18/9/2025 Practical IX

AIM: Implementation of SUBNETTING in CISCO PACKET TRACER simulator.

Classless IP subnetting is a technique that allows for more efficient use of IP addresses by allowing for subnets masks that are not just the default masks for each IP class. This means that we can divide our IP address space into smaller subnets, which can be useful when we have a limited number of IP addresses but need to create multiple networks.

CREATING A NETWORK TOPOLOGY:

The first step in implementing classless IP subnetting is to create a network topology in Packet Tracer. To create a network topology in Packet Tracer, select the "New Button" in the top left corner, then select "Network" and "General". This will create a blank network topology that we can use to add devices.

ADDING THE DEVICES:

Once we have created our network topology, we can add devices to it. Here, we will be adding routers, switches, and PCs. To add a device, select the device from the bottom left corner and drag it onto the network topology. Then, connect the devices by dragging a cable from one device's port to another device's port.

SUBNETTING:

To subnet the network address of 192.168.1.0/24 to provide enough space for at least 5 addresses for end devices, the switch, and the router, we can use a /27 subnet mask. This will give us 8 subnets with 30 host addresses each.

The IP addressing for the network shown in the topology can be as follows

Router R1

Gigabit Ethernet 0/0: 192.168.1.1

Gigabit Ethernet 0/1: 192.168.2.1

Switch S1:

Fast Ethernet 0/1: 192.168.1.0/27

PC1: 192.168.1.11

PC2: 192.168.1.12

PC3: 192.168.1.13

PC4: 192.168.1.14

PC 5: 192.168.1.15

Fast Ethernet 0/2: 192.168.2.0/27

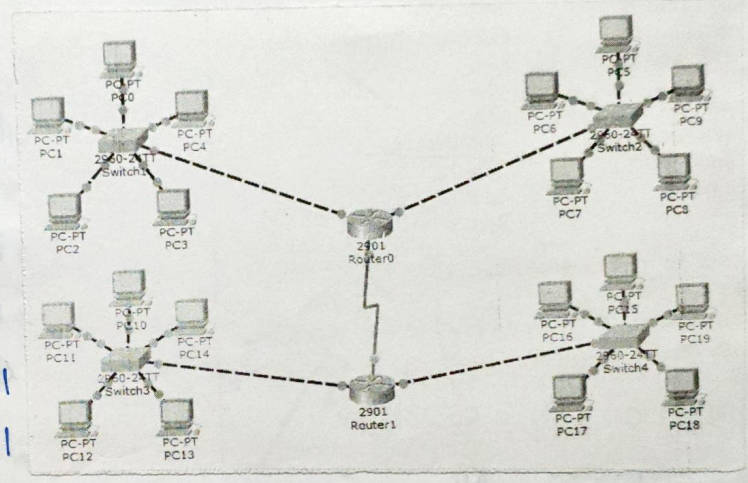
PC1: 192.168.2.11

PC2: 192.168.2.12

PC3: 192.168.2.13

PC4: 192.168.2.14

PC5: 192.168.2.15



Router R2:

Fast Ethernet 0/0: 192.168.3.1

Fast Ethernet 0/1: 192.168.4.1

Switch S2:

Fast Ethernet 0/1: 192.168.3.0/27

PC1: 192.168.3.11

PC2: 192.168.3.12

PC3: 192.168.3.13

PC4: 192.168.3.14

PC5: 192.168.3.15

Fast Ethernet 0/2: 192.168.4.0/27

PC1: 192.168.4.11

PC2: 192.168.4.12

PC3: 192.168.4.13

PC4: 192.168.4.14

PC5: 192.168.4.15

Configuring

CONFIGURING THE DEVICES

Now that we have added our devices and connected them, we can start configuring them. We will start by configuring the router. Right-click on the router and select "CLI". This will open the command-line interface (CLI) for the router. In the CLI, enter the following commands:

```
#enable
#configure terminal
#interface FastEthernet 0/0
#ip address 192.168.5.1 255.255.255.192
#no shutdown
#exit
```

The first interface, FastEthernet 0/0, will be connected to the switch, while the second interface, FastEthernet 0/1, will be connected to one of the PCs. These commands configure the router's interfaces with IP addresses and subnet masks.

Next, we will configure the switch.

```
#enable
#configure terminal
#interface FastEthernet 0/1
#switchport mode access
#exit
```

These commands configure the switch to operate in access mode on its two ports, which are connected to the two PCs.

Finally, we will configure the PCs. In the configuration window, enter the IP address, subnet mask, default gateway, and DNS server information. The IP address and subnet mask should be within the same subnet as the router's FastEthernet 0/1 interface.

To configure the GigabitEthernet interface on the router, you can follow these steps:

1. Right-click on the router and select "CLI".
2. Enter the following commands:

```
#enable
#configure terminal
#interface GigabitEthernet 0/0
#ip address 192.168.5.1 255.255.255.192
#no shutdown
#exit
```

These commands configure the GigabitEthernet interface with an IP address and subnet mask, and enable the interface.

1. Write down your understanding of subnetting.

Subnetting is the process of dividing one large network into smaller, manageable sub-networks.
It is done by borrowing bits from the host portion of IP address to create more addresses.

2. What is the advantage of implementing subnetting within a network?

Subnetting avoids wastage of addresses.
It reduces network congestion by localizing traffic within a subnet.
Simplifies management of small networks.

Result:

Hence, subnetting of networks was completed successfully