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 |
| [[R1Name]] | G0/1 | [[R1G1Add]] | [[R1G1Sub]] | N/A |
| [[R1Name]] | S0/0/0 | [[R1S0Add]] | [[R1S0Sub]] | N/A |
| [[R2Name]] | G0/0 | [[R2G0Add]] | [[R2G0Sub]] | N/A |
| [[R2Name]] | G0/1 | [[R2G1Add]] | [[R2G1Sub]] | N/A |
| [[R2Name]] | 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 |
| --- | --- | --- | --- | --- |
| blank | blank | blank | blank | blank |
| blank | blank | blank | blank | blank |
| blank | blank | blank | blank | blank |
| blank | blank | blank | blank | blank |
| blank | blank | blank | blank | blank |

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]]

End of document

# 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 |
| East | G0/1 | 10.1.1.65 | 255.255.255.224 | N/A |
| East | 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 |
| West | G0/1 | 10.1.1.1 | 255.255.255.192 | N/A |
| West | 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 |
| HQ | G0/1 | 172.19.67.33 | 255.255.255.224 | N/A |
| HQ | 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 |
| Remote | G0/1 | 172.19.67.81 | 255.255.255.240 | N/A |
| Remote | 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 |
| Police | G0/1 | 192.168.203.97 | 255.255.255.224 | N/A |
| Police | 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 |
| Schools | G0/1 | 192.168.203.1 | 255.255.255.192 | N/A |
| Schools | 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