Computer Network and Internet Protocol Experiment 8

Aim: - To implement subnetting between 2 groups of PCs in Cisco Packet Tracer.

Objective: - To show and understand how subnetting works among various PCs and within groups/connecting groups.

Theory: -Subnetting is the process of dividing a large IP network into smaller, manageable sub-networks called subnets. It enhances network performance, improves security, and optimizes IP address allocation. By borrowing bits from the host portion of an IP address, subnetting creates multiple logical networks within a single physical network. Each subnet has its own network and broadcast address, ensuring isolated communication domains. Subnetting reduces network congestion by limiting broadcast traffic and allows for efficient routing by organizing IP addresses hierarchically. It is commonly used in organizations to separate departments, manage network traffic, and make better use of available IP address space.

Procedure: -

1) Create the shown topology by connecting 1 router, 2 switches and 3 PCs with each switch to create 2 separate subnets.
2) Consider the Network ID as 192.168.10.0/25 and Subnet Mask as 192.168.10.128.
3) We have 192.168.10.0/25 which in binary is 11111111. 11111111. 11111111.10000000 so 2^n => 2^1 = 2 is the number of subnets, and number of hosts = 2^7 = 128. This gives us valid hosts as 1, 126 (subnet 0) and 129, 254 (subnet 128)
4) Assign IP Addresses to all PCs as shown below: -
    a. PC0 –> IP=192.168.10.1 with subnet mask 255.255.255.128 and default gateway 192.168.10.4
    b. PC1 –> IP= 192.168.10.2 with subnet mask 255.255.255.128 and default gateway 192.168.10.4
    c. PC2 –> IP=192.168.10.3 with subnet mask 255.255.255.128 and default gateway 192.168.10.4
    d. PC3 –> IP=192.168.10.129 with subnet mask 255.255.255.128 and default gateway 192.168.10.132
    e. PC4 –> IP=192.168.10.130 with subnet mask 255.255.255.128 and default gateway 192.168.10.132
    f. PC5 –> IP=192.168.10.131 with subnet mask 255.255.255.128 and default gateway 192.168.10.132
5) Now in the router: -
    a. Go to config
    b. Go to GigabitEthernet0/0, turn it on and enter IP as 192.168.10.4 and subnet mask as 255.255.255.128.
    c. Go to GigabitEthernet0/1, turn it on and enter IP as 192.168.10.132 and subnet mask as 255.255.255.128.
6) We can now confirm if all the connections are correct by pinging one device of a subnet from another device of the other subnet. (For ex: - in command prompt for PC0 run – ping 192.168.10.131 and observe the result).

Conclusion: - We observed that we are successfully able to ping one device of a subnet from another device in another subnet, proving the fact that the subnetting was correctly done for the network.

Result: - I was able to learn the fundamentals behind subnetting and how it works to distribute IP Addresses in a network to allow successful connection of devices in Cisco Packet Tracer.