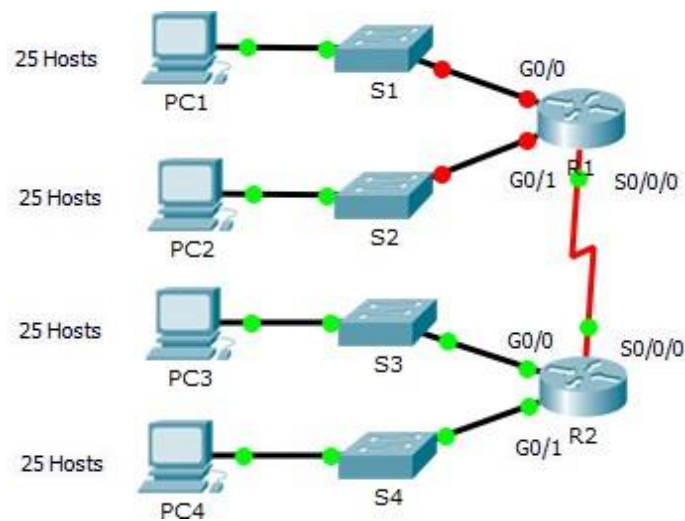# Packet Tracer - Subnetting Scenario 1

Topology

Objectives
Part 1: Design an IP Addressing Scheme
Part 2: Assign IP Addresses to Network Devices and Verify Connectivity

Scenario

In this activity, you are given the network address of 192.168.100.0/24 to subnet and provide the IP addressing for the Packet Tracer network. Each LAN in the network requires at least 25 addresses for end devices, the switch and the router. The connection between R1 to R2 will require an IP address for each end of the link.

Instructions

• Design an IP Addressing Scheme
• Subnet the 192.168.100.0/24 network into the appropriate number of subnets.

Questions:

1. Based on the topology, how many subnets are needed **Ans: 5**
2. How many bits must be borrowed to support the number of subnets in the topology **Ans: 3**
3. How many subnets does this create **Ans: 8**
4. How many usable hosts does this create per subnet **Ans: 30**

5. Calculate the binary value for the first five subnets. The first two subnets have been done for you.

Part 1:   Design an IP Addressing Scheme

Subnet	Network Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	192.168.100.	0	0	0	0	0	0	0	0
1	192.168.100.	0	0	1	0	0	0	0	0
2	192.168.100.	0	1	0	0	0	0	0	0
3	192.168.100.	0	1	1	0	0	0	0	0
4	192.168.100.	1	0	0	0	0	0	0	0

Calculate the binary and decimal value of the new subnet mask.

First Octet	Second Octet	Third Octet	Mask Bit 7	Mask Bit 6	Mask Bit 5	Mask Bit 4	Mask Bit 3	Mask Bit 2	Mask Bit 1	Mask Bit 0
11111111	11111111	11111111	1	1	1	0	0	0	0	0

```
        .11111111.11111111.  ___ ___ ___ ___ ___ ___ ___ ___
        11111111.11111111.111111111.  1   1   1   0   0   0   0   0
```

First Octet	First Octet	First Octet	Mask Bit 7	Mask Bit 6	Mask Bit 5	Mask Bit 4	Mask Bit 3	Mask Bit 2	Mask Bit 1	Mask Bit 0
First Decimal Octet	Second Decimal Octet	Third Decimal Octet				Fourth Decimal Octet				
255	255	255				224				

a. Fill in the **Subnet Table**, listing the decimal value of all available subnets, the first and last usable host address, and the broadcast address. Repeat until all addresses are listed.

Note: You may not need to use all rows.

Subnet Table

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0	192.168.100.0	192.168.100.1	192.168.100.30	192.168.100.31
1	192.168.100.32	192.168.100.33	192.168.100.62	192.168.100.63
2	192.168.100.64	192.168.100.65	192.168.100.94	192.168.100.95
3	192.168.100.96	192.168.100.97	192.168.100.126	192.168.100.127
4	192.168.100.128	192.168.100.129	192.168.100.158	192.168.100.159
5	192.168.100.160	192.168.100.161	192.168.100.190	192.168.100.191
6	192.168.100.192	192.168.100.193	192.168.100.222	192.168.100.223
7	192.168.100.224	192.168.100.225	192.168.100.254	192.168.100.255
8				
9				
10				

Step 2: Assign the subnets to the network shown in the topology.

a) Assign Subnet 0 to the LAN connected to the Gigabit Ethernet 0/0 interface of R1: 192.168.100.0/27

b) Assign Subnet 1 to the LAN connected to the Gigabit Ethernet 0/1 interface of R1: 192.168.100.32/27

c) Assign Subnet 2 to the LAN connected to the Gigabit Ethernet 0/0 interface of R2: 192.168.100.64/27

d) Assign Subnet 3 to the LAN connected to the Gigabit Ethernet 0/1 interface of R2: 192.168.100.96/27

e) Assign Subnet 4 to the WAN link between R1 to R2: 192.168.100.128/27

Step 3: Document the addressing scheme.

Fill in the **Subnet Table** using the following guidelines:

a. Assign the first usable IP addresses to R1 for the two LAN links and the WAN link.

b. Assign the first usable IP addresses to R2 for the LANs links. Assign the last usable IP address for the WAN link.

c. Assign the second usable IP addresses to the switches.

d. Assign the last usable IP addresses to the hosts.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.100.1	255.255.255.224	N/A
	G0/1	192.168.100.33	255.255.255.224	N/A
	S0/0/0	192.168.100.129	255.255.255.224	N/A
R2	G0/0	192.168.100.65	255.255.255.224	N/A
	G0/1	192.168.100.97	255.255.255.224	N/A
	S0/0/0	192.168.100.158	255.255.255.224	N/A
S1	VLAN 1	192.168.100.2	255.255.255.224	192.168.100.1
S2	VLAN 1	192.168.100.34	255.255.255.224	192.168.100.33
S3	VLAN 1	192.168.100.66	255.255.255.224	192.168.100.65
S4	VLAN 1	192.168.100.98	255.255.255.224	192.168.100.97
PC1	NIC	192.168.100.30	255.255.255.224	192.168.100.1
PC2	NIC	192.168.100.62	255.255.255.224	192.168.100.33
PC3	NIC	192.168.100.94	255.255.255.224	192.168.100.65
PC4	NIC	192.168.100.126	255.255.255.224	192.168.100.97

Part 2: Assign IP Addresses to Network Devices and Verify Connectivity

Most of the IP addressing is already configured on this network. Implement the following steps to complete the addressing configuration.

Step 1: Configure IP addressing on R1 LAN interfaces.

Step 2: Configure IP addressing on S3, including the default gateway.

Step 3: Configure IP addressing on PC4, including the default gateway.
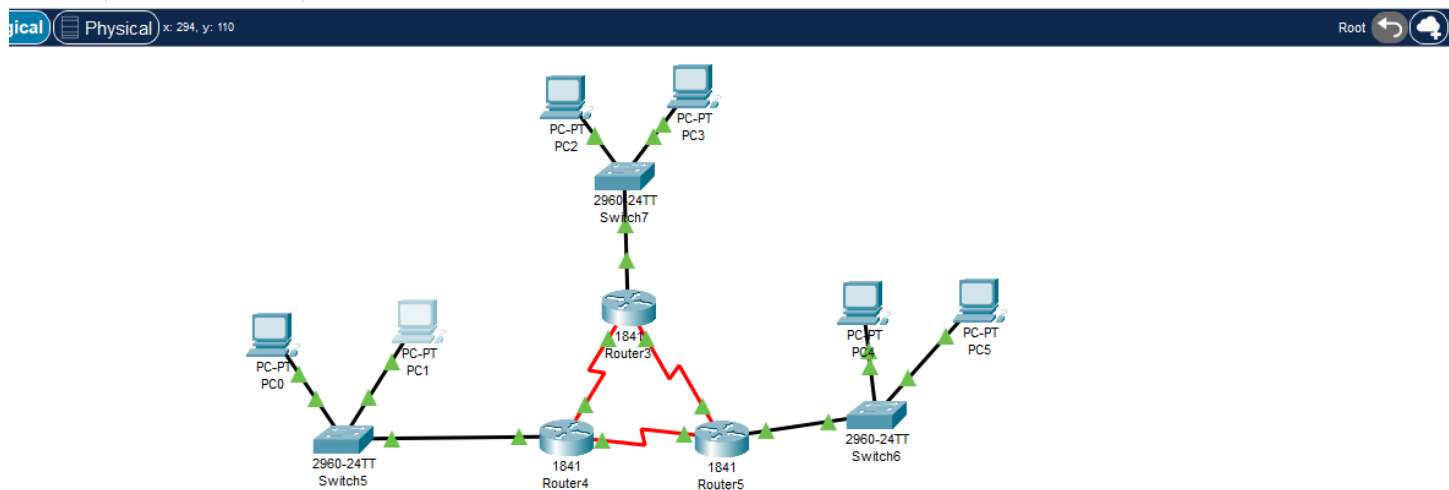
Step 4: Verify connectivity.

You can only verify connectivity from R1, S3, and PC4. However, you should be able to ping every IP address listed in the **Addressing Table**.

Topology B:

Implement Task 4 (Lab 10) in Packet Tracer and Assign IP Addresses to Network

Devices and Verify Connectivity.

After making the topology we assign IP addresses to the 6 pc's

PC0   —   □   ✕

Physical   Config   Desktop   Programming   Attributes

IP Configuration   X

Interface   FastEthernet0   ⌄

IP Configuration

○ DHCP   ⦿ Static

IPv4 Address   192.168.1.2

Subnet Mask   255.255.255.0

Default Gateway   192.168.1.1

DNS Server   0.0.0.0

IPv6 Configuration

○ Automatic   ⦿ Static

IPv6 Address   /

Link Local Address   FE80::260:3EFF:FE91:8704

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication   MD5   ⌄

Username

Password

☐ Top

PC3 — □ ✕

Physical | Config | Desktop | Programming | Attributes

IP Configuration X

Interface | FastEthernet0 ⌄

IP Configuration

○ DHCP   ⦿ Static

IPv4 Address   192.168.2.3

Subnet Mask   255.255.255.0

Default Gateway   192.168.1.2

DNS Server   0.0.0.0

IPv6 Configuration

○ Automatic   ⦿ Static

IPv6 Address   /

Link Local Address   FE80::2D0:FFFF:FE38:6B9E

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication   MD5

Username

Password

☐ Top

PC4 — □ ✕

Physical   Config   Desktop   Programming   Attributes

IP Configuration   X

Interface   FastEthernet0   ⌄

IP Configuration

○ DHCP   ◉ Static

IPv4 Address   192.168.3.2

Subnet Mask   255.255.255.0

Default Gateway   192.168.1.3

DNS Server   0.0.0.0

IPv6 Configuration

○ Automatic   ◉ Static

IPv6 Address   /

Link Local Address   FE80::20A:F3FF:FE42:4DD1

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication   MD5   ⌄

Username

Password

☐ Top

New   Delete

Then we assign ip addresses to our all three routers

Router4

Physical | Config | CLI | Attributes

GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
FastEthernet0/0
FastEthernet0/1
Serial0/0/0
Serial0/0/1

FastEthernet0/0

Port Status ☑ On

Bandwidth ◉ 100 Mbps ◯ 10 Mbps ☑ Auto

Duplex ◉ Half Duplex ◯ Full Duplex ☑ Auto

MAC Address: 0090.2163.5001

IP Configuration
IPv4 Address: 192.168.1.1
Subnet Mask: 255.255.255.0

Tx Ring Limit: 10

Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
```

☐ Top

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
Technical Support: http://www.cisco.com/techsupport
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Compiled Wed 26-Jun-13 02:49 by mnguyen


Press RETURN to get started!


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

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3, changed state to up


Switch>en
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#ip default-gateway 172.31.1.33
Switch(config)# int vlan1
Switch(config-if)#ip add 172.31.1.34 255.255.255.240
Switch(config-if)#no shut

Switch(config-if)#
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
```

Copy   Paste

☐ Top

Then we check our connectivity by pinging pc 4 from pc 1

```
Invalid Command.

C:\>ping 192.168.2.2

Pinging 192.168.2.2 with 32 bytes of data:

Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=16ms TTL=126
Reply from 192.168.2.2: bytes=32 time=1ms TTL=126
Reply from 192.168.2.2: bytes=32 time=7ms TTL=126

Ping statistics for 192.168.2.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 16ms, Average = 6ms

C:\>
```

☐ Top

And pc 5 from pc 1

```
C:\>ping 192.168.3.2

Pinging 192.168.3.2 with 32 bytes of data:

Reply from 192.168.3.2: bytes=32 time=22ms TTL=126
Reply from 192.168.3.2: bytes=32 time=13ms TTL=126
Reply from 192.168.3.2: bytes=32 time=6ms TTL=126
Reply from 192.168.3.2: bytes=32 time=8ms TTL=126

Ping statistics for 192.168.3.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 6ms, Maximum = 22ms, Average = 12ms

C:\>
```

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