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Networking Lab (Final) Assignment

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8th Semester

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SMUCT

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Professor Dr. Md. Rabiul Islam

Jul 1

Date: 07.01.2025

Labs:

Lab 1: LAN
Lab 2: WAN
Lab 3: Subnetting hand calculation
Lab 4: Subnetting packet tracer activity
Lab 5: Wireless LAN (WLAN)
Lab 6: DHCP
Lab 7: VLAN
Lab 8: Inter-VLAN

Lab 9: Switch Port Security
Lab 10: OSPF
Lab 11: Static and default route
Lab 12: NAT (Static)
Lab 13: NAT (Dynamic)
Lab 14: Link Aggregation
Lab 15: Console, Telnet and SSH Configuration

A

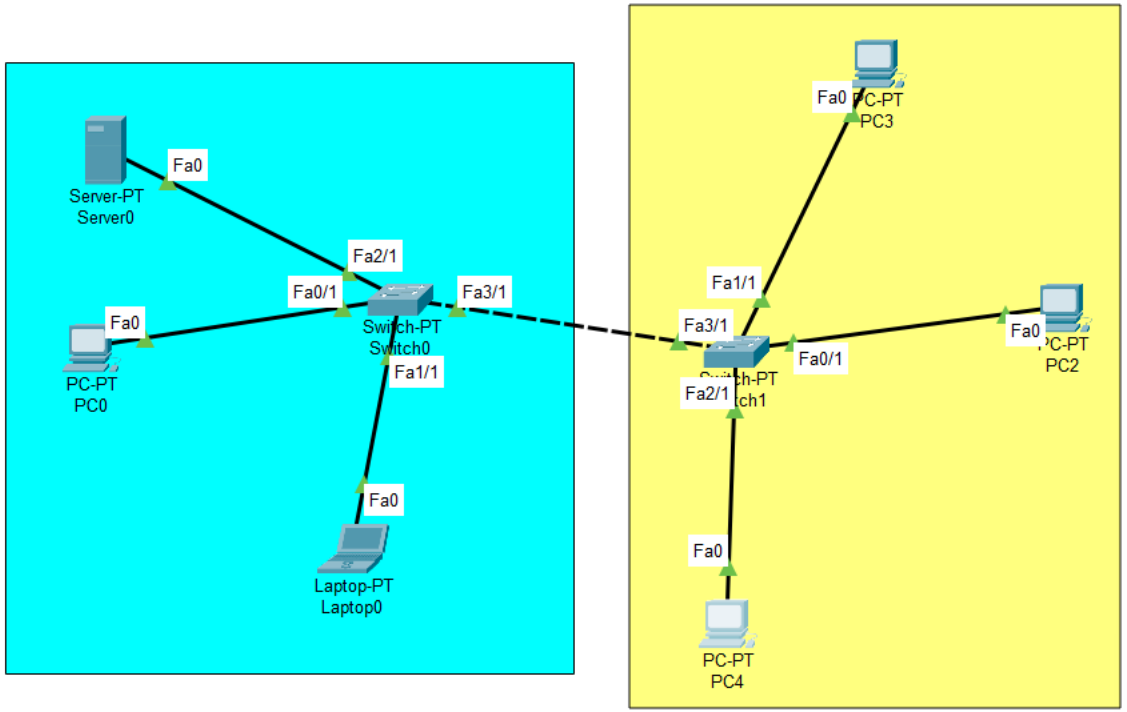
Add class comment...

Lab 1 - LAN

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_1 - LAN.pkt

File Edit Options View Tools Extensions Window Help

Logical | Physical | x: 1370, y: 682 | Root | 23:22:00



PC4

Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.4

Pinging 192.168.0.4 with 32 bytes of data:

Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128
Reply from 192.168.0.4: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Top

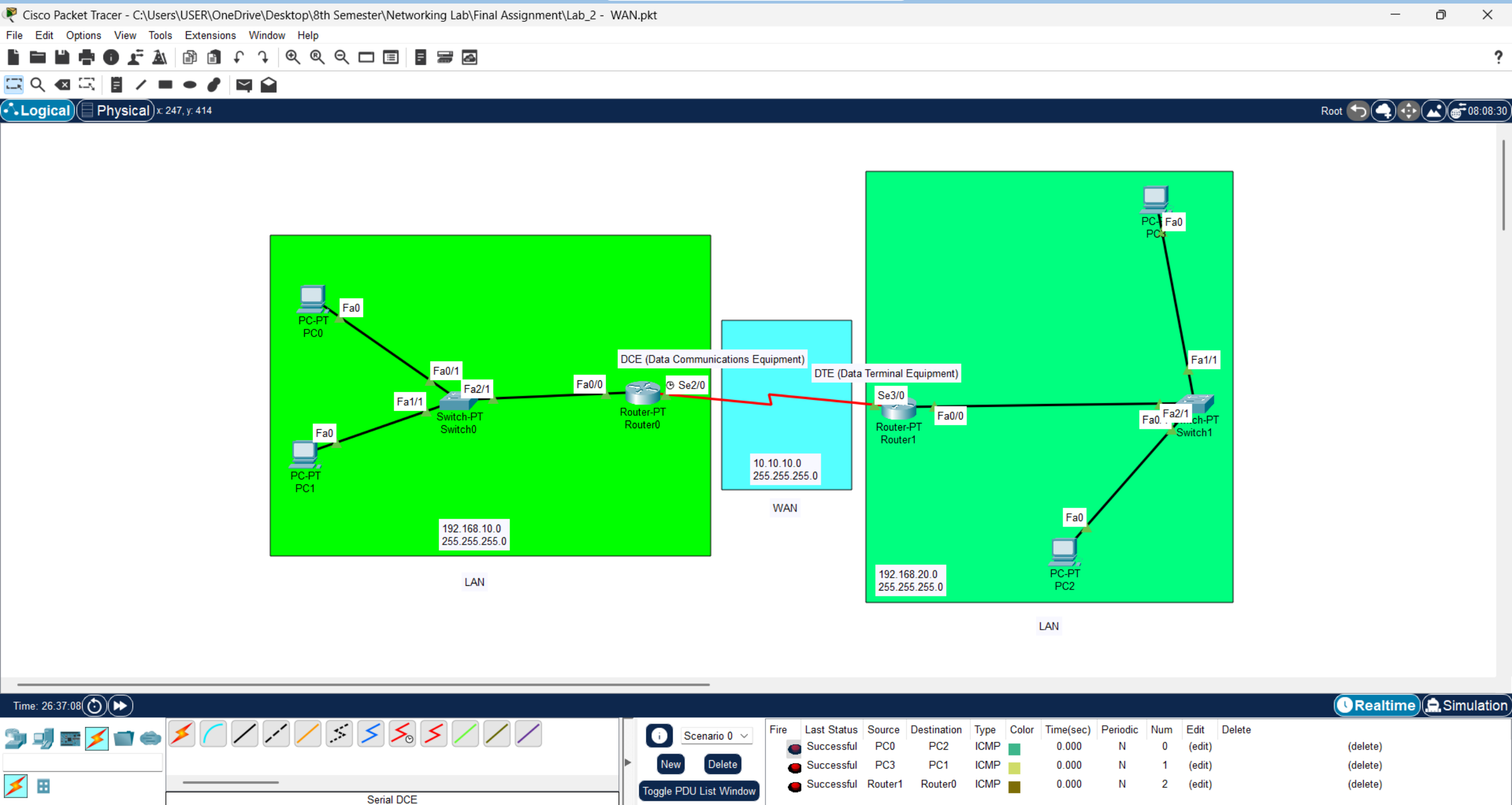
Time: 25:34:07 | Realtime | Simulation

Copper Cross-Over

Scenario 0 | New | Delete | Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Server0	ICMP		0.000	N	0	(edit)	(delete)
	Successful	Laptop0	Server0	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC4	PC0	ICMP		0.000	N	2	(edit)	(delete)

Lab 2 - WAN


Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_2 - WAN.pkt
File Edit Options View Tools Extensions Window Help
Logical Physical x: 247, y: 414
Root 08:08:30
PC-PT PC0
Fa0
Fa0/1
Fa2/1
Fa1/1
Switch-PT Switch0
Fa0
PC-PT PC1
192.168.10.0 255.255.255.0
LAN
Fa0/0
DCE (Data Communications Equipment)
Se2/0
Router-PT Router0
10.10.10.0 255.255.255.0
WAN
DTE (Data Terminal Equipment)
Se3/0
Router-PT Router1
Fa0/0
PC-PT PC3
Fa0
Fa1/1
Fa2/1
Switch-PT Switch1
Fa0
PC-PT PC2
192.168.20.0 255.255.255.0
LAN
Time: 26:37:08
Realtime Simulation
Scenario 0
New Delete
Toggle PDU List Window
Serial DCE
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
Successful PC0 PC2 ICMP 0.000 N 0 (edit) (delete)
Successful PC3 PC1 ICMP 0.000 N 1 (edit) (delete)
Successful Router1 Router0 ICMP 0.000 N 2 (edit) (delete)

Router0

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (Serial)

```
Router>enable
Router#configure terminal

Router(config)#interface se2/0
Router(config-if)#ip address 10.10.10.1 255.255.255.0
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
```

Serial DCE

IP Route Configuration (Router0)

```
Router>enable
Router#configure terminal

Router(config)#ip route 192.168.20.0 255.255.255.0 se2/0
```

Router1

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 192.168.20.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (Serial)

```
Router>enable
Router#configure terminal

Router(config)#interface se3/0
Router(config-if)#ip address 10.10.10.2 255.255.255.0
Router(config-if)#no shutdown
```

IP Route Configuration (Router1)

```
Router>enable
Router#configure terminal

Router(config)#ip route 192.168.10.0 255.255.255.0 se3/0
```

More

```
Router>enable
Router#show ip route
Router#show running-config
Router#show startup-config
Router#copy running-config startup-config
```

Lab 3 - Subnetting hand calculation

Problem Statement: Suppose you are working an ISP company as a network engineer. You have been given an IP address block of 172.17.0.0/20. You must provide for the following subnet arrangement for the company:

(a) 1st subnet, CSE Department LAN, up to 112 hosts
(b) 2nd subnet, EEE Department LAN, up to 210 hosts
(c) 3rd subnet, ETE Department LAN, up to 64 hosts
(d) Point to point link between CSE and ETE,
(e) Point to point link between CSE and EEE,
(f) Point to point to point link between EEE and ETE.

Fill up the following table, configure the exhibit and test the connectivity of the following cases:
(i) Ping from PC0 to PC5 (ii) PC1 to PC3 and (iii) PC2 to PC5

Subnet Name	Needed Size	Allocated Size	Network Address	Mask	Assignable Range	Broadcast Address
CSE						
EEE						
ETE						
CSE-ETE						
CSE-EEE						
EEE-ETE						

CIDR	Subnet Mask	Hosts (Usable)
/1	128.0.0.0	2,147,483,646
/2	192.0.0.0	1,073,741,822
/3	224.0.0.0	536,870,910
/4	240.0.0.0	268,435,454
/5	248.0.0.0	134,217,726
/6	252.0.0.0	67,108,862
/7	254.0.0.0	33,554,430
/8	255.0.0.0	16,777,214
/9	255.128.0.0	8,388,606
/10	255.192.0.0	4,194,302
/11	255.224.0.0	2,097,150
/12	255.240.0.0	1,048,574
/13	255.248.0.0	524,286
/14	255.252.0.0	262,142
/15	255.254.0.0	131,070
/16	255.255.0.0	65,534
/17	255.255.128.0	32,766
/18	255.255.192.0	16,382
/19	255.255.224.0	8,190
/20	255.255.240.0	4,094
/21	255.255.248.0	2,046
/22	255.255.252.0	1,022
/23	255.255.254.0	510
/24	255.255.255.0	254
/25	255.255.255.128	126
/26	255.255.255.192	62
/27	255.255.255.224	30
/28	255.255.255.240	14
/29	255.255.255.248	6
/30	255.255.255.252	2
/31	255.255.255.254	0*
/32	255.255.255.255	0

Solution of the problem: 172.17.0.0 / 20

Step 1: Sort (Descending order) the number of subnets according to their requirement

1st -- subnet, EEE Department LAN => 210 + 2 = 212 - (2^8) /24
2nd -- subnet, CSE Department LAN => 112 + 2 = 114 - (2^7) /25
3rd -- subnet, ETE Department LAN => 64 + 2 = 66 - (2^7) /25

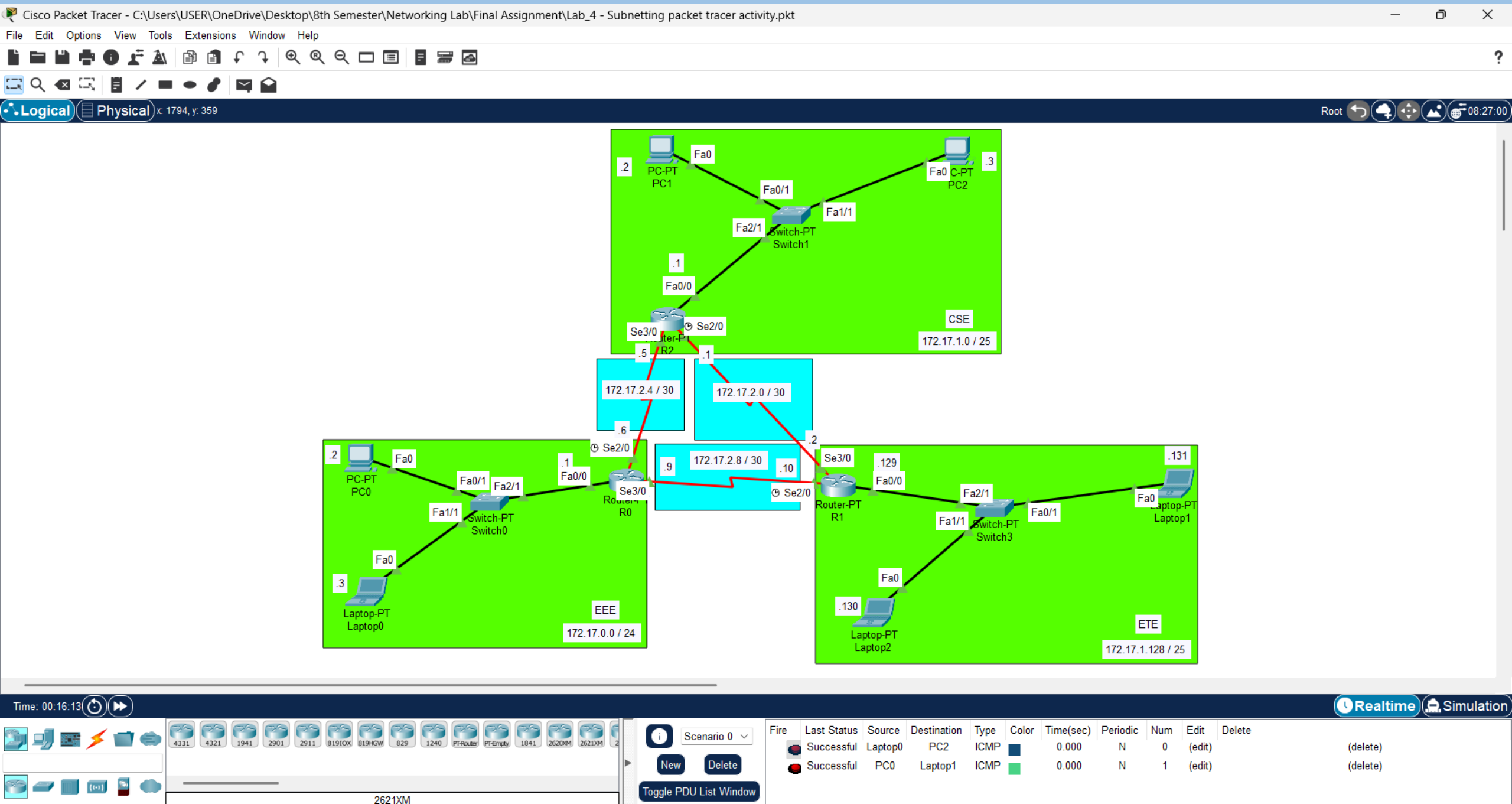
4th -- Point to point link between CSE and ETE => 2 + 2 = 4 - (2^2) /30
5th -- Point to point link between CSE and EEE => 2 + 2 = 4 - (2^2) /30
6th -- Point to point link between EEE and ETE => 2 + 2 = 4 - (2^2) /30

Step 2: Step 3: 212 <= 2^N

128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1		
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Network EEE	172.17.0.0 / 24
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1st Host of EEE	172.17.0.1 / 24
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	Last Host of EEE	172.17.0.254 / 24
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	Broadcast EEE	172.17.0.255 / 24
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	Network CSE	172.17.1.0 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1st Host of CSE	172.17.1.1 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	Last Host of CSE	172.17.1.126 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	1	Broadcast CSE	172.17.1.127 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	Network ETE	172.17.1.128 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1st Host of ETE	172.17.1.129 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	Last Host of ETE	172.17.1.254 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	Broadcast ETE	172.17.1.255 / 25
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	Network CSE-ETE	172.17.2.0 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1st Host of CSE-ETE	172.17.2.1 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	Last Host of CSE-ETE	172.17.2.2 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	Broadcast CSE-ETE	172.17.2.3 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	Network CSE-EEE	172.17.2.4 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1st Host of CSE-EEE	172.17.2.5 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	Last Host of CSE-EEE	172.17.2.6 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	Broadcast CSE-EEE	172.17.2.7 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	Network EEE-ETE	172.17.2.8 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1st Host of EEE-ETE	172.17.2.9 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	Last Host of EEE-ETE	172.17.2.10 / 30
1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	Broadcast EEE-ETE	172.17.2.11 / 30

Subnet Name	Needed Size	Allocated Size	Network Address	Mask	Assignable Range	Broadcast Address
EEE	210	254	172.17.0.0 / 24	255.255.255.0	172.17.0.1 - 172.17.0.254	172.17.0.255
CSE	112	126	172.17.1.0 / 25	255.255.255.128	172.17.1.1 - 172.17.1.126	172.17.1.127
ETE	64	126	172.17.1.128 / 25	255.255.255.128	172.17.1.129 - 172.17.1.254	172.17.1.255
CSE-ETE	2	2	172.17.2.0 / 30	255.255.255.252	172.17.2.1 - 172.17.2.2	172.17.2.3
CSE-EEE	2	2	172.17.2.4 / 30	255.255.255.252	172.17.2.5 - 172.17.2.6	172.17.2.7
EEE-ETE	2	2	172.17.2.8 / 30	255.255.255.252	172.17.2.9 - 172.17.2.10	172.17.2.11

Lab 4 - Subnetting packet tracer activity



Router-PT R0 (EEE)

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.0.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (Serial se2/0)

```
Router(config)#interface se2/0
Router(config-if)#ip address 172.17.2.6 255.255.255.252
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit
```

Serial DCE

Router Configuration (Serial se3/0)

```
Router(config)#interface se3/0
Router(config-if)#ip address 172.17.2.9 255.255.255.252
Router(config-if)#no shutdown
```

IP Route Configuration

```
Router(config)#ip route 172.17.1.0 255.255.255.128 se2/0
Router(config)#ip route 172.17.1.128 255.255.255.128 se3/0
```

Router-PT R2 (CSE)

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.1.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (Serial se2/0)

```
Router(config)#interface se2/0
Router(config-if)#ip address 172.17.2.1 255.255.255.252
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit
```

Serial DCE

Router Configuration (Serial se3/0)

```
Router(config)#interface se3/0
Router(config-if)#ip address 172.17.2.5 255.255.255.252
Router(config-if)#no shutdown
```

IP Route Configuration

```
Router(config)#ip route 172.17.0.0 255.255.255.0 se2/0
Router(config)#ip route 172.17.1.128 255.255.255.128 se3/0
```

Router-PT R1 (ETE)

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.1.129 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (Serial se2/0)

```
Router(config)#interface se2/0
Router(config-if)#ip address 172.17.2.10 255.255.255.252
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
Router(config-if)#exit
```

Serial DCE

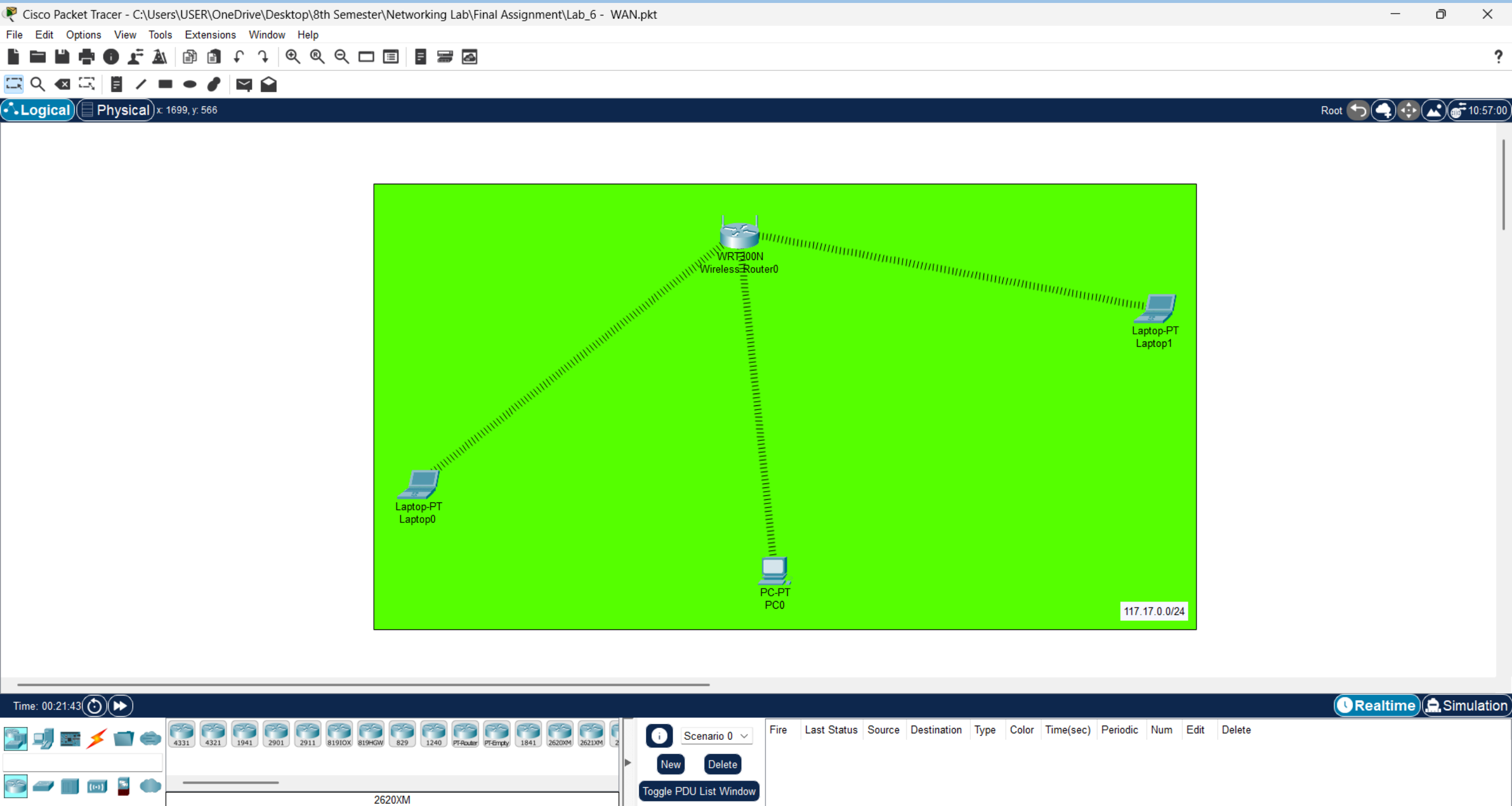
Router Configuration (Serial se3/0)

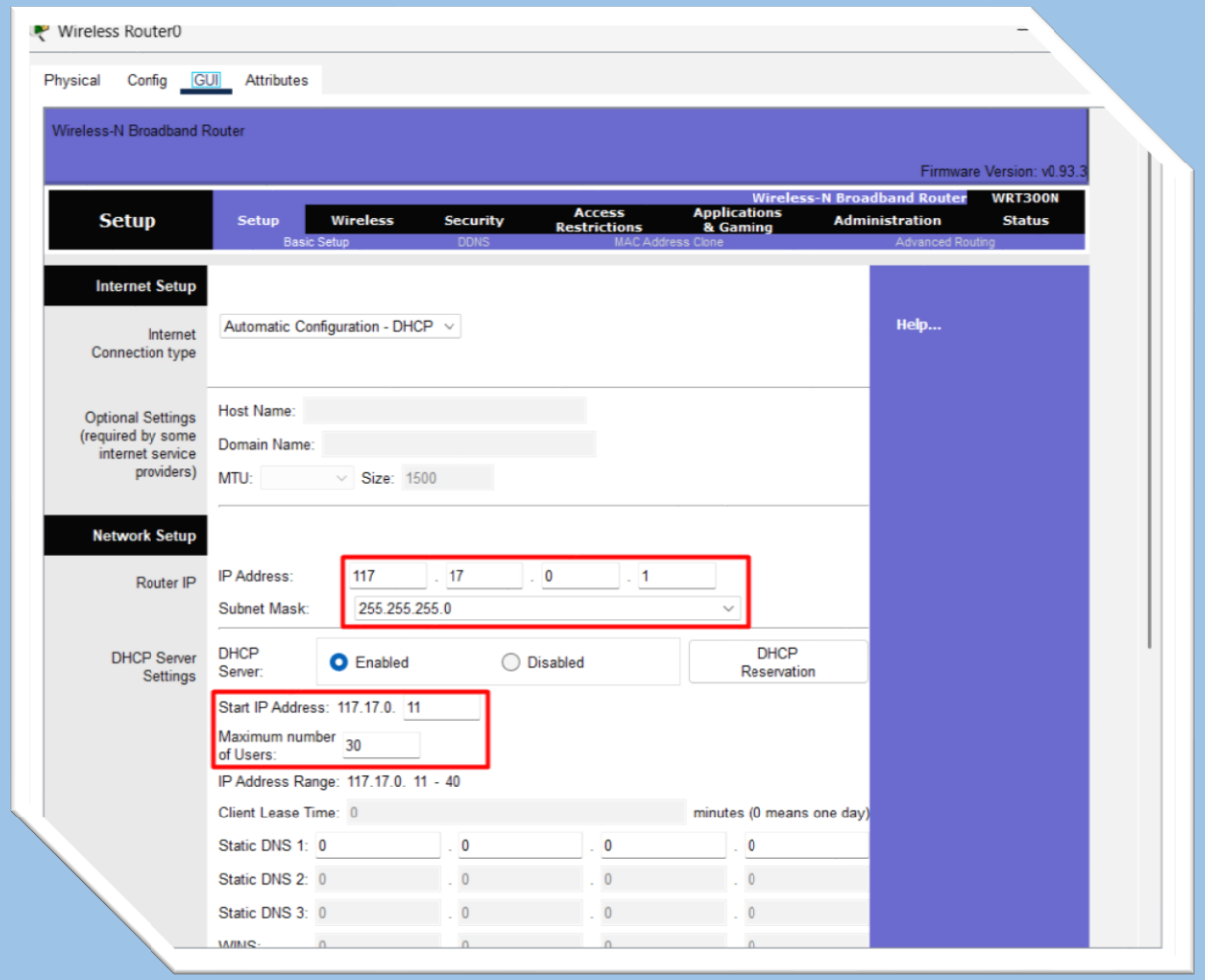
```
Router(config)#interface se3/0
Router(config-if)#ip address 172.17.2.2 255.255.255.252
Router(config-if)#no shutdown
```

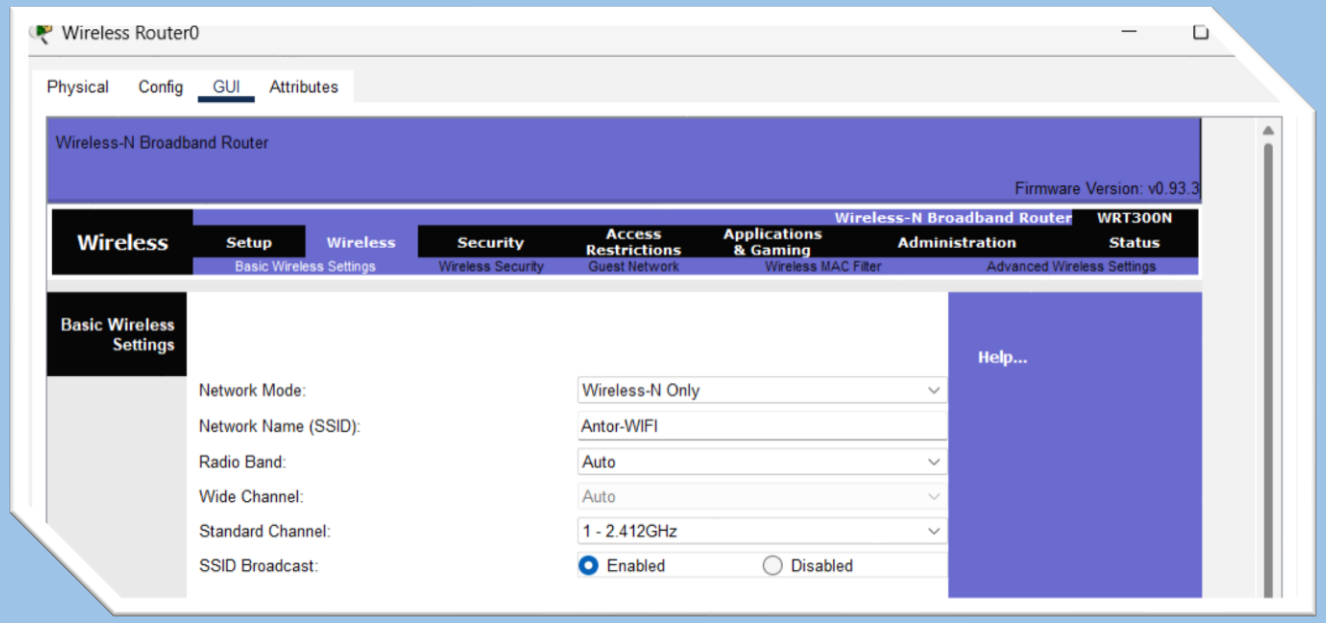
IP Route Configuration

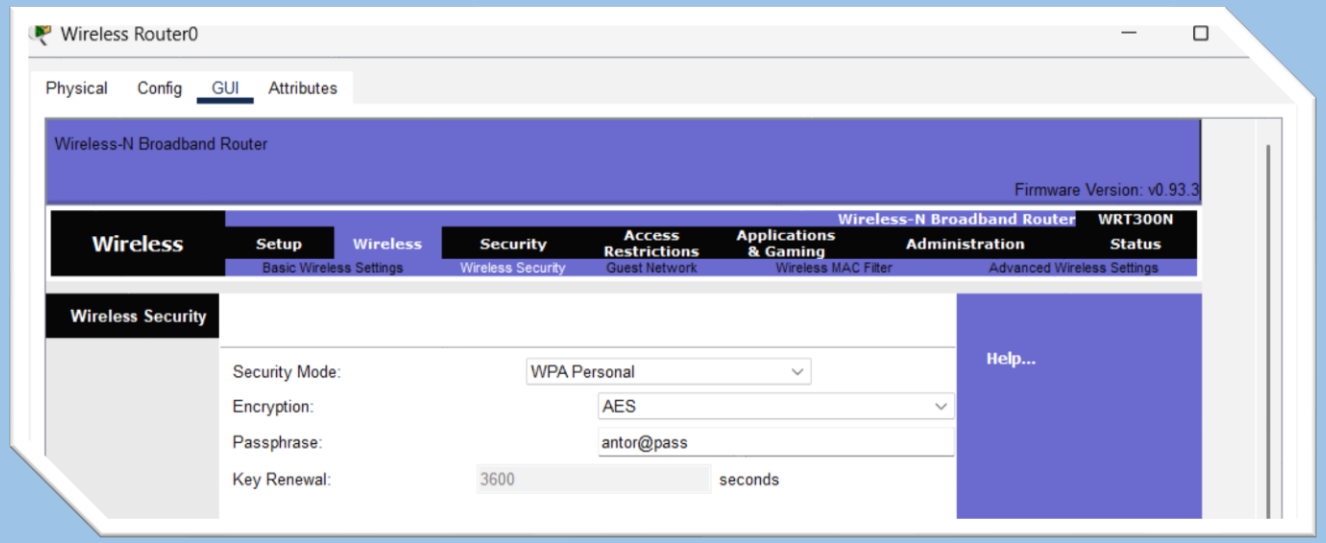
```
Router(config)#ip route 172.17.0.0 255.255.255.0 se2/0
Router(config)#ip route 172.17.1.0 255.255.255.128 se3/0
```

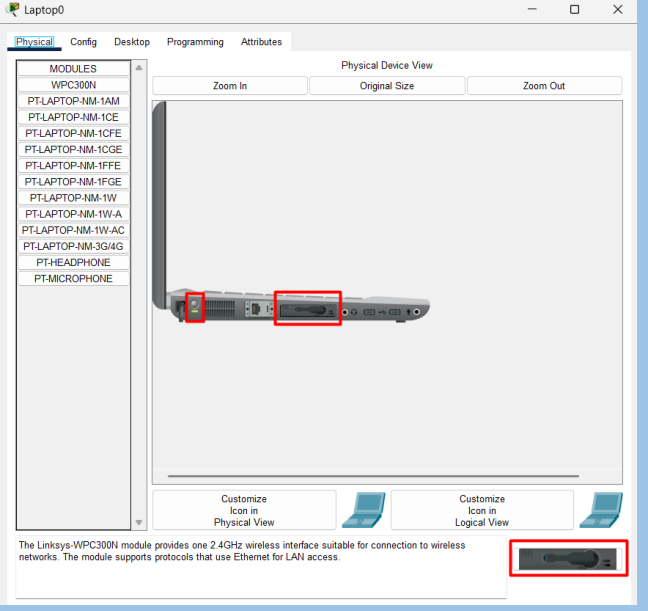
Lab 5 - Wireless LAN (WLAN)

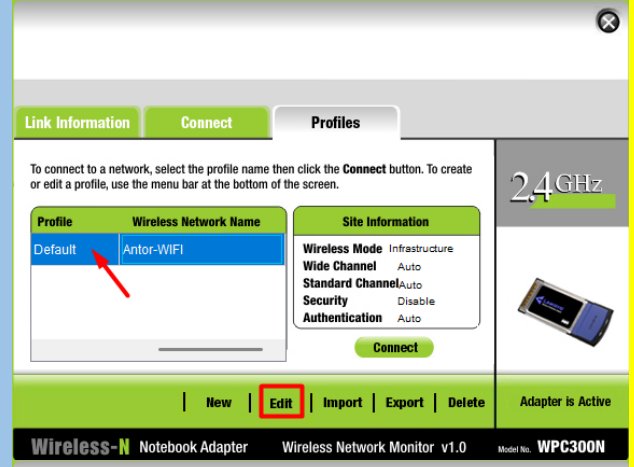


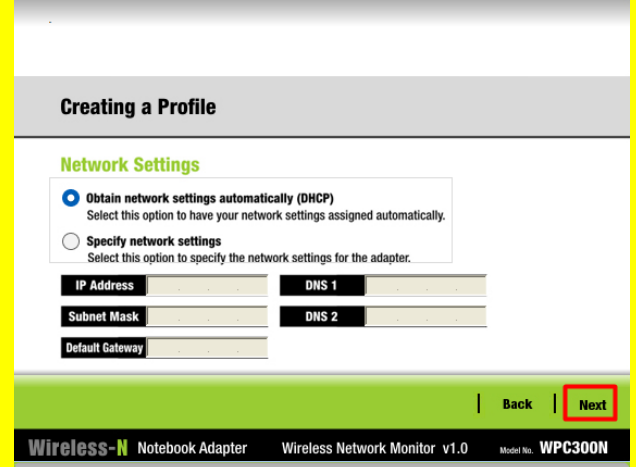

Wireless Router0
Physical
Config
GUI
Attributes
Wireless-N Broadband Router
Firmware Version: v0.93.3
Wireless-N Broadband Router WRT300N
Setup
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Setup
DDNS
MAC Address Clone
Advanced Routing
Internet Setup
Internet Connection type
Automatic Configuration - DHCP
Optional Settings (required by some internet service providers)
Host Name:
Domain Name:
MTU:
Size:
1500
Network Setup
Router IP
IP Address:
117 . 17 . 0 . 1
Subnet Mask:
255.255.255.0
DHCP Server Settings
DHCP Server:
Enabled
Disabled
DHCP Reservation
Start IP Address: 117.17.0. 11
Maximum number of Users:
30
IP Address Range: 117.17.0. 11 - 40
Client Lease Time:
0
minutes (0 means one day)
Static DNS 1:
Static DNS 2:
Static DNS 3:
Help...

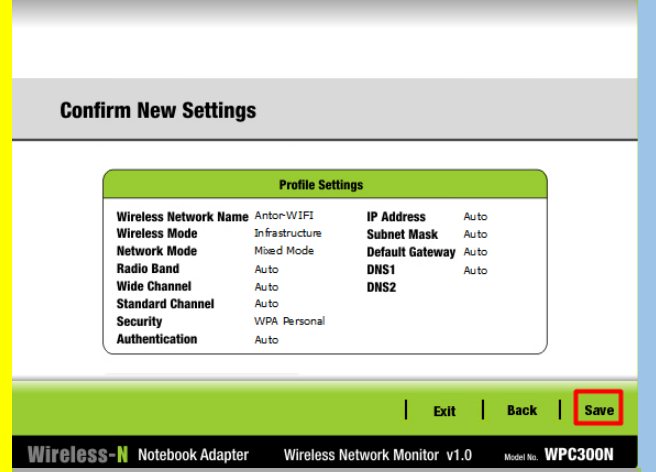

Wireless Router0
Physical
Config
GUI
Attributes
Wireless-N Broadband Router
Firmware Version: v0.93.3
Wireless-N Broadband Router WRT300N
Wireless
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Wireless Settings
Wireless Security
Guest Network
Wireless MAC Filter
Advanced Wireless Settings
Basic Wireless Settings
Network Mode:
Wireless-N Only
Network Name (SSID):
Antor-WIFI
Radio Band:
Auto
Wide Channel:
Auto
Standard Channel:
1 - 2.412GHz
SSID Broadcast:
Enabled
Disabled
Help...

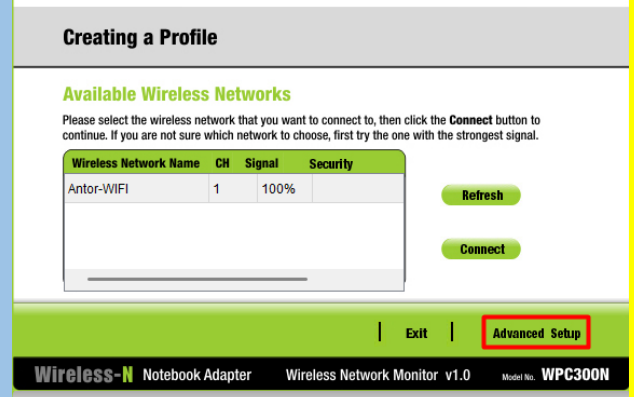

Wireless Router0
Physical
Config
GUI
Attributes
Wireless-N Broadband Router
Firmware Version: v0.93.3
Wireless-N Broadband Router WRT300N
Wireless
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Wireless Settings
Wireless Security
Guest Network
Wireless MAC Filter
Advanced Wireless Settings
Wireless Security
Security Mode:
WPA Personal
Encryption:
AES
Passphrase:
antor@pass
Key Renewal:
3600
seconds
Help...


Laptop0
Physical
Config
Desktop
Programming
Attributes
MODULES
WPC300N
PT-LAPTOP-NM-1AM
PT-LAPTOP-NM-1CE
PT-LAPTOP-NM-1CFE
PT-LAPTOP-NM-1CGE
PT-LAPTOP-NM-1FFE
PT-LAPTOP-NM-1FGE
PT-LAPTOP-NM-1W
PT-LAPTOP-NM-1W-A
PT-LAPTOP-NM-1W-AC
PT-LAPTOP-NM-3G/4G
PT-HEADPHONE
PT-MICROPHONE
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The Linksys-WPC300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

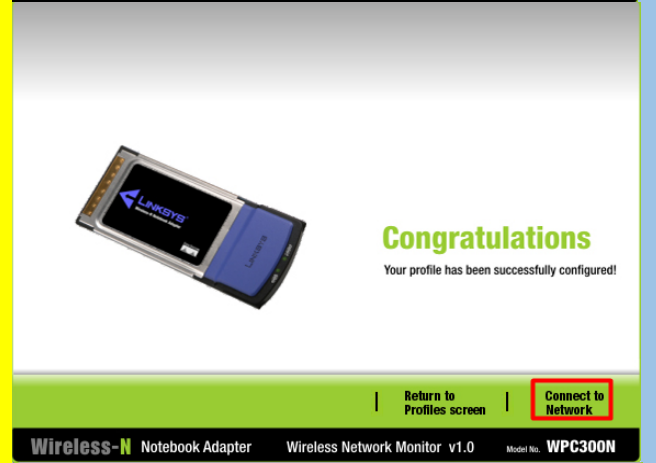

Link Information
Connect
Profiles
To connect to a network, select the profile name then click the Connect button. To create or edit a profile, use the menu bar at the bottom of the screen.
2.4GHz
Profile
Wireless Network Name
Default
Antor-WIFI
Site Information
Wireless Mode Infrastructure
Wide Channel Auto
Standard Channel Auto
Security Disable
Authentication Auto
Connect
New
Edit
Import
Export
Delete
Adapter is Active
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N

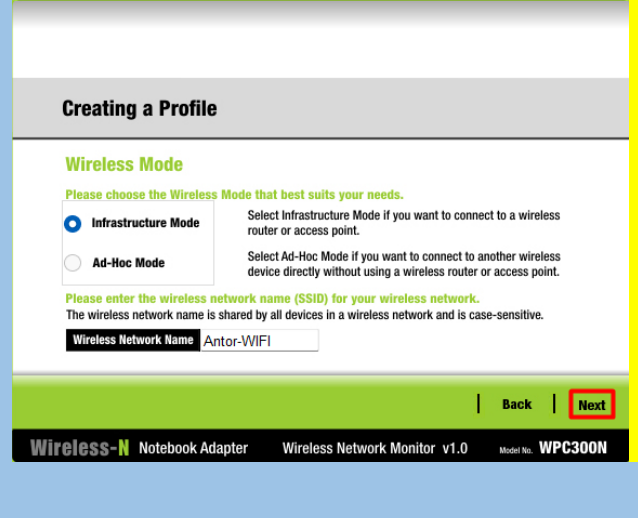

Creating a Profile
Network Settings
Obtain network settings automatically (DHCP)
Select this option to have your network settings assigned automatically.
Specify network settings
Select this option to specify the network settings for the adapter.
IP Address
Subnet Mask
Default Gateway
DNS 1
DNS 2
Back
Next
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N


Confirm New Settings
Profile Settings
Wireless Network Name Antor-WIFI
Wireless Mode Infrastructure
Network Mode Mixed Mode
Radio Band Auto
Wide Channel Auto
Standard Channel Auto
Security WPA Personal
Authentication Auto
IP Address Auto
Subnet Mask Auto
Default Gateway Auto
DNS1 Auto
DNS2
Exit
Back
Save
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N


Creating a Profile
Available Wireless Networks
Please select the wireless network that you want to connect to, then click the Connect button to continue. If you are not sure which network to choose, first try the one with the strongest signal.
Wireless Network Name
CH
Signal
Security
Antor-WIFI
1
100%
Refresh
Connect
Exit
Advanced Setup
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N


Creating a Profile
Wireless Security
Security
WPA-Personal
Please select the wireless security method used by your existing wireless network.
WEP stands for Wired Equivalent Privacy.
WPA-Personal, also known as Pre-shared Key, is a security standard stronger than WEP encryption.
WPA2-Personal is the newer version with stronger encryption than WPA-Personal.
WPA-Enterprise, WPA2-Enterprise and RADIUS use Remote Authentication Dial-In User Service (RADIUS).
Back
Next
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N


Congratulations
Your profile has been successfully configured!
Return to Profiles screen
Connect to Network
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N


Creating a Profile
Wireless Mode
Please choose the Wireless Mode that best suits your needs.
Infrastructure Mode
Select Infrastructure Mode if you want to connect to a wireless router or access point.
Ad-Hoc Mode
Select Ad-Hoc Mode if you want to connect to another wireless device directly without using a wireless router or access point.
Please enter the wireless network name (SSID) for your wireless network.
The wireless network name is shared by all devices in a wireless network and is case-sensitive.
Wireless Network Name
Antor-WIFI
Back
Next
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N


Creating a Profile
Wireless Security - WPA Personal
Encryption
AES
Please select the encryption type used to protect your wireless data transmissions.
Pre-shared Key
antor@pass
Please enter a Pre-shared Key that is 8 to 63 characters in length.
Back
Next
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N

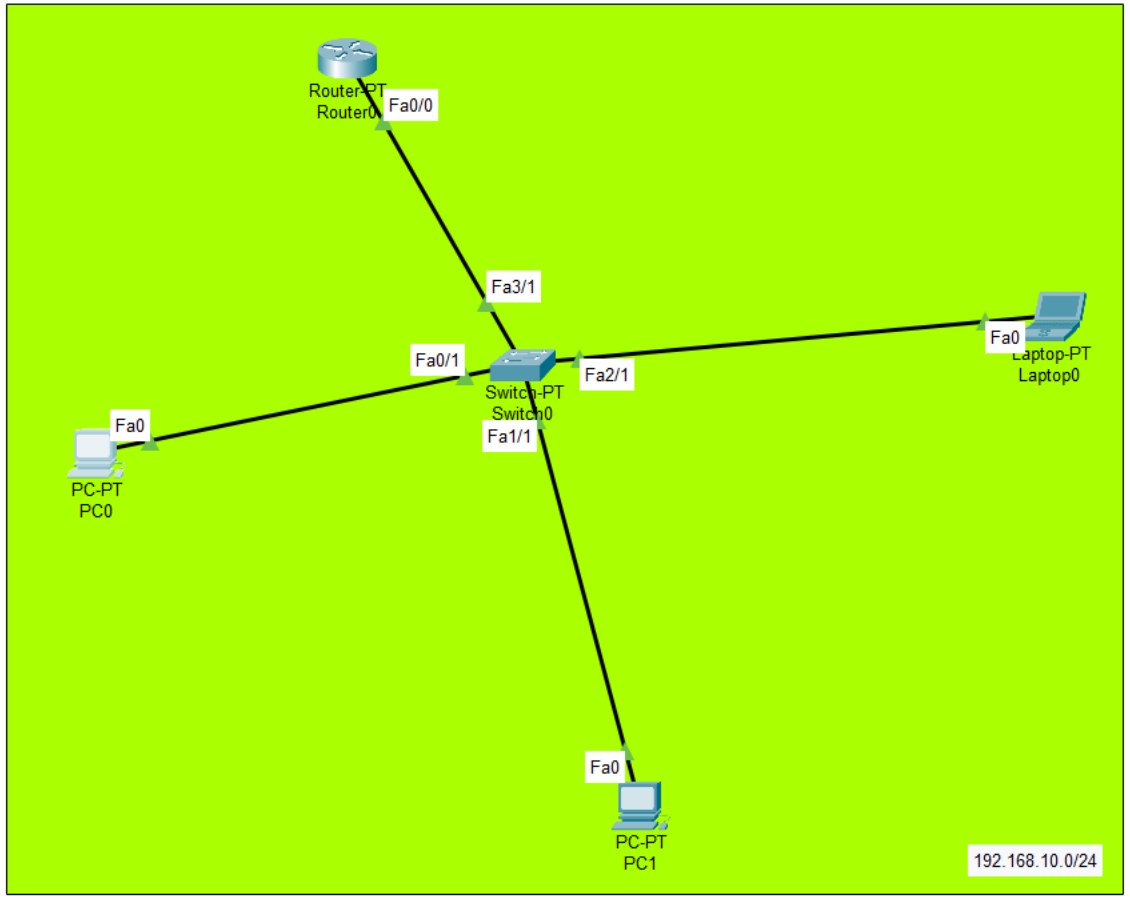

Link Information
Connect
Profiles
More Information
Infrastructure Mode
You have successfully connected to the access point
2.4GHz
Signal Strength
Link Quality
Adapter is Active
Wireless-N Notebook Adapter
Wireless Network Monitor v1.0
Model No. WPC300N

Lab 6 - DHCP

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_6 - DHCP.pkt

File Edit Options View Tools Extensions Window Help

Logical Physical x: 1895, y: 541 Root 06:33:30



Time: 01:00:43 Realtime Simulation

Scenario 0 New Delete Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	Laptop0	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC1	PC0	ICMP		0.000	N	1	(edit)	(delete)

Copper Straight-Through

Router0

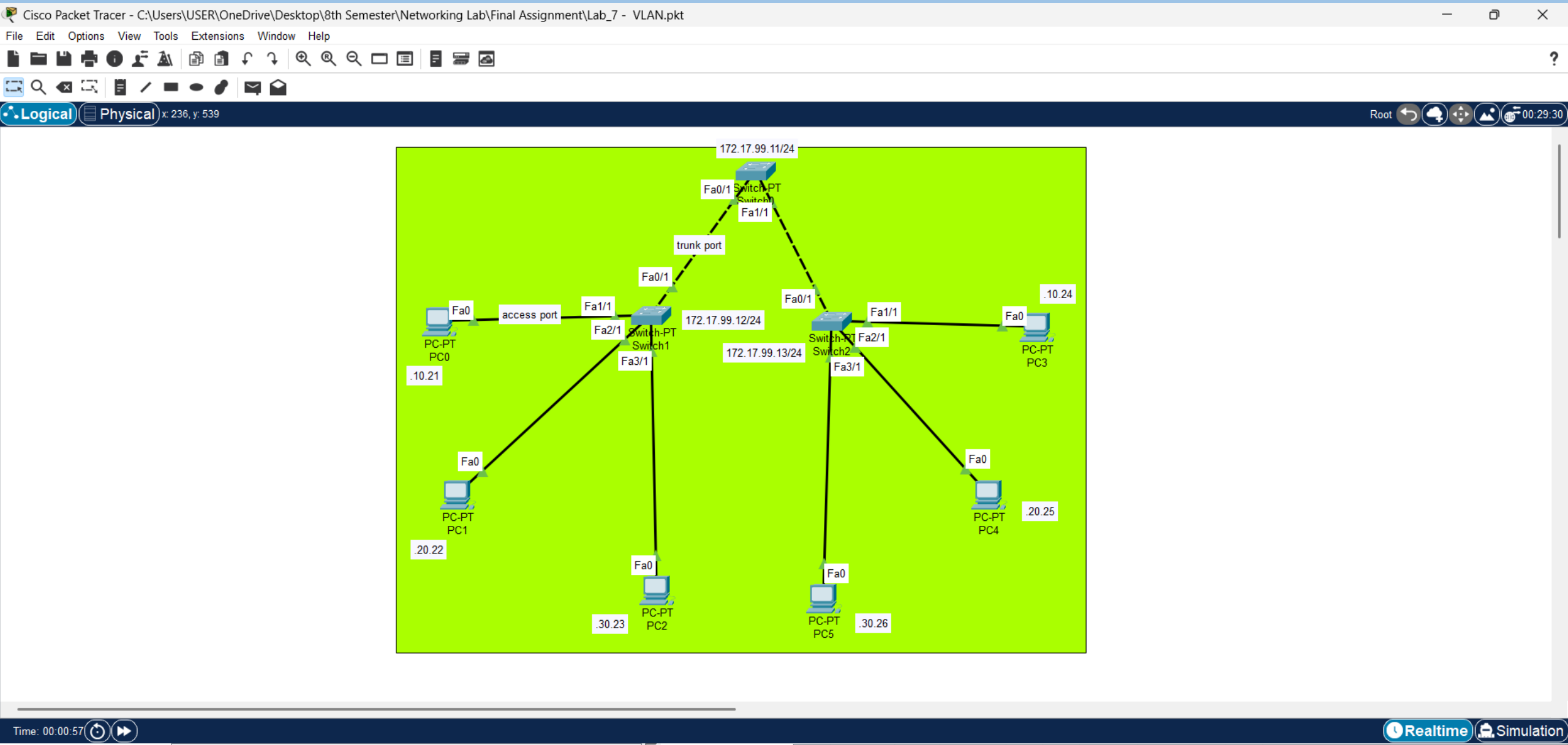
Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (DHCP)

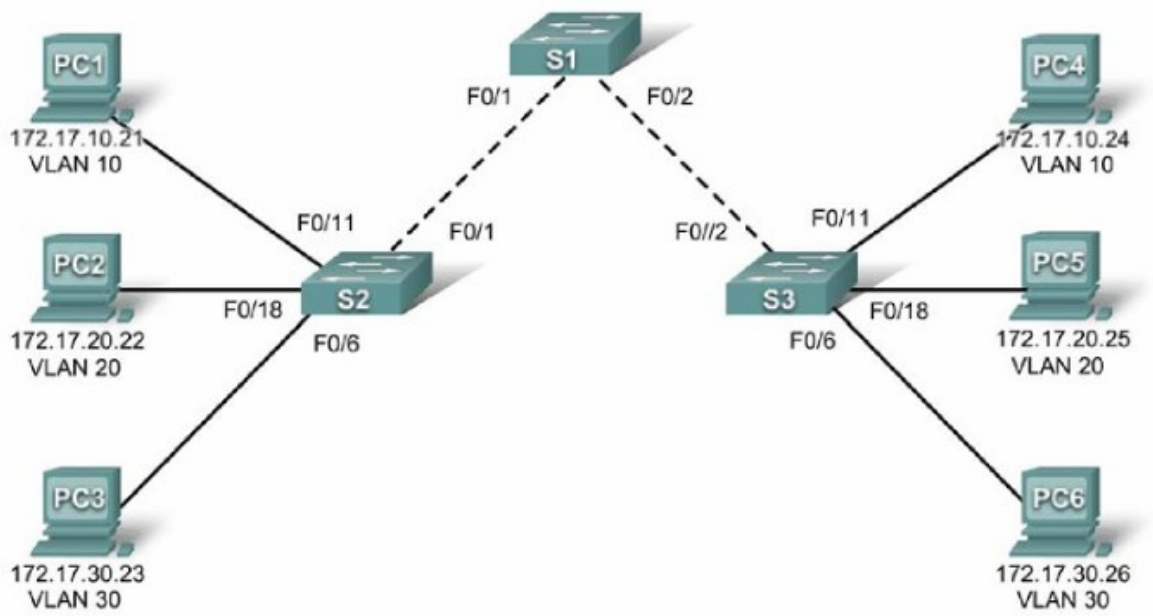
```
Router(config)#ip dhcp excluded-address 192.168.10.1 192.168.10.10
Router(config)#ip dhcp excluded-address 192.168.10.254

Router(config)#ip dhcp pool LAN-POOL-1
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.10.1

Router#copy running-config startup-config
```

Lab 7 - VLAN


Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_7 - VLAN.pkt
File Edit Options View Tools Extensions Window Help
Logical Physical x: 236, y: 539
Root 00:29:30
172.17.99.11/24
Fa0/1
Fa1/1
trunk port
Fa0/1
Fa0/1
.10.24
Fa0
access port
Fa1/1
Fa2/1
172.17.99.12/24
Fa1/1
Fa0
Fa2/1
172.17.99.13/24
PC-PT PC0
.10.21
Fa3/1
Fa3/1
PC-PT PC3
Fa0
Fa0
PC-PT PC1
.20.22
PC-PT PC4
.20.25
Fa0
Fa0
PC-PT PC2
.30.23
PC-PT PC5
.30.26
Time: 00:00:57
Realtime
Simulation
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Delete
Successful PC0 PC3 ICMP 0.000 N 0 (edit) (delete)
Successful PC2 PC5 ICMP 0.000 N 1 (edit) (delete)

Lab 3.5.1: Basic VLAN Configuration (Instructor Version)

Topology Diagram



Addressing Table

Device (Hostname)	Interface	IP Address	Subnet Mask	Default Gateway
S1	**VLAN 99**	172.17.99.11	255.255.255.0	N/A
S2	**VLAN 99**	172.17.99.12	255.255.255.0	N/A
S3	**VLAN 99**	172.17.99.13	255.255.255.0	N/A
PC1	**NIC**	172.17.10.21	255.255.255.0	172.17.10.1
PC2	**NIC**	172.17.20.22	255.255.255.0	172.17.20.1
PC3	**NIC**	172.17.30.23	255.255.255.0	172.17.30.1
PC4	**NIC**	172.17.10.24	255.255.255.0	172.17.10.1
PC5	**NIC**	172.17.20.25	255.255.255.0	172.17.20.1
PC6	**NIC**	172.17.30.26	255.255.255.0	172.17.30.1

Initial Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

User ports of S1 and S2 are enabled as access ports

Configure the PCs

Create VLAN on S0,S1 and S2

Assign switch ports to VLANs on S1 and S2

Assign the management VLAn

Configure trunking and native VLAN for the Switchs

Switch1

User ports of S1 and S2 are enabled as access ports

```
Router>enable
Router#configure terminal

Switch(config)#interface range fa1/1, fa2/1, fa3/1
Switch(config-if)#switchport mode access
Switch(config-if)#no shutdown
```

Configure the PCs with appropriate IP addresses

Create VLANs on S0, S1, and S2

```
Switch(config)#vlan 10
Switch(config-vlan)#name faculty
Switch(config)#vlan 20
Switch(config-vlan)#name students
Switch(config)#vlan 30
Switch(config-vlan)#name guest
Switch(config)#vlan 99
Switch(config-vlan)#name management
Switch(config-vlan)#end
```

Assign switch ports to VLANs on S1 and S2

```
Switch(config)#interface fa1/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config)#interface fa2/1
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config)#interface fa3/1
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
```

Assign the management VLAN on all switches

```
Switch(config)#interface vlan 99
Switch(config-if)#ip address 117.17.99.12 255.255.255.0
Switch(config-if)#no shutdown
```

Configure trunking and native VLAN between the switches

```
Switch(config)#interface fa0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#no shutdown
```

Switch2

User ports of S1 and S2 are enabled as access ports

```
Router>enable
Router#configure terminal

Switch(config)#interface range fa1/1, fa2/1, fa3/1
Switch(config-if)#switchport mode access
Switch(config-if)#no shutdown
```

Configure the PCs with appropriate IP addresses

Create VLANs on S0, S1, and S2

```
Switch(config)#vlan 10
Switch(config-vlan)#name faculty
Switch(config)#vlan 20
Switch(config-vlan)#name students
Switch(config)#vlan 30
Switch(config-vlan)#name guest
Switch(config)#vlan 99
Switch(config-vlan)#name management
Switch(config-vlan)#end
```

Assign switch ports to VLANs on S1 and S2

```
Switch(config)#interface fa1/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#no shutdown
Switch(config)#interface fa2/1
Switch(config-if)#switchport access vlan 20
Switch(config-if)#no shutdown
Switch(config)#interface fa3/1
Switch(config-if)#switchport access vlan 30
Switch(config-if)#no shutdown
```

Assign the management VLAN on all switches

```
Switch(config)#interface vlan 99
Switch(config-if)#ip address 117.17.99.13 255.255.255.0
Switch(config-if)#no shutdown
```

Configure trunking and native VLAN between the switches

```
Switch(config)#interface fa0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#no shutdown
```

More

```
Switch#show vlan brief
```

Switch0

User ports of S1 and S2 are enabled as access ports

```
Router>enable
Router#configure terminal
```

Configure the PCs with appropriate IP addresses

Create VLANs on S0, S1, and S2

```
Switch(config)#vlan 10
Switch(config-vlan)#name faculty
Switch(config)#vlan 20
Switch(config-vlan)#name students
Switch(config)#vlan 30
Switch(config-vlan)#name guest
Switch(config)#vlan 99
Switch(config-vlan)#name management
Switch(config-vlan)#end
```

Assign switch ports to VLANs on S1 and S2

Assign the management VLAN on all switches

```
Switch(config)#interface vlan 99
Switch(config-if)#ip address 117.17.99.11 255.255.255.0
Switch(config-if)#no shutdown
```

Configure trunking and native VLAN between the switches

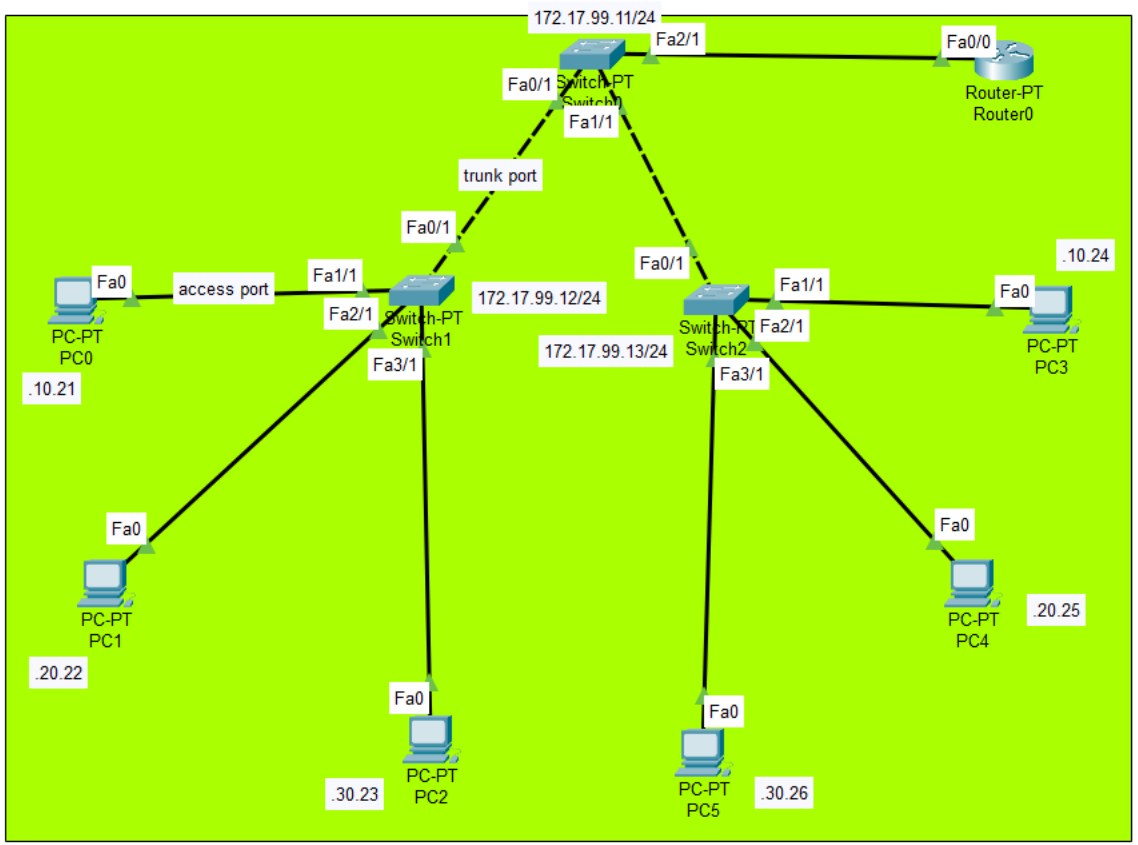
```
Switch(config)#interface range fa0/1, fa1/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#no shutdown
```

Lab 8 - Inter-VLAN

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_8 - Inter-VLAN.pkt

File Edit Options View Tools Extensions Window Help

Logical | Physical | x: 1612, y: 373 | Root | 12:56:30



Time: 00:24:35 | Realtime | Simulation

Copper Straight-Through

Scenario 0 | New | Delete | Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC0	PC5	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC0	PC5	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC0	PC4	ICMP		0.000	N	2	(edit)	(delete)

Router0

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#no shutdown
```

Router Configuration (Inter-VLAN)

```
Router(config)#interface fa0/0.10
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 172.17.10.1 255.255.255.0
Router(config-subif)#no shutdown

Router(config)#interface fa0/0.20
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 172.17.20.1 255.255.255.0
Router(config-subif)#no shutdown

Router(config)#interface fa0/0.30
Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip address 172.17.30.1 255.255.255.0
Router(config-subif)#no shutdown

Router(config)#interface fa0/0.99
Router(config-subif)#encapsulation dot1Q 99
Router(config-subif)#ip address 172.17.99.1 255.255.255.0
Router(config-subif)#no shutdown
```

Switch0

Switch Configuration (Inter-VLAN)

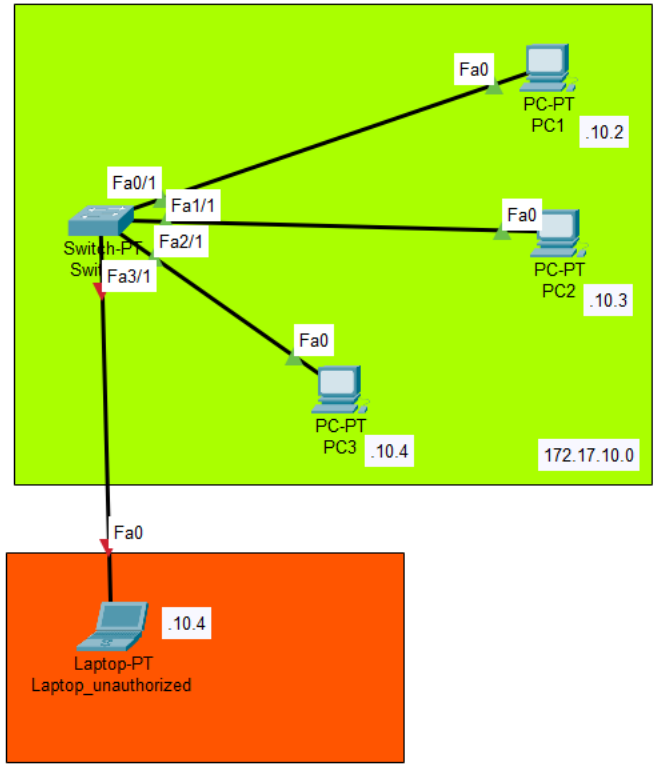
```
Switch(config)#interface fa2/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#no shutdown
```

Lab 9 - Switch Port Security

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_9 - Switch Port Security.pkt

File Edit Options View Tools Extensions Window Help

Logical | Physical | x: 1386, y: 521 | Root | 01:16:30



Time: 00:02:30 | Realtime | Simulation

4331 4321 1941 2901 2911 819IOX 819HGW 829 1240 PT-Router PT-Empty 1841 2620XM 2621XM

(Select a Device to Drag and Drop to the Workspace)

Scenario 0 | New | Delete | Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC3	PC1	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC3	PC2	ICMP		0.000	N	1	(edit)	(delete)
	Failed	Lapto...	PC2	ICMP		0.000	N	2	(edit)	(delete)

Switch0

Switch Configuration

```
Switch>enable
Switch#configure terminal

Switch(config)#interface range Fa3/1-Fa5/1
Switch(config-if)#shutdown
```

Switch Configuration (Port Security)

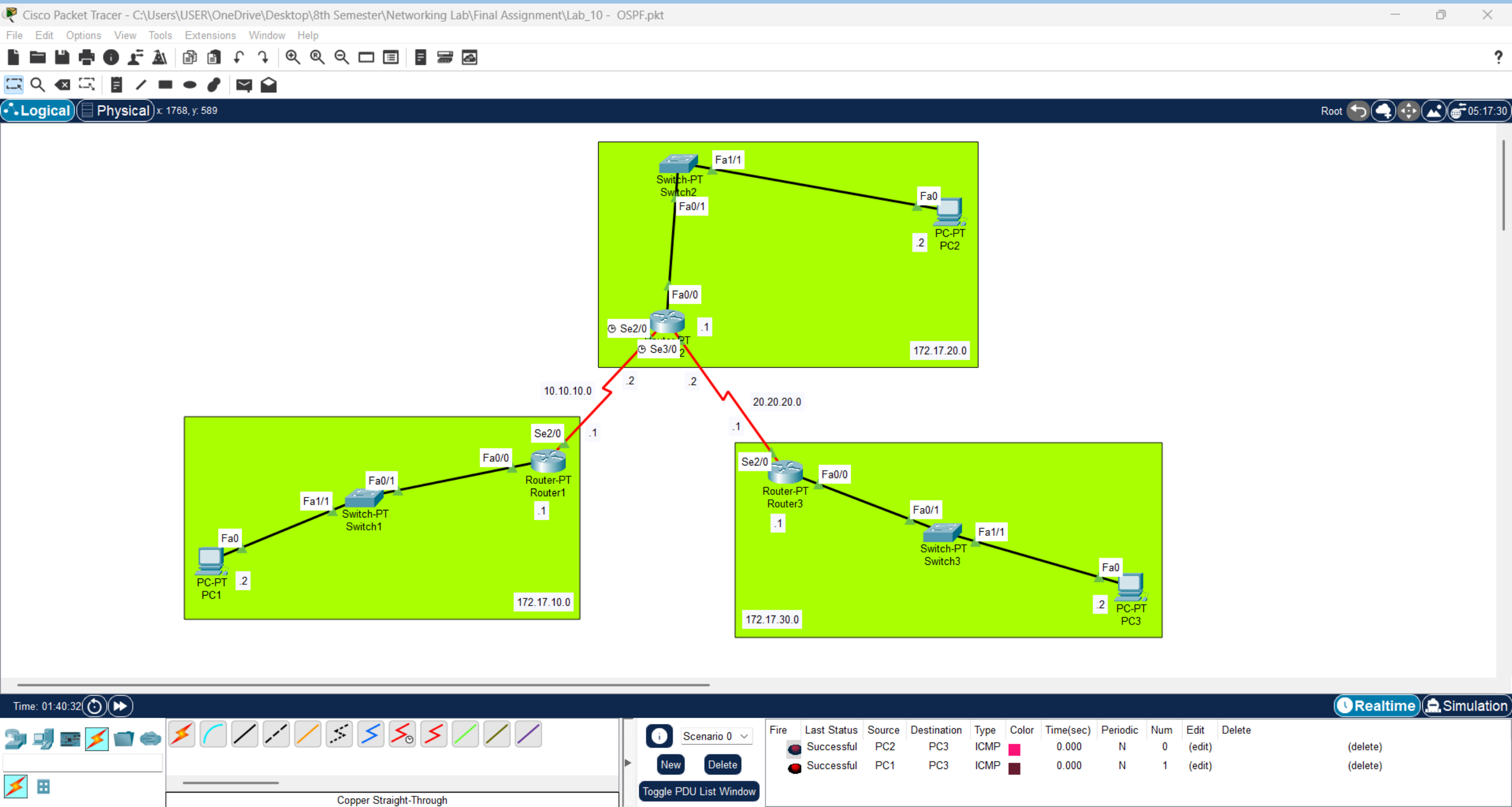
```
Switch(config)#interface range Fa0/1, Fa1/1, Fa2/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport port-security
Switch(config-if)#switchport port-security mac-address sticky
Switch(config-if)#switchport port-security violation shutdown
Switch(config-if)#no shutdown
```

protect: drop the packet
restrict: drop the packet and count the number of violations
shutdown: drop the packet and shutdown the corresponding link

More

```
Switch#show port-security
Switch #copy running-config startup-config

Or

Switch #write memory
```

Dynamic routing> **Lab 10 - OSPF (Open Shortest Path First**



Router1

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.10.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (se2/0)

```
Router(config)#interface se2/0
Router(config-if)#ip address 10.10.10.1 255.255.255.0
Router(config-if)#no shutdown
```

Router OSPF Configuration

```
Router(config)#router ospf 1
Router(config-router)#network 172.17.10.0 0.0.0.255 area 0
Router(config-router)#network 10.10.10.0 0.0.0.255 area 0
```

Router2

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.20.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (se2/0)

```
Router(config)#interface se2/0
Router(config-if)#ip address 10.10.10.2 255.255.255.0
Router(config-if)#clock rate 64000 Serial DCE
Router(config-if)#no shutdown
```

Router Configuration (se3/0)

```
Router(config)#interface se3/0
Router(config-if)#ip address 20.20.20.2 255.255.255.0
Router(config-if)#clock rate 64000 Serial DCE
Router(config-if)#no shutdown
```

Router OSPF Configuration

```
Router(config)#router ospf 1
Router(config-router)#network 172.17.20.0 0.0.0.255 area 0
Router(config-router)#network 10.10.10.0 0.0.0.255 area 0
Router(config-router)#network 20.20.20.0 0.0.0.255 area 0
```

Router3

Router Configuration

```
Router>enable
Router#configure terminal

Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.30.1 255.255.255.0
Router(config-if)#no shutdown
```

Router Configuration (se2/0)

```
Router(config)#interface se2/0
Router(config-if)#ip address 20.20.20.1 255.255.255.0
Router(config-if)#no shutdown
```

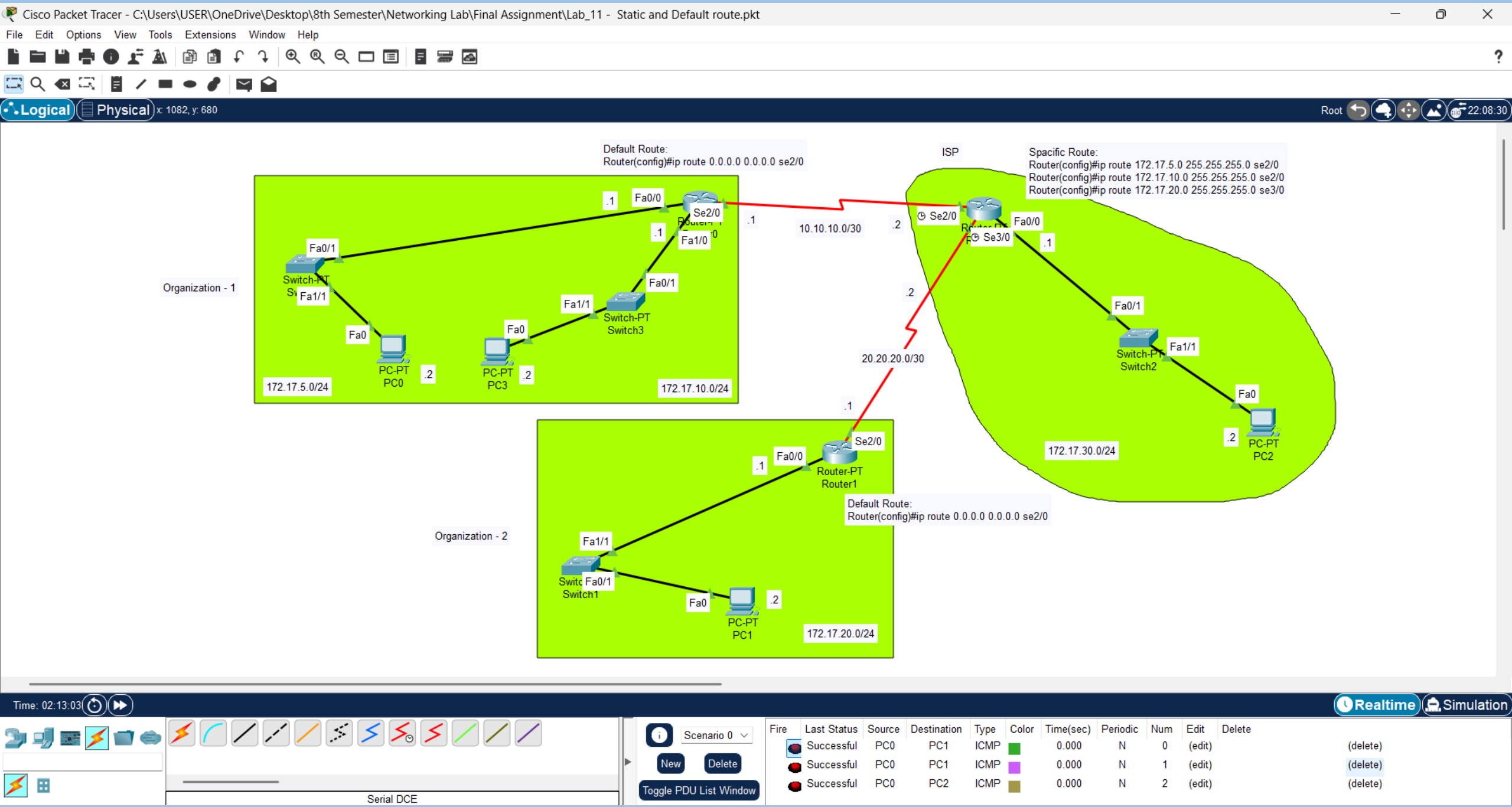
Router OSPF Configuration

```
Router(config)#router ospf 1
Router(config-router)#network 172.17.30.0 0.0.0.255 area 0
Router(config-router)#network 20.20.20.0 0.0.0.255 area 0
```

More

```
Router#show ip ospf neighbor
Router#show ip route ospf
```

Lab 11 - Static and default route



Router0

Router Configuration

```
Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.5.1 255.255.255.0h
Router(config-if)#no shutdown

Router(config)#interface fa1/0
Router(config-if)#ip address 172.17.10.1 255.255.255.0
Router(config-if)#no shutdown

Router(config)#interface se2/0
Router(config-if)#ip address 10.10.10.1 255.255.255.252
Router(config-if)#no shutdown
```

Default Route

```
Router(config)#ip route 0.0.0.0 0.0.0.0 se2/0
```

Router1

Router Configuration

```
Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.20.1 255.255.255.0
Router(config-if)#no shutdown

Router(config)#interface se2/0
Router(config-if)#ip address 20.20.20.1 255.255.255.252
Router(config-if)#no shutdown

Router(config)#ip route 0.0.0.0 0.0.0.0 se2/0
```

Default Route

```
Router(config)#ip route 0.0.0.0 0.0.0.0 se2/0
```

Router2 (ISP)

Router Configuration

```
Router(config)#interface fa0/0
Router(config-if)#ip address 172.17.30.1 255.255.255.0
Router(config-if)#no shutdown

Router(config)#interface se2/0
Router(config-if)#ip address 10.10.10.2 255.255.255.252
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown

Router(config)#interface se3/0
Router(config-if)#ip address 20.20.20.2 255.255.255.252
Router(config-if)#clock rate 64000
Router(config-if)#no shutdown
```

Spacific Route

```
Router(config)#ip route 172.17.5.0 255.255.255.0 se2/0
Router(config)#ip route 172.17.10.0 255.255.255.0 se2/0
Router(config)#ip route 172.17.20.0 255.255.255.0 se3/0
```

More

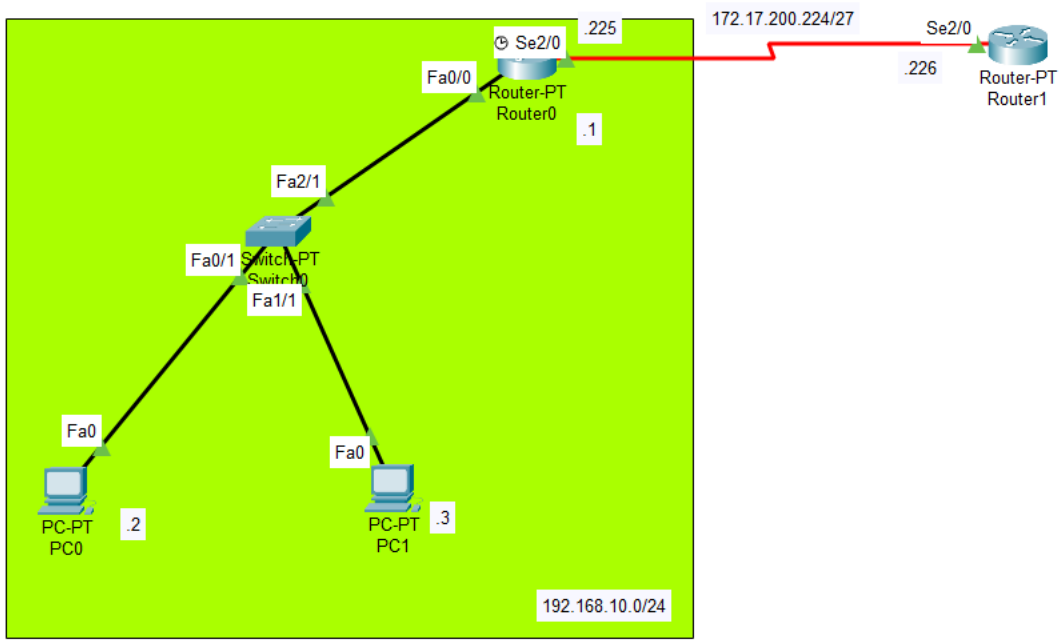
```
Router#show ip route
```

Lab 12 - NAT (Static) – Network Address Translation

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_12 - NAT (Static).pkt

File Edit Options View Tools Extensions Window Help

Logical | Physical | x: 1250, y: 404 | Root | 00:26:30



Time: 00:00:51 | Realtime | Simulation

4331 4321 1941 2901 2911 819IOX 819HGW 829 1240 PT-Router PT-Empty 1841 2620XM 2621XM

(Select a Device to Drag and Drop to the Workspace)

Scenario 0 | New | Delete | Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	Router1	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC0	Router1	ICMP		0.000	N	1	(edit)	(delete)

Router0

Router Configuration

```
Router(config)#ip route 0.0.0.0 0.0.0.0 se2/0
```

Router Configuration (NAT – Static)

```
Router(config)#ip nat inside source static 192.168. 10. 2 172.17.200.227
Router(config)#ip nat inside source static 192.168. 10. 2 172.17.200.226
Router(config)#interface fa0/0
Router(config)#ip nat inside
Router(config)#no shutdown

Router(config)#interface se2/0
Router(config)#ip nat outside
Router(config)#no shutdown
```

Router1

Router Configuration

```
Router(config)#ip route 192.168.10.0 255.255.255.0 se2/0
```

More

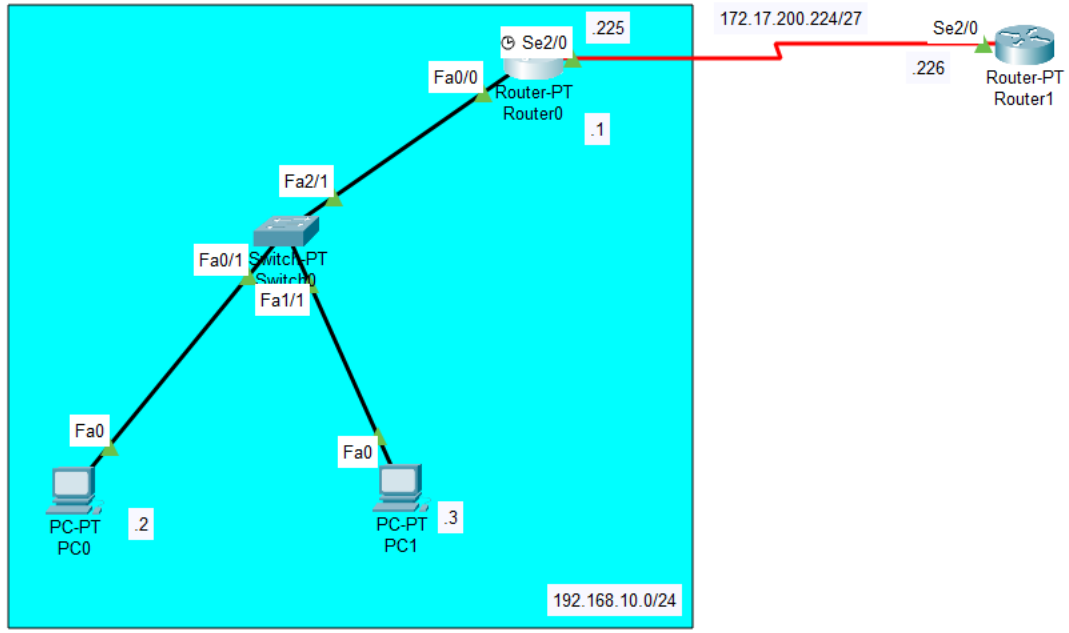
```
Router#show ip nat statistics
Router#show ip nat translations
```

Lab 13 - NAT (Dynamic)

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_13 - NAT (Dynamic).pkt

File Edit Options View Tools Extensions Window Help

Logical | Physical | x: 129, y: 243 | Root | 04:22:00



Time: 00:08:33 | Realtime | Simulation

4331 4321 1941 2901 2911 819IOX 819HGW 829 1240 PT-Router PT-Empty 1841 2620XM 2621XM

(Select a Device to Drag and Drop to the Workspace)

Scenario 0 | New | Delete | Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC1	Router1	ICMP		0.000	N	0	(edit)	(delete)

Router0

Router Configuration

```
Router(config)#ip route 0.0.0.0 0.0.0.0 se2/0
```

Router Configuration (NAT – Dynamic)

```
Router(config)#ip nat pool NAT_POOL1 172.17.200.227 172.17.200.235 netmask 255.255.255.224
Router(config)#ip access-list standard ACL1
Router(config-std-nacl)#Permit 192.168.10.0 0.0.0.255
Router(config-std-nacl)#ip nat inside source list ACL1 pool NAT_POOL1 overload

Router(config)#interface fa0/0
Router(config-if)#ip nat inside
Router(config-if)#no shutdown

Router(config)#interface ser2/0
Router(config-if)#ip nat outside
Router(config-if)#no shutdown
```

Router1

Router Configuration

```
Router(config)#ip route 192.168.10.0 255.255.255.0 se2/0
```

More

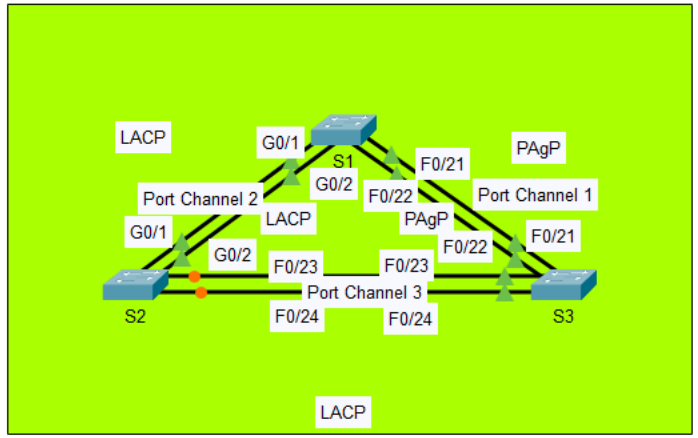
```
Router#show ip nat statistics
Router#show ip nat translations
```

Lab 14 - Link Aggregation

Cisco Packet Tracer - C:\Users\USER\OneDrive\Desktop\8th Semester\Networking Lab\Final Assignment\Lab_14 - Link Aggregation.pka - Guest - 2016-10-21 11:02:00

File Edit Options View Tools Extensions Window Help

Logical Physical x: 1440, y: 466 Root 19:05:30



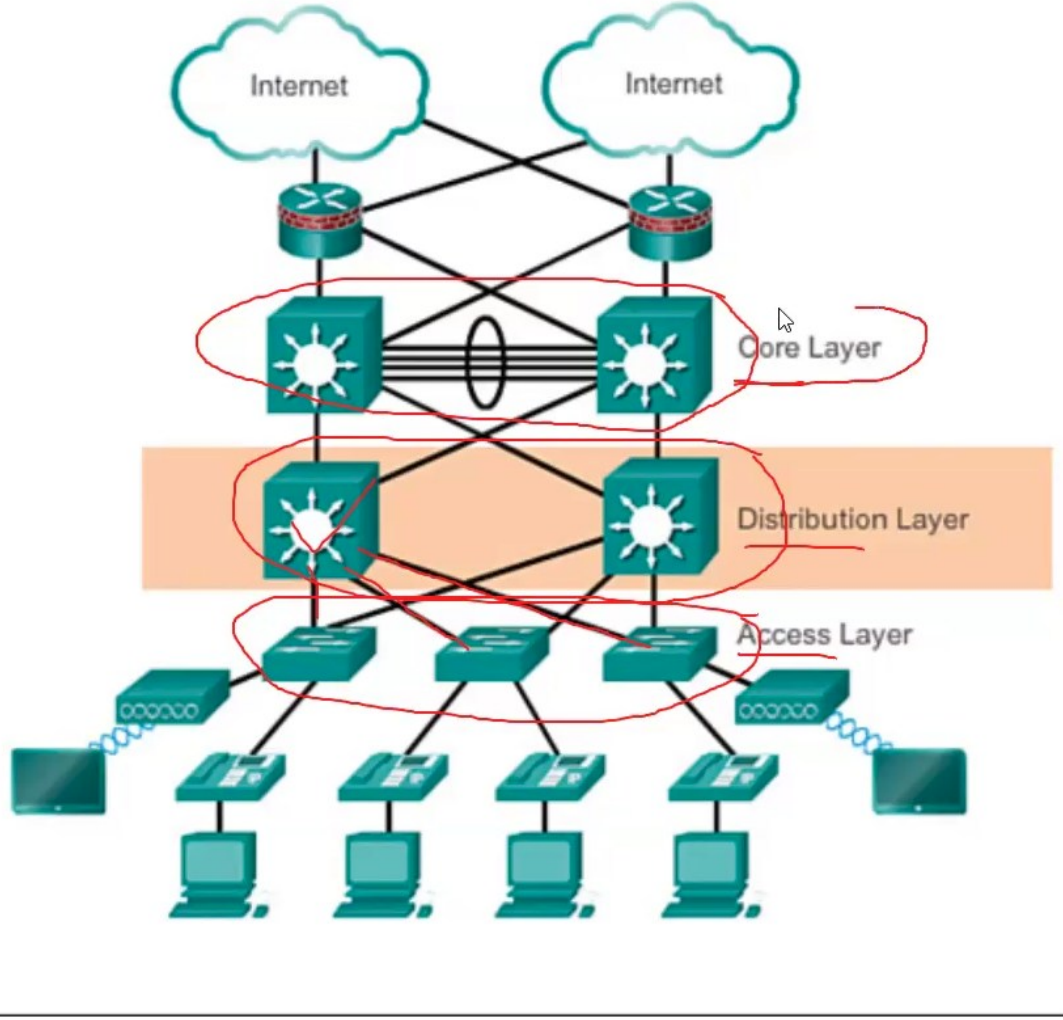
Time: 00:37:22 Realtime Simulation

4331 4321 1941 2901 2911 819IOX 819HGW 829 1240 PT-Router PT-Empty 1841 2620XM 2621XM

CGR1240

Scenario 0 New Delete Toggle PDU List Window

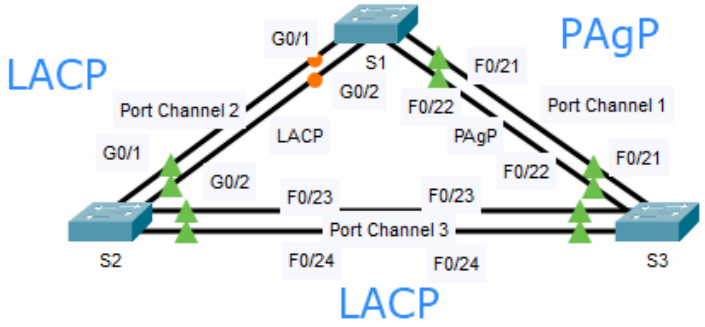
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete



Cisco's Core/Distribution/Access layer design

For PAgP:
Mode: auto or desirable

For LACP:
Mode: Active or Passive



Convert physical port to trank port
Convert the physical port to one logical port
Convert logical port to trunk port

Text - Notepad

File Edit Format View Help

PAgP Configuration Modes:

Auto mode- interface can respond to PAgP packet negotiation but will never start one on its own.
Desirable mode- interface actively attempts a negotiating state for PAgP packet negotiation.

LACP Configuration Modes:
Active - The interface actively sends LACP packets in its attempt to form an LACP connection.
Passive - The interface can respond to LACP negotiation but will never initiate on its own.

(1) Convert physical port to trank port

S1

```
Switch(config)#interface range g0/1-2
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
Switch(config)#interface range f0/21-22
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
```

S2

```
Switch(config)#interface range g0/1-2
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
Switch(config)#interface range f0/23-24
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
```

S3

```
Switch(config)#interface range f0/21-24
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
```

(2) Convert the physical port to one logical port

S1 & S3

```
Switch(config)#interface range f0/21 - 22
Switch(config-if-range)#shutdown

Switch(config-if-range)#channel-group 1 mode desirable
Switch(config-if-range)#no shutdown
```

S1 & S2

```
Switch(config)#interface range g0/1 - 2
Switch(config-if-range)#shutdown

Switch(config-if-range)#channel-group 2 mode active
Switch(config-if-range)#no shutdown
```

S2 & S3

```
Switch(config)#interface range f0/23 - 24
Switch(config-if-range)#shutdown

Switch(config-if-range)#channel-group 3 mode passive
Switch(config-if-range)#no shutdown
```

(3) Convert logical port to trunk port

S1 & S3

```
Switch(config)#interface port-channel 1
Switch(config-if)#switchport mode trunk
Switch(config-if)#no shutdown
```

S1 & S2

```
Switch(config-if-range)#interface port-channel 2
Switch(config-if)#switchport mode trunk
Switch(config-if)#no shutdown
```

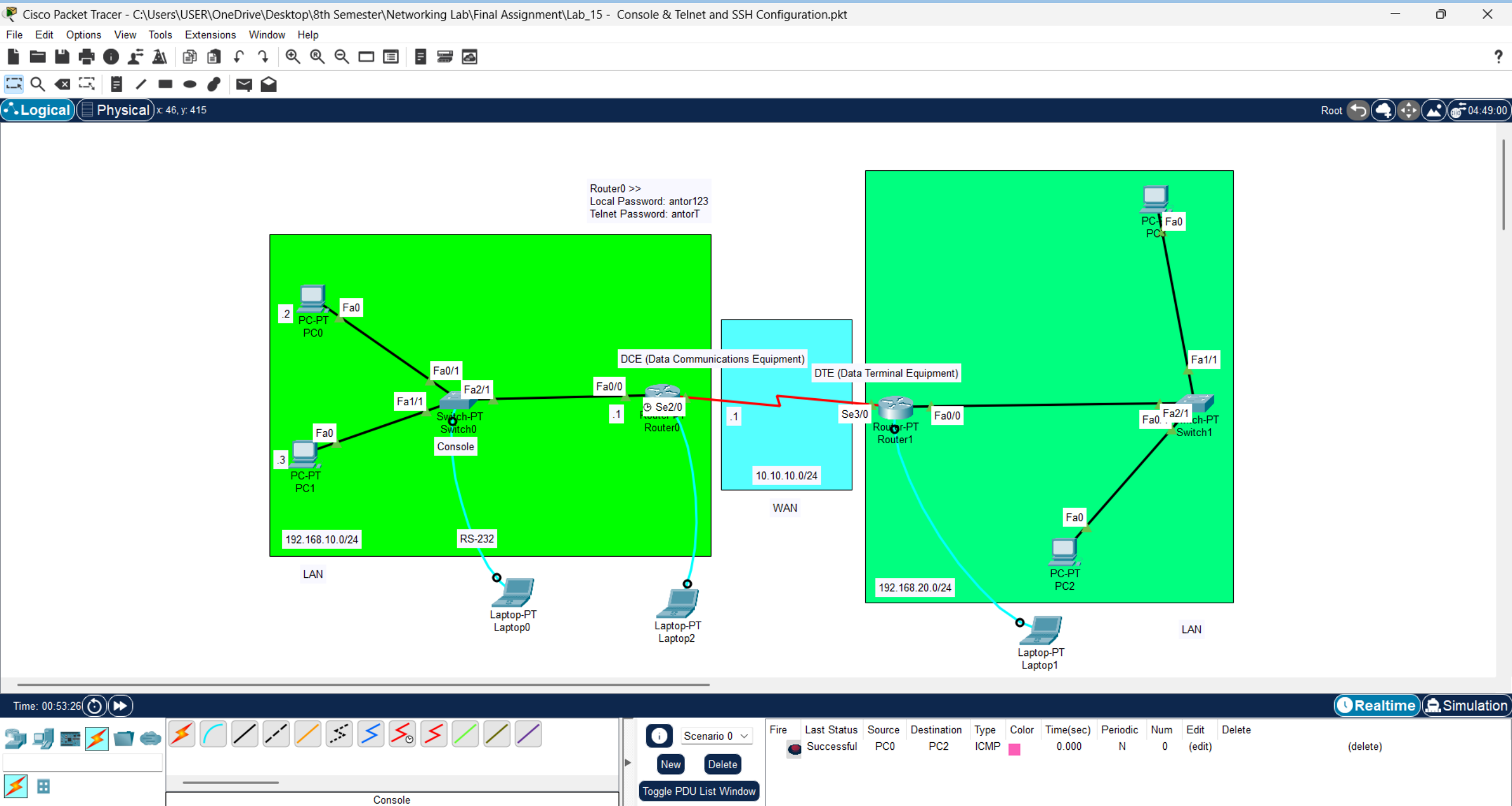
S2 & S3

```
Switch(config-if-range)#interface port-channel 3
Switch(config-if)#switchport mode trunk
Switch(config-if)#no shutdown
```

More

```
Switch#show interfaces trunk
Switch#show etherchannel summary
Switch#show spanning-tree
Switch#write memory
```

Lab 15 - Console, Telnet and SSH Configuration



Router Local Passoword Setup (Router0)

```
Router(config)#enable password antor
Router(config)#service password-encryption
Or>>
Router(config)#enable secret antor123

To Remove Password >>
Router(config)#no enable password
```

To configure Telnet access: (It's provide no security) (Router0)

```
Router(config)#line vty 0 5
Router(config-line)#password antorT
Router(config-line)#login
Router(config-line)#end
```

For test the telnet activity (From PC2)

```
C:\>telnet router_any_active_interface

C:\>telnet 192.168.10.1

Trying 192.168.10.1 ...Open

User Access Verification

Password: antorT
Router>en
Password: antor123
Router#
```

More

Max >> line vty 0 15 (max 15 users)
vty >> Virtual Terminal