

Packet Tracer - Designing and Implementing a VLSM Addressing Scheme (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology

You will receive one of three possible topologies.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
[[R1Name]]	G0/0	[[R1G0Add]]	[[R1G0Sub]]	N/A
	G0/1	[[R1G1Add]]	[[R1G1Sub]]	N/A
	S0/0/0	[[R1S0Add]]	[[R1S0Sub]]	N/A
[[R2Name]]	G0/0	[[R2G0Add]]	[[R2G0Sub]]	N/A
	G0/1	[[R2G1Add]]	[[R2G1Sub]]	N/A
	S0/0/0	[[R2S0Add]]	[[R2S0Sub]]	N/A
[[S1Name]]	VLAN 1	[[S1Add]]	[[S1Sub]]	[[R1G0Add]]
[[S2Name]]	VLAN 1	[[S2Add]]	[[S2Sub]]	[[R1G1Add]]
[[S3Name]]	VLAN 1	[[S3Add]]	[[S3Sub]]	[[R2G0Add]]
[[S4Name]]	VLAN 1	[[S4Add]]	[[S4Sub]]	[[R2G1Add]]
[[PC1Name]]	NIC	[[PC1Add]]	[[PC1Sub]]	[[R1G0Add]]
[[PC2Name]]	NIC	[[PC2Add]]	[[PC2Sub]]	[[R1G1Add]]
[[PC3Name]]	NIC	[[PC3Add]]	[[PC3Sub]]	[[R2G0Add]]
[[PC4Name]]	NIC	[[PC4Add]]	[[PC4Sub]]	[[R2G1Add]]

Objectives

Part 1: Examine the Network Requirements

Part 2: Design the VLSM Addressing Scheme

Part 3: Assign IP Addresses to Devices and Verify Connectivity

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 `[[DisplayNet]]`. The network has the following requirements:

- `[[S1Name]]` LAN will require `[[HostReg1]]` host IP addresses
- `[[S2Name]]` LAN will require `[[HostReg2]]` host IP addresses
- `[[S3Name]]` LAN will require `[[HostReg3]]` host IP addresses
- `[[S4Name]]` LAN will require `[[HostReg4]]` host IP addresses

How many subnets are needed in the network topology? **5**

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

- Which subnet mask will accommodate the number of IP addresses required for `[[S1Name]]`?
How many usable host addresses will this subnet support?
- Which subnet mask will accommodate the number of IP addresses required for `[[S2Name]]`?
How many usable host addresses will this subnet support?
- Which subnet mask will accommodate the number of IP addresses required for `[[S3Name]]`?
How many usable host addresses will this subnet support?
- Which subnet mask will accommodate the number of IP addresses required for `[[S4Name]]`?
How many usable host addresses will this subnet support?
- Which subnet mask will accommodate the number of IP addresses required for the connection between `[[R1Name]]` and `[[R2Name]]`?

Part 2: Design the VLSM Addressing Scheme

Step 1: Divide the `[[DisplayNet]]` network based on the number of hosts per subnet.

- Use the first subnet to accommodate the largest LAN.
- Use the second subnet to accommodate the second largest LAN.
- Use the third subnet to accommodate the third largest LAN.
- Use the fourth subnet to accommodate the fourth largest LAN.
- Use the fifth subnet to accommodate the connection between `[[R1Name]]` and `[[R2Name]]`.

Step 2: Document the VLSM subnets.

Complete the **Subnet Table**, listing the subnet descriptions (e.g. `[[S1Name]]` 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

Note: The correct answers for this table are variable depending on the scenario received. Refer to the Instructor Notes at the end of these instructions for further information. The format here follows what the student used in **Designing and Implementing a VLSM Addressing Scheme**.

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Broadcast Address

Step 3: Document the addressing scheme.

- a. Assign the first usable IP addresses to **[[R1Name]]** for the two LAN links and the WAN link.
- b. Assign the first usable IP addresses to **[[R2Name]]** for the two 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.

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 **[[R1Name]] LAN interfaces.**

Step 2: Configure IP addressing on **[[S3Name]], including the default gateway.**

Step 3: Configure IP addressing on **[[PC4Name]], including the default gateway.**

Step 4: Verify connectivity.

You can only verify connectivity from **[[R1Name]]**, **[[S3Name]]**, and **[[PC4Name]]**. However, you should be able to ping every IP address listed in the **Addressing Table**.

Suggested Scoring Rubric

Note: The majority of points are allocated to designing and documenting the addressing scheme. Implementation of the addresses in Packet Tracer is of minimal consideration.

Activity Section	Question Location	Possible Points	Earned Points
Part 1: Examine the Network Requirements	Step 1	1	
	Step 2	4	
Part 1 Total		5	
Part 2: Design the VLSM Addressing Scheme			
Complete Subnet Table		25	
Document Addressing		40	
Part 2 Total		65	
Packet Tracer Score		30	
Total Score		100	

ID:[indexAdds][indexNames][indexTopos]

Instructor Notes:

The following addressing tables represent the three possible addressing scenarios the student may get. Note that the Device column is independent of the addressing scheme. For example, a student could receive the device names from Scenario 1 and the addressing scheme from Scenario 3. In addition, the three possible topologies are also independent of the device names and the addressing scheme (click reset in the activity to see the different topologies). Therefore, this activity uses three independent variables with three possible values each for a total of 27 possible combinations (3 device names x 3 addressing schemes x 3 topologies = 27 isomorphs).

Scenario 1 - Network Address: 10.11.48.0/24

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Last Usable Host Address	Broadcast Address
Host-D LAN	60	10.11.48.0/26	10.11.48.1	10.11.48.62	10.11.48.63
Host-B LAN	30	10.11.48.64/27	10.11.48.65	10.11.48.94	10.11.48.95
Host-A LAN	14	10.11.48.96/28	10.11.48.97	10.11.48.110	10.11.48.111
Host-C LAN	6	10.11.48.112/29	10.11.48.113	10.11.48.118	10.11.48.119
WAN Link	2	10.11.48.120/30	10.11.48.121	10.11.48.122	10.11.48.123

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Device	Interface	Address	Subnet Mask	Default Gateway
Building1	G0/0	10.11.48.97	255.255.255.240	N/A
	G0/1	10.11.48.65	255.255.255.224	N/A
	S0/0/0	10.11.48.121	255.255.255.252	N/A
Building2	G0/0	10.11.48.113	255.255.255.248	N/A
	G0/1	10.11.48.1	255.255.255.192	N/A
	S0/0/0	10.11.48.122	255.255.255.252	N/A
ASW1	VLAN 1	10.11.48.98	255.255.255.240	10.11.48.97
ASW2	VLAN 1	10.11.48.66	255.255.255.224	10.11.48.65
ASW3	VLAN 1	10.11.48.114	255.255.255.248	10.11.48.113
ASW4	VLAN 1	10.11.48.2	255.255.255.192	10.11.48.1
Host-A	NIC	10.11.48.110	255.255.255.240	10.11.48.97
Host-B	NIC	10.11.48.94	255.255.255.224	10.11.48.65
Host-C	NIC	10.11.48.118	255.255.255.248	10.11.48.113
Host-D	NIC	10.11.48.62	255.255.255.192	10.11.48.1

Building 1

```
en
conf t
int g0/0
ip add 10.11.48.97 255.255.255.240
no shut
int g0/1
ip add 10.11.48.65 255.255.255.224
no shut
```

ASW3

```
en
conf t
int vlan 1
ip add 10.11.48.114 255.255.255.248
no shut
ip def 10.11.48.113
```

Scenario 2 - Network Address: 172.31.103.0/24

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

Device	Interface	Address	Subnet Mask	Default Gateway
Branch1	G0/0	172.31.103.1	255.255.255.224	N/A
	G0/1	172.31.103.33	255.255.255.224	N/A
	S0/0/0	172.31.103.97	255.255.255.252	N/A
Branch2	G0/0	172.31.103.65	255.255.255.240	N/A
	G0/1	172.31.103.81	255.255.255.240	N/A
	S0/0/0	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

Branch 1

```

en
conf t
int g0/0
ip add 172.31.103.1 255.255.255.224
no shut
int g0/1
    
```

```
ip add 172.31.103.33 255.255.255.224  
no shut
```

Room-312

```
en  
conf t  
int vlan 1  
ip add 172.31.103.66 255.255.255.240  
no shut  
ip def 172.31.103.65
```

Scenario 3 - Network Address: 192.168.72.0/24

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Last Usable Host Address	Broadcast Address
User-4 LAN	58	192.168.72.0/26	192.168.72.1	192.168.72.62	192.168.72.63
User-3 LAN	29	192.168.72.64/27	192.168.72.65	192.168.72.94	192.168.72.95
User-2 LAN	15	192.168.72.96/27	192.168.72.97	192.168.72.126	192.168.72.127
User-1 LAN	7	192.168.72.128/28	192.168.72.129	192.168.72.142	192.168.72.143
WAN Link	2	192.168.72.144/30	192.168.72.145	192.168.72.146	192.168.72.147

Device	Interface	Address	Subnet Mask	Default Gateway
Remote-Site1	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	192.168.72.145	255.255.255.252	N/A
Remote-Site2	G0/0	192.168.72.65	255.255.255.224	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
Sw1	VLAN 1	192.168.72.130	255.255.255.240	192.168.72.129
Sw2	VLAN 1	192.168.72.98	255.255.255.224	192.168.72.97
Sw3	VLAN 1	192.168.72.66	255.255.255.224	192.168.72.65
Sw4	VLAN 1	192.168.72.2	255.255.255.192	192.168.72.1
User-1	NIC	192.168.72.142	255.255.255.240	192.168.72.129
User-2	NIC	192.168.72.126	255.255.255.224	192.168.72.97
User-3	NIC	192.168.72.94	255.255.255.224	192.168.72.65
User-4	NIC	192.168.72.62	255.255.255.192	192.168.72.1

Remote-Site1

```

en
conf t
int g0/0
ip add 192.168.72.129 255.255.255.240
no shut
int g0/1
    
```



```
ip add 192.168.72.97 255.255.255.224  
no shut
```

Sw-3

```
en  
conf t  
int vlan 1  
ip add 192.168.72.66 255.255.255.224  
no shut  
ip def 192.168.72.65
```