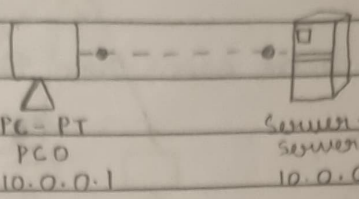
Date 25/9/24
Page

Exp-1:

1. PC to server



Aim: To set up a point-to-point network between a PC & a server, facilitating direct communication to observe data exchange

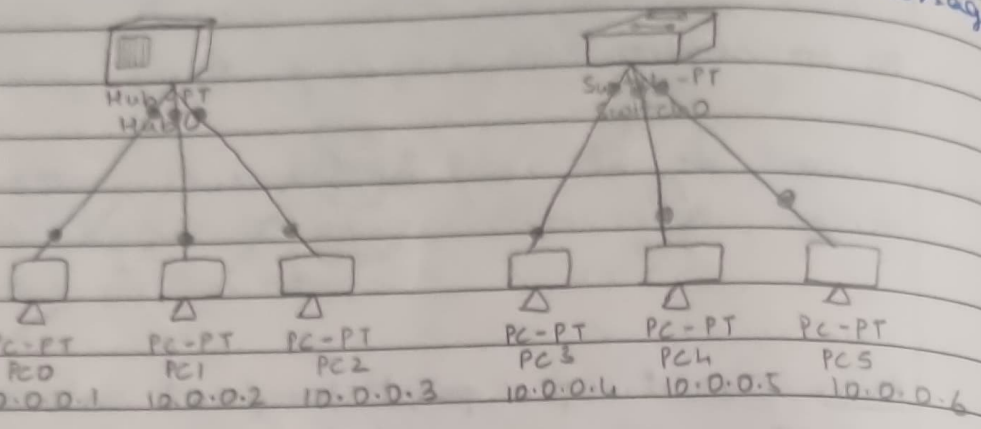
Topology: A PC(PC0) is connected to a server (server0) using a crossover ethernet cable.
IP address of PC0 : 10.0.0.1
IP address of ~~PC~~ server0 : 10.0.0.2

Observation : The direct connection allows PC0 to communicate with server0, which is typical in small networks for tasks such as file sharing, service requests or testing server responses to client queries.

Q. Create a topology & simulate sending a simple PDU from source to destination using hub & switch & demonstrate ping message

Date / / Page

2. Hub & Switch.



Aim: To create a simple network consisting of three PCs connected to a central hub and another network with three PCs connected to a switch. This configuration will help observe the behaviour of data transmission using hub & switch devices.

Topology:

1. Hub Network: Three PCs (PC0, PC1, PC2) are connected to a hub (Hub0) using straight-through Ethernet cables.
   IP addresses: PC0 = 10.0.0.1, PC1 = 10.0.0.2, PC2 = 10.0.0.3

2. Switch Network: Three PCs (PC3, PC4, PC5) are connected to a switch (Switch0) using straight-through ethernet cables.
   IP addresses: PC3 = 10.0.0.4, PC4 = 10.0.0.5, PC5 = 10.0.0.6

Procedure:

1. Add 1 hub, 1 switch and 6 PCs (PC0, PC1, PC2 for the hub; PC3, PC4, PC5 for the switch) to the Cisco packet tracer workspace.

Date __/__/__
Page _____

2. Use copper straight-through cables to connect PC0, PC1, and PC2 to Hub0. Next connect PC3, PC4 & PC5 to switch0 using same type of cables

3. Assign IP addresses to each PC & obtain subnet mask.

4. Switch to simulation mode to observe data traffic behaviour when packets are sent between the devices.

5. In the hub network, notice how the hub broadcasts packets to all devices, causing potential traffic overload
In the switch network, observe how the switch forwards packets only to the intended recipient, reducing unnecessary traffic.

6. The hub broadcasts data to all connected devices leading to more network congestion, while the switch efficiently sends data only to the correct device, optimizing performance.

Observation:

1. The hub broadcasts packets to all devices, which may cause unnecessary traffic.

2. The switch forwards packets only to the appropriate device by learning MAC addresses, making it more efficient in reducing traffic.

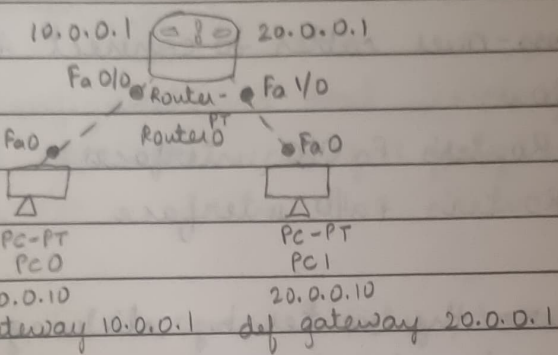
2a

Date / /
Page

X Exp-2 : Configure IP address to routers in packet tracer. Explore: ping responses, destination unreachable, request timed out, reply.

1. Aim: To connect two PCs on two different networks using a router

Topology:



1. PC0: Connected to router's interface Fa 0/0 using a cross-over cable.
   IP address : 10.0.0.10
   Default Gateway : 10.0.0.1

2. PC1: Connected to the router's interface Fa 1/0 using a cross-over cable
   IP address : 20.0.0.10
   Default Gateway : 20.0.0.1

3. Router:
   Interface Fa 0/0 connected to PC0
   Interface Fa 1/0 connected to PC1
   IP address of Fa 0/0 : 10.0.0.1
   IP address of Fa 1/0 : 20.0.0.1

Date __/__/__
Page

Procedure :

1. Open cisco packet tracer and drag the following components onto the workspace:
   Router : Place one router in the middle
   PCs : Place two PCs on either side of the router

2. Use Cross-over cables to connect the devices as follows:
   PC0 → Router's Fa 0/0 interface
   PC1 → Router's Fa1/0 interface

3. Configure the router by clicking on the router and enter the CLI
   Assign IP addresses to the router interfaces:
   Router > enable
   Router # configure 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) # interface fastethernet 1/0
   Router (config - if) # ip address 20.0.0.1 255.0.0.0
   Router (config - if) # no shutdown

4. Configure the PCs :
   For PC0:
   * click on PC0 and set the IP Address to 10.0.0.10, subnet mask to 255.0.0.0 and default gateway to 10.0.0.1

   For PC1:
   * click on PC1 and set the IP Address to 20.0.0.10, subnet mask to 255.0.0.0 and default gateway to 20.0.0.1

Date / /
Page

5. Test Connectivity by opening the command prompt on PC0 & PC1
Use the ping command to check connectivity:
From PC0, ping PC1's IP (20.0.0.10)
From PC1, ping PC0's IP (10.0.0.10)

Observation:

1. If the configurations and cabling are correct, you will receive successful ping replies b/w the two PCs

2. If there is no connectivity, troubleshoot by verifying: correct IP addressing, cabling type, both router interfaces are up & running.

3. Routing table is observed as following:
Router> show ip route
Codes: C- connected, S- static, I- IGRP, R- RIP, M- mobile, B- BGP, D- EIGRP, EX- EIGRP external, O- OSPF, IA- OSPF inter area, N1- OSPF NSSA external type 1, N2- OSPF NSSA external type 2, E1- OSPF external type 1, E2- OSPF external type 2, E- EGP, i- IS-IS, L1- IS-IS level-1, L2- IS-IS level-2, ia- IS-IS inter area, *- candidate default, U- per-user static route, o- ODR, P- periodic downloaded static route.
Gateway of last resort is not set
C 10.0.0.0/8 is directly connected, FastEthernet0/0
C 20.0.0.0/8 is directly connected, FastEthernet1/0

Date __/__/__
Page

4. The ping results are as follows:

```
PC> ping 20.0.0.10
Pinging 20.0.0.10 with 32 bytes of data:
Reply from 20.0.0.10: byte=32 time=0ms TTL=127
Reply from 20.0.0.10: byte=32 time=0ms TTL=127
Reply from 20.0.0.10: byte=32 time=0ms TTL=127
Reply from 20.0.0.10: byte=32 time=0ms TTL=127

Ping statistics for 20.0.0.10:
    Packets: sent=4, received=4, lost=0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum=0ms, Maximum=0ms, Average=0ms
```

9/10/24

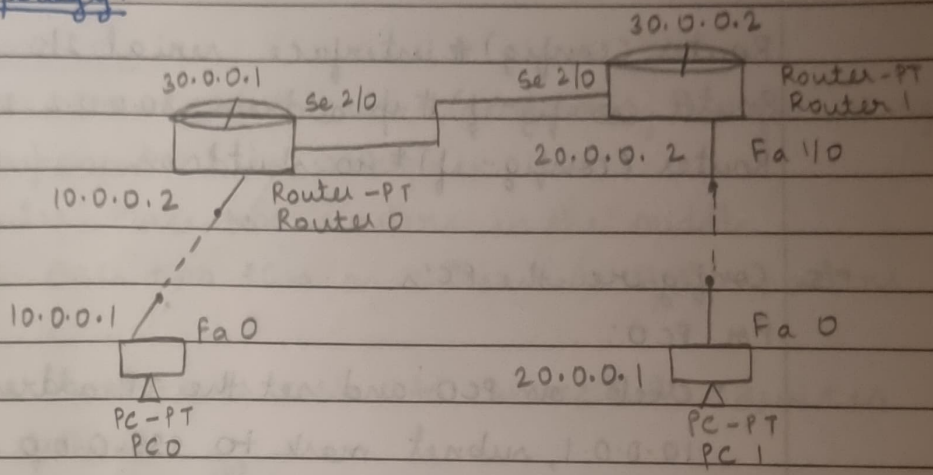
(2b)

Date __/__/__
Page _____

Exp-2b:

Aim: To connect two PC's on two networks via two routers

Topology:



1. PC 0 - Connected to router's interface Fa 0/0 using a cross-over cable
   IP address : 10.0.0.1
   Default Gateway : 10.0.0.2

2. PC 1 - Connected to router's (Router 1) interface Fa 1/0 using a cross-over cable
   IP address : 20.0.0.1
   Default Gateway : 20.0.0.2

3. Router 0
   * Interface Fa 0/0 connected to PC-0
   * Interface Se 2/0 connected to Router-1
   * IP address of Fa 0/0 : 10.0.0.2
   * IP address of Se 2/0 : 30.0.0.1

* Configure Router 1 similarly.

Router > enable
Router # configure terminal
Router (config) # interface fast ethernet 1/0
Router (config-if) # ip address 20.0.0.2 255.0.0.0
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) # no shutdown

5. Configure the PC's

For PC0:

- click on PC0 and set the IP address to 10.0.0.1, subnet mask to 255.0.0.0 and default gateway to 10.0.0.2

For PC1:

- click on PC1 and set the IP address to 20.0.0.1, subnet mask to 255.0.0.0 and default gateway to 20.0.0.2

- Test connectivity by going opening command prompt on PC0.

Use the ping command to check connectivity.
From PC0, ping PC1's IP address (20.0.0.1)

Observation:

- If the configuration and cabling are correct, you will receive successful ping replies b/w the two PC's

Date __/__/__
Page _____

4. Router 1:
- Interface Fa 1/0 connected to PC-1
- Interface Se 2/0 connected to Router 0
- IP address of Fa 1/0 : 20.0.0.2
- IP address of Se 2/0 : 30.0.0.2

Procedure:
- Open Cisco packet tracer and drag the following components onto workspace:
Router: Place two routers in the middle
PC: Place two PC's on either side of the routers.

- Use cross-over cables to connect the devices as follows:
PC 0 → Router's (0) Fa 0/0 interface
PC 1 → Router's (1) Fa 1/0 interface

- Configure Router 0 by clicking on the router & enter CLI
Assign IP addresses to the router interfaces:
Router > enable
Router # configure terminal
Router (config)# interface fast ethernet 0/0
Router (config-if)# ip address 10.0.0.2 255.0.0.0
Router (config-if)# exit

Router (config)# interface serial 2/0
Router (config-if)# ip addres 30.0.0.1 255.0.0.0
Router (config-if)# no shutdown

Date __/__/__
Page

The ping results are as follows:

Pc > ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data
Request timed out
Request timed out
Request timed out
Request timed out

Ping statistics for 20.0.0.1:
Packet set = 4, Received = 0, Loss = 4 (100% loss)

Pc > ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data
Reply from 10.0.0.2: Destination host unreachable
Reply from 10.0.0.2: Destination host unreachable
Reply from 10.0.0.2: Destination host unreachable
Request timed out

16/10/23

Ping statistics for 20.0.0.1:
Packet: sent = 4, received = 0, lost = 4
(100% loss)

Date 23/10/24
Page

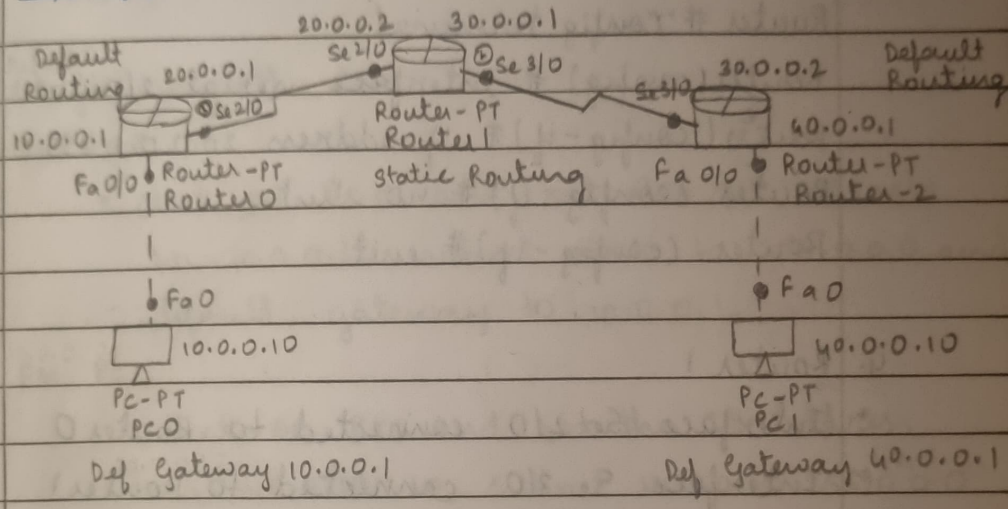
Exp-3:

Q. Configure default route, static route to the router.

Aim: To demonstrate static routing and default routing using 3 routers.

o/p soon

Topology:



1. PC0 is connected to router 0's interface Fa 0/0 using a cross-over cable
   IP address : 10.0.0.10
   Def gateway : 10.0.0.1

2. PC1 is connected to router 2's interface Fa 0/0 using a cross-over cable
   IP address : 40.0.0.10
   Def gateway : 40.0.0.1

3. Router 0
   * Interface Fa 0/0 connected to PC0
   * Interface Se 2/0 connected to router 1
   * IP address of Fa 0/0 : 10.0.0.1
   * IP address of Se 2/0 : 20.0.0.1

Configure Router 0

Router > enable
Router # config terminal
Router (config) # interface fast ethernet 0/0
Router (config-if)# ip address 10.0.0.1 255.0.0.0
Router (config-if)# no shut
Router (config-if)# exit.

Router # config terminal
Router(config) # interface serial 2/0
Router (config-if)# ip address 20.0.0.1 255.0.0.0
Router (config-if)# no shut
Router (config-if)# exit.

4. Router 1
- Interface Se 2/0 connected to Router 0
- Interface Se 3/0 connected to Router 1
- IP address of Se 2/0: 20.0.0.2
- IP address of Se 3/0: 30.0.0.1

Configure Router 1

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) # no shut
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) # No shut

Date __/__/__
Page _____

Router (config-if)# exit

5. Router 2
* Interface Fa 0/0 is connected to PC 1
* Interface Se 3/0 is connected to router 1
* IP address of Fa 0/0: 40.0.0.1
* IP address of Se 3/0: 30.0.0.2

Config Router 2 like to Router 0.

Configuring the PCs

For PC0:
* click on PC0 and set the IP address to 10.0.0.10, subnet mask to 255.0.0.0 and default gateway to 10.0.0.1

For PC1:
* click on PC1 and set the IP address to 40.0.0.10, subnet mask to 255.0.0.0 and default gateway to 40.0.0.1.

→ Default Routing of Router 0

Router > enable
Router # config terminal
Router (config)# ip route 10.0.0.0 0.0.0.0 0.0.0.0 20.0.0.2
Router (config)# exit
Router # show ip route
Gateway of last resort is 20.0.0.2 to network 0.0.0.0
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* 0.0.0.0/0 [1/0] via 20.0.0.2

Date __/__/__
Page

→ Static Routing of Router 1

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 # show ip route

S 10.0.0.0/8 [1/0] via 20.0.0.1
C 20.0.0.0/8 is directly connected, Serial 2/0
C 30.0.0.0/8 is directly connected, Serial 3/0
S 40.0.0.0/8 [1/0] via 30.0.0.2

→ Default Routing of Router 2

Router (config)# ip route 0.0.0.0 0.0.0.0 30.0.0.1

Router # show ip route

C 30.0.0.0/8 is directly connected, Serial 3/0
C 40.0.0.0/8 is directly connected, FastEthernet 0/0
S* 0.0.0.0/0 [1/0] via 30.0.0.1.

Procedure:

1. Open Cisco Packet Tracer and drag the following components onto workspace:
Router: Place 3 routers in the middle
PC: Place two PCs on the below router 0 & router 2.

2. Use cross over cables to connect PC0 & router0 and also PC1 & router2.

Date / /
Page

3. Connect router0, router1, router2 using serial DCE

4. Configure the PCs & routers and add labels for the IP addresses & default gateway for PC & routers.

5. Configure router0 & router2 for default routing and router1 for static routing

6. Test the connectivity by opening command prompt on PC0 and use ping command to check connectivity. Ping PC1.

The ping results are as follows:

```
PC> ping 40.0.0.10
Pinging 40.0.0.10 with 32 bytes of data:
Request timed out
Reply from 40.0.0.10 : bytes=32 time=6ms TTL=125
Reply from 40.0.0.10 : bytes=32 time=6ms TTL=125
Reply from 40.0.0.10 : bytes=32 time=6ms TTL=125
Ping statistics for 40.0.0.10:
    Packets: sent=4, Received=3, Lost=1 (25% loss),
Approx round trip times in milli-seconds:
    Minimum=6ms, Maximum=8ms, Average=6ms
```

23/10/24

Observation:

If the configuration & cabling are correct, you will receive successful ping replies b/w two PCs

Def Routing: Used as a "catch-all" for forwarding pkts to unknown n/ws, typically in smaller or single-exit pt n/ws, simplifying configuration

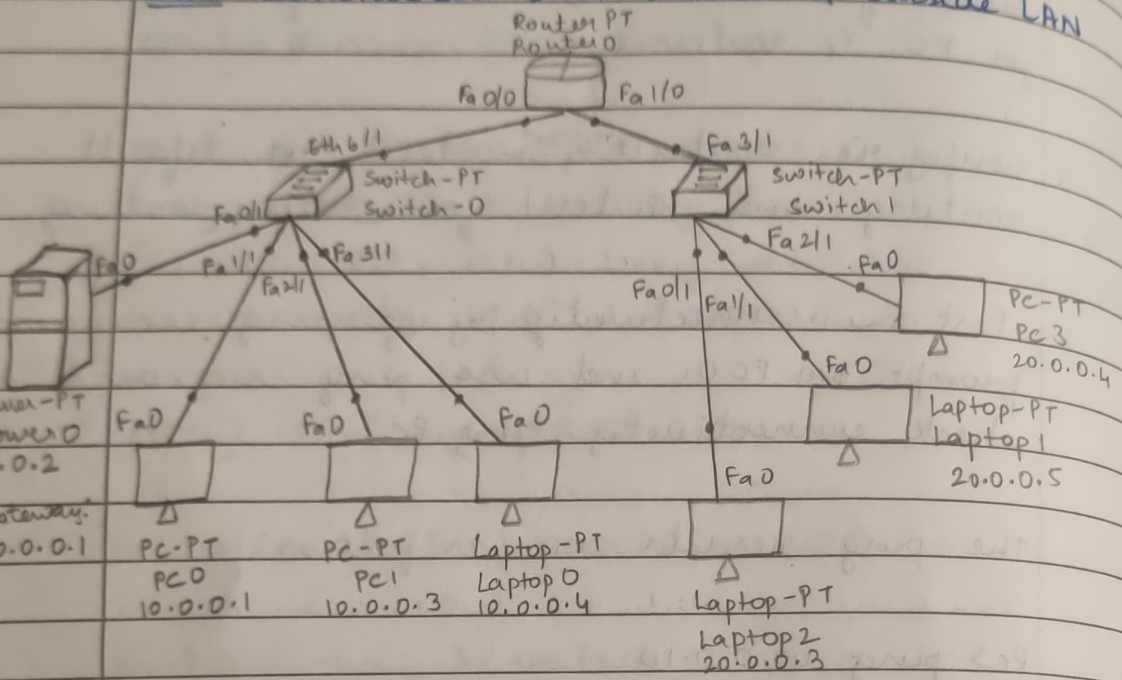
Static Routing: Manually configured routes for known n/ws, offering ctrl & security but req manual updates for changes

Date 13/11/24
Page

Experiment-4

Q. Configure DHCP within a LAN and outside LAN

Aim: Demonstrate DHCP within & outside LAN



Topology:

1. Switch0 connected to Router0 interface Fa 0/0 using copper straight-through cable from Eth 6/1.

2. PC0, PC1, PC2 connected to switch0 via copper straight-through with IP address - 10.0.0.1, 10.0.0.3, 10.0.0.4 resp

3. Server0 connected to switch 0 with ip address 10.0.0.2.

4. PC3, PC4, PC5 connected to switch1 with ip address 20.0.0.4, 20.0.0.5, 20.0.0.3 resp.

Date __/__/__
Page _____

5. switch1 connected to router 0 interface Fa1/0 using copper straight through cable from Fa 3/1.

Procedure:

1. Open cisco packet tracer and drag the following components:
   - Router: Place 1 router in the middle.
   - Switch: connect two switches to Router0
   - Pc: Take 3 PCs and connect it to switch 0 & another 3 PCs to switch1
   - Server: Place one server & connect it to the switch1 via ~~copple~~ → copper straight-through cable.

2. Configure server0 by clicking on the server & click IP configurations
   set IP address as 10.0.0.2,
   Subnet mask as 255.0.0.0,
   Def gateway as 10.0.0.1

3. In DHCP services, config switch 0 with
   Pool Name - switch1
   Start ip address - 10.0.0.0
   Def gateway - 0.0.0.0
   Subnet Mask - 255.0.0.0

4. In DHCP services add switch1 config with
   Pool Name - switch2
   start ip address - 10.0.0.3
   Def gateway - 10.0.0.1
   Subnet Mask - 255.0.0.0

Date ___/___/___
Page ___

5. Set the ip configuration of all PC's to DHCP due to which each PC attains its ip address, subnet mask & default Gateway.

6. Configure Router0 by clicking on the router and selecting CLI
Assign IP addresses to the router interfaces.

```
Router> enable
Router # config terminal
Router (config) # interface fa 0/0
Router (config) # ip address 10.0.0.1 255.0.0.0
Router (config) # ip helper-address 10.0.0.2
Router (config) # no shut

Router (config) # interface fa 1/0
Router (config) # ip address 20.0.0.1 255.0.0.0
Router (config) # ip helper-address 10.0.0.2
Router (config) # no shut
Router # exit
```

Observation:

If config & cabling are correct, you will receive successful ping replies b/w two PCs

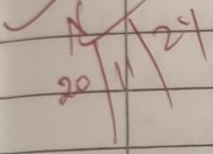
```
PC> ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data

Reply from 10.0.0.3: bytes=32 time=1ms TTL=120
Reply from 10.0.0.3: bytes=32 time=0ms TTL=120
Reply from 10.0.0.3: bytes=32 time=0ms TTL=120
Reply from 10.0.0.3: bytes=32 time=2ms TTL=120
```

Date __/__/__
Page _____

Ping statistics for 10.0.0.3:
Packets: sent=4, received=4, loss=0 (0% loss)
Approx round trip times in milliseconds:
Minimum=0ms, Maximum=2ms, Avg=0ms.

Within a LAN: Placing the DHCP server in the same subnet as clients to ensure broadcasts reach the server directly. Dynamic ip's are given to the systems connected in same network. When we have to dynamically assign ip address to another network we do it using a router & a server
If the connections are successful the ip addresses are assigned within the ~~server~~ LAN & outside the ~~server~~ LAN



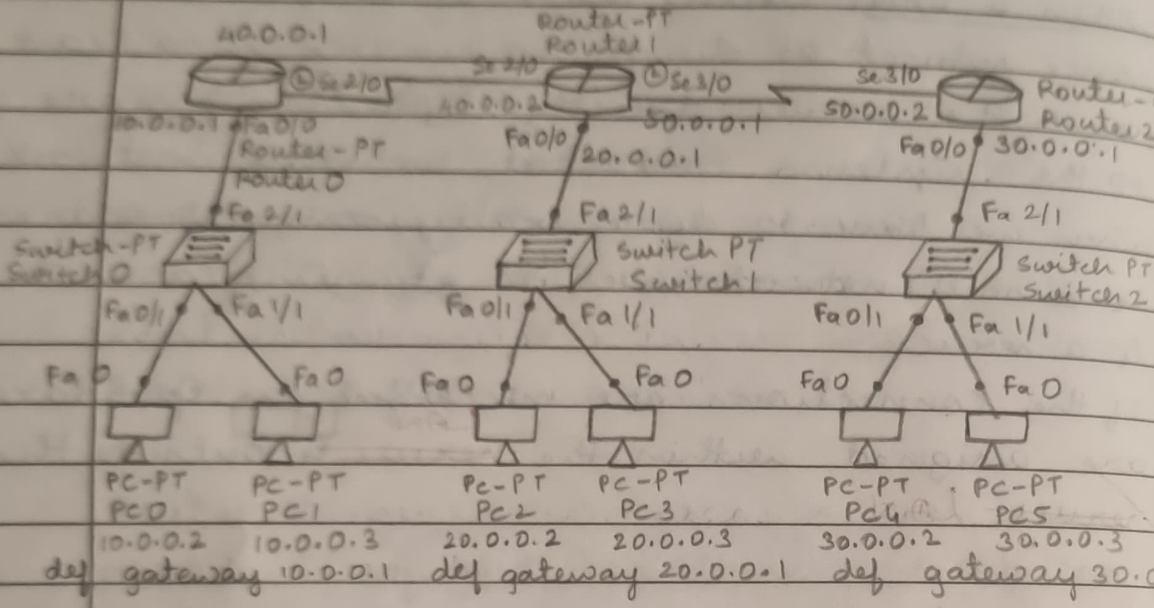
Routers share their routing table

Date 20/11/24
Page

Experiment - 5

Q. Configure Routing information protocol in routers

Aim: To configure routing info protocol in routers



Topology:

1. Switch 0 connected to router 0 interface Fa 0/0 using copper-straight through cable from Fa 2/1
2. Similarly, switch1 & switch 2 connected to router interface Fa 0/0 & router 2 interface Fa0/0 resp.
3. Router 2 connected to router0 & router1 via Se 2/0 & Se 3/0 interface resp.
4. PC0, PC1 connected to switch0 via copper straight cable with ip address 10.0.0.2, 10.0.0.3 resp.
5. PC2, PC 3 connected to switch1 via copper straight cable with ip address 20.0.0.2, 20.0.0.3 resp

Date __/__/__
Page _____

6. PC4, PC5 connected to switch2 via copper straight cable with ip address 30.0.0.2 and 30.0.0.3 resp.

Procedure:

1. Open cisco packet tracer and drag the following components:
Routers: Place 3 routers in the middle.
Switch: Place 3 switches & connect them to the routers with Fa 2/1 interface using copper-straight cable.
PC: Place 6 PCs, two of them connected to each of the 3 switches via Fa 0/0 interface using copper straight cable.
Connect the routers using serial-dct cable.

2 Configure all the 3 routers:
* Router 0:
Router > enable
Router # > config terminal
Router (config) # interface serial 2/0
Router (config-if) # ip address 30.0.0.1 255.0.0.0
Router (config) # no shut
Router (config) # exit

* Router 1:
Router (config) # interface serial 2/0
Router (config-if) # ip address 40.0.0.1 255.0.0.0
Router (config-if) # no shut
Router (config-if) # exit

Router (config) # interface Fa0/0
Router (config-if) # ip address 20.0.0.1 255.0.0.0

Router(config-if)# No shut
Router (config-if)# exit

Router(config)# interface se 3/0
Router(config-if)# ip address 50.0.0.1 255.0.0.0
Router(config-if)# no shut
Router(config-if)# exit

* Router 2:
Router(config)# interface Fa 0/0
Router(config-if)# ip address 30.0.0.1 255.0.0.0
Router(config-if)# No shut
Router(config-if)# exit

Router(config)# interface se 2/0
Router(config-if)# ip address 50.0.0.2 255.0.0.0
Router(config-if)# no shut
Router(config-if)# exit.

3. Set the ip address & default gateway for all the 6 PCs.

4. Configure RIP for all routers.

* Router 0:
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 30.0.0.0

* Router 1:
Router(config)# router rip
Router(config-router)# network 40.0.0.0
Router(config-router)# network 20.0.0.0
Router(config-router)# network 50.0.0.0

Date __/__/__
Page _____

- Router 2:

Router (config) # router rip
Router (config-router) # network 30.0.0.0
Router (config-router) # network 50.0.0.0

5. ~~Close~~ Ping the PCs to check the connections.

Observation:
The routers communicate with each other and share ~~it~~ each of their routing table after they are configured with routing info protocol.
Once RIP is activated in Routers, every router share its routing protocol with its immediate neighbours. Hence in iterations every router will know about all ~~routers~~ PCs that their neighbours are connected to.