Page No.	Teacher Sign / Remarks

3/11/22 LAB-1

My First Packet Tracer Lab :

Packet tracer is a cross-platform visual simulation tool designed by Cisco systems that allows users to create network topologies and imitate modern computer networks. The software allow users to ~~create network topologies and imitate~~ simulate the configuration of Cisco routers and switches using a simulated command line interface.

Steps to create a Network :-

① Usually we are supposed to do it in Logical with Realtime and not in Physical, simulation.

② Start creating a network by first selecting "end devices" which is located in the left most bottom of the screen.

- Add a "generic PC" (1st option in beside row) and add another "generic PC". (Press on icon - drag - place)

③ Under "connections" located in the bottom left corner (zig zak icon) select "Automatically choose connection type" (default) and connect the devices.

④ Click on the end generic device (2 devices connected with wire) choose "config" then click "FastEthernet0" then enter IP address" (eg: 10.0.0.1) then click on "Subnet Mask" automatically the value occurs as (255.0.0.0) then exit. Do the same thing for the first generic device with diff. "IP address" (eg: 10.0.0.2) then exit. Now click on "simple PDU" located right side (envelope icon) place on both the devices. In the bottom right it shows as successfull.

⑤ Now, left click on the end generic device - go to "Desktop" - click "Command Prompt" - type "ping" space IP address of the generic device which ~~was entered~~ want to send and press enter. (eg: 10.0.0.1)

→ HUB : • Atleast single network is required to connect.
• It's a physical layer device i.e; layer 1.
• Works on the basis of broadcasting.
• multiport repeater in which a signal introduced at the I/P of any port appears at the O/P of all available ports.

→ SWITCH : • Atleast single network is required to connect.
• It's a Data link Layer device i.e; layer 2.
• works on the basis of MAC address.
• It's a telecommunication device which receives message from any device connected to it and transmits message only to device for which message is intended.

→ ROUTER : • Atleast 2 networks are required to connect.
• Router is a network layer device i.e; layer 3.
• works on basis of IP address.
• Reads the header of incoming packet & forward it to port & which it's intended there by determines the route.

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10/11/22. LAB-2 CYCLE-1

EXPERIMENT-1

Creating a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices.

a) Using hub as connecting device.

Hub is an unintelligent device. It operates in physical layer. No signal processing / regeneration occurs.

Procedure:

- We open Cisco packet tracer in logical mode. At the left hand side button corner we select end devices from device-type selection box.
- We select 4 generic end devices and enter the following IP addresses:- 10.0.0.1, 10.0.0.2, 10.0.0.3, 10.0.0.4. They have a common subnet mask of 255.0.0.0.
- We select a generic hub and make connections to the end devices using copper - straight - Through connections. We add a PDU to source end device (IP: 10.0.0.1) & destination end device (IP: 10.0.0.4).
- We switch to simulation mode and select auto capture/play.
- Message moves from Device (10.0.0.1) to Hub.
- The Hub transmits the message to remaining devices.
- Only Device (10.0.0.4) receives it correctly. The other 2 devices reject it.

Event List:

Time	Last Device	At device
0.000	---	PC0
0.001	PC0	Hub0
0.002	Hub0	PC1
0.002	Hub0	PC2
0.002	Hub0	PC3
0.003	PC3	Hub0

• Real Time (Event list)

Fire	Last Status	Source	Destination	Time (sec)	Periodic	Num
	Successful	PC0	PC3	0.000	N	0

• Ping PC > ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:

Reply from 10.0.0.4 : bytes = 32 time = 0ms TTL = 128

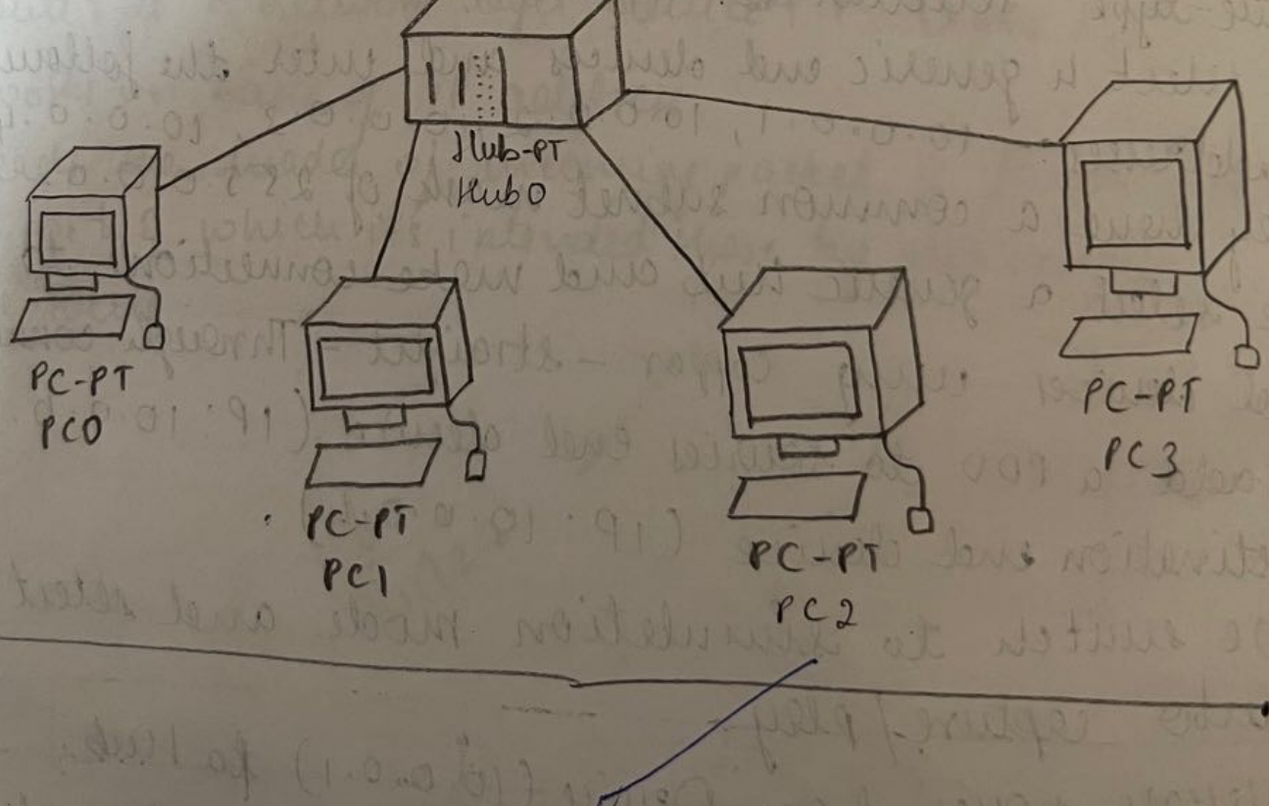
Statistics

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)

Round trip times:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

TOPOLOGY:



b) Using Switch as Connecting Device:

Switch is a point to point communication device. It operates at data link layer. It uses switching table to obtain correct address.

Procedure:

- We select 4 end devices from the Device-type selection box. We enter 10.0.0.5, 10.0.0.6, 10.0.0.7, 10.0.0.8 as their IP address respectively. They have common subnet mask 255.0.0.0.
- We select a generic switch and make connections to the end devices using copper-straight-through connects.
- We add a PDU to source End device (IP: 10.0.0.5), and destination End device (IP: 10.0.0.8)
- We enter simulation mode and select auto capture/play.
- Message moves from end device (10.0.0.5) to Switch.
- The Switch upon receiving the message sends it to destination end device (10.0.0.8) without broadcasting the message to other devices. Point-to-Point communication is present.

Real time (Event list)

Fire	Last status	Source	Destination	Time(sec)	Periodic	Num	Edit
	Successful	PC4	PC7	0.000	N	0	

Simulation Model (Event list)

Time (sec)	Last Device	At Device
0.000	---	PC4
0.001	PC4	Switch0
0.002	Switch0	PC7
0.003	PC7	Switch0
0.004	Switch0	PC4

· ping PC> ping 10.0.0.8

Pinging 10.0.0.8 with 32 bytes of data:

Reply from 10.0.0.8: bytes = 32 time = 11ms TTL = 128

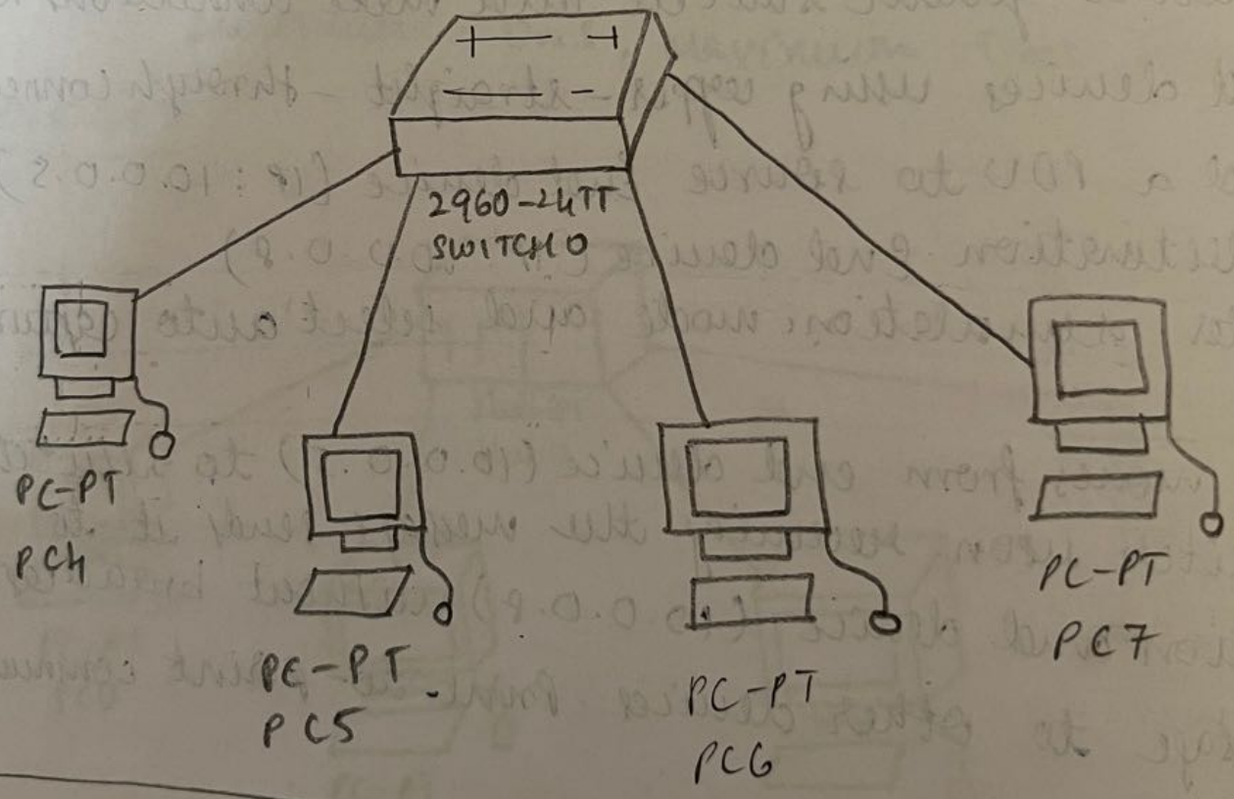
Statistics for 10.0.0.8

Packets: Sent = 4, Received = 4, Lost = 0 (0 % loss)

Approximate round trip times in milli-seconds.

Minimum = 0ms, Maximum = 11ms, Avg = 4 ms.

Topology:



c) Using both hub and switch as connecting devices:

Procedure:

- We form an interconnected LAN by making a connectn b/w Hub & switch established previously using a copper-cross-over connectn.
- We add a PDU to end device-source (IP: 10.0.0.1) & to end device - destinatn (IP: 10.0.0.8).
  Source connected to Hub & Destination connected to switch.
- We enter simulation mode & select auto capture/play.

Real time (Event list)

Fire	Last Status	Source	Destinatn	Time(sec)	Periodic	Num
	successful	PC0	PC7	0.000	N	0

- Message moves from source end device (IP: 10.0.0.1) to Hub.
- Hub broadcasts the message to devices (IP: 10.0.0.2, IP: 10.0.0.3, IP: 10.0.0.4) and to the switch.
- The end devices reject message
- The switch receives the message and sends it to destination end device (IP: 10.0.0.8) directly & not to any other device.
- In the next cycle, message sent from device (IP: 10.0.0.8) goes to switch and then to Hub directly.
- Hub broadcasts it to devices (IP: 10.0.0.1, 10.0.0.2, 10.0.0.3, 10.0.0.4), source device (IP: 10.0.0.1) receives message.

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• Simulation Model (Event list)

Time (sec)	Last Device	At Device
0.000	---	PC0
0.001	PC0	Hub0
0.002	Hub0	Switch0
0.003	Switch0	PC7
0.004	PC7	Switch0
0.005	Switch0	Hub0
0.006	Hub0	PC4
0.006	Hub0	PC3
0.006	Hub0	PC2
0.006	Hub0	PC1
0.006	Hub0	

Ping PC> ping 10.0.0.8

Pinging 10.0.0.8 with 32 bytes of data.

Reply from 10.0.0.8 : bytes=32 time<1ms TTL=128
Reply from 10.0.0.8 : bytes=32 time<1ms TTL=128
Reply from 10.0.0.8 : bytes=32 time<1ms TTL=128
Reply from 10.0.0.8 : bytes=32 time=1ms TTL=128

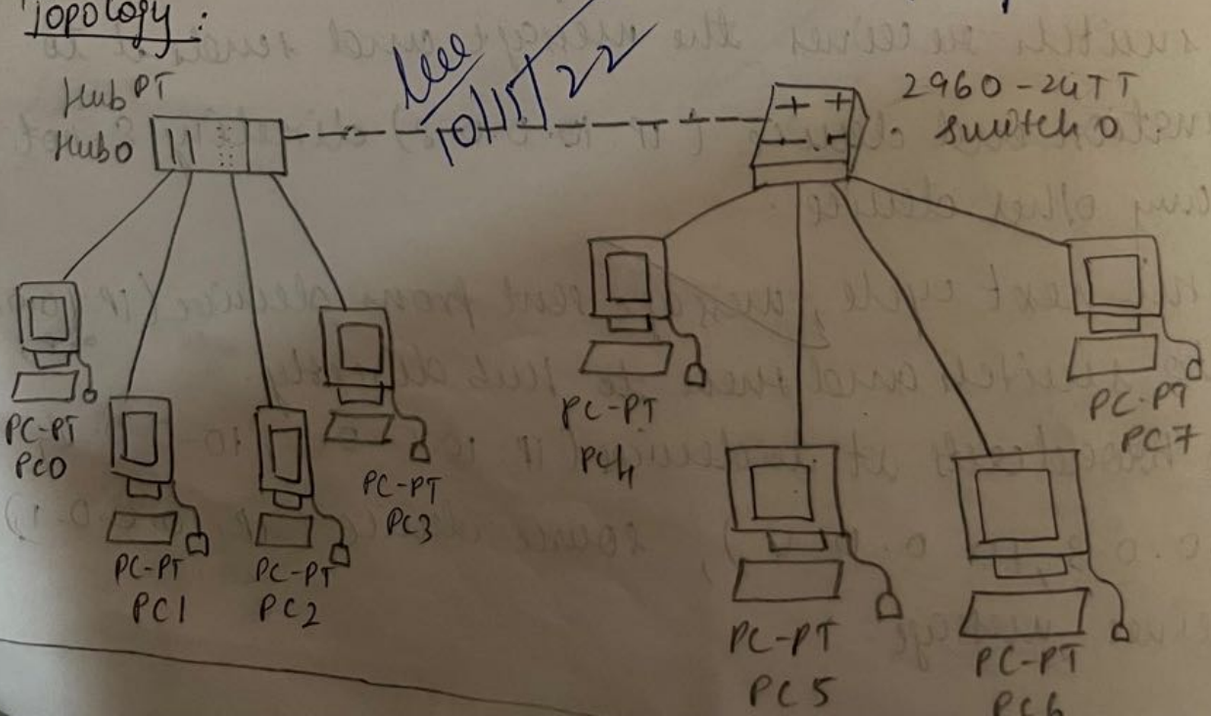
Ping statistics for 10.0.0.8

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds

Minimum = 0ms, Maximum = 1ms, Avg = 0ms.

Topology:



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17/11/22 LAB-3 PROGRAM-2

Configuring IP address to Routers in Packet Tracers. Explore the following messages: Ping Responses, Destination unreachable, Request timed out, Repay.

- Routers are sophisticated multi-port devices. They operate at Network layer and use a routing table to determine which path from source to destination should be selected.

Procedure:

- We select 2 generic end devices from the Device-type selection box. We give the source device IP address as 10.0.0.1 and 20.0.0.1 to the other end device. Subnet mask 255.0.0.0.
- We select a generic Router-PT and connect it to the end devices using copper cross-over connections.
- We see interface between end device and router denoted by a red dot (Network not yet functional).
- We have to configure the interfaces.
- The following commands are executed by clicking on the router and selecting CLI:
- Continue with configuration dialog? [yes/no]: no

1st side configuration:

```
Router > enable
Router# config terminal
Router(config)# interface fastEthernet 0/0.
Router(config-if)# IP address 10.0.0.10 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
```

2nd side configuration:

```
Router(config)#interface fastEthernet 1/0
Router(config-if)# IP address 20.0.0.10 255.0.0.0
Router(config-if)# no shutdown
Router(config)# exit
```

- The interfaces (represented by red dot) turn green. This indicates that the network is functional.
- We add PDU's to the end devices.
- We ~~so~~ select the source end devices and go to the command prompt option in Desktop panel.
- Enter command:

PC> ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data.

~~Ref~~ Request timed out
Request timed out
Request timed out
Request timed out

- Gateway address has to be added for end devices to know where to send PDU when Router is present.
- For source end-device (IP: 10.0.0.1) enter gateway of interface IP address: 10.0.0.10
- For classification end-device (IP: 20.0.0.2) enter gateway as interface IP address: 20.0.0.10.
- Select source end device and go to desktop panel, choose command prompt option.
- Enter the command:

PC > ping 20.0.0.1

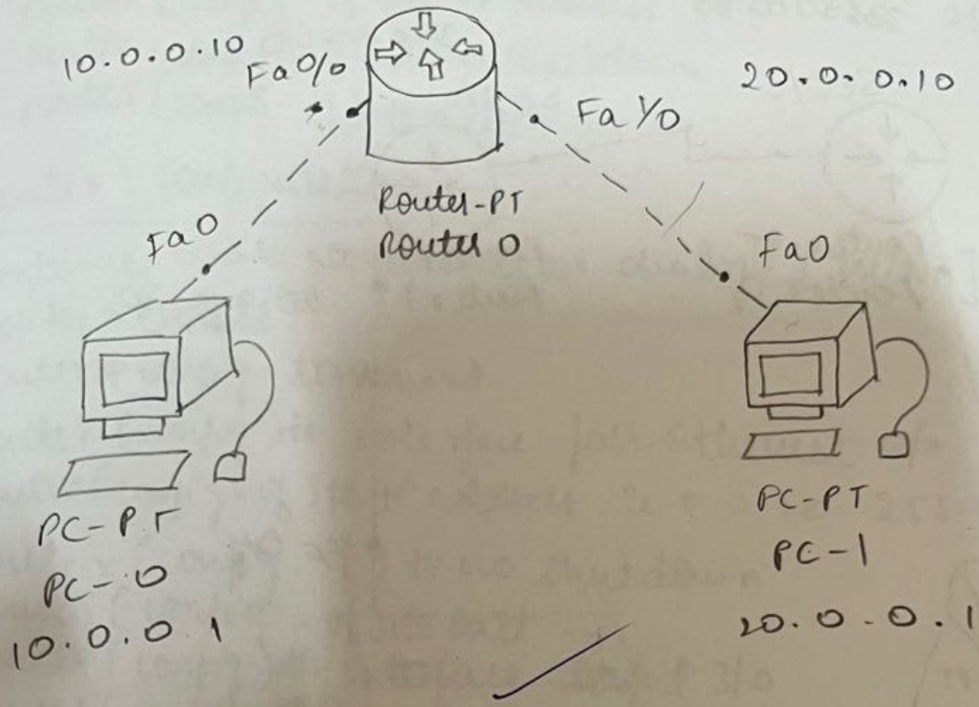
Pinging 20.0.0.1 with 32 bytes of data.

Reply from 20.0.0.1: bytes = 32 time = 0ms TTL = 127
Reply from 20.0.0.1: bytes = 32 time = 0ms TTL = 127
Reply from 20.0.0.1: bytes = 32 time = 0ms TTL = 127
Reply from 20.0.0.1: bytes = 32 time = 0ms TTL = 127

Ping statistics for 20.0.0.1

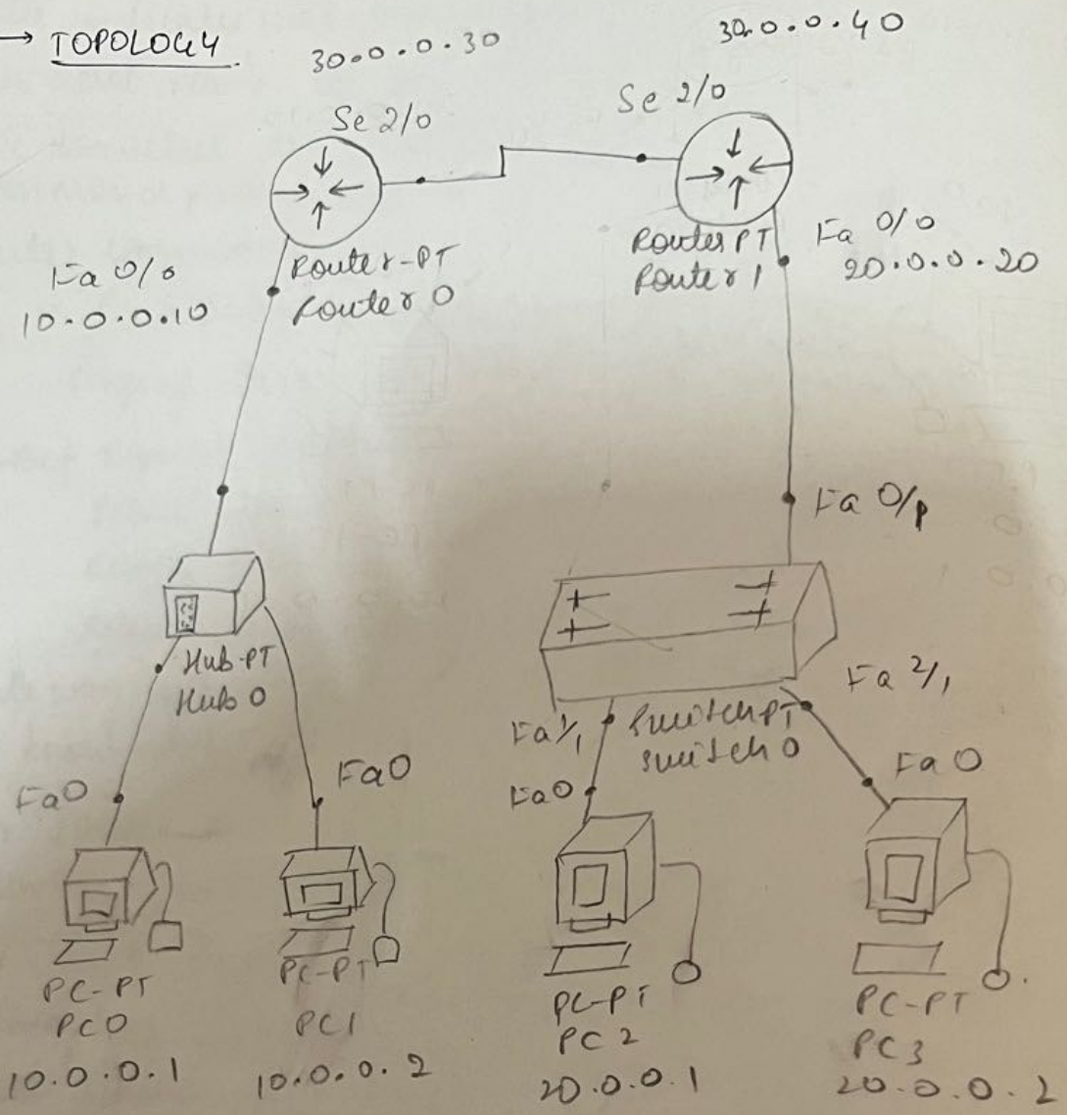
Packets: sent = 4, Received = 4, Lost = (0% loss),
Approximate round trip times in milliseconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms.

→ TOPOLOGY:


10.0.0.10
Fa0/0
Fa1/0
20.0.0.10
Router-PT
Router 0
Fa0
Fa0
PC-PT
PC-0
10.0.0.1
PC-PT
PC-1
20.0.0.1

Part-2

→ TOPOLOGY



PC > ping 20.0.0.2 (from PC0)

Destination Host Unreachable. ✓

Ping statistics for 20.0.0.2:

Packets: Sent = 4, Received = 0, Lost = 4 (100% loss)

Ping 30.0.0.40 (from Router 0 to Router 1)

Packets Sent = 4, Receives = 4, Lost = 0 (0% loss)

Router 0 configuration:

continue with configuration dialog? [Yes/No]: No.

Router > enable

Router # config terminal.

Router (config)# interface fastEthernet 0/0.

Router (config-if)# IP address 10.0.0.10 255.0.0.0

Router (config-if)# no shutdown.

Router (config-if)# exit.
Router (config)# interface serial 2/0.
Router (config-if)# IP address 30.0.0.30 255.0.0.0.
Router (config-if)# no shutdown
Router (config-if)# exit.

Router | configuration:

- continue with configuration dialog? [Yes/No]: No
Router > enable
Router# config terminal.
Router (config)# interface fastEthernet 0/0.
Router (config-if)# IP address 20.0.0.20 255.0.0.0
Router (config-if)# no shutdown
Router (config-if)# exit
Router (config)# interface serial 3/0.
Router (config-if)# IP address 30.0.0.40 255.0.0.0.
Router (config-if)# no shutdown
Router (config-if)# exit.

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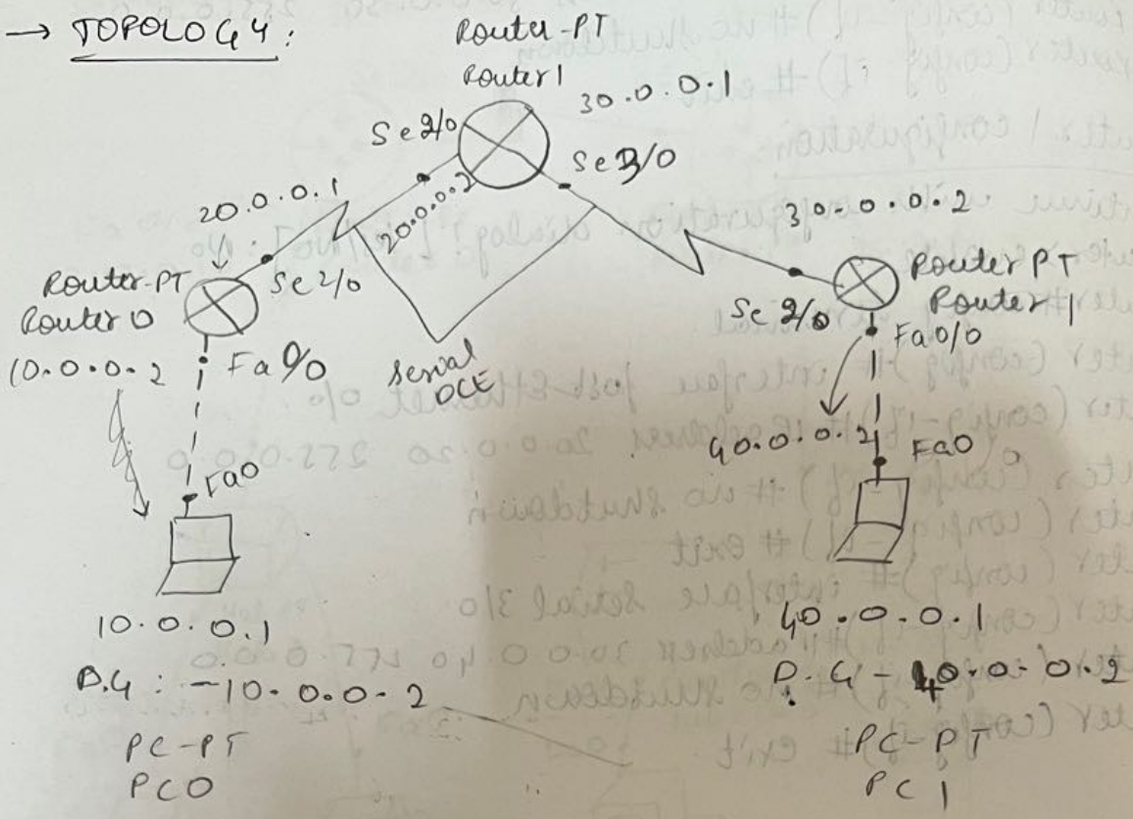
24/11/22 LAB-4 PROGRAM-3

→ TOPOLOGY:



Router-0 configuration:

- Continue with configuration dialog [Yes/No]? No.
  Router > enable
  Router # config terminal
  Router (config) # interface fastEthernet 0/0
  Router (config-if) # IPaddress 10.0.0.2 255.0.0.0
  Router (config-if) # no shutdown
  Router (config-if) # exit
  Router (config) # interface Serial 2/0
  Router (config-if) # IPaddress 20.0.0.1 255.0.0.0
  Router (config-if) # NoShutdown
  Router (config-if) # Exit
- ip route 30.0.0.0 255.0.0.0 20.0.0.2
  ip route 40.0.0.0 255.0.0.0 20.0.0.2

Router-1 configuration:

Continue with configuration dialog [Yes/No] ? No.
Router > enable
Router # config terminal
Router (config) # interface ~~fastEthernet 1/0~~ Serial 2/0
Router (config-if) # IP address 20.0.0.2 255.0.0.0

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Router-1

- ip route
  ip route

Router-2

- ip route
  ip route

PC > pi
Pinging
Reply f
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Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface serial 3/0
Router(config-if)# IP address 30.0.0.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit

Router-2 configuration:

Continue with configuration dialog [Yes/No]? No
Router> enable
Router# config terminal
Router(config)# interface Serial 2/0
Router(config-if)# IP address 30.0.0.2 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface ~~serial 2/0~~ fastEthernet 0/0
Router(config-if)# IP address 40.0.0.2 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit

Router-1

- ip route 10.0.0.0 255.0.0.0 30.0.0.1
  ip route 20.0.0.0 255.0.0.0 30.0.0.1

Router-2

- ip route 10.0.0.0 255.0.0.0 20.0.0.1
  ip route 40.0.0.0 255.0.0.0 30.0.0.2

PC> ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=9ms TTL=125
Reply from 40.0.0.1: bytes=32 time=6ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125

Ping Statistics:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss)
Approximate round trip times in milli-seconds.
Minimum = 2ms, Maximum = 9ms, Average = 4ms.
PDU from source end device (10.0.0.1)
Sent successfully to destination end device (40.0.0.1)

Router 1:

Router > show ip router
C 10.0.0.0/8 is directly connected, FastEthernet 0/0
C 20.0.0.0/8 is directly connected, serial 2/0
Router > enable
Router# config terminal
Router(config)# ip route 30.0.0.0 255.0.0.0 20.0.0.2
Router(config)# ip router 40.0.0.0 255.0.0.0 20.0.0.2
exit
Router > show ip route
C 10.0.0.0/8 is directly connected, FastEthernet 0/0.
C 20.0.0.0/8 is directly connected, Serial 2/0.
S 30.0.0.0/8 [1/0] via 20.0.0.2
S 40.0.0.0/8 [1/0] via 20.0.0.2

Router 2:

Router(config)# ip route 10.0.0.0 255.0.0.0 20.0.0.1
Router(config)# ip route 40.0.0.0 255.0.0.0 30.0.0.2

Router 3:

Router(config)# ip route 20.0.0.0 255.0.0.0 30.0.0.1
Router(config)# ip route 10.0.0.0 255.0.0.0 30.0.0.1
Router(config)# ip route Destination n/w subset mask
nethop address.

PC > pong 10.0.0.1
Ponging from 10.0.0.1 with 32 bytes of data
Reply from 10.0.0.1: bytes = 32 time = 12ms TTL = 125
Reply from 10.0.0.1: bytes = 32 time = 12ms TTL = 125
Reply from 10.0.0.1: bytes = 32 time = 20ms TTL = 125

ping statistics for 10.0.0.1
packets: sent = 4, Received = 4 lost = 0 (0% loss)
Approximate round trip times in milli-seconds:
Minimum = 2ms, Maximum = 20ms, Average = 11ms.

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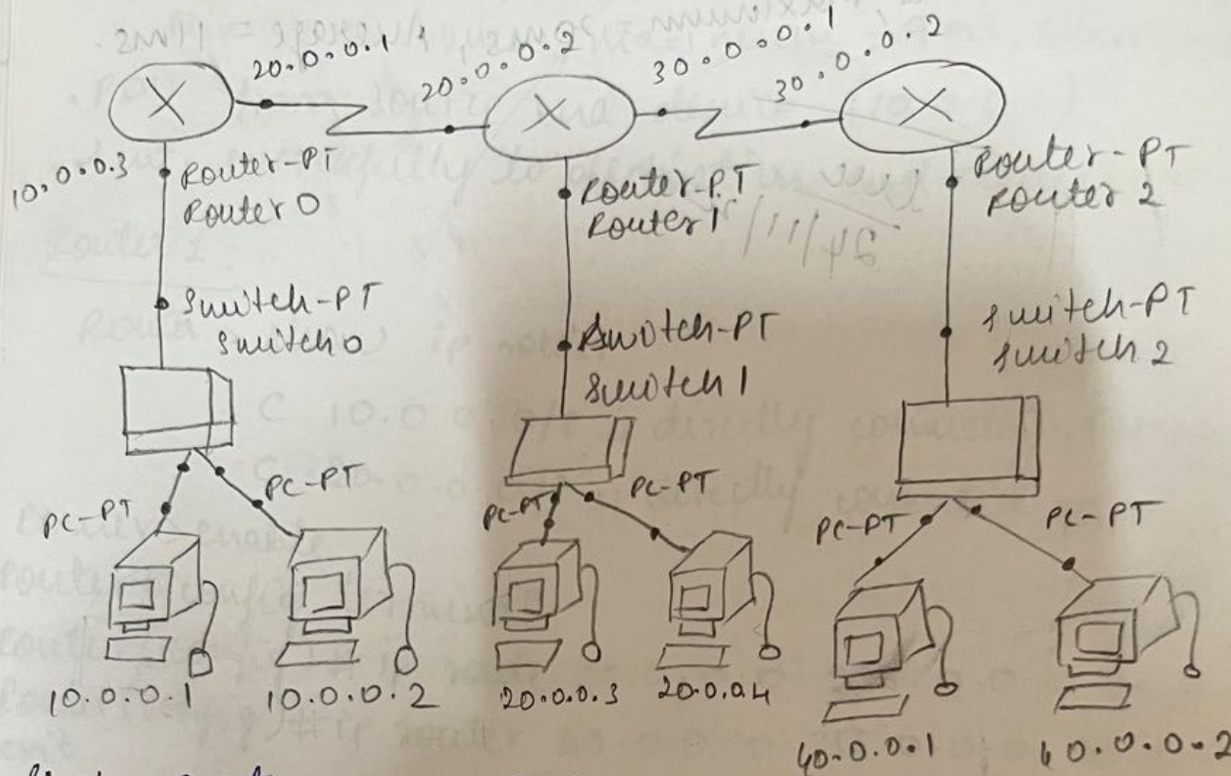
1/12/22 LAB-5 PROGRAM-4

→ TOPOLOGY:



Step 1: Create a network topology with Router and Switch and PC's.

Step 2: Configuring Hosts (PC's) with IP addresses and Default gateway using IP addressing.

Step 3: Configuring the Interfaces (routers) with IP addresses and Default gateways and assigning the default routes.

Router 0 configuration:

- Now we will add the IP addr of the serial se2/0 & its subnet mask.
- We will add the IP addr of the interface FastEthernet port fa0/0 and its subnet mask.
- Add IP addr of the next hope to connect with another LAN.

Router(config)# interface serial 2/0
Router(config)# ip address 20.0.0.1 255.0.0.0
Router(config-if)# No shutdown
Router(config)# interface fastethernet 0/0
Router(config)# ip address 10.0.0.3 255.0.0.0
Router(config-if)# No shutdown
Router(config)# ip route 0.0.0.0 0.0.0.0 20.0.0.2
Router(config)# ip route 0.0.0.0 0.0.0.0 20.0.0.2

Router 1 configuration.

Router(config)# interface serial 2/0
Router(config)# ip address 20.0.0.2 255.0.0.0
Router(config-if)# No shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 0/0
Router(config)# ip address 30.0.0.1 255.0.0.0
Router(config-if)# No shutdown
Router(config-if)# exit
Router(config)# ip route 0.0.0.0 0.0.0.0 20.0.0.1
Router(config)# ip route 0.0.0.0 0.0.0.0 30.0.0.2

Router 2 configuration:

Router(config)# interface serial 3/0
Router(config)# ip address 30.0.0.2 255.0.0.0
Router(config-if)# No shutdown
Router(config-if)# exit
Router(config)# interface fastethernet 1/0
Router(config)# ip address 40.0.0.3 255.0.0.0
Router(config)# exit
Router(config)# ip route 0.0.0.0 30.0.0.1
Router(config)# ip route 0.0.0.0 30.0.0.1

Ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data

Reply from 10.0.0.1 : bytes=32 time=3ms TTL= 255

Reply from 10.0.0.1 : bytes = 32 time= 3ms TTL = 255

Reply from 10.0.0.1 : bytes = 32 time = 6ms TTL = 255

Reply from 10.0.0.1 : bytes = 32 time = 2ms TTL = 255

Packets

Sent = 4, Received = 4, Lost = 0

minimum = 2ms, maximum = 6ms Average = 3ms

Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data.

Request Timed Out

Request Timed Out

Request Timed Out

Request Timed Out

Ping 40.0.0.1

Ping 40.0.0.1 with 32 bytes of data.

Reply from 40.0.0.1 : bytes = 32 time = 1ms TTL = 255

Reply from 40.0.0.1 : bytes = 32 time = 6ms TTL = 255

Reply from 40.0.0.1 : bytes = 32 time = 2ms TTL = 255

Reply from 40.0.0.1 : bytes = 32 time = 2ms TTL = 255

Ping Statistics

Packets sent = 4, Received = 4, Lost = 0

Approximate round trip time in milliseconds.

minimum = 2ms maximum = 9ms Average = 4ms

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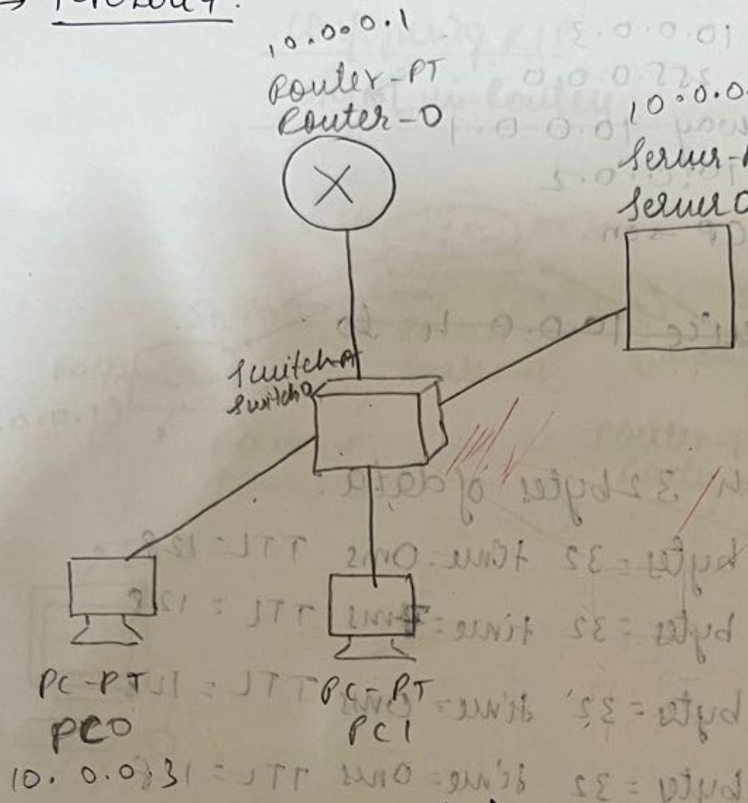
8/12/22. LAB-6 PROGRAM-5

DHCP (Dynamic Host configuration Protocol)

→ TOPOLOGY:



→ Router 0 configuration:

Router>enable
Router#config terminal
Router(config)#interface fastEthernet 0/0
Router(config-if)#IP address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
exit.

Configure server ip address as 10.0.0.2
config → fastethernet → ip address 10.0.0.2.
Services → DHCP (switch on)
→ Default Gateway as 10.0.0.1 (Router addr)
DNS Server as 10.0.0.2 (Server ipaddr)
Start IP addr as 10.0.0.3
Subnet Mask as 255.0.0.0
Max. no. of users as ~~10.0.0.2~~ 512
TFTP Server as 10.0.0.2
Then save.

	Server
end device	Services
Desktop	DHCP
IPconfig	10.0.0.1
	10.0.0.2
	10.0.0.3
	10.0.0.3
	512
	10.0.0.2
	Save

→ For an end device

Desktop → IP configuration → DHCP

IP Address 10.0.0.3
Subnet mask 255.0.0.0
Default Gateway 10.0.0.1
DNS Server 10.0.0.2

then again DHCP → on.

~~Ping from end device 10.0.0.4 to~~

PC > ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.3 : bytes = 32 time = 7ms TTL = 128
Reply from 10.0.0.3 : bytes = 32 time = 0ms TTL = 128
Reply from 10.0.0.3 : bytes = 32 time = 0ms TTL = 128

Ping statistics for 10.0.0.3:

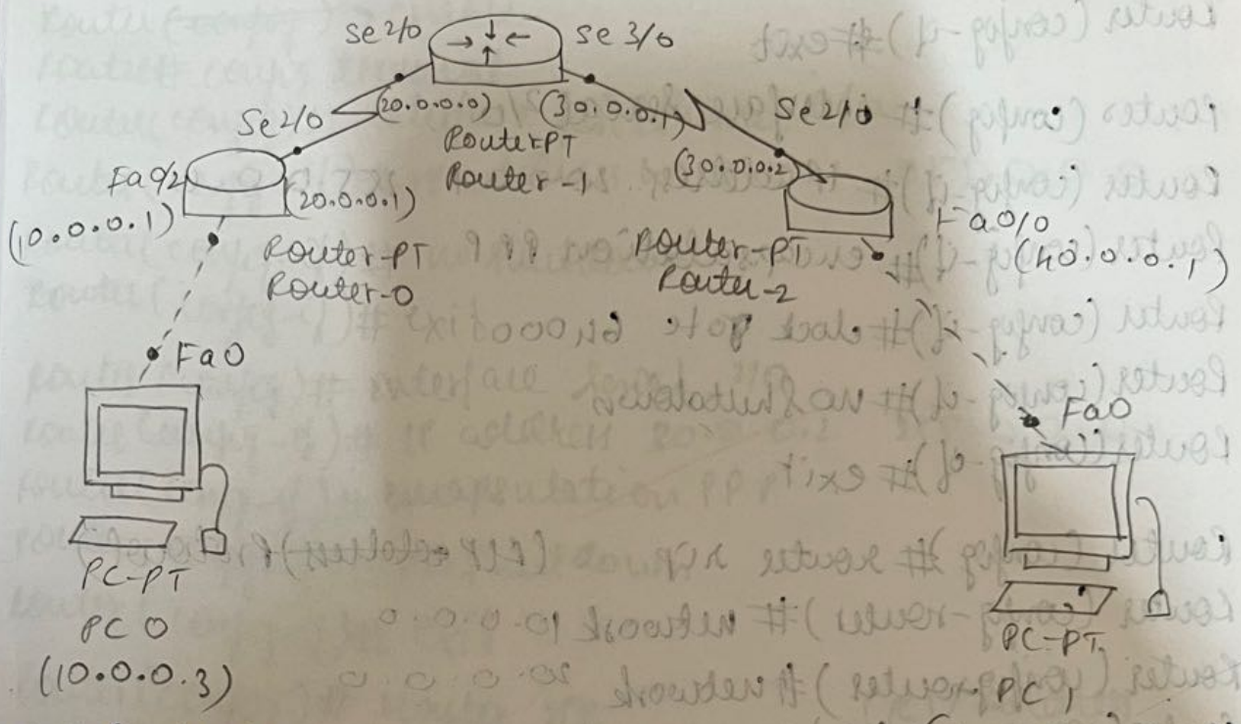
Packets : sent = 4, Received = 4, Lost = 0 (0% Loss)
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 7ms, Average = 1ms

8/12/22

15/12/22 LAB-7 Program-6

TOPOLOGY:

Configuring RIP Protocol in Routers



- RIP: Router Information Protocol
- DVA: Distance Vector Algorithm

→ Finds optimal path. Also known as Router ~~determinant~~ Protocol.

→ Constant / Periodic updates relayed throughout network

→ Information about neighbours passed to all end trusted.

PROCEDURE:

- Select 2 end devices & set their IP addresses as 10.0.0.3 & 40.0.0.3 with subnet mask 255.0.0.0 respectively.
- Select 3 generic routers & make connections b/w routers and end devices.

Router-0-configuration:

```
Router >enable
Router #config terminal
Router (config)# interface fastEthernet 0/0
Router (config-if)# IP address 10.0.0.1 255.0.0.0
Router(config-if)# no shutdown
Router (config-if)# exit

Router (config)# interface Serial 2/0
Router (config-if)# IP address 20.0.0.1 255.0.0.0
Router (config-if)# encapsulation PPP
Router (config-if)# clock rate 64000
Router (config-if)# no shutdown
Router (config-if)# exit

Router (config)# router rip (RIP protocol)
Router (config-router)# network 10.0.0.0
Router (config-router)# network 20.0.0.0
Router (config-router)# network exit
```

Router-1 configuration:

```
Router >enable
Router #config terminal
Router (config)# interface Serial 2/0
Router(config-if)# IP address 20.0.0.2 255.0.0.0
Router (config-if)# encapsulation PPP
Router (config-if)# no shutdown
Router (config-if)# exit

Router #config terminal
Router (config)# interface Serial 3/0
Router (config-if)# IP address 30.0.0.1 255.0.0.0
Router(config-if)# encapsulation PPP
Router (config-if)# clock rate 64000
Router (config-if)# no shutdown
Router (config-if)# exit
```

Router(config)# router rip (RIP Protocol)
Router(config-router)# network 20.0.0.0
Router(config-router)# network 30.0.0.0
Router(config-router)# exit

Router-2 configuration:

Router > enable
Router# config terminal
Router(config)# interface fastEthernet 0/0
Router(config-if)# ip address 40.0.0.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface Serial 2/0
Router(config-if)# ip address 30.0.0.2 255.0.0.0
Router(config-if)# encapsulation PPP
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# router rip (RIP Protocol)
Router(config-router)# network 30.0.0.0
Router(config-router)# network 40.0.0.0
Router(config-router)# exit.
Assign 10.0.0.1 as gateway for EndDevice (10.0.0.3)
Assign 40.0.0.1 as gateway for EndDevice (40.0.0.3)

Ping Statistics:

PC> Ping 40.0.0.3
Pinging 40.0.0.3 with 32 bytes of data:
Reply from 40.0.0.3 bytes=32 time=2ms TTL=125
Reply from 40.0.0.3 bytes=32 time=2ms TTL=125
Reply from 40.0.0.3 bytes=32 time=2ms TTL=125
Reply from 40.0.0.3 bytes=32 time=12ms TTL=125
Reply

Ping statistics for 40.0.0.3:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 3ms, Maximum = 12ms, Average = 4ms

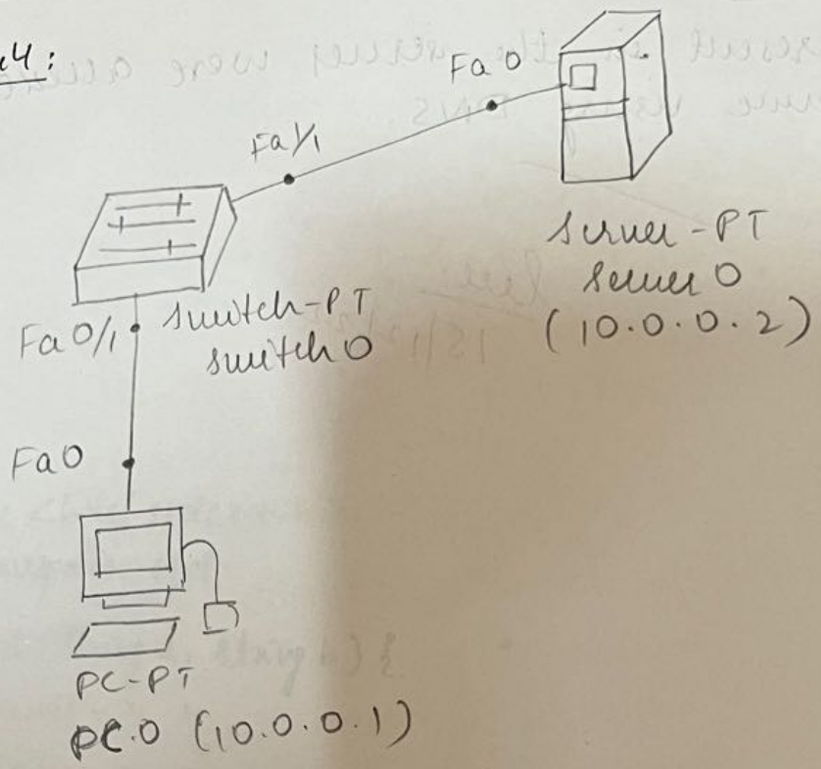
OBSERVATION:

RIP protocol enabled the sharing of routing table information throughout the network.
PDU was successfully sent from 1 end device to another device.

15/12/22

Demonstration of WEB server and DNS using Packet Tracer :

TOPOLOGY :



PROCEDURE :

- Select and end device and configure it with an IP address of 10.0.0.1 & subnet mask 255.0.0.0
- Connect it to a switch and then make a connection b/w switch and a server.
- Server configuration to make it have ~~text~~ an IP address of 10.0.0.2 & subnet mask 255.0.0.0.
- Click on the server and go to services menu. Ensure that HTTP service is switched on. Go to DNS service, switch it on. Under resource records enter name of the desired website (eg: www.cmrcet.com)
- Enter the IP address of the server & then add the records.

Select the TFTP service & switch it on.

- Select the end device and go to desktop.
- Select web browser icon and in the URL space enter the website name / address along with filename

in HTTP service. eg) http://10.0.0.2/helloworld.html
• file is displayed along with content.

OBSERVATION:

• Files present in the server were accessed by end device using DNS.

Lee
15/12/22

29/12/22 [LAB-8] [Program-7]

Write a program to detect errors using CRC 16-bit.

$(x^{16} + x^{12} + x^5 + 1)$

(1 0 1 1 1 0 1) ⇒ data given.

x^{16}	x^{15}	x^{14}	x^{13}	x^{12}	x^{11}	x^{10}	x^9	x^8	x^7	x^6	x^5	x^4	x^3	x^2	x^1	#
1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1

(n-1) ⇒ (16-1) ⇒ 15 key.

(add 15 0's to the given data.)

code:

```
#include <bits/stdc++.h>
using namespace std;
string xor1(string a, string b) {
string result = "";
int n = b.length();
for(int i=1; i<n; i++){
if (a[i] == b[i])
    result += "0";
else
    result += "1";
} return result;
}
string mod2div(string dividend, string divisor) {
    int pick = divisor.length();
    string tmp = dividend.substr(0, pick);
    int n = dividend.length();
    while (pick < n){
    if (tmp[0] == '1')
        tmp = xor1(divisor, tmp) + dividend[pick];
        else
        tmp = xor1(std::string(pick, '0'), tmp) +
              dividend[pick];
```

```
    pick += 1;
} if (tmp[0] == '1')
    tmp = xorI(divisor, tmp);
  else
    tmp = xorI(std::string(pick,'0'), tmp);
  return tmp;
}
void encodeData(string data, string key)
{ int l_key = key.length();
  string appended_data = (data + std::string(l_key
                                -1, '0'));
  string remainder = mod2div(appended_data, key);
  string codeword = data + remainder;
  cout << "Remainder:"
       << remainder << "\n";
  cout << "Encoded Data (Data + Remainder):"
       << codeword << "\n";
}void receiver(string data, string key){
  string currxor = mod2div(data.substr(0, key.size()), key);
  int curr = key.size();
  while (curr != data.size()){
    if (currxor.size() != key.size()){
      currxor.push_back(data[curr++]);
    }else{
      currxor = mod2div(currxor, key);
    }
  }
  if (currxor.size() == key.size()){
  currxor = mod2div(currxor, key);
  }
  if (currxor.find('1') != string::npos)
```

```
{ cout << "there is some error in data " << endl;
} else {
cout << "correct message recieved" << endl;
}
}
int main()
{
string data = "10111010000000000000000";
string key = "10001000000010000 1";
encodeData(data, key);
return 0;
}
```

Output:

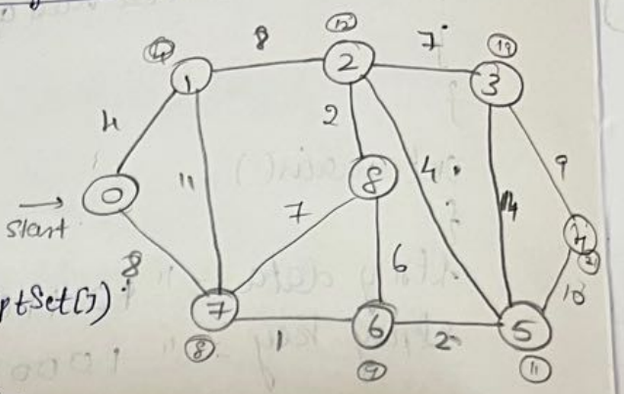
remainder: 10000110010111111

Encodied Data (Data + Remainder): 10110100000000000000010000110010111111

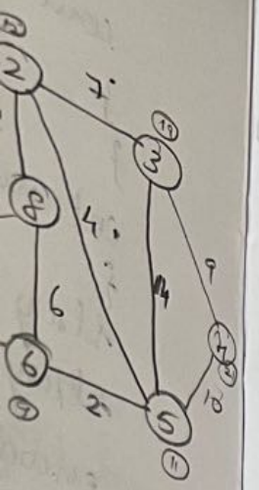
correct message recieved

5/1/23 LAB - 9 Program - 8

Dijkstra's Algorithm




```
#include <iostream>
using namespace std;
#include <limits.h>
#define V 9
int minDistance(int dist[], bool sptSet[])
{
 int min = INT_MAX, min_index;
   for (int v = 0; v < V; v++)
     if (sptSet[v] == false && dist[v] <= min)
         min = dist[v], min_index = v;
     return min_index;
} void printSolution(int dist[])
{
 cout << "Vertex \t Distance from Source" << endl;
 for (int i = 0; i < V; i++)
     cout << i << "\t\t\t\t" << dist[i] << endl;
} void dijkstra(int graph[V][V], int src)
{
 int dist[V];
 bool sptSet[V];
 for (int i = 0; i < V; i++)
   dist[i] = INT_MAX, sptSet[i] = false;
   dist[src] = 0;
   for (int count = 0; count < V-1; count++){
     int u = minDistance(dist, sptSet);
     sptSet[u] = true;
     for (int v=0; v<V; v++)
       if (!sptSet[v] && graph[u][v]
           && dist[u] != INT_MAX
           && dist[u] + graph[u][v] < dist[v])
```



```
            dist[v] = dist[u] + graph[u][v];
        }printSolution(dist);
    }int main()
    {int graph[V][V] = {{ 0, 4, 0, 0, 0, 0, 0, 8, 0},
                        { 4, 0, 8, 0, 0, 0, 0, 11, 0},
                        { 0, 8, 0, 7, 0, 4, 0, 0, 2},
                        { 0, 0, 7, 0, 9, 14, 0, 0, 0},
                        { 0, 0, 0, 9, 0, 10, 0, 0, 0},
                        { 0, 0, 4, 14, 10, 0, 2, 0, 0},
                        { 0, 0, 0, 0, 0, 2, 0, 1, 6},
                        { 8, 11, 0, 0, 0, 0, 1, 0, 7},
                        { 0, 0, 2, 0, 0, 0, 6, 7, 0}};

    dijkstra(graph, 0);
    return 0;
}
```

0 to 0 → 0
0 to 1 → 4
0 to 2 → 0
0 to 3 → 0
0 to 7 → 8
0 to 8 → 0

OUTPUT:

Vertex	Distance from Source
0	0
1	4
2	12
3	19
4	21
5	11
6	9
7	8
8	14

12/1/23

LAB-10

Program-9

Distance vector algorithm (to find suitable path for transmission)

→ Distance_Vector Routing Algorithm for a Node.

```
Distance_Vector_Routing()
{
  // Initialize (create initial vectors for the node)
  D[myself] = 0
  for(y = 1 to N)
  {
    if(y is a neighbor)
        D[y] = c[myself][y]
    else
        D[y] = ∞
  }
  send vector [D[1], D[2], ..., D[N]] to all neighbors.
  // Update (improve the vector with the vector received
        from a neighbor)
  repeat(forever)
  {
    wait(for a vector Dw from a neighbor w or any
    &     change in the link)
    for(y = 1 to N)
    {
      D[y] = min[D[y], (c[myself][w] + Dw[y])] // Bellman
                                                  -Ford eqn
    }
    if(any change in the vector)
        send vector [D[1], D[2], ..., D[N]] to all neighbors
```

code:

#include
using
#defin
10 int
class
char
int ta
table
for(i
}vo
for
ad
ta
}}
f

o find suitable
ath for transmission)

Node

node)

eighbors.

r received

w or any

])] //Bellman
-Ford eqn

all neighbors

code:

```
#include<bits/stdc++.h>
using namespace std;
#define MAX
10 int n;
class router{

char adj_new[MAX], adj_old[MAX];
int table_new[MAX];
table_old[MAX]; public: router(){
for(int i=0; i<MAX; i++)table_old[i] = table_new[i] = 99;
}void copy(){
for(int i=0; i<n; i++){
adj_old[i] = adj_new[i];
table_old[i] = table_new[i];
}} int equal(){
for(int i=0; i<n; i++)
if(table_old[i] != table_new[i] || adj_new[i] != adj_old[i])
return 0;
return 1;
}void input(int j){
cout<<"Enter 1 if the corresponding router is adjacent to
        router"
<<(char)('A'+j)<<" else enter 99;
"<<endl<<" "; for(int i=0; i<n; i++) if (i!=j)
cout<<(char)('A'+i)<<" ";
cout<<"\n Enter matrix: ";
for(int i=0; i<n; i++){
if(i==j) table_new[i]=0;
else cin>>table_new[i];
adj_new[i]=(char)('A'+i);
} cout<<endl;
}void display(){
cout<<"\nDestination Router:";
for(int i=0; i<n; i++)
cout<<(char)('A'+i)<<" ";
cout<<"\nOutgoing Line: ";
for(int i=0; i<n; i++)
cout<<(char)('A'+i)<<" ";
cout<<"\nOutgoing Line: ";
```

```
for(int i=0; i<n ;i++)
cout<<adj_new[i]<<" ";
cout<<"\nHop count:";
for(int i=0; i<n; i++) cout<<table_new[i]<<" ";
}void build(int j){
for(int i=0; i<n; i++)
for(int k=0; (i!=j)&&(k<n); k++) if(table_old[i]!=99)
if((table_new[i]+table_new[k])<table_new[k])
{
table_new[k]=table_new[i]+table_new[k];
adj_new[k]=(char)('A'+i);
}}} r[MAX];
void build_table(){
int i=0,j=0;
while(i!=n)
{
for(i=j;i<n;i++){
r[i].copy();
r[i].build(i);
}for(i=0;i<n;i++)if(!r[i].equal())
{j=i;
break;
}}}
int main(){
cout<<"Enter the number the routers (<"<<MAX<<"):";
cin>>n; for(int i=0; i<n;i++)r[i].input(i);
build_table(); for(int i=0; i<n; i++){
cout<<"Router Table entries for router
"<<(char)('A'+i)<<":-"; r[i].display();
cout<<endl<<endl;
}}
```

OUTPUT:

Enter the number the routers (<10): 5

Enter 1 if the corresponding router is adjacent to router A else enter 99:

BCDE

Enter matrix: 1 1 99 99

Enter 1 of the corres " —— router B " —— " ——

&ACDE

Enter matrix: 1 99 99 99

Enter 1 " —— " —— router C " —— " ——

ABDE

Enter matrix: 1 99 1 1

Enter 1 " —— " —— router D " —— " ——

ABCE

Enter matrix: 99 99 1 99

Enter 1 " —— " —— router E " —— " ——

ABCD

Enter matrix: 99 99 1 99

Router table entries for router A:-

Destination Router: A B C D E

Outgoing line: A B C D E

Hop count: 0 1 1 99 99

Router table entries for router B:-

DR: A B C D E

OL: A B C D E

HC: 1 0 99 99 99

Router C:-

DR: A B C D E

OL: A B C D E

HC: 1 99 0 1 1

Router D:-

DR: A B C D E

OL: A B C D E

HC: 99 99 1 0 99

Router E:-

DR: A B C D E

OL: A B C D E

HC: 99 99 1 99 0

28/1/23.

Lap Program:

→ Socket Programming using TCP & UDP

⇒ Socket

⇒ Stream jargon.

⇒ Types of sockets

⇒ client

⇒ Server tcp.py

→ Socket programming with UDP:-

⇒ Server udp.py:

TCP (Program - 5)

CODE

SERVER (saved as server.py)

```
import socket
serverName = '127.0.0.1'
serverPort = 12345
#create
server_socket = socket.socket(socket.AF_INET, socket.SOCK_
STREAM)
#bind
server_socket.bind((serverName, serverPort))
#listen
server_socket.listen(5)
while True:
    print("Server waiting for connection")
    client_socket, addr = server_socket.accept()
    print("Client connected from", addr)
    sentence = client_socket.recv(1024).decode()
    file = open(sentence, "r")
    l = file.read(1024)
```

```
client_socket.send(1.encode())
fore.close()
client_socket.close()
```

Client: (saved as client.py)

```
import socket
serverName = '127.0.0.1'
serverPort = 12345
client_socket = socket.socket(socket.AF_INET, socket.
    SOCK_STREAM)
client_socket.connect((serverName, serverPort))
sentence = input("Enter file name: ")
client_socket.send(sentence.encode())
filecontents = client_socket.recv(1024).decode()
print('From Server:', filecontents)
client_socket.close()
```

Text file (saved as tcp-example.txt)

This is an example file for TCP/IP program.

Command Prompt: (2 windows).

server.py

```
>python tcp_server.py
Server waiting for connection
client connected from
<'127.0.0.1', 49438>
Server waiting for
connection.
```

client.py

```
>python tcp_client.py
Enter file name: tcp-example
.txt
This is an example file
for TCP/IP program.
```

(Program-6) UDP

server: (saved as server.py)

```
from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))
print("The server is ready to receive")
while 1:
    sentence, clientAddress = serverSocket.recvfrom(2048)
    file = open(sentence, "r")
    l = file.read(2048)
    serverSocket.sendto(bytes(l, "utf-8"), clientAddress)
    print("sent back to client", l)
    file.close()
```

client: (saved as client.py)

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
sentence = input("Enter file name")
clientSocket.sendto(bytes(sentence, "utf-8"), (serverName, serverPort))
fileContents, serverAddress = clientSocket.recvfrom(2048)
print('From Server:', fileContents)
clientSocket.close()
```

Command Prompt (2 windows)

server.py

```
> python udpserver.py
The server is ready to receive
sent back to client This is
an example file for TCP/IP
program.
```

client.py

```
>python udpclient.py
Enter file name: tcp-example.txt
From Server: b' This is an
example file for TCP/IP
program.\n'
```