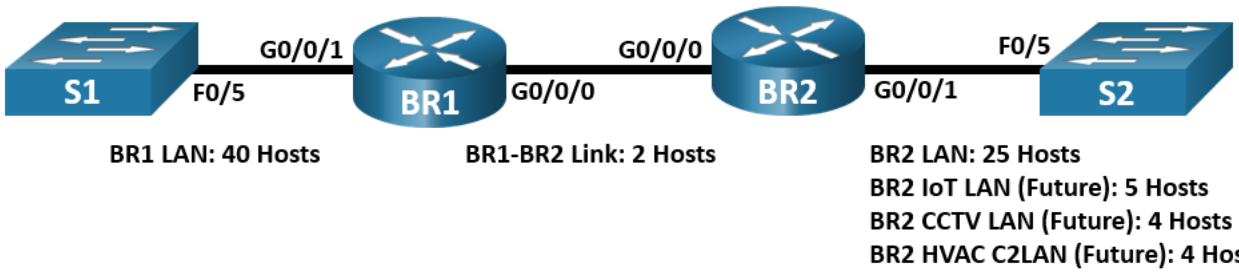
Packet Tracer - Design and Implement a VLSM Addressing Scheme - Physical Mode

Topology



Objectives

Part 1: Examine Network Requirements

Part 2: Design the VLSM Address Scheme

Part 3: Cable and Configure the IPv4 Network

Background / Scenario

Variable Length Subnet Mask (VLSM) was designed to avoid wasting IP addresses. With VLSM, a network is subnetted and then re-subnetted. This process can be repeated multiple times to create subnets of various sizes, based on the number of hosts required in each subnet. Effective use of VLSM requires address planning.

In this Packet Tracer Physical Mode (PTPM) activity, use the 192.168.33.128/25 network address to develop an address scheme for the network that is displayed in the topology diagram. Use VLSM to meet the IPv4 addressing requirements. After you have designed the VLSM address scheme, you will configure the interfaces on the routers with the appropriate IP address information. The future LANS at BR2 will need to have addresses allocated, but no interfaces will be configured at this time.

Instructions

Part 1: Examine Network Requirements

In this part, you will examine the network requirements to develop a VLSM address scheme for the network that is displayed in the topology diagram using the 192.168.33.128/25 network address.

Step 1: Determine how many host addresses and subnets are available.

How many host addresses are available in a /25 network?

128 hosts, 126 valid hosts

What is the total number of host addresses needed in the topology diagram?

80 hosts

How many subnets are needed in the network topology?

6 subnets

Step 2: Determine the largest subnet.

What is the subnet description (e.g. BR1 LAN or BR1-BR2 link)?

BR1-LAN, 40 hosts

How many IP addresses are required in the largest subnet?

40 IP addresses

What subnet mask can support that many host addresses?

255.255.255.192

How many total host addresses can that subnet mask support?

62 host addresses

Can you subnet the 192.168.33.128/25 network address to support this subnet?

Yes, I can.

What are the network addresses that would result from this subnetting?

192.168.33.128/26 and 192.168.33.192/26

Use the first network address for this subnet.

Step 3: Determine the second largest subnet.

What is the subnet description?

BR2-LAN

How many IP addresses are required for the second largest subnet?

25 IP addresses

What subnet mask can support that many host addresses?

255.255.255.192

How many total host addresses can that subnet mask support?

62 valid host addresses

Can you subnet the remaining subnet again and still support this subnet?

Yes, I can

What are the network addresses that would result from this subnetting?

192.168.33.192/27 and 192.168.33.224/27

Use the first network address for this subnet.

Step 4: Determine the third largest subnet.

What is the subnet description?

BR2-IoT LAN

How many IP addresses are required for the next largest subnet?

5 IP addresses

What subnet mask can support that many host addresses?

255.255.255.224

How many total host addresses can that subnet mask support?

30 valid host addresses

Can you subnet the remaining subnet again and still support this subnet?

Yes, I can

What are the network addresses that would result from this subnetting?

192.168.33.224/29 | 192.168.33.232/29 | 192.168.33.240/29 | 192.168.33.248/29

Use the first network address for this subnet.

Use the second network address for the CCTV LAN.

Use the third network address for the HVAC C2 LAN.

Step 5: Determine the fourth largest subnet.

What is the subnet description?

BR1-BR2 Link

How many IP addresses are required for the next largest subnet?

2 valid host addresses

What subnet mask can support that many host addresses?

255.255.255.248

How many total host addresses can that subnet mask support?

6 valid host addresses

Can you subnet the remaining subnet again and still support this subnet?

Yes, I can

What are the network addresses that would result from this subnetting?

192.168.33.248/30 and 192.168.33.252/30

Use the first network address for this subnet.

Part 2: Design the VLSM Address Scheme

In this part, you will document the VLSM addressing scheme.

Step 1: Calculate the subnet information.

Use the information that you obtained in Part 1 to fill in the following table.

Subnet Description	Number of Hosts Needed	Network Address /CIDR	First Host Address	Broadcast Address
BR1 LAN	40	/26	192.168.33.129	192.168.33.191
BR2 LAN	25	/27	192.168.33.191	192.168.33.223
BR2 IoT LAN	5	/29	192.168.33.225	192.168.33.231
BR2 CCTV LAN	4	/29	192.168.33.233	192.168.33.239

Subnet Description	Number of Hosts Needed	Network Address /CIDR	First Host Address	Broadcast Address
BR2 HVAC C2LAN	4	/29	192.168.33.241	192.168.33.247
BR1-BR2 Link	2	/30	192.168.33.249	192.168.33.251

Step 2: Complete the device interface address table.

Assign the first host address in the subnet to the Ethernet interfaces. BR1 should be assigned the first host address in the BR1-BR2 Link.

Device	Interface	IP Address	Subnet Mask	Device Interface
BR1	G0/0/0	192.168.33.249	255.255.255.252	BR1-BR2 Link
	G0/0/1	192.168.33.129	255.255.255.192	40 Host LAN
BR2	G0/0/0	192.168.33.250	255.255.255.252	BR1-BR2 Link
	G0/0/1	192.168.33.193	255.255.255.224	25 Host LAN

Part 3: Cable and Configure the IPv4 Network

In this part, you will cable the network to match the topology. You will configure the three routers using the VLSM address scheme that you developed in Part 2.

Step 1: Cable the network.

a. In the main wiring closet, click and drag the routers and switches from the inventory shelf to the rack.

b. Cable the network as shown in the topology and power on the devices as necessary.

Step 2: Configure basic settings on each router.

a. Establish a console connection between a router and the PC on the table.

b. From the terminal window on the PC, establish a terminal session to the router.

c. Assign the correct device name to each of the two routers.

d. Assign **class** as the privileged EXEC encrypted password for both routers.

e. Assign **cisco** as the console password and enable login for the routers.

f. Assign **cisco** as the vty password and enable login for the routers.

g. Encrypt the plaintext passwords for the routers.

h. Create a banner that will warn anyone accessing the device that unauthorized access is prohibited on both routers.

Step 3: Configure the interfaces on each router.

a. Assign an IP address and subnet mask to each interface using the table that you completed in Part 2.

b. Configure an interface description for each interface.

c. Activate the interfaces.

Step 4: Save the configuration on all devices.

Step 5: Test connectivity.

a. From BR1, ping G0/0/0 interface on BR2.

b. From BR2, ping G0/0/0 interface on BR1.

c. Troubleshoot connectivity issues if pings were not successful.

Note: Pings to the GigabitEthernet LAN interfaces on other routers will not be successful. A routing protocol needs to be in place for other devices to be aware of those subnets. The GigabitEthernet interfaces also need to be in an up/up state before a routing protocol can add the subnets to the routing table. The focus of this lab is on VLSM and configuring the interfaces.

Reflection Question

Can you think of a shortcut for calculating the network addresses of consecutive /30 subnets?