INFORMATION SECURITY

ASSIGNMENT # 4

REG#: 2023403

NAME: MUHAMMAD BIN WASEEM

COURSE CODE: CYS 211

INSTRUCTOR: DR. M. ZAIN SIDDIQI

Task 1: Sol.

1. Network Topology: Point to point

➢ **Description**:

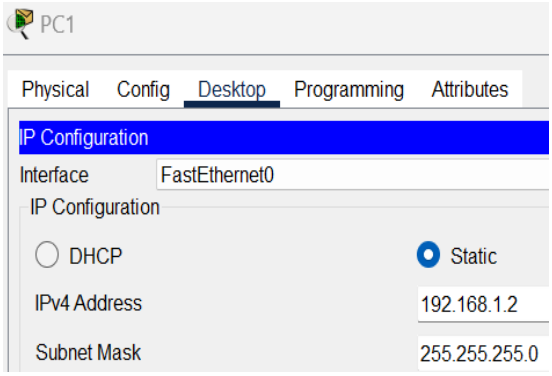
- Two PCs (PC0 and PC1) connected via an Ethernet cable using the "Copper Cross-Over" cable in Packet Tracer.

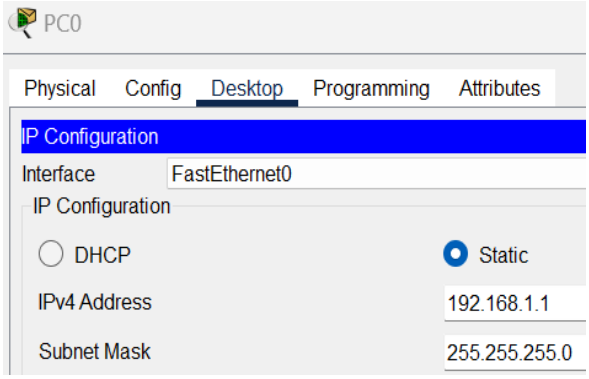
2. Device Configuration:

➢ **PC0 Configuration**:

- **IP Address**: **192.168.1.1**
- **Subnet Mask**: **255.255.255.0**

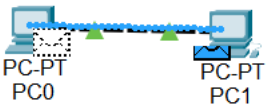
- **PC1 Configuration**:
  - **IP Address: 192.168.1.2**
  - **Subnet Mask: 255.255.255.0**





3. Traffic Analysis :

In the PDU Table, the ICMP Echo Request from PC0 to PC1 is shown as it travels across the network. Initially, PC0 sends an ARP Request to resolve PC1's MAC address. Once resolved, the ping packet moves from PC0 to the switch and then to PC1. The ICMP Echo Reply follows the same path back from PC1 to PC0. The PDU Table provides a detailed view of the source and destination IP addresses, along with the MAC addresses at each hop.



- PDU Table :

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

➢ Command Prompt and Event list:

```
Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=2ms TTL=128
Reply from 192.168.1.2: bytes=32 time=2ms TTL=128
Reply from 192.168.1.2: bytes=32 time=2ms TTL=128
Reply from 192.168.1.2: bytes=32 time=2ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 2ms, Average = 2ms
```

Event List

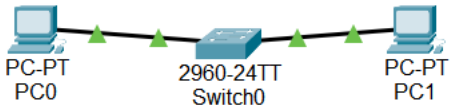
Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC0	ICMP
	0.001	PC0	PC1	ICMP
	0.002	PC1	PC0	ICMP
	4565.792	--	PC0	ICMP
	4565.793	PC0	PC1	ICMP
	4565.794	PC1	PC0	ICMP
	4566.794	--	PC0	ICMP
	4566.795	PC0	PC1	ICMP
	4566.796	PC1	PC0	ICMP
	4567.797	--	PC0	ICMP
	4567.798	PC0	PC1	ICMP
	4567.799	PC1	PC0	ICMP
	4568.802	--	PC0	ICMP
	4568.803	PC0	PC1	ICMP
Visible	4568.804	PC1	PC0	ICMP

In the Event List, the flow of packets is captured in a detailed sequence. When PC0 sends a ping command, an ARP Request is first initiated to discover PC1's MAC address. Then, the ICMP Echo Request travels from PC0 to PC1, and PC1 replies with an ICMP Echo Reply. The Event List allows you to observe each step in the process, showing the communication between devices with timestamps and detailed packet information, such as source/destination IP addresses and protocols used.

Task 2: Sol.

1.Description:

- Extending the network by adding a switch using copper straight through wire . A star topology .



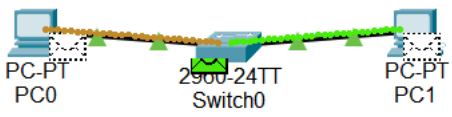
2. Device Configuration:

- **Now both PCS are indirectly connected through switch.**
- **Switch Configuration:**
  - No IP configuration needed (Layer 2 device), just ensure that the switch is powered on and the PCs are connected to the switch ports.

3. Traffic Analysis :

In the traffic analysis of PC0 and PC1 connected through a switch, PC0 first sends an ARP Request to find PC1's MAC address, and the switch forwards this request to all connected devices. Once PC1 responds with its MAC address, PC0 sends an ICMP Echo Request (ping) to PC1. The switch forwards the ping request to PC1, which replies with an ICMP Echo Reply back to PC0. Similarly, PC1 can initiate communication with PC0 by following the same process, sending ARP requests and ICMP packets, with the switch acting as the intermediary that forwards data between the two PCs.

Command Prompt and Events List :




```
Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time=5ms TTL=128
Reply from 192.168.1.2: bytes=32 time=4ms TTL=128
Reply from 192.168.1.2: bytes=32 time=4ms TTL=128
Reply from 192.168.1.2: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 5ms, Average = 4ms
```

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.005	Switch0	PC0	ICMP
	1.008	--	PC0	ICMP
	1.009	PC0	Switch0	ICMP
	1.010	Switch0	PC1	ICMP
	1.011	PC1	Switch0	ICMP
	1.012	Switch0	PC0	ICMP
	2.013	--	PC0	ICMP
	2.014	PC0	Switch0	ICMP
	2.015	Switch0	PC1	ICMP
	2.016	PC1	Switch0	ICMP
	2.017	Switch0	PC0	ICMP
	3.018	--	PC0	ICMP
	3.019	PC0	Switch0	ICMP
	3.020	Switch0	PC1	ICMP

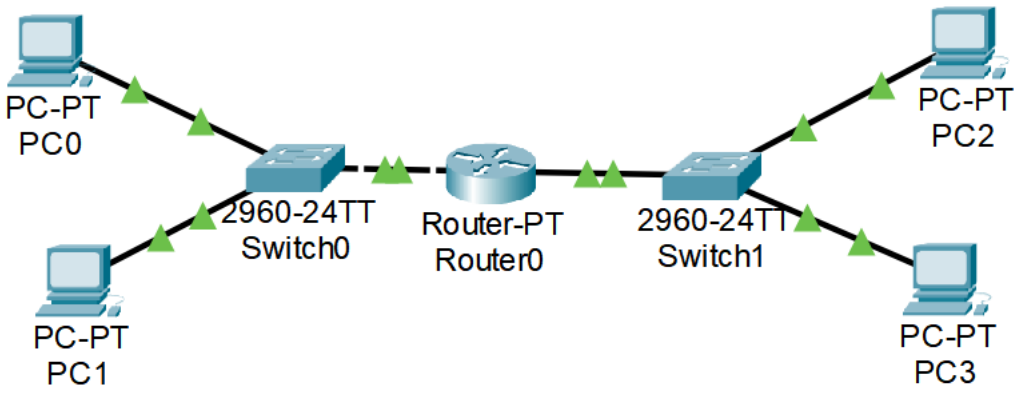
- **PDU Table :**

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

Both devices can communicate with each other.

Task 3: Sol.

- **Description**:
  - Extending the network by adding another LAN , and connecting 2 Lans through router using copper straight through cable. Joining two stars by point to point network .

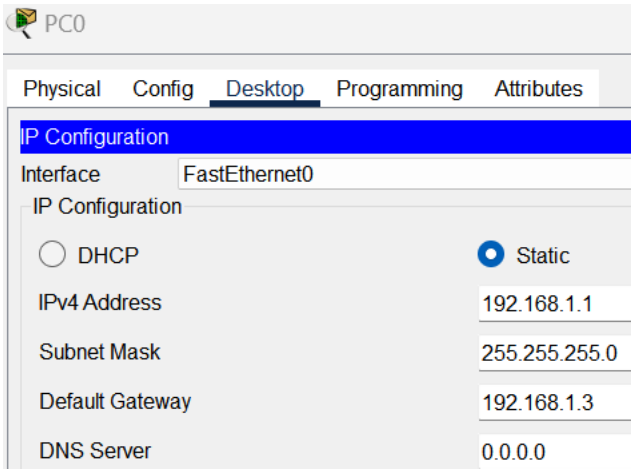


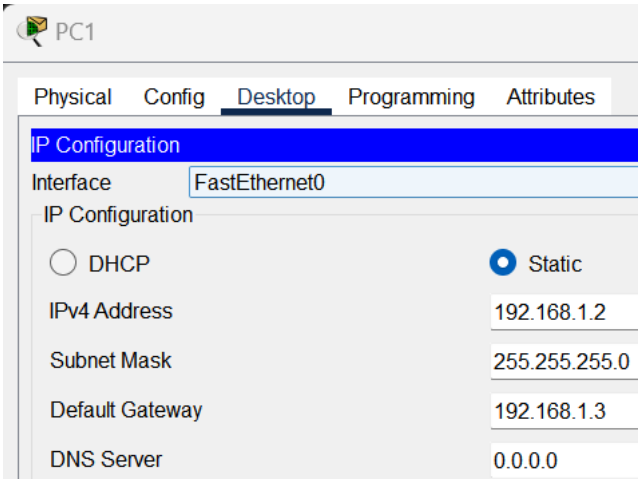
Device Configuration:

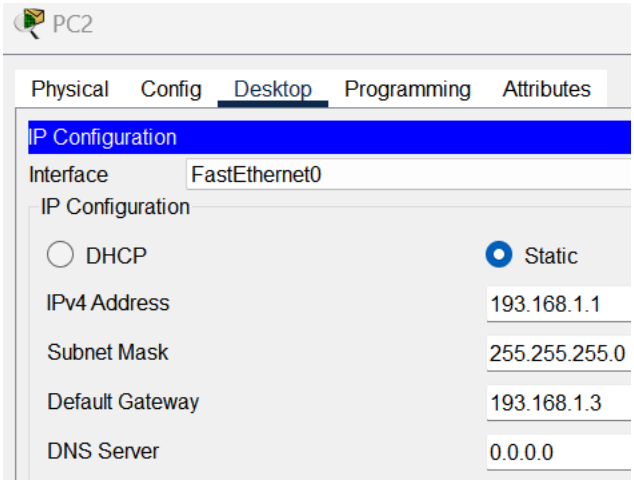
- **PC0 Configuration:**
  - **IP Address**: 192.168.1.1
  - **Subnet Mask**: 255.255.255.0
  - **Default Gateway** : 192.168.1.3
- **PC1 Configuration:**
  - **IP Address**: 192.168.1.2
  - **Subnet Mask**: 255.255.255.0
  - **Default Gateway** : 192.168.1.3
- **PC2 Configuration:**
  - **IP Address**: 193.168.1.1
  - **Subnet Mask**: 255.255.255.0
  - **Default Gateway** : 193.168.1.3

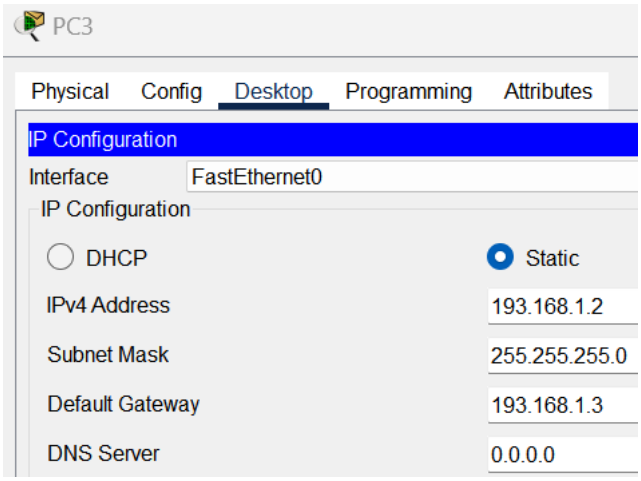
➢ **PC3 Configuration:**

- **IP Address**: 193.168.1.2
- **Subnet Mask**: 255.255.255.0
- **Default Gateway** : 193.168.1.3







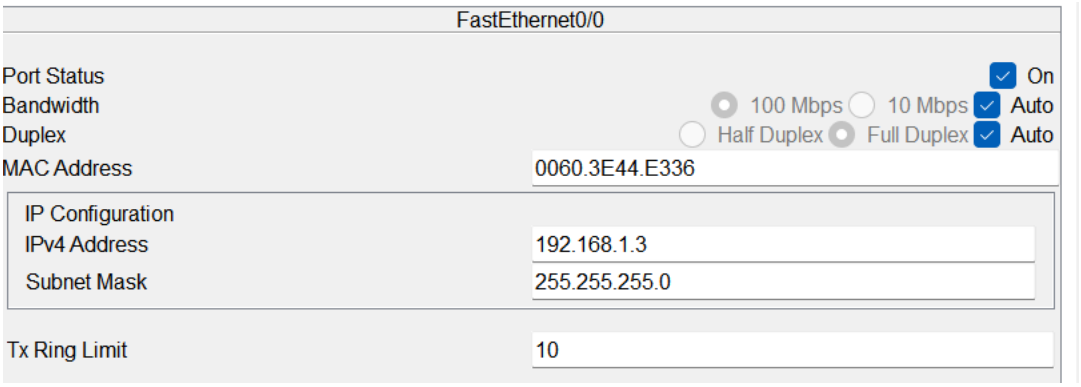


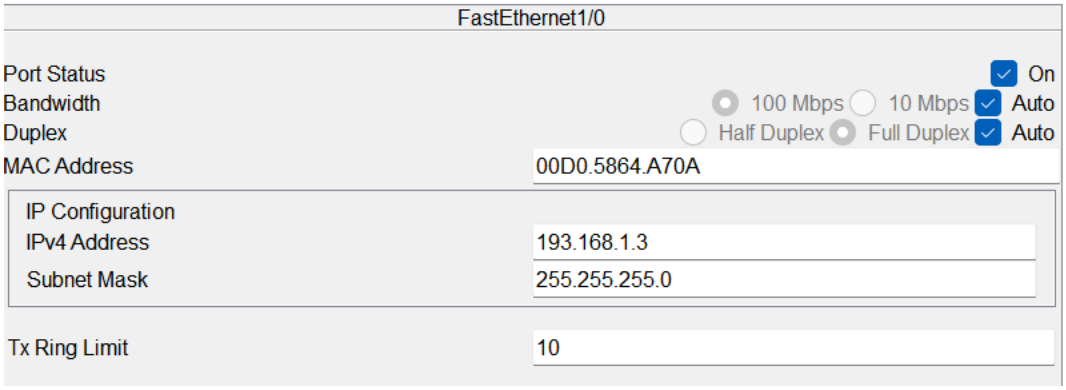
➢ **Switch0 & Switch1 Configuration:**

- No IP configuration needed (Layer 2 device), just ensure that the switch is powered on and the PCs are connected to the switch ports.

➢ **Router 0 Configuration:**

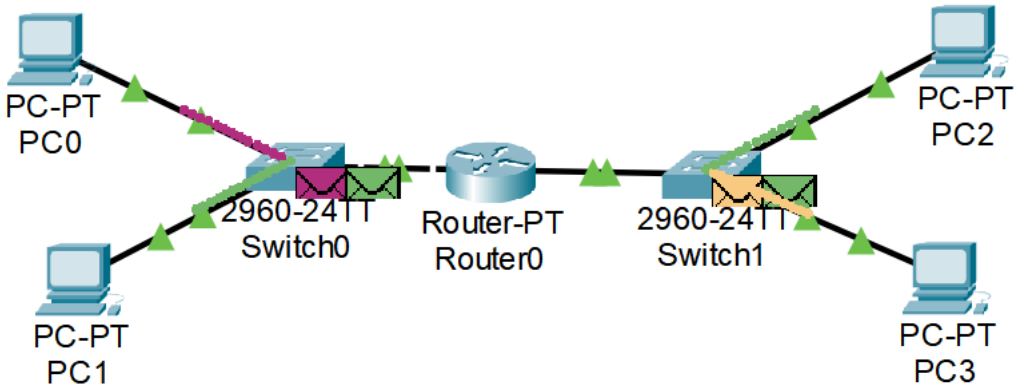
- **IP Address of Lan1(On the Left side)**: 192.168.1.3
- **Subnet Mask of Lan1(On the Left side)**: 255.255.255.0
- **IP Address of Lan2(On the Right side):** 193.168.1.3
- **Subnet Mask of Lan2(On the Right side)**: 255.255.255.0





➢ **Traffic Analysis :**

In this network setup, PC1 in LAN 1 communicates with PC3 in LAN 2 through a router connected via a WAN link. The packet travels from PC1 to the switch in LAN 1, then to the router, which routes it over the WAN link to the router in LAN 2. The router forwards the packet to the switch, and it reaches PC3. Switches handle local frame forwarding, while the router uses IP routing to connect the two LANs. The WAN link provides the connection between the two routers, enabling communication between the LANs.



Command Prompt and Events List :

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.005	PC1	Switch0	ICMP
	0.006	PC2	Switch1	ICMP
	0.006	PC0	Switch0	ICMP
	0.006	Switch1	Router0	ICMP
	0.006	Switch0	Router0	ICMP
	0.007	Switch1	Router0	ICMP
	0.007	Switch0	Router0	ICMP
	0.007	Router0	Switch0	ICMP
	0.007	Router0	Switch1	ICMP
	0.008	Router0	Switch0	ICMP
	0.008	Router0	Switch1	ICMP
	0.008	Switch0	PC0	ICMP
	0.008	Switch1	PC3	ICMP
Visible	0.009	Switch0	PC1	ICMP
Visible	0.009	Switch1	PC2	ICMP

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 193.168.1.1

Pinging 193.168.1.1 with 32 bytes of data:

Reply from 193.168.1.1: bytes=32 time=1ms TTL=127
Reply from 193.168.1.1: bytes=32 time<1ms TTL=127
Reply from 193.168.1.1: bytes=32 time=23ms TTL=127
Reply from 193.168.1.1: bytes=32 time<1ms TTL=127

Ping statistics for 193.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 23ms, Average = 6ms
```

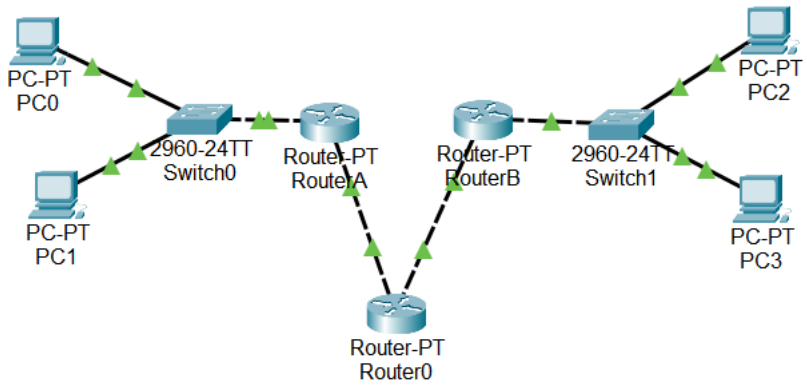
PDU Table :

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	PC1	PC2	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC3	PC1	ICMP		0.000	N	2	(edit)	(delete)
	Successful	PC2	PC0	ICMP		0.000	N	3	(edit)	(delete)

Task 4: Sol.

- **Description**:
- Extending the network by adding two extra routers using crossover cable for same devices. But Router A for Lan1 , Router B for Lan2. Connecting these to a main Router 0.

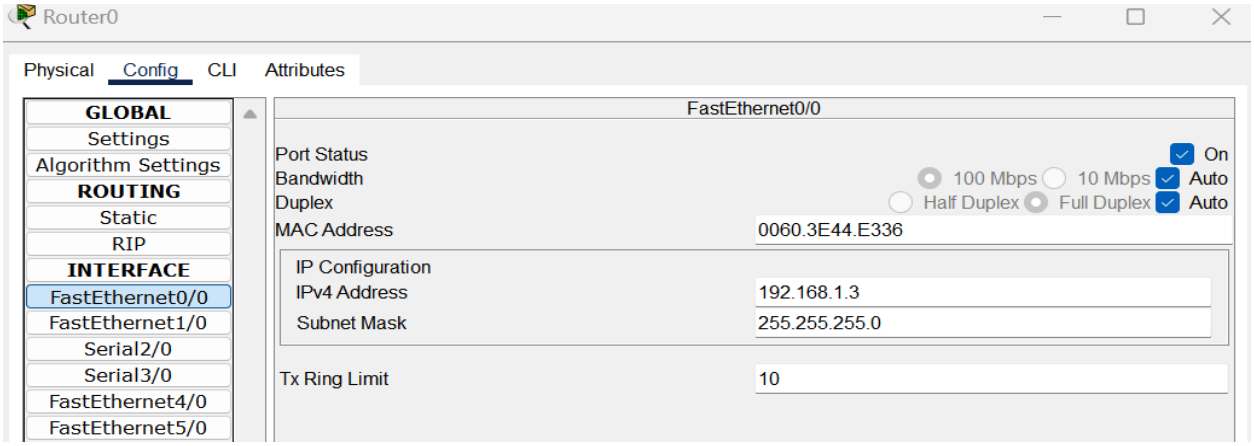


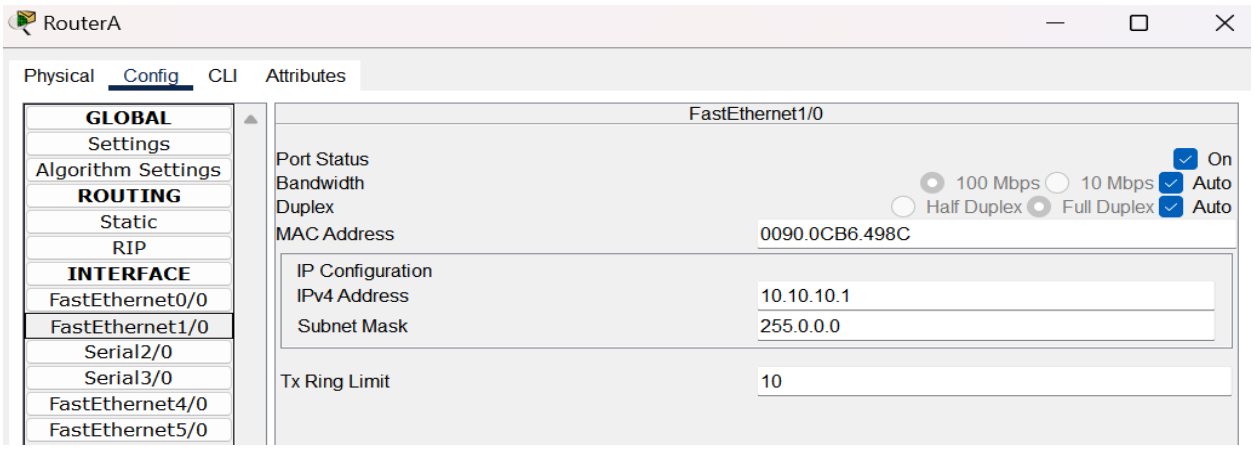
1. **Device Configuration:**

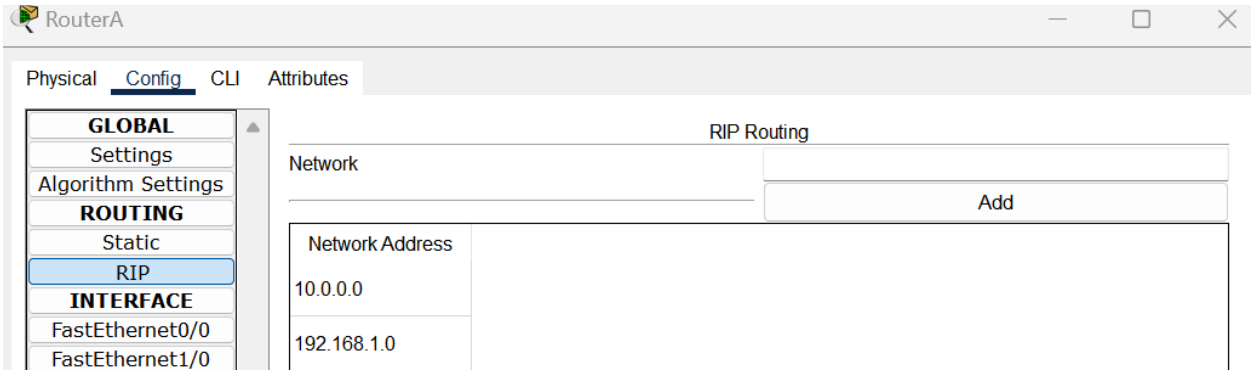
- **All PCS configurations will remain the same.**

➢ **Router A Configuration:**

- **IP Address :**10.10.10.1 (connected to Router 0)
- **Subnet Mask :** 250.0.0.0 (connected to Router 0)
- **IP Address for Lan1(On the Left side):** 192.168.1.3
- **Subnet Mask for Lan1(On the Left side):** 255.250.250.0
- Adding Lan1 address and Router A address to Network Address in RIP

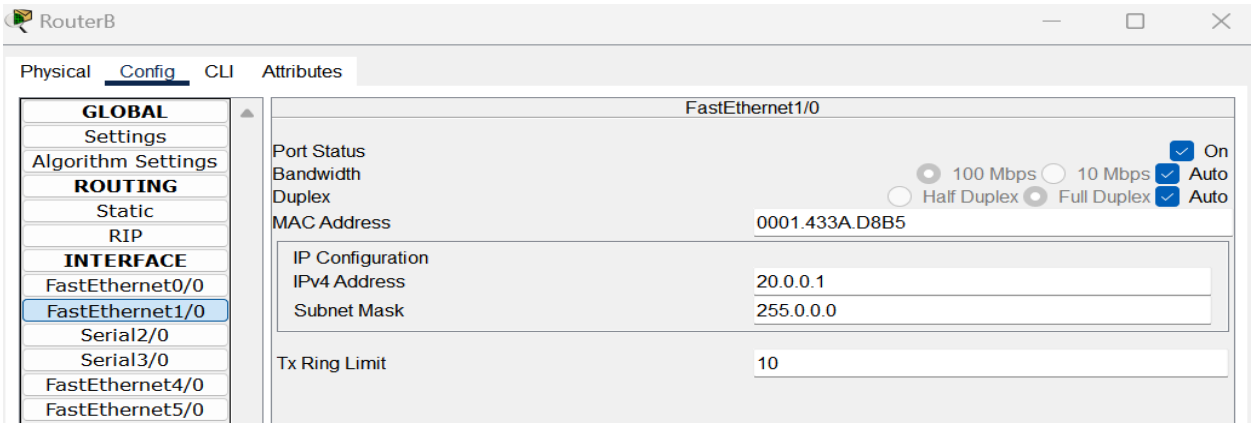


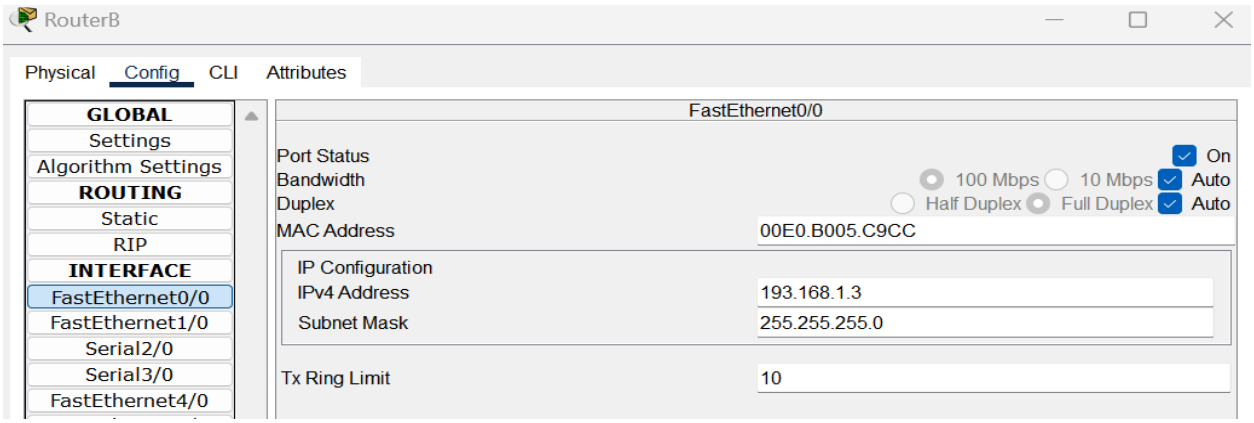


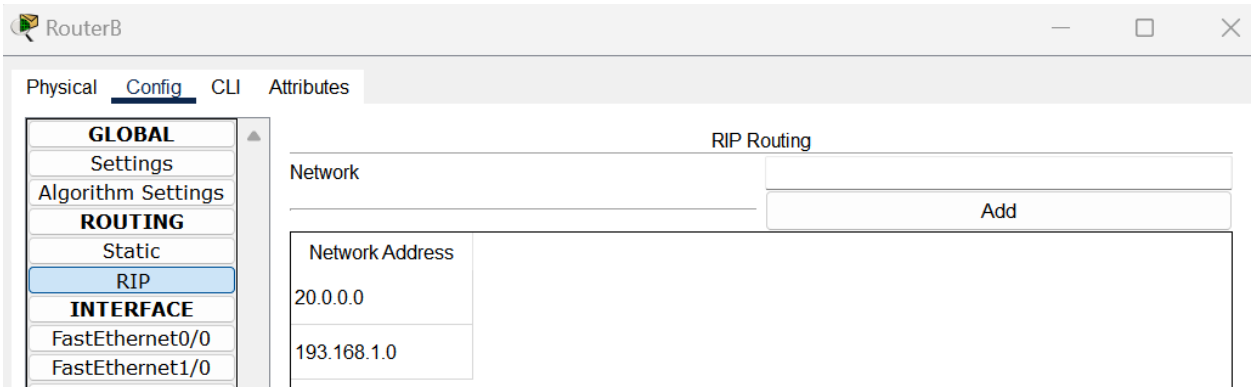


➢ **Router B Configuration:**

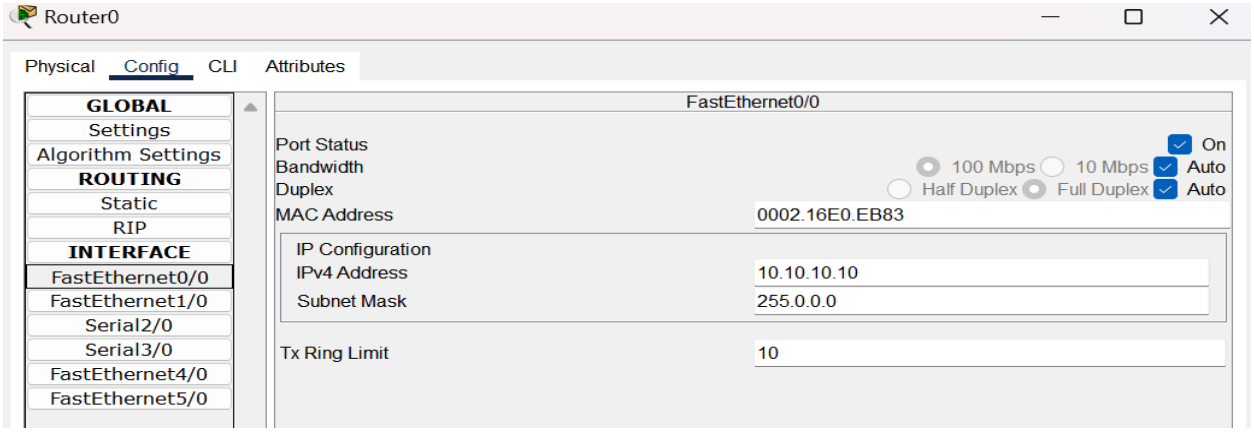
- **IP Address :** 20.20.20.1 (connected to Router 0)
- **Subnet Mask :** 250.0.0.0 (connected to Router 0)
- **IP Address for Lan2(On the Right side):** 192.168.1.3
- **Subnet Mask for Lan2(On the Right side):** 255.250.250.0
- Adding Lan2 address and Router A address to Network Address in RIP

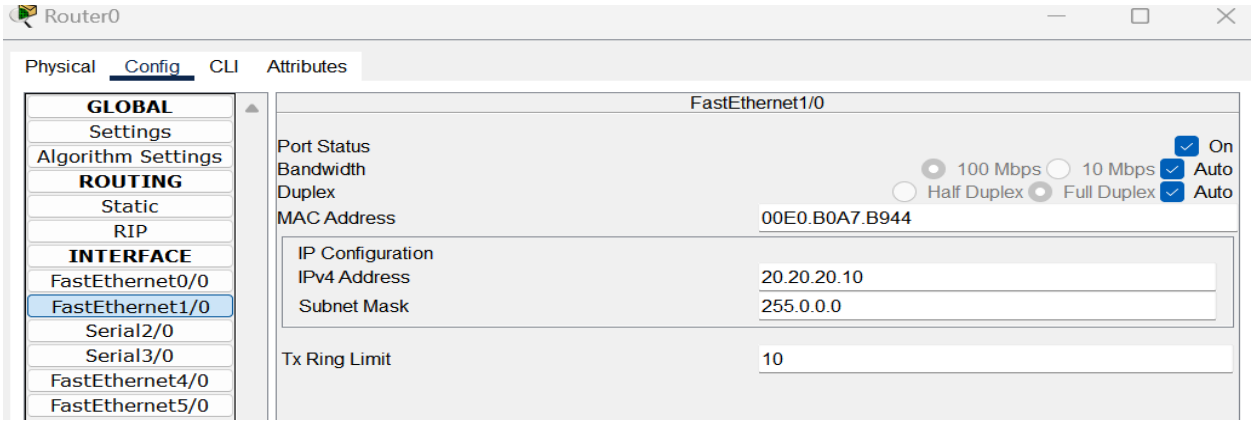


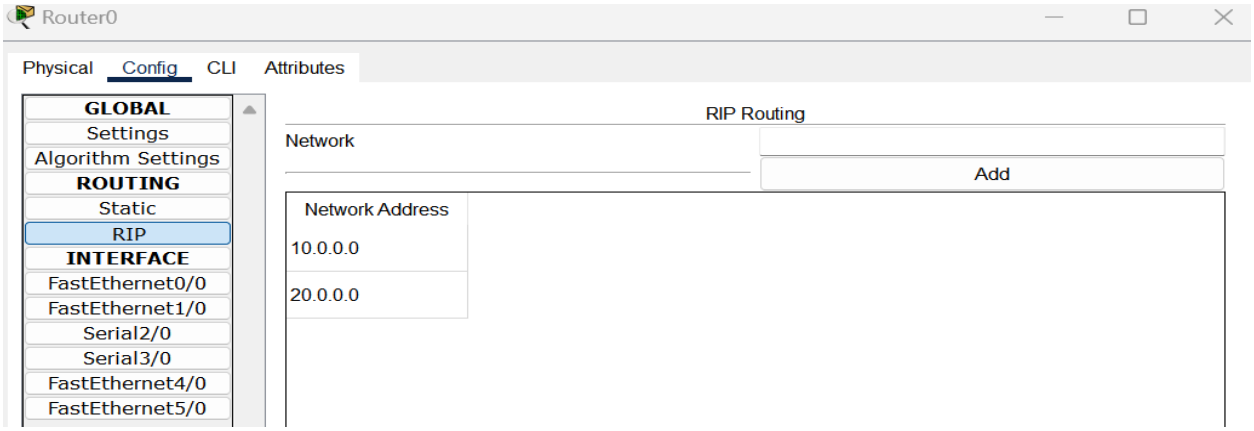




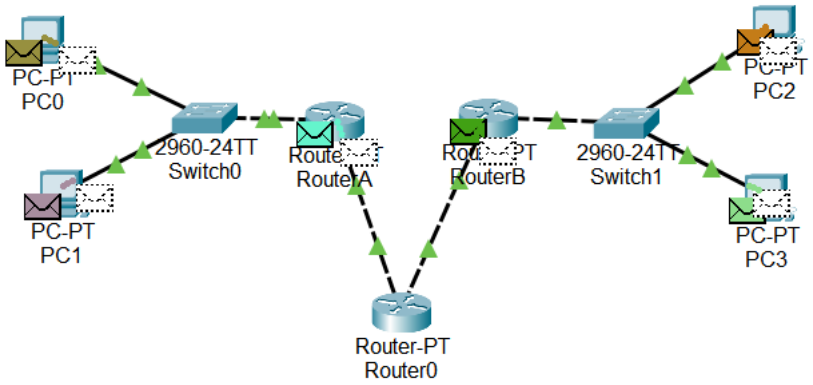
- **Router 0 Configuration:**
- **IP Address : 1**0.10.10.10 (connected to Router A)
- **Subnet Mask :** 250.0.0.0 (connected to Router A)
- **IP Address :** 20.20.20.10 (connected to Router B)
- **Subnet Mask :** 250.0.0.0 (connected to Router B)
- Adding Router A address and Router B address to Network Address in RIP.







➢ Traffic Analysis :



In this setup, when a PC in LAN 1 sends a packet to LAN 2, the packet first reaches the LAN 1 switch and is forwarded to Router 1. Router 1 then forwards the packet to the Main Router. The Main Router routes the packet to the LAN 2 Router, which sends it to the LAN 2 switch, delivering it to the destination device. If the destination replies (e.g., an ICMP response), the process is reversed, with the packet traveling back through the routers to the original device.

Command Prompt and Events List :

```
C:\>ping 193.168.1.1

Pinging 193.168.1.1 with 32 bytes of data:

Reply from 193.168.1.1: bytes=32 time=1ms TTL=125
Reply from 193.168.1.1: bytes=32 time=14ms TTL=125
Reply from 193.168.1.1: bytes=32 time=12ms TTL=125
Reply from 193.168.1.1: bytes=32 time=21ms TTL=125

Ping statistics for 193.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 21ms, Average = 12ms
```

Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC3	ICMP
	0.000	--	RouterA	ICMP
	0.000	--	RouterB	ICMP
	0.001	PC0	Switch0	ICMP
	0.001	PC1	Switch0	ICMP
	0.001	PC2	Switch1	ICMP
	0.001	PC3	Switch1	ICMP
	0.001	RouterA	Router0	ICMP
	0.001	RouterB	Router0	ICMP
	0.002	--	Switch0	ICMP
	0.002	Switch0	RouterA	ICMP
	0.002	Switch1	RouterB	ICMP
	0.002	Router0	RouterB	ICMP
	0.002	Router0	RouterA	ICMP

PDU Table :

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	PC1	PC2	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC2	PC1	ICMP		0.000	N	2	(edit)	(delete)
	Successful	PC3	PC0	ICMP		0.000	N	3	(edit)	(delete)
	Successful	RouterA	RouterB	ICMP		0.000	N	4	(edit)	(delete)
	Successful	RouterB	RouterA	ICMP		0.000	N	5	(edit)	(delete)