LAB MANUAL

for

Computer Network Lab

Jorhat Engineering College

Department of Computer Science and engineering

Subject Code: CSE181612

Class: VI Semester(CSE) B.Tech.

JORHAT : 785007, ASSAMVision of the Department

Vision of the Department:

To become a prominent department of Computer Science and Engineering for producing quality human resources to meet the needs of the industry and society

Mission of the Department

1: To impart quality education through well-designed curriculum and academic facilities to meet the computing needs of the industry and society

2: To inculcate the spirit of creativity, team work, innovation, entrepreneurship and professional ethics among the students

3: To facilitate effective interactions to foster networking with alumni, industries, institutions of learning and research and other stake-holders

4: To promote research and continuous learning in the field of Computer Science and Engineering

OBJECTIVE: This course provides students with hands on training regarding the design, troubleshooting, modeling and evaluation of computer networks. In this course, students are going to experiment in a real test-bed networking environment, and learn about network design and troubleshooting topics and tools such as: network addressing, Address Resolution Protocol (ARP), basic troubleshooting tools (e.g. ping, ICMP), IP routing (e,g, RIP), route discovery (e.g. traceroute), TCP and UDP, IP fragmentation and many others. Student will also be introduced to the network modeling and simulation, and they will have the opportunity to build some simple networking models using the tool and perform simulations that will help them evaluate their design approaches and expected network performance .

Program Outcomes

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal,health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1 Gain ability to employ modern computer languages, environments and platforms in creating innovative career paths .

PSO2 Achieve an ability to implement, test and maintain computer based system that fulfils the desired needs.

S.No	Experiment
1	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
2	Study of Network Devices in Detail.
3	Study of network IP.
4	Connect the computers in Local Area Network.
5	Study of basic network command and Network configuration commands.
6	Configure a Network topology using packet tracer software.
7	Configure a Network topology using packet tracer software.
8	Configure a Network using Distance Vector Routing protocol.
9	Configure Network using Link State Vector Routing protocol.
10	Socket Programming for Sending Data from one node to another node.

<p style="text-align: center;">**EXPERIMENT-1**</p>

Aim: Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.

Apparatus (Components): RJ-45 connector, Climping Tool, Twisted pair Cable
Procedure: To do these practical following steps should be done:

1. Start by stripping off about 2 inches of the plastic jacket off the end of the cable. Be very careful at this point, as to not nick or cut into the wires, which are inside. Doing so could alter the characteristics of your cable, or even worse render is useless. Check the wires, **one more time** for nicks or cuts. If there are any, just whack the whole end off, and start over.

2. Spread the wires apart, but be sure to hold onto the base of the jacket with your other hand. You do not want the wires to become untwisted down inside the jacket. Category 5 cable must only have 1/2 of an inch of 'untwisted' wire at the end; otherwise it will be 'out of spec'. At this point, you obviously have ALOT more than 1/2 of an inch of un-twisted wire.

3. You have 2 end jacks, which must be installed on your cable. If you are using a pre-made cable, with one of the ends whacked off, you only have one end to install - the crossed over end. Below are two diagrams, which show how you need to arrange the cables for each type of cable end. Decide at this point which end you are making and examine the associated picture below.
Diagram shows you how to prepare Cross wired connection

RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Orange		1	White/Green	
2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

Diagram shows you how to prepare straight through wired connection

RJ45 Pin # (END 1)	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Wire Color	Diagram End #2
1	White/Orange		1	White/Green	
2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

Aim: Study of following Network Devices in Detail
- Repeater
- Hub
- Switch
- Bridge
- Router
- Gate Way

Apparatus (Software): No software or hardware needed.

Procedure: Following should be done to understand this practical.

1. **Repeater:**Functioning at Physical Layer.A **repeater** is an electronic device that receives a signal and retransmits it at a higher level and/or higher power, or onto the other side of an obstruction, so that the signal can cover longer distances. Repeater have two ports ,so cannot be use to connect for more than two devices

Hub: An **Ethernet hub**, **active hub**, **network hub**, **repeater hub**, **hub** or **concentrator** is a device for connecting multiple twisted pair or fiber optic Ethernet devices together and making them act as a single network segment. Hubs work at the physical layer (layer 1) of the OSI model. The device is a form of multiport repeater. Repeater hubs also participate in collision detection, forwarding a jam signal to all ports if it detects a collision.

2. **Switch:**A **network switch** or **switching hub** is a computer networking device that connects network segments.The term commonly refers to a network bridge that processes and routes data at the data link layer (layer 2) of the OSI model. Switches that additionally process data at the network layer (layer 3 and above) are often referred to as Layer 3 switches or multilayer switches.

3. **Bridge:** A **network bridge** connects multiple network segments at the data link layer (Layer 2) of the OSI model. In Ethernet networks, the term *bridge* formally means a device that behaves according to the IEEE 802.1D standard. A bridge and switch are very much alike; a switch being a bridge with numerous ports. *Switch* or *Layer 2 switch* is often used interchangeably with *bridge*.Bridges can analyze incoming data packets to determine if the bridge is able to send the given packet to another segment of the network.

4. **Router:** A **router** is an electronic device that interconnects two or more computer networks, and selectively interchanges packets of data between them. Each data packet contains address information that a router can use to determine if the source and destination are on the same network, or if the data packet must be transferred from one network to another. Where multiple routers are used in a large collection of interconnected networks, the routers exchange information about target system addresses, so that each router can build up a table showing the preferred paths between any two systems on the interconnected networks.

5. **Gate Way:** In a communications network, a network node equipped for interfacing with

another network that uses different protocols.

- A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires the establishment of mutually acceptable administrative procedures between both networks.
- A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions.

EXPERIMENT- 3

Aim: Study of network IP

- Classification of IP address
- Sub netting
- Super netting

Apparatus (Software): NA

Procedure: Following is required to be study under this practical.
- Classification of IP address

As show in figure we teach how the ip addresses are classified and when they are used.

Class	Address Range	Supports
Class A	1.0.0.1 to 126.255.255.254	Supports 16 million hosts on each of 127 networks.
Class B	128.1.0.1 to 191.255.255.254	Supports 65,000 hosts on each of 16,000 networks.
Class C	192.0.1.1 to 223.255.254.254	Supports 254 hosts on each of 2 million networks.
Class D	224.0.0.0 to 239.255.255.255	Reserved for multicast groups.
Class E	240.0.0.0 to 254.255.255.254	Reserved.

- Sub netting

Why we Develop sub netting and How to calculate subnet mask and how to identify subnet address.

- Super netting

Why we develop super netting and How to calculate supernet mask and how to identify supernet address.

<center>**EXPERIMENT-4**</center>

Aim: Connect the computers in Local Area Network.

Procedure: On the host computer

On the host computer, follow these steps to share the Internet connection:

1. Log on to the host computer as Administrator or as Owner.
2. Click **Start**, and then click **Control Panel**.
Click **Network and Internet Connections**.
3. Click **Network Connections**.
4.   Right-click the connection that you use to connect to the Internet. For example, if you connect to the Internet by using a modem, right-click the connection that you want under Dial-up / other network available.
5. Click **Properties**.
6. Click the **Advanced** tab.

7.   Under **Internet Connection Sharing**, select the **Allow other network users to connect through this computer's Internet connection** check box.

8.   If you are sharing a dial-up Internet connection, select the **Establish a dial-up connection whenever a computer on my network attempts to access the Internet** check box if you want to permit your computer to automatically connect to the Internet.

9.   Click **OK**. You receive the following message:

When Internet Connection Sharing is enabled, your LAN adapter will be set to use IP address 192.168.0.1. Your computer may lose connectivity with other computers on your network. If these other computers have static IP addresses, it is a good idea to set them to obtain their IP addresses automatically. Are you sure you want to enable Internet Connection Sharing?

10. Click **Yes**.
The connection to the Internet is shared to other computers on the local area network (LAN).

The network adapter that is connected to the LAN is configured with a static IP address of 192.168.0.1 and a subnet mask of 255.255.255.0

On the client computer

To connect to the Internet by using the shared connection, you must confirm the LAN adapter IP configuration, and then configure the client computer. To confirm the LAN adapter IP configuration, follow these steps:

1. Log on to the client computer as Administrator or as Owner.
2. Click **Start**, and then click **Control Panel**.Click Network and Internet Connections.
3. Click **Network Connections**.
4. Right-click **Local Area Connection** and then click **Properties**.
5. Click the **General** tab, click **Internet Protocol (TCP/IP)** in the **connection uses the following items** list, and then click **Properties**.

6. In the **Internet Protocol (TCP/IP) Properties** dialog box, click **Obtain an IP address automatically** (if it is not already selected), and then click **OK**.

Note: You can also assign a unique static IP address in the range of 192.168.0.2 to 192.168.0.254. For example, you can assign the following static IP address, subnet mask, and default gateway:

8. IP Address 192.168.31.202
9. Subnet mask 255.255.255.0
10. Default gateway 192.168.31.1

11. In the **Local Area Connection Properties** dialog box, click **OK**.

12. Quit Control Panel.

EXPERIMENT- 5

Aim: Study of basic network command and Network configuration commands.

Apparatus (Software): Command Prompt And Packet Tracer.

Procedure: To do this EXPERIMENT- follows these steps:

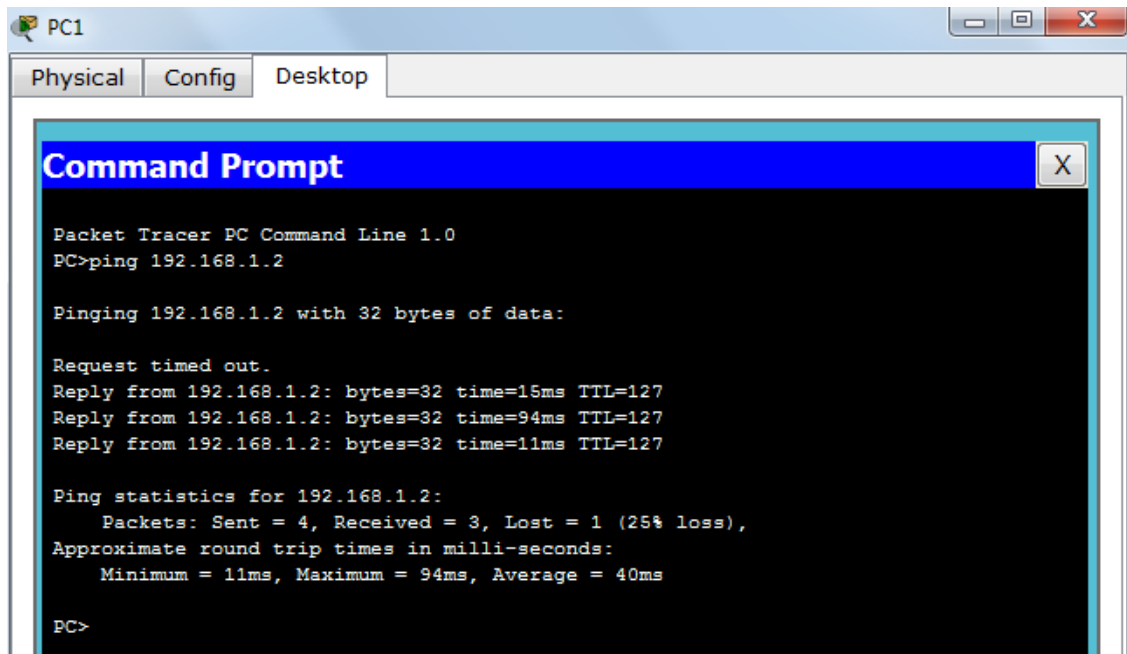In this EXPERIMENT- students have to understand basic networking commands e.g ping, tracert etc.

All commands related to Network configuration which includes how to switch to privilege mode and normal mode and how to configure router interface and how to save this configuration to flash memory or permanent memory.

This commands includes

- Configuring the Router commands
- General Commands to configure network
- Privileged Mode commands of a router
- Router Processes & Statistics
- IP Commands
- Other IP Commands e.g. show ip route etc.

ping:

ping(8) sends an ICMP ECHO_REQUEST packet to the specified host. If the host responds, you get an ICMP packet back. Sound strange? Well, you can "ping" an IP address to see if a machine is alive. If there is no response, you know something is wrong.

Traceroute:

 Tracert is a command which can show you the path a packet of information takes from your computer to one you specify. It will list all the routers it passes through until it reaches its destination, or fails to and is discarded. In addition to this, it will tell you how long each 'hop' from router to router takes.
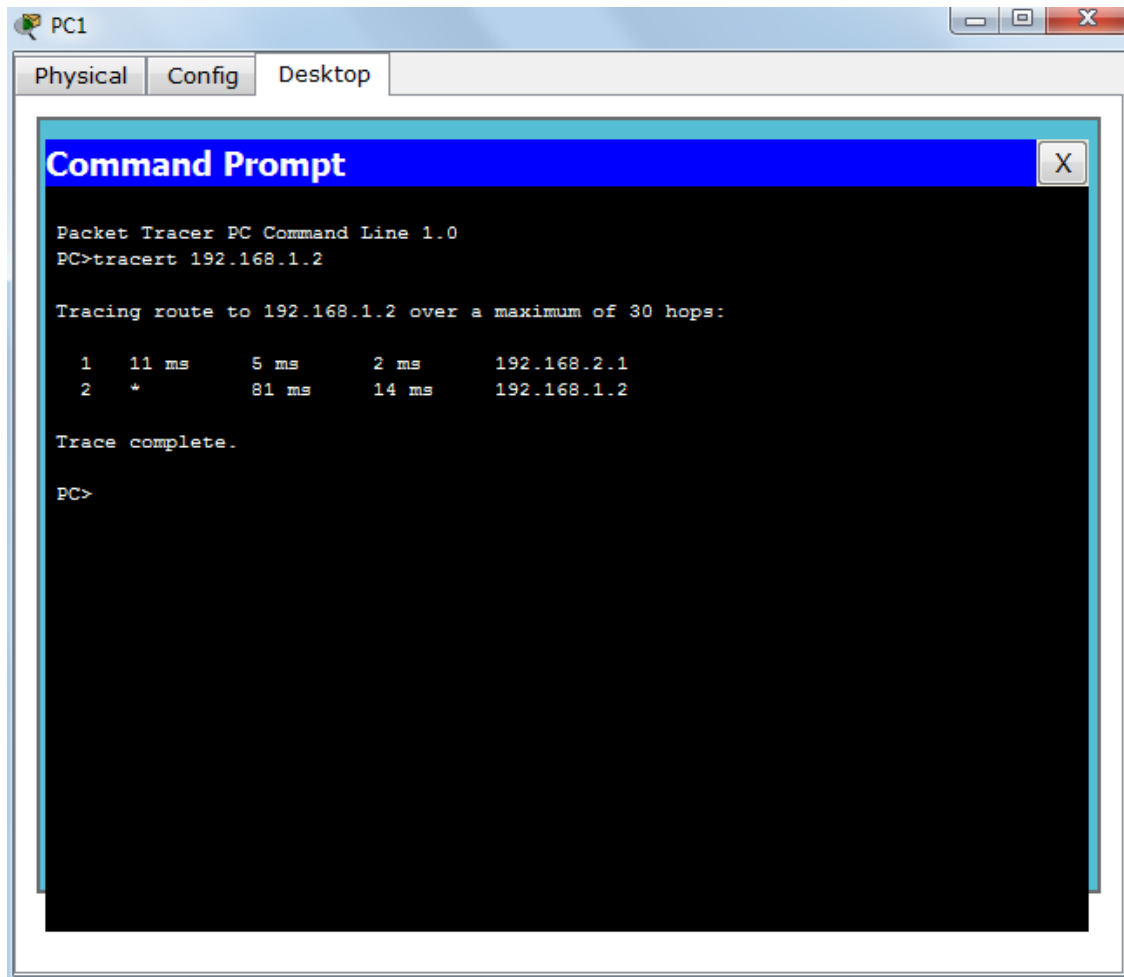
nslookup:

Displays information from Domain Name System (DNS) name servers.

NOTE :If you write the command as above it shows as default your pc's server name firstly.

pathping:

A better version of tracert that gives you statics about packet lost and latency.

Getting Help

In any command mode, you can get a list of available commands by entering a question mark

(?). Router>**?**

To obtain a list of commands that begin with a particular character sequence, type in
those haracters followed immediately by the question mark (?).

Router#**co?**

configure connect copy
To list keywords or arguments, enter a question mark in place of a keyword or argument.
Include a space before the question mark.

Router#**configure ?**

memory Configure from NV memory
network Configure from a TFTP network
host terminal Configure from the terminal
You can also abbreviate commands and keywords by entering just enough characters to make
the command unique from other commands. For example, you can abbreviate the **show**
command to **sh**.

Configuration Files

Any time you make changes to the router configuration, you must save the changes to memory
because if you do not they will be lost if there is a system reload or power outage. There are two
types of configuration files: the running (current operating) configuration and the startup
configuration.
Use the following privileged mode commands to work with configuration files.

- **configure terminal** – modify the running configuration manually from the terminal.

- **show running-config** – display the running configuration.

- **show startup-config** – display the startup configuration.

- **copy running-config startup-config** – copy the running configuration to the startup configuration.

- **copy startup-config running-config** – copy the startup configuration to the running configuration.

- **erase startup-config** – erase the startup-configuration in NVRAM.

- **copy tftp running-config** – load a configuration file stored on a Trivial File Transfer Protocol (TFTP) server into the running configuration.

- **copy running-config tftp** – store the running configuration on a TFTP server.

IP Address Configuration

Take the following steps to configure the IP address of an interface. Step 1: Enter privileged EXEC mode:

Router>**enable** password

Step 2: Enter the **configure terminal** command to enter global configuration mode.

Router#**config terminal**

Step 3: Enter the **interface** type slot/port (for Cisco 7000 series) or **interface** type port (for Cisco 2500 series) to enter the interface configuration mode.

Example:
Router (config)#**interface ethernet 0/1**
Step 4: Enter the IP address and subnet mask of the interface using the **ip address** ipaddress subnetmask command.

Example,
Router (config-if)#**ip address 192.168.10.1 255.255.255.0**

Step 5: Exit the configuration mode by pressing Ctrl-
Z Router(config-if)#**[Ctrl-Z]**

<center>**EXPERIMENT-6**</center>

Aim: Configure a Network topology using packet tracer software.

Apparatus (Software): Packet tracer Software

Procedure: To implement this practical following network topology is required to be configured using the commands learned in previous practical.

After configuring the given network a packet should be ping from any one machine to another.
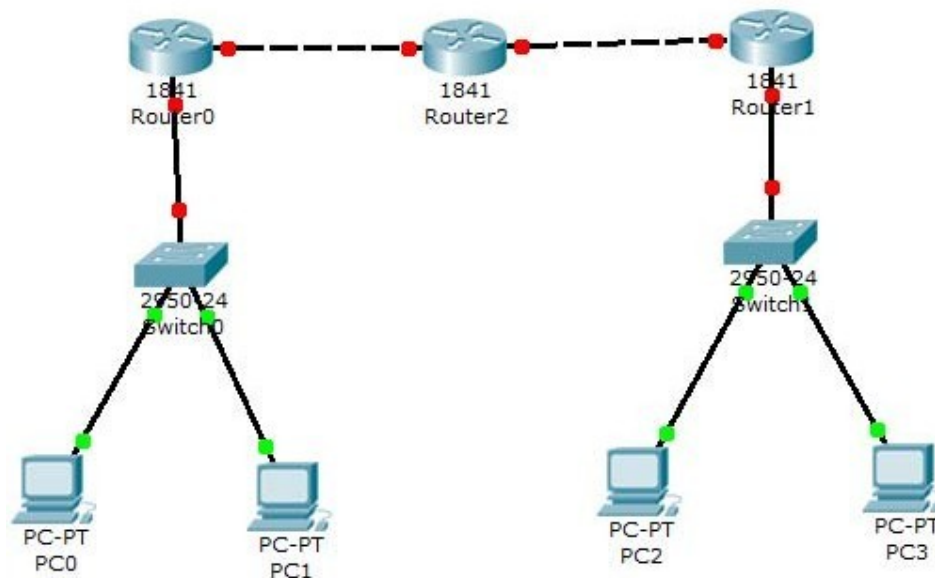
Router0 Configuration Command :.........

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

Press RETURN to get

started! Router>

Router>Enabl

e

Router#config

t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname router0

router0(config)#interface fastethernet 0/0

router0(config-if)#ip address 192.168.1.1

255.255.255.0 router0(config-if)#description router0

fastethernet 0/0 router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state

to up router0(config-if)#exit

router0(config)#interface fastethernet 0/1

router0(config-if)#description router0 fastethernet

0/1 router0(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state

to up router0(config-if)#exit

router0(config)#exit

%SYS-5-CONFIG_I: Configured from console by console

router0#show running-config

Building configuration...

Current configuration : 437 bytes!

version 12.4

no service password-encryption

!

hostname router0

!

!

!

!

!

ip ssh version 1

!

!

interface FastEthernet0/0

 description router0 fastethernet

 0/0

 ip address 192.168.1.1 255.255.255.0

```
 duplex auto

 speed auto

!

interface FastEthernet0/1

 description router0 fastethernet

 0/1 no ip address

 duplex auto

 speed auto

!

interface

 Vlan1 no ip

 address

shutdown


!

ip classless

!

!

!

!

!

line con 0
```

line vty 0

 4 login

!

!

end

router0#

router0#

router0#copy running-config startup-

config Destination filename [startup-
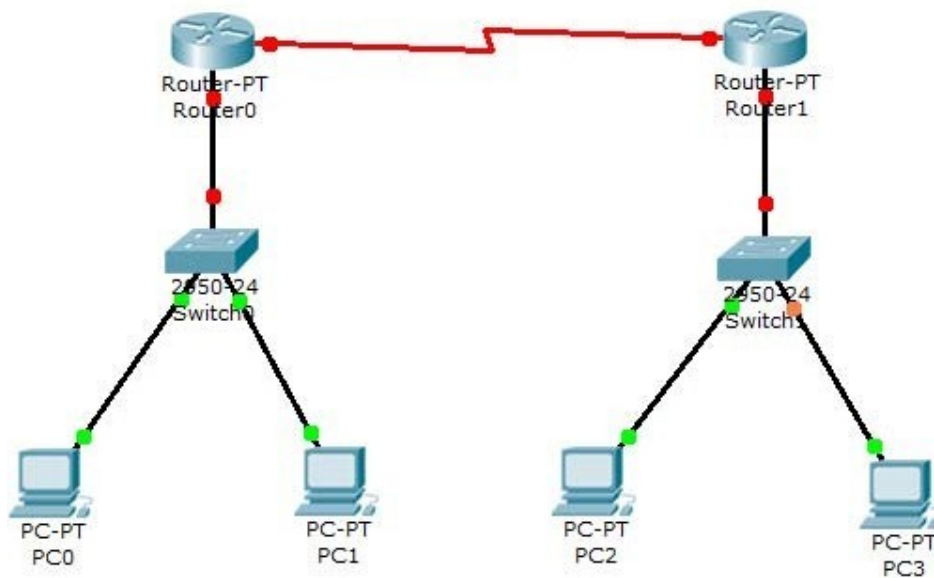
config]?

Building

configuration... [OK]

router0#

Aim: Configure a Network topology using packet tracer software.

Apparatus (Software): Packet tracer Software

Procedure: To implement this practical following network topology is required to be configured using the commands learned in previous practical.

After configuring the given network a packet should be ping from any one machine to another.

Router0 Configuration Command.........

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 192.168.0.254

255.255.255.0 Router(config-if)#no shutdown

%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)#exit

%SYS-5-CONFIG_I: Configured from console by console
Router#
Router#configure terminal

Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-
if)#exit
Router(config)#interface Serial2/0

Router(config-if)#ip address 192.168.1.1
255.255.255.0 Router(config-if)#no shutdown

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

Router(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building
configuration... [OK]
Router#show running-
config Building
configuration...

Current configuration : 542 bytes

!
version 12.2
no service password-encryption
!
hostname Router
!
!
!
!
!
ip ssh version 1
!
!
interface FastEthernet0/0
 ip address 192.168.0.254 255.255.255.0

```
 duplex auto
 speed auto
!
interface
 FastEthernet1/0 no ip
 address
 duplex auto
 speed auto
 shutdown
!
interface Serial2/0
 ip address 192.168.1.1 255.255.255.0
!
interface Serial3/0 no ip address shutdown
!
interface
 FastEthernet4/0 no ip
 address
 shutdown
!
interface
 FastEthernet5/0 no ip
 address
 shutdown
!
ip classless
!
!
!
!
!
line con 0
line vty 0
 4 login
!
!
end
```

Router#

Router1 Configuration Command.......

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

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial2/0
Router(config-if)#ip address 192.168.1.2
255.255.255.0 Router(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state
to up Router(config-if)#exit
Router(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#config t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#
Router(config)#interface
Serial2/0 Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.2.254
255.255.255.0 Router(config-if)#no shutdown

%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)#exit
%SYS-5-CONFIG_I: Configured from console by console
Router#wr
Building
configuration... [OK]
Router#

Router#show running-
config Building
configuration...

Current configuration : 542 bytes

!

version 12.2

```
no service password-encryption
!
hostname Router
!
!
!
!
!
ip ssh version 1
!
!
interface FastEthernet0/0
 ip address 192.168.2.254 255.255.255.0
 duplex auto
 speed auto
!
interface
 FastEthernet1/0 no ip
 address
 duplex auto
 speed auto
 shutdown
!
interface Serial2/0
 ip address 192.168.1.2 255.255.255.0
!
interface Serial3/0 no ip address shutdown
!
interface
 FastEthernet4/0 no ip
 address
 shutdown
!
interface
 FastEthernet5/0 no ip
 address
 shutdown
!
ip classless
!
!
!
!
!
```

line con 0
line vty 0
 4 login
!
!
end

Router#

IP ROUTE Command.....
Router#config t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#ip route 192.168.2.0 255.255.255.0
192.168.2.2 Router(config)#exit
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   192.168.2.0/24 is directly connected, FastEthernet0/0

C   192.168.1.2/24 is directly connected, Serial2/0
S   192.168.2.0/24 [1/0] via 192.168.1.2
Router#
IP ROUTE Command.....

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

S 192.168.0.0/24 [1/0] via 192.168.1.1

C 192.168.0.0/24 is directly connected, FastEthernet0/0
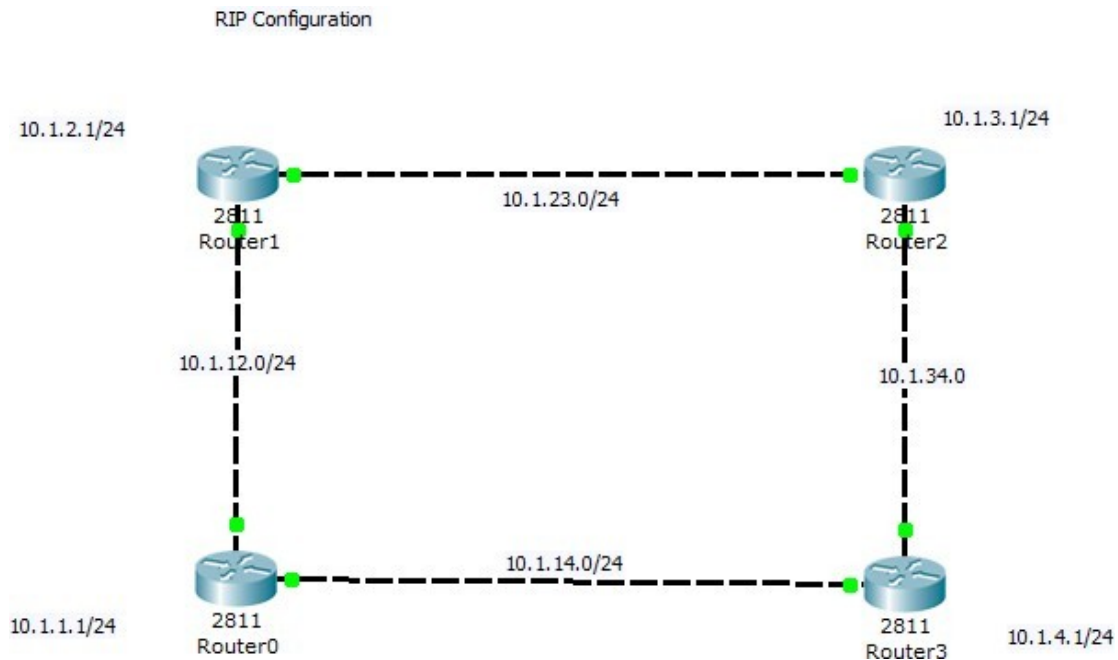C 192.168.1.1/24 is directly connected, Serial2/0
Router#

Aim: Configure a Network using Distance Vector Routing protocol.

- RIP

Apparatus (Software): packet tracer software

Procedure:
1. Develop a Topology shown in figure given below.
3. Configure all Routers
4. Implement RIP protocols in Router to configure Network.

RIP Configuration

10.1.2.1/24   10.1.3.1/24

2811   10.1.23.0/24   2811
Router1   Router2

10.1.12.0/24   10.1.34.0

                        10.1.14.0/24

10.1.1.1/24   2811   2811   10.1.4.1/24
               Router0   Router3

Router0 configuration.....

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

Press RETURN to get

started! Router>

```
Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname router0 router0(config)#int lo0
%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
router0(config-if)#ip address 10.1.1.1 255.255.255.0
router0(config-if)#int  f0/0
router0(config-if)#ip address 10.1.12.1 255.255.255.0 router0(config-
if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
router0(config-if)#int f0/1
router0(config-if)#ip address 10.1.14.1 255.255.255.0 router0(config-
if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to
up router0(config-if)#end
%SYS-5-CONFIG_I: Configured from console by
console router0#wr
Building configuration...
[OK]
router0#
router0#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

router0 con0 is now available

Press RETURN to get started.

router0>
router0>en
router0#config t
Enter configuration commands, one per line.  End with
CNTL/Z. router0(config)#router rip
router0(config-router)#net 10.0.0.0
router0(config-router)# router0(config-
router)#end
%SYS-5-CONFIG_I: Configured from console by
console router0#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
```

10.0.0.0/24 is subnetted, 3 subnets
C   10.1.1.0 is directly connected, Loopback0
C   10.1.12.0 is directly connected, FastEthernet0/0
C 10.1.14.0 is directly connected, FastEthernet0/1
router0#
router0#

Router1 Configuration.....

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

Press RETURN to get started!

Router>enable
Router#config t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Router(config-if)#ip address 10.1.2.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int f0/1
Router(config-if)#ip address 10.1.23.1 255.255.255.0 Router(config-
if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.12.2 255.255.255.0 Router(config-
if)#no shut

%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)#end
%SYS-5-CONFIG_I: Configured from console by
console Router#wr
Building configuration...
[OK]
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to

up Router con0 is now available

Press RETURN to get started.

Router>
Router>en
Router#con t

% Ambiguous command: "con
t" Router#co t
% Ambiguous command: "co
t" Router#conf t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)# Router(config-
router)# Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by
console Router#

Router2 Configuration.....

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

Press RETURN to get

started! Router>en
Router#config t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Router(config-if)#ip address 10.1.3.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.23.2 255.255.255.0 Router(config-
if)#no shut

%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)#int f0/1
Router(config-if)#ip address 10.1.34.1 255.255.255.0 Router(config-
if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
Router(config-if)#End
%SYS-5-CONFIG_I: Configured from console by console

Router#wr
Building configuration...
[OK]
Router#
Router#
Router#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router con0 is now available

Press RETURN to get started.

Router>
Router>
Router>en
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

    10.0.0.0/24 is subnetted, 3

    subnets
C   10.1.3.0 is directly connected, Loopback0
C   10.1.23.0 is directly connected, FastEthernet0/0
C 10.1.34.0 is directly connected, FastEthernet0/1
Router#config t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)#end
%SYS-5-CONFIG_I: Configured from console by
console Router#
Router#
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

    10.0.0.0/24 is subnetted, 7

    subnets
R   10.1.1.0 [120/2] via 10.1.23.1, 00:00:19, FastEthernet0/0
R   10.1.2.0 [120/1] via 10.1.23.1, 00:00:19, FastEthernet0/0
C   10.1.3.0 is directly connected, Loopback0
R   10.1.12.0 [120/1] via 10.1.23.1, 00:00:19, FastEthernet0/0

R   10.1.14.0 [120/2] via 10.1.23.1, 00:00:19, FastEthernet0/0
C   10.1.23.0 is directly connected, FastEthernet0/0
C   10.1.34.0 is directly connected, FastEthernet0/1 Router#
Router#
Router#

Router3 Configuration.......

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

Press RETURN to get

started! Router>
Router>en
Router#config t
Enter configuration commands, one per line. End with
CNTL/Z. Router(config)#int lo0

%LINK-5-CHANGED: Interface Loopback0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Router(config-if)#int f0/0
Router(config-if)#ip address 10.1.34.2 255.255.255.0 Router(config-
if)#no shut

%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)#
Router(config-if)#int f0/1
Router(config-if)#ip address 10.1.14.2 255.255.255.0
Router(config-if)#no shut

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Router(config-if)#end
%SYS-5-CONFIG_I: Configured from console by
console Router#wr
Building configuration...
[OK]
Router#
Router#
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

```
    10.0.0.0/24 is subnetted, 2 subnets
C    10.1.14.0 is directly connected, FastEthernet0/1
C 10.1.34.0  is  directly  connected,  FastEthernet0/0
Router#conf t
Enter configuration commands, one per line.  End with
CNTL/Z. Router(config)#router rip
Router(config-router)#net 10.0.0.0
Router(config-router)#

Router(config-router)#end
%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

    10.0.0.0/24 is subnetted, 7

    subnets
R        10.1.1.0 [120/1] via 10.1.14.1, 00:00:09, FastEthernet0/1
R        10.1.2.0 [120/2] via 10.1.34.1, 00:00:14, FastEthernet0/0
           [120/2] via 10.1.14.1, 00:00:09, FastEthernet0/1
R        10.1.3.0 [120/1] via 10.1.34.1, 00:00:14, FastEthernet0/0
R        10.1.12.0 [120/1] via 10.1.14.1, 00:00:09, FastEthernet0/1
C        10.1.14.0 is directly connected, FastEthernet0/1
R        10.1.23.0 [120/1] via 10.1.34.1, 00:00:14, FastEthernet0/0
C        10.1.34.0 is directly connected,
FastEthernet0/0 Router#
```
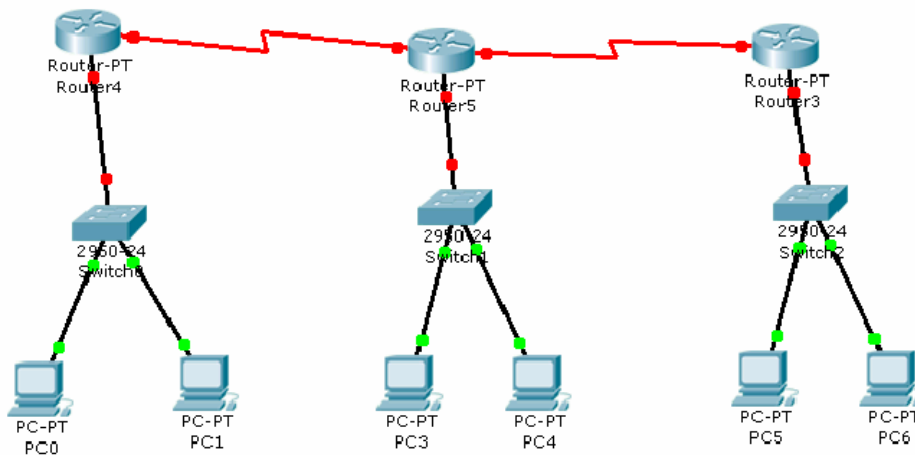
EXPERIMENT- 9

Aim: Configure Network using Link State Vector Routing protocol.

- OSPF

Apparatus (Software): Packet Tracer Software

Procedure:

1. Develop a Topology shown in figure given below.
2. Configure all the workstations
3. Configure all switches
4. Configure all Routers
5. Implement OSPF protocols in Router to configure Network.

EXPERIMENT- 10

Aim: **Socket Programming for Sending Data from one node to another node.**

Apparatus (Software): Linux Terminal

You can follow a few basic steps to create a socket, set up the destination host, establish the channel to another network program, and shut down. Figure 1.1 graphically shows the steps the client takes to connect to a server.

Figure 1.1
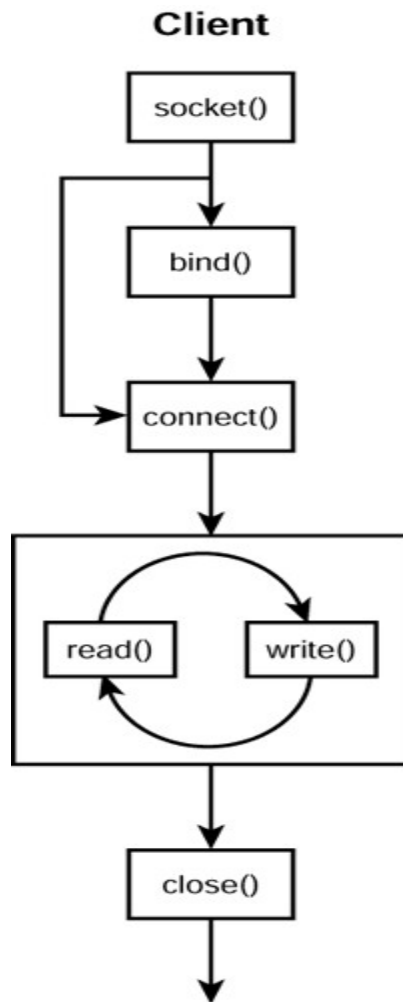

The following list describes each step:

1. Create a socket. Select from the various network domains (such as the Internet) and socket types (stream).

2. Set socket options (optional). You have many options that affect the behavior of the socket.

3. Bind to address/port (optional). Accept connections from all or a single IP address, and establish port service.

4. Connect to peer/server (optional). Reach out and establish a bidirectional

channel between your program and another network program. If you skip this, your program uses directed or connectionless communication.

5. Partially close the connection (optional). Limit the channel to either sending or receiving. You may want to use this step after duplicating the channel.

6. Send/receive messages (optional). One reason to opt out of any I/O might include checking host availability.

7. Close the connection. Of course this step is important: Long-running programs may eventually run out of available file descriptors if the programs do not close defunct connections.
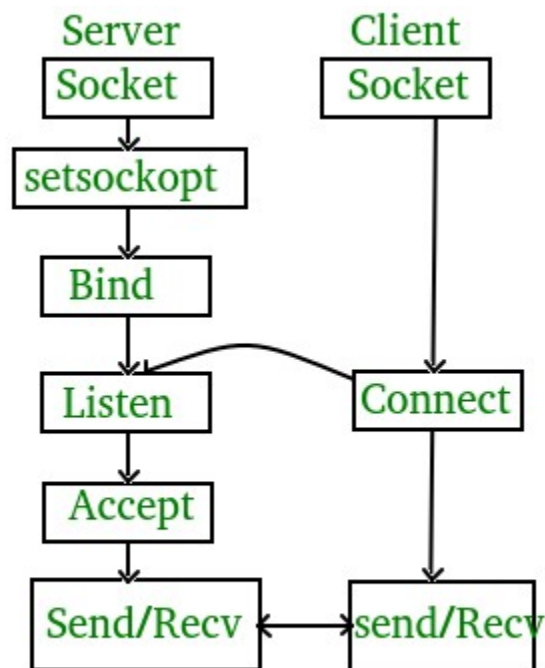
Server –
1. using create(), Create TCP socket.
2. using bind(), Bind the socket to server address.
3. using listen(), put the server socket in a passive mode, where it waits for the client to approach the server to make a connection
4. using accept(), At this point, connection is established between client and server, and they are ready to transfer data.
5. Go back to Step 3.