VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

CN LAB REPORT

Submitted by

AMISH B HARSOOR(1BM21CS017)

in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
JUN-2023 to SEP-2023

B. M. S. College of Engineering,
Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)
Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "COMPUTER NETWORKS LAB" carried out by **AMISH B HARSOOR (1BM21CS017),** who is bonafide student of **B. M. S. College of Engineering.** It isin partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2023. The Lab report has been approved as it satisfies the academic requirements in respect of a COMPUTER NETWORKS LAB - **(22CS4PCCON)** work prescribed for the said degree.

Dr. SHYAMALA G
Assistant Professor
Department of CSE
BMSCE, Bengaluru

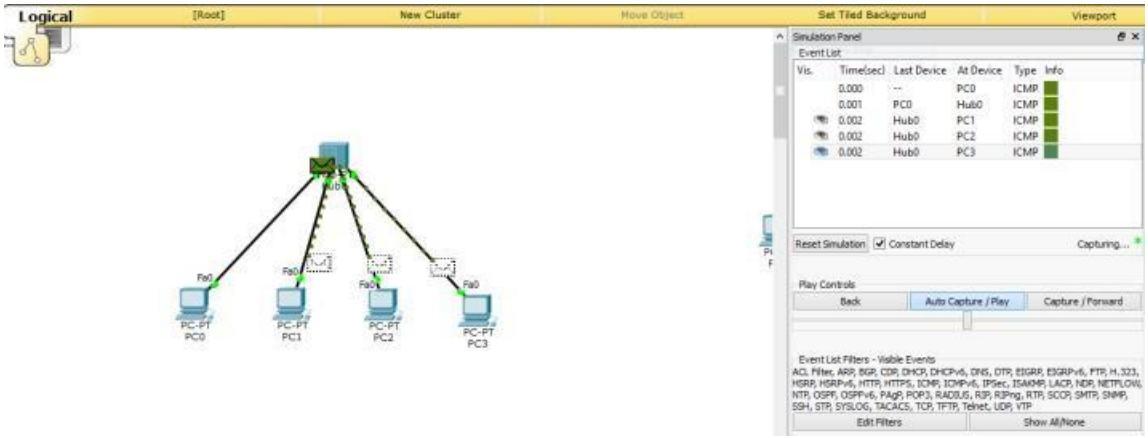
Dr. Jyothi S Nayak
Professor and Head
Department of CSE
BMSCE, Bengaluru

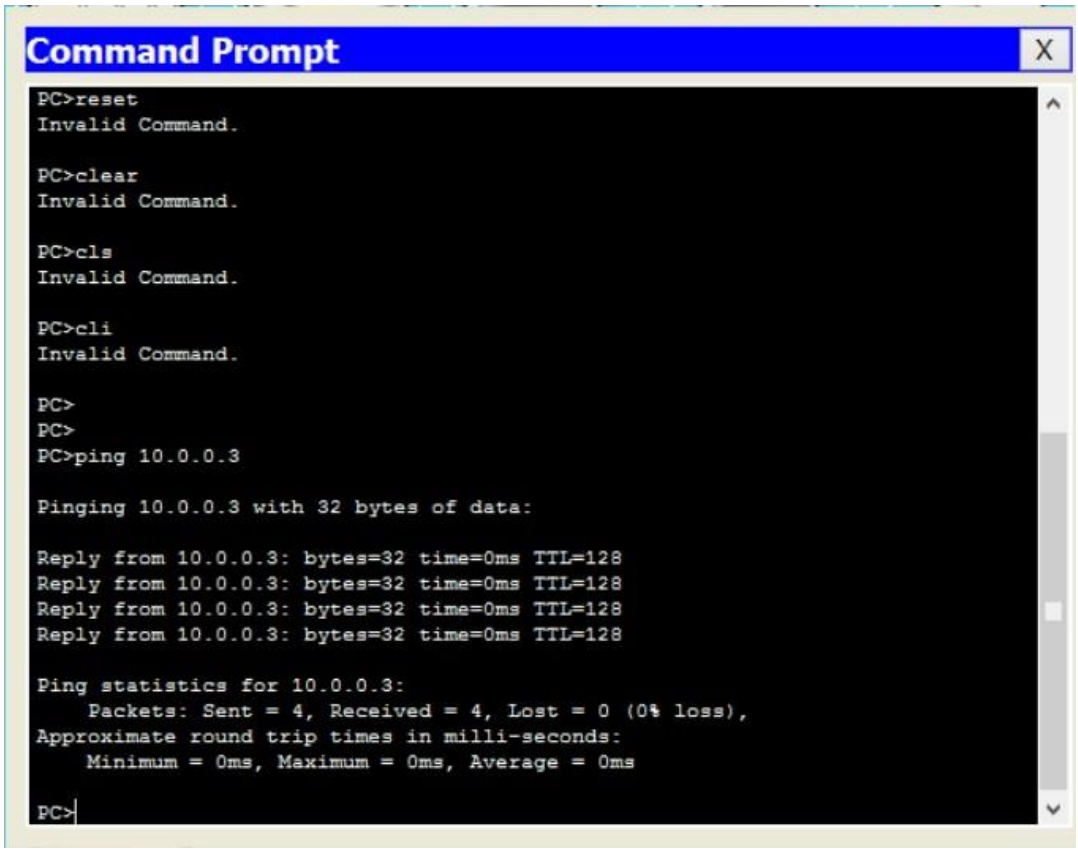
`

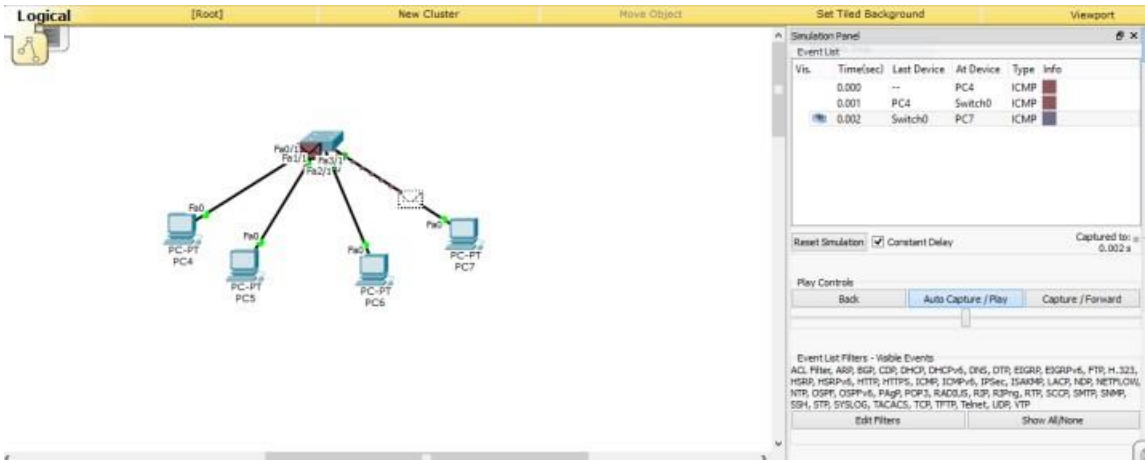
Index

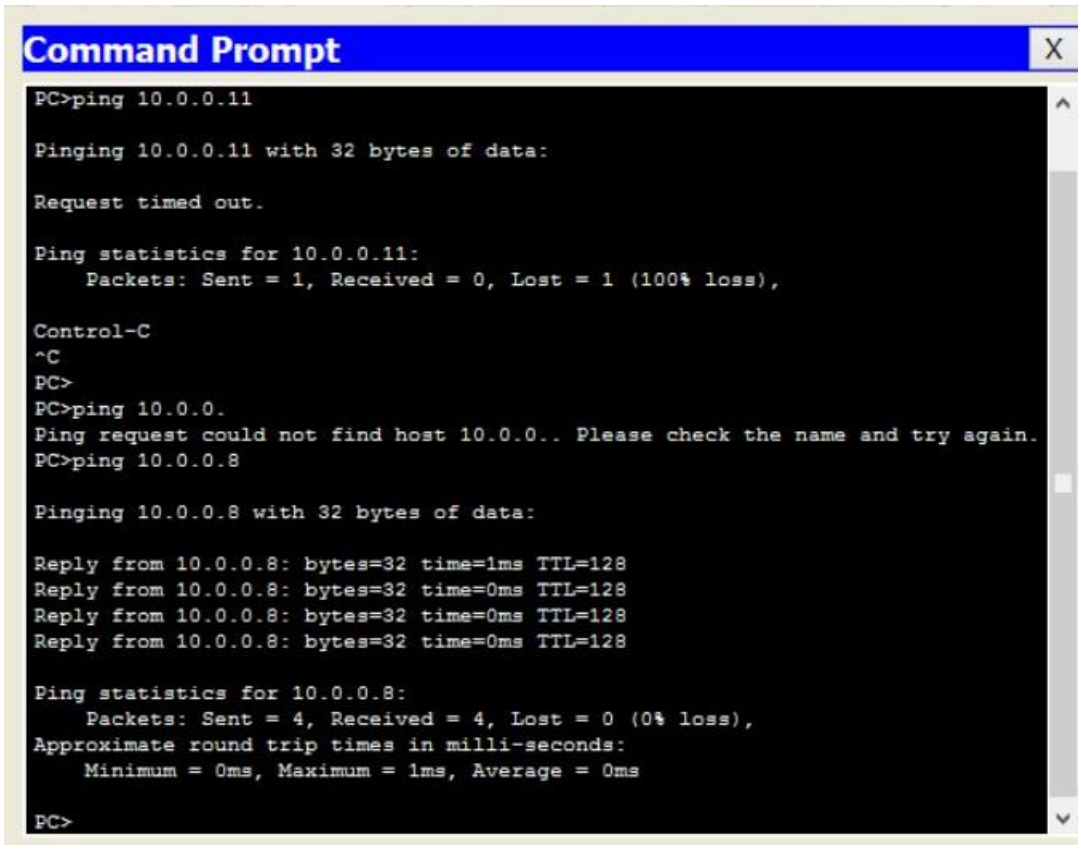
Experiment -1

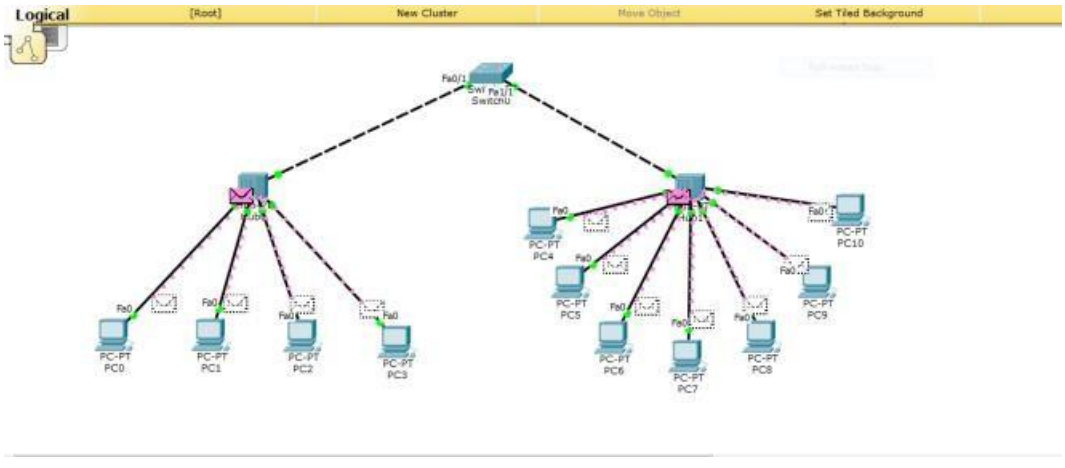
Aim: Create a topology and simulate sending a simple PDU from source to destination using hub and switch as connecting devices and demonstrate ping message.

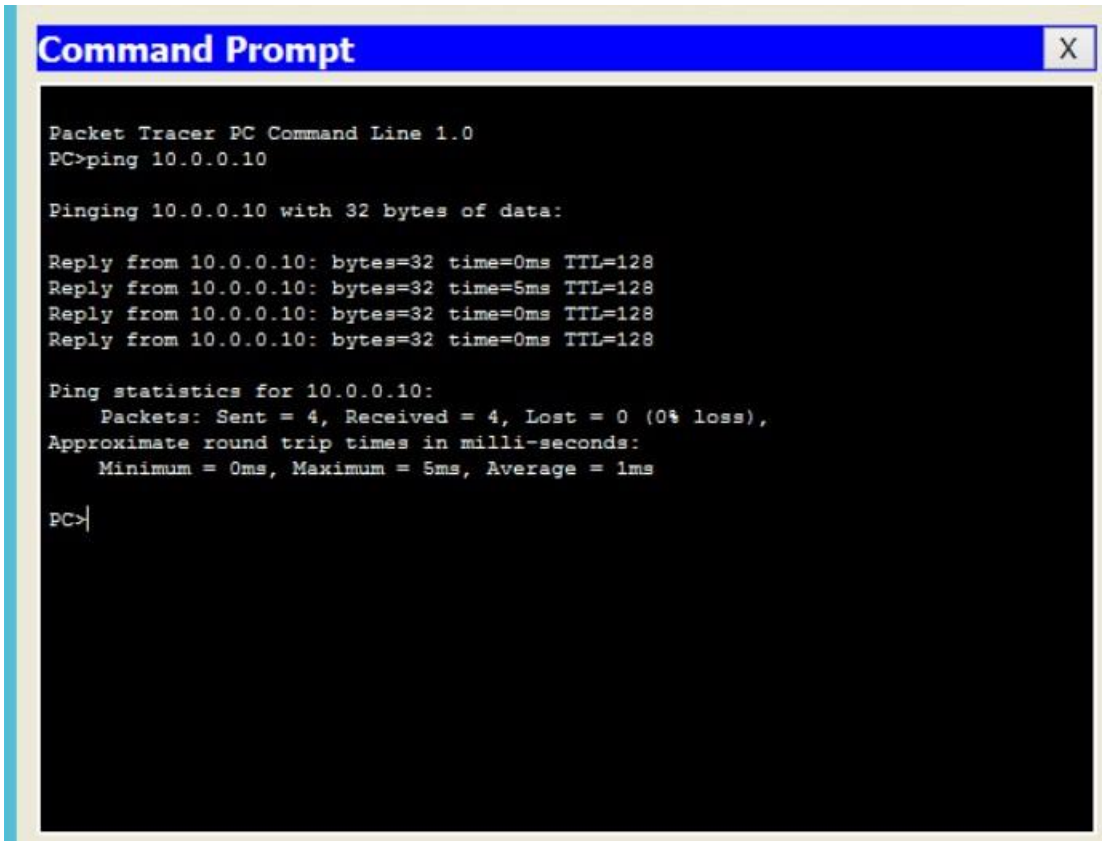





Logical
[Root]
New Cluster
Move Object
Set Tiled Background
Viewport
Simulation Panel
Event List
Vis. Time(sec) Last Device At Device Type Info
0.000 -- PC4 ICMP
0.001 PC4 Switch0 ICMP
0.002 Switch0 PC7 ICMP
Reset Simulation
Constant Delay
Captured to: 0.002 s
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
Edit Filters
Show All/None
PC-PT PC4
PC-PT PC5
PC-PT PC6
PC-PT PC7


Command Prompt
X
PC>ping 10.0.0.11
Pinging 10.0.0.11 with 32 bytes of data:
Request timed out.
Ping statistics for 10.0.0.11:
Packets: Sent = 1, Received = 0, Lost = 1 (100% loss),
Control-C
^C
PC>
PC>ping 10.0.0.
Ping request could not find host 10.0.0.. Please check the name and try again.
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=0ms TTL=128
Reply from 10.0.0.8: bytes=32 time=0ms TTL=128
Reply from 10.0.0.8: bytes=32 time=0ms 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, Average = 0ms
PC>


Logical
[Root]
New Cluster
Move Object
Set Tiled Background
PC-PT PC0
PC-PT PC1
PC-PT PC2
PC-PT PC3
PC-PT PC4
PC-PT PC5
PC-PT PC6
PC-PT PC7
PC-PT PC8
PC-PT PC9
PC-PT PC10


Command Prompt
X
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=0ms TTL=128
Reply from 10.0.0.10: bytes=32 time=5ms TTL=128
Reply from 10.0.0.10: bytes=32 time=0ms TTL=128
Reply from 10.0.0.10: bytes=32 time=0ms TTL=128
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 5ms, Average = 1ms
PC>

(1) Create the Topology here simulate sending the simple PDU from source to destination using a simple hub and switch as connecting domain.

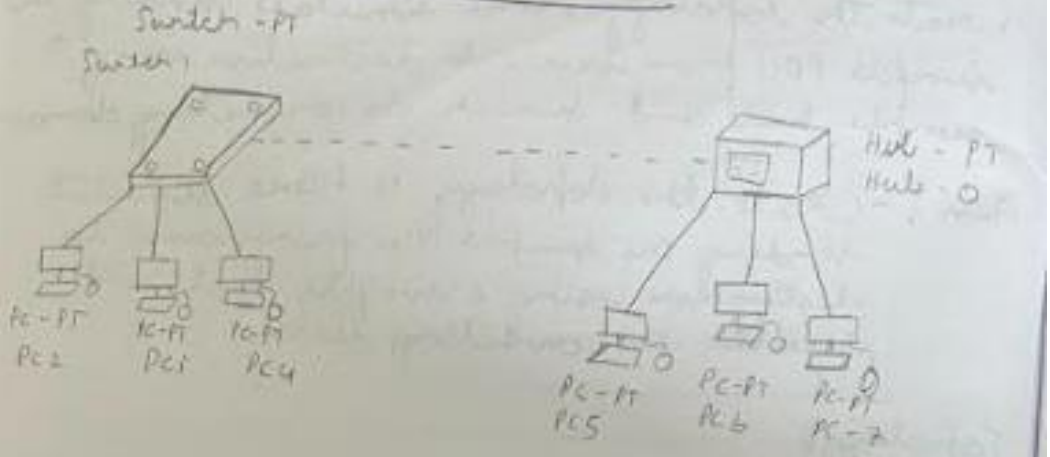
Aim :- Create the Topology & Here simulate sending the simple PDU from source to destination using a simple hub and switch as connecting device

Topology:

Switch

Hub:

Mixed Network



Procedure

Switch-PC

⇒ Place 3 generic PC's (PC2, PC3, PC4) and a generic switch (eg switch PT-switch-1)

⇒ Connect the switch ports with all PC's using copper-straight Through wire

⇒ Configure the IP address of the PC's

PC2 (10.0.0.1)
PC3 (10.0.0.2)
PC4 (10.0.0.3)

⇒ Click the add simple PDU option, select the source as PC2 and destination as PC-4

⇒ On Running the simulation the packet is travel from source to destination.

Hub - PC's

→ follow the procedure as in the switch - PC replace the switch with the hub.

→ set IP address PC 5 (10.0.0.4)
PC 6 (10.0.0.5)
PC 7 (10.0.0.6)

→ Now connect the switch and the Hub with coffee cross over cable.

→ Simulate the packet triangle from source to destination.

Output

PC > ping 10.0.0.3

pinging 10.0.0.3 with 32 bytes of data

Reply from 10.0.0.3: byte = 32 time = 0ms TTL=128

Reply from 10.0.0.3: byte = 32 time 2ms TTL = 128

Reply from 10.0.0.3: byte = 32 time 0ms TTL = 128

Reply from 10.0.0.3: byte = 32 time = 0ms TTL = 128

Ping statistics for:- 10.0.0.3

Packets: sent = 4, Received = 4, lost = 0

Approx = Round trip time in milliseconds

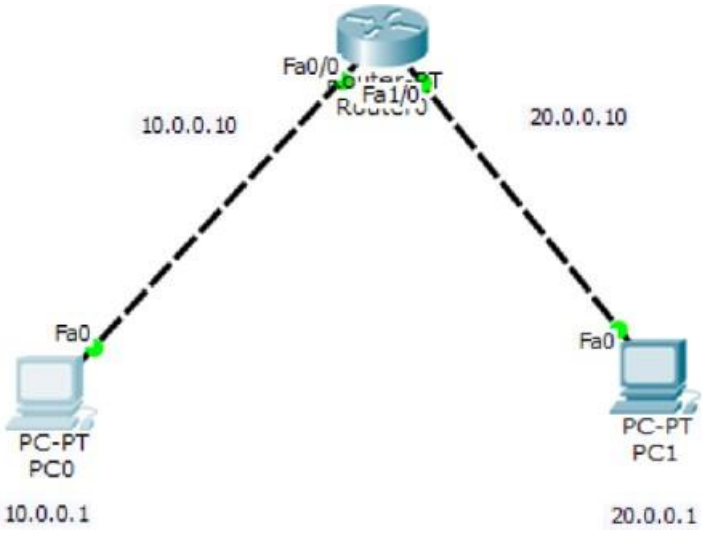
minimum = 0ms, maximum = 2ms,

Average = 0ms.

3/8/2023

Experiment - 2

Aim:
Configure IP address to routers in packet tracer. Explore the following messages: ping responses, destination unreachable, request timed out, reply



Command Prompt

```
PC>ping 20.0.0.1

Pinging 20.0.0.1 with 32 bytes of data:

Request timed out.
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=1ms TTL=127

Ping statistics for 20.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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
```

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.
Reply from 10.0.0.10: Destination host unreachable.

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.10
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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

S    10.0.0.0/8 [1/0] via 20.0.0.10
C    20.0.0.0/8 is directly connected, Serial2/0
C    30.0.0.0/8 is directly connected, Serial3/0
S    40.0.0.0/8 [1/0] via 30.0.0.20
Router#
```

```
Router(config)#ip route 20.0.0.0 255.0.0.0 30.0.0.10
Router(config)#ip route 10.0.0.0 255.0.0.0 30.0.0.10
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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

S    10.0.0.0/8 [1/0] via 30.0.0.10
S    20.0.0.0/8 [1/0] via 30.0.0.10
C    30.0.0.0/8 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

```
Router(config)#ip route 30.0.0.0 255.0.0.0 20.0.0.20
Router(config)#ip route 40.0.0.0 255.0.0.0 20.0.0.20
Router(config)#show ip route
                ^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

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, Serial2/0
S    30.0.0.0/8 [1/0] via 20.0.0.20
S    40.0.0.0/8 [1/0] via 20.0.0.20
Router#
```

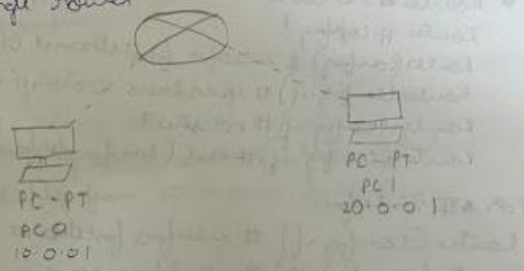
```
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Reply from 40.0.0.1: bytes=32 time=16ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=12ms TTL=125
Reply from 40.0.0.1: bytes=32 time=23ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 23ms, Average = 13ms
```

Lab - 2

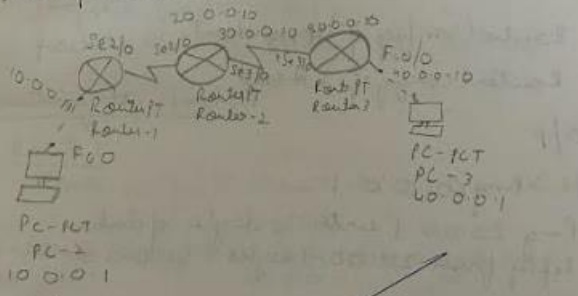
Aim :- To configure the address to route in packet tracer and explore the following messages: ping response, destination, unreachable, request timed out reply.

Topology :-

(i) Single router



(ii) Multiple router :-



Procedure

(i) Single router

→ Connect the 2 networks consisting of one end device each using a router as shown topology

→ Set the IP address and gateway for each end device

	IP address	Gateway
Device 1	10.0.0.1	10.0.0.10
Device 2	20.0.0.1	20.0.0.10

→ Configure the router using command line interface

```
Router>enable
Router#config t
Router(config)# interface fastethernet 0/0
Router(config-if)# ip address 10.0.0.10 255.0.0.0
Router(config-if)# no shut
Router(config-if)# exit (exit interface)
```

For all interface

```
Router(config-if)# interface fastethernet 1/0
Router(config-if)# ipaddress 20.0.0.10
                                255.0.0.0
Router(config-if)# noshut
Router(config-if)# exit
```

O/P:

```
PC>Ping 20.0.0.1
Ping 20.0.0.1 with 32 bytes of data
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
    Approx round trip time in ms min = 0
                                max = 0  Avg = 0
```

(iv) Multiple Routes

→ Connect an end to end device of network 10.0.0.0 to II network 20.0.0.0 thro 3 routers shown in topology.

→ Configure the IP address gate way of II end device

→ Configure the Routers: Each router for each interface is followed for a single routers in step 3 of the procedure.

Ping O/P

PC > Ping 20.0.0.1

pinging 20.0.0.1 with 32 bytes of data

Reply from 10.0.0.10 destination

..

Ping stats for 20.0.0.1

Packets sent = 4, Received = 0, lost = 4

Routing the packets

Route 1

Router (config) # IP route 30.0.0.0 255.0.0.0 20.0.0.0

Router (config) # IP route 40.0.0.0 255.0.0.0 20.0.0.0

Route 2

Router (config) # IP route 10.0.0.0 255.000 30.0.0.0

Router (config) # IP route 20.0.0.0 255.0.0.0 30.0.0.0

O/P

PC5 Ping 40.0.0.1

Pinging 40.0.0.1 into 32 bytes of data

Request timed out

Reply from 40.0.0.1 bytes = 32 time = 7 ms
TTL = 125

" " " time = 11 ms

" " " time = 5 ms

Ping stats for 40.0.0.1

Packets sent = 4, Received = 3 lost = 1

Approx round trip time in ms

~~Min time taken time~~

Min = 4ms max = 11ms Avg = 7ms

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 = 8ms
TTL = 125

" " time = 2 ms TTL = 125

" " time = 2 ms TTL = 125

" " time = 8 ms TTL = 125

Ping stats for 40.0.0.1

Packets sent = 4, received = 4, lost = 0

Approx round trip time in ms = Min = 2 ms max = 18 ms
Avg = 7 ms

20/8/2023

Observation:

observed different cases for ping response such as destination unreached, request timed out & reply.

Experiment - 3

Aim: Configure default route, static route to the Router

IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 10.0.0.10 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.0.0.10 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#ip address 0.0.0.0 0.0.0.0 20.0.0.20
          ^
% Invalid input detected at '^' marker.

Router#enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip address 0.0.0.0 0.0.0.0 20.0.0.20
                  ^
% Invalid input detected at '^' marker.

Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#exit
```

IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#no ip address
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial2/0
Router(config-if)#ip address 20.0.0.20 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface Serial3/0
Router(config-if)#ip address 30.0.0.10 255.0.0.0
Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial3/0, changed state to down
Router(config-if)#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up

Router(config-if)#ip route 10.0.0.0 255.0.0.0 20.0.0.0
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.0
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#enable
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 10.0.0.0 255.0.0.0 20.0.0.10
Router(config)#ip route 40.0.0.0 255.0.0.0 30.0.0.20
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

IOS Command Line Interface

```
         --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n


Press RETURN to get started!



Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 30.0.0.20 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
ip address 40.0.0.10 255.0.0.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#ip route 0.0.0.0 0.0.0.0 30.0.0.10
```

Command Prompt

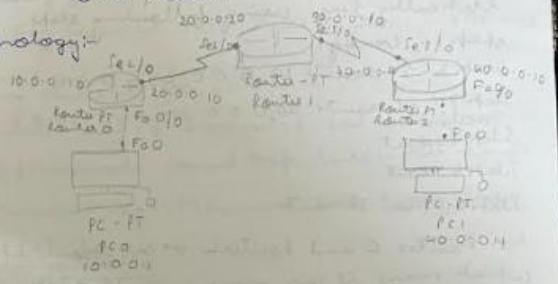
```
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=13ms TTL=125
Reply from 40.0.0.1: bytes=32 time=2ms TTL=125
Reply from 40.0.0.1: bytes=32 time=20ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 20ms, Average = 11ms

PC>
```

13/7/23

Lab - 3

Aim :- Configure default route, static route to the router

Topology :-



Procedure :-

→ Connect 3 routers and 2 PC's using copper cross-over cable for PC to router and a serial DCE cable to connect router to router

→ Set the IP address of both PC's and respective gateway number

→ For all 3 Routers set the respective 2 IP address in CLI mode by using these commands

Step 1 : Enable
Step 2 : Config T
Step 3 : Interface fast Ethernet 0/0
Step 4 : IP address 10.0.0.10 255.0.0.0
Step 5 : No shut
Step 6 : Exit
Step 7 : Interface S0 2/0
Step 8 : IP address 20.0.0.10 255.0.0.0
Step 9 : No shut
Step 10 : Exit
Step 11 : Exit

→ Repeat these commands for other 2 routers with their respective IP addresses.

→ For Router 1, set IP route of other IP address statically by using following steps.

Step 1: config T

Step 2: IP route 10.0.0.0 255.0.0.0 20.0.0.2

Step 3: IP route 40.0.0.0 255.0.0.0 30.0.0.20

Step 4: Exit

Step 5: Exit

Step 6: Show IP route

For Router 0 and Router 2 we set default IP route which means it can access any IP address with any subnet mask.

Set the default IP route by following these commands

Step 1: config T

Step 2: IP route 0.0.0.0 0.0.0.0 20.0.0.20

Step 3: IP route 0.0.0.0 0.0.0.0 30.0.0.10

step 2 is given for Router 0 & step 3 command for Router 1.

Go to PC's command prompt and type ping message to send packets across.

Ping Output :-

Packet Tracer PC command line 1.0

PC > Ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.

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

Reply from 40.0.0.1: bytes = 32 time = 16ms TTL = 125

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

Ping statistics for 40.0.0.1:

Packets: sent = 4, Received = 3, Lost = 1 (25% loss)

Approximate round trip times in milli-seconds

Minimum = 2ms, Maximum = 16ms, Average = 6ms

Observation:-

→ A default route is the route which takes effect when no other route is available for an IP address destination.

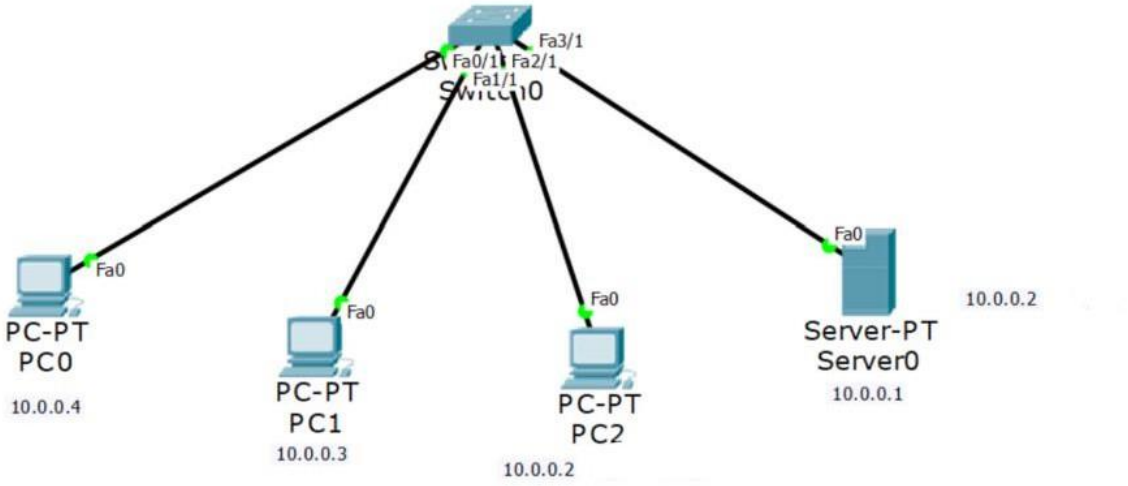
→ If a packet is received, the device first checks the IP destination address, if the IP destination address is not local the device checks its routing table

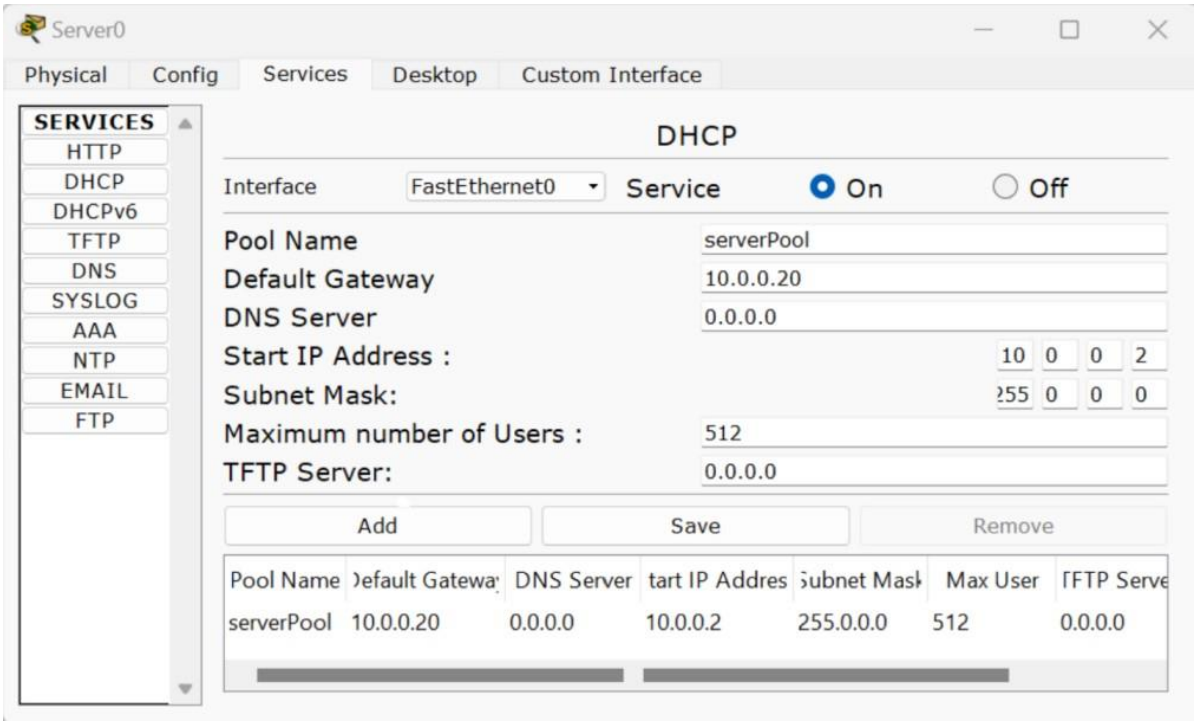
→ If the remote destination subnet is not listed then the packet is forwarded to the next hop towards its destination using the default route.

→ The process repeats until the packet is delivered.

Experiment - 4

Aim: Configure DHCP within a LAN and outside LAN.





Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>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=0ms TTL=128
Reply from 10.0.0.2: bytes=32 time=0ms 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:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

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=128
Reply from 10.0.0.3: bytes=32 time=12ms 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 = 12ms, Average = 3ms
```

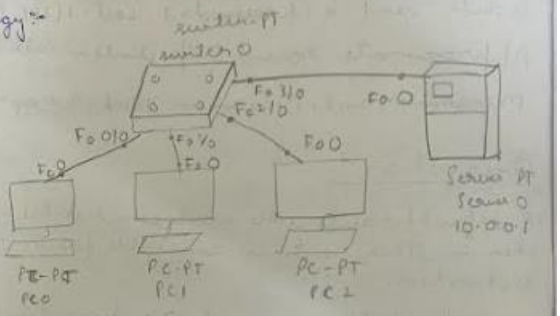
13/9/23

Lab - 4

Program - 4.1

Aim - Configure DHCP within a LAN and outside LAN

Topology :-



Procedure :-

→ Connect 3 PC's and 1 server to a switch using copper straight through cable.

→ Click on server and go to services tab select DHCP and turn on the DHCP service

→ Set the IP address of the start IP address as 10.0.0.2 and click on save button.

→ Before this, set the IP address of server in config Tab under fastEthernet as 10.0.0.1

→ Next click on PC0 and go to desktop tab, here click on IP configuration. Select DHCP here. It will request for an IP address and successfully get the DHCP request also sets the IP address

→ Repeat this steps for other 2 PC's

→ To send a packet across PC's, go to PC's command prompt and type ping destination IP address.

Ping output

Packet Tracer PC command Line 10
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 = 0ms TTL = 128
Reply from 10.0.0.3 bytes = 32 time = 1ms TTL = 128
Reply from 10.0.0.3 bytes = 32 time = 0ms TTL = 128

Ping statistics from 10.0.0.3
Packets: sent = 4, Received = 4, Lost = 0, (0% loss)
Approximate round trip times in milli-seconds,
minimum = 0ms, Maximum = 1ms, Average = 0ms

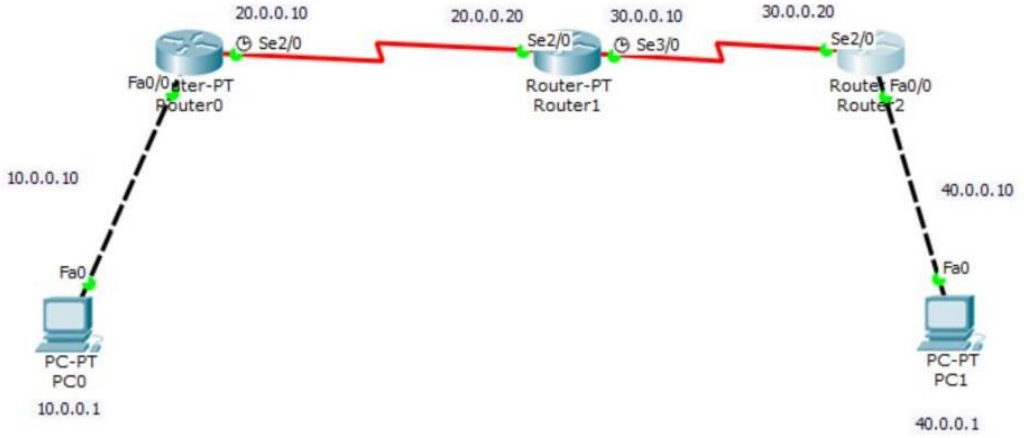
Observation

→ DHCP is used to dynamically assign an IP address to any device or node
→ It is a client-server protocol in which servers manage a pool of unique IP addresses and also about client configuration parameters.
→ DHCP enabled clients sends a request to DHCP server when they want to connect to a network.
→ The DHCP server responds to the client request by providing IP configuration information from address pools, previously specified by a network administrator.

NP
31/8/2023

Experiment - 5

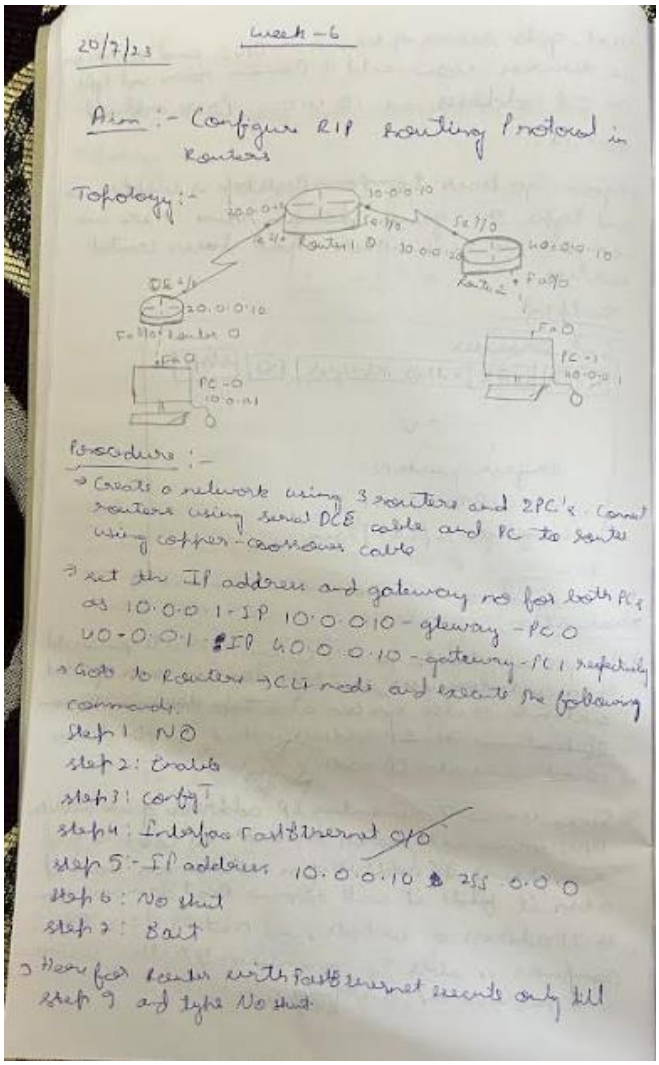
Aim: Configure RIP routing Protocol in Routers




```
Router#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 10.0.0.0
Router(config-router)#network 20.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       20.0.0.0/8 is directly connected, Serial2/0
C       20.0.0.20/32 is directly connected, Serial2/0
R    30.0.0.0/8 [120/1] via 20.0.0.20, 00:00:18, Serial2/0
R    40.0.0.0/8 [120/2] via 20.0.0.20, 00:00:18, Serial2/0
Router#
```

```
Router#
%LINK-5-CHANGED: Interface Serial3/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial3/0, changed state to up
config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#router rip
Router(config-router)#network 20.0.0.0
Router(config-router)#network 30.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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

R    10.0.0.0/8 [120/1] via 20.0.0.10, 00:00:20, Serial2/0
     20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       20.0.0.0/8 is directly connected, Serial2/0
C       20.0.0.10/32 is directly connected, Serial2/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial3/0
C       30.0.0.20/32 is directly connected, Serial3/0
R    40.0.0.0/8 [120/1] via 30.0.0.20, 00:00:19, Serial3/0
Router#

Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#network 30.0.0.0
                   ^
% Invalid input detected at '^' marker.

Router(config)#router rip
Router(config-router)#network 30.0.0.0
Router(config-router)#network 40.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
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

R    10.0.0.0/8 [120/2] via 30.0.0.10, 00:00:14, Serial2/0
R    20.0.0.0/8 [120/1] via 30.0.0.10, 00:00:14, Serial2/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial2/0
C       30.0.0.10/32 is directly connected, Serial2/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
Router#
```

```
Packet Tracer PC Command Line 1.0
PC>ping 40.0.0.1

Pinging 40.0.0.1 with 32 bytes of data:

Request timed out.
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125
Reply from 40.0.0.1: bytes=32 time=7ms TTL=125
Reply from 40.0.0.1: bytes=32 time=10ms TTL=125

Ping statistics for 40.0.0.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 10ms, Average = 9ms

PC>
```



20/7/23 Week-6

Aim :- Configure RIP routing protocol in Routers

Topology :-

Procedure :-

→ Create a network using 3 routers and 2 PC's. Connect routers using serial DCE cable and PC to router using copper-crossover cable

→ Set the IP address and gateway no for both PC's as 10.0.0.1 - IP 10.0.0.10 - gateway - PC 0
40.0.0.1 - IP 40.0.0.10 - gateway - PC 1 respectively

→ Goto to Routers → CLI mode and execute the following commands:

Step 1: NO
Step 2: Enable
Step 3: config T
Step 4: Interface FastEthernet 0/0
Step 5: IP address 10.0.0.10 & 255.0.0.0
Step 6: No shut
Step 7: Exit

→ Now for Router with FastEthernet records only till step 7 and type No shut

→ Again go to Router 0 → CLI mode and type these steps:-

Step 1 :- Config T
Step 2 :- router rip
Step 3 :- Network 10.0.0.0
Step 4 :- Network 20.00.0
Step 5 :- Exit

→ Repeat these steps for all routers

→ At last now go to each router and type show IP route Here the IP addresses associated with the router will be labelled as 'O' and other IP addresses are labelled as R.

Final output :-

→ Packet Tracer PC command Line 1.0
PC > Ping 10.00.1
Pinging 40.0.0.1 with 32 bytes of data

Request timed out:-
Reply from 40.0.0.1 : bytes = 32 times: 1ms TTL = 125
Reply from 40.0.0.1 : bytes = 32 times: 5ms TTL = 125
Reply from 40.0.0.1 : bytes = 32 times: 10ms TTL = 125

Observation:-

→ RIP is a dynamic routing protocol that uses hop count a routing metric to find the best path between source and destination.

→ Hop count is the no. of routers coming in between source and destination.

→ Updates of routing information are always ~~broadcasts~~ broadcasts.

→ Full routing tables are sent in updates

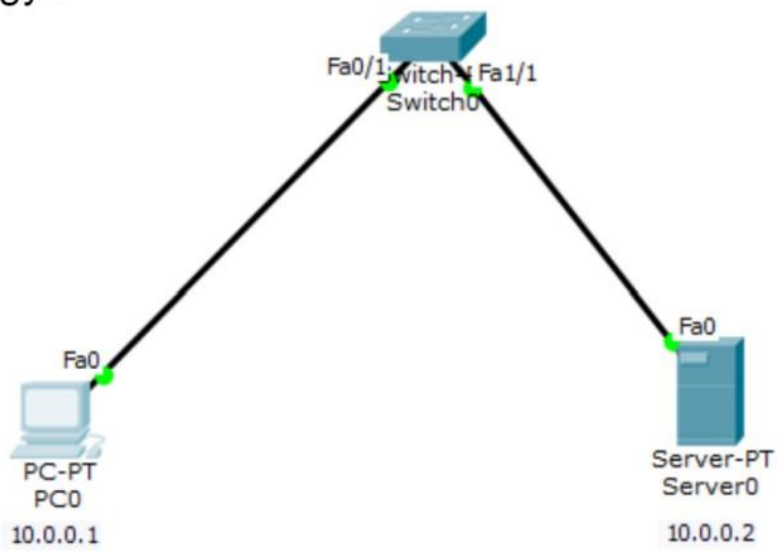
→ Routers always trust routing information received from neighbours routers.

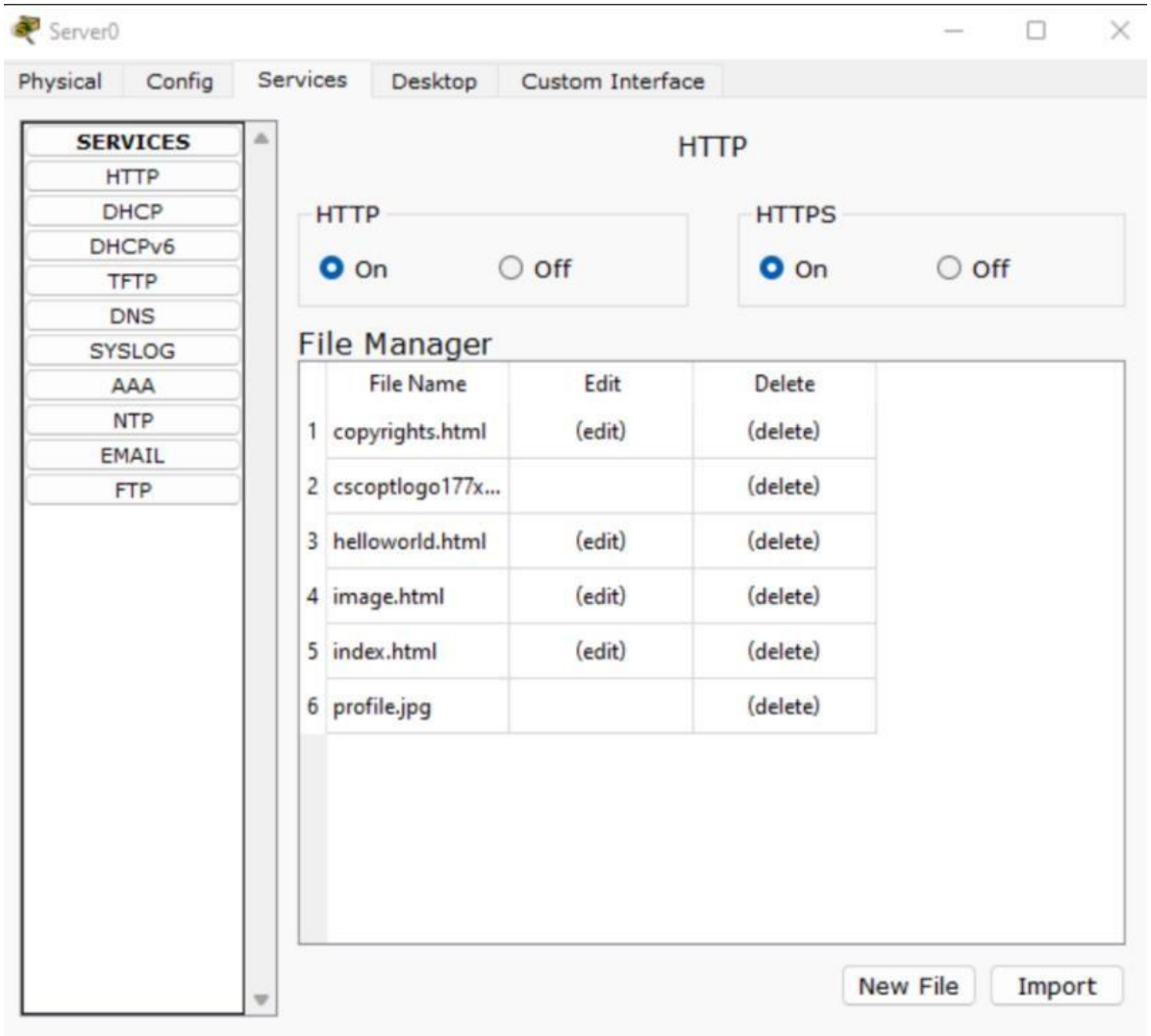
NL 8/8/2023

Experiment - 6

Aim: Configure Web Server, DNS within a LAN.

Topology :

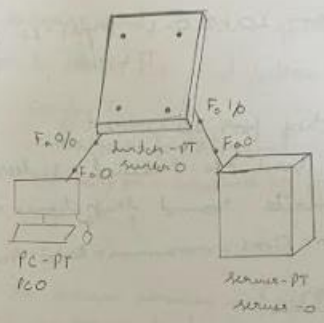



Server0
Physical
Config
Services
Desktop
Custom Interface
SERVICES
HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
HTTP
HTTP
On
Off
HTTPS
On
Off
File Manager
File Name
Edit
Delete
1 copyrights.html (edit) (delete)
2 cscoptlogo177x... (delete)
3 helloworld.html (edit) (delete)
4 image.html (edit) (delete)
5 index.html (edit) (delete)
6 profile.jpg (delete)
New File
Import

20/7/23 Lab-5

Aaim :- Configure web server, DNS within a LAN

Topology :-



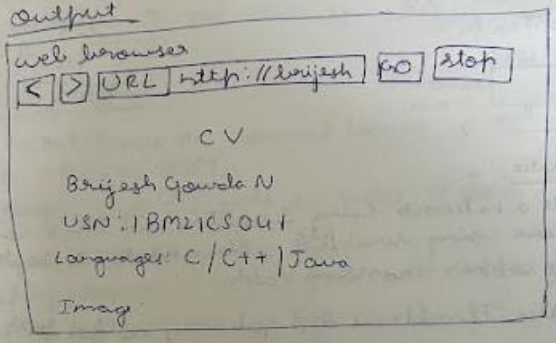
Procedure :-

→ Connect a switch, PC and a server to form a LAN
→ Set PC's IP address by clicking on it and go to config tab. There in fast Ether option set IP address as 10.0.0.1 and subnet mask.
→ Set servers IP address as 10.0.0.2 and subnet mask respectively.
→ Go to PC's Desktop and click on web browser in the URL tab type 10.0.0.2 you will get a default display.
→ To make a CV now, we need to make changes in server services.
→ Go to server → services → HTTP → index.html. Here create the CV and click on save.
→ Again go to PC → Desktop → web browser and type 10.0.0.2.

→ Next, goto server → services → DNS and switch on the services. Now add a Domain name and type the IP address as 10.0.0.2. Press add and save it.

→ Again Go back to PC → Desktop → web browser and type the given domain name. Here we can see the CV which had been created earlier.

Output



Observation:-

→ If you wanted to go to a certain website you would open web browser and type domain name of that website or else you can also type ~~domain name of that website~~ the IP address instead if you know that website's IP address.

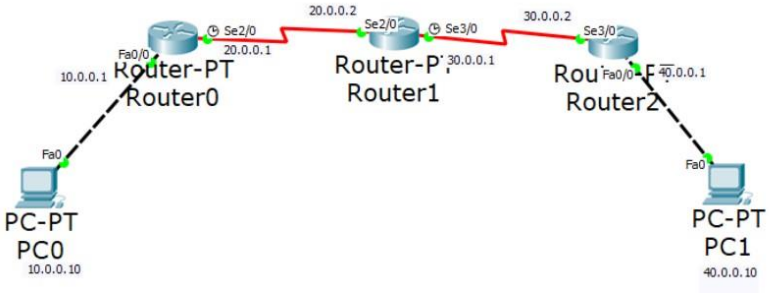
→ Since we can't remember IP addresses of all websites DNS server will search through its cache to find a matching IP address for that domain name and when it finds it will resolve that domain name to IP address of website, and that is done so computer is able to communicate with a webserver and retrieve the webpage.

3/8/2023

Experiment- 7

Aim: Configure OSPF routing protocol

Topology:



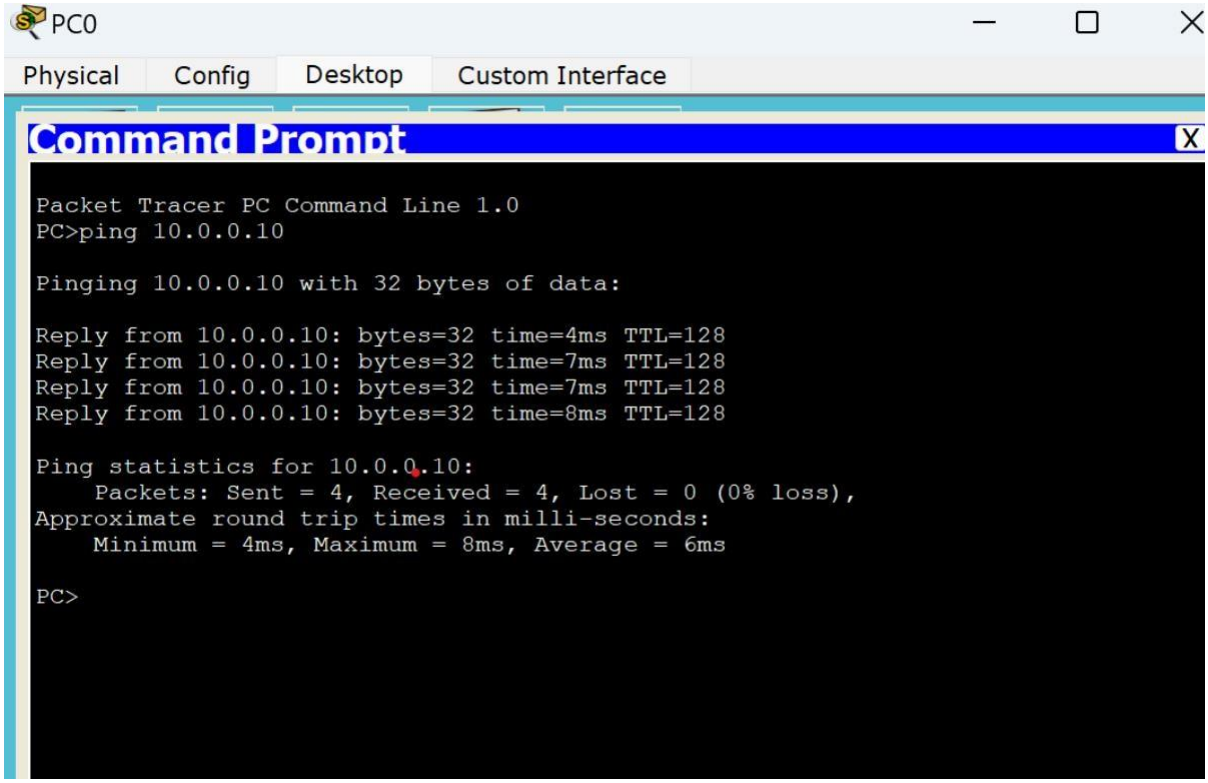
Router2

Physical | Config | CLI

IOS Command Line Interface

```
Loading Done


Router>enable
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

O IA 10.0.0.0/8 [110/129] via 30.0.0.1, 00:00:33, Serial3/0
O IA 20.0.0.0/8 [110/128] via 30.0.0.1, 00:00:43, Serial3/0
     30.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       30.0.0.0/8 is directly connected, Serial3/0
C       30.0.0.1/32 is directly connected, Serial3/0
C    40.0.0.0/8 is directly connected, FastEthernet0/0
C    172.16.0.0/16 is directly connected, Loopback0
Router#
```

Copy | Paste

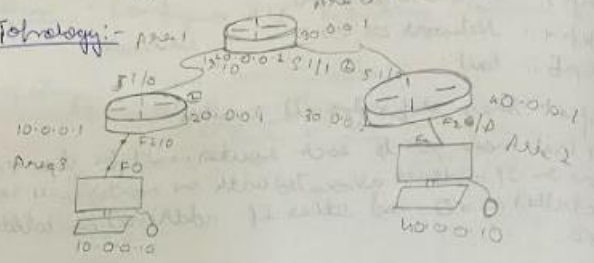

PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.10
Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=4ms TTL=128
Reply from 10.0.0.10: bytes=32 time=7ms TTL=128
Reply from 10.0.0.10: bytes=32 time=7ms TTL=128
Reply from 10.0.0.10: bytes=32 time=8ms TTL=128
Ping statistics for 10.0.0.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 8ms, Average = 6ms
PC>

27/7/23

Week - 7

Aim :- Configure OSPF routing Protocol

Topology :-



Procedure :

→ create the topology using 3 routers & 2 PC's
→ Configure the PC's with IP address and gateway
→ Configure each of the routers acc. to IP address given.
→ Execute the following commands.
Routers → CLI → config mode.
Step 1 :- Router ospf 1
step 2 :- router id 1.1.1.1
step 3 :- Network 10.0.0.0
step 4 : Network 20.0.0.0
step 5 : exit
→ Repeat these commands for other routers.
→ Then type show ip route
→ Next to set loopbacks
step 1 : (in config if mode) interface loopback 0
step 2 : ip address 17.2.16.1 252.255.255.0.0
step 3 : No shut down
→ Repeat these step 3 for other 2 routers

→ Create virtual link b/w R1, R2 by this use create a virtual link ~~b/w R1~~, to connect to area0.

⇒ In config mode of R1
step 1: router ospf 1
step 2: area 1 virtual-link 2222
step 3: #enter/exit
In route 2 config - mode
step 1: #router ospf 1
step 2: area 1 virtual link 1.1.1.1
step 3: exit
step 4: #

→ check the routing table, show ip route
→ Lastly ping messages from PC to PC

Ping Output:-

→ Packet tracer PC command line 1.0
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=11ms TTL=125
Reply from 40.0.0.10: bytes=32 time=11ms TTL=125
Reply from 40.0.0.10: bytes=32 time=8ms TTL=125

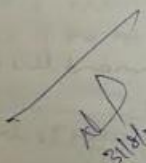
⇒ Ping statistics for 40.0.0.10;
Packets sent = 4, Received = 3, Lost = 1 (25% loss)
Approximate round trip times in milliseconds
minimum = 8ms max = 11ms Avg = 10ms

Observation:-

→ OSPF is a link-state routing protocol that is used to find the best path between source and destination route using its own spf Algorithm.

→ This network is divided into 4 areas. One area is the backbone.

→ After we make the virtual link between the area which is not connected to the backbone area, we can ping messages successfully.

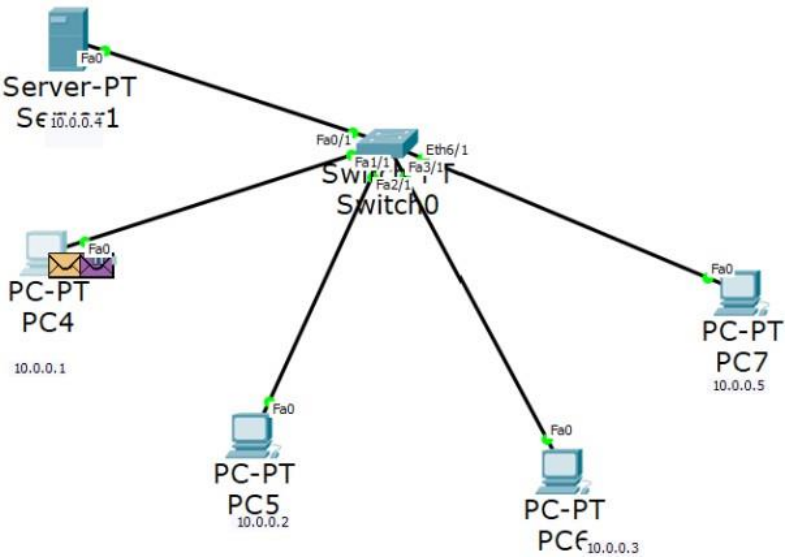


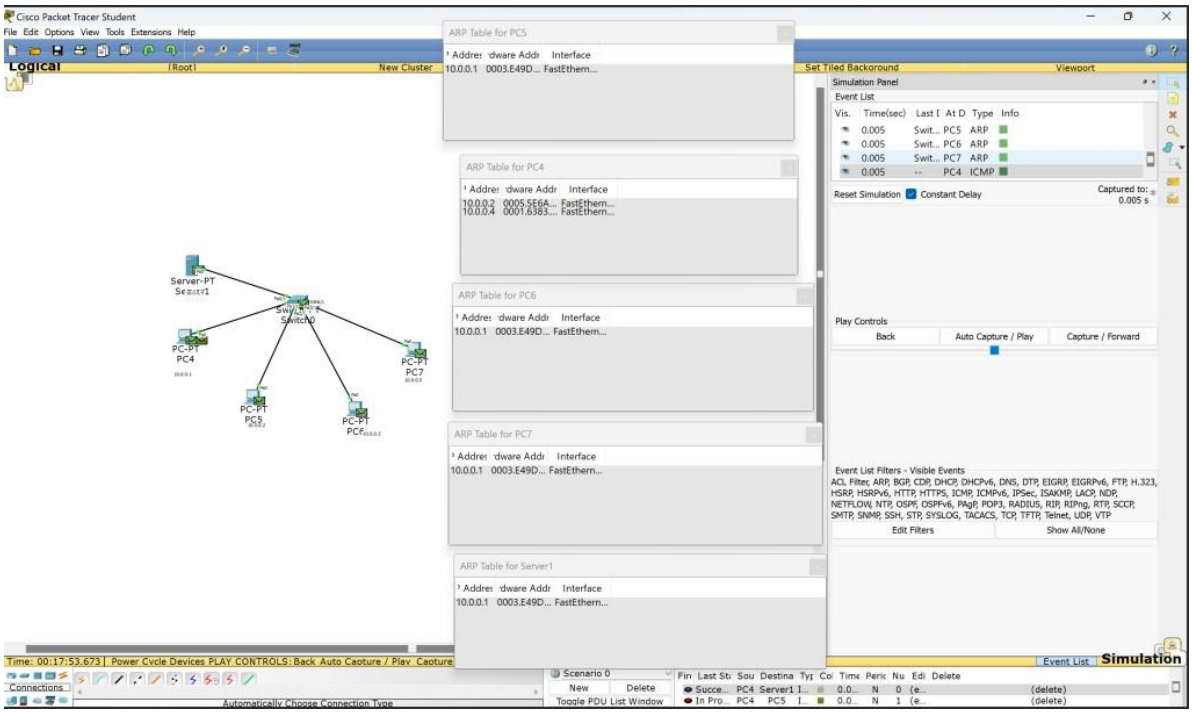
31/8/2023

Experiment - 8

Aim:To construct simple LAN and understand the concept and operation of Address Resolution Protocol (ARP)

Topology:




Cisco Packet Tracer Student
File Edit Options View Tools Extensions Help
Logical
[Root]
New Cluster
Set Tiled Background
Viewport
ARP Table for PC5
Address
Hardware Addr
Interface
10.0.0.1 0003.E49D... FastEthern...
ARP Table for PC4
10.0.0.2 0005.5E6A... FastEthern...
10.0.0.4 0001.6383... FastEthern...
ARP Table for PC6
10.0.0.1 0003.E49D... FastEthern...
ARP Table for PC7
10.0.0.1 0003.E49D... FastEthern...
ARP Table for Server1
10.0.0.1 0003.E49D... FastEthern...
Server-PT
Switch0
PC-PT PC4
PC-PT PC7
PC-PT PC5
PC-PT PC6
Simulation Panel
Event List
Vis. Time(sec) Last I At D Type Info
0.005 Swit... PC5 ARP
0.005 Swit... PC6 ARP
0.005 Swit... PC7 ARP
0.005 -- PC4 ICMP
Reset Simulation
Constant Delay
Captured to:
0.005 s
Play Controls
Back
Auto Capture / Play
Capture / Forward
Event List Filters - Visible Events
ACL Filter, ARP, BGP, CDP, DHCP, DHCPv6, DNS, DTP, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, LACP, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, RADIUS, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, VTP
Edit Filters
Show All/None
Time: 00:17:53.673 | Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture
Event List
Simulation
Connections
Automatically Choose Connection Type
Scenario 0
New
Delete
Toggle PDU List Window
Fire Last Status Source Destination Type Color Time Periodic Num Edit Delete
Succe... PC4 Server1 I... 0.0... N 0 (e... (delete)
In Pro... PC4 PC5 I... 0.0... N 1 (e... (delete)

Physical | Config | CLI

IOS Command Line Interface

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to
up

%LINK-5-CHANGED: Interface FastEthernet1/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to
up

%LINK-5-CHANGED: Interface FastEthernet2/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet2/1, changed state to
up

%LINK-5-CHANGED: Interface FastEthernet3/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet3/1, changed state to
up

%LINK-5-CHANGED: Interface Ethernet6/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet6/1, changed state to up

Switch(config)#show mac address-table
                ^
% Invalid input detected at '^' marker.

Switch(config)#exit
Switch#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.6383.ddb2    DYNAMIC     Fa0/1
   1    0003.e49d.b2d9    DYNAMIC     Fa1/1
   1    0004.9a42.616c    DYNAMIC     Eth6/1
   1    0005.5e6a.7da2    DYNAMIC     Fa2/1
   1    0030.f285.7a19    DYNAMIC     Fa3/1
Switch#
```

Copy | Paste

PC4

Physical | Config | Desktop | Custom Interface

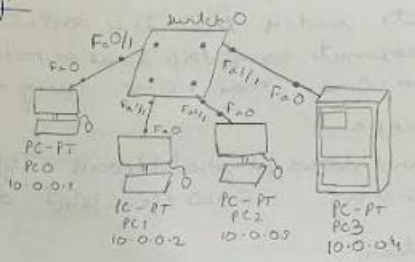
Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>arp -a
No ARP Entries Found
PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.4              0001.6383.ddb2        dynamic

PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2              0005.5e6a.7da2        dynamic
  10.0.0.4              0001.6383.ddb2        dynamic

PC>arp -a
  Internet Address      Physical Address      Type
  10.0.0.2              0005.5e6a.7da2        dynamic
  10.0.0.3              0030.f285.7a19        dynamic
  10.0.0.4              0001.6383.ddb2        dynamic
  10.0.0.5              0004.9a42.616c        dynamic

PC>
```

3/2/25 Lab-3

Aim:- To construct single LAN and understand the concept and operating of Address Resolution Protocol (ARP)

Topology:-



Procedure:

- Create a topology of PC's and server
- Assign IP address to all PC's and server
- Connect them through the switch
- Use the inspect tool to click on PC to see ARP table
- Command in cmd for the same is arp -a
- Initially ARP table is empty
- Also in CLI of switch, the command show mac address table can be given on every transaction to see how the switch learns from transactions and build the address table
- Use the capture button in the simulation panel to go step by step so that the changes in ARP can be clearly noted.

Ping Output:-

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

Ping statistics for 10.0.0.4:
Packets: sent = 4 Received = 4 lost = 0 (0% loss)
Approximate round trip times in milliseconds:
min = 0ms max = 0ms avg = 0ms

PC > arp a

Internet address	physical Address	Type
10.0.0.4	0060.2f00.324d	dynamic

observation:-

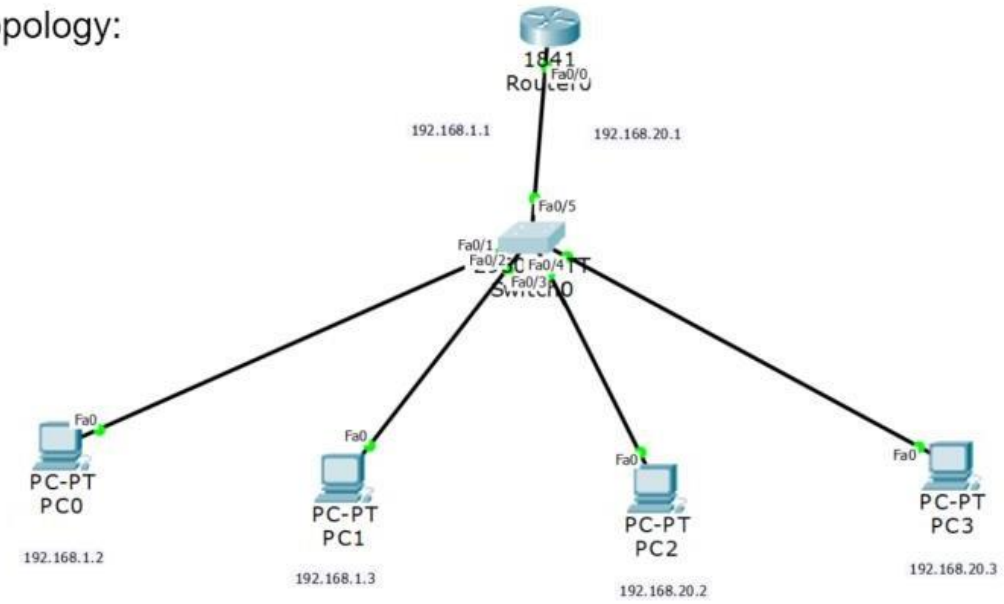
→ when we ping PC and server the address of server is known to PC & vice versa
→ when we ping the other 2 PC's simultaneously the addresses of each other are known.
→ Every time a host requests a MAC address in order to send a packet to another host in the LAN, it checks its ARP cache to see if the IP to mac address translation address already exists. if no translation doesn't exist it perform ARP.

NL
9/8/2023

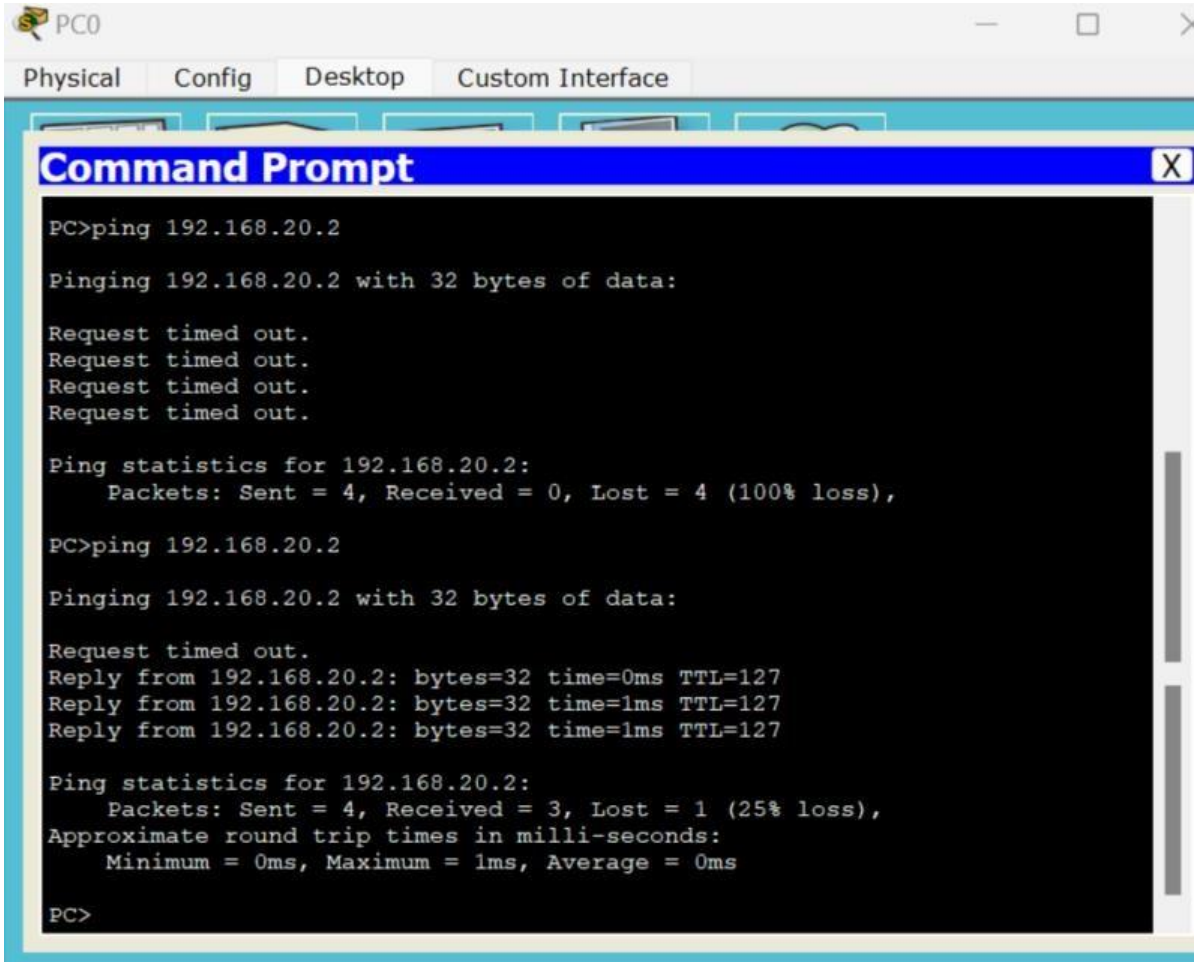
Experiment - 9

Aim: To construct a VLAN and make the PC's communicate among a VLAN

Topology:



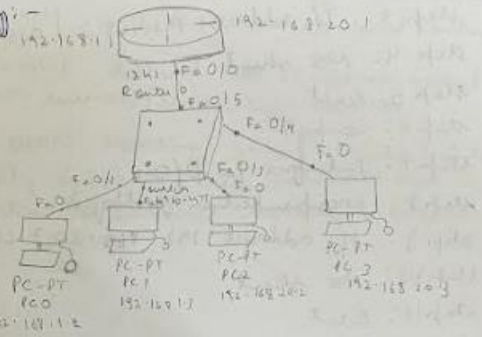
```
         --- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n


Press RETURN to get started!



Router>enable
Router#vlan database
% Warning: It is recommended to configure VLAN from config mode,
  as VLAN database mode is being deprecated. Please consult user
  documentation for configuring VTP/VLAN in config mode.

Router(vlan)#vlan 20 name NEWVLAN
VLAN 20 modified:
    Name: NEWVLAN
Router(vlan)#exit
APPLY completed.
Exiting....
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/5
%Invalid interface type and number
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#int fa 0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up

Router(config-subif)#encapsulation dot1q 20
Router(config-subif)#ip address 192.168.20.1 255.255.255.0
Router(config-subif)#no shut
Router(config-subif)#exit
Router(config)#
```


PC0
Physical
Config
Desktop
Custom Interface
Command Prompt
X
PC>ping 192.168.20.2
Pinging 192.168.20.2 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Ping statistics for 192.168.20.2:
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
PC>ping 192.168.20.2
Pinging 192.168.20.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.20.2: bytes=32 time=0ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Reply from 192.168.20.2: bytes=32 time=1ms TTL=127
Ping statistics for 192.168.20.2:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
PC>

Lab - 9

Aim:- To construct a VLAN and make a PC communicate among VLAN

Topology:-



Procedure:-

→ Create a topology as shown above, choose 1841 router and 2960-24TT switch.

→ Set the IP address of the router and 4 PC's respectively, we use class C type addresses also gateways.

→ In switch, go to config tab and select VLAN Database. Give any VLAN no. like 2 and name as vlan

→ select the interface fastethernet 4/1 and make it trunk.

→ Next select the switches under 2nd interface which has interface 0/3 and 0/4. Click on each of them and set VLAN number 2.

→ Go to router → config tab and select VLAN database and enter the name vlan and no 2 created.

Go to router → CLI and type the following commands.

Step #1: - configT
step 2: interface fe 0/0
step 3: IP address 192.168.1.1 255.255.255.0
step 4: No shut
step 5: Exit
step 6: ConfigT
step 7: Interface fa 0/0.1
step 8: encapsulation dot1q 2
step 9: ip address 192.169.20.7 255.255.255.0
step 10: No shut
step 11: Exit

→ Ping message from PC to another VLAN PC

PING OUTPUT

Packet tracer PC command line 1.0

PC> ping 192.168.20.3

Pinging 192.168.20.3: ~~bytes=32 time=0ms TTL=127~~

with 32 bytes of data:

~~Pinging~~

Request timed out.

Reply from 192.168.20.3: bytes=32 time=0ms TTL=127
Reply from 192.168.20.3: bytes=32 time=5ms TTL=127
Reply from 192.168.20.3: bytes=32 time=0ms TTL=127

Ping statistics for 192.168.20.3

Packets: sent=4 Received = 3 loss = 1 (25% loss)

Approximate round trip time in milliseconds:

min = 0ms max = [illegible]

Observation:-

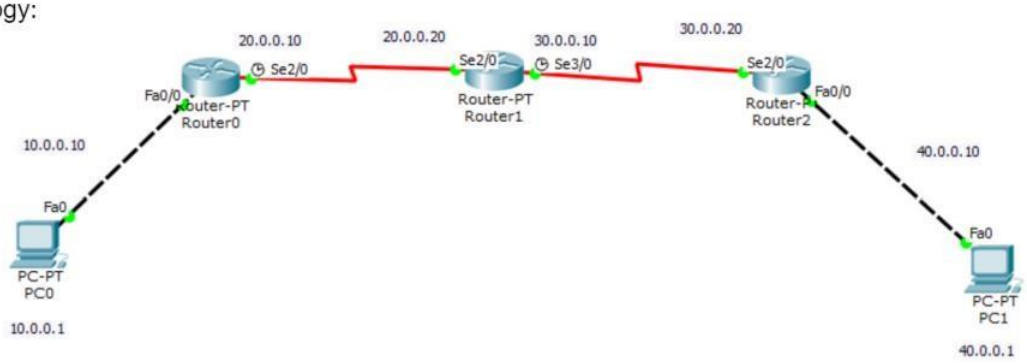
- We can have one device on one VLAN & another on another VLAN connected to the same switch. They will only hear other broadcast traffic from within their VLANS, as if they were connected 2 switches.
- Here VLANS doesn't use IP address instead deal with subnets / class C type addresses
- Inter-VLAN routing gives a flexible tool to logically subdivide their networks that has potential to enhance security & performance

3/8/2023

Experiment - 10

Aim: Demonstrate the TTL/ Life of a Packet

Topology:

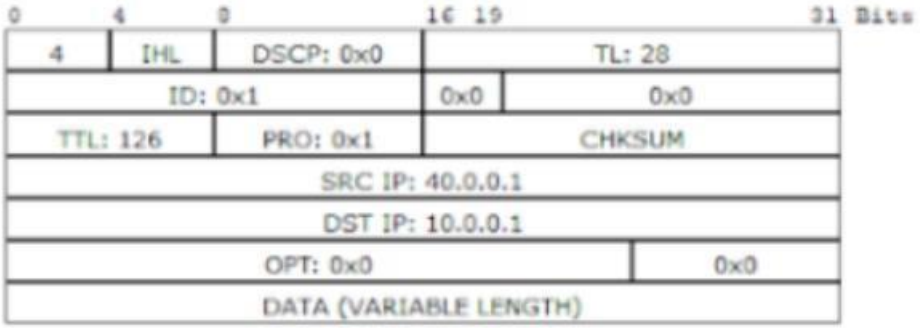


OSI Model | Inbound PDU Details | Outbound PDU Details

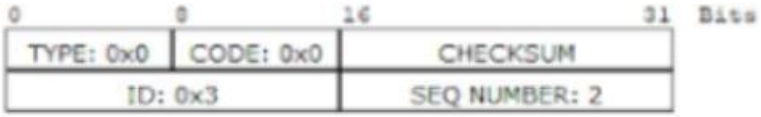
PDU Formats

HDLC

IP

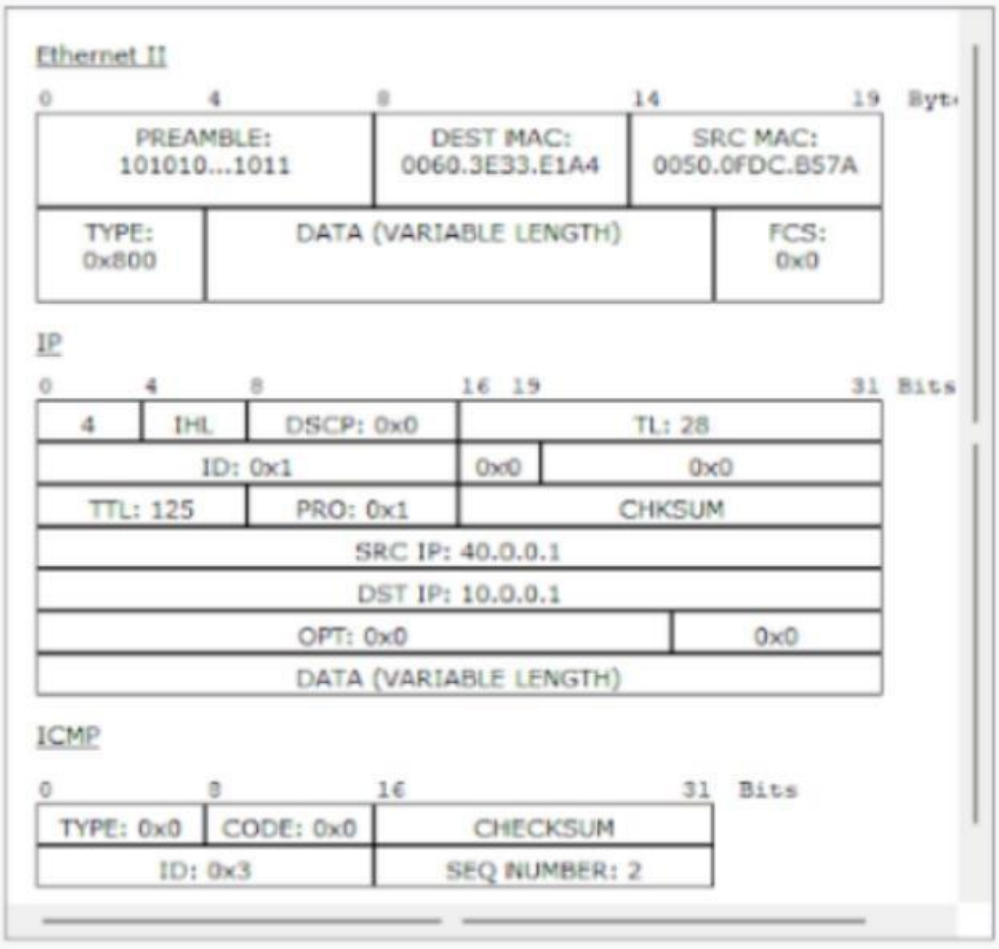


ICMP



OSI Model | Inbound PDU Details | Outbound PDU Details

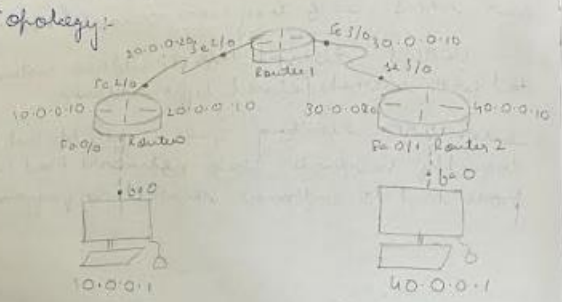
PDU Formats



10/8/23 Lab-10

Aim:- Demonstrate the TTL life of a packet

Topology:-

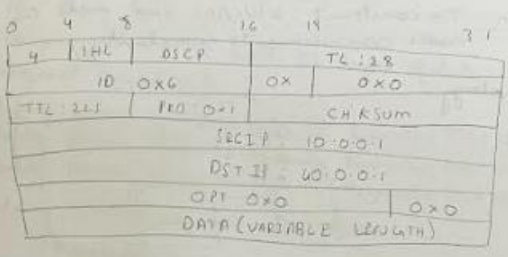


Procedure:-

→ Create a topology as shown above with 2PC's and 3 Routers.
→ Set the IP address and gateway for both PC's
→ Configure the routers either static / default routing way.
→ In simulation mode send a simple PDU from one PC to another.
→ Use capture button to capture every transfer.
→ Click on the PDU during every transfer to see the inbound & outbound PDU details.

Output :-

IP



Observation:-

→ The no. of hops the packet travel before being discarded as TTL

→ Datagrams TTL field is set by the sender and reduced by each router along the path to its destination.

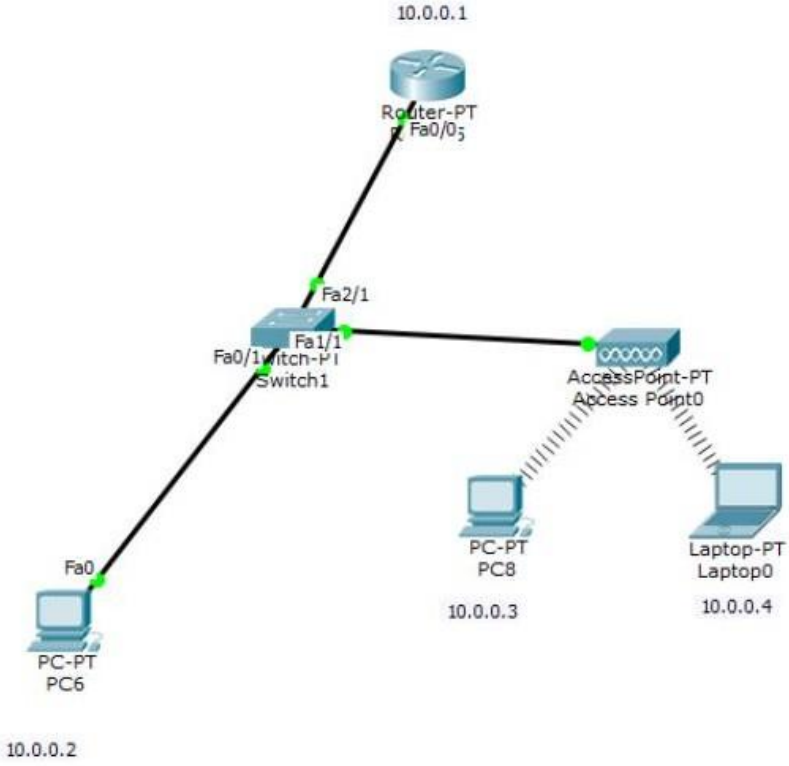
→ The router reduces TTL value by one when forwarding the packets

→ When the TTL value is 0, the router discards it and sends an ICMP message.

31/8/2023

Experiment -11

Aim: To construct a WLAN and make the nodes communicate wirelessly



Command Prompt

```
Packet Tracer PC Command Line 1.0
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=21ms TTL=128
Reply from 10.0.0.3: bytes=32 time=9ms TTL=128
Reply from 10.0.0.3: bytes=32 time=13ms TTL=128
Reply from 10.0.0.3: bytes=32 time=12ms 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 = 9ms, Maximum = 21ms, Average = 13ms

PC>
```

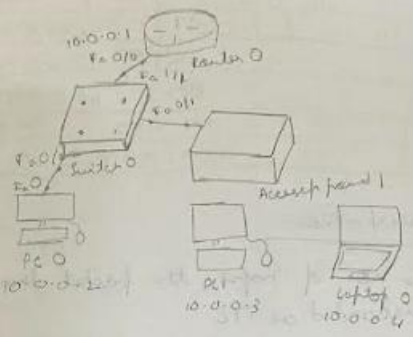
Command Prompt

```
Packet Tracer PC Command Line 1.0
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=18ms TTL=128
Reply from 10.0.0.4: bytes=32 time=9ms TTL=128
Reply from 10.0.0.4: bytes=32 time=5ms TTL=128
Reply from 10.0.0.4: bytes=32 time=12ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 5ms, Maximum = 18ms, Average = 11ms

PC>
```

10/8/23 Lab-11

Aim:- To construct a WLAN and make the nodes communicate wirelessly

Topology:-



Procedure:-

→ Construct the above topology
→ Configure PC0 and Router 0 as normally done
→ Configure Accesspoint 1 - port 1 → SSID Name - WLAN
→ Select to BP & give any 10 digit hex key - 1234567890
→ Config PT & laptop with wireless standards
→ Switch off the devices. Drag the existing ~~PT-HOST~~ PT-HOST-NM-1AM to the component listed in LHS. Drag WMP300N wireless interface to the empty port. Switch on the device.
→ In the config tab a new wireless interface would have been added. Now configure SSID, WEP, WEP key, IP address and gateway to the device.
→ Ping from ~~one~~ every device to every other device.

Ping Output:-

Packet Tracer PC command line 1.0
PC > Ping 10.0.0.3
Pinging 10.0.0.3 with 32 bytes of data
Request timed out.
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127
Reply from 10.0.0.3: bytes=32 time=0ms TTL=127

Ping statistics for 10.0.0.3
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milliseconds
Min = 0ms Max = 1ms, Avg = 0ms

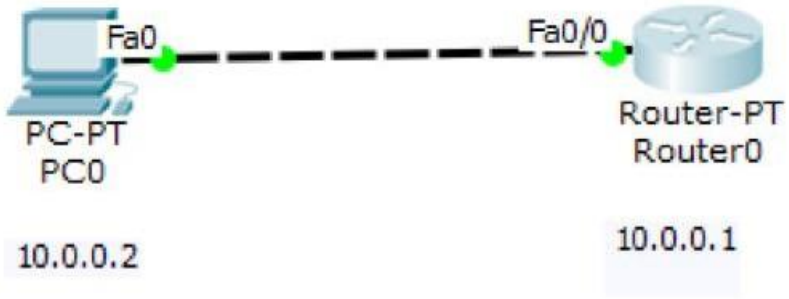
Observation:-

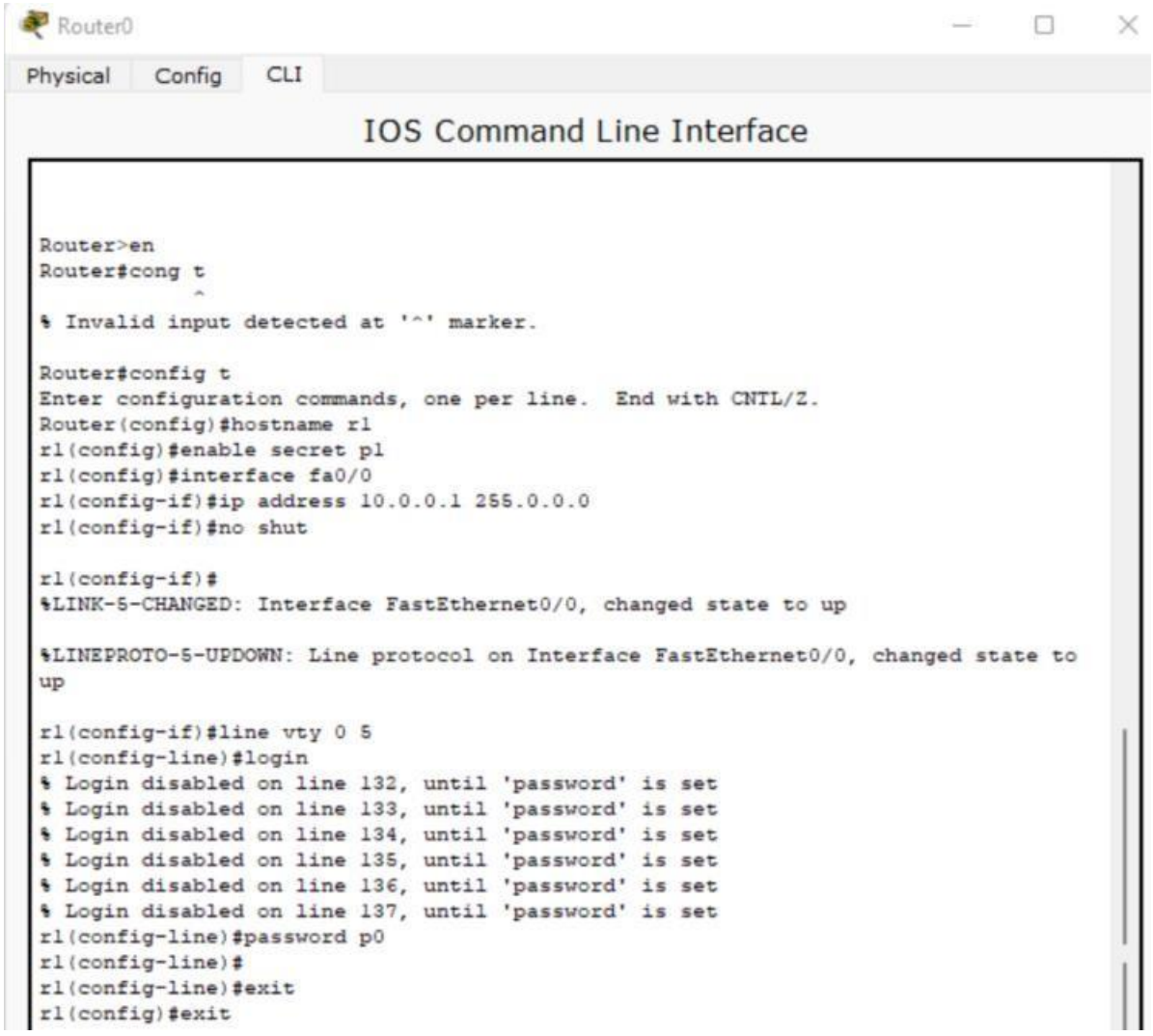
- A WLAN is a group of colocated devices that form a network based on radio transmissions
- Data sent in packets contain layers with labels and instructions. MAC address to end points for routing.
- The access point is the base station that served as a hub to ~~which~~ which other stations connect.
- With an access point we can connect to multiple devices wirelessly and transmit data

31/8/2023

Experiment - 12

Aim: To understand the operation of TELNET by accessing the router in server room from a PC in IT office.




Router0
Physical
Config
CLI
IOS Command Line Interface
Router>en
Router#cong t
^
% Invalid input detected at '^' marker.
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname r1
r1(config)#enable secret p1
r1(config)#interface fa0/0
r1(config-if)#ip address 10.0.0.1 255.0.0.0
r1(config-if)#no shut
r1(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
r1(config-if)#line vty 0 5
r1(config-line)#login
% Login disabled on line 132, until 'password' is set
% Login disabled on line 133, until 'password' is set
% Login disabled on line 134, until 'password' is set
% Login disabled on line 135, until 'password' is set
% Login disabled on line 136, until 'password' is set
% Login disabled on line 137, until 'password' is set
r1(config-line)#password p0
r1(config-line)#
r1(config-line)#exit
r1(config)#exit

Command Prompt

```
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 = 3ms, Average = 1ms

PC>telnet 10.0.0.1
Trying 10.0.0.1 ...Open


User Access Verification

Password:
Password:
r1>en
Password:
r1#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
```

Command Prompt

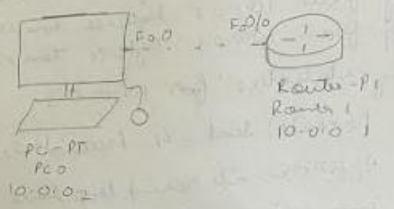
```
Packet Tracer PC Command Line 1.0
PC>ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data:

Reply from 10.0.0.1: bytes=32 time=1ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=0ms TTL=255
Reply from 10.0.0.1: bytes=32 time=3ms TTL=255

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 = 3ms, Average = 1ms
```

Lab-12

10/9/23

Aim :- To understand the operation of TELNET by accessing the router in server room from a PC in IT office.

Topology :-



Procedure :-

→ create a topology as shown above

→ config the IP address & gateway for PC0

→ config the router by ~~entering~~ executing the following commands

Step 1 : enable
step 2 : config t
step 3 : hostname R1
step 4 : enable secret 1
step 5 : interface fastethernet 0/0
step 6 : ip address fastethernet 0/0
step 7 : No shut
step 8 : line vty 0 5
step 9 : login
step 10 : password 1
step 11 : Exit ; Exit
Step 12 : Ctrl

→ Ping message to router
Password for User Access verification is P0
password for enable is P1
Accessing router CLI from PC
show ip route

PING OUTPUT –

Packet Tracer PC command line 1.0
PC > Ping 10.0.0.1

Pinging 10.0.0.1 with 32 bytes of data

Reply from 10.0.0.1 : bytes = 32 Time = 0ms TTL = 255
Reply from 10.0.0.1 : bytes = 32 Time = 0ms TTL = 255
Reply from 10.0.0.1 : bytes = 32 Time = 0ms TTL = 255
Reply from 10.0.0.1 : bytes = 32 Time = 0ms TTL = 255

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

PC > telnet 10.0.0.1

Typing 10.0.0.1 after
user Access verification
Password: P0
P1 > enable
Password: P1
R1 # show ip route

C 10.0.0.0/8 is directly connected,
FastEthernet 0/0

Observation :-

⇒ TELNET stands for Teletype Network. It is a type of protocol that enables one computer to connect to the local computer.

⇒ It is used as a standard TCP/IP protocol for virtual terminal service provided by ISO.

⇒ During TELNET operation, whatever is being performed on the remote computer will be displayed by the local computer. Telnet operates on a client/server principle.

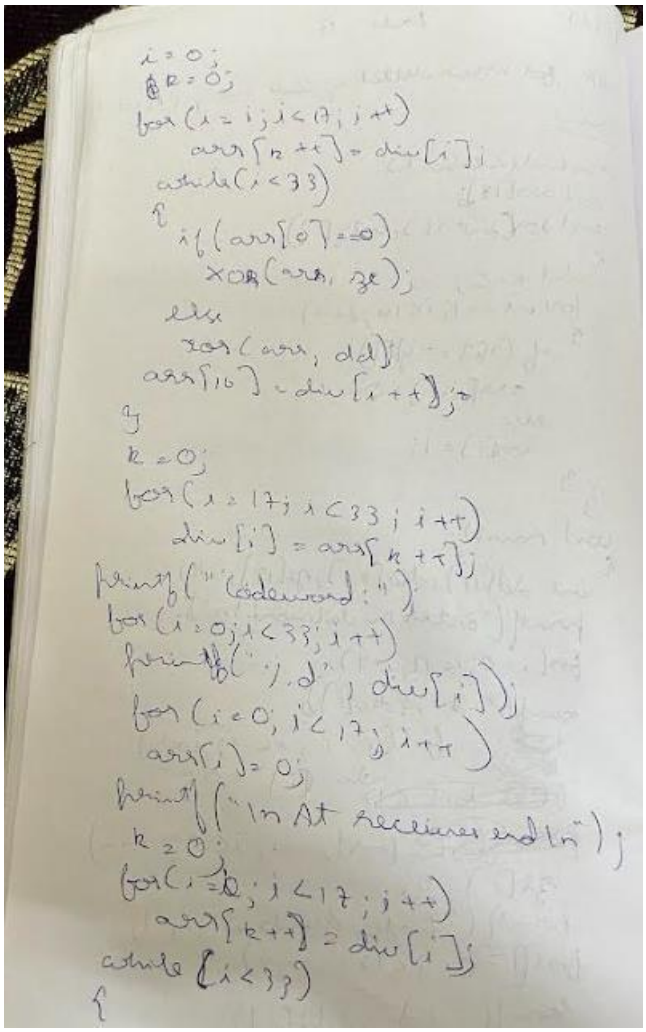
31/8/2023

17/2/25 Lab - 13

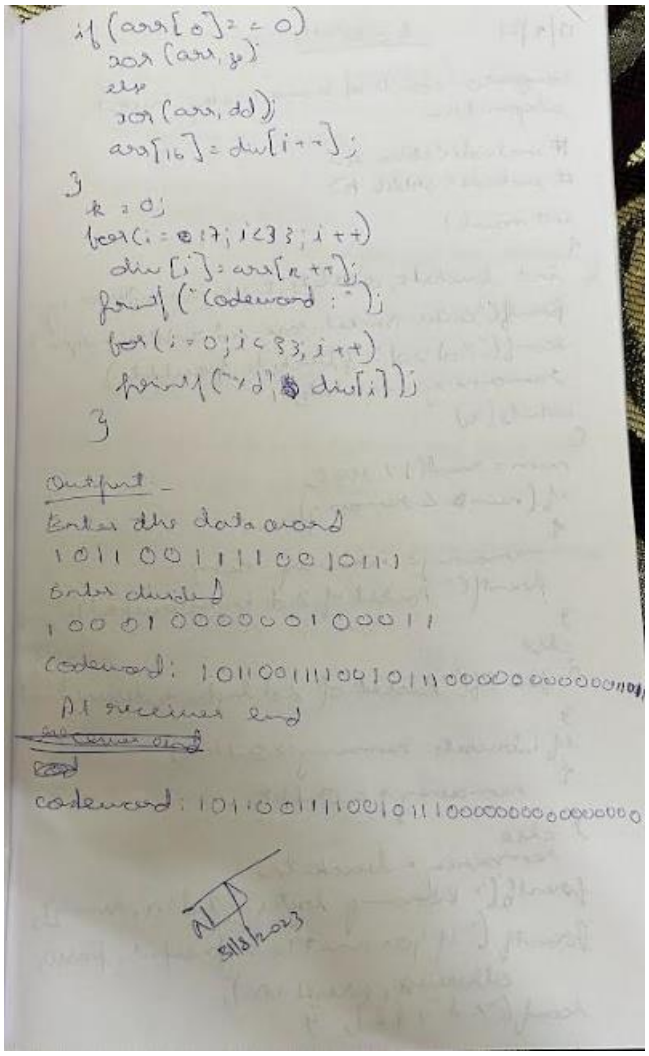
WAP for error detecting code using CRC-CCITT

Code:-

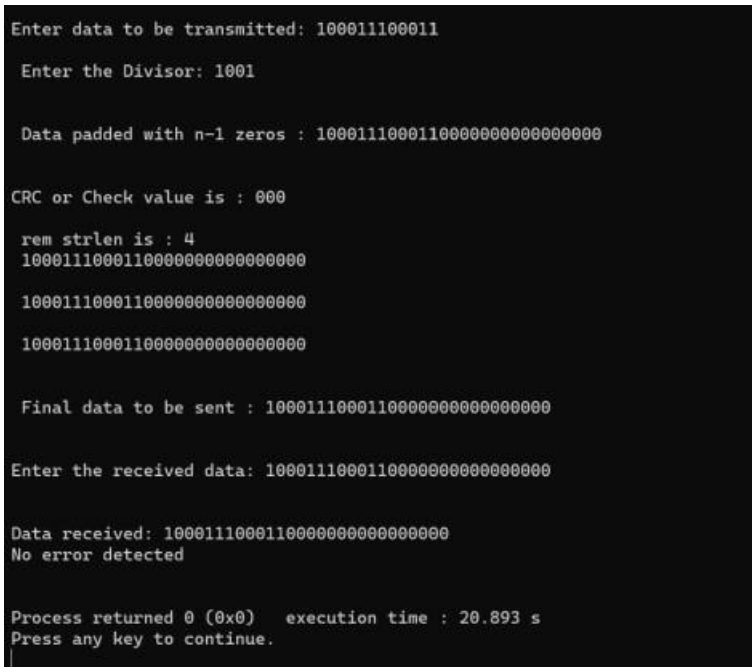
```
#include<stdio.h>
int arr[17];
void xor(int x[], int y[])
{
  int k=0;
  for(int i=1;i<16;i++)
  {
    if(x[i]==y[i])
      arr[k++]=0
    else
      arr[i]=1;
  }
}
void main()
{
  int dd[17], dw[33], ge[17], i, k;
  printf("Enter the data word \n");
  for(i=0;i<17;i++)
  scanf("%d",&dw[i]);
  k=0;  for(i=i; i<33;i++)
        dw[i]=0;
  for(i=0; i<17; i++)
  ge[i]=0;
  printf("Enter divisor \n");
  for(i=0; i<17; i++)
  scanf("%d",&dd[i]);
```



```
i = 0;
k = 0;
for (i = i; i < 9; i++)
    arr[k++] = div[i];
while(i < 33)
{
  if(arr[0] == 0)
    xor(arr, ze);
  else
    xor(arr, dd);
  arr[10] = div[i++];
}
k = 0;
for(i = 17; i < 33; i++)
    div[i] = arr[k++];
printf("Codeword:");
for(i = 0; i < 33; i++)
  printf("%d", div[i]);
  for(i = 0; i < 17; i++)
    arr[i] = 0;
  printf("In At receiver end\n");
  k = 0;
  for(i = 0; i < 17; i++)
    arr[k++] = div[i];
while(i < 33)
{
```



```
Enter data to be transmitted: 1010101111

 Enter the Divisor: 10101


 Data padded with n-1 zeros : 1010101111000000000000000

CRC or Check value is : 1100
 rem strlen is : 4
 1010101111000000000000000
 1010101111000000000000100
 1010101111000000000000110

 Final data to be sent : 1010101111000000000000110

Enter the received data: 1010101111000000000000110


Data received: 1010101111000000000000110
Error detected


Process returned 0 (0x0)   execution time : 38.224 s
Press any key to continue.
```


Enter data to be transmitted: 100011100011
Enter the Divisor: 1001
Data padded with n-1 zeros : 100011100011000000000000000
CRC or Check value is : 000
rem strlen is : 4
100011100011000000000000000
100011100011000000000000000
100011100011000000000000000
Final data to be sent : 100011100011000000000000000
Enter the received data: 100011100011000000000000000
Data received: 100011100011000000000000000
No error detected
Process returned 0 (0x0) execution time : 20.893 s
Press any key to continue.

17/8/23 Lab-14

Congestion control using Leaky bucket algorithm

```
#include<stdio.h>
#include<stdlib.h>
int main()
{
 int buckets, outlets, k = 1, num, remaining;
 printf("Enter Bucket size and outstream size:");
 scanf("%d %d", &buckets, &outlets);
 remaining = buckets;
while(k)
{
 num = rand() % 1000;
 if(num < remaining)
 {
  remaining = remaining - num;
  printf(" Packet of %d bytes accepted \n", num);
 }
 else
 { printf(" Packet of %d bytes is discarded \n", num);
 }
 if(buckets - remaining > outlets)
 {
   remaining += outlet;
 } else
   remaining = buckets;
printf(" Remaining bytes: %d \n", remaining);
printf(" If you want to stop input, press 0, Otherwise, press 1 \n");
scanf("%d", &k); }
```

```
while (remaining < buckets)
{ if (buckets - remaining > outlets)
  { remaining += outlets;
  }else
     remaining = buckets;
     printf("Remaining bytes:%d\n", remaining);
  }
  return 0;
}
```

Output

Enter Bucket size & outstream size 2000 100
Packet of 41 bytes accepted
Remaining bytes: 2000
If you want to stop input, press 0, otherwise, press 1.
Packet of 367 bytes accepted
Packet of 324 bytes accepted
Remaining bytes: 1399
Remaining bytes: 1599
Remaining bytes: 1699
Remaining bytes: 1799
Remaining bytes: 1899
Remaining bytes: 1999
Remaining bytes: 2000

NLP
3/8/2022

Lab-15

Client-server program using TCP/IP sockets

ClientTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
clientSocket = socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName, serverPort))
sentence = input("\n Enter file name: ")

clientSocket.send(sentence.encode())
fileContents = clientSocket.recv(1024).decode()
print('\n From Server: \n')
print(fileContents)
clientSocket.close()
```

ServerTCP.py

```
from socket import *
serverName = '127.0.0.1'
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_STREAM)
serverSocket.bind((serverName, serverPort))
serverSocket.listen(1)
```

```
while 1:
    print("The server is ready to receive")
    connectionSocket, addr = serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()
    file = open(sentence, "r")
    l = file.read(1024)
    connectionSocket.send(l.encode())
    print('\n Sent contents of' + sentence)
    file.close()
    ConnectionSocket.close()
```

IDLE Shell 3.11.2

File Edit Shell Debug Options Window Help

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb  7 2023, 16:38:35) [MSC v.1934 64 bit (
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: F:/CN/cycle2/ServerTCP.py ==========
The server is ready to receive

Sent contents ofServerTCP.py
The server is ready to receive
```

IDLE Shell 3.11.2

File Edit Shell Debug Options Window Help

```
Python 3.11.2 (tags/v3.11.2:878ead1, Feb  7 2023, 16:38:35) [MSC v.1934 64 bit (
AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: F:/CN/cycle2/ClientTCP.py ==========

Enter the file name: ServerTCP.py

From sever:

from socket import *
serverName="127.0.0.1"
serverPort = 12000
serverSocket=socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1)
while 1:
    print("The server is ready to receive ")
    connectionSocket,addr=serverSocket.accept()
    sentence = connectionSocket.recv(1024).decode()

    file=open(sentence,"r")
    l=file.read(1024)

    connectionSocket.send(l.encode())
    print('\nSent contents of'+sentence)
    file.close()
    connectionSocket.close()
```

Lab 16

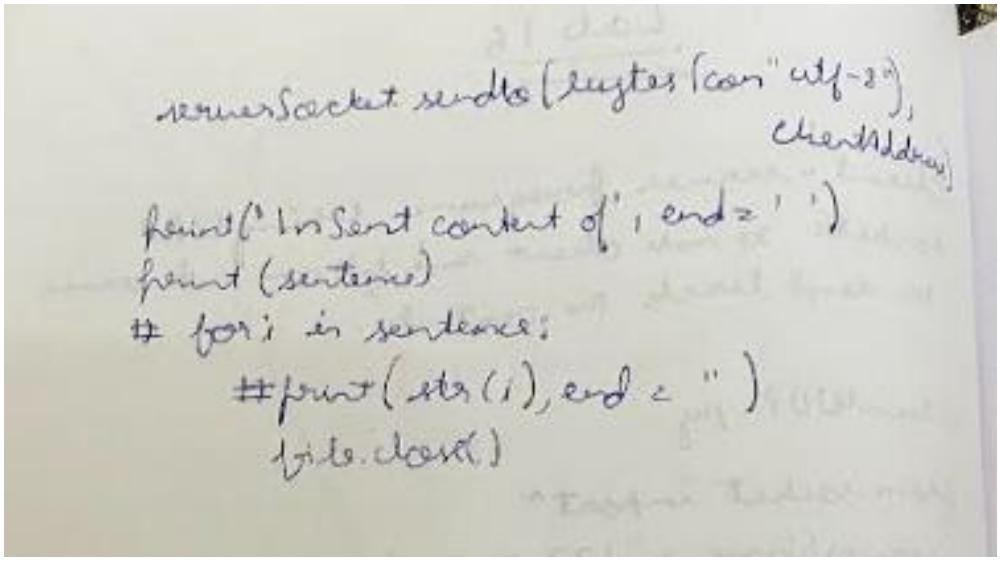
Client - server program using UDP sockets to make client send file name and server to send back the contents.

ClientUDP.py

```
from socket import *
serverName = "127.0.0.1"
serverPort = 12000
clientSocket.sendto(bytes(sentence,"utf-8"),
                    (serverName, serverPort))
fileContents, serverAddress = clientSocket.recvfrom(
print('In Reply from Server:\n')
print(fileContents.decode("utf-8"))
# for i in fileContents:
  #print(str(i), end="")
  clientSocket.close()
  clientSocket.close()
```

ServerUDP.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)
  sentence = sentence.decode("utf-8")
  file = open(sentence,"r")
  con = file.read(2048)
```


serverSocket.sendto(bytes(con,"utf-8"),
clientAddress)
print("\n\nSent content of:",end=' ')
print(sentence)
# for i in sentence:
#print(str(i),end="")
file.close()

Python 3.6.7 Shell

File Edit Shell Debug Options Window Help

```
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 (
4)] on win32
Type "help", "copyright", "credits" or "license()" for more informati
>>>
========== RESTART: D:\AUG_DEC 2021\CN\LAB\cycle 3\ServerUDP.py ==
The server is ready to receive

Sent contents of  ServerUDP.py
The server is ready to receive
```

Python 3.6.7 Shell

File Edit Shell Debug Options Window Help

```
Python 3.6.7 (v3.6.7:6ec5cf24b7, Oct 20 2018, 13:35:33) [MSC v.1900 64 bit (AMD6
4)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
========== RESTART: D:\AUG_DEC 2021\CN\LAB\cycle 3\ClientUDP.py ==========

Enter file name:  ServerUDP.py

Reply from Server:

from socket import *
serverPort = 12000
serverSocket = socket(AF_INET, SOCK_DGRAM)
serverSocket.bind(("127.0.0.1", serverPort))

while 1:
     print ("The server is ready to receive")
     sentence, clientAddress = serverSocket.recvfrom(2048)
     sentence = sentence.decode("utf-8")
     file=open(sentence,"r")
     l=file.read(2048)

     serverSocket.sendto(bytes(l,"utf-8"),clientAddress)

     print ('\nSent contents of ', end = ' ')
     print (sentence)
    #  for i in sentence:
        #  print (str(i), end = '')
     file.close()
```

Lab - 17

wireshark functionalities

wireshark is similar to tcpdump in networking.

TCPdump is a common packet analyzer which allows the user to display other packets and TCP/IP packets, being transmitted and received over a network attached to computer. ~~It has~~

It has a graphic end and some sorting & filtering functions.

wireshark users can see all traffic passing through the network.

wireshark can also monitor the unicast traffic which is not sent to network's MAC address interface.

It is multi-platform software, i.e it can run on Linux, Windows, OS X, Free BSD, Net BSD, etc.

It is a standard three ⓞ packet browser

It performs deep inspection of hundreds of protocols.

It performs live analysis

It makes the user view the data easily.