Siddhant
Bhagat
22BCE0682

1.3 Design a bus topology with switches and routers

Design and configure a fully connected Bus 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 the Bus Network? Mention both the IP and MAC addresses 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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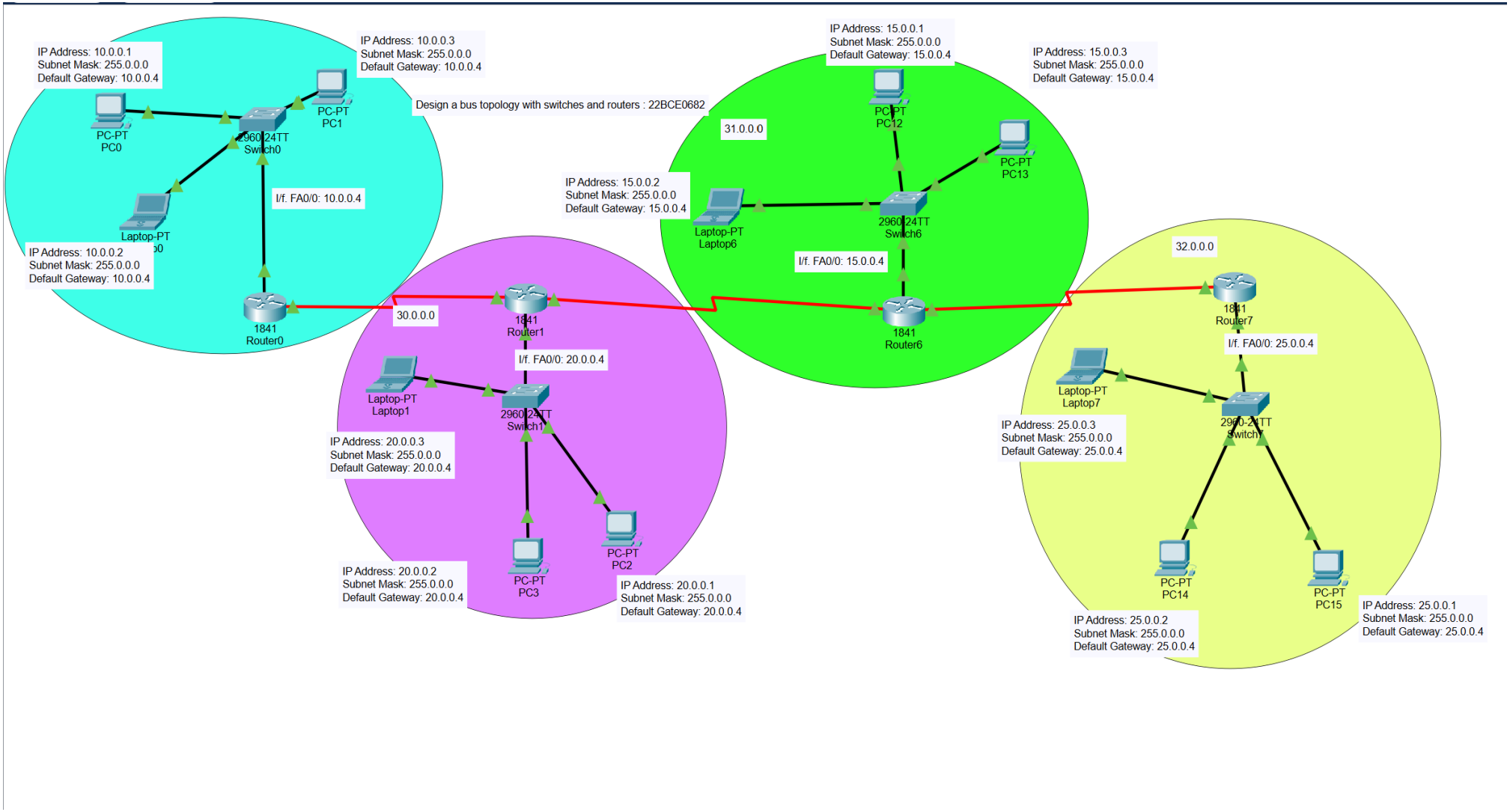
1. Detailed Network Design(Screenshot from CISCO)



2. Basic setup

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

- The devices used are:
  - 4 Switches
  - 4 Routers
  - 8 PCs
  - 4 Laptops

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 2 PCs and 1 Laptop 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: 10.0.0.1, MAC Address: 00E0.F9EC.2E60
    - PC1: IP Address: 10.0.0.3, MAC Address: 0002.1785.C041
    - PC2: IP Address: 20.0.0.1, MAC Address: 0090.0C2C.379B
    - PC3: IP Address: 20.0.0.2, MAC Address: 00D0.9775.BBA7
    - PC12: IP Address: 15.0.0.1, MAC Address: 00D0.FF21.6D1B
    - PC13: IP Address: 15.0.0.3, MAC Address: 000C.8570.9B25
    - PC14: IP Address: 25.0.0.2, MAC Address: 0040.0B1E.9D1D
    - PC15: IP Address: 25.0.0.1, MAC Address: 0030.F2B8.652A
    - Laptop0: IP Address: 10.0.0.2, MAC Address: 0001.9613.6D2E
    - Laptop1: IP Address: 20.0.0.3, MAC Address: 00D0.5828.81EC
    - Laptop6: IP Address: 15.0.0.2, MAC Address: 00E0.B073.ED09
    - Laptop7: IP Address: 25.0.0.3, MAC Address: 0002.4AD2.B70D

- Routers:
    - Router0:
        - I/f. FA0/0: IP Address: 10.0.0.4, MAC Address: 00D0.D375.B702
        - I/f. Se0/0/0: IP Address: 30.0.0.1
        - RIP: 10.0.0.0, 30.0.0.0
    - Router1:
        - I/f. FA0/0: IP Address: 20.0.0.4, MAC Address: 0001.63D7.5D85
        - I/f. Se0/0/0: IP Address: 30.0.0.2
        - I/f. Se0/0/1: IP Address: 31.0.0.1
        - RIP: 20.0.0.0, 30.0.0.0, 31.0.0.0
    - Router6:
        - I/f. FA0/0: IP Address: 15.0.0.4, MAC Address: 0005.5E29.E9AA
        - I/f. Se0/0/0: IP Address: 32.0.0.1
        - I/f. Se0/0/1: IP Address: 31.0.0.2
        - RIP: 15.0.0.0, 31.0.0.0, 32.0.0.0
    - Router7:
        - I/f. FA0/0: IP Address: 25.0.0.4, MAC Address: 0009.7C97.DAE8
        - I/f. Se0/0/0: IP Address: 32.0.0.2
        - RIP: 25.0.0.0, 32.0.0.0

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

- Added HWIC-2T Module
- Set Respective FA0/0 and FA0/1 (We do not assign any values to FA0/1 in this problem)
- 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	
	PC12	
	PC13	
	PC14	
	PC15	

Devices		Subnet - Mask
Laptop	Laptop0	255.0.0.0
	Laptop1	
	Laptop6	
	Laptop7	

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 15.0.0.2

```
C:\>ping 15.0.0.2

Pinging 15.0.0.2 with 32 bytes of data:

Request timed out.
Reply from 15.0.0.2: bytes=32 time=25ms TTL=125
Reply from 15.0.0.2: bytes=32 time=2ms TTL=125
Reply from 15.0.0.2: bytes=32 time=34ms TTL=125

Ping statistics for 15.0.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 34ms, Average = 20ms
```

  - Pinging 15.0.0.3 to 20.0.0.3

```
C:\>ping 20.0.0.3

Pinging 20.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 20.0.0.3: bytes=32 time=22ms TTL=126
Reply from 20.0.0.3: bytes=32 time=2ms TTL=126
Reply from 20.0.0.3: bytes=32 time=16ms TTL=126

Ping statistics for 20.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 22ms, Average = 13ms
```

- Pinging 20.0.0.1 to 10.0.0.1

```
C:\>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128
Reply from 10.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

- Pinging 20.0.0.3 to 25.0.0.3

```
C:\>ping 25.0.0.3

Pinging 25.0.0.3 with 32 bytes of data:

Request timed out.
Reply from 25.0.0.3: bytes=32 time=3ms TTL=124
Reply from 25.0.0.3: bytes=32 time=5ms TTL=124
Reply from 25.0.0.3: bytes=32 time=3ms TTL=124

Ping statistics for 25.0.0.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 5ms, Average = 3ms
```

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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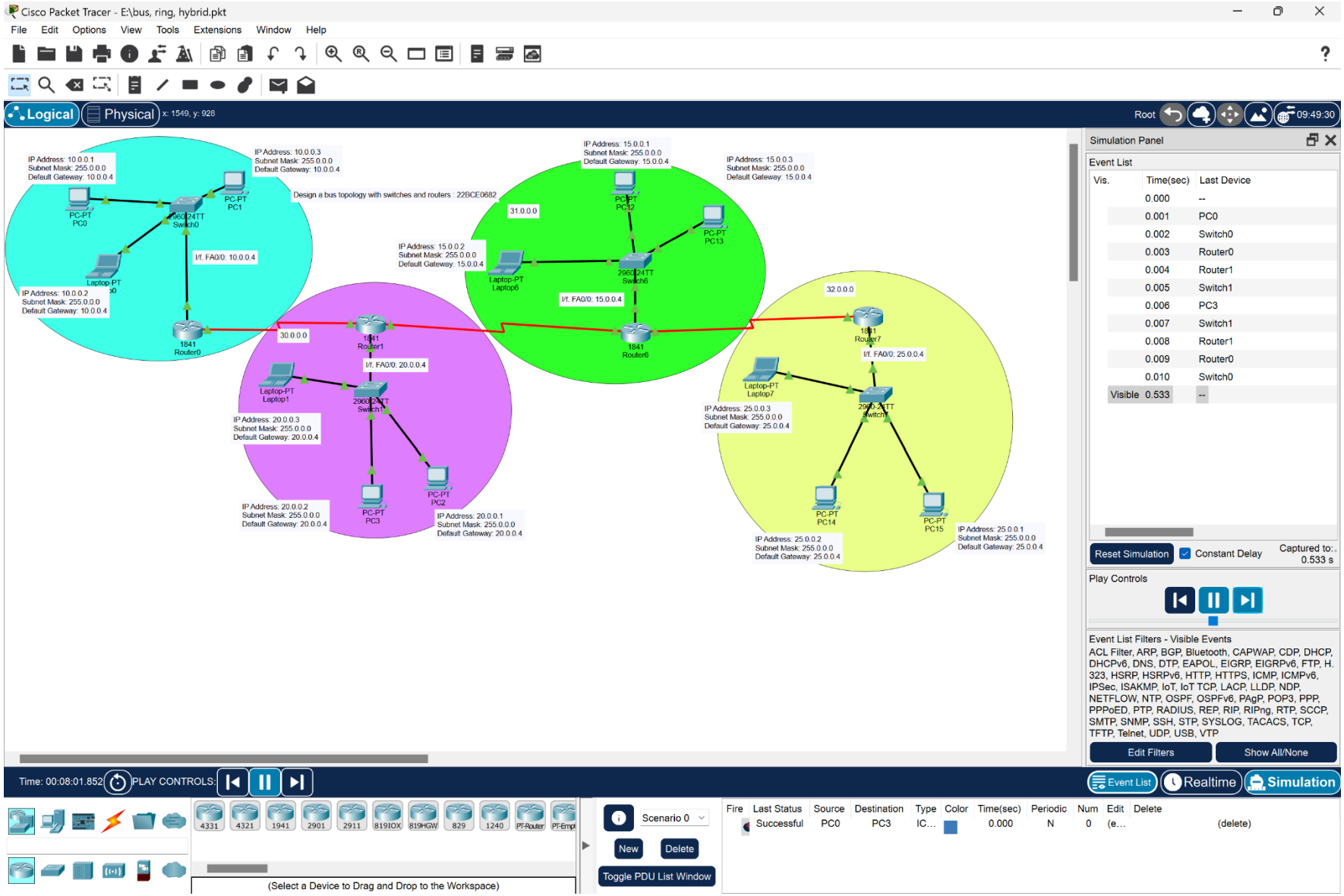
Siddhant Bhagat
22BCE0682

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



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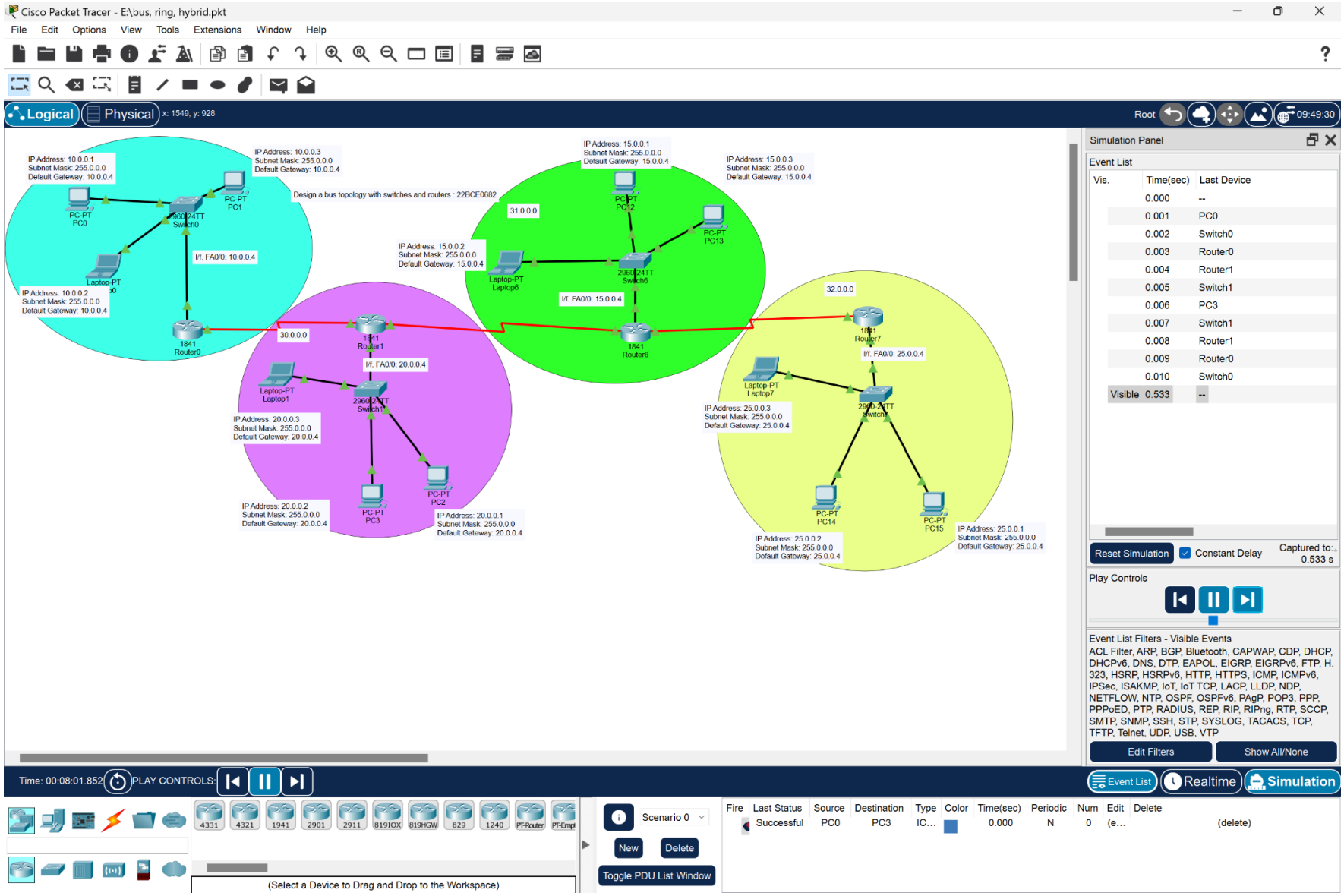
1. Sending Message from PC0 to PC3



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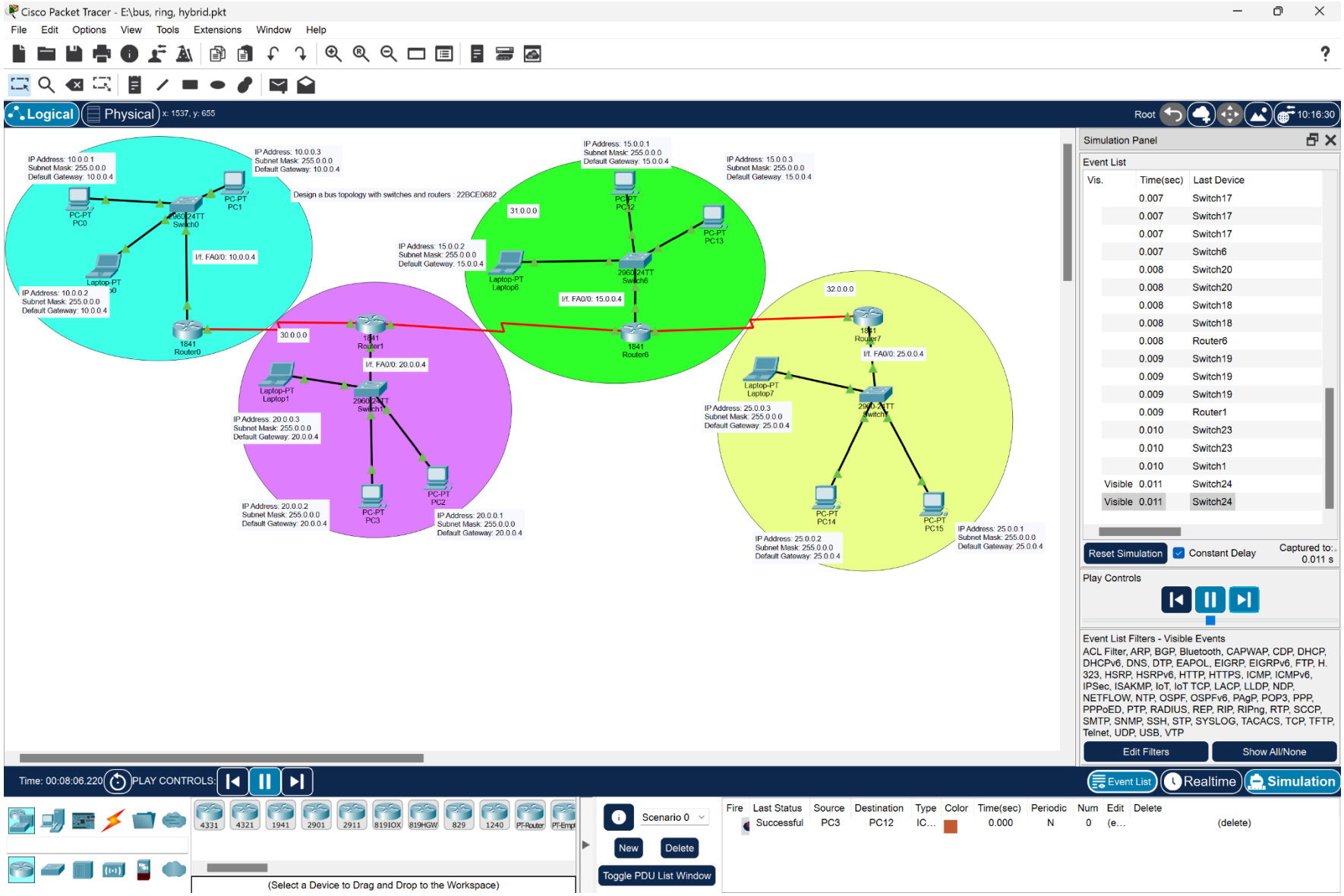
2. Sending Message from PC3 to PC12



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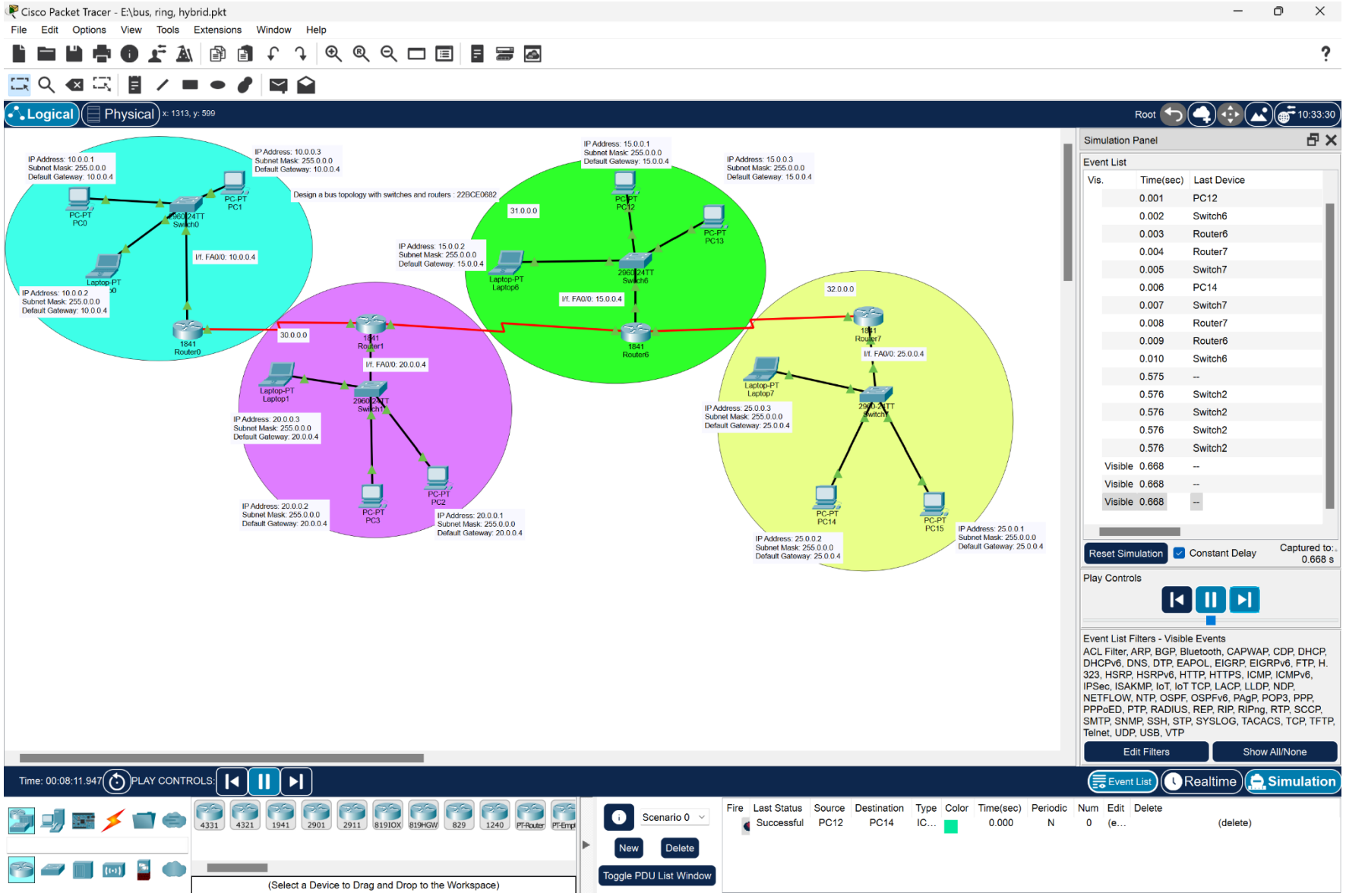
3. Sending Message from PC12 to PC14



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4. Sending Message from PC15 to PC00