

1.5 – ITN – PacketKnows – Designing and Implementing a VLSM Addressing

Objectives

Part 1: Examine the Network Requirements

Part 2: Design the VLSM Addressing Scheme

Part 3: Assign IP Addresses to Devices and Verify Connectivity

NOTE

- **Power all the devices first by clicking the triangle button on the upper navbar.**
- **Right click the device then click the web console first to configure on the device**
- **Always type “save” when configuring IP addresses of PC’s**

Background

In this activity, you are given a /24 network address to use to design a VLSM addressing scheme. Based on a set of requirements, you will assign subnets and addressing, configure devices and verify connectivity.

Part 1: Examine the Network Requirements

Step 1: Determine the number of subnets needed.

You will subnet the network address 172.31.103.0/24. The network has the following requirements:

- **Room-114** LAN will require **27** host IP addresses
- **Room-279** LAN will require **25** host IP addresses
- **Room-312** LAN will require **14** host IP addresses
- **Room-407** LAN will require **8** host IP addresses

How many subnets are needed in the network topology?

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

- a. Which subnet mask will accommodate the number of IP addresses required for **Room-114**?

How many usable host addresses will this subnet support?

- b. Which subnet mask will accommodate the number of IP addresses required for **Room-279**?
How many usable host addresses will this subnet support?
- c. Which subnet mask will accommodate the number of IP addresses required for **Room-312**?
How many usable host addresses will this subnet support?
- d. Which subnet mask will accommodate the number of IP addresses required for **Room-407**?
How many usable host addresses will this subnet support?
- e. Which subnet mask will accommodate the number of IP addresses required for the connection between **Branch1** and **Branch2**?

Part 2: Design the VLSM Addressing Scheme

Step 1: Divide the 172.31.103.0/24 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.

Complete the **Subnet Table**, listing the subnet descriptions (e.g. Room-114 LAN), number of hosts needed, then network address for the subnet, the first usable host address, and the broadcast address. Repeat until all addresses are listed.

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Last Usable Host Address	Broadcast Address
PC-A LAN	27	172.31.103.0/27	172.31.103.1	172.31.103.30	172.31.103.31
PC-B LAN	25	172.31.103.32/27	172.31.103.33	172.31.103.62	172.31.103.63

PC-C LAN	14	172.31.103.64/28	172.31.103.65	172.31.103.78	172.31.103.79
PC-D LAN	8	172.31.103.80/28	172.31.103.81	172.31.103.94	172.31.103.95
WAN LINK	2	172.31.103.96/30	172.31.103.97	172.31.103.98	172.31.103.99

Step 3: Document the addressing scheme.

- Assign the first usable IP addresses to **Branch1** for the two LAN links and the WAN link.
- Assign the first usable IP addresses to **Branch2** for the two LANs links. Assign the last usable IP address for the WAN link.
- Assign the second usable IP addresses to the switches.
- 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 Branch1 LAN interfaces.

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

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

Step 4: Verify connectivity.

Note: OSPF is already configured, you should be able to ping PC to PC

Device	Interface	Address	Subnet Mask	Default Gateway
Branch1	Fa0/0	172.31.103.1	255.255.255.224	N/A
	Fa0/1	172.31.103.33	255.255.255.224	N/A
	S0/1	172.31.103.97	255.255.255.252	N/A
Branch2	Fa0/0	172.31.103.65	255.255.255.240	N/A
	Fa0/1	172.31.103.81	255.255.255.240	N/A
	S0/1	172.31.103.98	255.255.255.252	N/A
Room-114	VLAN 1	172.31.103.2	255.255.255.224	172.31.103.1

Room-279	VLAN 1	172.31.103.34	255.255.255.224	172.31.103.33
Room-312	VLAN 1	172.31.103.66	255.255.255.240	172.31.103.65
Room-407	VLAN 1	172.31.103.82	255.255.255.240	172.31.103.81
PC-A	NIC	172.31.103.30	255.255.255.224	172.31.103.1
PC-B	NIC	172.31.103.62	255.255.255.224	172.31.103.33
PC-C	NIC	172.31.103.78	255.255.255.240	172.31.103.65
PC-D	NIC	172.31.103.94	255.255.255.240	172.31.103.81

```

Branch1#conf t
Branch1(Config)#int fa0/0
Branch1(Config-if)#ip address 172.31.103.1 255.255.255.224
Branch1(Config-if)#no shut
Branch1(Config-if)#int fa0/1
Branch1(Config-if)#ip address 172.31.103.33 255.255.255.224
Branch1(Config-if)#no shut
Branch1(Config-if)#int s0/1
Branch1(Config-if)#ip address 172.31.103.97 255.255.255.252
Branch1(Config-if)#no shut
Branch1(Config-if)#exit

Branch1(Config)#router ospf 1
Branch1(Config)#Branch1(Config)#network 172.31.103.0
0.0.0.31 area 0
Branch1(Config)#network 172.31.103.32 0.0.0.31 area 0
Branch1(Config)#network 172.31.103.96 0.0.0.3 area 0
Branch1(Config)#exit

```

```
Branch1#copy running-config startup-config
```

```
Branch2#conf t
```

```
Branch2(Config)#int fa0/0
```

```
ip add 172.31.103.65 255.255.255.240
```

```
no shut
```

```
int fa0/1
```

```
ip add 172.31.103.81 255.255.255.240
```

```
no shut
```

```
int s0/1
```

```
ip address 172.31.103.98 255.255.255.252
```

```
no shut
```

```
exit
```

```
router ospf 1
```

```
network 172.31.103.64 0.0.0.15 area 0
```

```
network 172.31.103.80 0.0.0.15 area 0
```

```
network 172.31.103.96 0.0.0.3 area 0
```

```
copy running-config startup-config
```

```
conf t
```

```
int vlan 1
```

```
ip address 172.31.103.2 255.255.255.224
no shut
ip default-gateway 172.31.103.1
end
copy running-config startup-config
```

```
conf t
int vlan 1
ip address 172.31.103.34 255.255.255.224
no shut
ip default-gateway 172.31.103.33
end
copy running-config startup-config
```

```
conf t
int vlan 1
ip address 172.31.103.66 255.255.255.40
no shut
ip default-gateway 172.31.103.65
end
copy running-config startup-config
```

```
conf t
int vlan 1
```

```
ip address 172.31.103.82 255.255.255.240
no shut
ip default-gateway 172.31.103.81
end
copy running-config startup-config
```

PC- A

```
ip 172.31.103.30 255.255.255.224 172.31.103.1
save
```

PC-B

```
ip 172.31.103.62 255.255.255.224 172.31.103.33
save
```

PC-C

```
ip 172.31.103.78 255.255.255.240 172.31.103.65
save
```

PC-D

```
ip 172.31.103.97 255.255.255.240 172.31.103.96
save
```