

# Name: ANSHU PATEL

Roll No: 2108410100014

Computer Network (KCS 653)

Rajkiya Engineering College, Sonbhadra

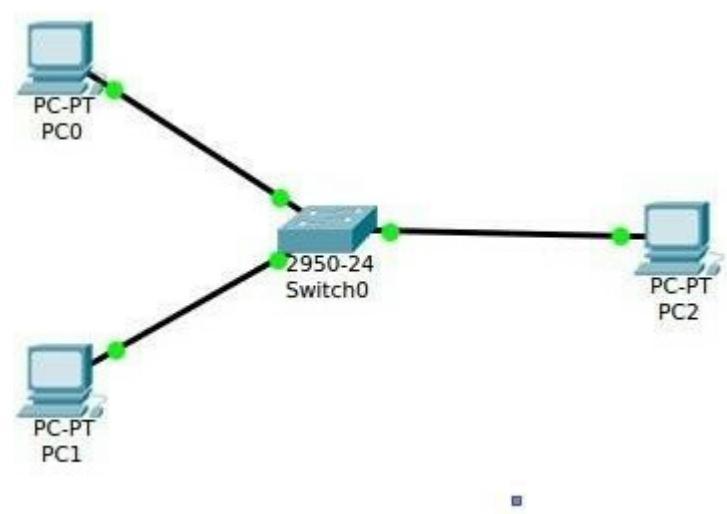
Sno	List of Practicals	Date Sign
01	Cisco Packet Tracer (Topology 1 and Topology 2 )	
	Cisco Packet Tracer ( TREE	
02	Topology)	
03	WireShark	
	Cisco Packet Tracer ( ICMP	
04	request)	
05	Wire Cutting Exercise	
	Capturing and Analyzing ethernet	
06	frames	
	Basic Subnetting and Routing Exercise (Fixed and Variable	
07	length)	

## Computer Networks Lab -PRACTICAL # 1

### Cisco Packet Tracer:

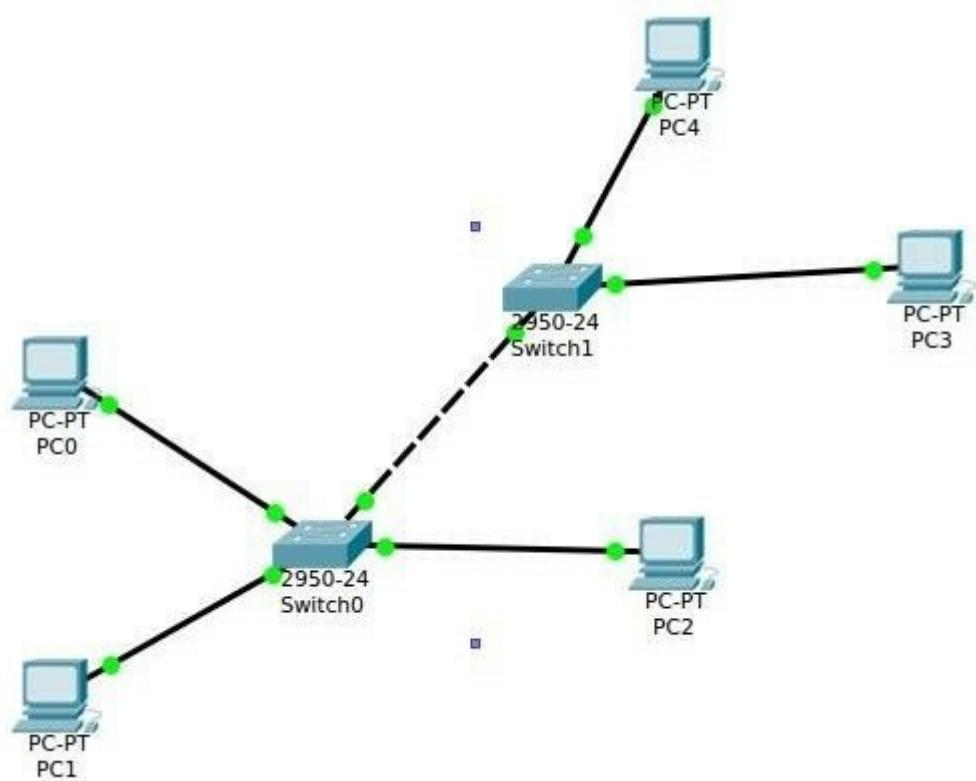
Use the Cisco Packet Tracer Simulation Tool to design the following network topologies in Realtime mode. Use the Simulation mode to test the ICMP Ping service (using a Simple PDU) on both the networks:

#### Topology 1:



In the above topology, replace the **switch** with a **hub** and compare the behaviour.

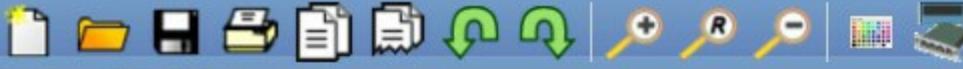
#### Topology 2:



## SOLUTION

# Cisco Packet Tracer Student

File Edit Options View Tools Extensions Help



Logical

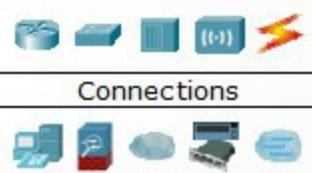
[Root]

New Cluster



Time: 00:05:00.367

Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



## Cisco Packet Tracer Student

File Edit Options View Tools Extensions Help



Logical

[Root]

New Cluster



PC0

Physical    Config

Command

Packet Tracer  
PC>ping 169.1.

Pinging 169.1.

Reply from 169.1.

Reply from 169.1.

Reply from 169.1.

Reply from 169.1.

Ping statistics:  
  Packets:

Approximate round trip:

Minimum =

PC&gt;

Time: 00:02:05

Power Cycle Devices Fast Forward Time



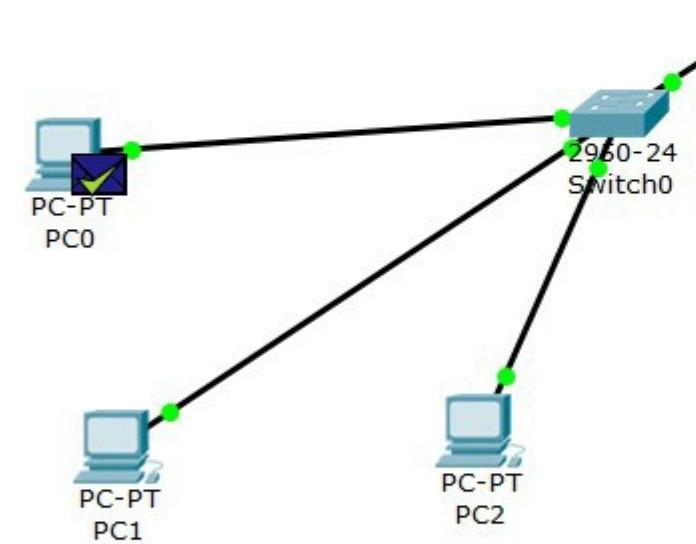
Phone



## Logical

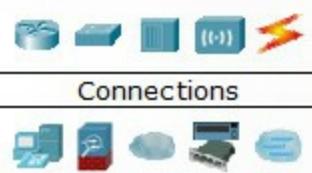
[Root]

New Cluster



Time: 00:07:54.277

Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



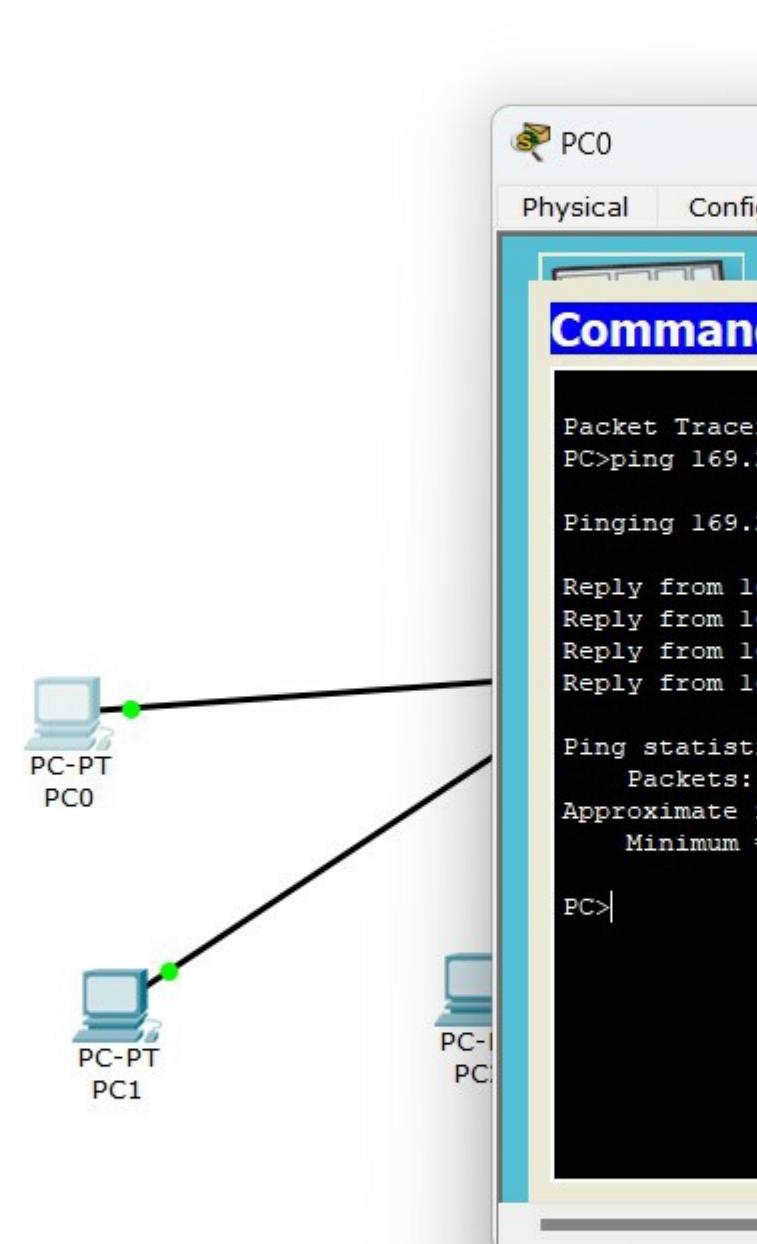
Automatically Choose Connection Type



Logical

[Root]

New Cluster



Time: 00:02:29

Power Cycle Devices Fast Forward Time



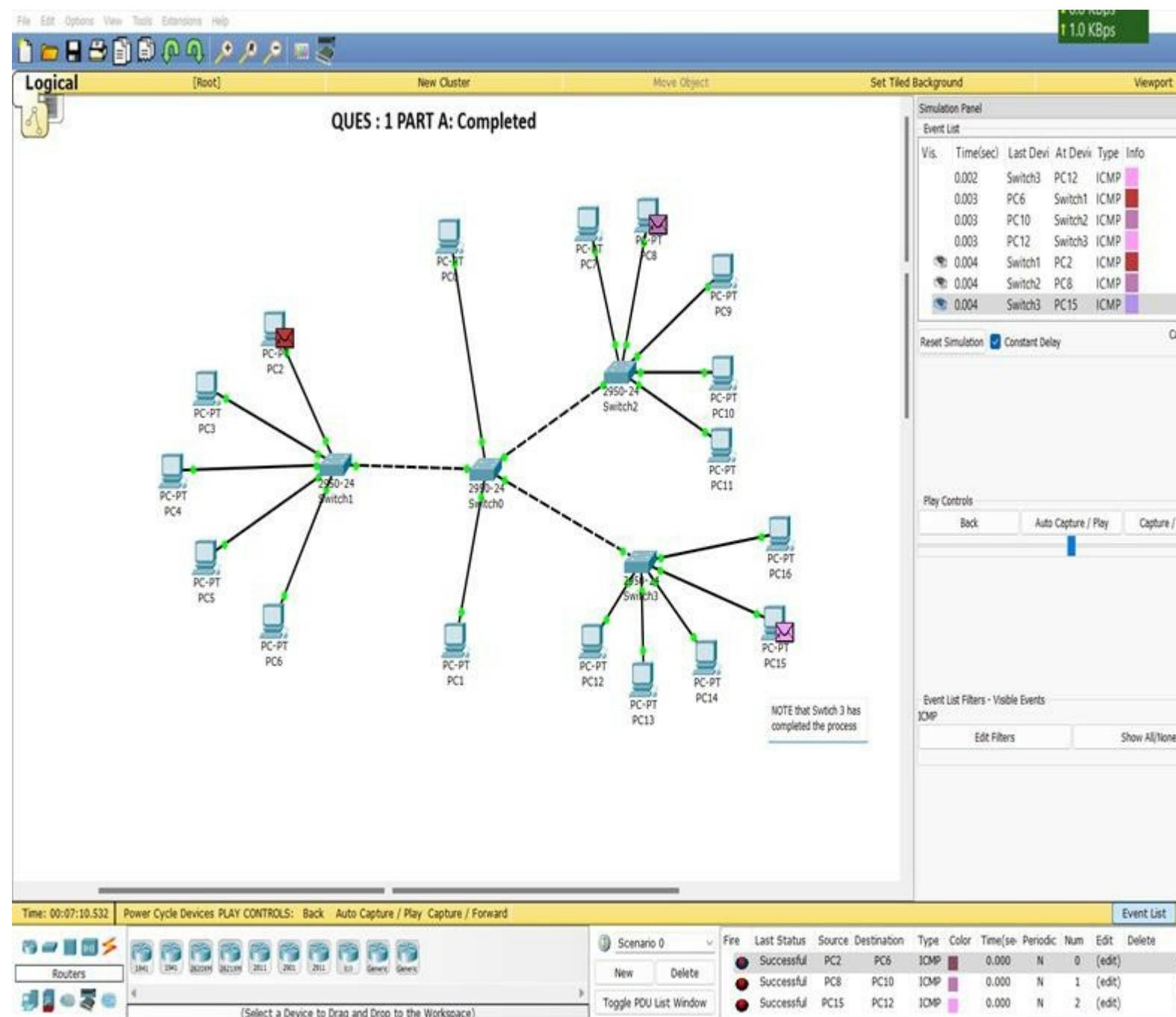
Automatically Choose Connection Type

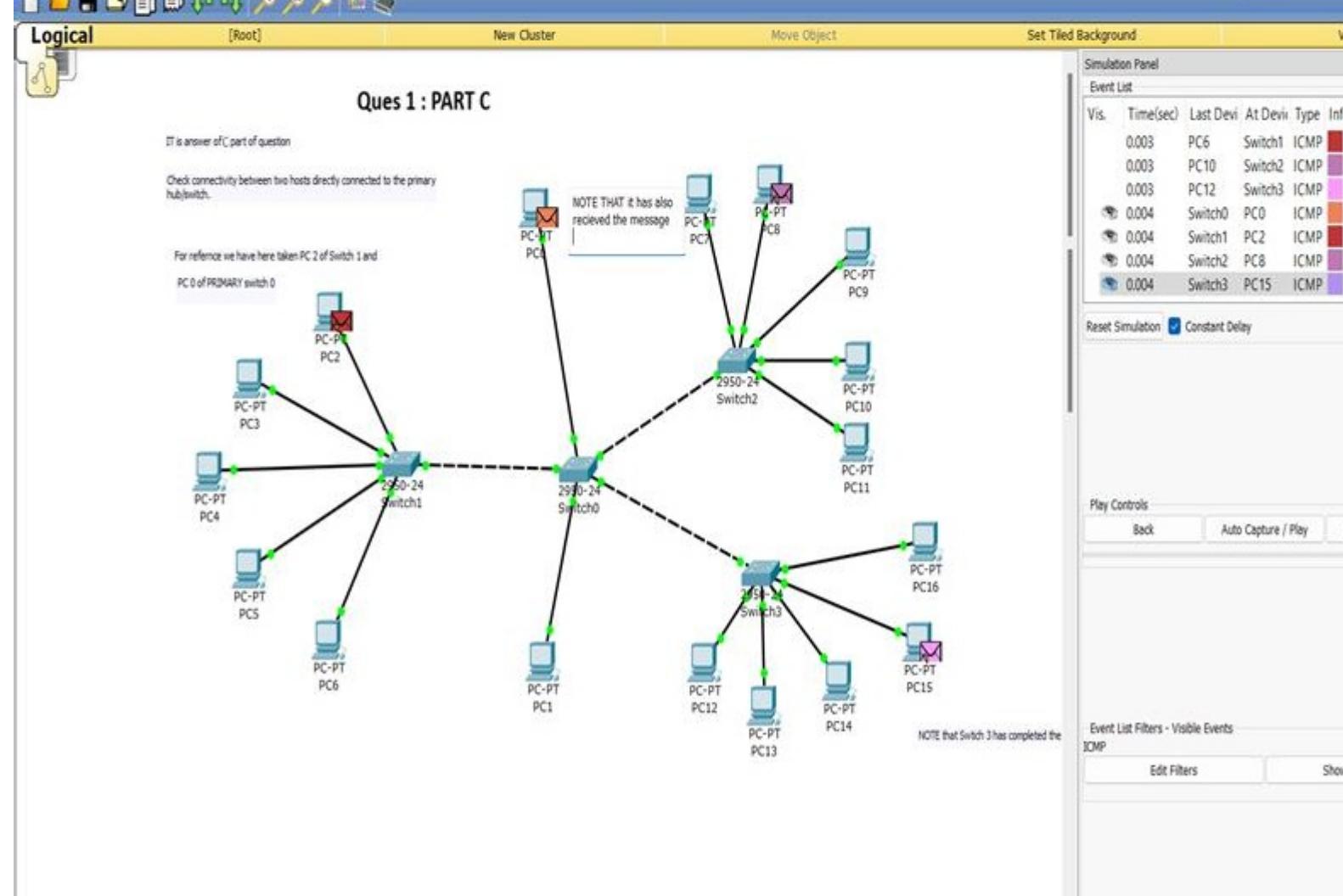
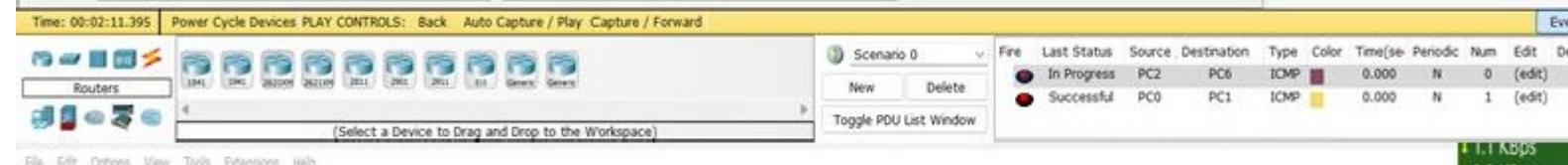
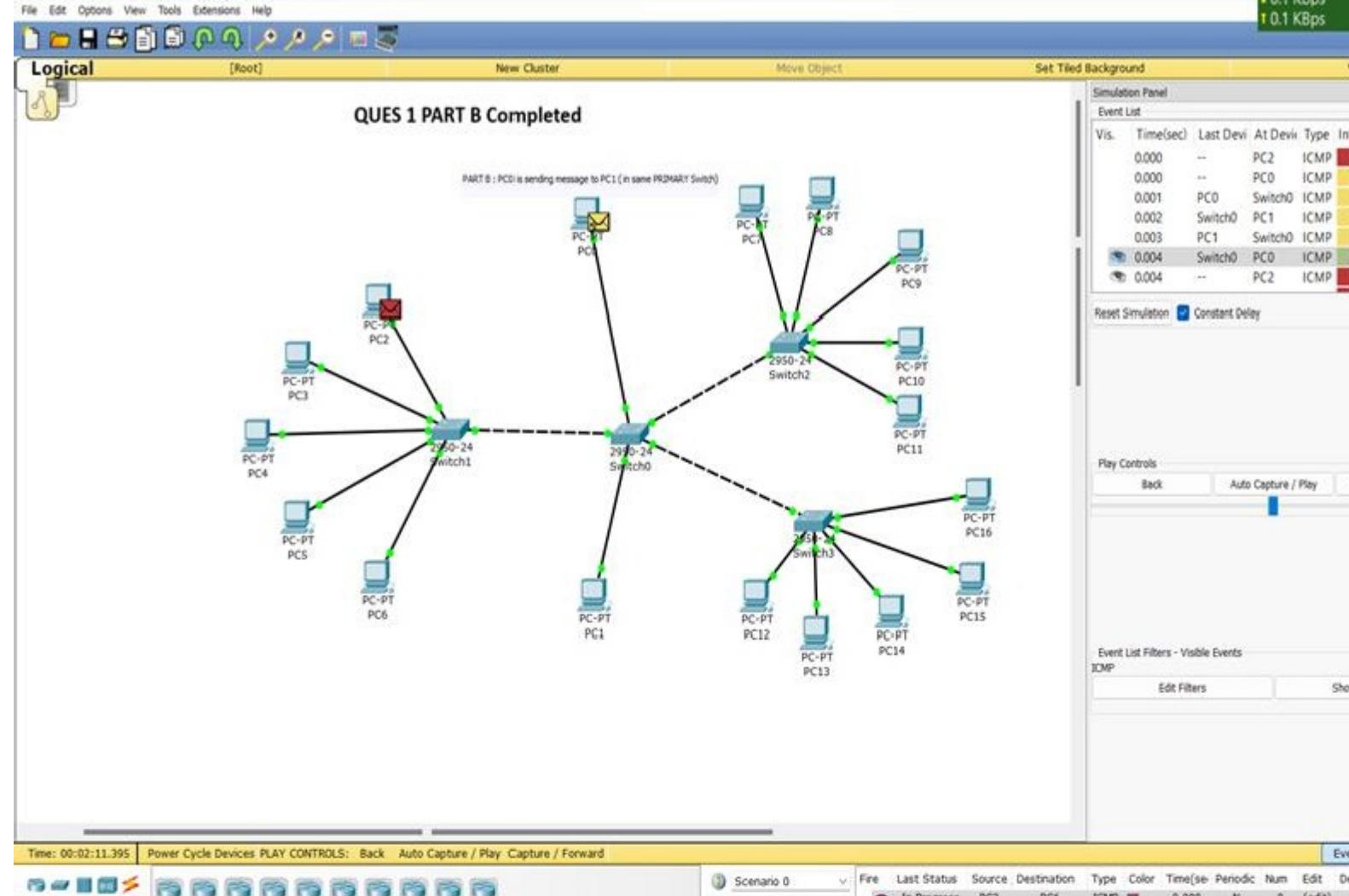
# Computer Networks Lab - PRACTICAL # 2

Assignment :

1. Construct a tree topology that uses a primary hub/switch to connect three secondary hubs/switches. The primary hub/switch has two hosts connected directly to it, whereas each of the three secondary hubs/switches have five directly connected hosts. Simulate the above constructed tree network using ICMP request/response packets to perform the following:
  1. Check connectivity between any two hosts directly connected to the same secondary hub/switch (Do it for all the three secondary hubs/switches).
  2. Check connectivity between two hosts directly connected to the primary hub/switch.
  3. Check connectivity between a host connected to the primary hub/switch and a host connected to any of the three secondary hubs/switches.
  4. Check connectivity between a host connected directly to a secondary hub/switch and another host connected directly to some other secondary hub/switch.
2. Construct a LAN of five hosts arranged in a ring topology and check connectivity between the hosts by sending ICMP request/response packets.
3. Use Command Line prompt to PING hosts in a network and check their ARP Tables. (Refer the student packet tracer manual)

Solution :





Time: 00:25:10.586 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Del
Successful		PC2	PC6	ICMP	Dark Blue	0.000	N	0	(edit)	
Successful		PC8	PC10	ICMP	Dark Blue	0.000	N	1	(edit)	
Successful		PC15	PC12	ICMP	Dark Blue	0.000	N	2	(edit)	

File Edit Options View Tools Extensions Help

0.1 Kbps  
1.0 Kbps

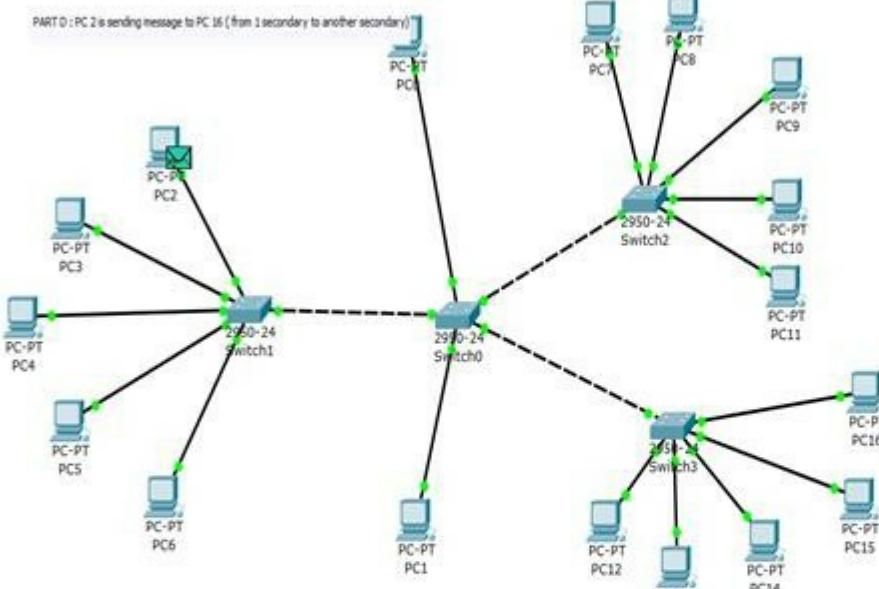
Logical

[Root]

New Cluster

Move Object

Set Tiled Background

**QUES 1 : PART D completed**

Simulation Panel

Event List

Vis.	Time(sec)	Last Devi	At Devir	Type	Info
0.004		Switch1	Switch0	ICMP	
0.005		Switch0	Switch3	ICMP	
0.006		Switch3	PC15	ICMP	
0.007		PC1	Switch3	ICMP	
0.008		Switch3	Switch0	ICMP	
0.009		Switch0	Switch1	ICMP	
0.010		Switch1	PC2	ICMP	

Reset Simulation  Constant Delay

Play Controls

Back Auto Capture / Play

Event List Filters - Visible Events

ICMP

Edit Filters

Show

Time: 00:10:05.389 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Del
Successful		PC2	PC15	ICMP	Dark Blue	0.000	N	0	(edit)	



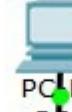
## Logical

[Root]

New Cluster

Construct a LAN of five hosts arranged in a ring topology and check connectivity between the hosts by sending ICMP request/response packets.

Sir, we are sending message from PC1 to PC 4

PC-PT  
PC1PC-PT  
PC2PC-PT  
PC32950-  
Switch

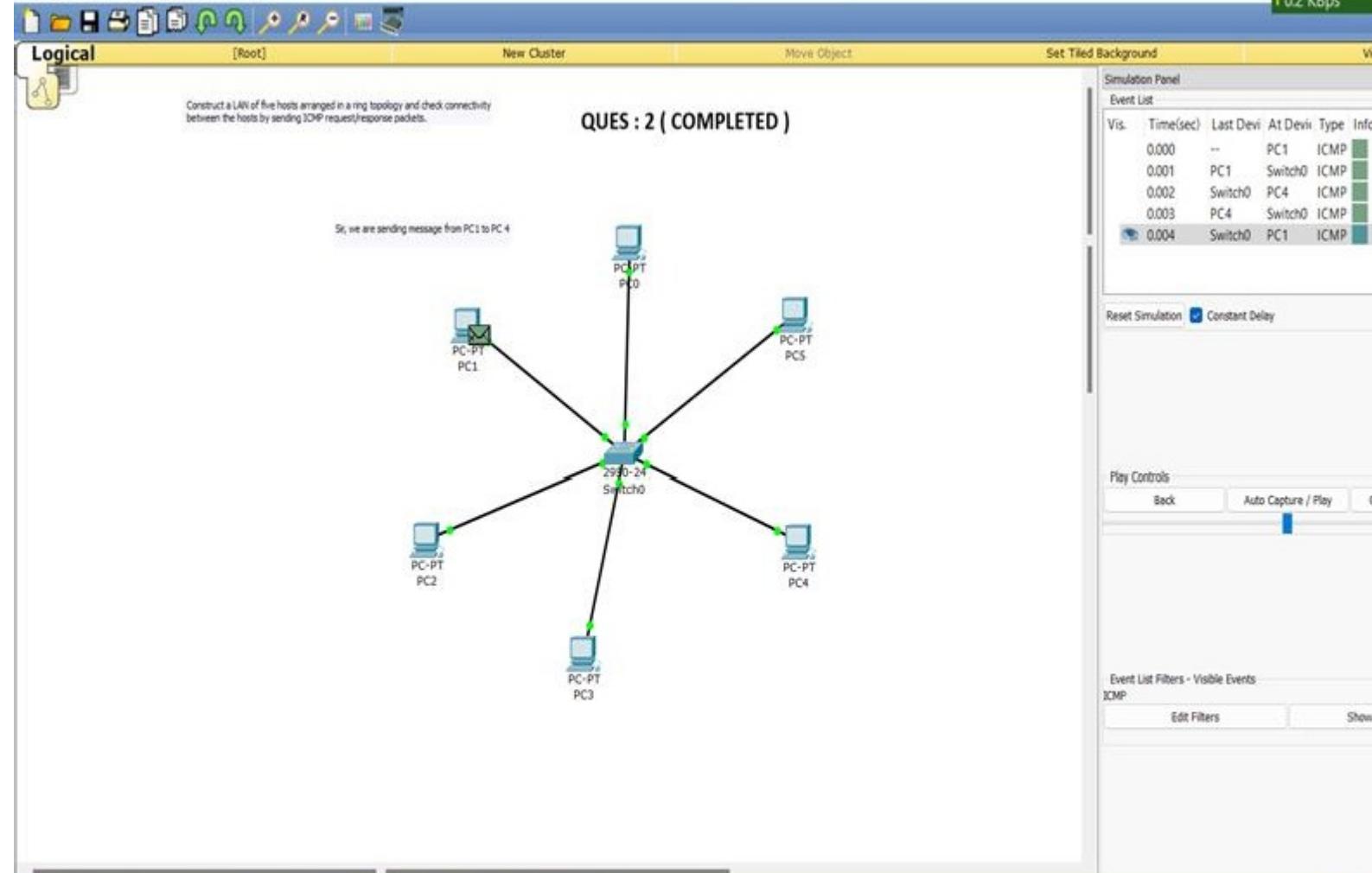
Time: 00:03:44

Power Cycle Devices Fast Forward Time



Connections

Automatically Choose Connection Type



Time: 00:04:01.083 Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward

Connections

Automatically Choose Connection Type

Scenario 0

New Delete Toggle PDU List Window

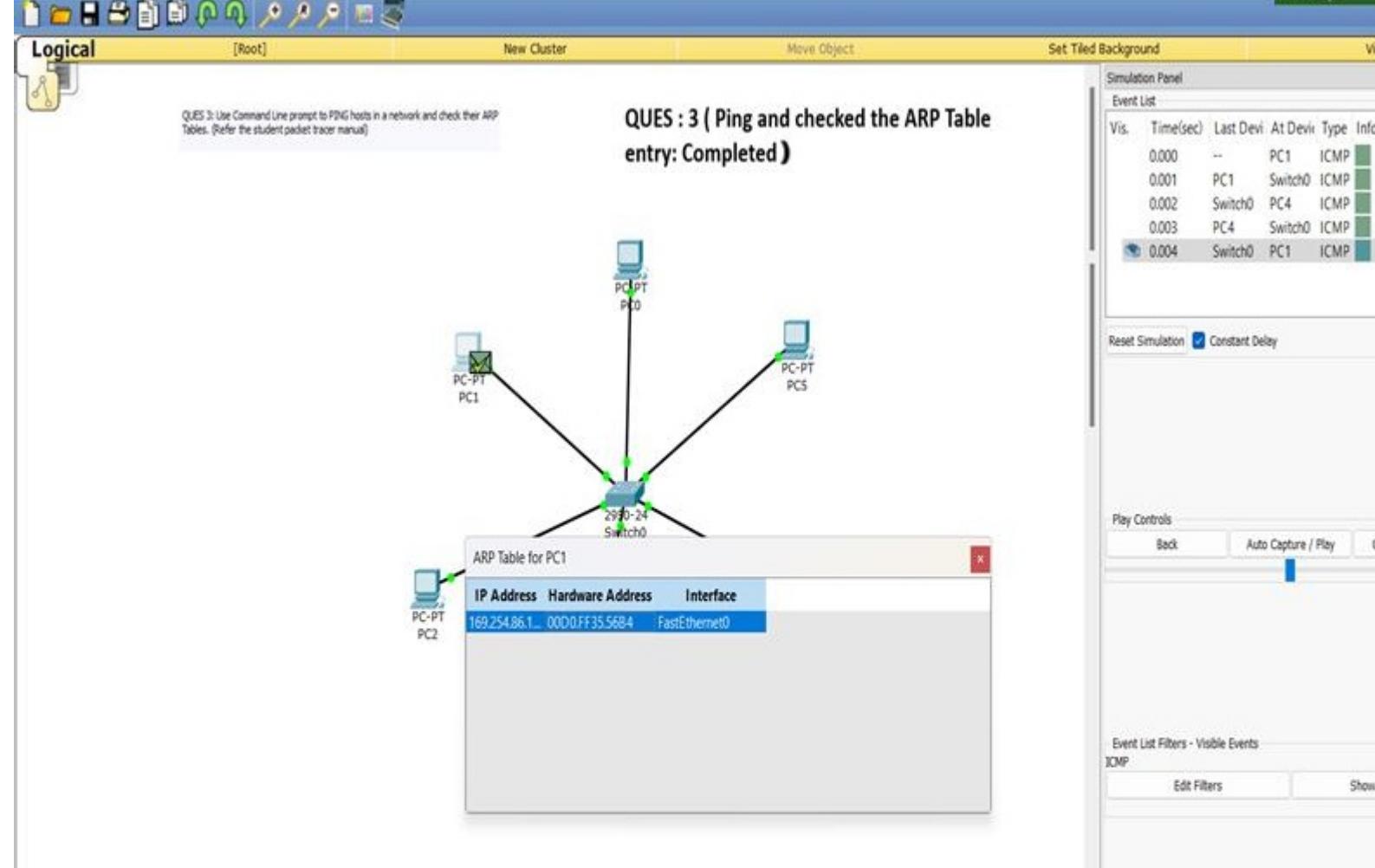
Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit Del

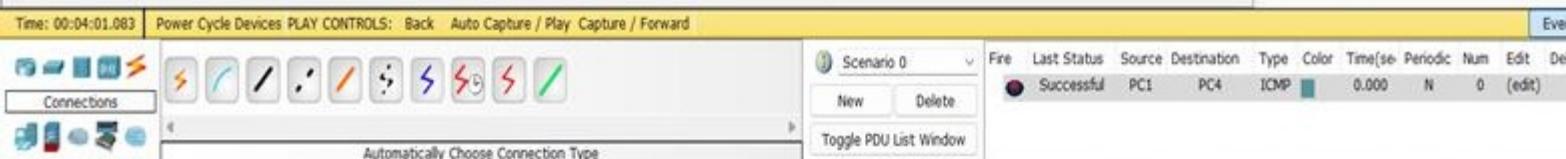
Successful PC1 PC4 ICMP 0.000 N 0 (edit)

Cisco Packet Tracer Student

File Edit Options View Tools Extensions Help

0.1 Kbps 0.1 Kbps





## Computer Networks Lab - PRACTICAL # 3

1. List 3 different protocols that appear in the protocol column in the unfiltered packet-listing window in step 7 above. Ans: TCP, ARP, HTTP, SSL
2. How long did it take from when the HTTP GET message was sent until the HTTP OK reply was received? (By default, the value of the Time column in the packet-listing window is the amount of time, in seconds, since Wireshark tracing began. To display the Time field in time-of-day format, select the Wireshark View pull down menu, then select Time Display Format, then select Time-of-day.)

Ans: Time taken in sending and receiving the HTTP messages:

HTTP GET message was sent at: 21:35:52.295390 HTTP OK reply was received at: 21:35:52.602691 Time taken = 21:35:52.602691 - 21:35:52.295390

= 0.307301 seconds

1. What is the Internet address of the gaia.cs.umass.edu (also known as www- net.cs.umass.edu)? What is the Internet address of your computer?

Ans: Internet address of the gaia.cs.umass.edu: 128.119.245.12

Internet address of MY computer: 172.16.224.2

1. Print the two HTTP messages (GET and OK) referred to in question 2 above. To do so, select Print from the wireshark File command menu, and select the “Selected Packet Only” and ‘Print as displayed’ radial buttons, and then click OK.

Ans.

GET messages:

No.	Time	Source	Destination	Protocol
563	2024-03-28 22:01:01.278016	2409:40e3:1040:2547:a4:3b9:948f:a540	64:ff9b::8077	wireshark-file1.html HTTP/1.1
Frame 563: 556 bytes on wire (4448 bits), 556 bytes captured (4448 bits) on interface \Device\NPF_{...}				
Ethernet II, Src: AzureWaveTec_1d:e4:35 (f8:54:f6:1d:e4:35), Dst: 62:c4:80:73:cb:17 (62:c4:80:73:cb:17)				
Internet Protocol Version 6, Src: 2409:40e3:1040:2547:a4:3b9:948f:a540, Dst: 64:ff9b::8077				
Transmission Control Protocol, Src Port: 58508, Dst Port: 80, Seq: 1, Ack: 1, Len: 482				
Hypertext Transfer Protocol				

OK Messages:

No.	Time	Source	Destination	Protocol
642	2024-03-28 22:01:02.946064	64:ff9b::8077:f50c	2409:40e3:1040:2547:a4:3b9:948f:a540	
Frame 642: 512 bytes on wire (4096 bits), 512 bytes captured (4096 bits) on interface \Device\NPF_{...}				
Ethernet II, Src: 62:c4:80:73:cb:17 (62:c4:80:73:cb:17), Dst: AzureWaveTec_1d:e4:35 (f8:54:f6:1d:e4:35)				
Internet Protocol Version 6, Src: 64:ff9b::8077:f50c, Dst: 2409:40e3:1040:2547:a4:3b9:948f:a540				
Transmission Control Protocol, Src Port: 80, Dst Port: 58508, Seq: 1, Ack: 483, Len: 438				
Hypertext Transfer Protocol				
Line-based text data: text/html (3 lines)				

# Computer Networks Lab - Assignment # 4

Cisco Packet Tracer:

Use Cisco Packet Tracer to construct two separate star networks comprising of four hosts each (Use hubs to create both the star networks). Now use a layer-2 switch to provide connectivity between both the star networks. Simulate the above network using ICMP request/response packets to perform the following:

1. Assign Static IP addresses (manual configuration) to the host devices. Apply ARP and ICMP filters before starting the simulation.
2. Check connectivity using ICMP/PING between any two hosts in the same star network (Do it for both star networks).
3. Check connectivity using ICMP/PING between a host of one star network and a host of the other star network.
4. Will there be any change in the nature of communication, if the layer-2 switch is replaced by a simple hub?
5. Check/Print ARP tables of all communicating hosts before and after sending of the ARP packets.
6. Check/Print MAC tables of all the switches before and after sending the ICMP request packet.
7. Print Ethernet Header and PDU of ARP request/response messages.
8. Print PDU of ICMP request/response messages.

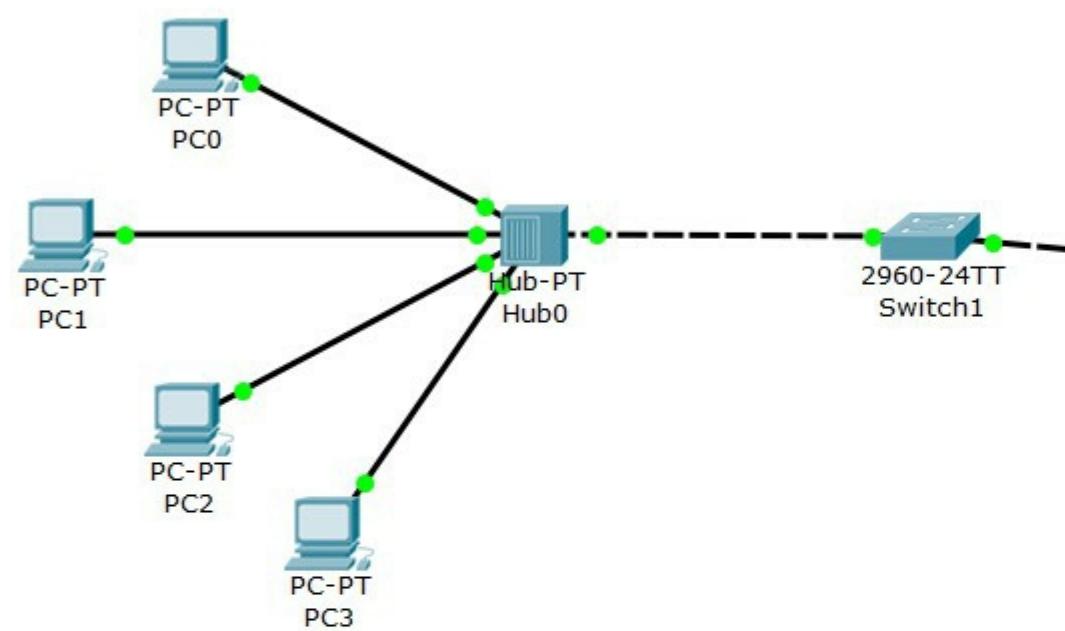
SOLUTION:



Logical

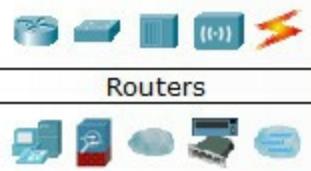
[Root]

New Cluster



Time: 00:01:37

Power Cycle Devices Fast Forward Time



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



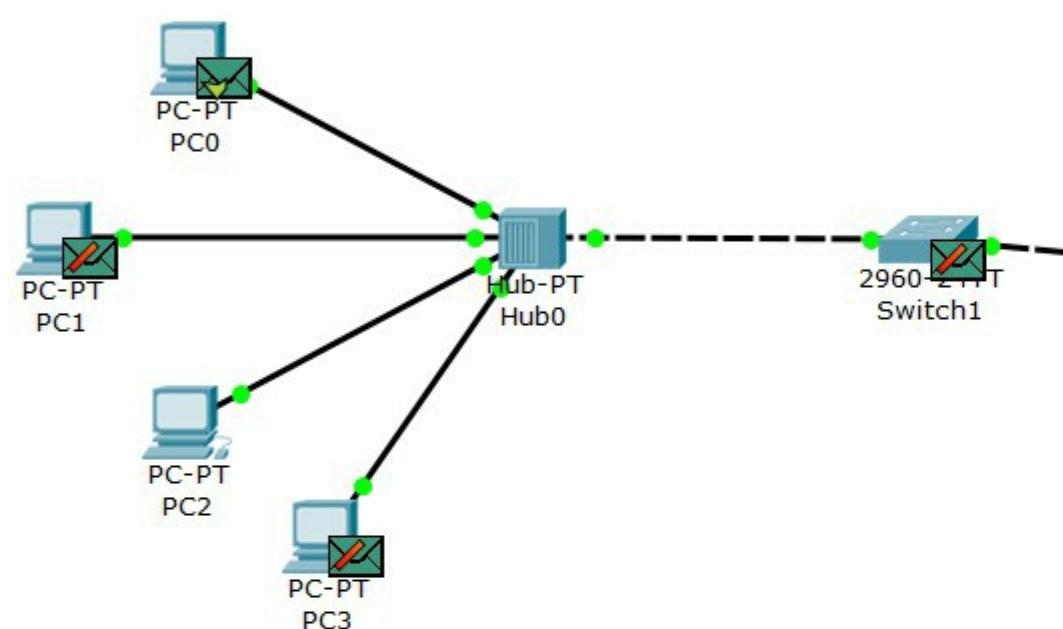
## Logical

[Root]

New Cluster



PART b



b)

c)



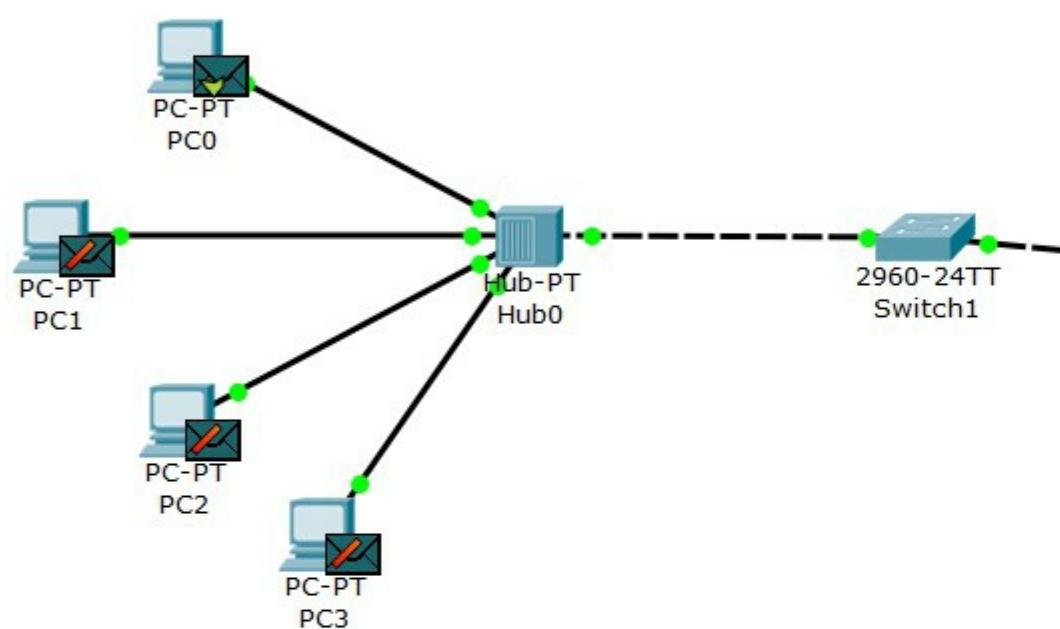
## Logical

[Root]

New Cluster



PART c

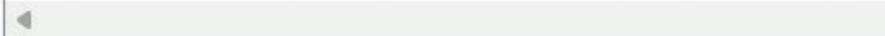


Time: 00:17:03.572

Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



Routers



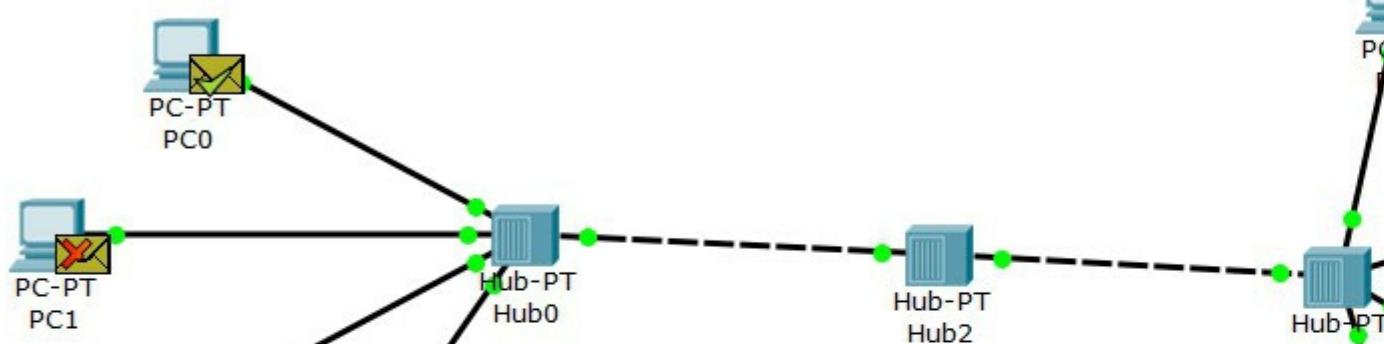
Router-PT-Empty



## Logical

[Root]

New Cluster



A hub is on the physical layer (layer 1) of the OSI model, so it can't process layer-2 or layer-3 traffic, or information based on IP or MAC addresses.

Time: 01:17:58.945

Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



d)

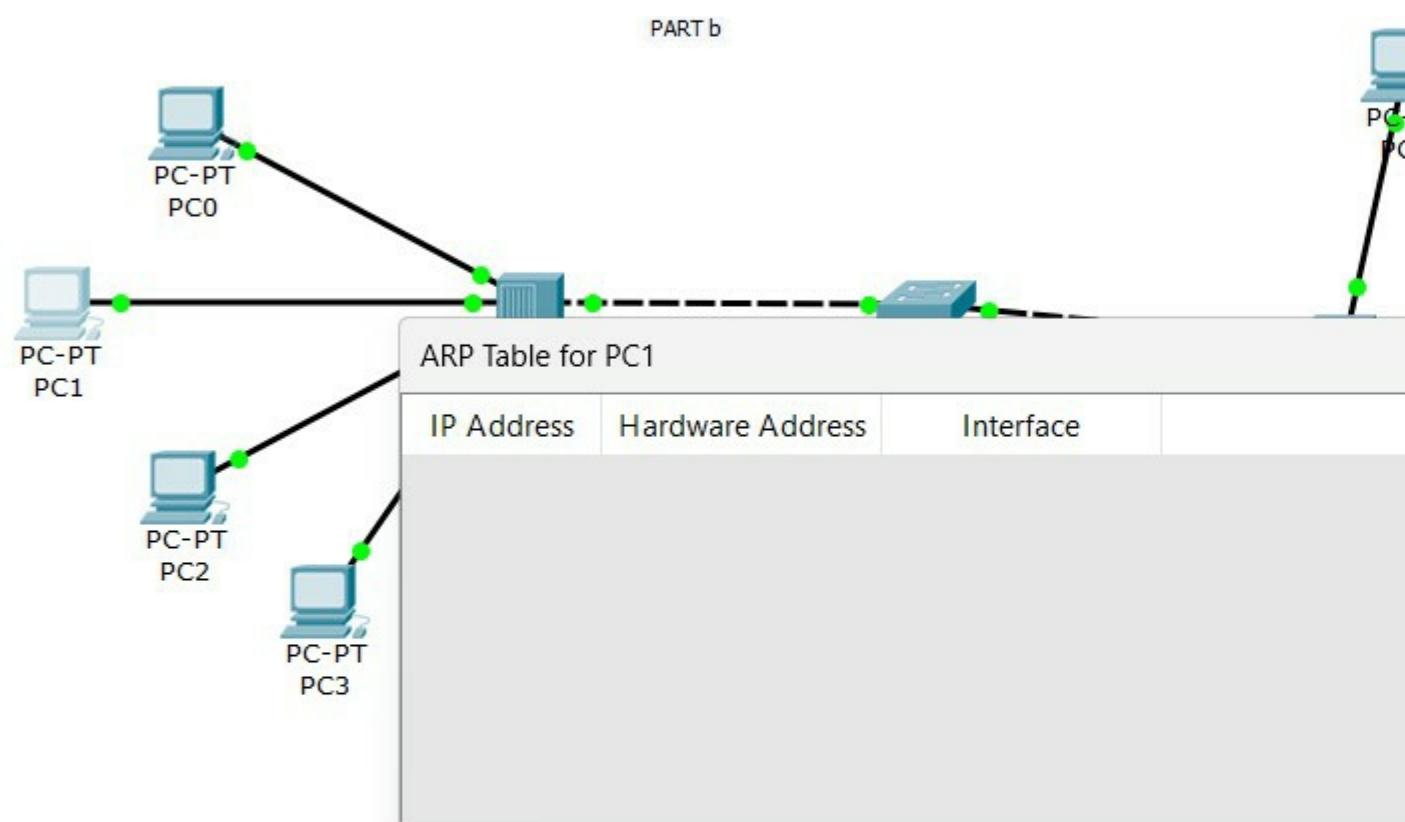
( BEFORE SENDING)



## Logical

[Root]

New Cluster



Time: 00:31:22.404

Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



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



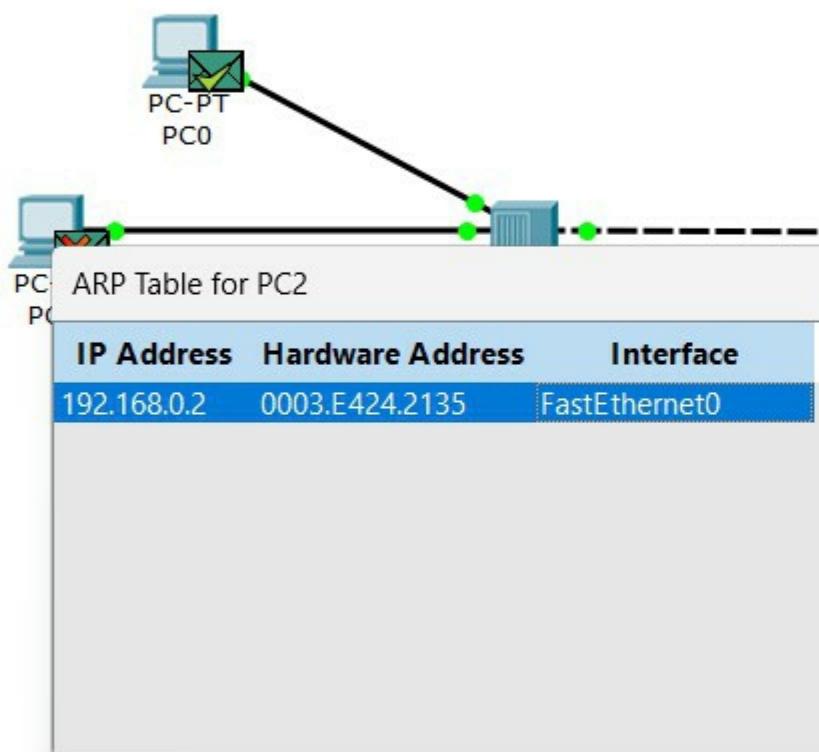
## Logical

[Root]

New Cl



PART b



Time: 00:14:10.555

Power Cycle Devices

PLAY CONTROLS: Back Auto Capture / Play Capt



Routers



1.

(AFTER SENDING)

2. (After SENDING)

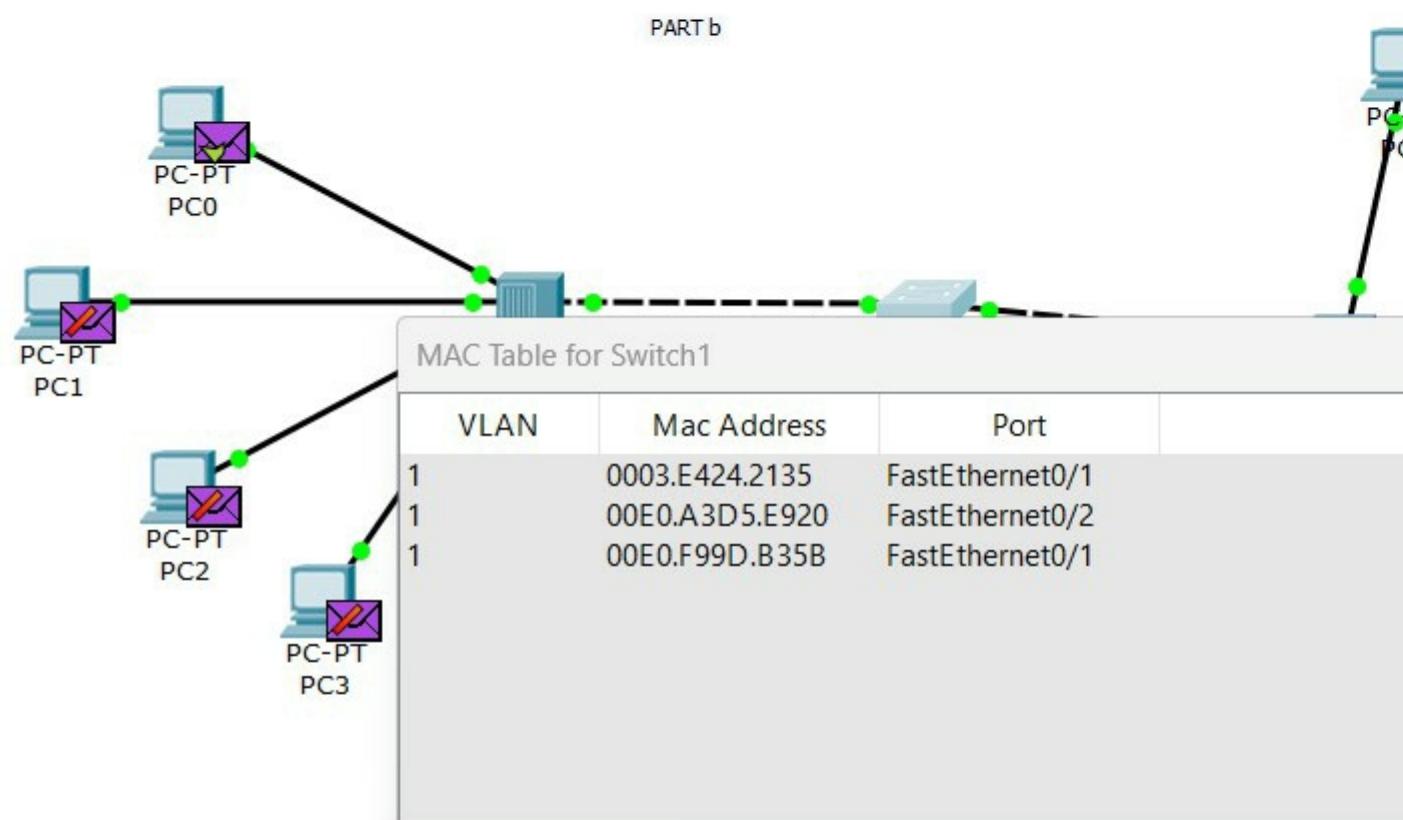
(Select a Device to Drag and Drop to the Worksp



## Logical

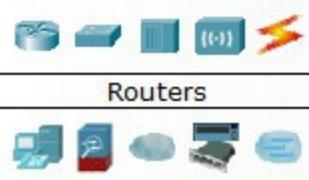
[Root]

New Cluster



Time: 00:34:22.408

Power Cycle Devices | PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



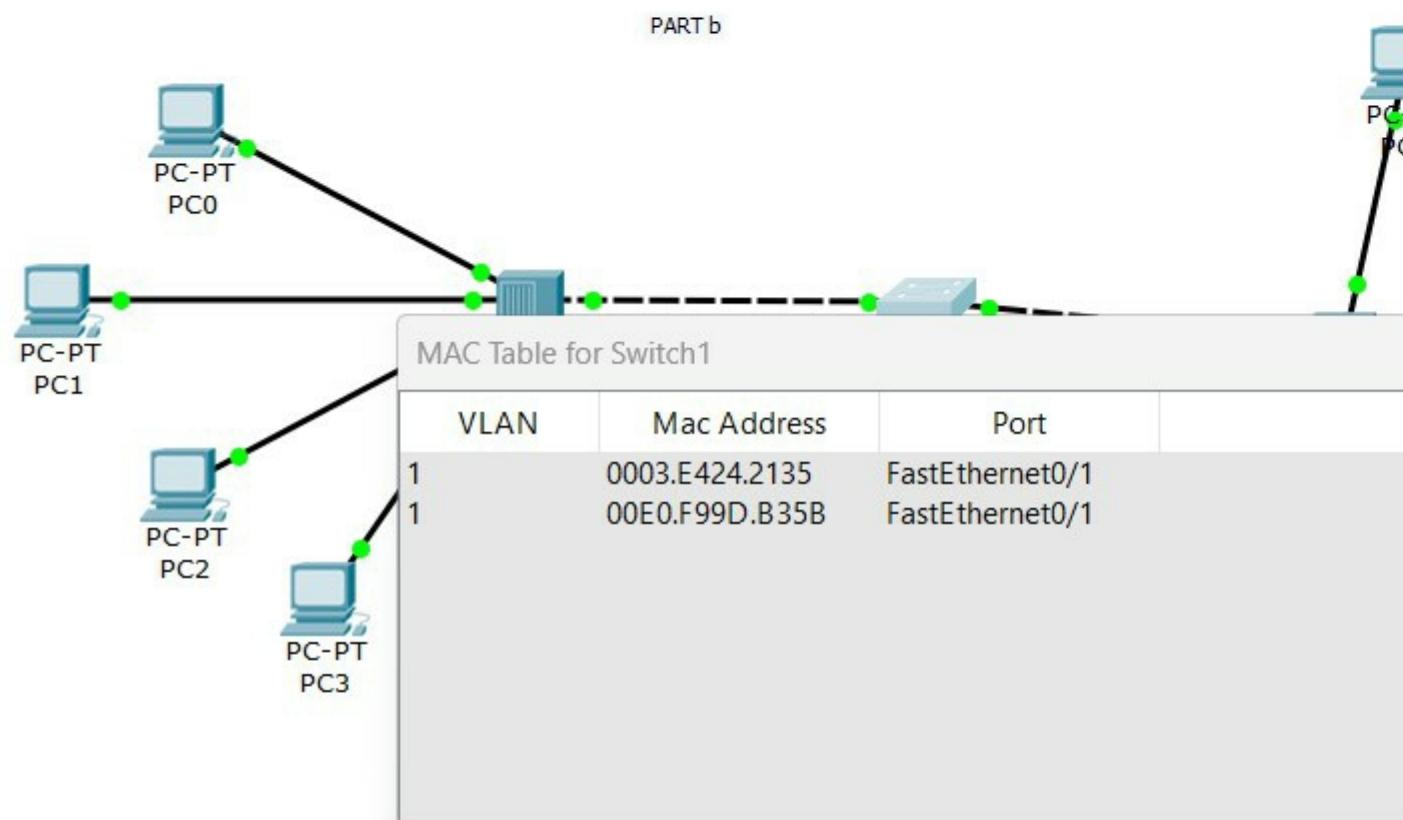
(Select a Device to Drag and Drop to the Workspace)



## Logical

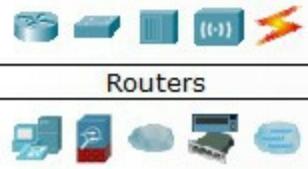
[Root]

New Cluster



Time: 00:31:52.329

Power Cycle Devices | PLAY CONTROLS: Back Auto Capture / Play Capture / Forward



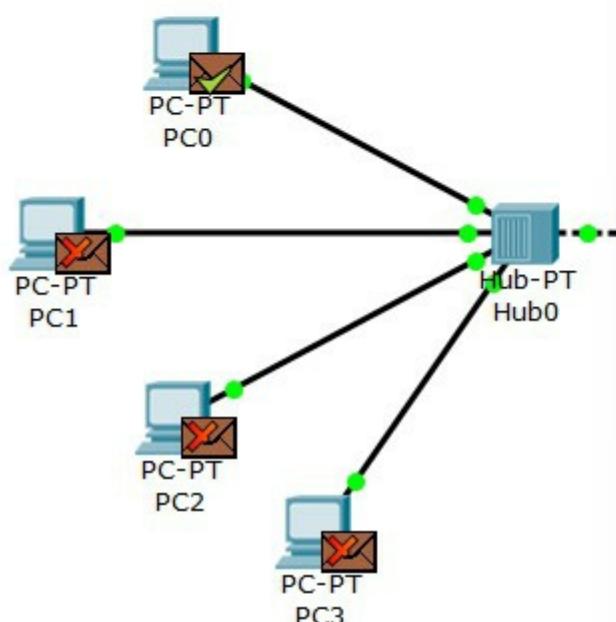
(Select a Device to Drag and Drop to the Workspace)

**(BEFORE SENDING)**

**Logical**

[Root]

New Cluster



## PDU Information at Device: PC0

OSI Model Inbound PDU Details

## PDU Formats

Ethernet II

0	4	8	
PREAMBLE:	101010...1011	DEST MAC:	0003.E424.2111
TYPE:	0x800	DATA (VARIABLE LENGTH)	

IP

0	4	8	16	19
4	IHL	DSCP: 0x0		
	ID: 0x2		0x0	
TTL: 128	PRO: 0x1			
	SRC IP: 192.168.0.			
	DST IP: 192.168.0.			
	OPT: 0x0			
	DATA (VARIABLE LENGTH)			

ICMP

0	8	16	
TYPE: 0x0	CODE: 0x0	CHECKSUM	
ID: 0x4		SEQ NUMBER	

Time: 00:51:00.698

Power Cycle Devices

PLAY CONTROLS: Back Auto Capture / Play Capture /



Routers



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

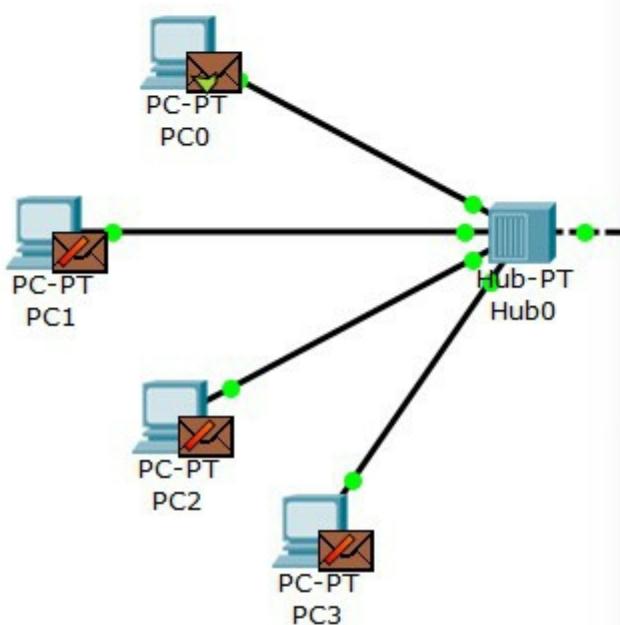
1.

( Ethernet header Information)

**Logical**

[Root]

New Cluster

**PDU Information at Device: PC0****OSI Model    Inbound PDU Details**

**At Device: PC0**  
**Source:** PC0  
**Destination:** PC5

**In Layers**

Layer7  
 Layer6  
 Layer5  
 Layer4

**Layer 3: IP Header** Src. IP: 192.168.0.7, Dest. IP: 192.168.0.2  
**ICMP Message Type:** 0  
**Layer 2: Ethernet II Header**  
 00E0.A399.C23A >>  
 0003.E424.2135  
**Layer 1: Port** FastEthernet0

1. FastEthernet0 receives the frame.

**Out Layers**

Layer7  
 Layer6  
 Layer5  
 Layer4  
 Layer3  
 Layer2  
 Layer1

**Challenge Me**

&lt;&lt; Previous

Time: 00:51:00.698

Power Cycle Devices

PLAY CONTROLS: Back

Auto Capture / Play Capture / Forward



1.

(PDU Information)

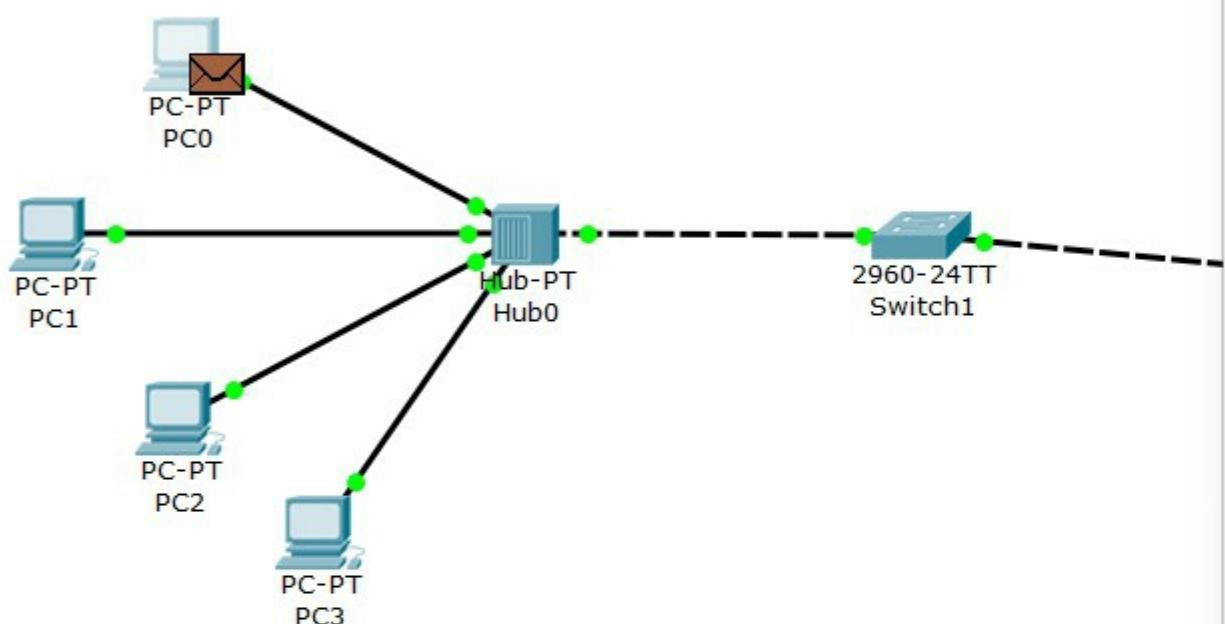
(Select a Device to Drag and Drop to the Workspace)



## Logical

[Root]

New Cluster



PDU I

OSI I

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IP ad

4. T

5. T

next

Chal

Time: 00:51:00.698 | Power Cycle Devices | PLAY CONTROLS: Back Auto Capture / Play Capture / Forward

Routers

1841	1941	2620XM	2621XM	2811	2901	2911	819	Generic	Generic
------	------	--------	--------	------	------	------	-----	---------	---------

2. ( PDU of ICMP )

- 1. What is the 48-bit Ethernet address of your computer? Ans. Source: AmbitMicrosy\_a9:3d:68 (00:d0:59:a9:3d:68)
  2. What is the 48-bit destination address in the Ethernet frame? Is this the Ethernet address of gaia.cs.umass.edu? (Hint: the answer is no). What device has this as its Ethernet address?

Ans. Address Destination: LinksysGroup\_da:af73 (00:06:25:da:af:73)

The destination MAC address in the Ethernet frame is "00:06:25:da:af:73." This MAC address does not correspond to the Ethernet address of "gaia.cs.umass.edu.

- 1. Give the hexadecimal value for the two-byte Frame type field. What upper layer protocol does this correspond to?

Ans. Type: IPv4 (0x0800)

The hexadecimal value for the two-byte Frame type field in the Ethernet II frame is "0800."

This corresponds to the IPv4 protocol at the upper layer. In Ethernet II frames, the Frame type field specifies the protocol of the payload encapsulated within the Ethernet frame. "0800" indicates that the payload is an IPv4 packet.

- 1. How many bytes from the very start of the Ethernet frame does the ASCII "G" in "GET" appear in the Ethernet frame? Next, answer the following questions, based on the contents of the Ethernet frame containing the first byte of the HTTP response message:

Ans. The ASCII "G" in "GET" appears 55<sup>th</sup> byte from the very start of the Ethernet frame.

- 1. What is the value of the Ethernet source address? Is this the address of your computer, or of gaia.cs.umass.edu? (Hint: the answer is no). What device has this as its Ethernet address?

Ans. The value of the Ethernet source address is 00:06:25:da:af:73. This is not the address of my computer, nor is it the address of gaia.cs.umass.edu. This address belongs to the device with the manufacturer identified as LinksysGroup.

- 1. What is the destination address in the Ethernet frame? Is this the Ethernet address of your computer?

Ans. The destination address in the Ethernet frame is 00:d0:59:a9:3d:68. No, this is not the Ethernet address of my computer.

- 1. Give the hexadecimal value for the two-byte Frame type field. What upper layer protocol does this correspond to?

Ans. The hexadecimal value for the two-byte Frame type field is 0x0800. This corresponds to the upper layer protocol IPv4.

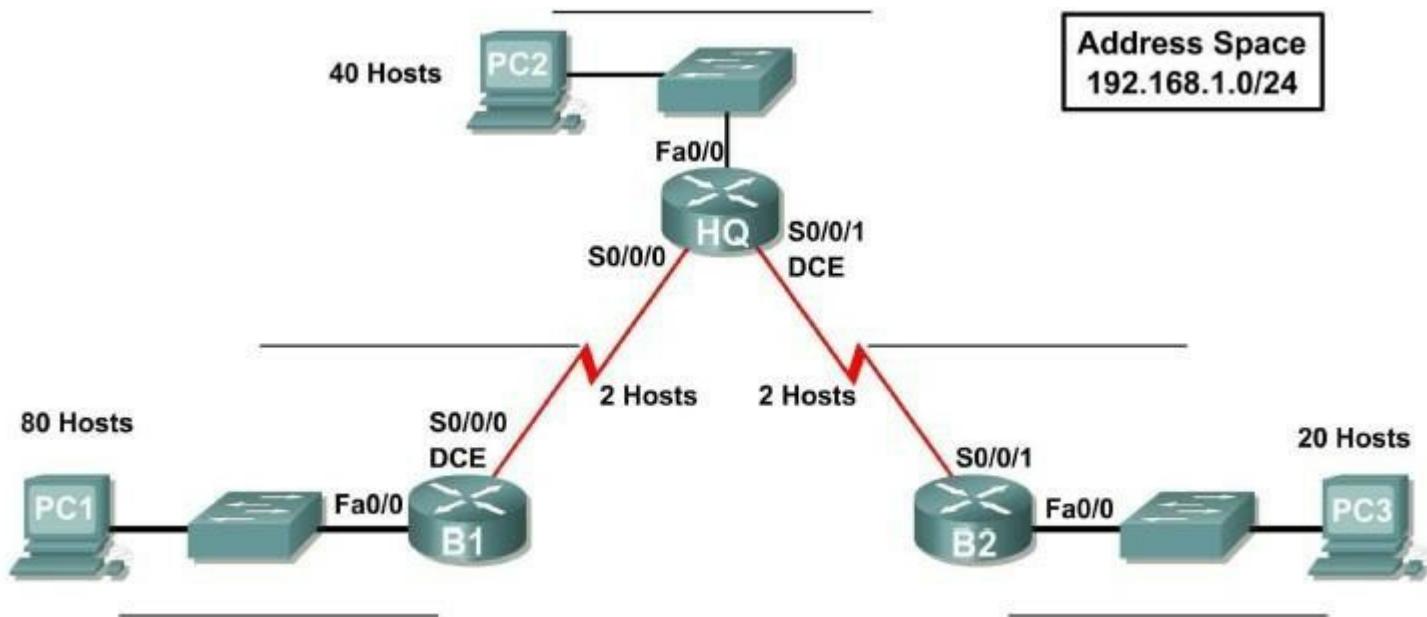
- 1. How many bytes from the very start of the Ethernet frame does the ASCII "O" in "OK" (i.e., the HTTP response code) appear in the Ethernet frame?

Ans. The ASCII "O" in "OK" (HTTP response code) appears in the Ethernet frame at byte offset 0x002E. This corresponds to byte 46 in decimal.

#### Computer Networks Lab - Assignment # 7

**Basic Subnetting and Routing Exercise:** Use Cisco Packet Tracer to perform subnetting of the given address space. Assign IP addresses to hosts in all the subnets and also to all the router interfaces. Also construct routing tables of each router and test

for end-to-end connectivity.



Objectives:

- - 
  - Design and document an addressing scheme based on requirements.
  - Apply a basic configuration to the devices.
  - Select appropriate equipment and cable the devices.
  - Verify full connectivity between all devices in the topology.
  - Identify layer 2 and layer 3 addresses used to switch packets.
  - Test End to End Connectivity

Note:

1. Use Fixed Length Subnet Masking to perform IP subnetting
2. Repeat the exercise with Variable Length Subnet Masking to perform IP subnetting

## SOLUTION

Basic Subnetting and Routing Exercise Given Address Space: 192.168.1.0/24 **Fixed Length Subnet Masking (FLSM):**

**Determine the number of subnets and hosts:**

- - we need 4 subnets with equal number of hosts.
  - Subnet mask: /26 (255.255.255.192)
  - Each subnet can host up to 62 hosts.

**Subnets:**

- - **Subnet 1:** 192.168.1.0/26
    - Network Address: 192.168.1.0
    - Broadcast Address: 192.168.1.63
    - Host Range: 192.168.1.1 - 192.168.1.62
  - **Subnet 2:** 192.168.1.64/26
    - Network Address: 192.168.1.64
    - Broadcast Address: 192.168.1.127
    - Host Range: 192.168.1.65 - 192.168.1.126

- **Subnet 3:** 192.168.1.128/26
  - Network Address: 192.168.1.128
  - Broadcast Address: 192.168.1.191
  - Host Range: 192.168.1.129 - 192.168.1.190
- **Subnet 4:** 192.168.1.192/26
  - Network Address: 192.168.1.192
  - Broadcast Address: 192.168.1.255
  - Host Range: 192.168.1.193 - 192.168.1.254

## Variable Length Subnet Masking (VLSM):

1. **Determine subnets based on host requirements:**
  - different subnets need different number of hosts.

## Subnets:

- - **Subnet 1:** Requires 50 hosts
    - Subnet Address: 192.168.1.0/26
    - Network Address: 192.168.1.0
    - Broadcast Address: 192.168.1.63
    - Host Range: 192.168.1.1 - 192.168.1.62
  - **Subnet 2:** Requires 30 hosts
    - Subnet Address: 192.168.1.64/27
    - Network Address: 192.168.1.64
    - Broadcast Address: 192.168.1.95
    - Host Range: 192.168.1.65 - 192.168.1.94
  - **Subnet 3:** Requires 10 hosts
    - Subnet Address: 192.168.1.96/28
    - Network Address: 192.168.1.96
    - Broadcast Address: 192.168.1.111
    - Host Range: 192.168.1.97 - 192.168.1.110
  - **Subnet 4:** Requires 5 hosts
    - Subnet Address: 192.168.1.112/29
    - Network Address: 192.168.1.112
    - Broadcast Address: 192.168.1.119
    - Host Range: 192.168.1.113 - 192.168.1.118

## Router Configuration:

- - we have routers connecting each subnet.

## IP Addresses:

### Router 1 Interfaces:

- - - G0/0: 192.168.1.1/26
    - G0/1: 192.168.1.65/26

### Router 2 Interfaces:

- G0/0: 192.168.1.129/26
- G0/1: 192.168.1.193/26

## Host Configuration:

- Assign IPs to hosts within each subnet range.

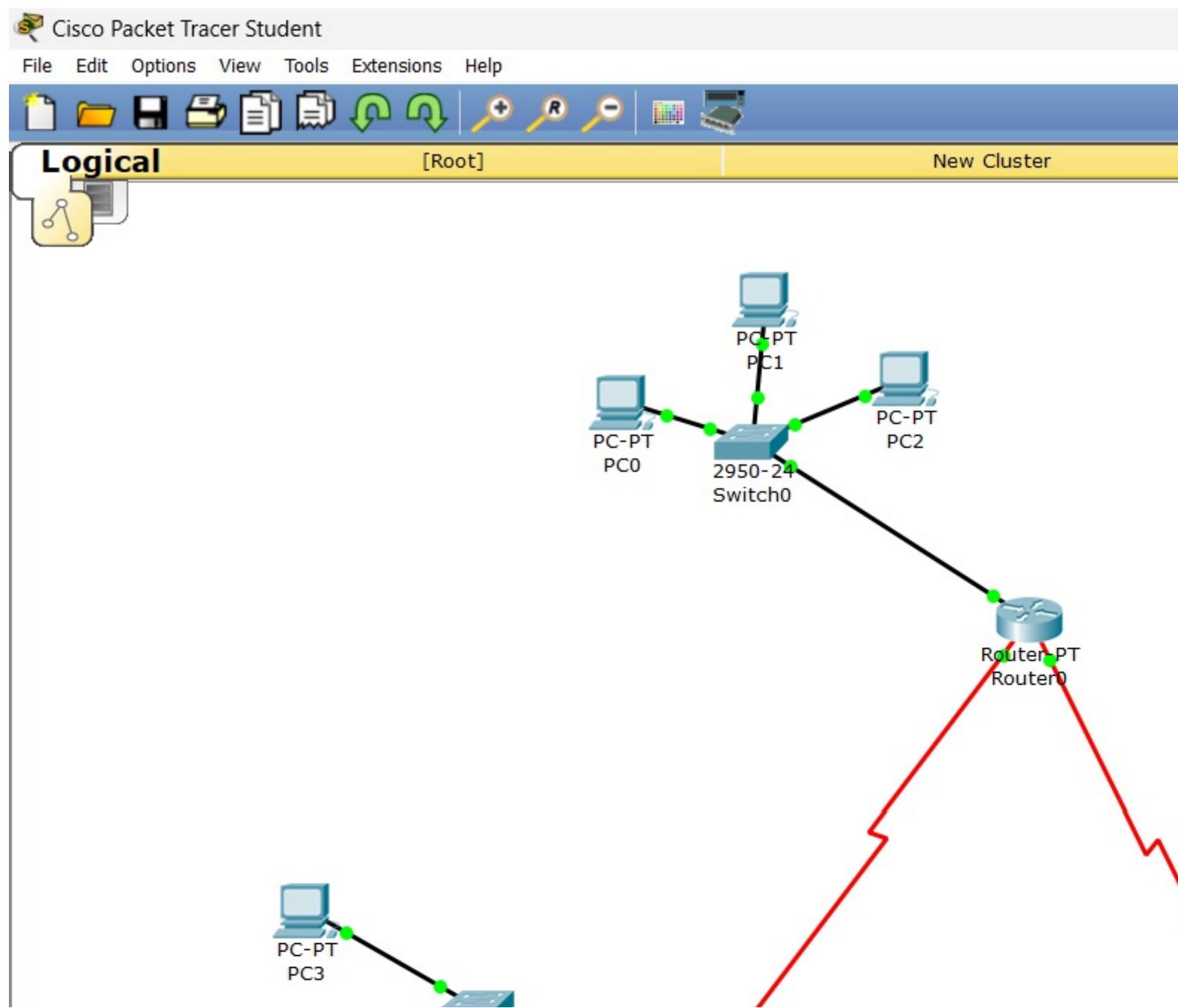
## Routing Tables

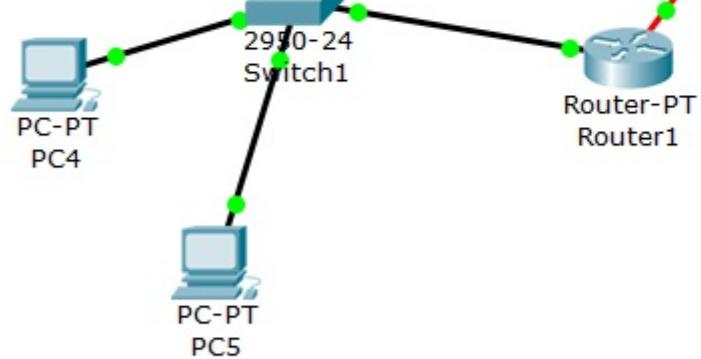
### Router 1:

- ip route 192.168.1.128 255.255.255.192 G0/1
- ip route 192.168.1.192 255.255.255.192 G0/1

### Router 2:

- ip route 192.168.1.0 255.255.255.192 G0/0
- ip route 192.168.1.64 255.255.255.192 G0/0





Time: 00:43:03 Power Cycle Devices Fast Forward Time



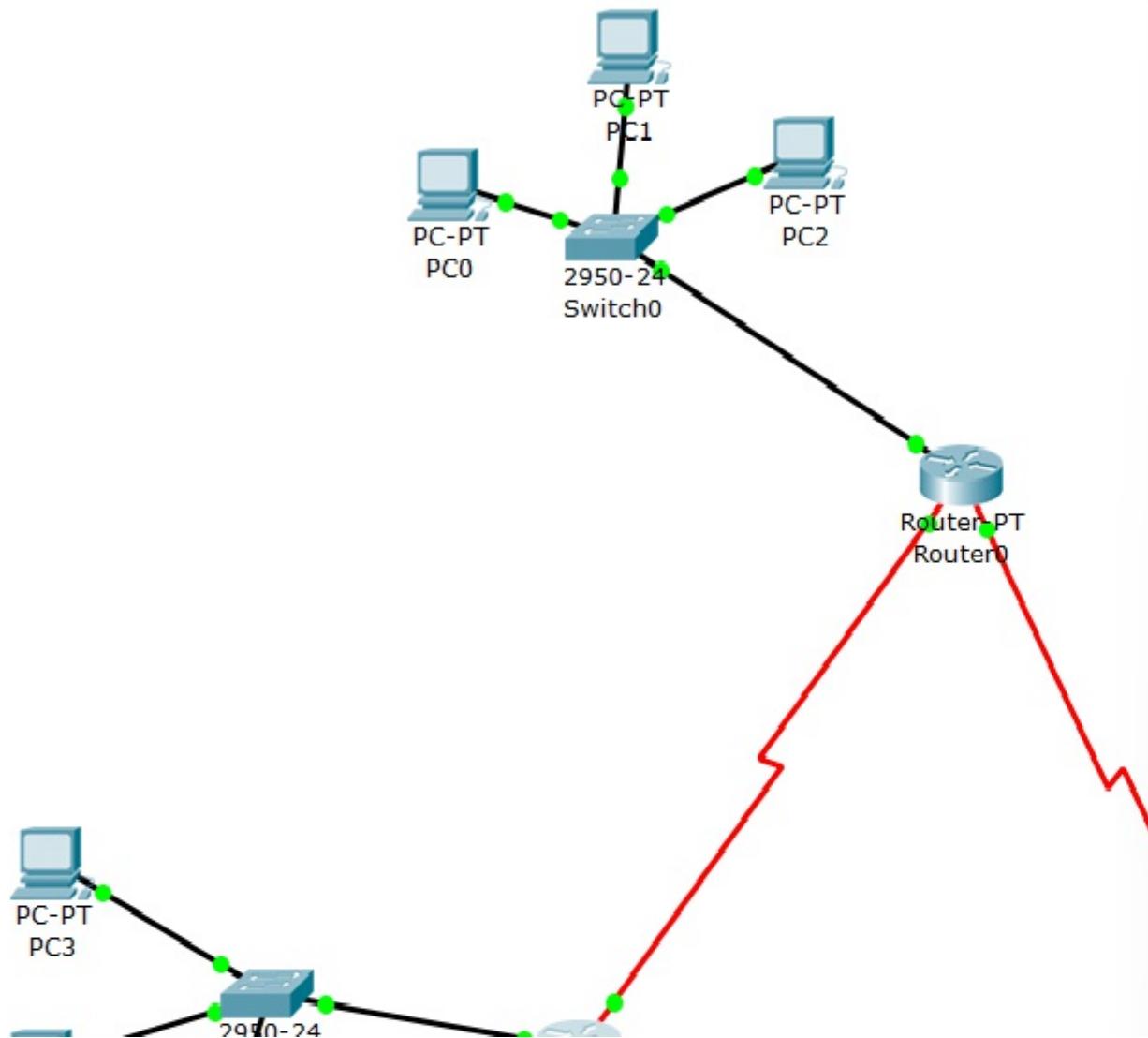
File Edit Options View Tools Extensions Help

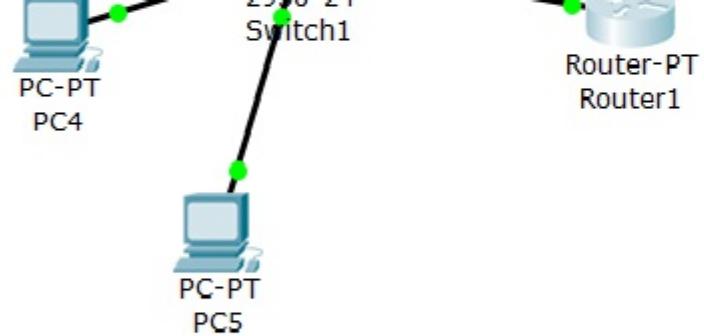


Logical

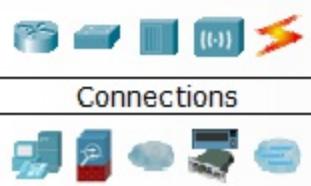
[Root]

New Cluster





Time: 00:52:58 | Power Cycle Devices Fast Forward Time

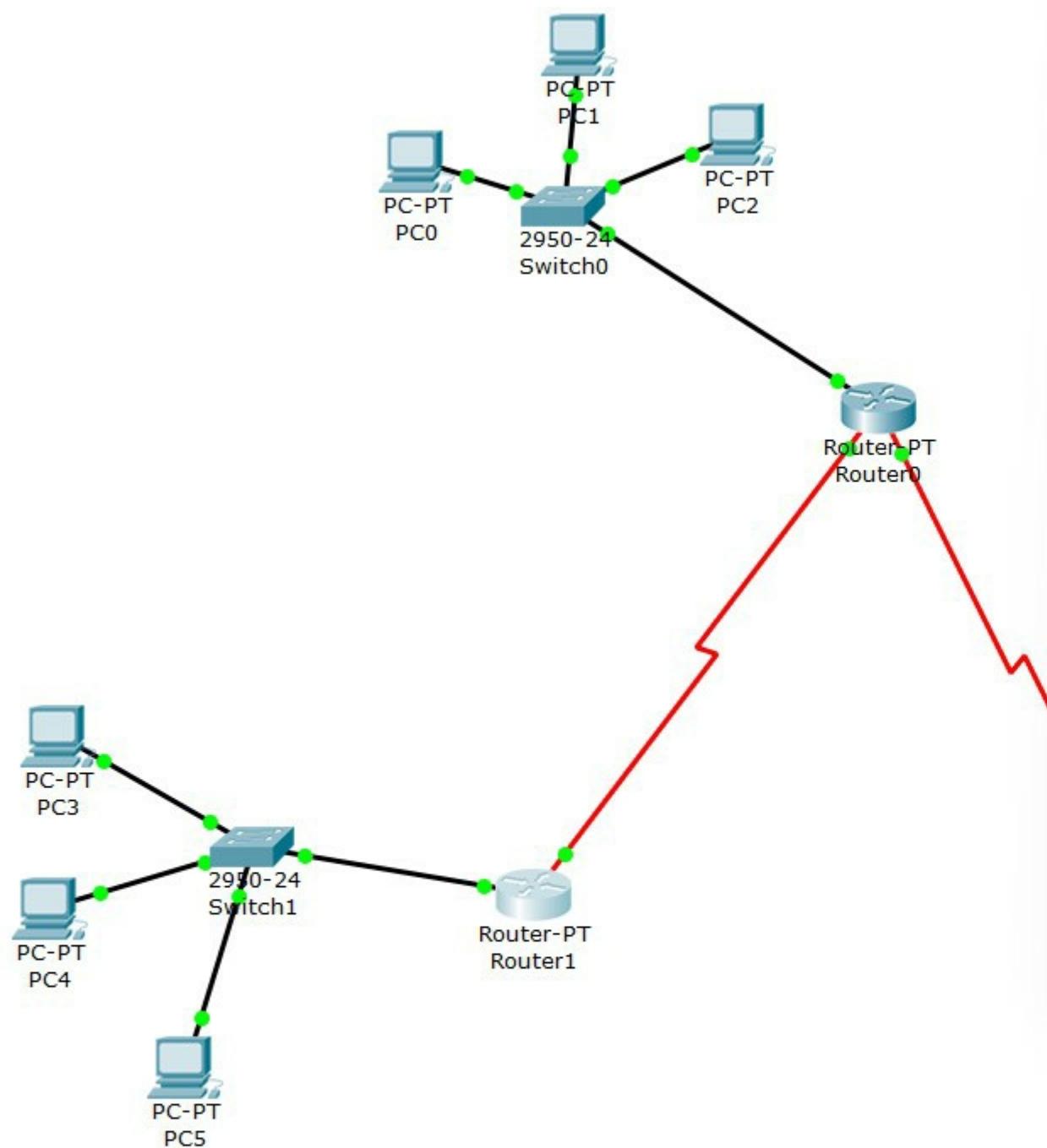




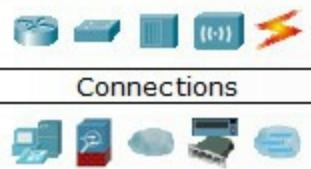
## Logical

[Root]

New Cluster



Time: 00:53:21 Power Cycle Devices Fast Forward Time



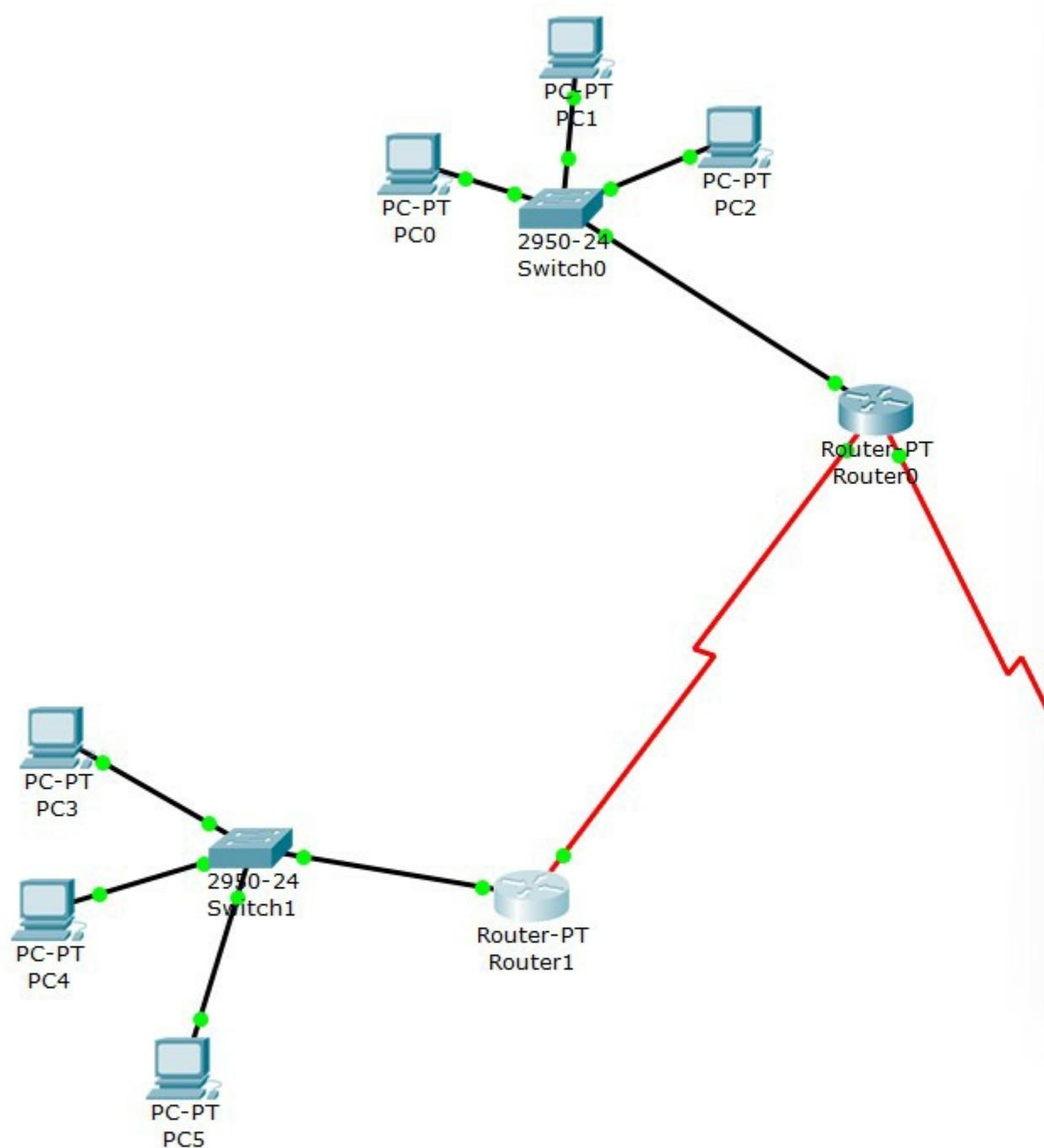
Serial DTE



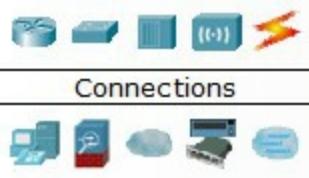
## Logical

[Root]

New Cluster

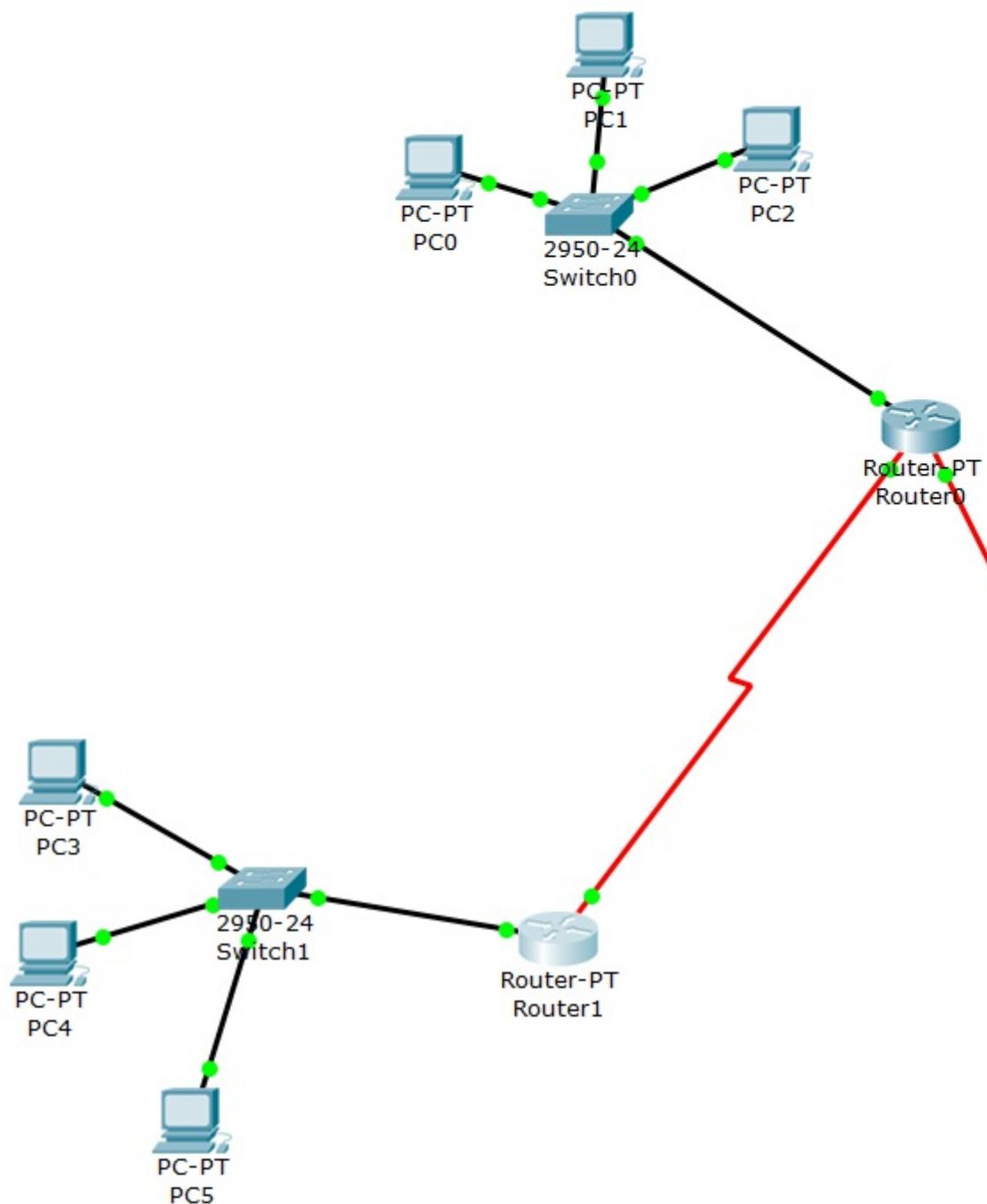


Time: 00:54:09 Power Cycle Devices Fast Forward Time



Serial DTE





Time: 00:55:07

Power Cycle Devices Fast Forward Time



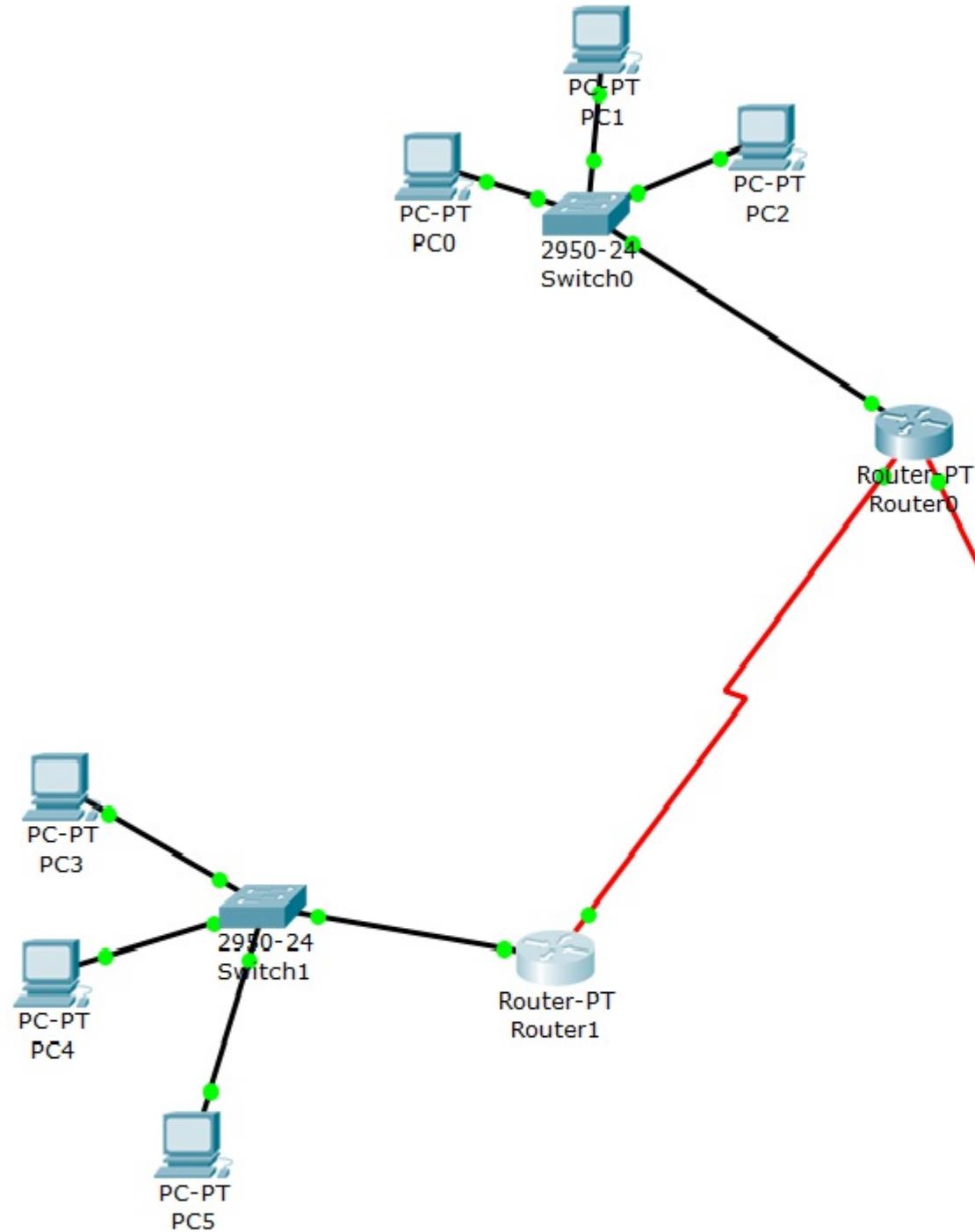
Connections



Serial DTE

File Edit Options View Tools Extensions Help





Time: 00:56:25 Power Cycle Devices Fast Forward Time

