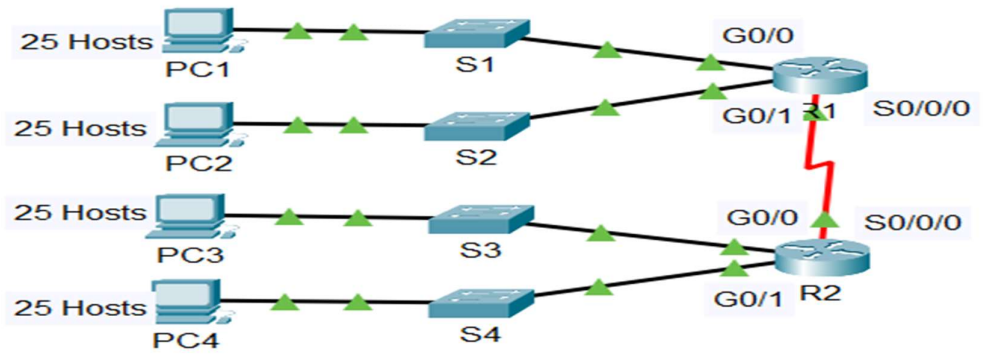
EXPERIMENT 11

Aim:

To understand the Subnetting Scenario.

Software Used: Cisco Packet Tracer

Topology:



Objectives:

Part 1: Design an IP Addressing Scheme

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

Questions based on this activity are:

Q1: Based on the topology, how many subnets are needed?

Ans: 5 Four for the LANS, and one for the link between the routers.

Q2: How many bits must be borrowed to support the number of subnets in the topology table?

Ans: 3

Q3: How many subnets does this create?

Ans: 8

Q4: How many usable hosts does this create per subnet?

Ans: 30

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 1: Design an IP Addressing Scheme

Step 1: Subnet the 192.168.100.0/24 network into the appropriate number of subnets.

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

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

Step 3: Document the addressing scheme.

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

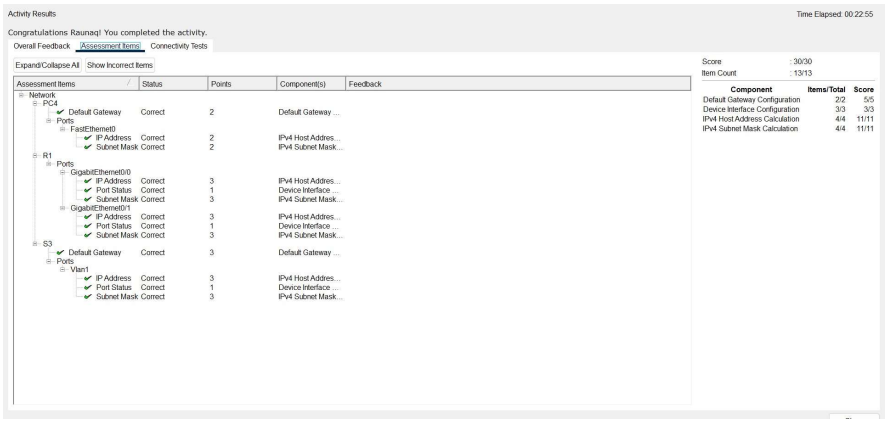
Step 1: Configure R1 LAN interfaces.

Step 2: Configure IP addressing on S3.

Step 3: Configure PC4.

Step 4: Verify connectivity.

Result-



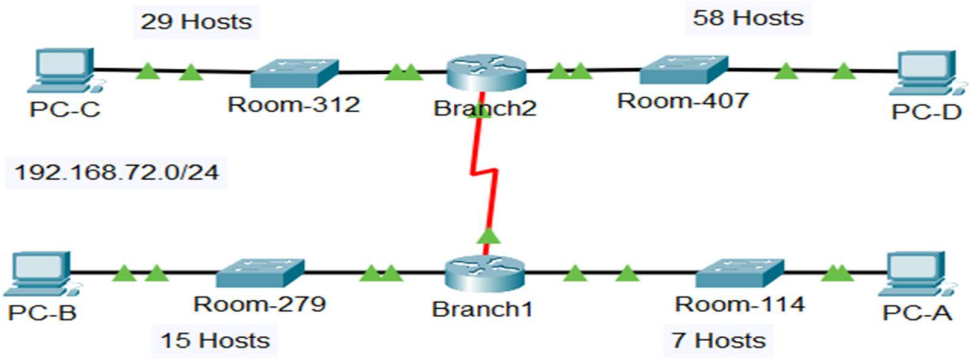
EXPERIMENT 12

Aim:

To study VLSM Design and Implementation.

Software Used:Cisco Packet Tracer

Topology:



Objectives-

Part 1: Examine the Network Requirements

Part 2: Design the VLSM Addressing Scheme

Part 3: Assign IP Addresses to Devices and Verify Connectivity

Questions related to this activity are:

Q1: How many subnets are needed in the network topology?

Ans: 5

Q2: Which subnet mask will accommodate the number of IP addresses required for ASW-1?

Ans: 255.255.255.240/24

Q3: How many usable host addresses will this subnet support?

Ans: 14 (10.11.48.97-10.11.48.110)

Q4: Which subnet mask will accommodate the number of IP addresses required for ASW-2?

Ans: 255.255.255.224 /27

Q5: How many usable host addresses will this subnet support?

Ans: 30 (10.11.48.65-10.11.48.94)

Q6: Which subnet mask will accommodate the number of IP addresses required for ASW-3?

Ans: 255.255.255.248/29

Q7: How many usable host addresses will this subnet support?

Ans: 6 (10.11.48.113-10.11.48.118)

Q8: Which subnet mask will accommodate the number of IP addresses required for ASW-4?

Ans: 255.255.255.192/26

Q9: How many usable host addresses will this subnet support?

Ans: 62 (10.11.48.1-10.11.48.62)

Q10: Which subnet mask will accommodate the number of IP addresses required for the connection between Building I and Building??

Ans: 255.255.255.252/30

Addressing Table

Device	Interface	Address	Subnet Mask	Default Gateway
Branch 1	G0/0	192.168.72.129	255.255.255.240	N/A
	G0/1	192.168.72.97	255.255.255.224	N/A
	S0/0/0	192.162.72.145	255.255.255.252	N/A
Branch2	G0/0	192.168.72.65	255.255.255.248	N/A
	G0/1	192.168.72.1	255.255.255.192	N/A
	S0/0/0	192.168.72.146	255.255.255.252	N/A
Room-114	VLAN 1	192.168.72.130	255.255.255.240	192.168.72.129
Room-279	VLAN 1	192.168.72.96	255.255.255.224	192.168.72.97
Room-312	VLAN 1	192.168.72.66	255.255.255.248	192.168.72.65
Room-407	VLAN 1	192.168.72.2	255.255.255.192	192.168.72.1
PC-A	NIC	192.168.72.142	255.255.255.240	192.168.72.129
PC-B	NIC	192.168.72.126	255.255.255.224	192.168.72.97

Device	Interface	Address	Subnet Mask	Default Gateway
PC-C	NIC	192.168.72.94	255.255.255.248	192.168.72.65
PC-D	NIC	192.168.72.62	255.255.255.192	192.168l.72.1

Instructions

Part 1: Examine the Network Requirements

Step 1: Determine the number of subnets needed.

You will subnet the network address **192.168.72.0/24**. The network has the following requirements:

- **Room-114** LAN will require **7** host IP addresses
- **Room-279** LAN will require **15** host IP addresses
- **Room-312** LAN will require **29** host IP addresses
- **Room-407** LAN will require **58** host IP addresses

Step 2: Determine the subnet mask information for each subnet.

Part 2: Design the VLSM Addressing Scheme

Step 1: Divide the 192.168.72.0/24 network based on the number of hosts per subnet.

a. Use the first subnet to accommodate the largest LAN.

b. Use the second subnet to accommodate the second largest LAN.

c. Use the third subnet to accommodate the third largest LAN.

d. Use the fourth subnet to accommodate the fourth largest LAN.

e. Use the fifth subnet to accommodate the connection between **Branch1** and **Branch2**.

Step 2: Document the VLSM subnets.

Step 3: Document the addressing scheme.

a. Assign the first usable IP addresses to **Branch1** for the two LAN links and the WAN link.

b. Assign the first usable IP addresses to **Branch2** for the two LAN 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.

Part 3: Assign IP Addresses to Devices and Verify Connectivity

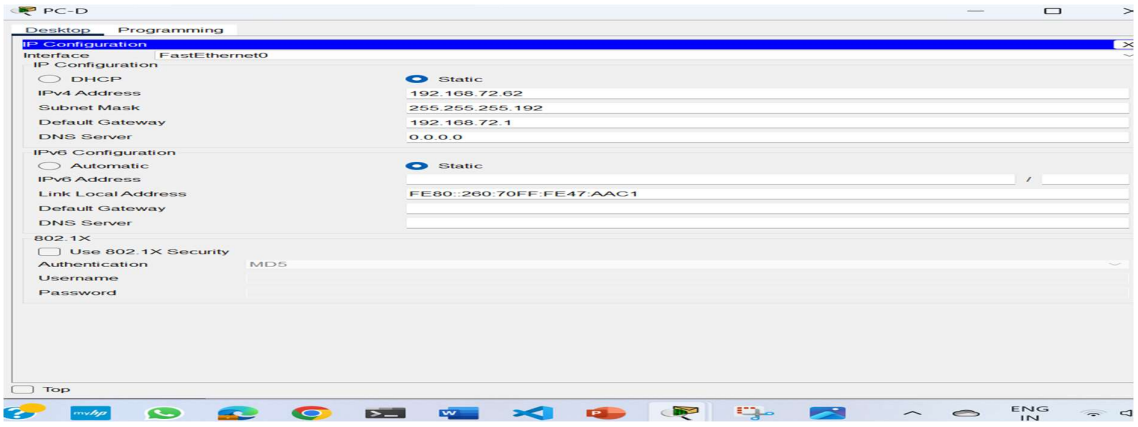
Most of the IP addressing is already configured on this network. Implement the following steps to complete the addressing configuration.

Step 1: Configure IP addressing on the Branch1 router LAN interfaces.

Step 2: Configure IP addressing on the Room-312, switch including the default gateway.

Step 3: Configure IP addressing on PC-D, including the default gateway.

Step 4: Verify connectivity.




```
C:\>ping 192.168.72.97

Pinging 192.168.72.97 with 32 bytes of data:

Reply from 192.168.72.97: bytes=32 time=1ms TTL=254
Reply from 192.168.72.97: bytes=32 time=1ms TTL=254
Reply from 192.168.72.97: bytes=32 time=1ms TTL=254
Reply from 192.168.72.97: bytes=32 time=25ms TTL=254

Ping statistics for 192.168.72.97:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 25ms, Average = 7ms

C:\>ping 192.168.72.98

Pinging 192.168.72.98 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.72.98: bytes=32 time=25ms TTL=253
Reply from 192.168.72.98: bytes=32 time=40ms TTL=253

Ping statistics for 192.168.72.98:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 40ms, Average = 32ms

C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126
Reply from 192.168.72.142: bytes=32 time=60ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 60ms, Average = 20ms
```

Result- Hence we have studied the VLSM Design and Implementation.

Congratulations Raunaq! You completed the activity.

Overall Feedback | Assessment Items | Connectivity Tests

Expand/Collapse All | Show Incorrect Items

Assessment Items	Status	Points	Component(s)	Feedback
Network				
Branch1				
Ports				
GigabitEthernet0/0				
IP Address	Correct	3	VLSM Addressing...	
Port Status	Correct	1	Device Interface ...	
Subnet Mask	Correct	3	VLSM Addressing...	
GigabitEthernet0/1				
IP Address	Correct	3	VLSM Addressing...	
Port Status	Correct	1	Device Interface ...	
Subnet Mask	Correct	3	VLSM Addressing...	
PC-D				
Default Gateway	Correct	2	Default Gateway ...	
Ports				
FastEthernet0				
IP Address	Correct	2	VLSM Addressing...	
Subnet Mask	Correct	2	VLSM Addressing...	
Room-312				
Default Gateway	Correct	3	Default Gateway ...	
Ports				
Vlan1				
IP Address	Correct	3	VLSM Addressing...	
Port Status	Correct	1	Device Interface ...	
Subnet Mask	Correct	3	VLSM Addressing...	

Score : 30/30
Item Count : 13/13

Component	Items/Total	Score
Default Gateway Configuration	2/2	5/5
Device Interface Configuration	3/3	3/3
VLSM Addressing Implementation	8/8	22/22

```
C:\>ping 192.168.72.97

Pinging 192.168.72.97 with 32 bytes of data:

Reply from 192.168.72.97: bytes=32 time=1ms TTL=254
Reply from 192.168.72.97: bytes=32 time=1ms TTL=254
Reply from 192.168.72.97: bytes=32 time=1ms TTL=254
Reply from 192.168.72.97: bytes=32 time=25ms TTL=254

Ping statistics for 192.168.72.97:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 25ms, Average = 7ms

C:\>ping 192.168.72.98

Pinging 192.168.72.98 with 32 bytes of data:

Request timed out.
Request timed out.
Reply from 192.168.72.98: bytes=32 time=25ms TTL=253
Reply from 192.168.72.98: bytes=32 time=40ms TTL=253

Ping statistics for 192.168.72.98:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 40ms, Average = 32ms

C:\>ping 192.168.72.142

Pinging 192.168.72.142 with 32 bytes of data:

Request timed out.
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126
Reply from 192.168.72.142: bytes=32 time=60ms TTL=126
Reply from 192.168.72.142: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.72.142:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 60ms, Average = 20ms
```

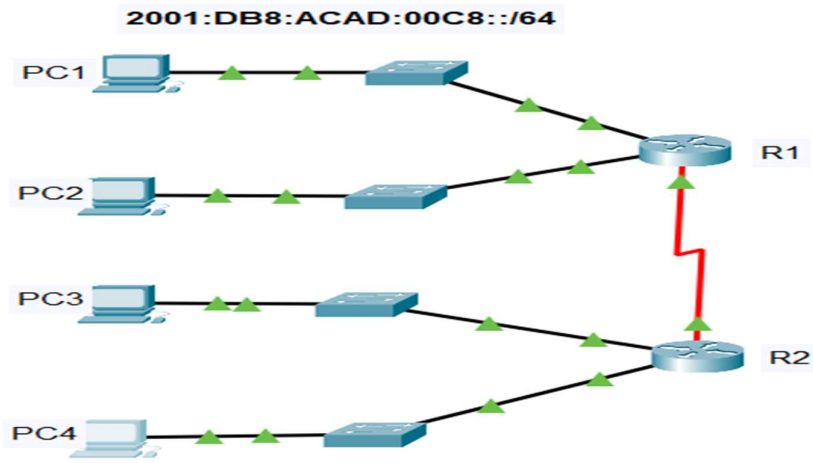
EXPERIMENT 13

Aim:

To implement a subnetted IPv6 addressing scheme.

Software Used:Cisco Packet Tracer

Topology:



Addressing Table-

Device	Interface	IPv6 Address	Link-local Address
R1	G0/0	2001:db8:acad:00c8::1/64	fe80::1
R1	G0/1	2001:db8:acad:00c9::1/64	fe80::1
R1	S0/0/0	2001:db8:acad:00cc::1/64	fe80::1
R2	G0/0	2001:db8:acad:00ca::1/64	fe80::2
R2	G0/1	2001:db8:acad:00cb::1/64	fe80::2
R2	S0/0/0	2001:db8:acad:00cc::2/64	fe80::2
PC1	NIC	Auto Config	
PC2	NIC	Auto Config	
PC3	NIC	Auto Config	
PC4	NIC	Auto Config	

Objectives-

Step 1: Determine IPv6 subnets and addressing scheme.

Step 2: Configure IPv6 addressing on routers and PCs.

Step 3: Verify IPv6 connectivity

Instructions -

Step 1: Determine IPv6 subnets and addressing scheme.

Step 2: Configure IPv6 addressing on routers and PCs.

Step 3: Verify IPv6 connectivity.

CLI Mode of R1-

```
R1(config)#interface gigabit ethernet 0/1
                              ^
% Invalid input detected at '^' marker.

R1(config)#interface gigabitethernet 0/1
R1(config-if)#ipv6 address 2001:db8:acad:00c9::1/64
R1(config-if)#ipv6 address fe 80::1 link-local
                              ^
% Invalid input detected at '^' marker.

R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

R1(config-if)#interface serial 0/0/0/0
              ^
% Invalid input detected at '^' marker.

R1(config-if)#interface serial 0/0/0
R1(config-if)#ipv6 address 2001:db8:acad:00cc::1/64
R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
R1(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

R1(config-if)#interface gigabitethernet 0/0
R1(config-if)#ipv6 address 2001:db8:acad:00c8::1/64
R1(config-if)#ipv6 address fe80::1 link-local
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#
```

```
R1(config-if)#exit
R1(config)#ipv6 unicast-routing
R1(config)#
```

CLI Mode Of R2-

```
R2>enable
R2#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface gigabitethernet 0/0
R2(config-if)#ipv6 address 2001:db8:acad:00ca::1/64
R2(config-if)#ipv6 address fe80::2 link-local
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

R2(config-if)#exit
R2(config)#interface gigabitethernet 0/1
R2(config-if)#ipv6 address 2001:db8:acad:00cb::1/64
R2(config-if)#ipv6 address fe80::2 link-local
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

R2(config-if)#exit
R2(config)#interface serial 0/0/0
R2(config-if)#ipv6 address 2001:db8:acad:00cc::2/64
R2(config-if)#ipv6 address fe80::2 link-local
R2(config-if)#no shutdown

R2(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

R2(config-if)#
```

```
R2(config-if)#exit
R2(config)#ipv6 unicast-routing
R2(config)#
```

Result- Hence we have implemented a subnetted IPv6 Addressing Scheme .