NAME: Aaryan Prakash

STD: 5 DIV: A ROLL NO.: CS006

SUBJECT: Computer Networks Lab

INDEX

SR. NO.	DATE	TITLE	PAGE NO.	TEACHER'S SIGN
1	14/08/2025	Lab 1: Theory	10	
2	21/08/25	Lab 2: Hub and Switch	10	
3	28/08/25	Lab 3: DHCP	10	
4	04/09/25	Lab 4: DNS	09	
5	11/09/25	Lab 5: Router (Static and Dynamic)	10	
6	09/10/25	Lab 6: TELNET	10	
7	16/10/25	Lab 7: RIP Routing Protocol	10	
8	16/10/25	: W-LAN	10	
9	16/10/25	: Address Resolution Protocol		
10	30/10/25	Lab 8: VLAN	10	20/10
11	06/11/25	Lab 9: OSPF	10	
12	13/11/25	Part B: Lab 10: Leaky Bucket Algorithm	10	
13	13/11/25	: CRC	10	
14	20/11/25	Lab 11: TCP	10	
		UDP	10	

14/02/2025 Lab 1

Repeater Repeats and amplifies the signal

Hub Takes i/p and broadcasts to all devices in the network to memory

Switch Takes i/p and transfers to only required device. It has memory. It will not read IP address but only MAC address. Only used within a network.

Bridge Connects 2 different networks that use same protocol

Gateway Connects 2 different networks using different protocols

Router Reads IP address

What is IP address? What are the components of IP address? What are the uses of IP address? What are the types of IP address? What are the formats of IP address?

→ An IP address is a unique numerical label assigned to each device connected to a network that uses internet protocol for communication. It serves 2 main purposes: identifying the host or network interface and providing the location of the device in the network.

→ An IP address is made up of 2 components: the network ID and the host ID. There are 2 main types of IP addresses: IPv4 and IPv6 which differ in format and length.

→ IP addresses can also be static or dynamic. They are essential for routing data between devices on local and global networks like the internet

What is subset mask? How is it used?

→ A subset mask is a 32-bit number used in IP networking to divide an IP address into network and host portions. It helps determine which part of the IP address refers to the network and which part refers to the host. It works by "masking" the IP address and separating the bits that represent the network from those that represent the host.

→ Subnet masks are essential for routing and efficient IP address allocation, as they help devices and routers understand if a destination IP is within the same local network or if the data must be sent outside through a gateway.

14/08/25

M T W T F S S

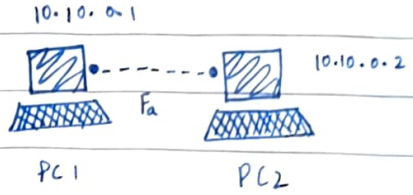
Page No.

Date

YOUVA

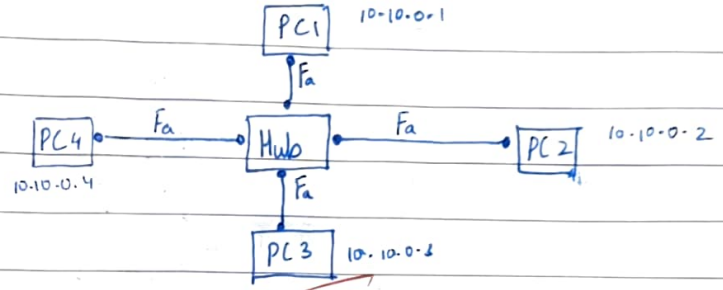
21/08/2025 Lab 2

Experiment 1



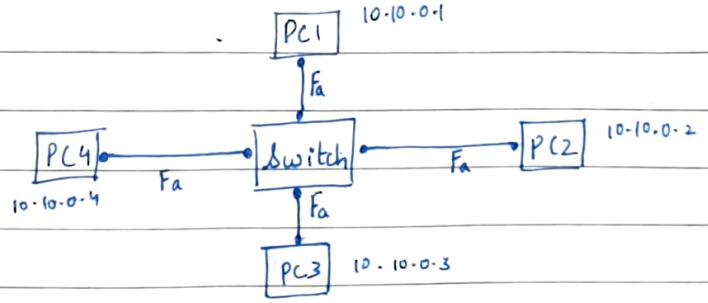
→ Select and place 2PCs - PC1 and PC2 on screen
→ Select generic connection and place b/w the 2 PCs
→ Set IP address for both PCs
→ Select PC1 as source of message and PC2 as destination and click auto capture/play
Result Successful

Experiment 2: Hub



→ Select and place one hub and 4 PCs
→ Connect hub to each PC using generic cable in a star topology.
→ Set IP addresses for all 4 PCs
→ Send message from PC3 to PC2
Result Successful

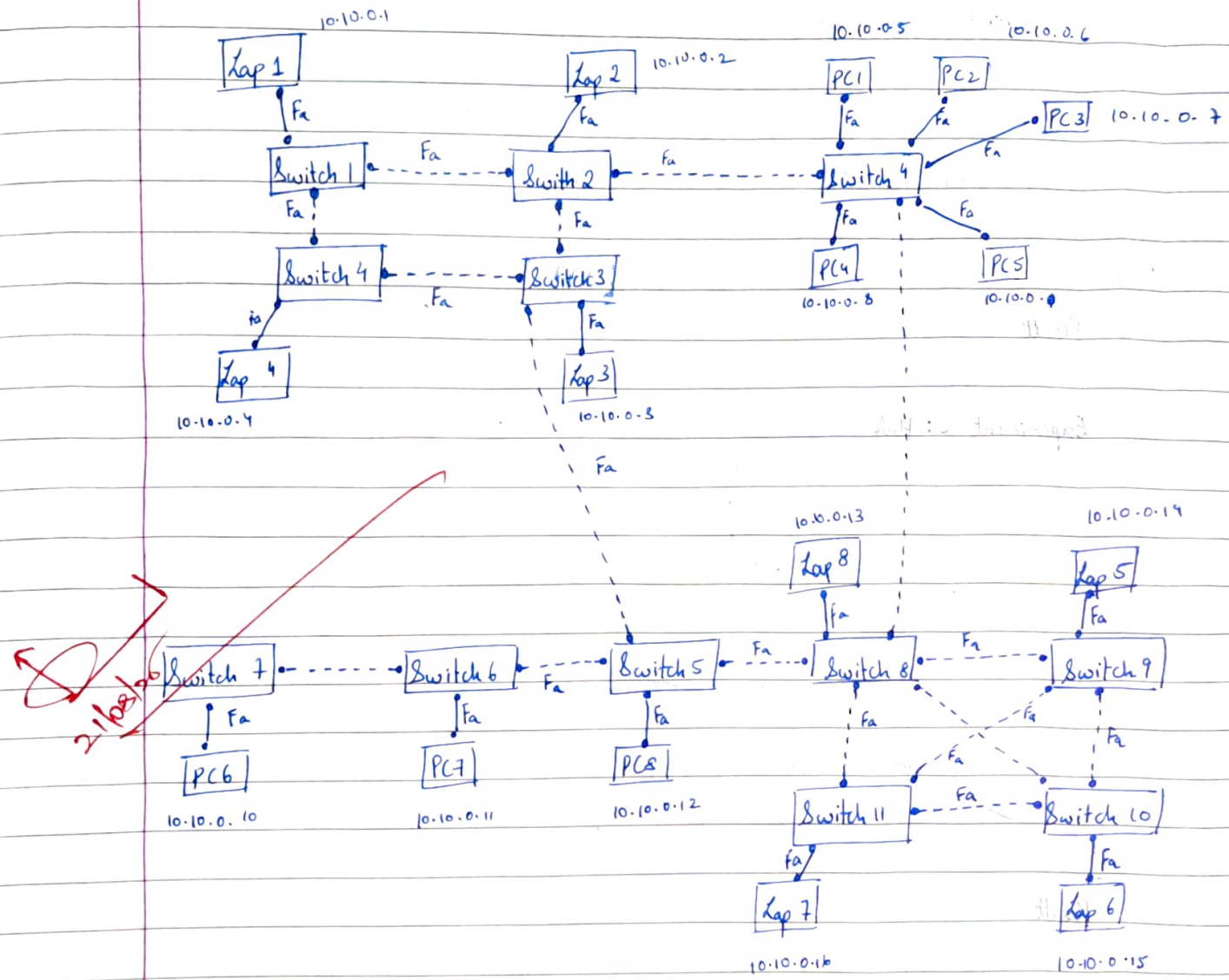
Experiment 2: Switch



→ Select and place 4PCs and one switch
→ Connect switch to each PC using generic cable

→ Set IP addresses for all 4 PCs
→ Send message from PC3 to PC2
Result Successful

Experiment 4



→ Place all end devices and switches
→ Connect using generic cables
→ Set IP addresses
→ Send message from Laptop 1 to PC3
Result Successful

M T W T F S S

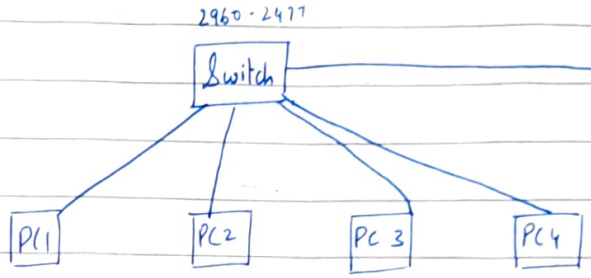
Page No.:

Date:

YOUVA

28/8/24 Experiment 5: Dynamic Host Control Protocol

Configure DHCP within a LAN and outside LAN



1 Click on Server → Services → DHCP →

2 Set start IP address : 10.10.20.11

Subnet mask: 255.255.255.0

Max no. of user: 12

→ Desktop → IP Config

IP address: 192.168.10.2

Gateway: 192.168.10.1

Start IP: 192.168.10.3

255.255.255.0

Max 10

3 Service ON

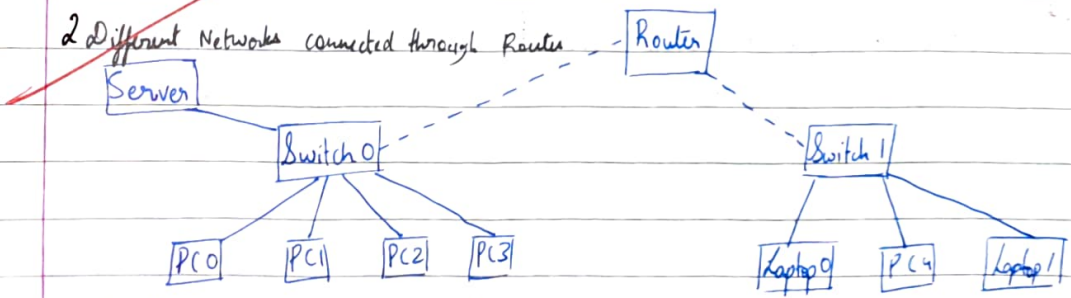
4 Interface → Fast Ethernet 0

Set IP configuration 10.10.20.10. Port Status ON

5 Configure all PCs wit IP address. Set IP configuration to DHCP

Result Successful

2 Different Networks connected through Router



→ Cable used for router: Copper cross over

Server

1 Click on IP configuration → IP address 192.168.10.2

2 Default gateway: 192.168.10.1

3 Click on Service → DHCP → Pool name: switch 1

Default gateway : 192.168.10.1

Start IP address: 192.168.10.3

Subnet mask : 255.255.255.0

Max no. of users: 20

4 Click on Service → DHCP → Pool Name: Switch 2

Default Gateway: 192.168.20.1

Start IP address: 192.168.20.5

Subnet Mask: 255.255.255.0

Maximum: 10

Router Configuration

1. Click CLI → continue with configuration? no
2. enter return
3. Router > Enable

   Router # conf t

   Router (config) #int fa 0/0

   Router (config-if) # ip address 192.168.10.1 255.255.255.0 (Not used Gateway address)

   Router (config-if) # ip helper-address 192.168.10.2 (DHCP Address Server)

   Router (config-if) # no shutdown

   do write memory

   Router (config-if) # exit

4. Configure IP config 1 → DHCP successful
   ↳ Desktop → IP Config → DHCP for all

#int fa0/0

#ip address 192.168.20.1 255.255.255.0

#ip helper 192.168.10.2

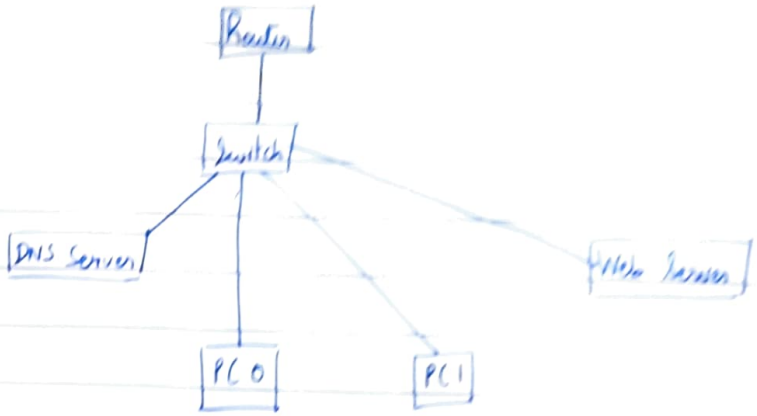
#no shutdown

#do write memory

#exit

09/09/25 Lab 4: DNS

Configure web server and DNS within a LAN



1 PC 0 → IP Address: 192.168.1.100 (device IP address)
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.1 (Router IP address)
DNS Server: 192.168.1.5 (Server IP address)

2 PC 1 → IP Address: 192.168.1.101
Default Gateway: 192.168.1.1
DNS Server: 192.168.1.5

3 Web Server → Service → HTTP → Turn on HTTP & HTTPS
→ Click on helloworld.html → edit text → add your own text
→ Desktop → IP config → IP address: 192.168.1.6
Default Gateway: 192.168.1.1
DNS Server: 192.168.1.5

4 DNS Server → Service → DNS → Name: "www.letslearn.com" → Type: A Record →
Address: 192.168.1.6 (web server IP)
→ IP Configuration: IP address: 192.168.1.5
Default Gateway: 192.168.1.1
DNS Server: 192.168.1.5 Turn on Server

5 PC0 → Command prompt → ping 192.168.1.5 and ping 192.168.1.6 :

→ Check if it is working

→ Web Browser → http://www.ldslearn.com

→ a html page should open

Output: Hello World! Welcome to CN Lab

Q. Configure IP addresses to router in packet tracer. Explore the following message
i Ping Mssage
ii Destination Unreachable
iii Request Timeout
iv Reply

i ping 192.168.1.5 // another PC IP

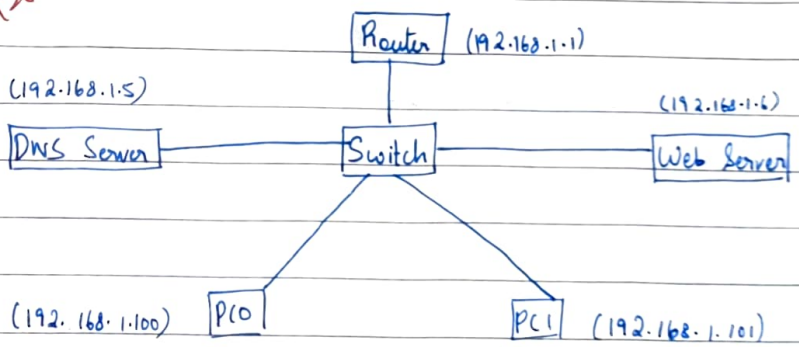
pinging 192.168.1.5 with 32 bytes of data:
Reply from 192.168.1.5 : bytes = 32 time = 1ms

iii ping 192.168.1.1 // router IP

pinging 192.168.1.1 with 32 bytes
Request time out

iv ping 192.168.1.5 # PC IP

pinging 192.168.1.5 with 32 bytes of data:
Reply from 192.168.1.5: bytes = 32 time = 6ms TTL = 128
Reply from 192.168.1.5: bytes = 32 time = 0ms TTL = 128



ii Destination host unreachable
→ Disconnect router from switch
Ping 192.168.1.1

Lab 5: Static and Dynamic Routing

Q. Configure default route, static route to the router

→ Add 3 routers (1841) and label it R_1, R_2, R_3

→ Add 3 switches

→ Add 3 PCs

Connect them all w wire

→ Router → Config →

→ Physical → Drag HWIC 2T into 2 blank slots and turn on power

↳ Serial Interface

→ PC1 → Desktop → Configure → IP: 192.168.10.10, default: 192.168.10.1

	IP	
PC2	192.168.[illegible].10	192.168.20.1
PC3	192.[illegible]	192.168.30.1

→ Connect R_1 to R_2 with Serial DCE wire (Se 0/0/0 port)

→ Router 1 → CLI

>no

>enable

conf t

int Se0/1/0

ip address 172.16.1.1 255.255.255.252 (address of opposite router)

no shutdown

exit

interface fa0/0

ip address 192.168.10.1 255.255.255.0

no shutdown

do write memory

→ Router 2 -> CLI

: no

> enable

conf t

hostname R2

→ Set up IP address for 3 PCs

	PC0	PC1	PC2
IP	192.168.10.10	192.168.20.10	192.168.30.10
DG	192.168.10.1	192.168.20.1	192.168.30.1

→ Click on router 1

> enable

conf t

hostname R1

ip route 192.168.20.0 255.255.255.0 172.16.1.2 (next pol for router2)

ip route 172.162.0 255.255.255.252 172.16.1.2 (can be whatever ip range)

ip route 172.168.30.0 255.255.255.0 172.16.1.2

ip route 0.0.0.0 0.0.0.0 Se0/1/0

^Z

wr

→ Click on router 2

> enable

conf t

ip route 192.168.10.0 255.255.255.0 172.16.1.1

ip route 192.168.30.0 255.255.255.0 172.16.6.2

^Z

wr

→ Router 3

> enable

conf t

ip route 192.168.10.0 255.255.255.0 172.16.2.1

ip route 192.168.20.0 255.255.255.0 172.16.2.1

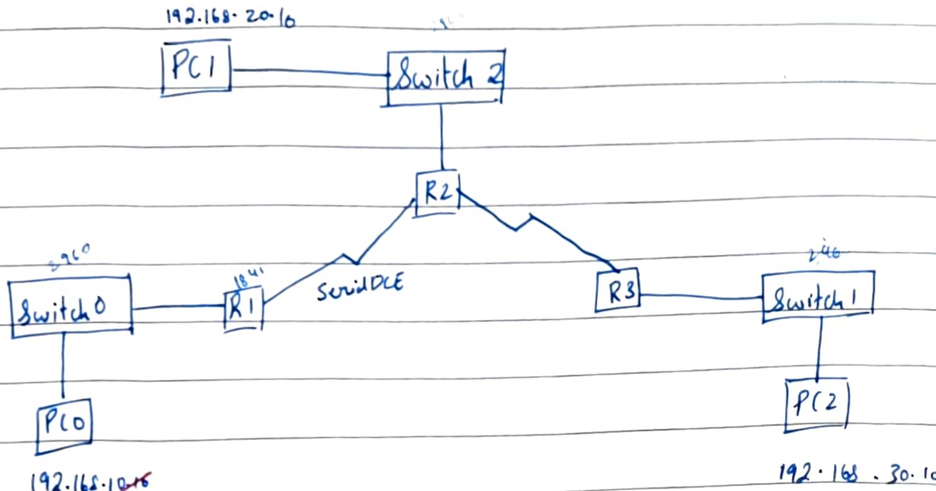
ip route 0.0.0.0 0.0.0.0 Se 0/1/0

ctrl Z

M	T	W	T	F	S	S

Page No.:
Date:
YOUVA

→ Send PC from PC0 to PC1
Result: Succesful



11/09/25

09/00/25 Lab 6: TELNET

Q. Configure TELNET to access ~~server~~ router remotely.

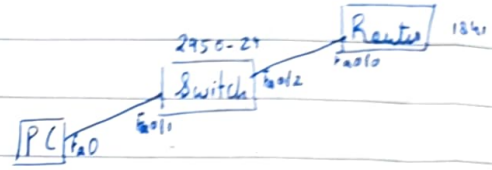
→ TELNET is used to access remote server/router and it is a simple command line tool that runs on your computer and it allows you to send commands remotely through a server & administration

→ It is also used to manage other devices like router, switch and also to check if the ports are open or closed.

1 Set up PC

→ Gateway: IP of router : 192.168.1.1

IP Add: 192.168.1.2



→ Router > CLI > no ↵ ma ↵ #

>enable

conf t

hostname r1

enable secret rp

int Fa0/0

ip address 192.168.1.1 255.255.255.0

no shutdown ↵ ↵

line vty 0 5

login ~~password~~ tp

password tp

exit

exit

wr

show ip interface brief

PC > Command Prompt

>ping 192.168.1.1

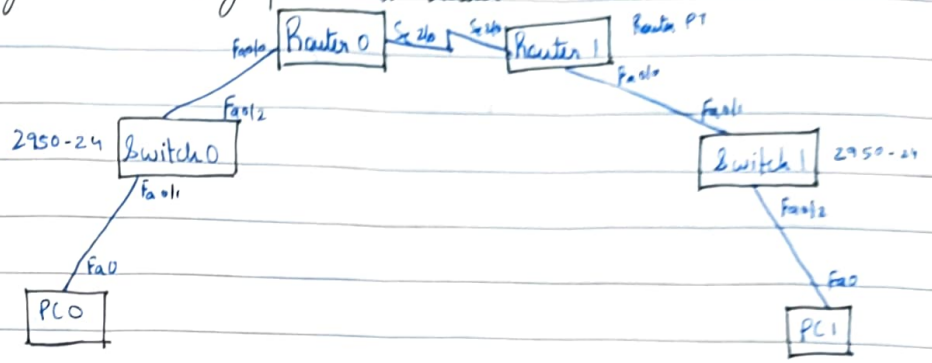
※ > telnet 192.168.1.1
Password: tp

r1> enable
Password: rp
r1 # conf t
int Fa0/1
ip add 192.168.1.4 255.255.255.0
show ip interface brief
do show ip interface brief

Observation Routers can be modified using telnet through the PCs

16/10/25 Lab 7: RIP Routing Protocol

Configure RIP routing protocol in router



→ Router → Physical → Add 1SS to an empty slot 3 for both routers

→ PC 0 : IP Config →

IP Address : 192.168.1.2

Default Gateway : 192.168.1.1

→ PC 1 : IP Config

IP Address : 192.168.2.2

Default Gateway : 192.168.2.1

→ Router 0 → Config → Fa 0/0

IP Address : 192.168.1.1

Port Status → ✓

→ Router 1 → Config

IP : 192.168.1.1

Port Status → ✓

→ Router 0 → Config → Interface Se 2/0

Clock Rate → 64000

IP Address → 10.10.0.2

Port Status → ON

Router 1 :

→ 64000

→ 10.10.0.3

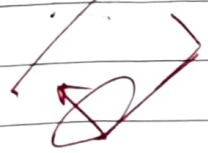
→ ON

→ For RIP

Router 0 → Config → Routing → RIP	Router 1
Network → 192.168.1.0 → Add	→ 192.168.2.0 } Add
10.10.0.0 → Add	→ 10.0.0.0
Settings → NVRAM → Save	⇒ "

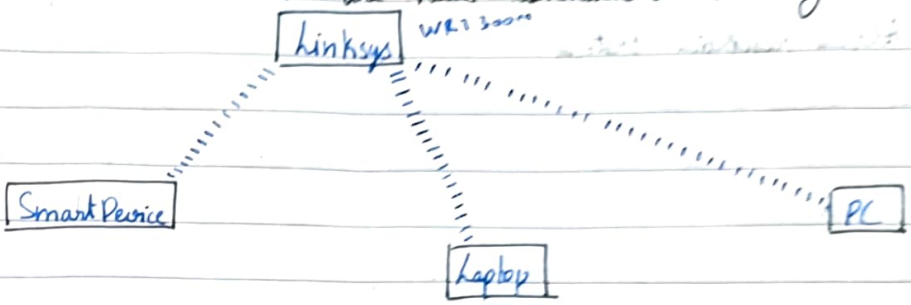
Send message from PC0 to PC1

Output: Successful



16/10/2015 Lab 7: W-LAN

Construct a W-LAN and make the nodes communicate wirelessly



→ Click on laptop → turn it off → remove ethernet → add LINKSYS → WPC 300N

→ PC → " → " → "

→ Wireless Router → GUI

→ Config → Wireless → SSID → BMSCE

→ Authentication → WPA2-PSK bmsce 12345

→ Smartphone → Config → Wireless → SSID → BMSCE } same for laptop and PC

WPA2-PSK Passphrase bmsce12345

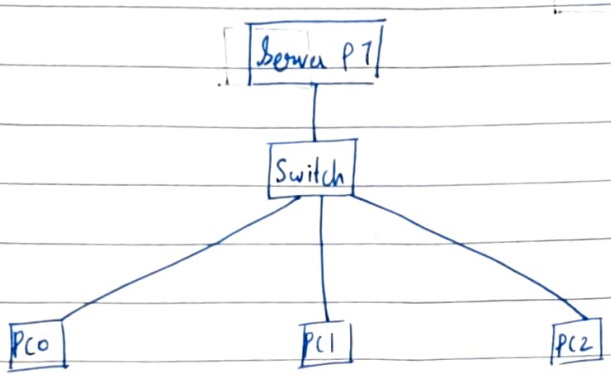
M T W T F S S
Page No.:
Date:
YOUVA

16/10/25 Lab 7: Address Resolution Protocol

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

→ ARP is used to map an IP address to a MAC address

→ ARP is used to get data link layer address, MAC address with the help of IP address



→ PC0 → IP Config → IP: 192.168.11.1
192.168.11.2
192.168.11.3
19.168.11.4
} PC0, PC1, PC2
} Server

→ Magnifying Glass → Click on PC0
Server
} ARP Table

→ PC0 → Desktop → Command Prompt

> ping 192.168.11.4

> arp -a

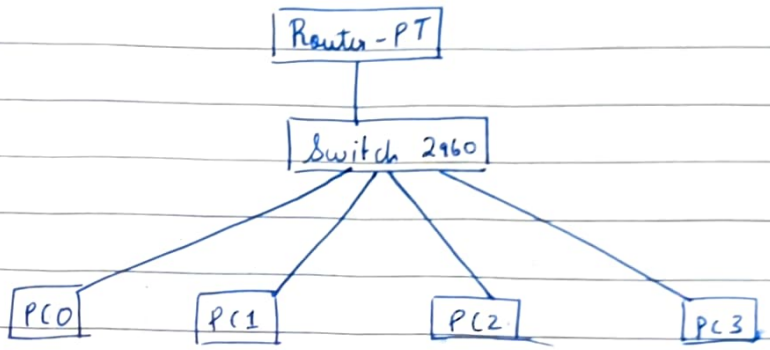
30/10/25 Lab 8: VLAN

Q. To construct VLAN and make PCs communicate among VLAN

→ Take 4 generic PCs, Switch 2960 and connect with copper straight-through

→ Take generic router-PT

→ All connections are for through Fast Ethernet



→ Router > Config > Fast Ethernet 0/0 > IP Address = 10.0.0.1
Turn it on

→ PC0 > Config > Gateway = 10.0.0.1
> Fast Ethernet > IP Address = 10.0.0.2

→ PC1 > Config > Gateway = 10.0.0.1
> Fasth Ethernet > IP Address = 10.0.0.3

→ ~~PC2 → IP: 10.0.0.4~~
~~PC3 → IP: 10.0.0.5~~

→ PC2 > Config > Gateway = 20.0.0.1
PC2 > Config > Fast Ethernet > IP Address = 20.0.0.3

→ PC3 > Config > Gateway = 20.0.0.1
PC3 > Config > Fast Ethernet > IP: 20.0.0.2

→ Switch > VLAN Database > VLAN Number : 2 } Add
VLAN Name: vlan

→ Check ~~same~~ port label going from router to switch
Switch > ~~Router~~ Fast Ethernet 0/5 > Access → Trunk
(Under VLAN drop down)

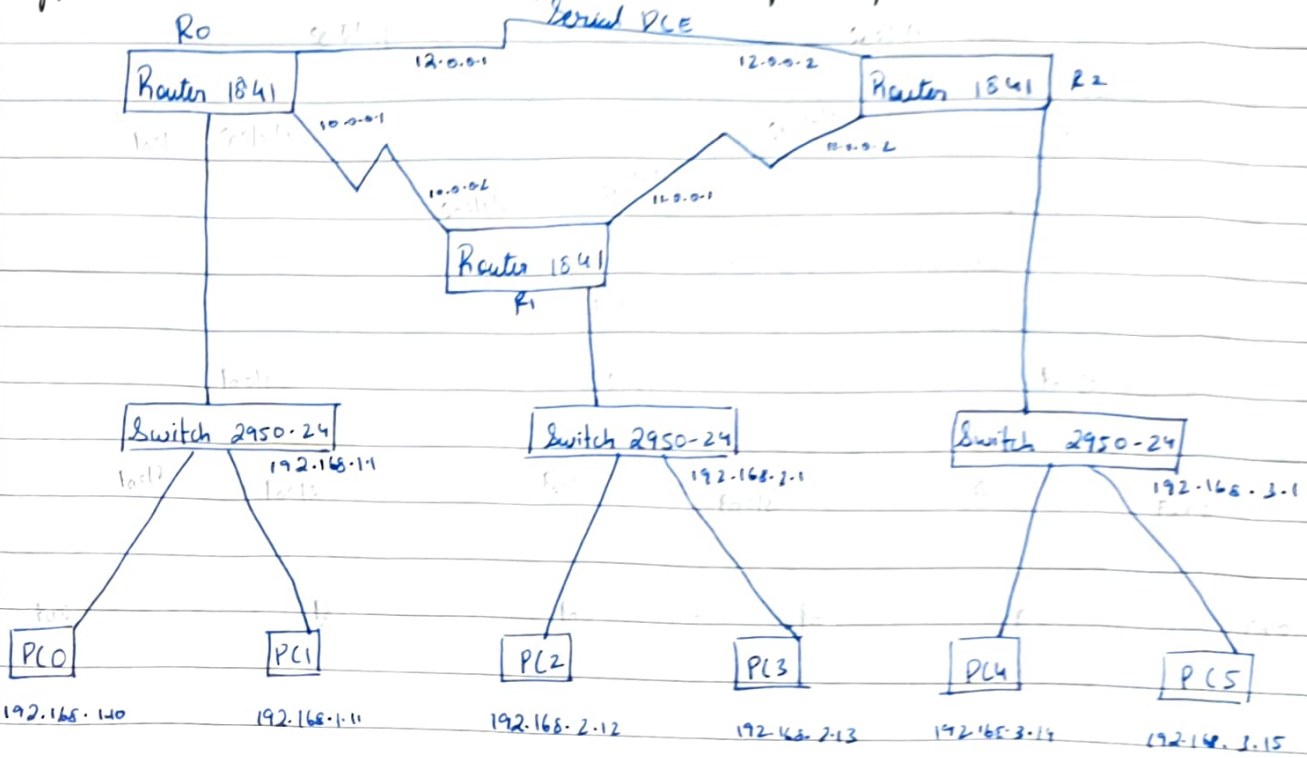
→ Switch > config > Fast Ethernet 0/5 > 2: vlan
Fast Ethernet 0/4 > 2: vlan

→ Router > CLI > Enable
Router (config-if) # config t
interface FastEthernet 0/0
ip address 10.0.0.1 255.0.0.0
no shutdown
exit
interface Fa 0/0.1
↵
encapsulation dot1q 2 (vlan number)
ip address 20.0.0.1 255.0.0.0
no shutdown
exit

30/10/2025

06/11/25 Lab 9: OSPF

Configure OSPF and demonstrate how packets is transferred from node A to node B.



→ IP Config

PC0 : 192.168.1.10 } Default gateway: 192.168.1.1
PC1 : 192.168.1.11

PC2 : 192.168.2.12 } Default gateway: 192.168.2.1
PC3 : 192.168.2.13

PC4 : 192.168.3.14 } Default gateway: 192.168.3.1
PC5 : 192.168.3.15

HWIC 2T in each router

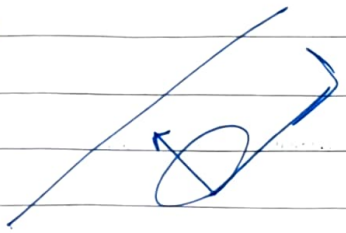
→ For router 0, 1 and 2, do the following by changing port and IP address:

```
no ↵
enable
conf t
hostname R0
```

int Fa0/0
ip add 192.168.1.1 255.255.255.0
no shutdown
↵
exit

int Se0/0/0
ip add 10.0.0.1 255.0.0.0
clock rate 64000
no shutdown
exit

int Se 0/0/1
ip add 12.0.0.1 255.0.0.0
clock rate 64000
no shutdown
exit



router ospf 1
network 192.168.1.0 0.0.0.255 area 0
network 10.0.0.0 0.255.255.255 area 0
network 12.0.0.0 0.255.255 area 0
exit
exit

} network routes (local)

→ Router 1 ospf
router ospf 1
network 192.168.2.0 0.0.0.255 area 0
network 10.0.0.0 0.255.255.255 area 0
network 11.0.0.0 0.255.255.255 area 0
exit
exit

13/11/2025 Part B: Lab 10: Leaky Bucket Algorithm

Write a program for congestion control using leaky bucket algorithm

```
func leaky_bucket()
    input bucket_size, output_rate, incoming_packets[n]
    SET bucket_content <- 0
    FOR time <- 1 to n DO
        PRINT Time, Incoming Packets
        bucket_content <- bucket_content + incoming_packets[time]
        IF bucket_content > bucket_size then
            dropped <- bucket_content - bucket_size
            bucket_content <- bucket_size
        ELSE
            dropped <- 0

        sent <- MIN(bucket_content, output_rate
        bucket_content <- bucket_content - sent
        PRINT Sent, dropped, bucket_content

    while bucket_content > 0
        Print Draining Remaining Packets
        Sent <- MIN(bucket_content, output_rate)
        bucket_content <- bucket_content - Sent
        print Sent, bucket_content
```

Bucket Size = 0, Output Rate = 1, No of Packets = 5

Incoming Packet Size	Dropped	Data pre leak	Data after leak
6	0	6	5
4	0	9	8
8	6	10	9
1	0	10	10
0	0	9	8

8 leaking remaining, all packets processed.

13/11/2025 CRC

Q WAP for error detecting code using CRC CCITT (16 bits) fun CRC()

input message-bits
Set generator ← 0x1021
Set crc ← 0xFFFF

Append 16 0s to message bits
crc ← crc XOR (bit << 15)
for i ← 1 to 1 do
if (crc & 0x8000) ≠ 0
crc ← (crc << 1) XOR gen
else
crc ← crc << 1
crc ← crc and 0xFFFF

Output crc

Append crc to original message bits
if crc-ccitt(transmitted-frame) == 0
print "No Error Detected"
else
print "Error Detected"

→ Output
Enter data bits: 101101
Enter generator bits: 1101

CRC bits: 010
Transmitted Data (Data + CRC) = 101101010
No error detected. Data received correctly

20/11/2025 **Lab 11: TCP**

Server.java

```
import java.net.*;
import java.io.*;
public class Server{
    public static void main(String[] args) throws Exception{
        ServerSocket sersock = new ServerSocket(4000);
        System.out.println("Server Ready for Connection");
        Socket sock = sersock.accept();
        System.out.println("Connection Succesful. Waiting for Chatting");
        InputStream istream = sock.getInputStream();
        BufferedReader fileread = new BufferedReader(new InputStreamReader(istream));
        String fname = fileread.readLine();
        BufferedReader contentread = new BufferedReader(new FileReader(fname));
        OutputStream ostream = sock.getOutputStream();
        PrintWriter pw = new PrintWriter(ostream, true);
        String str;
        while((str = contentread.readLine())!=null){
            pw.println(str);
        }
        sock.close();
        pw.close();
        fileread.close();
        contentread.close();
    }
}
```

txtfile.txt

hi hello

Client.java

```
import java.net.*;
import java.io.*;

public class Client {
    public static void main(String[] args) throws Exception {
        Socket Sock = new Socket("127.0.0.1", 4000);
        System.out.println("Enter File Name:");
        BufferedReader keyRead = new BufferedReader(new InputStreamReader(
        System.in));
        String fname = keyRead.readLine();
        OutputStream ostream = Sock.getOutputStream();
        PrintWriter pw = new PrintWriter(ostream, true);
        pw.println(fname);
        InputStream stream = Sock.getInputStream();
        BufferedReader SocketRead = new BufferedReader(new InputStreamReader
        (stream));
        String str;
        while((str = SocketRead.readLine()) != null)
            System.out.println(str);
        pw.close();
        SocketRead.close();
        keyRead.close();
    }
}
```

Output

→ javac Server.java
java Server
Server Ready for Connection. Ready for Chatting

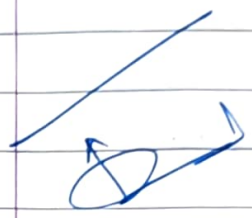
→ javac Client.java

java Client

enter file name:

txtfile.txt

hi hello.



M T W T F S S

Page No.:

Date:

YOUVA

20/11/2025 UDP

DSender.java

```
import java.net.*;
impat java.util.Scanner;
pubtic class DSender{
    public static void main (string[] args) throws Exception{
        System.out.println ("Sender ");
        DatagramSocket ds = new DatagramSocket ();
        Scanner scanner =new Scanner ( system.in);
        System.out.println ("\n Enter the Message:");
        while (true) {
            String msg = scanner.nextline();
            InetAddress ip = InetAddress.getByName ("127.0.0.1");
            DatagramPacket dp= new DatagramPacket (msg.getBytes (), msg.
            length(), ip, 3000);
            ds.send(dp);
        }
    }
}
```

DReciever.java

```
impat java.net.*;
public class DReciever{
    public static void main (String () args ) throws Exception{
        byte[] buf =new byte [1024];
        System.out.println ("Reciever ");
        DatagramSocket ds= new DatagramSocket (buf, 1024);
        ds.recieve (dp);
        String msg = new String (dp.getData (), 0, dp.getLength ());
        System.out.println(msg);
    }
}
```

Output

→ javac DSender.java

java DSender

Sender

Enter Message:

hi my name is jon

→ javac DReciever.java

java DReciever

Reciver

hi my name is jon