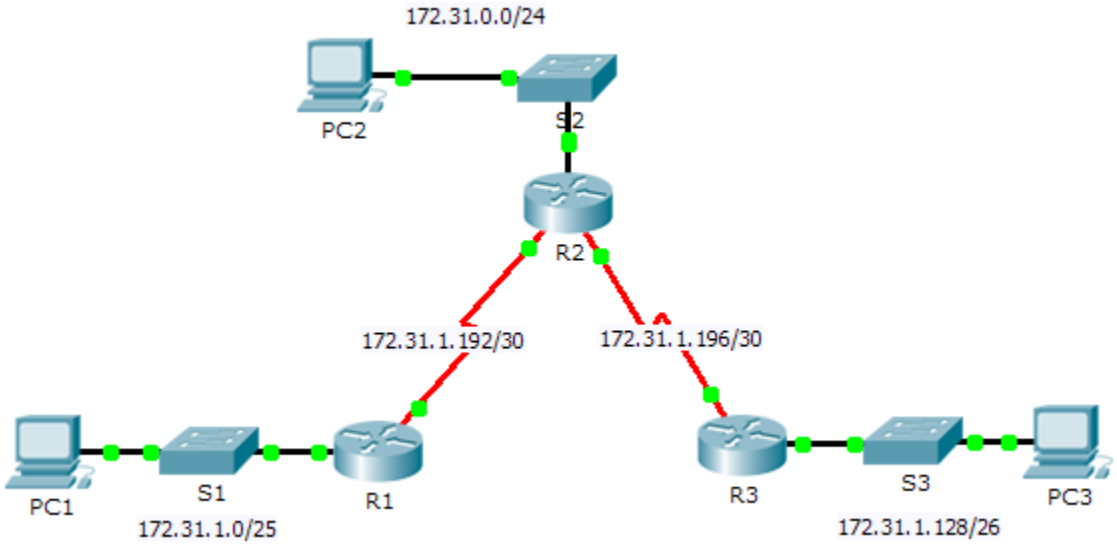
Packet Tracer - Configuring IPv4 Static and Default Routes

Topology



Addressing Table

Device	Interface	IPv4 Address	Subnet Mask	Default Gateway
R1	G0/0	172.31.1.1	255.255.255.128	N/A
	S0/0/0	172.31.1.194	255.255.255.252	N/A
R2	G0/0	172.31.0.1	255.255.255.0	N/A
	S0/0/0	172.31.1.193	255.255.255.252	N/A
	S0/0/1	172.31.1.197	255.255.255.252	N/A
R3	G0/0	172.31.1.129	255.255.255.192	N/A
	S0/0/1	172.31.1.198	255.255.255.252	N/A
PC1	NIC	172.31.1.126	255.255.255.128	172.31.1.1
PC2	NIC	172.31.0.254	255.255.255.0	172.31.0.1
PC3	NIC	172.31.1.190	255.255.255.192	172.31.1.129

Objectives

Part 1: Examine the Network and Evaluate the Need for Static Routing

Part 2: Configure Static and Default Routes

Part 3: Verify Connectivity

Background

In this activity, you will configure static and default routes. A static route is a route that is entered manually by the network administrator to create a reliable and safe route. There are four different static routes that are used in this activity: a recursive static route, a directly attached static route, a fully specified static route, and a default route.

Part 1: Examine the Network and Evaluate the Need for Static Routing

a. Looking at the topology diagram, how many networks are there in total? 5 networks

b. How many networks are directly connected to R1, R2, and R3? 2, 3 and 2

c. How many static routes are required by each router to reach networks that are not directly connected?

R1 requires 3, R2 requires 2 and for R3 requires 3 static routes.

d. Test connectivity to the R2 and R3 LANs by pinging PC2 and PC3 from PC1.

Why were you unsuccessful? Routes of R2 and R3 networks have not been configured yet in R1.

Part 2: Configure Static and Default Routes

Step 1: Configure recursive static routes on R1.

a. What is recursive static route?

When the router has to perform multiple lookups in the routing table for a static route before forwarding a packet, that route is called a recursive static route.

b. Why does a recursive static route require two routing table lookups?

A recursive static route contains the IP address of the next hop. To forward the packet, the router has to perform a second lookup for the next hop IP address in the routing table to find the exit interface.

c. Configure a recursive static route to every network not directly connected to R1, including the WAN link between R2 and R3.

d. Test connectivity to the R2 LAN and ping the IP addresses of PC2 and PC3.

Why were you unsuccessful?

R2 and R3 are not yet configured with the static route for 172.31.1.0/25, the network of PC1.

Step 2: Configure directly attached static routes on R2.

a. How does a directly attached static route differ from a recursive static route?

A directly attached static route contains the exit interface, which performs one lookup; while a recursive static route contains the IP address of the next hop, which performs at least two lookups.

b. Configure a directly attached static route from R2 to every network not directly connected.

c. Which command only displays directly connected networks? show ip route connected

d. Which command only displays the static routes listed in the routing table? show ip route static

e. When viewing the entire routing table, how can you distinguish between a directly attached static route and a directly connected network?

Directly attached static routes are marked with "S", and directly connected networks with "C".

Step 3: Configure a default route on R3.

a. How does a default route differ from a regular static route?

A default route contains the special address 0.0.0.0/0 as destination, which signifies that any IP address can be routed with it. The default route is chosen when the router does not have a regular route for that destination IP address. A static route is used to route traffic to a specific network.

b. Configure a default route on R3 so that every network not directly connected is reachable.

c. How is a static route displayed in the routing table? A static route is marked with "S".

Step 4: Document the commands for fully specified routes.

Note: Packet Tracer does not currently support configuring fully specified static routes. Therefore, in this step, document the configuration for fully specified routes.

a. Explain a fully specified route.

A fully specified route specifies both the exit interface and the next hop IP address.

b. Which command provides a fully specified static route from R3 to the R2 LAN?

ip route 172.31.0.0 255.255.255.0 s0/0/1 172.31.1.197

c. Write a fully specified route from R3 to the network between R2 and R1. Do not configure the route; just calculate it.

ip route 172.31.1.192 255.255.255.252 s0/0/1 172.31.1.197

d. Write a fully specified static route from R3 to the R1 LAN. Do not configure the route; just calculate it.

ip route 172.31.1.0 255.255.255.128 s0/0/1 172.31.1.197

Step 5: Verify static route configurations.

Use the appropriate **show** commands to verify correct configurations.

Which **show** commands can you use to verify that the static routes are configured correctly?

show ip route static

Part 3: Verify Connectivity

Every device should now be able to ping every other device. If not, review your static and default route configurations.

Suggested Scoring Rubric

Activity Section	Question Location	Possible Points	Earned Points
Part 1: Examine the Network and Evaluate the Need for Static Routing	a - d	10	
	Part 1 Total	**10**	
Part 2: Configure Static and Default Routes	Step 1	7	
	Step 2	7	
	Step 3	3	
	Step 4	10	
	Step 5	3	
	Part 2 Total	**30**	
	Packet Tracer Score	**60**	
	Total Score	**100**	