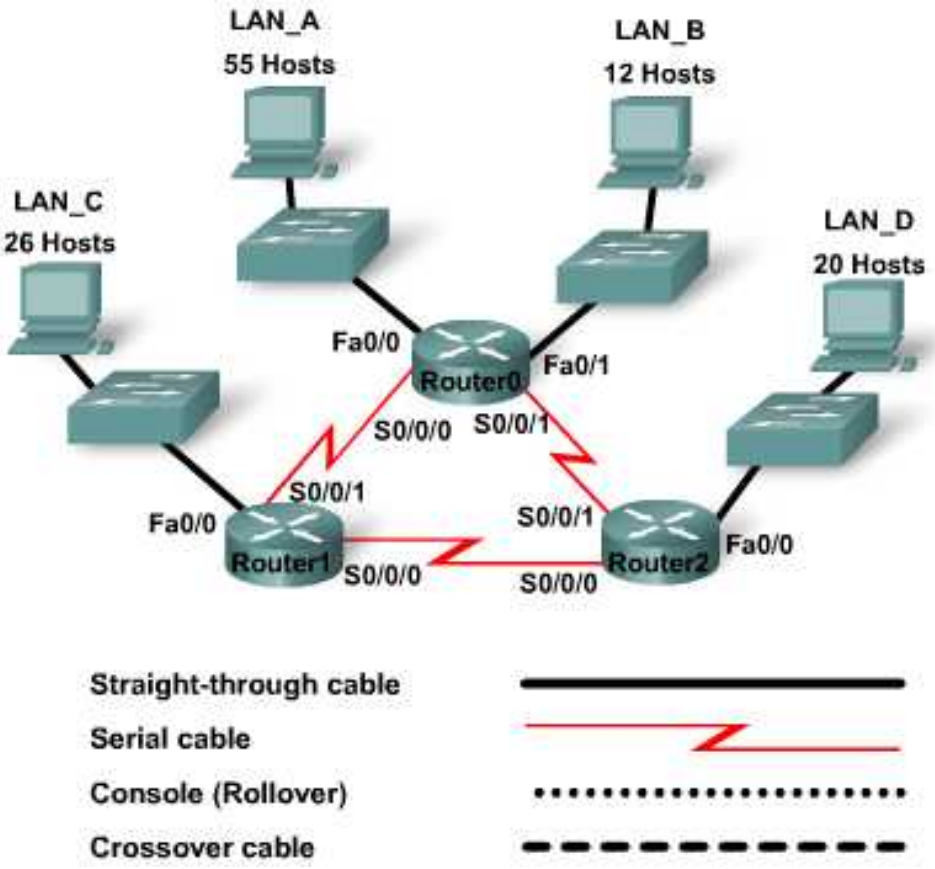
Lab 4.2.5 Calculating a VLSM Addressing Scheme



Objectives

- Determine the number of subnets needed.
- Determine the number of hosts needed for each subnet.
- Design an appropriate addressing scheme using VLSM.
- Assign IP configurations to device interfaces.
- Examine the use of the available network address space.

Background / Preparation

This lab explores the use of VLSM to meet the needs of a network topology. In this lab, you will assess the topology, determine the addressing scheme to meet its needs, and prepare documentation for the addressing. You have been assigned the 192.168.1.0/24 network to address this network.

Step 1: Examine the network requirements

Use the topology diagram to determine the answers to the questions below. Remember that IP addresses will be needed for each LAN and WAN interface.

a. How many subnets are needed? _____

b. What is the maximum number of IP addresses that are needed for a single subnet? _____

c. How many host IP addresses are needed for the second largest LAN? _____

d. How many host IP addresses are needed for the next-largest LAN? _____

e. How many host IP addresses are needed for the smallest LAN? _____

f. How many host IP addresses are needed for each WAN link? _____

g. What is the total number of host IP addresses that are needed for these networks? _____

h. What is the total number of host IP addresses that are available in the 192.168.1.0/24 network? _____

i. If the network is subnetted to provide 7 usable subnets, can the addressing requirements be met?

_____

Step 2: Design an IP addressing scheme to fit the network requirements

a. Determine the subnet information for the largest subnet needed.

What is the smallest size subnet that can be used to meet this requirement? _____

Will a subnet of this size allow for future growth of 10 – 15%? _____

Fill in the chart below with the appropriate information. Assign the first available subnet on the 192.168.1.0 network to this LAN.

LAN_A Subnet

Network Address	Decimal Subnet Mask	CIDR Subnet Mask	First Usable IP Address	Last Usable IP Address	Broadcast Address

b. Assign the next available subnet to the next-largest LAN.

c. Fill in the chart below with the appropriate information.

LAN_C Subnet

Network Address	Decimal Subnet Mask	CIDR Subnet Mask	First Usable IP Address	Last Usable IP Address	Broadcast Address

d. Continue assigning subnets of appropriate sizes to the remaining LANs.

LAN_D Subnet

Network Address	Decimal Subnet Mask	CIDR Subnet Mask	First Usable IP Address	Last Usable IP Address	Broadcast Address

LAN_B Subnet

Network Address	Decimal Subnet Mask	CIDR Subnet Mask	First Usable IP Address	Last Usable IP Address	Broadcast Address

Step 3: Assign subnets to the WAN links between routers

Start with the next available subnet. Complete the chart below with the addressing information.

Network Address	Decimal Subnet Mask	CIDR Subnet Mask	First Usable IP Address	Last Usable IP Address	Broadcast Address
WAN link between Router0 and Router1					
WAN link between Router1 and Router 2					
WAN link between Router2 and Router0					

Step 4: Assign IP configurations to router interfaces

Complete the chart below with IP assignments for router interfaces. Use the first available host IP address for the router's LAN interface.

Device	Interface	IP Address	Subnet Mask
Router0	Fa0/0		
	Fa0/1		
	S0/0/0		
	S0/0/1		
Router1	Fa0/0		
	S0/0/0		
	S0/0/1		
Router2	Fa0/0		
	S0/0/0		
	S0/0/1		

Step 5: Assign IP configurations to workstations

One workstation has been provided to represent each LAN. Complete the chart below with IP configuration information for each representative workstation.

LAN	IP Address	Subnet Mask	Default Gateway
LAN_A			
LAN_B			
LAN_C			
LAN_D			

Step 6: Reflection

a. What is the last host IP address that will be used by this VLSM scheme?

_____

b. Your largest LAN can accommodate 15% growth with your VLSM scheme. Which of the other LANs can also accomplish this goal?

_____

c. If you decided to change the masks on those LANs that did not meet the 15% growth goal, would you have enough addresses to complete your scheme? _____.

d. What would the new network addresses be for the four LANs?

LAN_A: _____

LAN_C: _____

LAN_D: _____

LAN_B: _____

e. If you wanted to provide redundant backup WAN links between your routers, how many more subnets would you need? _____

f. Could you do it with this VLSM scheme? _____

g. Summarize the advantages of using VLSM for network addressing schemes:

_____

_____

_____

_____