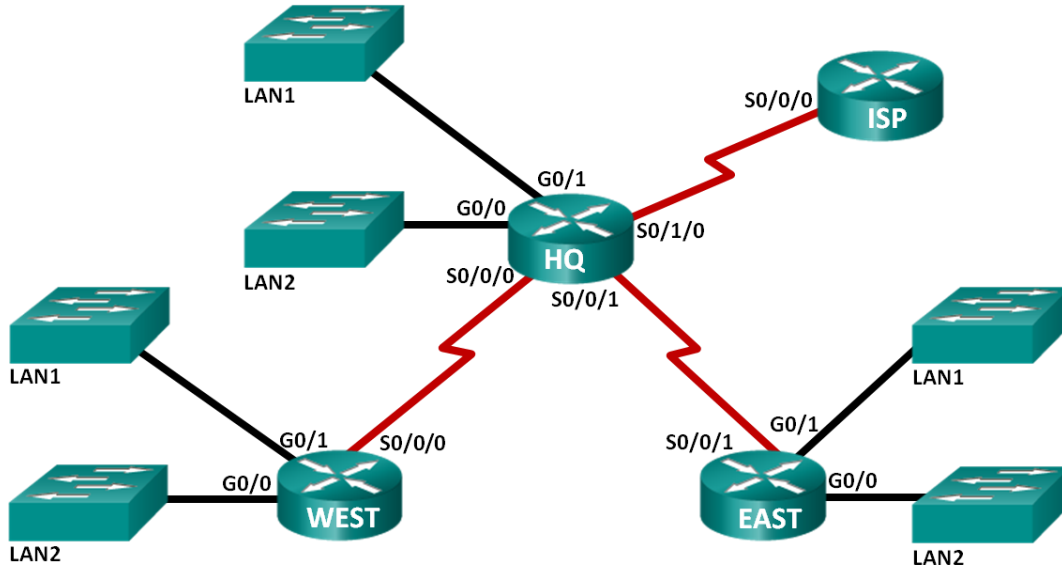


Lab – Calculating Summary Routes with IPv4 and IPv6

Topology



Addressing Table

Subnet	IPv4 Address	IPv6 Address
HQ LAN1	192.168.64.0/23	2001:DB8:ACAD:E::/64
HQ LAN2	192.168.66.0/23	2001:DB8:ACAD:F::/64
EAST LAN1	192.168.68.0/24	2001:DB8:ACAD:1::/64
EAST LAN2	192.168.69.0/24	2001:DB8:ACAD:2::/64
WEST LAN1	192.168.70.0/25	2001:DB8:ACAD:9::/64
WEST LAN2	192.168.70.128/25	2001:DB8:ACAD:A::/64
Link from HQ to EAST	192.168.71.4/30	2001:DB8:ACAD:1000::/64
Link from HQ to WEST	192.168.71.0/30	2001:DB8:ACAD:2000::/64
Link from HQ to ISP	209.165.201.0/30	2001:DB8:CC1E:1::/64

Objectives

Part 1: Calculate IPv4 Summary Routes

- Determine the summary route for the HQ LANs.
- Determine the summary route for the EAST LANs.
- Determine the summary route for the WEST LANs.
- Determine the summary route for the HQ, EAST, and WEST LANs.

Part 2: Calculate IPv6 Summary Routes

- Determine the summary route for the HQ LANs.
- Determine the summary route for the EAST LANs.
- Determine the summary route for the WEST LANs.
- Determine the summary route for the HQ, EAST, and WEST LANs.

Background / Scenario

Summary routes reduce the number of entries in routing tables and make the routing table lookup process more efficient. This process also reduces the memory requirements for the router. A single static route can be used to represent a few routes or thousands of routes.

In this lab, you will determine the summary routes for different subnets of a network. You will then determine the summary route for the entire network. Summary routes will be determined for both IPv4 and IPv6 addresses. Because IPv6 uses hexadecimal (hex) values, you will be required to convert hex to binary.

Required Resources

- 1 PC (Windows 7, Vista, or XP with Internet access)
- Optional: calculator for converting hex and decimal to binary

Part 1: Calculate IPv4 Summary Routes

In Part 1, you will determine summarized routes that can be used to reduce the size of routing tables. Fill in the tables, after each set of steps, with the appropriate IPv4 addressing information.

Step 1: List the HQ LAN1 and HQ LAN2 IP subnet mask in decimal form.

Step 2: List the HQ LAN1 and HQ LAN2 IP address in binary form.

Step 3: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the two networks?
- b. List the subnet mask for the summary route in decimal form.

Step 4: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching binary bits for HQ LAN1 and HQ LAN2 subnets.
- b. Add zeros to comprise the remainder of the network address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv4 Address	Subnet Mask	Subnet IP Address in Binary Form
HQ LAN1	192.168.64.0		
HQ LAN2	192.168.66.0		
HQ LANs Summary Address			

Step 5: List the EAST LAN1 and EAST LAN2 IP subnet mask in decimal form.

Step 6: List the EAST LAN1 and EAST LAN2 IP address in binary form.

Step 7: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the two networks?
- b. List the subnet mask for the summary route in decimal form.

Step 8: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching binary bits for EAST LAN1 and EAST LAN2 subnets.
- b. Add zeros to comprise the remainder of the network address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv4 Address	Subnet Mask	Subnet Address in Binary Form
EAST LAN1	192.168.68.0		
EAST LAN2	192.168.69.0		
EAST LANs Summary Address			

Step 9: List the WEST LAN1 and WEST LAN2 IP subnet mask in decimal form.

Step 10: List the WEST LAN1 and WEST LAN2 IP address in binary form.

Step 11: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the two networks?
- b. List the subnet mask for the summary route in decimal form.

Step 12: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching binary bits for WEST LAN1 and WEST LAN2 subnets.

Lab – Calculating Summary Routes with IPv4 and IPv6

- b. Add zeros to comprise the remainder of the network address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv4 Address	Subnet Mask	Subnet IP Address in Binary Form
WEST LAN1	192.168.70.0		
WEST LAN2	192.168.70.128		
WEST LANs Summary Address			

Step 13: List the HQ, EAST, and WEST summary route IP address and subnet mask in decimal form.

Step 14: List the HQ, EAST, and WEST summary route IP address in binary form.

Step 15: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the three networks?
- b. List the subnet mask for the summary route in decimal form.

Step 16: Copy the matching binary bits and then add all zeros to determine the summarized network address.

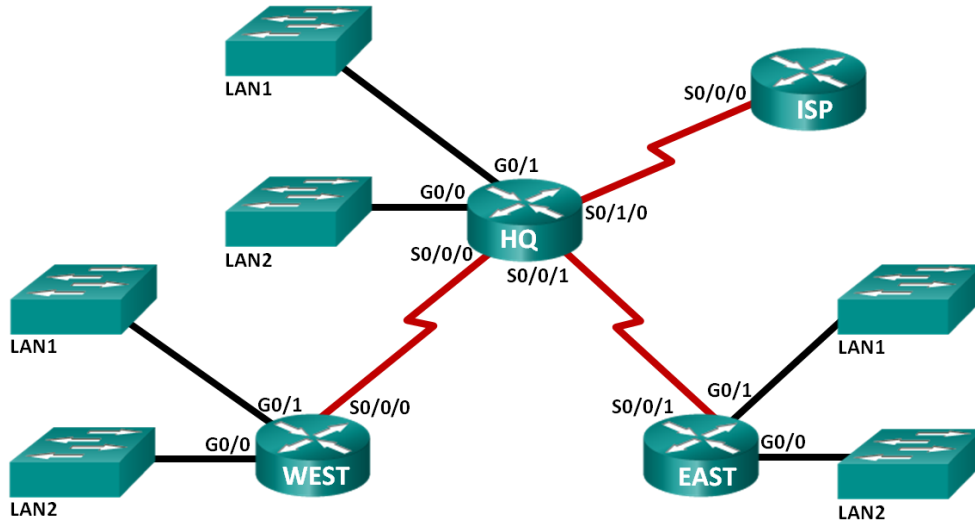
- a. List the matching binary bits for HQ, EAST, and WEST subnets.
- b. Add zeros to comprise the remainder of the network address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv4 Address	Subnet Mask	Subnet IP Address in Binary Form
HQ			
EAST			
WEST			
Network Address Summary Route			

Part 2: Calculate IPv6 Summary Routes

In Part 2, you will determine summarized routes that can be used to reduce the size of routing tables. Complete the tables after each set of steps, with the appropriate IPv6 addressing information.

Topology



Addressing Table

Subnet	IPv6 Address
HQ LAN1	2001:DB8:ACAD:E::/64
HQ LAN2	2001:DB8:ACAD:F::/64
EAST LAN1	2001:DB8:ACAD:1::/64
EAST LAN2	2001:DB8:ACAD:2::/64
WEST LAN1	2001:DB8:ACAD:9::/64
WEST LAN2	2001:DB8:ACAD:A::/64
Link from HQ to EAST	2001:DB8:ACAD:1000::/64
Link from HQ to WEST	2001:DB8:ACAD:2000::/64
Link from HQ to ISP	2001:DB8:CC1E:1::/64

Step 1: List the first 64 bits of the HQ LAN1 and HQ LAN2 IP subnet mask in hexadecimal form.

Step 2: List the HQ LAN1 and HQ LAN2 subnet ID (bits 48-64) in binary form.

Step 3: Count the number of far left matching bits to determine the subnet mask for the summary route.

- How many far left matching bits are present in the two subnet IDs?
- List the subnet mask for the first 64 bits of the summary route in decimal form.

Step 4: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching subnet ID binary bits for HQ LAN1 and HQ LAN2 subnets.
- b. Add zeros to comprise the remainder of the subnet ID address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv6 Address	Subnet Mask for First 64 bits	Subnet ID in Binary Form
HQ LAN1	2001:DB8:ACAD:E::/64		
HQ LAN2	2001:DB8:ACAD:F::/64		
HQ LANs Summary Address			

Step 5: List the first 64 bits of the EAST LAN1 and EAST LAN2 IP subnet mask in hexadecimal form.

Step 6: List the EAST LAN1 and EAST LAN2 subnet ID (bits 48-64) in binary form.

Step 7: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the two subnet IDs?
- b. List the subnet mask for the first 64 bits of the summary route in decimal form.

Step 8: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching binary bits for EAST LAN1 and EAST LAN2 subnets.
- b. Add zeros to comprise the remainder of the subnet ID address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv6 Address	Subnet Mask for First 64 bits	Subnet ID in Binary Form
EAST LAN1	2001:DB8:ACAD:1::/64		
EAST LAN2	2001:DB8:ACAD:2::/64		
EAST LANs Summary Address			

Step 9: List the first 64 bits of the WEST LAN1 and WEST LAN2 IP subnet mask in decimal form.

Step 10: List the WEST LAN1 and WEST LAN2 subnet ID (bits 48-64) in binary form.

Step 11: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the two subnet IDs?
- b. List the subnet mask for the first 64 bits of the summary route in decimal form.

Step 12: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching binary bits for WEST LAN1 and WEST LAN2 subnets.
- b. Add zeros to comprise the remainder of the subnet ID address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv6 Address	Subnet Mask for First 64 bits	Subnet ID in Binary Form
WEST LAN1	2001:DB8:ACAD:9::/64		
WEST LAN2	2001:DB8:ACAD:A::/64		
WEST LANs Summary Address			

Step 13: List the HQ, EAST, and WEST summary route IP address and the first 64 bits of the subnet mask in decimal form.

Step 14: List the HQ, EAST, and WEST summary route subnet ID in binary form.

Step 15: Count the number of far left matching bits to determine the subnet mask for the summary route.

- a. How many far left matching bits are present in the three subnet IDs?
- b. List the subnet mask for the first 64 bits of the summary route in decimal form.

Step 16: Copy the matching binary bits and then add all zeros to determine the summarized network address.

- a. List the matching binary bits for HQ, EAST, and WEST subnets.
- b. Add zeros to comprise the remainder of the subnet ID address in binary form.
- c. List the summarized network address in decimal form.

Subnet	IPv6 Address	Subnet Mask for first 64 bits	Subnet ID in Binary Form
HQ			
EAST			
WEST			
Network Address Summary Route			

Reflection

- 1. How is determining the summary route for IPv4 different from IPv6?

- 2. Why are summary routes beneficial to a network?