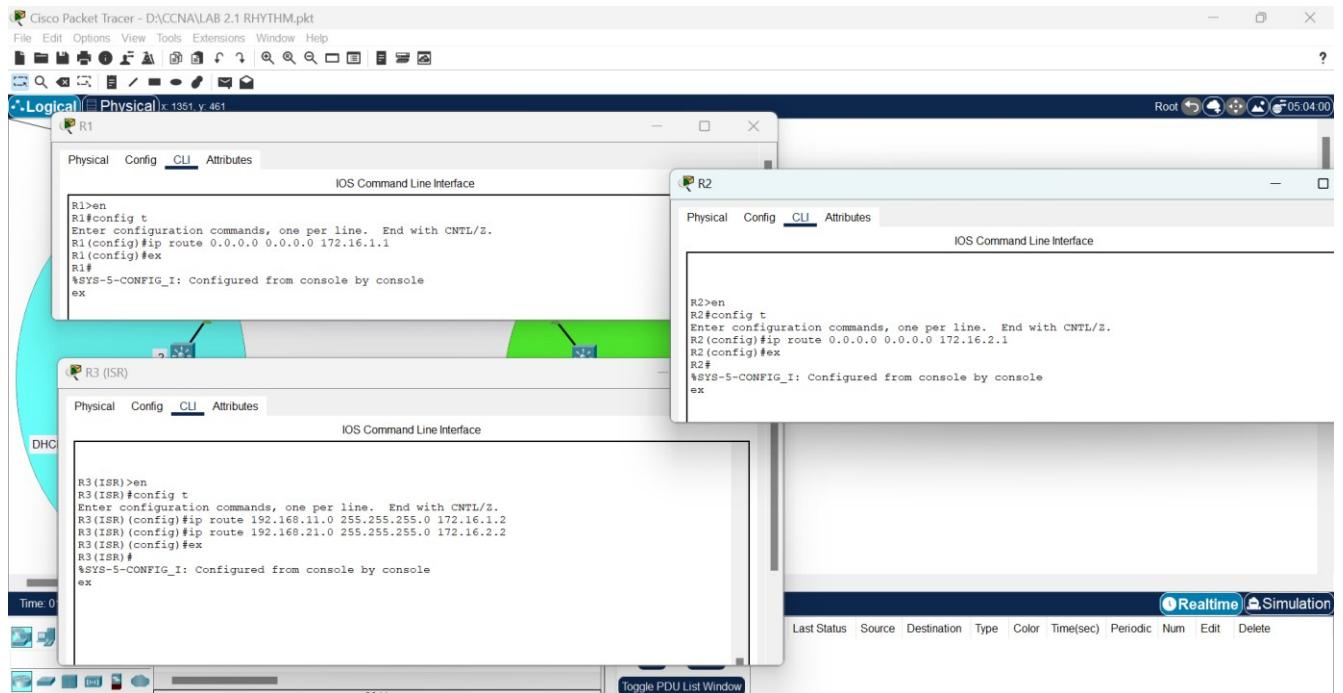
R2



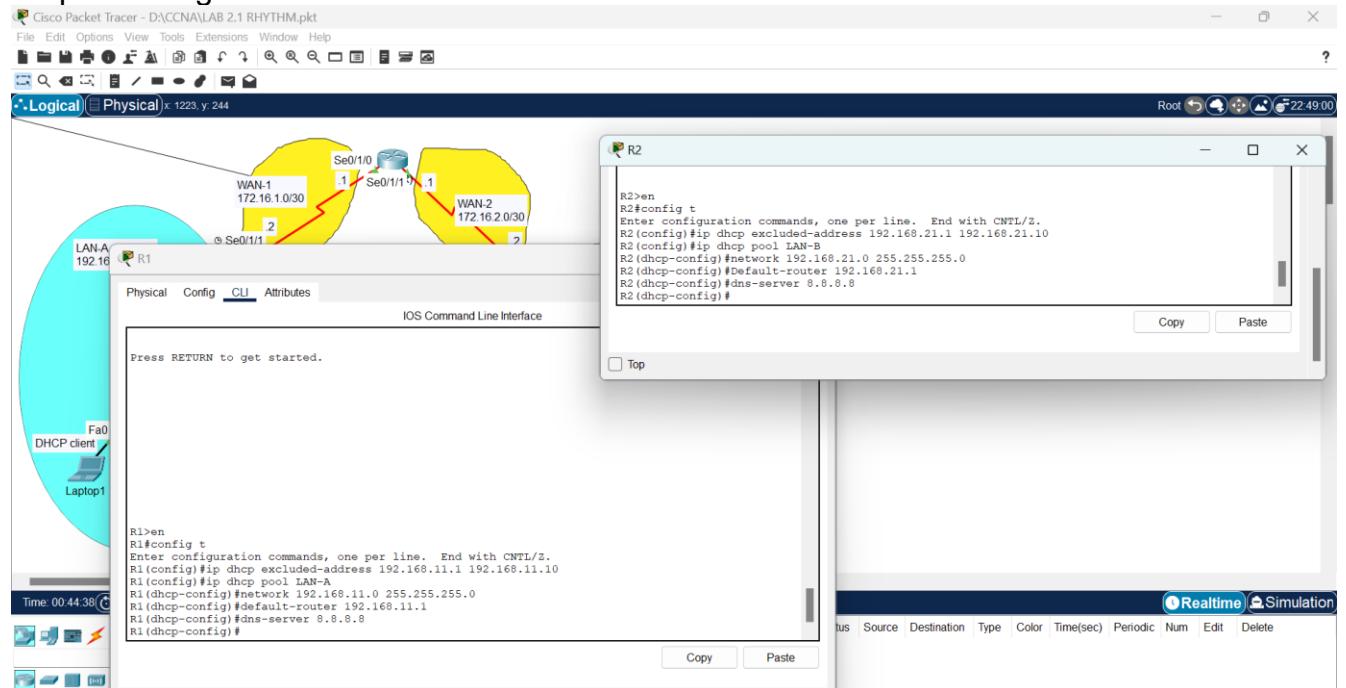
R3



Step 4: Configure static routing on all routers:



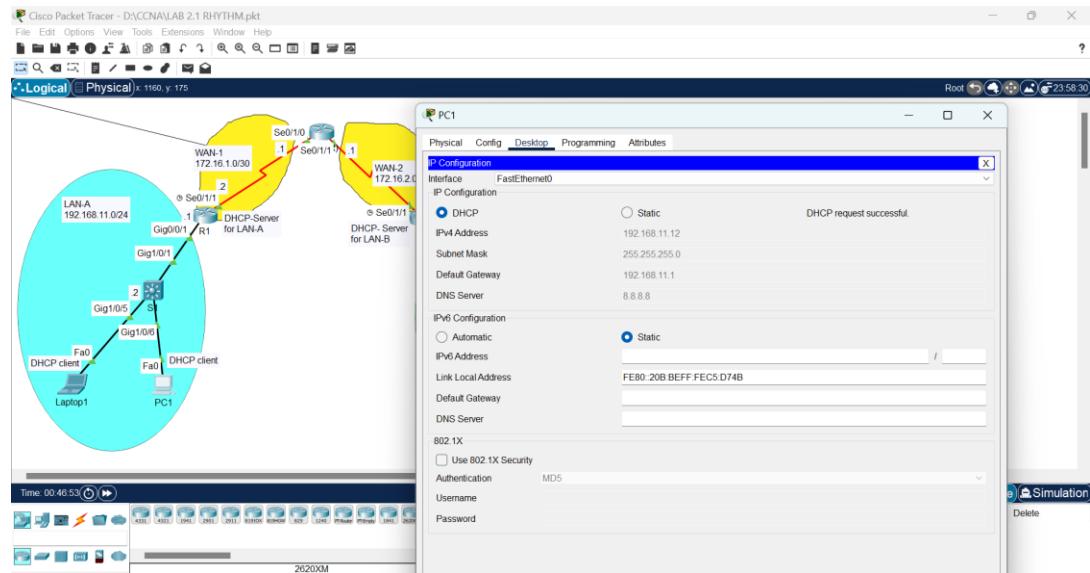
Step 5: Configure DHCP Server on Router R1 and R2



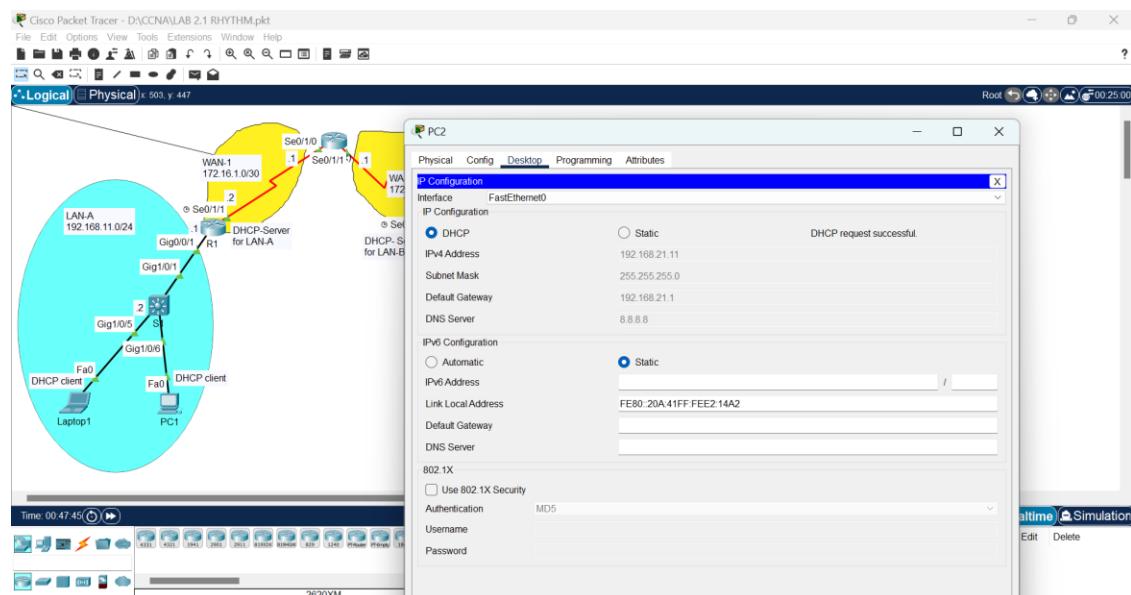
- Exclude the first 10 addresses from the pool, so these excluded addresses may be assigned as static IP addresses to the intermediary devices, servers, printers and so on. within LAN-A and LAN-B.
 - ip dhcp excluded-address 192.168.Pod no.+10 .1 192.168.Pod no.+10 .10*
 - Create DHCP Pool for LAN-A
 - ip dhcp pool LAN-A*
 - Configure the LAN Network
 - network 192.168.Pod no.+10 .0 255.255.255.0*
 - Configure the default gateway
 - Default-router 192.168.Pod no.+10 .1*
 - Configure the DNS server
 - dns-server 8.8.8.8*
- Repeat Step 5 for Router R-2.

Step 6: Set PCs and Laptops to receive IP addresses automatically using DHCP.

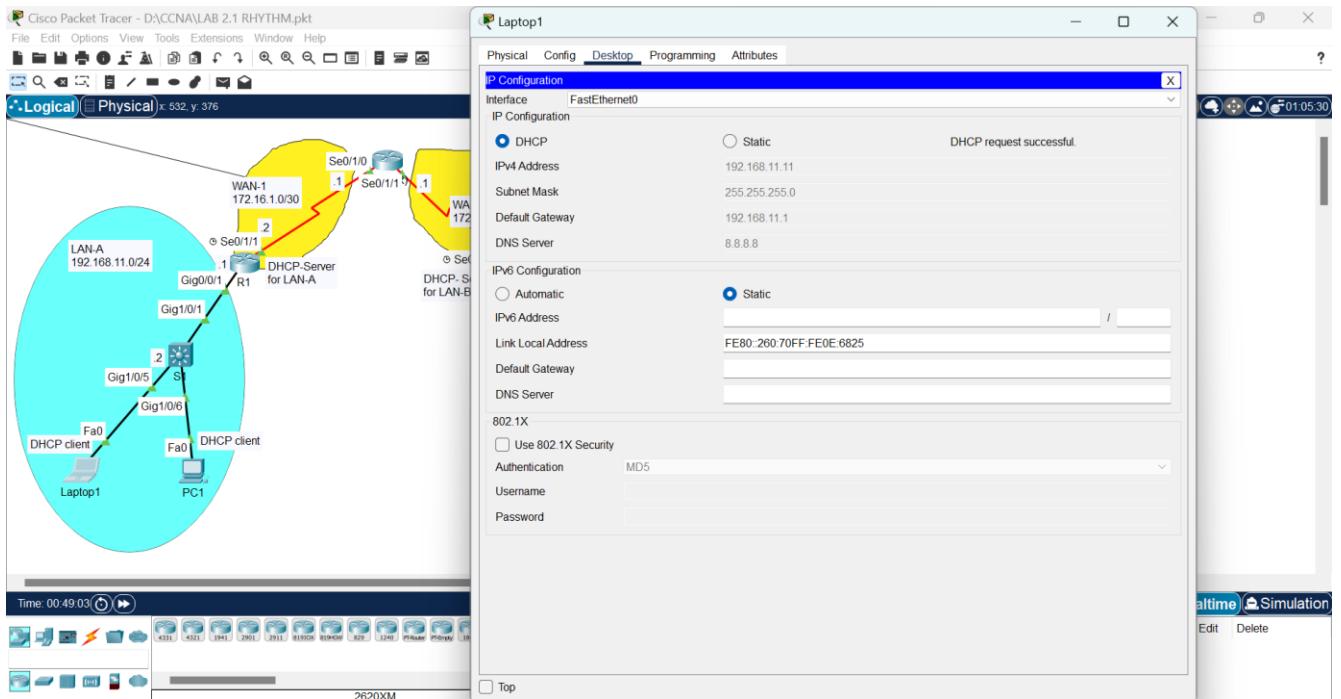
PC1



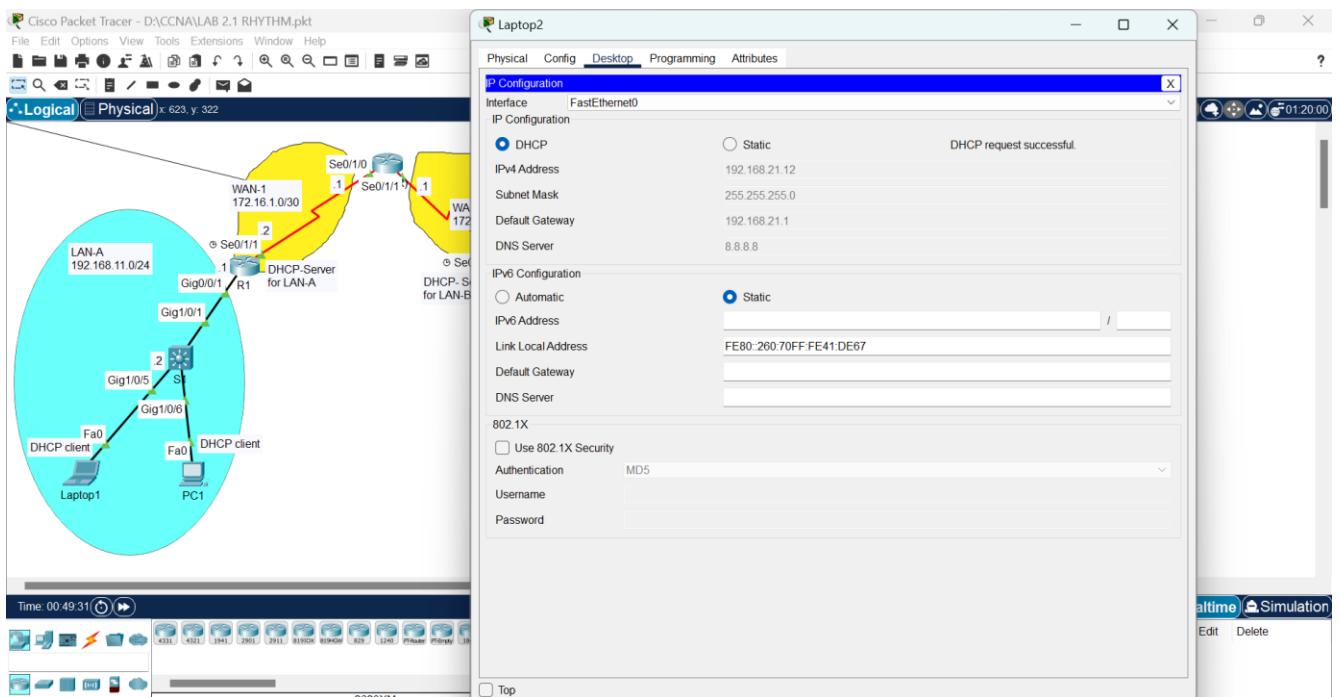
PC2



LAPTOP1

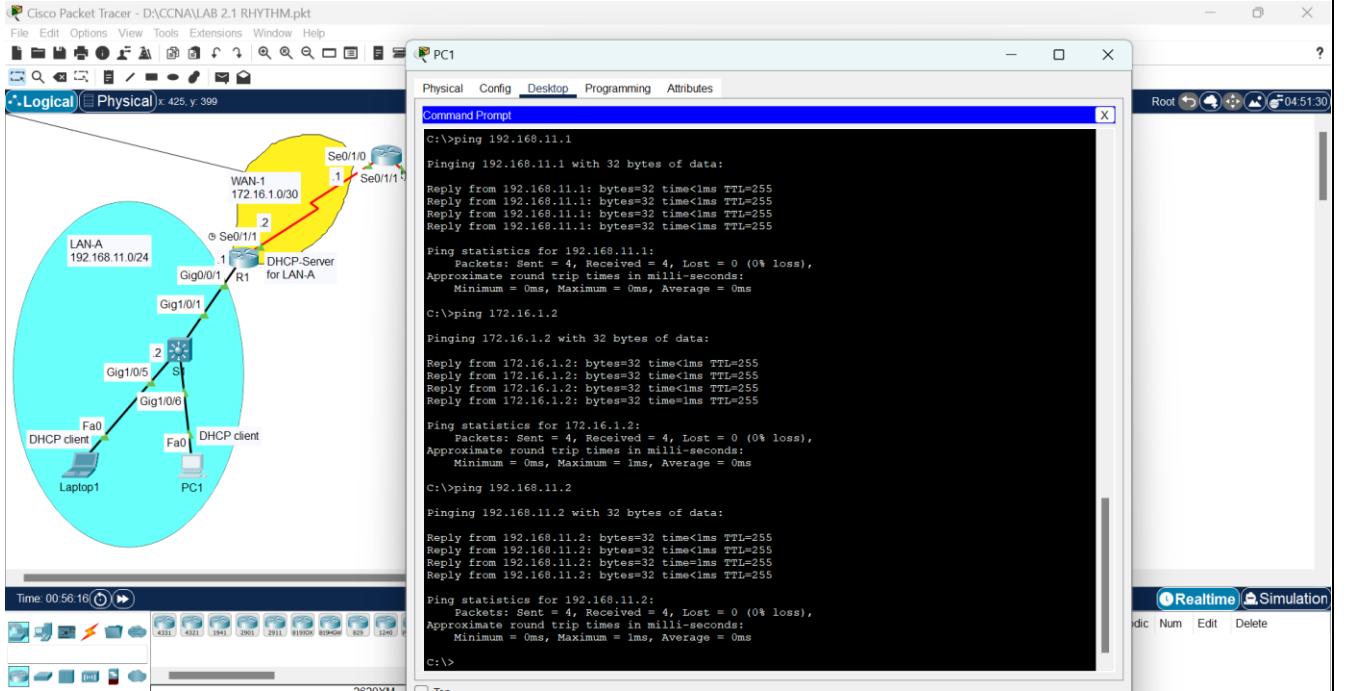


Laptop2

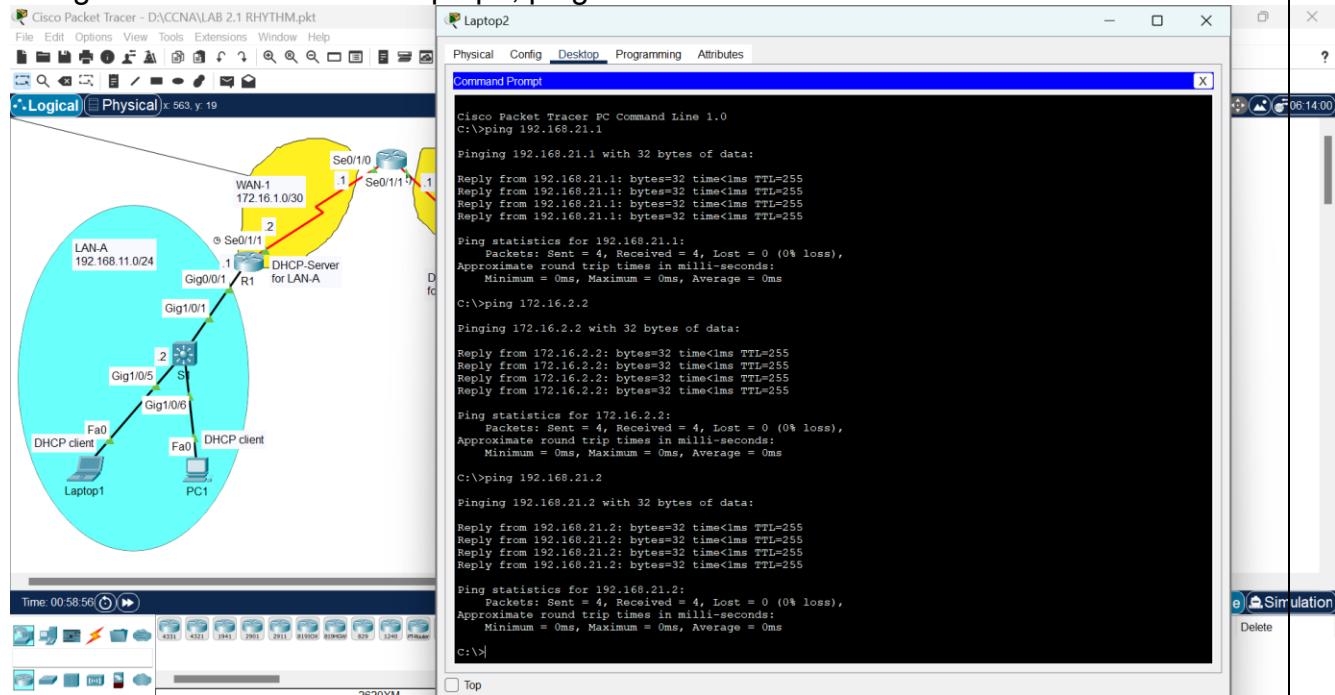


Step 7: Verify the connectivity.

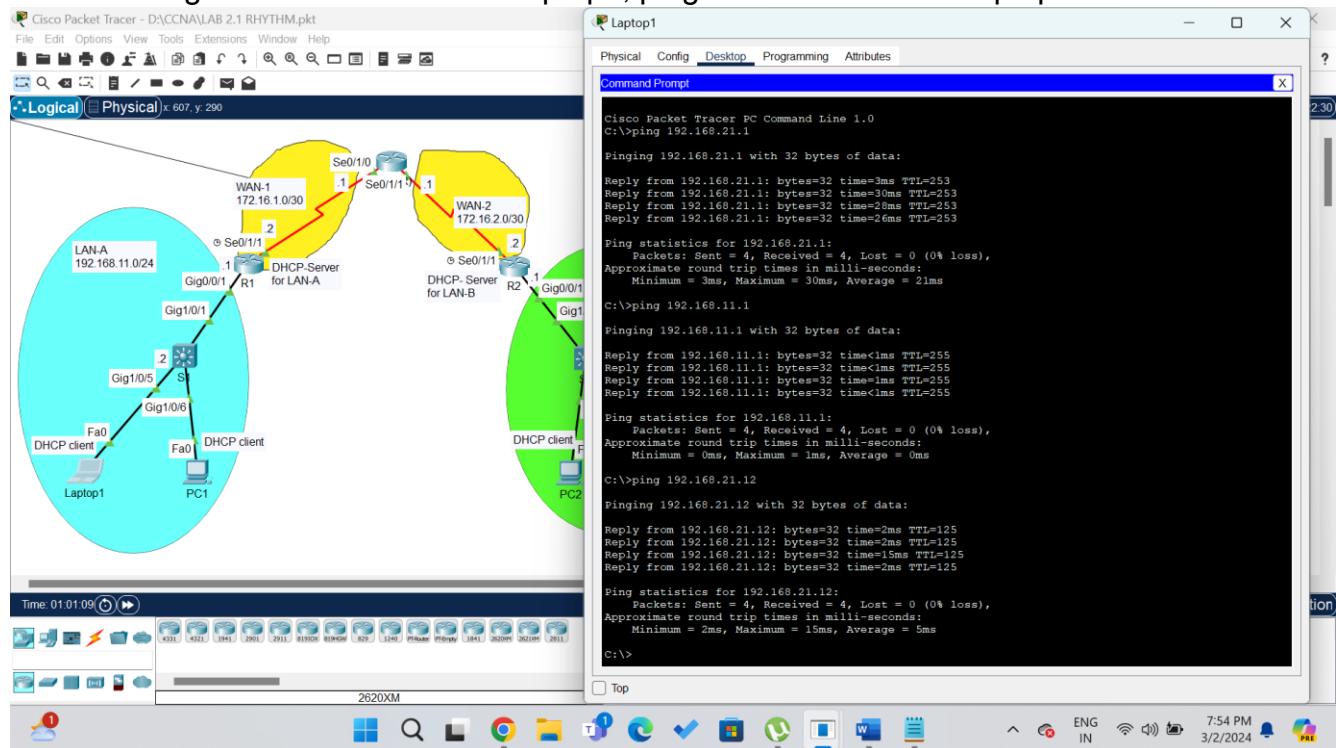
- Using the command line at PC1, ping the IP address of int. g0/0/1 at R1.
- Using the command line at PC1, ping the IP address of int. S0/1/1 at R1.
- Using the command line at PC1, ping the IP address of SVI of switch S1.



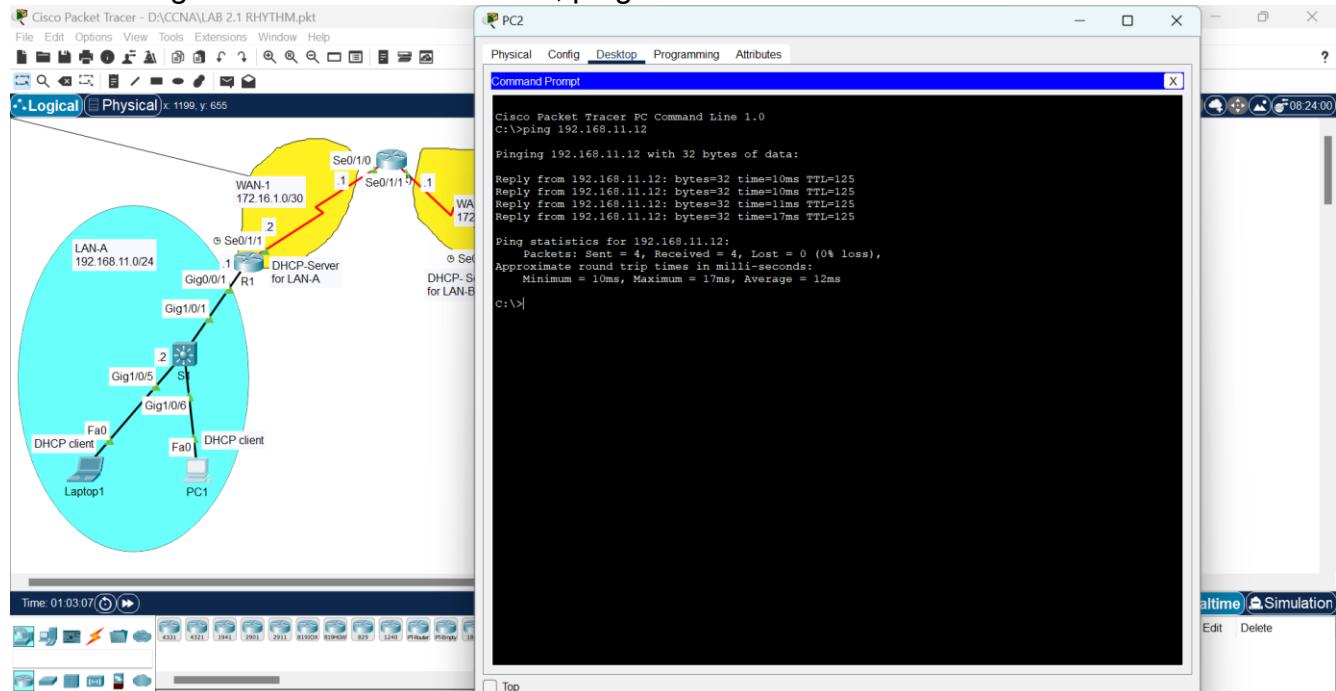
- Using the command line at Laptop2, ping the IP address of int. g0/0/1 at R2.
- Using the command line at Laptop2, ping the IP address of int. S0/1/1 at R2.
- Using the command line at Laptop2, ping the IP address of SVI of switch S2.



- Using the command line at Laptop1, ping the IP address of SVI of both switches.
- Using the command line at Laptop1, ping the IP address of Laptop2.



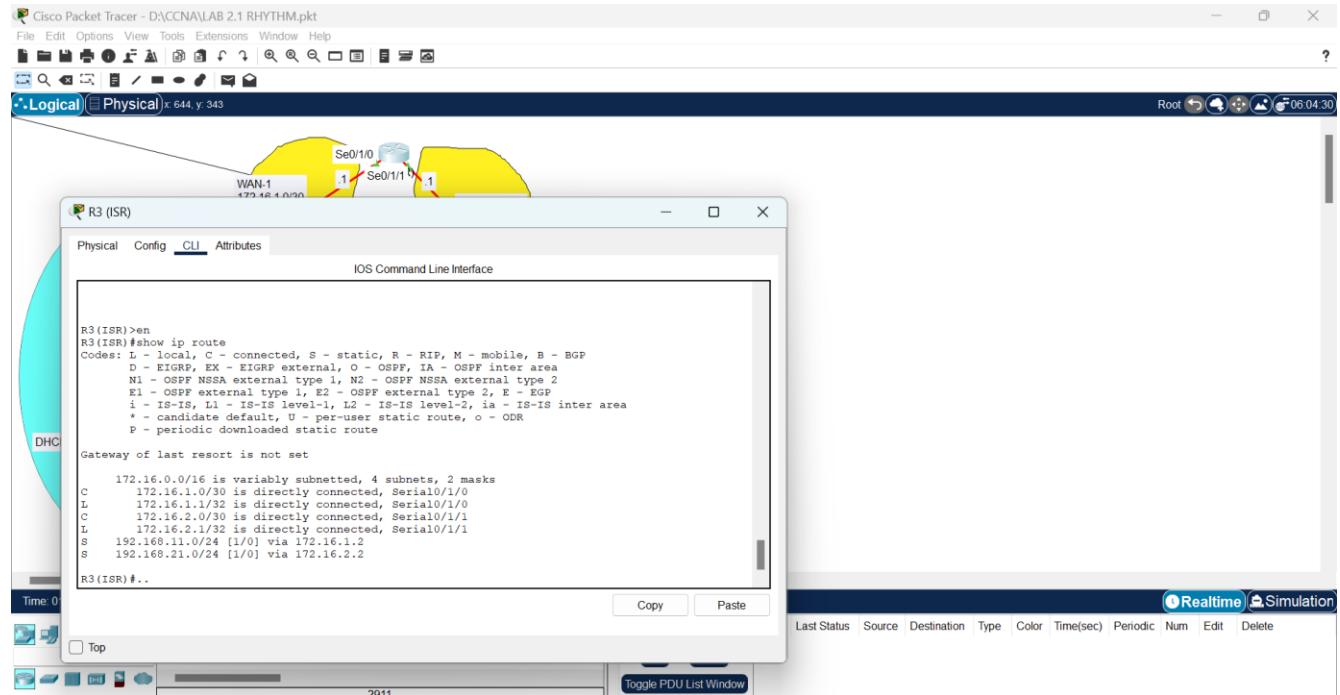
- Using the command line at PC2, ping the IP address of PC1.



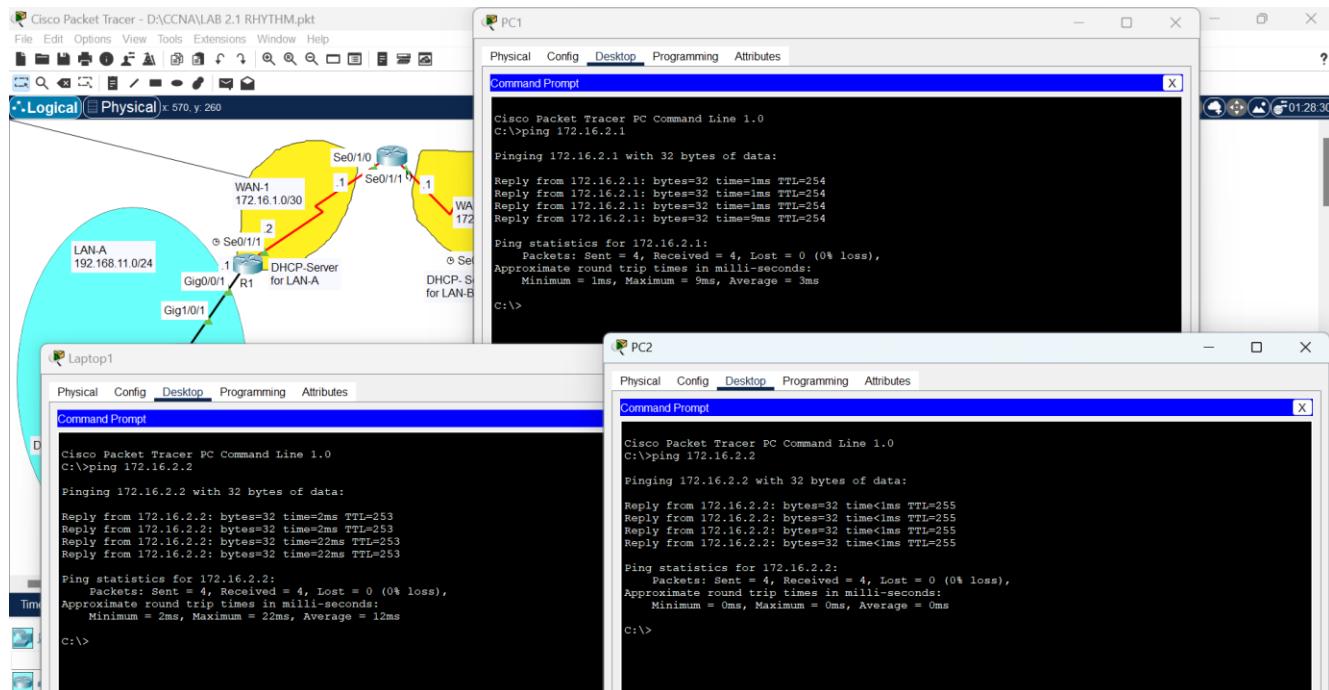
NOTE: All the above-mentioned pings must work, otherwise troubleshoot the network.

CHALLENGE:

Make sure the following pings are also successful. (Hint: Check the routing of R3-ISR)



- Using the command line at PC1, ping the IP address of int. S0/1/1 at R3.
- Using the command line at Laptop1, ping the IP address of int. S0/1/1 at R2.
- Using the command line at PC2, ping the IP address of int. S0/1/1 at R2.



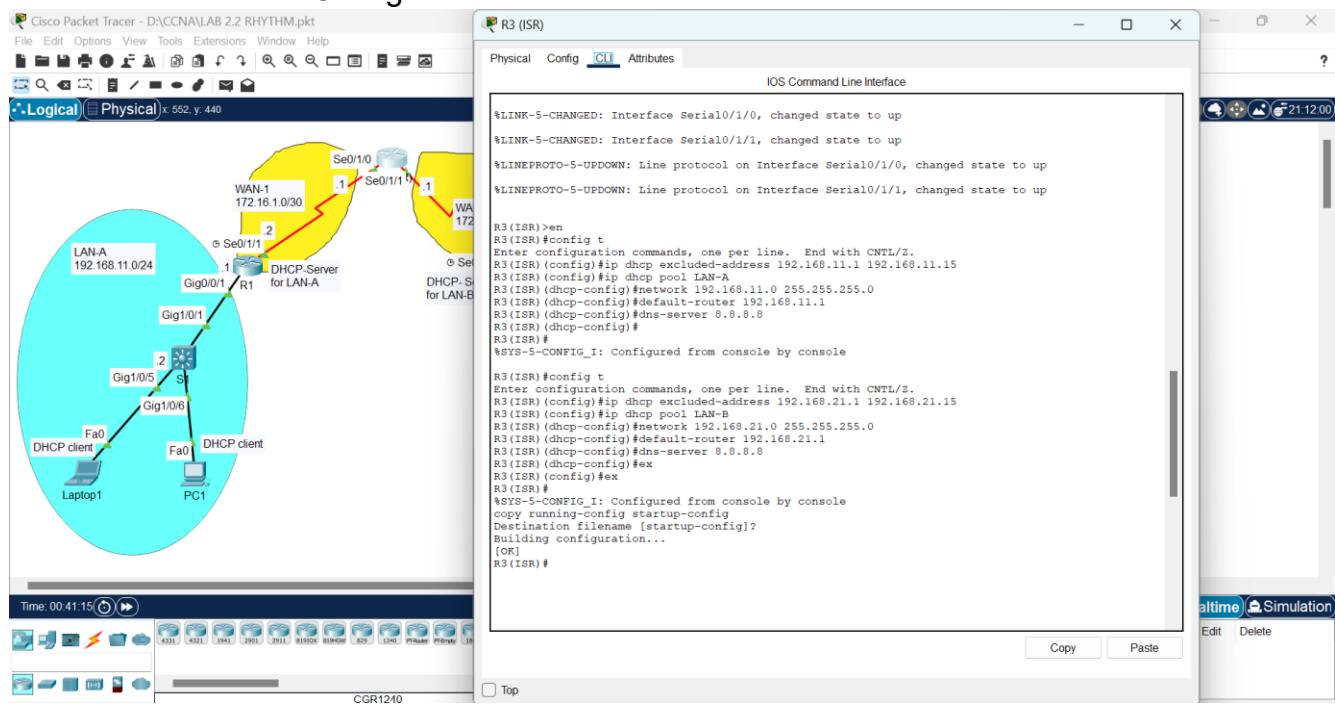
PART – 2

Lab Activity – DHCP Server Configuration (Remote – Relay agent):

Step 1: Remove the DHCP Server configuration completely from router R1 and R2.

Now configure the DHCP Server on router R3-ISR for both LANs (LAN-A and LAN-B):

- Exclude the first 15 addresses from the pool for both LANs so these excluded addresses may be assigned as static IP addresses to the intermediary devices, servers, printers and so on. within LAN-A and LAN-B.
- Create two DHCP pools for LAN-A and LAN-B:
 - Configure the LAN Network.
 - Configure the default router.
 - Configure the DNS server.



- Configure the appropriate IP Helper address on the G0/0/1 interfaces for routers R1 and R2.
 - At R1:
 - *int g0/0/1*
 - *ip helper-address 172.16.1.1*
 - *exit*
 - At R2:
 - *int g0/0/1*
 - *ip helper-address 172.16.2.1*
 - *exit*

```

Cisco Packet Tracer - D:\CCNA\LAB 2.2 RHYTHM.pkt
File Edit Options View Tools Extensions Window Help
Logical Physical x 894 y 0
Root 20:46:00

R1
Physical Config CLI Attributes
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#no ip domain-lookup
R1(config)#interface g0/0/1
R1(config-if)#ip address 192.168.11.1 255.255.255.0
R1(config-if)#no shutdown

R1(config-if)#interface serial0/1/1
R1(config-if)#ip address 172.16.1.2 255.255.255.252
R1(config-if)#no shutdown

R1(config-if)#exit
R1(config)#ip route 0.0.0.0 0.0.0.0 172.16.1.1
R1(config)#int g0/0/1
R1(config-if)#ip helper-address 172.16.1.1
R1(config-if)#exit
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

R1(config-if)#ex
R1#
%SYS-5-CONFIG_I: Configured from console by console
copy run st
Destination filename [startup-config]?
Building configuration...
[OK]
R1#

```



```

R2
Physical Config CLI Attributes
IOS Command Line Interface
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R2
R2(config)#no ip domain-lookup
R2(config)#interface g0/0/1
R2(config-if)#ip address 192.168.21.1 255.255.255.0
R2(config-if)#no shutdown

R2(config-if)#interface serial0/1/1
R2(config-if)#ip address 172.16.2.2 255.255.255.252
R2(config-if)#no shutdown

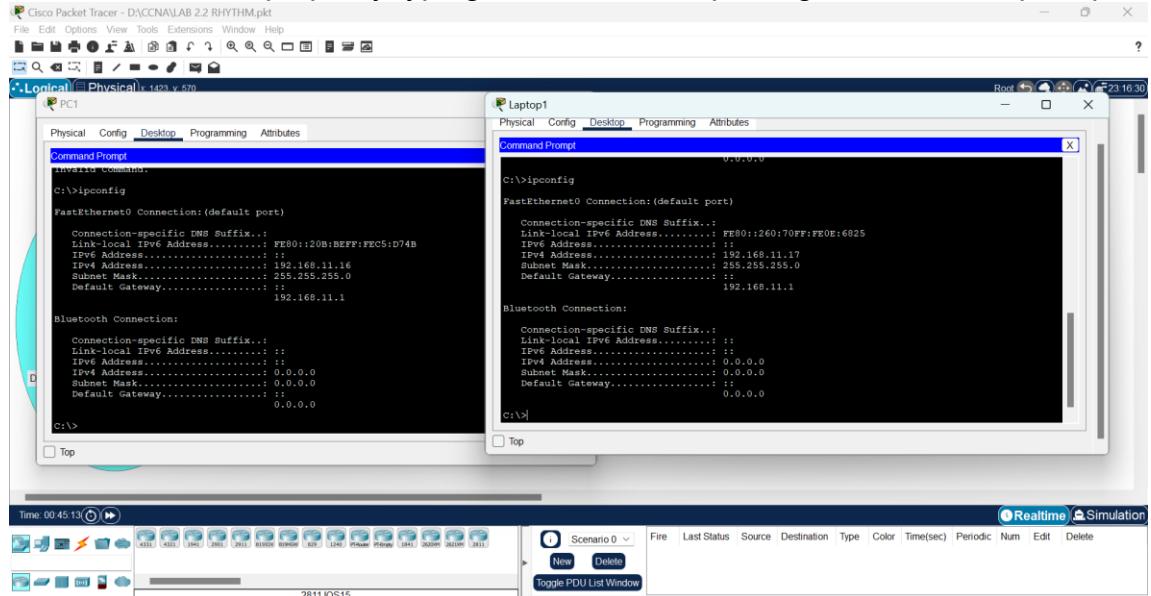
R2(config-if)#exit
R2(config)#ip route 0.0.0.0 0.0.0.0 172.16.2.1
R2(config)#int g0/0/1
R2(config-if)#ip helper-address 172.16.2.1
R2(config-if)#exit
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
%LINK-5-CHANGED: Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up

R2(config-if)#ex
R2#
%SYS-5-CONFIG_I: Configured from console by console
copy run st
Destination filename [startup-config]?
Building configuration...
[OK]
R2#

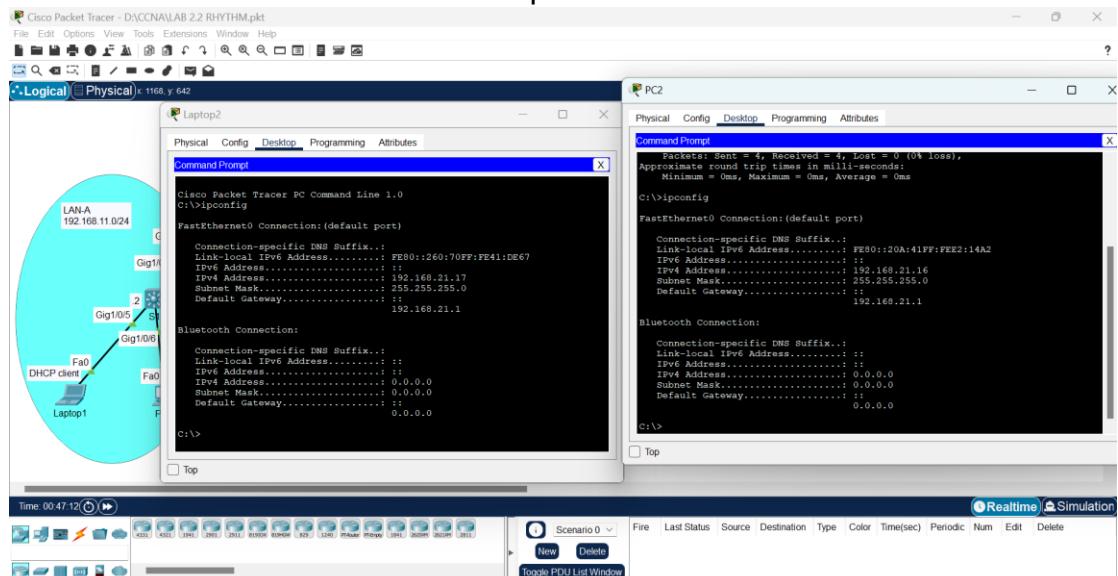
```

Step 2: Set PCs and laptops to receive IP addresses automatically using DHCP:

- Check and verify the IP address, subnet mask and default gateway at PC1 and Laptop1 by typing the command “ipconfig” at command prompt.



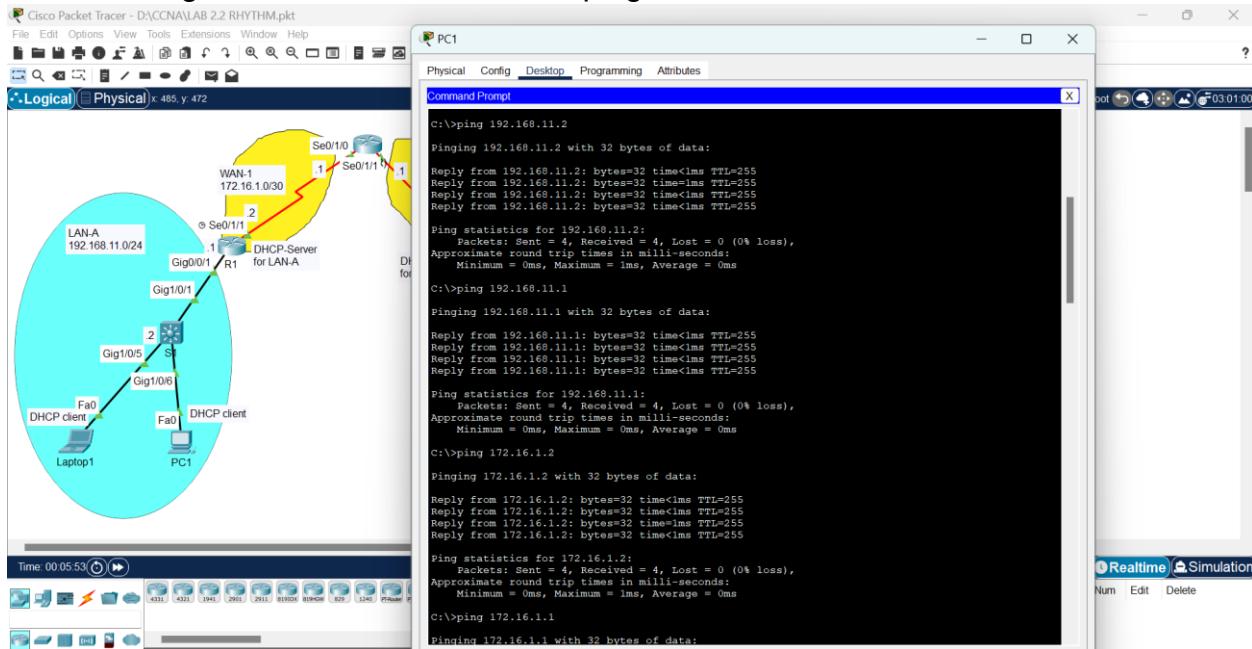
- a. Do they (PC and laptop) receive the IP addresses from LAN-A network pool?
- b. Are those IP addresses, subnet mask, and default gateways valid/proper?
- If the answers to the above questions in Step 2 a and b are “yes” then repeat the above Step 2 for PC2 and Laptop2 to receive the appropriate IP addresses within their respective LANs.



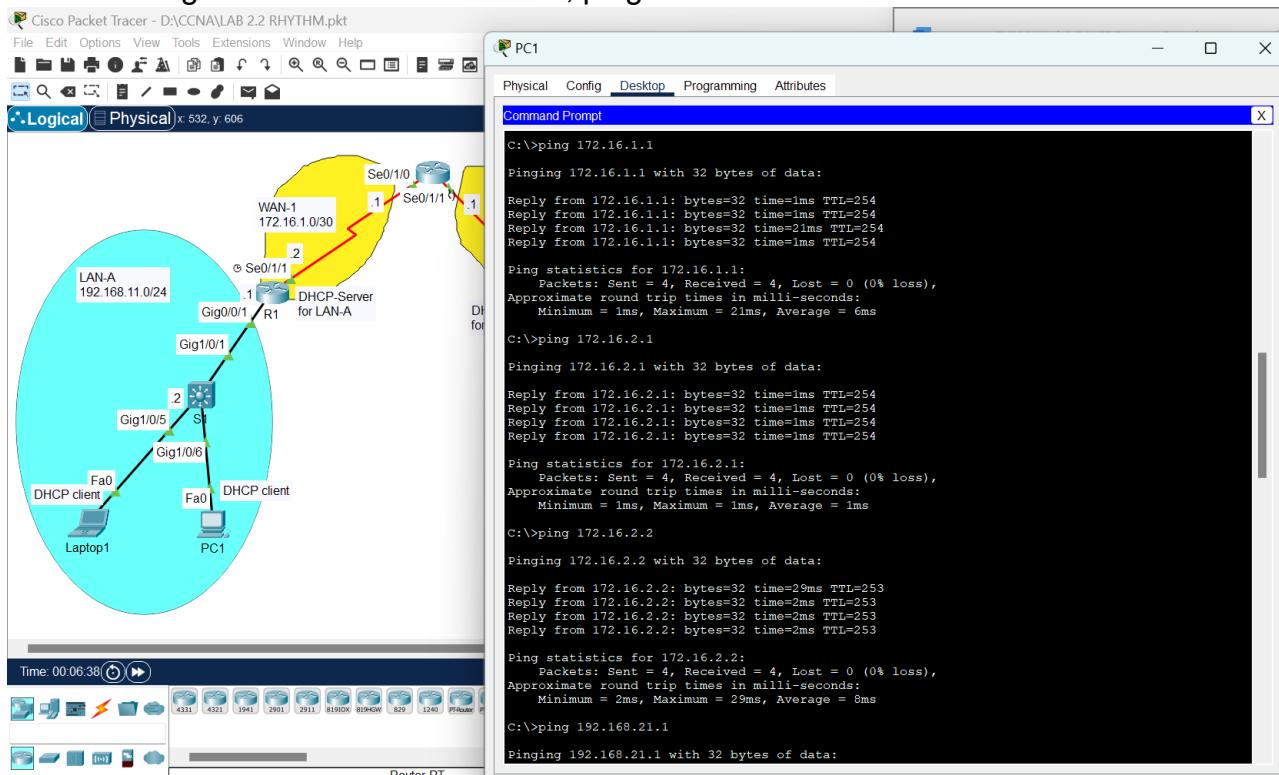
If the answers to above questions in Step 2 a and b are “No”, then troubleshoot to fix the DHCP configuration errors or any other connections / communication error and then repeat the above Step 2 from a to b for all PCs and laptops in both LANs.

Step 3: Verify the connectivity:

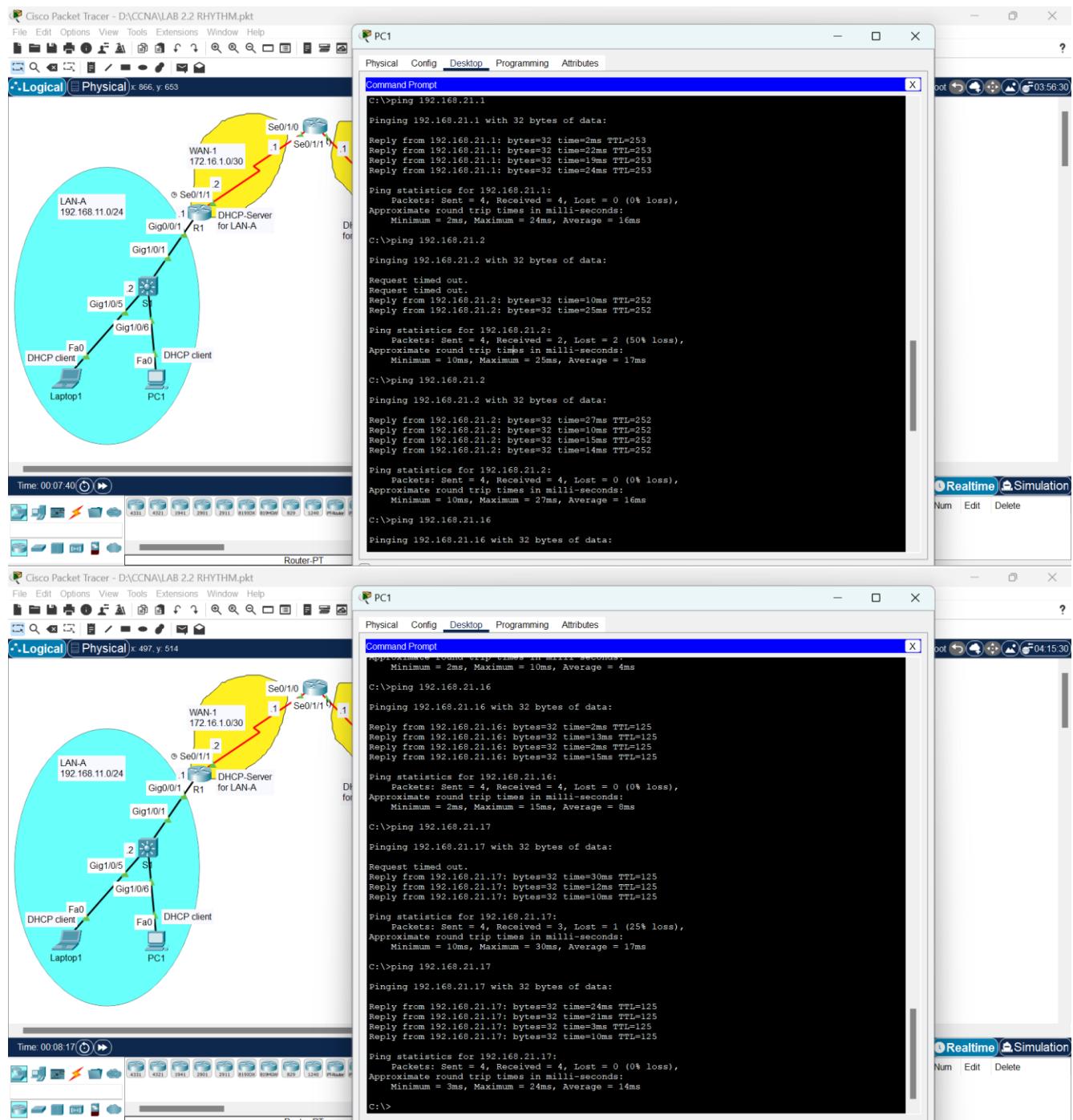
- Using the command line at PC1, ping the IP address of int. SVI of switch S1.
- Using the command line at PC1, ping the IP address of int. G0/0/1 at R1.
- Using the command line at PC1, ping the IP address of int. S0/1/1 at R1.



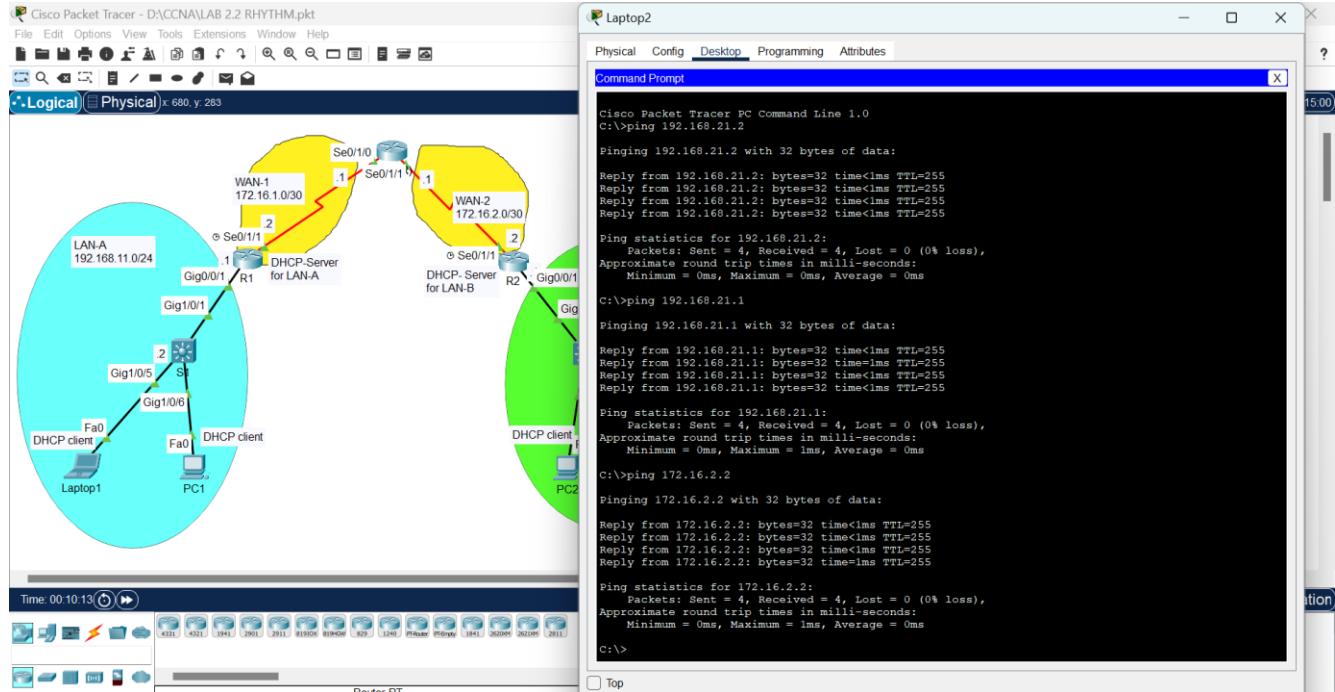
- Using the command line at PC1, ping the IP address of int. S0/1/0 at R3-ISR.
- Using the command line at PC1, ping the IP address of int. S0/1/1 at R3-ISR.
- Using the command line at PC1, ping the IP address of int. S0/1/1 at R2.



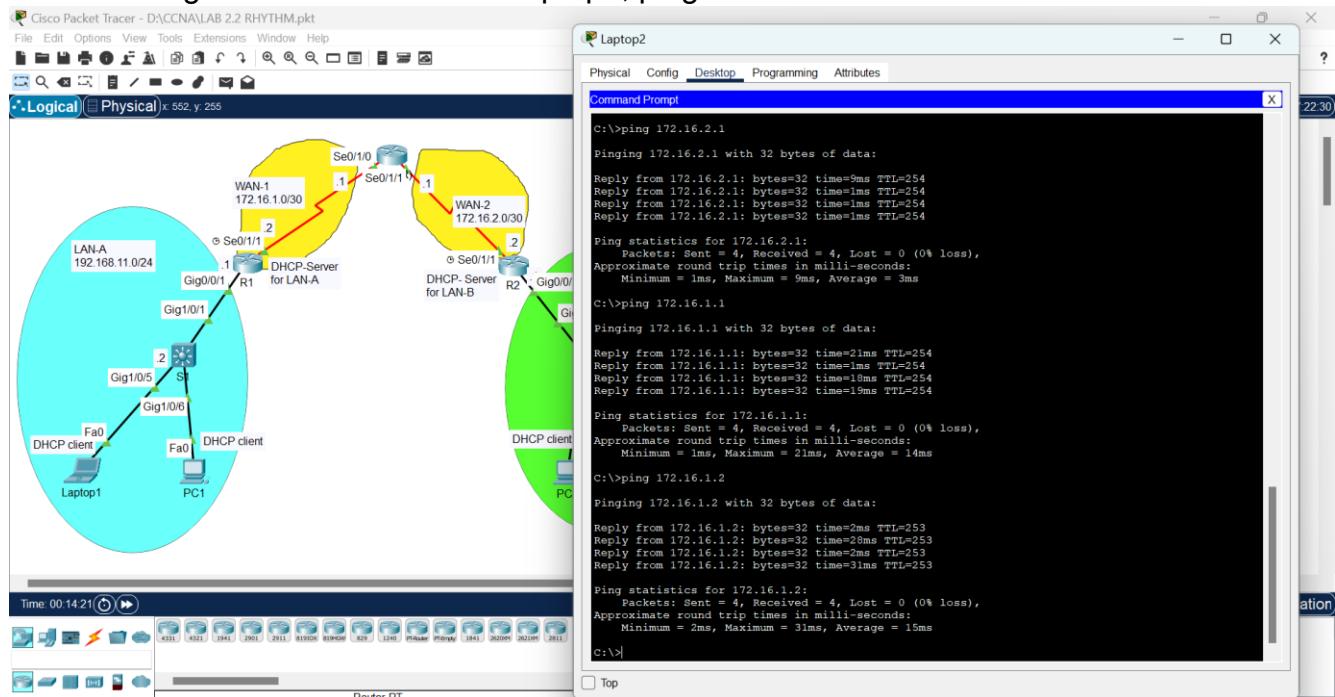
- Using the command line at PC1, ping the IP address of int. G0/0/1 of R2.
- Using the command line at PC1, ping the IP address of int. SVI of switch S2.
- Using the command line at PC1, ping the IP address of PC2 and Laptop2.



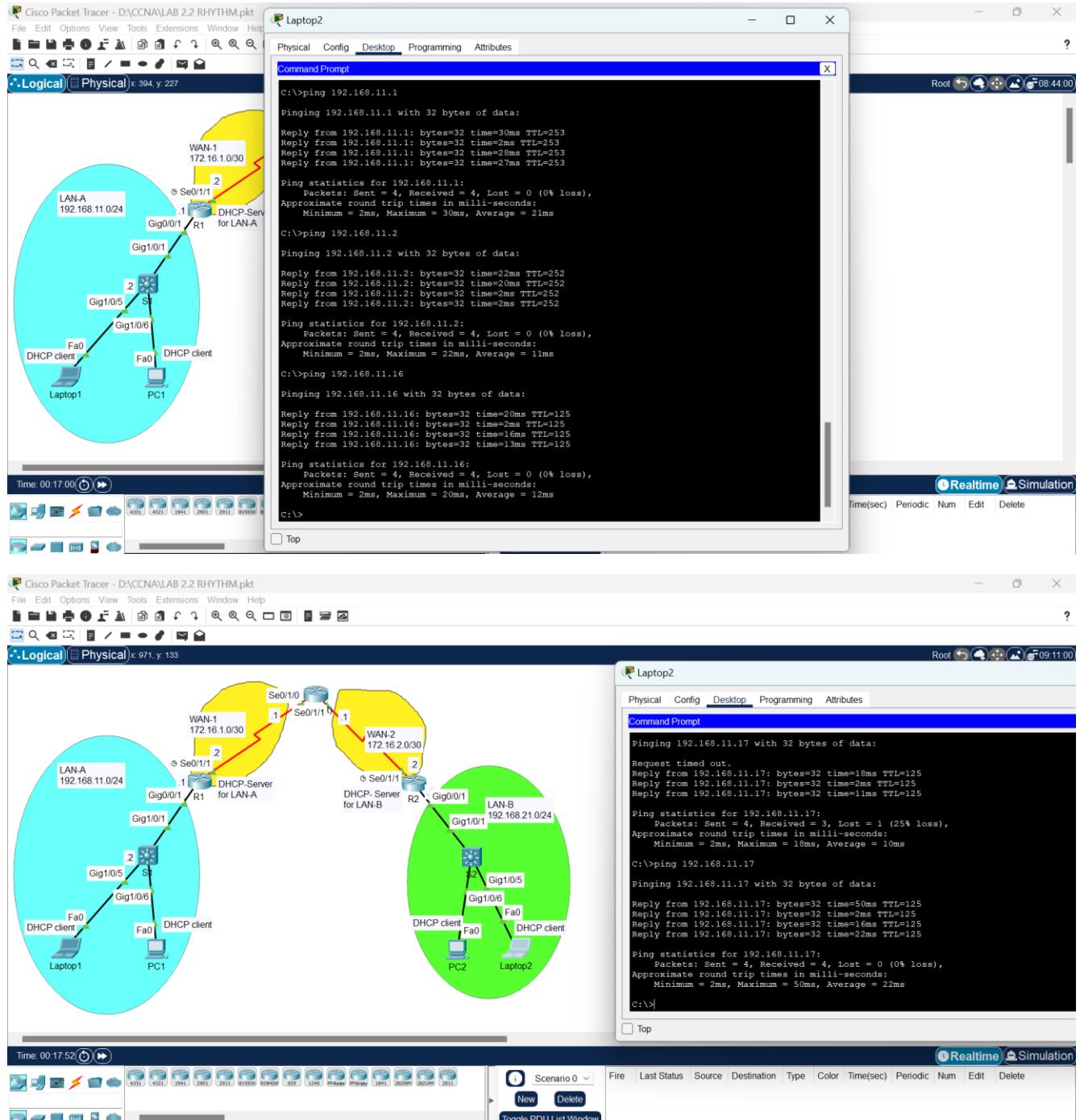
- Using the command line at Laptop2, ping the IP address of int. SVI of switch S2.
- Using the command line at Laptop2, ping the IP address of int. G0/0/1 at R2.
- Using the command line at Laptop2, ping the IP address of int. S0/1/1 at R2



- Using the command line at Laptop2, ping the IP address of int. S0/1/1 at R3-ISR.
- Using the command line at Laptop2, ping the IP address of int. S0/1/0 at R3-ISR.
- Using the command line at Laptop2, ping the IP address of int. S0/1/1 at R1.



- Using the command line at Laptop2, ping the IP address of int. G0/0/1 of R1.
- Using the command line at Laptop2, ping the IP address of int. SVI of switch S1.
- Using the command line at Laptop2, ping the IP address of PC1 and Laptop1.



- NOTE: All the above-mentioned pings must work, otherwise troubleshoot the network.