EXPERIMENT NO.4

AIM: Installation and configuration of two Computers with router for packet transmission.

SOFTWARE REQUIRED: CISCO Packet Tracer.

Theory- IP Networking:

IP Networking Basics

IP 101

This is a very brief introduction to IP networking. For more in-depth information, there are a number of excellent references. In particular, Douglas Comer's Internetworking with TCP/IP (Prentice Hall) is one of the standard references and provides a wealth of information on the subject.

IP Addresses

Each device on an IP network requires 3 different pieces of information in order to correctly communicate with other devices on the network: an IP address, a subnet mask, and a broadcast address. You will usually see each of these numbers written as four "octets" (e.g. 198.41.12.151, 255.255.255.0, and 198.41.12.255).

Every IP address is really made up of two pieces: a "network" portion, which tells routers what group of devices a packet should go to (e.g., any, a campus, etc.) and a "host" portion which tells routers what specific device among that group the packet should go to.

By examining the destination address in an IP packet that must be forwarded, and by using information that has either been statically configured or dynamically gathered from other routers, any router can determine the optimal path for forwarding packets from one group to another.

Each group of devices on an IP internet needs to have a unique network portion, and each device within that group also needs a unique host portion. In the case of the Internet, this uniqueness is made possible by indirectly getting all network portion assignments through a central clearinghouse called the Network Information Center or "NIC." The NIC assigns blocks of addresses to Internet Service Providers (ISPs), who then assign these addresses to their customers. If your network is, or will be, connected to the Internet, you will need to get a unique network address from your ISP or network administrator.

How much of any given address is the network part and how much is the host part is determined by the "class" of the network. In each case, the part of the address not used for the network portion is left as the host portion.

Table A-1 describes how IP address classes are organized.

Table A-1 IP Address Classes

Class	Network Portion	Hosts Allowed
A	from 1.0 to 127.0	approx. 16 million
B	from 128.0 to 191.255	65,536
C	from 192.0 to 223.255.255	255

You can always tell what class an address is by looking at the first octet and comparing it to the chart above. For instance, the address at the top of this appendix has 198 as the first octet, so it is Class C.

Subnet Masks

A subnet mask tells a router how much of an address it should treat as the network portion. The masks for traditional Class A, B and C networks are shown below in Table A-2

Table A-2 Standard IP Subnets

Class	Subnet Mask
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0

Comparing the masks above to the first chart, you can see that the 255s in a mask identify the network portion of the address.

Just as the masks above specify what portion of the global IP address range a network is using, a subnet mask can also be used to subdivide a Class A, B or C network range into multiple groups of hosts, or "subnets."

This is done by telling the router that more than the traditional number of bits in the mask are to be treated as the network portion of the address. Table A-3 shows all of the possible Class C subnet masks, and how many hosts are then allowed on each subnet.

Table A-3 Subnetted Class C Host Ranges

Subnet Mask	Host Ranges
255.255.255.0	1 to 254 (traditional C)
255.255.255.128	1-126, 129-254
255.255.255.192	1-62, 65-126, 129-190, 193-254
255.255.255.224	1-30, 33-62, 65-94, 97-126, 129-158, 161-190, 193-222, 225-254
255.255.255.240	1-14, 17-30, 33-46, 49-62, 65-78, 81-94, 97-110, 113-126, 129-142, 145-158, 161-174, 177-190, 193-206, 209-222, 225-238, 241-254
255.255.255.248	1-6, etc.

The lowest calculated address in each range (0 in the traditional C range) is not shown, cannot be used, and is skipped in the chart. The highest address in each range (255 in the traditional C range) is also not shown, and is the broadcast address for the subnet.

With each mask above, the 1s in the binary value represent the network portion, and the 0s represent the host portion (128 is 10000000, 192 is 11000000, etc.). As you use more bits to represent the network portion, fewer bits are left to use as host addresses.

The same idea can be extended to Class A and Class B networks.

Broadcast Addresses

The broadcast address is the address to which devices send packets meant for all other devices. All devices "listen" for broadcasts in addition to their own address. Address Resolution Protocol (ARP) packets and routing information are examples of packets sent to the broadcast address. Most often, the broadcast address is the last address in the network (or subnet) with the host portion being all 1's binary (some networks use 0.0.0.0 or 255.255.255.255, however.). Table A-4 shows some examples of broadcast addresses.

Table A-4 Broadcast Address Examples

Class	Network	Subnet Mask	Broadcast
A	45.0.0.0	255.0.0.0	45.255.255.255
B	128.138.0.0	255.255.0.0	128.138.255.255

C	198.41.9.0	255.255.255.0	198.41.9.255
A*	45.21.16.0	255.255.252.0	42.21.19.255
C*	198.41.9.64	255.255.255.224	198.41.9.95

The first three entries are traditional Class A, B and C network addresses and use traditional masks. The last two are less traditional, "real world" examples. Note in line 4 the change in the third octet between network address and broadcast address. Line 5 shows what happens when a Class C network has been subnetted.

Procedure:

1. Open Cisco packet tracer.

2. Place the devices and make connection as shown in the figure.

3. Configure IP address of both PC by double clicking and editing the IP address

(192.168.1.1 and 192.168.2.1).

4. Open router configuration window by double clicking the router and selecting fast Ethernet o/o in the configure tab.

5. Allocate 192.168.1.10 IP address to it subnet of 255.255.255.0 will be automatically assigned to it.

6. Similarly go to fast Ethernet I/O and allocate 192.168.2.10. IP address to it.

7. Ensure that both the ports are ON.

8. Refresh the connection between the router and computer by disconnecting and

connect the cable again.

9. If the configure is proper, green dots will be assigned shown up indicating that the connection id OK.

10. Send a message from PC1 to router and if everything is OK, a successfully message is shown in the last status.

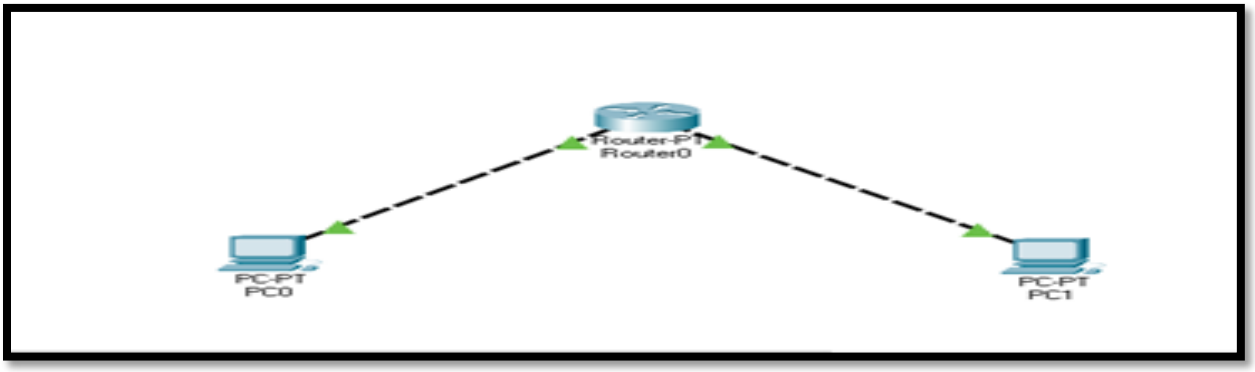
11. As now since the gateway is not configure, it is not possible to send message/ packet from PC1 to PC2. So to indicate the default gateway addresses 192.168.1.10 and 192.168.2.10 respectively in the IP configure tabs of both PC.

12. Now go to RIP tabs in the configure tabs of router.

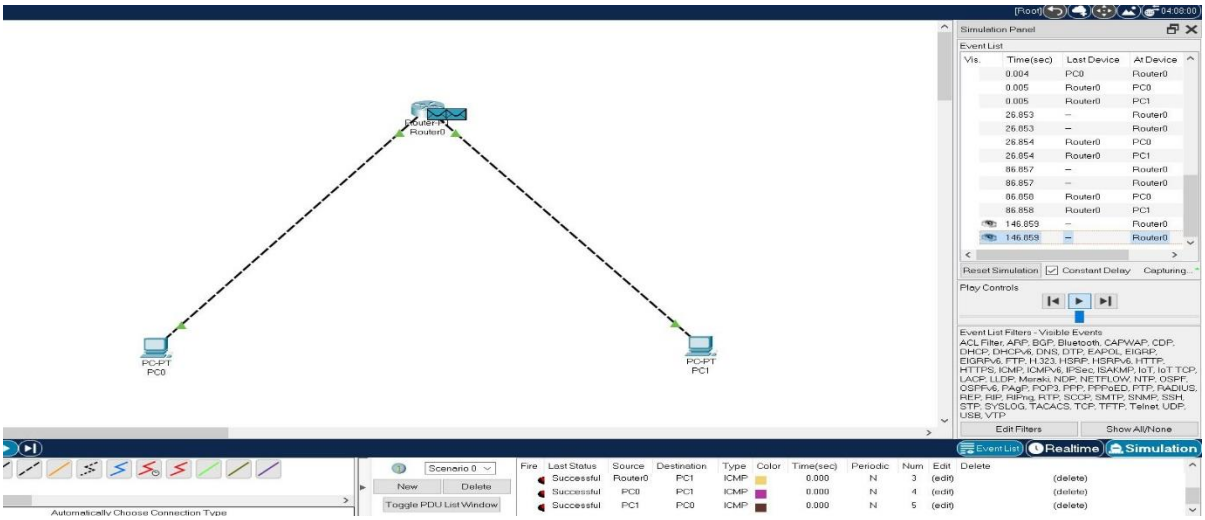
13. Add 192.168.1.0 and 192.168.2.0 as network address.

14. If is now possible to send packet between the PC's via the router.

Configuration diagram:



OUTPUT :



CONCLUSION:

We have Successfully done Installation and configuration of two Computers with router for packet transmission. Got Successful connection between PC1 to Router and PC2 to router and between PC1 and PC2.