Lab 3.5.2: Subnetting Scenario 1
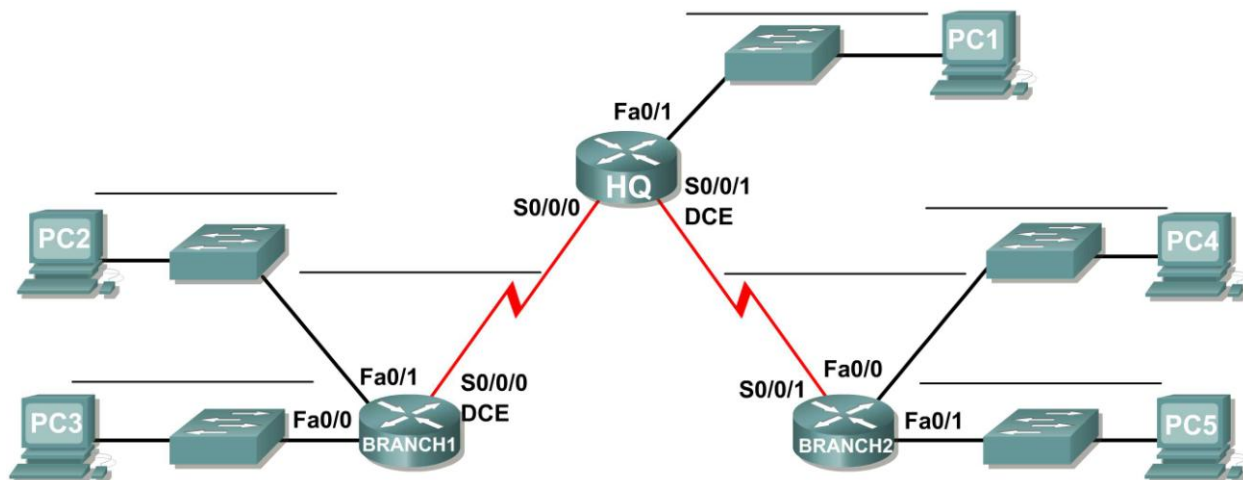
Topology Diagram

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
HQ	Fa0/1			N/A
	S0/0/0			N/A
	S0/0/1			N/A
BRANCH1	Fa0/0			N/A
	Fa0/1			N/A
	S0/0/0			N/A
BRANCH2	Fa0/0			N/A
	Fa0/1			N/A
	S0/0/1			N/A
PC1	NIC			
PC2	NIC			
PC3	NIC			
PC4	NIC			
PC5	NIC			

Learning Objectives

Upon completion of this lab, you will be able to:

- Determine the number of subnets needed.
- Determine the number of hosts needed.
- Design an appropriate addressing scheme.
- Assign addresses and subnet mask pairs to device interfaces and hosts.
- Examine the use of the available network address space.
- Determine how static routing could be applied to the network.

Scenario

In this lab, you have been given the network address 192.168.9.0/24 to subnet and provide the IP addressing for the network shown in the Topology Diagram. The network has the following addressing requirements:

- The BRANCH1 LAN 1 will require 10 host IP addresses.
- The BRANCH1 LAN 2 will require 10 host IP addresses.
- The BRANCH2 LAN 1 will require 10 host IP addresses.
- The BRANCH2 LAN 2 will require 10 host IP addresses.
- The HQ LAN will require 20 host IP addresses.
- The link from HQ to BRANCH1 will require an IP address for each end of the link.
- The link from HQ to BRANCH2 will require an IP address for each end of the link.

(**Note:** Remember that the interfaces of network devices are also host IP addresses and are included in the above addressing requirements.)

Task 1: Examine the Network Requirements.

Examine the network requirements and answer the questions below. Keep in mind that IP addresses will be needed for each of the LAN interfaces.

How many subnets are needed? _____

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

How many IP addresses are needed for each of the branch LANs? _____

What is the total number of IP addresses that are needed? _____

Task 2: Design an IP Addressing Scheme.

Step 1: Subnet the 192.168.9.0 network into the appropriate number of subnets.

What will the subnet mask be for the subnetworks? _____

How many usable host IP addresses are there per subnet? _____

Fill in the following chart with the subnet information.

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0				
1				
2				

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
3				
4				
5				
6				
7				

Step 2: Assign the subnets to the network shown in the Topology Diagram.

When assigning the subnets, keep in mind that routing will need to occur to allow information to be sent throughout the network. The subnets will be assigned to the networks to allow for route summarization on each of the routers.

1. Assign first subnet (lowest subnet) to the LAN connected to the Fa0/1 interface of BRANCH2. What is the subnet address? _____

2. Assign second subnet to LAN connected to the Fa0/0 interface of BRANCH2. What is the subnet address? _____

3. Assign third subnet to LAN connected to the Fa0/0 interface of BRANCH1. What is the subnet address? _____

4. Assign fourth subnet to LAN connected to the Fa0/1 interface of BRANCH1. What is the subnet address? _____

5. Assign fifth subnet to the WAN link from HQ to BRANCH1. What is the subnet address? _____

6. Assign sixth subnet to the WAN link from HQ to BRANCH2. _____

7. Assign seventh subnet to LAN connected to the Fa0/1 interface of HQ. What is the subnet address? _____

Note: The highest subnet will not be required in this topology.

Task 3: Assign IP Addresses to the Network Devices

Assign the appropriate addresses to the device interfaces. Document the addresses to be used in the Addressing Table provided under the Topology Diagram.

Step 1: Assign addresses to the HQ router.

1. Assign the first valid host address in the HQ LAN subnet to the LAN interface.

2. Assign the first valid host address in link from HQ to BRANCH1 subnet to the S0/0/0 interface.

3. Assign the first valid host address in link from HQ to BRANCH2 subnet to the S0/0/1 interface.

Step 2: Assign addresses to the BRANCH1 router.

1. Assign the first valid host address in the BRANCH1 LAN 1 subnet to the Fa0/0 LAN interface.

2. Assign the first valid host address in the BRANCH1 LAN 2 subnet to the Fa0/1 LAN interface.

3. Assign the last valid host address in link from HQ to BRANCH1 subnet to the WAN interface.

Step 3: Assign addresses to the BRANCH2 router.

1. Assign the first valid host address in the BRANCH2 LAN 1 subnet to the Fa0/0 LAN interface.

2. Assign the first valid host address in the BRANCH2 LAN 2 subnet to the Fa0/1 LAN interface.

3. Assign the last valid host address in link from HQ to BRANCH2 subnet to the WAN interface.

Step 4: Assign addresses to the host PCs.

1. Assign the last valid host address in the HQ LAN subnet to PC1.

2. Assign the last valid host address in the BRANCH1 LAN 1 subnet to PC2.

3. Assign the last valid host address in the BRANCH1 LAN 2 subnet to PC3.

4. Assign the last valid host address in the BRANCH2 LAN 1 subnet to PC4.

5. Assign the last valid host address in the BRANCH2 LAN 2 subnet to PC5.

Task 4: Test the Network Design.

Apply your addressing scheme. Check to see that all devices on directly connected networks can ping each other.

Task 5: Reflection

How many IP address in the 192.168.9.0 network are unused or unusable in this design? _____

What would the command be to add a default static route on the WAN interface of the BRANCH1 router?

_____

Can both of the BRANCH1 LANs be summarized into one route on the HQ router? _____

What would be the command used to add this summary route to the routing table?

_____

Can both of the BRANCH2 LANs be summarized into one route on the HQ router? _____

What would be the command used to add this summary route to the routing table?

_____

Can the HQ LAN and both of the BRANCH1 LANs be summarized into one route on the BRANCH2 router? This summarized route should also include the link between the HQ and BRANCH1 routers.
_____

What would be the command used to add this summary route to the routing table?

_____