

## 11.10.1 Packet Tracer - Design and Implement a VLSM Addressing Scheme (Instructor Version)

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

### 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

In this lab you will design a VLSM addressing scheme given a network address and host requirements. You will configure addressing on routers, switches, and network hosts.

- Design a VLSM IP addressing scheme given requirements.
- Configure addressing on network devices and hosts.
- Verify IP connectivity.
- Troubleshoot connectivity issues as required.

### Background / Scenario

You have been asked to design, implement, and test an addressing scheme for a customer. The customer has given you the network address that is suitable for the network, the topology, and the host requirements. You will implement and test your design.

## Instructions

You have been given the network address **[[DisplayNet]]** by your customer. The host address requirements are:

## Requirements

### Host Requirements:

LAN	Number of Addresses Required
[[S1Name]] LAN	[[HostReg1]]
[[S2Name]] LAN	[[HostReg2]]
[[S3Name]] LAN	[[HostReg3]]
[[S4Name]] LAN	[[HostReg4]]

### Design Requirements

- Create the addressing design. Follow guidelines provided in the curriculum regarding the order of the subnets.
- The subnets should be contiguous. There should be no unused address space between subnets.
- Provide the most efficient subnet possible for the point-to-point link between the routers.
- Document your design in a table such as the one below.

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

### Configuration Requirements

**Note:** You will configure addressing on **all** devices and hosts in the network.

- Assign the first usable IP addresses in the appropriate subnets to **[[R1Name]]** for the two LAN links and the WAN link.
- Assign the first usable IP addresses in the appropriate subnets to **[[R2Name]]** for the two LANs links. Assign the last usable IP address for the WAN link.
- Assign the second usable IP addresses in the appropriate subnets to the switches.
- The switch management interface should be reachable from hosts on all of the LANs.
- Assign the last usable IP addresses in the appropriate subnets to the hosts.

If the addressing design and implementation are correct, all hosts and devices should be reachable over the network.

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: 10.1.1.0/24

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Last Usable Host Address	Broadcast Address
WS-2 LAN	47	10.1.1.0/26	10.1.1.1	10.1.1.62	10.1.1.63
ES-2 LAN	28	10.1.1.64/27	10.1.1.65	10.1.1.94	10.1.1.95
ES-1 LAN	11	10.1.48.96/28	10.1.1.97	10.1.1.110	10.1.1.111
WS-1 LAN	5	10.1.48.112/29	10.1.1.113	10.1.1.118	10.1.1.119
WAN Link	2	10.1.48.120/30	10.1.1.121	10.1.1.122	10.1.1.123

Device Addressing Table

Device	Interface	Address	Subnet Mask	Default Gateway
East	G0/0	10.1.1.97	255.255.255.240	N/A
	G0/1	10.1.1.65	255.255.255.224	N/A
	S0/0/0	10.1.1.121	255.255.255.252	N/A
West	G0/0	10.1.1.113	255.255.255.248	N/A
	G0/1	10.1.1.1	255.255.255.192	N/A
	S0/0/0	10.1.1.122	255.255.255.252	N/A
ES-1	VLAN 1	10.1.1.98	255.255.255.240	10.1.1.97
ES-2	VLAN 1	10.1.1.66	255.255.255.224	10.1.1.65
WS-1	VLAN 1	10.1.1.114	255.255.255.248	10.1.1.113
WS-2	VLAN 1	10.1.1.2	255.255.255.192	10.1.1.1
PC E1-22	NIC	10.1.1.110	255.255.255.240	10.1.1.97
PC E2-47	NIC	10.1.1.94	255.255.255.224	10.1.1.65
PC W1-201	NIC	10.1.1.118	255.255.255.248	10.1.1.113
PC W2-87	NIC	10.1.1.62	255.255.255.192	10.1.1.1

### East

```
en
conf t
int g0/0
ip add 10.1.1.97 255.255.255.240
no shut
int g0/1
ip add 10.1.1.65 255.255.255.224
no shut
int s0/0/0
ip add 10.1.1.121 255.255.255.252
no shut
```

### West

```
en
conf t
int g0/0
ip add 10.1.1.113 255.255.255.248
no shut
int g0/1
ip add 10.1.1.1 255.255.255.192
no shut
int s0/0/0
ip add 10.1.1.122 255.255.255.252
no shut
```

### ES-1

```
en
conf t
int vlan 1
ip add 10.1.1.98 255.255.255.240
no shut
ip def 10.1.1.97
```

### ES-2

```
en
conf t
int vlan 1
ip add 10.1.1.66 255.255.255.224
no shut
ip def 10.1.1.65
```

### WS-1

```
en
conf t
int vlan 1
ip add 10.1.1.114 255.255.255.248
no shut
ip def 10.1.1.113
```

**WS-2**

```

en
conf t
int vlan 1
ip add 10.1.1.2 255.255.255.192
no shut
ip def 10.1.1.1
    
```

**Scenario 2 - Network Address: 172.19.67.0/24**

**Subnet Table**

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Last Usable Host Address	Broadcast Address
HQ-1 LAN	19	172.19.67.0/27	172.19.67.1	172.19.67.30	172.19.67.31
HQ-2 LAN	23	172.19.67.32/27	172.19.67.33	172.19.67.62	172.19.67.63
Remote-1 LAN	11	172.19.67.64/28	172.19.67.65	172.19.67.78	172.19.67.79
Remote-2 LAN	7	172.19.67.80/28	172.19.67.81	172.19.67.94	172.19.67.95
WAN Link	2	172.19.67.96/30	172.19.67.97	172.19.67.98	172.19.67.99

**Device Addressing Table**

Device	Interface	Address	Subnet Mask	Default Gateway
HQ	G0/0	172.19.67.1	255.255.255.224	N/A
	G0/1	172.19.67.33	255.255.255.224	N/A
	S0/0/0	172.19.67.97	255.255.255.252	N/A
Remote	G0/0	172.19.67.65	255.255.255.240	N/A
	G0/1	172.19.67.81	255.255.255.240	N/A
	S0/0/0	172.19.67.98	255.255.255.252	N/A
HQ-1	VLAN 1	172.19.67.2	255.255.255.224	172.19.67.1
HQ-2	VLAN 1	172.19.67.34	255.255.255.224	172.19.67.33
Remote-1	VLAN 1	172.19.67.66	255.255.255.240	172.19.67.65
Remote-2	VLAN 1	172.19.67.82	255.255.255.240	172.19.67.81
WS116	NIC	172.19.67.30	255.255.255.224	172.19.67.1
WS145	NIC	172.19.67.62	255.255.255.224	172.19.67.33
WS203	NIC	172.19.67.78	255.255.255.240	172.19.67.65
WS234	NIC	172.19.67.94	255.255.255.240	172.19.67.81

**HQ**

```

en
conf t
    
```

```
int g0/0
ip add 172.19.67.1 255.255.255.224
no shut
int g0/1
ip add 172.19.67.33 255.255.255.224
no shut
int s0/0/0
ip add 172.19.67.97 255.255.255.252
no shut
```

### Remote

```
en
conf t
int g0/0
ip add 172.19.67.65 255.255.255.240
no shut
int g0/1
ip add 172.19.67.81 255.255.255.240
no shut
int s0/0/0
ip add 172.19.67.98 255.255.255.252
no shut
```

### HQ-1

```
en
conf t
int vlan 1
ip add 172.19.67.2 255.255.255.224
no shut
ip def 172.19.67.1
```

### HQ-2

```
en
conf t
int vlan 1
ip add 172.19.67.34 255.255.255.224
no shut
ip def 172.19.67.33
```

### Remote-1

```
en
conf t
int vlan 1
ip add 172.19.67.66 255.255.255.240
no shut
ip def 172.19.67.65
```

### Remote-2

```
en
conf t
int vlan 1
ip add 172.19.67.82 255.255.255.240
no shut
ip def 172.19.67.81
```

### Scenario 3 - Network Address: 192.168.203.0/24

Subnet Table

Subnet Description	Number of Hosts Needed	Network Address/CIDR	First Usable Host Address	Last Usable Host Address	Broadcast Address
PS-115 LAN	31	192.168.203.0/26	192.168.203.1	192.168.203.62	192.168.203.63
PS-101 LAN	19	192.168.203.64/27	192.168.203.65	192.168.203.94	192.168.203.95
PD-2 LAN	21	192.168.203.96/27	192.168.203.97	192.168.203.126	192.168.203.127
PD-1 LAN	14	192.168.203.128/28	192.168.203.129	192.168.203.142	192.168.203.143
WAN Link	2	192.168.203.144/30	192.168.203.145	192.168.203.146	192.168.203.147

Device Addressing Table

Device	Interface	Address	Subnet Mask	Default Gateway
Police	G0/0	192.168.203.129	255.255.255.240	N/A
	G0/1	192.168.203.97	255.255.255.224	N/A
	S0/0/0	192.168.203.145	255.255.255.252	N/A
Schools	G0/0	192.168.203.65	255.255.255.224	N/A
	G0/1	192.168.203.1	255.255.255.192	N/A
	S0/0/0	192.168.203.146	255.255.255.252	N/A
PD-1	VLAN 1	192.168.203.130	255.255.255.240	192.168.203.129
PD-2	VLAN 1	192.168.203.98	255.255.255.224	192.168.203.97
PS-101	VLAN 1	192.168.203.66	255.255.255.224	192.168.203.65
PS-115	VLAN 1	192.168.203.2	255.255.255.192	192.168.203.1
PD-1-11	NIC	192.168.203.142	255.255.255.240	192.168.203.129
PD-2-23	NIC	192.168.203.126	255.255.255.224	192.168.203.97
PS-101-87	NIC	192.168.203.94	255.255.255.224	192.168.203.65
PS-115-12	NIC	192.168.203.62	255.255.255.192	192.168.203.1

#### Police

```

en
conf t
int g0/0
ip add 192.168.203.129 255.255.255.240
no shut
int g0/1
ip add 192.168.203.97 255.255.255.224
no shut
int s0/0/0
ip address 192.168.203.145 255.255.255.252
    
```

```
no shut
```

### Schools

```
en
conf t
int g0/0
ip add 192.168.203.65 255.255.255.224
no shut
int g0/1
ip add 192.168.203.1 255.255.255.192
no shut
int s0/0/0
ip address 192.168.203.146 255.255.255.252
no shut
```

### PD-1

```
en
conf t
int vlan 1
ip add 192.168.203.130 255.255.255.240
no shut
ip def 192.168.203.129
```

### PD-2

```
en
conf t
int vlan 1
ip add 192.168.203.98 255.255.255.224
no shut
ip def 192.168.203.97
```

### PS-101

```
en
conf t
int vlan 1
ip add 192.168.203.66 255.255.255.224
no shut
ip def 192.168.203.65
```

### PS-115

```
en
conf t
int vlan 1
ip add 192.168.203.2 255.255.255.192
no shut
ip def 192.168.203.1
```