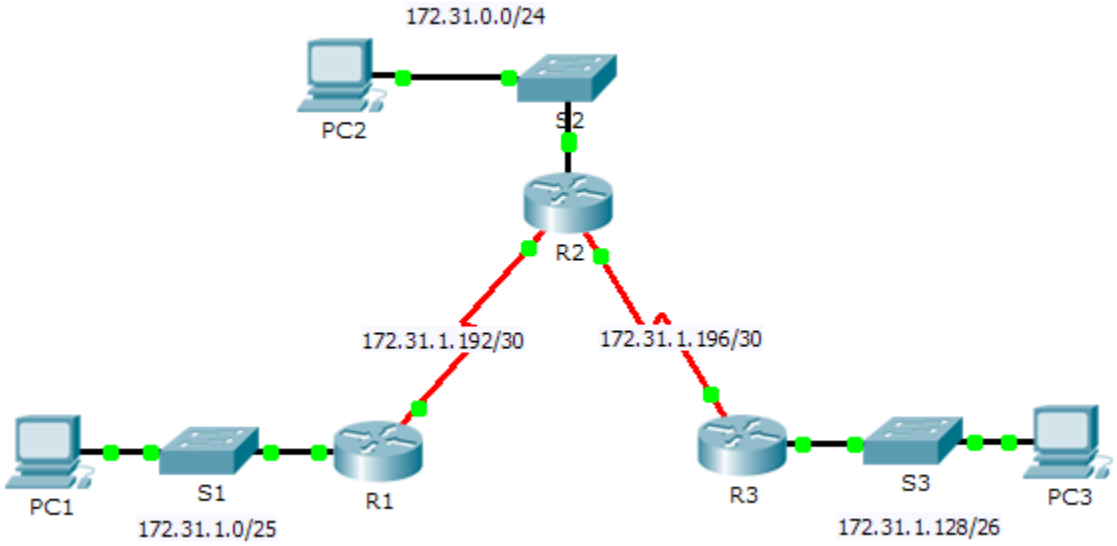
Packet Tracer - Configuring IPv4 Static and Default Routes

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

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

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

R1 - 3, R2 - 2, R3 - 3

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

Why were you unsuccessful? We didn't configure R1 to know the static route beforehand.

Part 2: Configure Static and Default Routes

Step 1: Configure recursive static routes on R1.

a. What is recursive static route?

Recursive static route is when we configure any router to have a static route consisting only the next hop IP address without the exit interface.

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

Because initially when the incoming packet's destination IP address matches, it finds another IP address in the table. It then starts to search the table again for that IP address unless it finds an 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 were yet to be configured.

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 consists of the next hop IP address only, whereas the directly attached static route provides the exit interface as well for the static route to be configured in the router.

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?

The network type of directly attached static route is 'S', while it is 'C' for directly connected.

Step 3: Configure a default route on R3.

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

Defaults routers are routes that direct a packet to higher level routers. A default route is taken by a packet when no other destination IP address in routing table matches with the packet's destination IP address. On the other hand, a static route is for specific route in the routing table for a particular destination IP address.

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? Type of network field is '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 is a manually configured static route that includes both the next hop IP address and the exit interface.

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" or "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**	