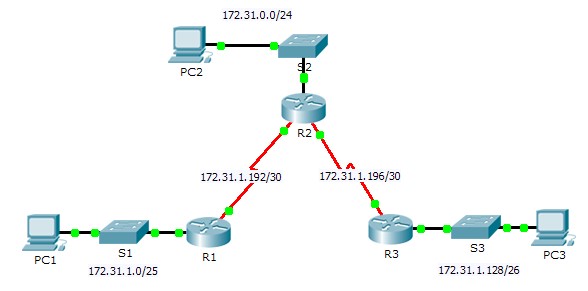
**Packet Tracer - Configuring IPv4 Static and Default Routes**

# 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**

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# 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

1. Looking at the topology diagram, how many networks are there in total? 5 networks
2. How many networks are directly connected to R1, R2, and R3? R1: 2, R2: 2, R3: 2
3. How many static routes are required by each router to reach networks that are not directly connected?

R1: 3, R2: 2, R3: 2

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

Why were you unsuccessful? The routers don't know the routes for these IPs as we didn't configure anything.

# Part 2: Configure Static and Default Routes

**Step 1: Configure recursive static routes on R1.**

1. What is recursive static route?

A recursive static route uses the IP address of the next hop router to forward packets to their destination.

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

The router first checks the routing table to determine which next hop IP can reach the destination. Then, it performs a second lookup to find out which interface can be used to reach that next hop IP.

1. Configure a recursive static route to every network not directly connected to R1, including the WAN link between R2 and R3.
2. Test connectivity to the R2 LAN and ping the IP addresses of PC2 and PC3.

Why were you unsuccessful? R2 and R3 were unable to return ping replies to R1’s network because no configurations had been set up for them.

**Step 2: Configure directly attached static routes on R2.**

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

A directly attached static route uses its specified exit interface to forward packets to the destination, whereas a recursive static route depends on the next-hop router’s IP address to determine the path.

1. Configure a directly attached static route from R2 to every network not directly connected.
2. Which command only displays directly connected networks? show ip route connected
3. Which command only displays the static routes listed in the routing table? show ip route static
4. When viewing the entire routing table, how can you distinguish between a directly attached static route and a directly connected network? In the routing table, a directly connected network is marked with the code C, while a static route is identified with the code S in the leftmost column.

**Step 3: Configure a default route on R3.**

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

A default route is used by the router when no other specific route is found for a destination, while a static route directs traffic to a particular network.

1. Configure a default route on R3 so that every network not directly connected is reachable.
2. How is a static route displayed in the routing table? A default static route is shown with the code S\* and the IP address 0.0.0.0/0.

**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 static route is defined using both an exit interface and a next hop IP address.

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

R3(config)#ip route 172.31.0.0 255.255.255.0 s0/0/1 172.31.1.197

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

R3(config)#ip route 172.31.1.192 255.255.255.252 s0/0/1 172.31.1.197

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

R3(config)#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, show ip route connected, 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** |  |