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1.5 Design a Hybrid topology with switches and routers

Design and configure a fully connected Hybrid Network in CISCO Packet Tracer and ensure all devices can communicate with each other.

Requirements:

1. Detailed Network Design(Screenshot from CISCO)
2. Basic setup
    1. What devices are added to the workspace in CISCO Packet Tracer?
    2. What are the steps to connect each device to every other device using appropriate cables?
3. MAC and IP address configuration
    1. How do you assign an IP address to each device in Hybrid Network? Mention the both IP and MAC address of each device from your network.
    2. Mention the configuration made on routers with different interfaces.
    3. What subnet mask should be used for the given IP address?
4. Verification
    1. How can you verify the connectivity between devices using the command?
    2. What steps would you take if a device does not respond to a ping request?
5. Status of packet transmission (screenshot of workspace along with status panel)

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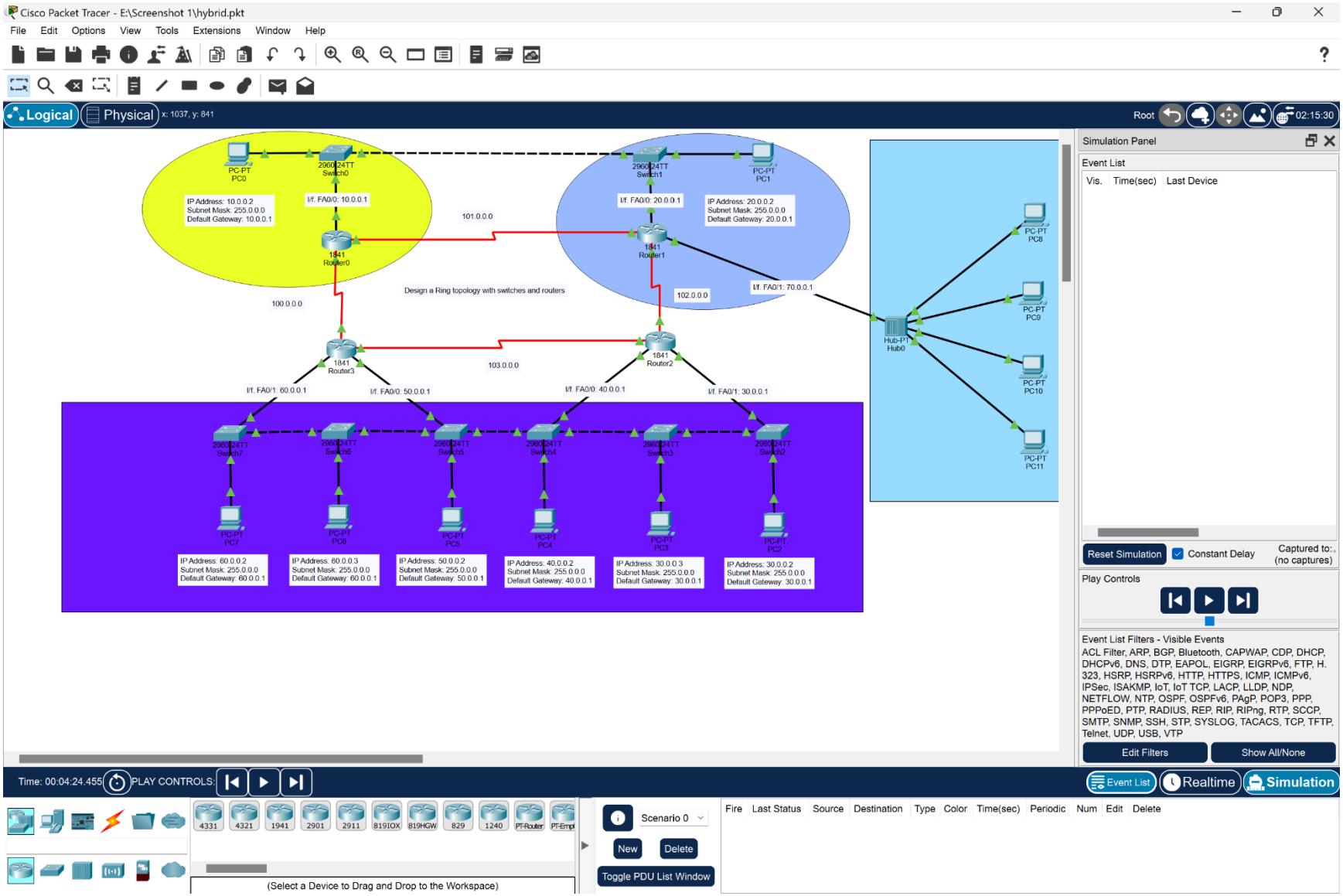
1. Detailed Network Design(Screenshot from CISCO)



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2. Basic setup

a. What devices are added to the workspace in CISCO Packet Tracer?

- The devices used are:
  - 8 Switches
  - 4 Routers
  - 12 PCs
  - 1 Hub

b. What are the steps to connect each device to every other device using appropriate cables?

- Connect each Router to a Switch using a Copper Straight-through cable.
- Connect each Switch to a PC using Copper Straight-through cables.
- Connect the Routers to each other using Serial cables to establish communication between them.

3. MAC and IP address configuration

a. How do you assign an IP address to each device in the Bus Network? Mention both the IP and MAC addresses of each device from your network.

- PCs and Laptops:
  - Click on a PC or Laptop.
  - Go to the "Desktop" tab.
  - Open the "IP Configuration" tool.
  - Assign an IP address and subnet mask.
    - PC0: IP Address: 10.0.0.2, MAC Address: 0030.F2D3.9868
    - PC1: IP Address: 20.0.0.2, MAC Address: 0005.5E0C.A61C
    - PC2: IP Address: 30.0.0.2, MAC Address: 00E0.8FD7.7B36
    - PC3: IP Address: 30.0.0.3, MAC Address: 0001.97ED.026E
    - PC4: IP Address: 40.0.0.2, MAC Address: 0001.6446.2110
    - PC5: IP Address: 50.0.0.2, MAC Address: 0030.F233.6506
    - PC6: IP Address: 60.0.0.3, MAC Address: 0030.A3EE.8B96
    - PC7: IP Address: 60.0.0.2, MAC Address: 00E0.F725.9DD7
    - PC8: IP Address: 70.0.0.2, MAC Address: 0001.C908.E6C4
    - PC9: IP Address: 70.0.0.3, MAC Address: 000A.41C2.56D4
    - PC10: IP Address: 70.0.0.4, MAC Address: 000D.BD4D.A166
    - PC11: IP Address: 70.0.0.5, MAC Address: 00E0.A3A8.4B9C

- Routers:
  - Router0:
    - I/f. FA0/0: IP Address: 10.0.0.1, MAC Address: 00E0.A3BA.8C01
    - I/f. Se0/0/0: IP Address: 100.0.0.2
    - I/f. Se0/0/1: IP Address: 101.0.0.1
    - RIP: 10.0.0.0, 100.0.0., 101.0.0.0

- Router1:
  - I/f. FA0/0: IP Address: 20.0.0.1, MAC Address: 0002.1704.1501
  - I/f. FA0/1: IP Address: 70.0.0.1, MAC Address: 0002.1704.1502
  - I/f. Se0/0/0: IP Address: 102.0.0.1
  - I/f. Se0/0/1: IP Address: 101.0.0.2
  - RIP: 20.0.0.0,70.0.0.0, 101.0.0., 102.0.0.0
- Router2:
  - I/f. FA0/1: IP Address: 30.0.0.1, MAC Address: 0000.0C90.5602
  - I/f. FA0/0: IP Address: 40.0.0.1, MAC Address: 0000.0C90.5601
  - I/f. Se0/0/0: IP Address: 102.0.0.2
  - I/f. Se0/0/1: IP Address: 103.0.0.1
  - RIP: 30.0.0.0, 40.0.0.0, 102.0.0., 103.0.0.0
- Router3:
  - I/f. FA0/0: IP Address: 50.0.0.1, MAC Address: 0040.0BAB.5601
  - I/f. FA0/1: IP Address: 60.0.0.1, MAC Address: 0040.0BAB.5602
  - I/f. Se0/0/0: IP Address: 100.0.0.1
  - I/f. Se0/0/1: IP Address: 103.0.0.2
  - RIP: 50.0.0.0, 60.0.0.0, 100.0.0., 103.0.0.0

b. Mention the configuration made on routers with different interfaces.

- Added HWIC-2T Module
- Set Respective FA0/0 and FA0/1
- Set Respective Se0/0/0 and Se0/0/1
- Set all the RIP Routing.

c. What subnet mask should be used for the given IP address?

Devices		Subnet - Mask
PC	PC0	255.0.0.0
	PC1	
	PC2	
	PC3	
	PC4	
	PC5	
	PC6	
	PC7	
	PC8	

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Devices		Subnet - Mask
	PC9	
	PC10	
	PC11	

4. Verification

a. How can you verify the connectivity between devices using the command?

- Open the Command Prompt on a PC or Laptop.
- Use the ping command to test connectivity. For example:

```
Unset
ping ip-address-of-the-target
```

- Some Examples:
  - Pinging 10.0.0.2 to 20.0.0.2

```
C:\>ping 20.0.0.2

Pinging 20.0.0.2 with 32 bytes of data:

Reply from 20.0.0.2: bytes=32 time=1ms TTL=126
Reply from 20.0.0.2: bytes=32 time=1ms TTL=126
Reply from 20.0.0.2: bytes=32 time=1ms TTL=126
Reply from 20.0.0.2: bytes=32 time=1ms TTL=126

Ping statistics for 20.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

  - Pinging 20.0.0.2 to 30.0.0.3

```
C:\>ping 30.0.0.3

Pinging 30.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 30.0.0.3: bytes=32 time=39ms TTL=125
Reply from 30.0.0.3: bytes=32 time=2ms TTL=125
Reply from 30.0.0.3: bytes=32 time=10ms TTL=125

Ping statistics for 30.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 39ms, Average = 17ms
```

- Pinging 40.0.0.2 to 60.0.0.2

```
C:\>ping 60.0.0.2

Pinging 60.0.0.2 with 32 bytes of data:

Reply from 60.0.0.2: bytes=32 time=27ms TTL=126
Reply from 60.0.0.2: bytes=32 time=20ms TTL=126
Reply from 60.0.0.2: bytes=32 time=1ms TTL=126
Reply from 60.0.0.2: bytes=32 time=2ms TTL=126

Ping statistics for 60.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 27ms, Average = 12ms
```

- Pinging 50.0.0.2 to 10.0.0.2

```
C:\>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=1ms TTL=126
Reply from 10.0.0.2: bytes=32 time=2ms TTL=126
Reply from 10.0.0.2: bytes=32 time=1ms TTL=126
Reply from 10.0.0.2: bytes=32 time=1ms TTL=126

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 2ms, Average = 1ms
```

b. What steps would you take if a device does not respond to a ping request?

- Check cabling and ensure correct IP addressing.
- Verify that the routers are properly configured and that routing between networks is enabled.
- Ensure that all interfaces are up and running.

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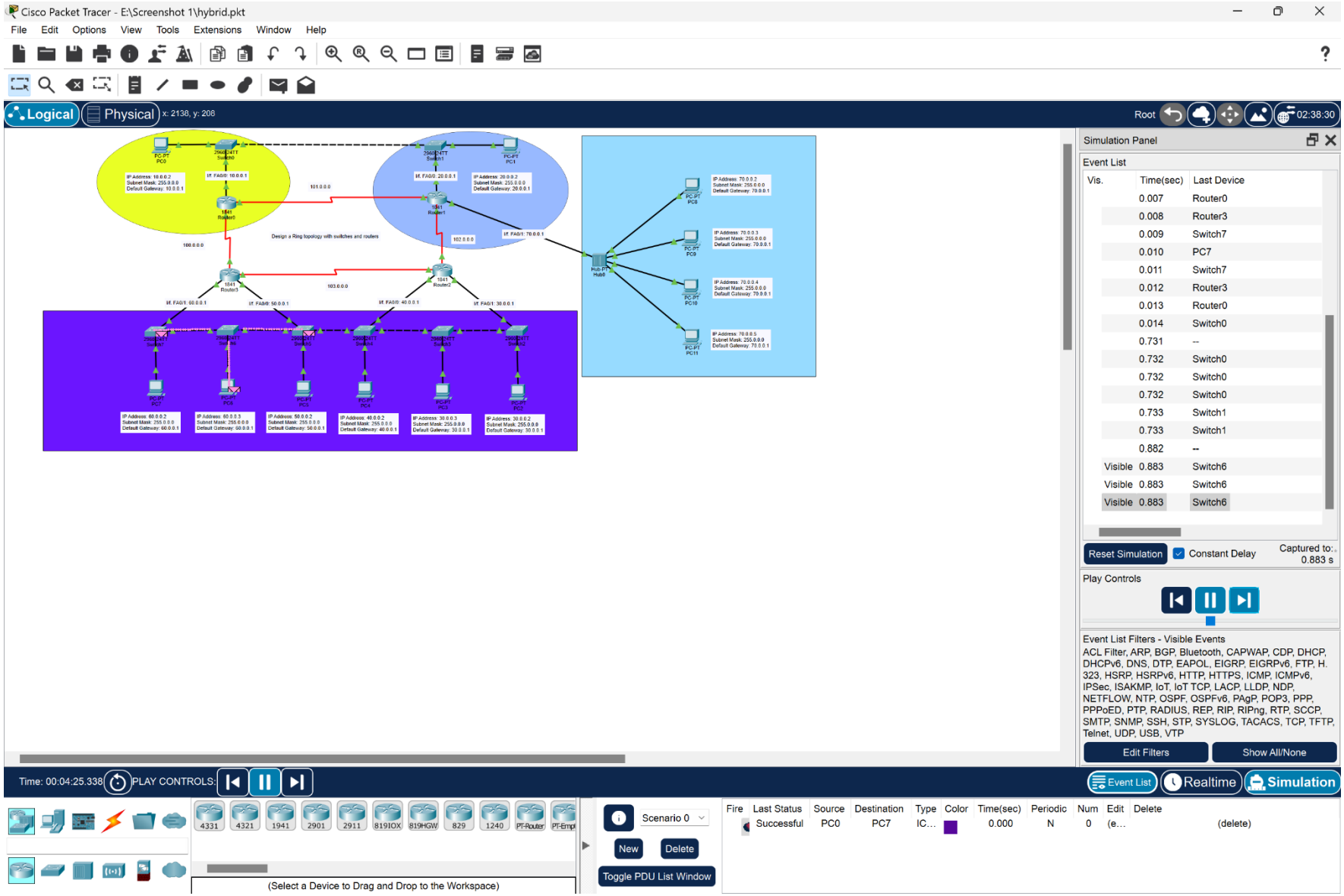
5. Status of packet transmission (screenshot of workspace along with status panel)



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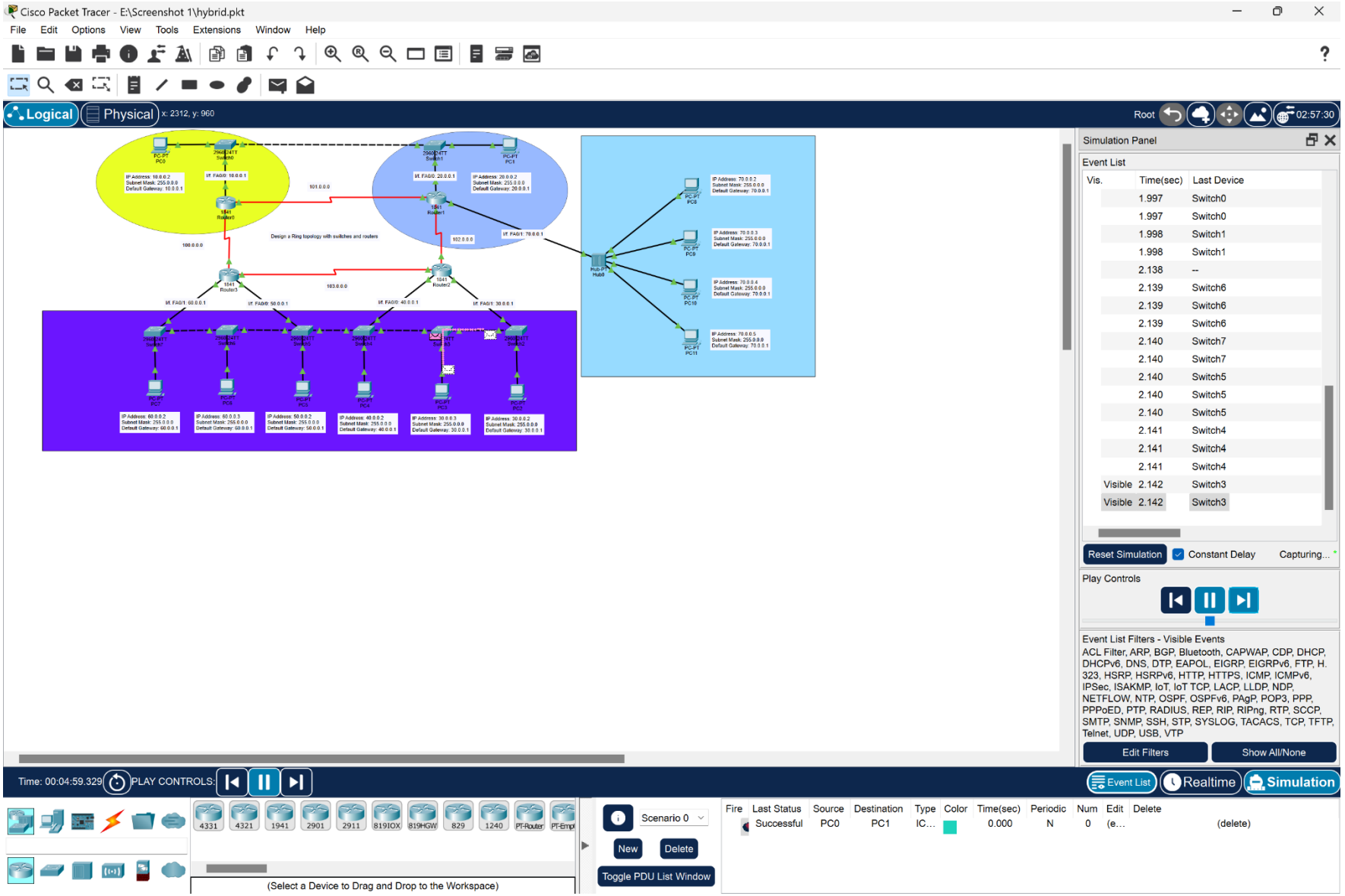
1. Sending Message from PC0 to PC1



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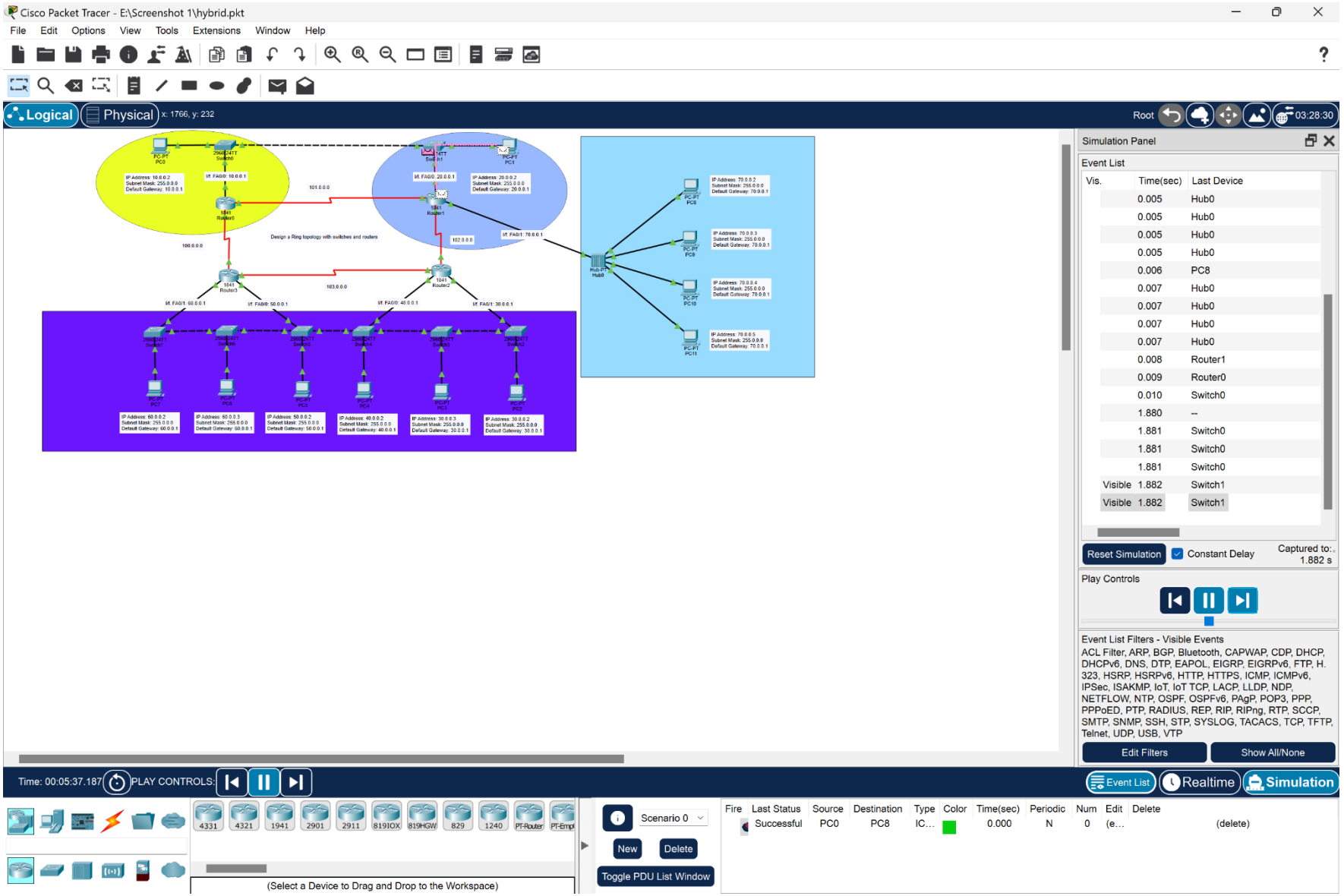
2. Sending Message from PC0 to PC8



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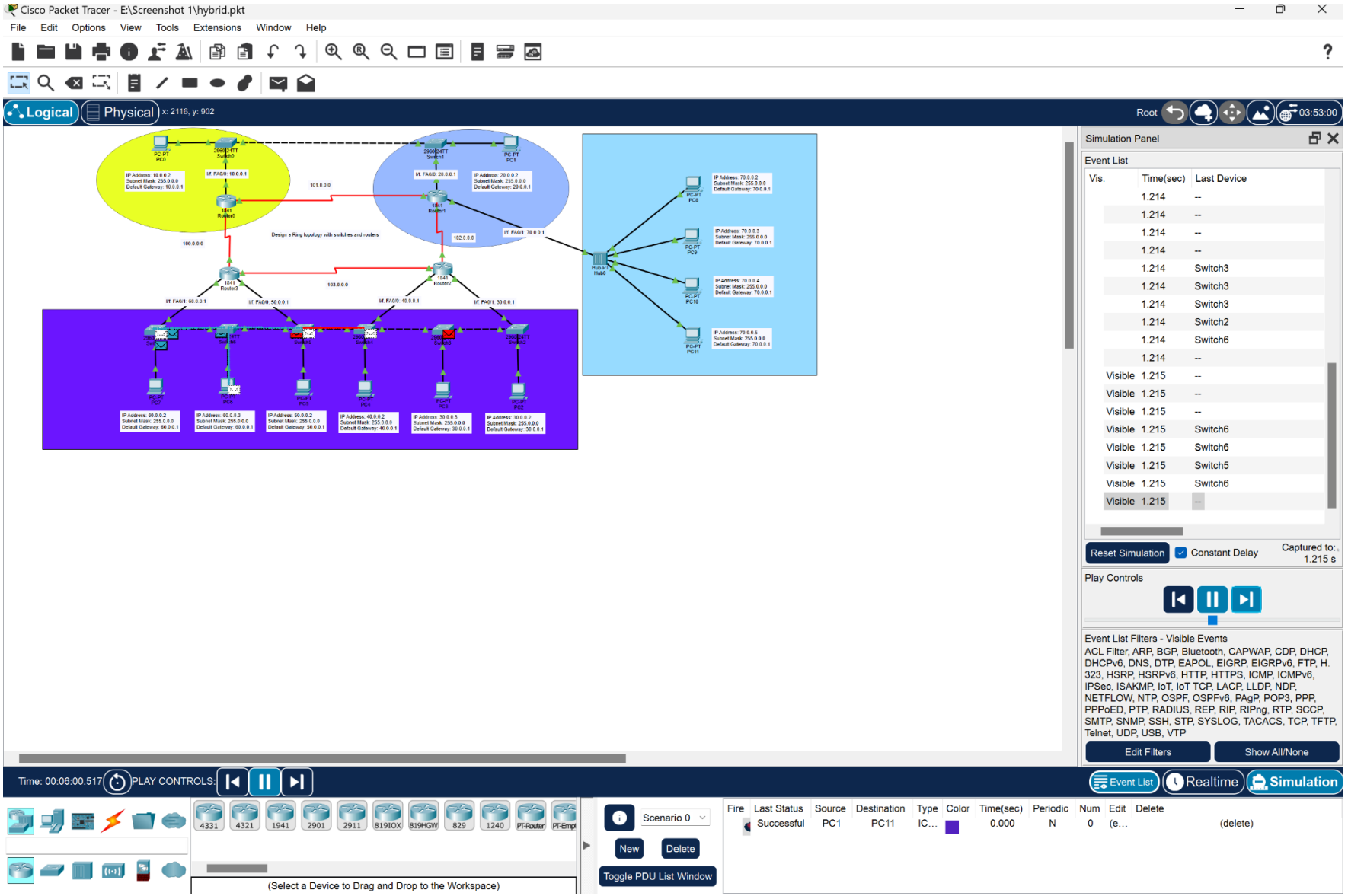
3. Sending Message from PC1 to PC11



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4. Sending Message from PC0 to PC7