Lab Introduction:

In this lab we'll be learning the basics of Router and Repeater and uses of them in LANs using a network simulation tool, Cisco Packet Tracer.

Objectives:

- To learn what a Router and a repeater is
- How a Router and a repeater works
- Where and why a Router is needed
- Where and why a Repeater is needed

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Experiment No.: 1

Experiment Title: Introduction with Router using Cisco Packet Tracer

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Objectives:

- To learn what a Router is
- How a Router works
- Where and why a Router is needed

Discussion:

A Router, an inevitable device for the internet, is a networking device that forwards data packets between computer networks.

- It connects two or more LANs
- It is a layer 3(i.e. Network layer) device
- It has a memory and stores routing table

Methodology:

- Create a New Project.
- Create the basic Network topology.
- Configuration of the Network Nodes.
- Choose the Statistics.
- Run the Simulation.
- Analysis of the Results.

Working procedure:

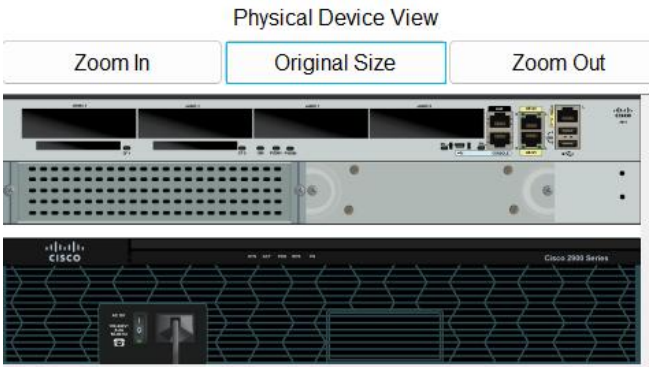

Fig 1.1: Physical rear view of a 2911 Router

1. Connecting two LANs of different IP schemes with a Router

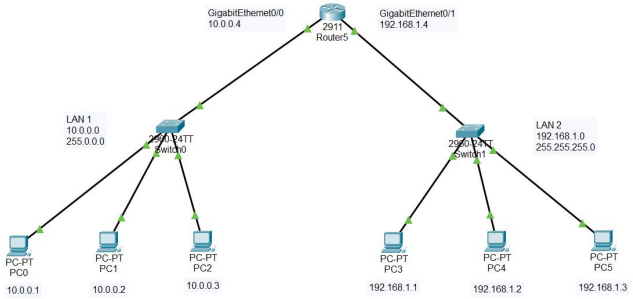

Fig 1.2: Two labeled LANs of different IP schemes connected by a Router in CPT

1.1. Configure PC0, PC1, PC2 with the following IP addresses and Subnet Masks

Host	IP Address	Subnet Mask	Default Gateway
PC0	10.0.0.1	255.0.0.0	10.0.0.4
PC1	10.0.0.2	255.0.0.0	10.0.0.4
PC2	10.0.0.3	255.0.0.0	10.0.0.4

1.2. Configure PC3, PC4, PC5 with the following IP addresses and Subnet Masks

Host	IP Address	Subnet Mask	Default Gateway
PC3	192.168.1.1	255.255.255.0	192.168.1.4
PC4	192.168.1.2	255.255.255.0	192.168.1.4
PC5	192.168.1.3	255.255.255.0	192.168.1.4

1.3. Connection tests across PCs in a single LAN

Ping two PCs by there IP addresses from another PC within a LAN, one after another. If connection is there, four replies will come.

Do the same for the second LAN.

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time=30ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 30ms, Average = 7ms

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=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

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

Fig 1.3: Pinging PC2 and PC1 from PC0

1.4. Connecting LANs with a Router

A. Connecting LAN1 with the Router by the GigabitEthernet0/0 interface

B. Connecting LAN2 with the Router by the GigabitEthernet0/1 interface

C. Giving the interfaces an IP address and a Subnet Mask of the same scheme

Interface	IP address	Subnet Mask
GigabitEthernet0/0	10.0.0.4	255.0.0.0
GigabitEthernet0/1	192.168.1.4	255.255.255.0

D. Check “On” in the port status for each interface in the

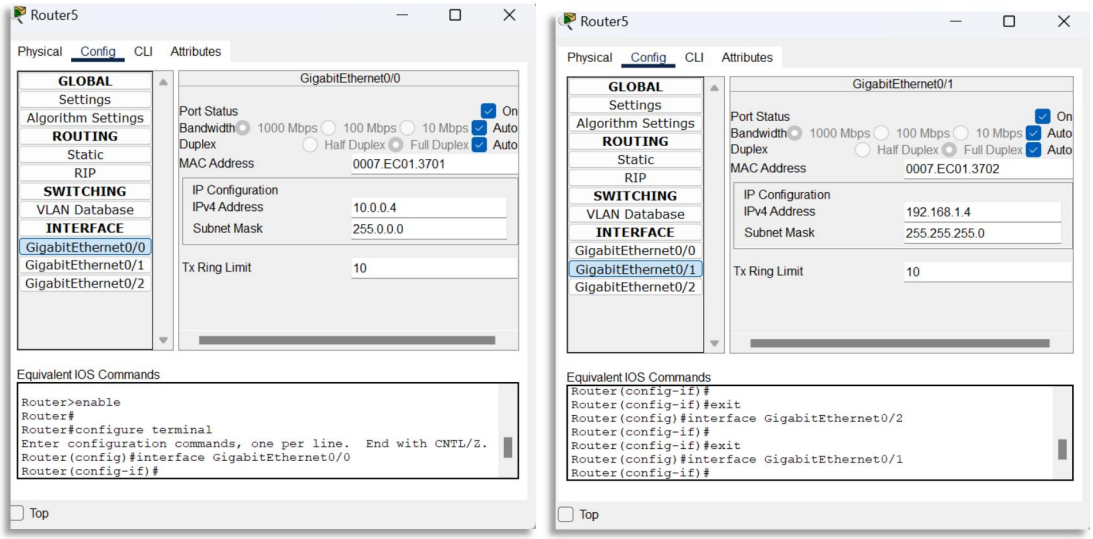

Fig 1.4: Configuring GigabitEthernet0/0 and GigabitEthernet0/1 of the Router

2. Sending data across LANs

For the first time communication, 1 packet may be lost, but from then on, data will be transmitted with 0% loss.

Also, if observed in simulation mode, for the first time communication, switch will be broadcasting data packets as the IP address of the Router hasn’t been stored.

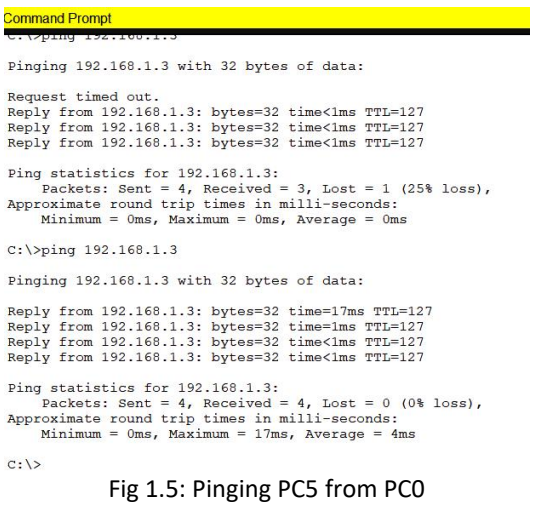

Fig 1.5: Pinging PC5 from PC0

3. Simulation:

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

Fig 1.6: Successful packets travel across PCs

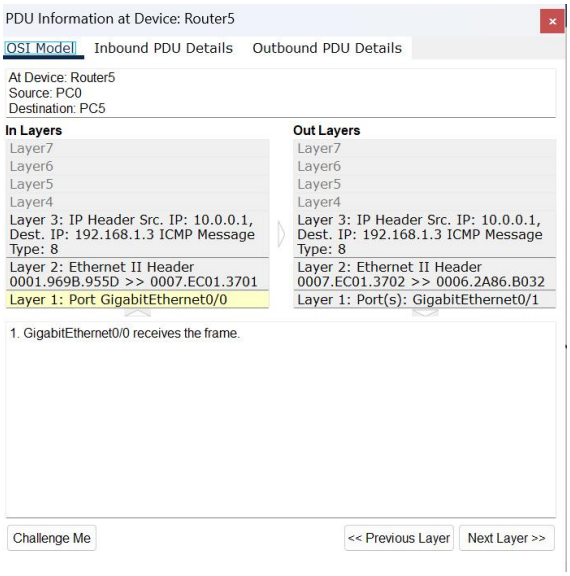

Fig 1.7: PDU information at Router5

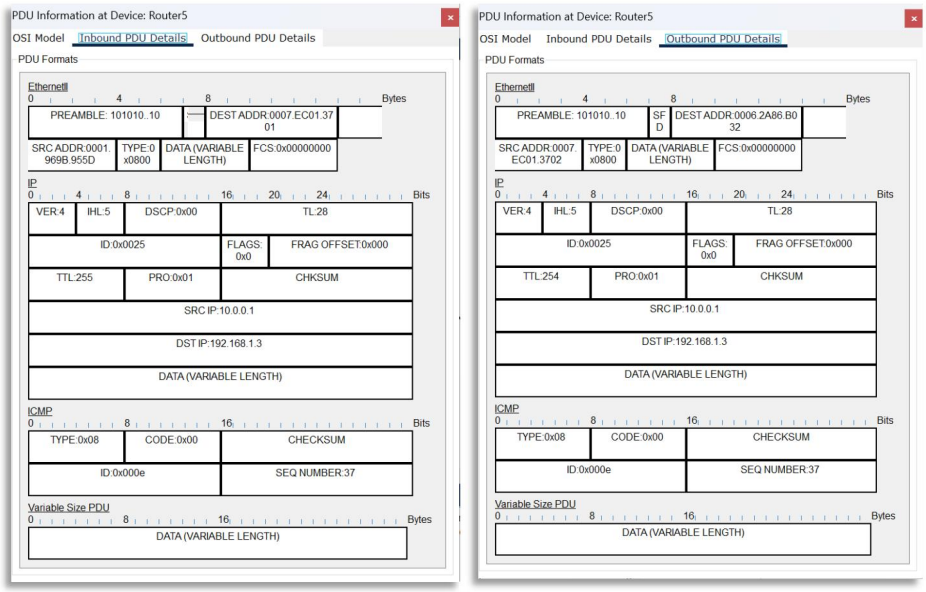

Fig 1.8: Inbound and Outbound PDU details at Router5

Conclusion:

- A Router is needed to create an inter LAN.
- A Router has a memory and it stores routing table
- A Router is a layer 3 device

Experiment No.: 2

Experiment Title: Introduction with Repeater using Cisco Packet Tracer

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Objectives:

- To learn what a Repeater is
- How a Repeater works
- Where and why a Repeater is needed

Discussion:

Signals traveling a long distance tend to get weak or corrupted. For this we use a repeater to generate the same signal midway.

- A Repeater generates the signal over the same network
- It is a layer 1(i.e. Physical layer) device
- It does not amplify the signal
- It is a two port device

Methodology:

- Create a New Project.
- Create the basic Network topology.
- Configuration of the Network Nodes.
- Choose the Statistics.
- Run the Simulation.
- Analysis of the Results.

Working procedure:

1. Connecting two LANs of the same IP scheme with a Router

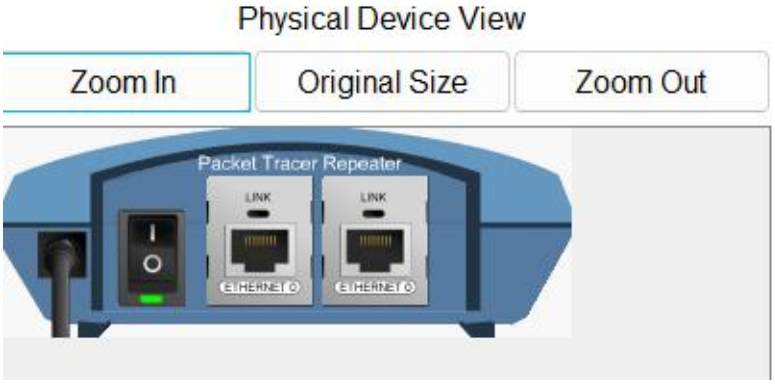

Fig 2.1: Physical rear view of a repeater

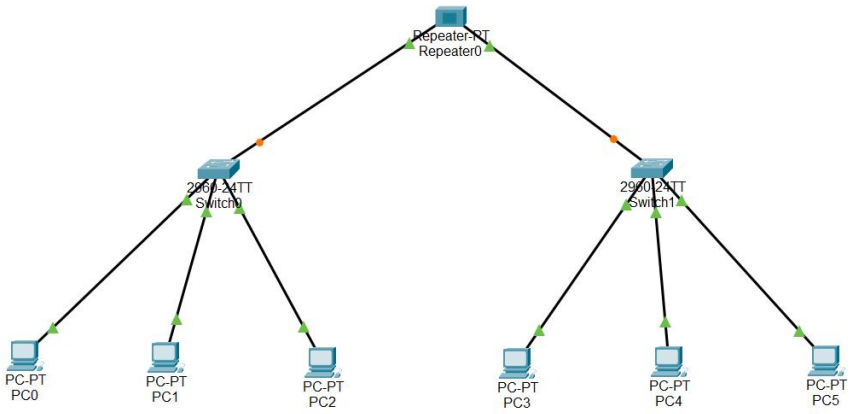

Fig 2.2: Two LANs of same IP schemes connected through a repeater in CPT

1.1. Configure PC0, PC1, PC2 with the following IP addresses and Subnet Masks

Host	IP Address	Subnet Mask
PC0	10.0.0.1	255.0.0.0
PC1	10.0.0.2	255.0.0.0
PC2	10.0.0.3	255.0.0.0

1.2. Configure PC3, PC4, PC5 with the following IP addresses and Subnet Masks

Host	IP Address	Subnet Mask
PC3	10.0.0.4	255.0.0.0
PC4	10.0.0.5	255.0.0.0
PC5	10.0.0.6	255.0.0.0

1.3. Connection tests across PCs in a single LAN

Ping two PCs by there IP addresses from another PC within a LAN, one after another. If connection is there, four replies will come.

Do the same for the second LAN.

Command Prompt

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Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time=30ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 30ms, Average = 7ms

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=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

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

Fig 2.3: Pinging PC2 and PC1 from PC0

1.4. Connecting two LANs via the two switches with straight through Ethernet cables by the two interfaces of the Repeater.

2. Sending data across LANs

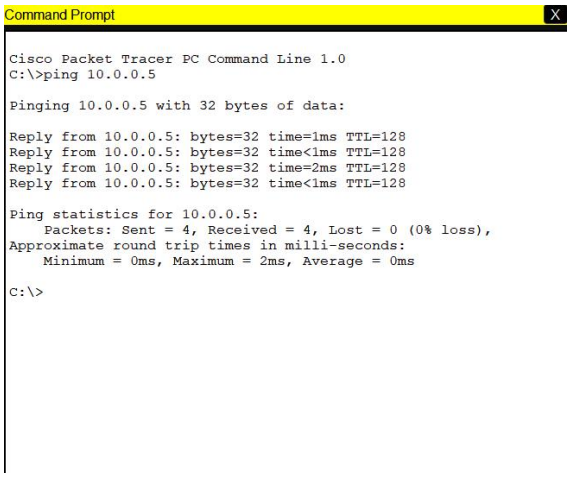

Fig 2.4: Pinging PC5 from PC0

3. Simulation:

Fig 2.5: Successful packets travel across PCs

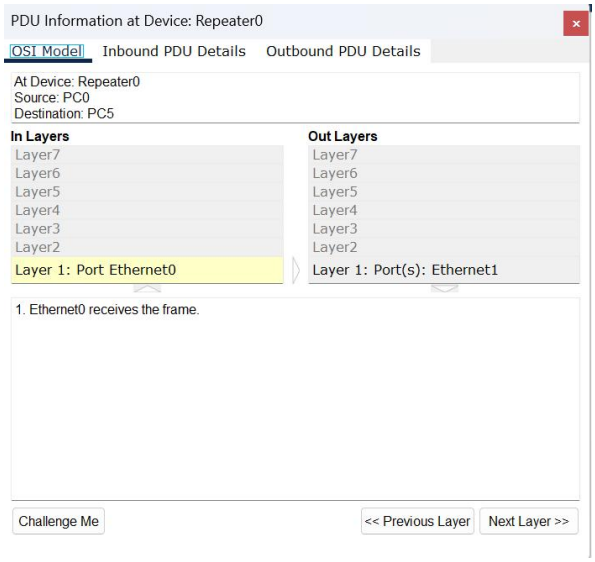

Fig 2.6: PDU information at Repeater

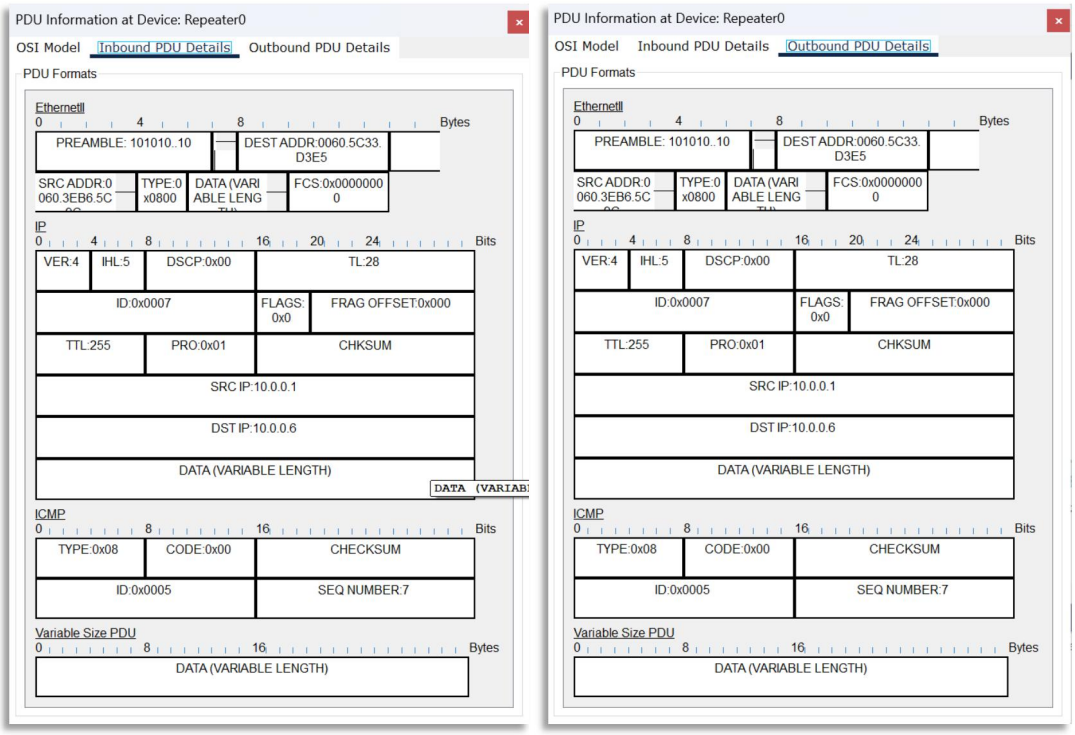

Fig 2.7: Inbound and Outbound PDU details at Repeater

Conclusion:

- A Router is a layer 1 device
- A Repeater is needed to regenerate signal traveling over long distances.
- A Repeater does not amplify the signal, only regenerates the same signal over the same network.

Lab Conclusion:

From this lab we got to know about,

- The basics of Router
  - A Router is a layer 3 device, therefore, it operates at the Network layer of the OSI model
  - A Router is an intelligent device as it has a a memory where it stores the routing table

- The basics of Repeater
  - A Repeater is a layer 1 device. Therefore, it operates at the Physical layer of the OSI model.
  - A Repeater is a 2 port device as it generally has only 2 ports
  - A Repeater only regenerates the received-signal and does not amplify it
  - A repeater works over the same LAN

- Use of Router
  - A Router is used to create an inter-LAN(Local Area Network)
  - A Router can inter-connect two LANs of different IP schemes

- Use of Repeater
  - A repeater is used to regenerate a signal that needs to travel a long distance over the same network; for without it(repeater), the signal may get weak or corrupted.