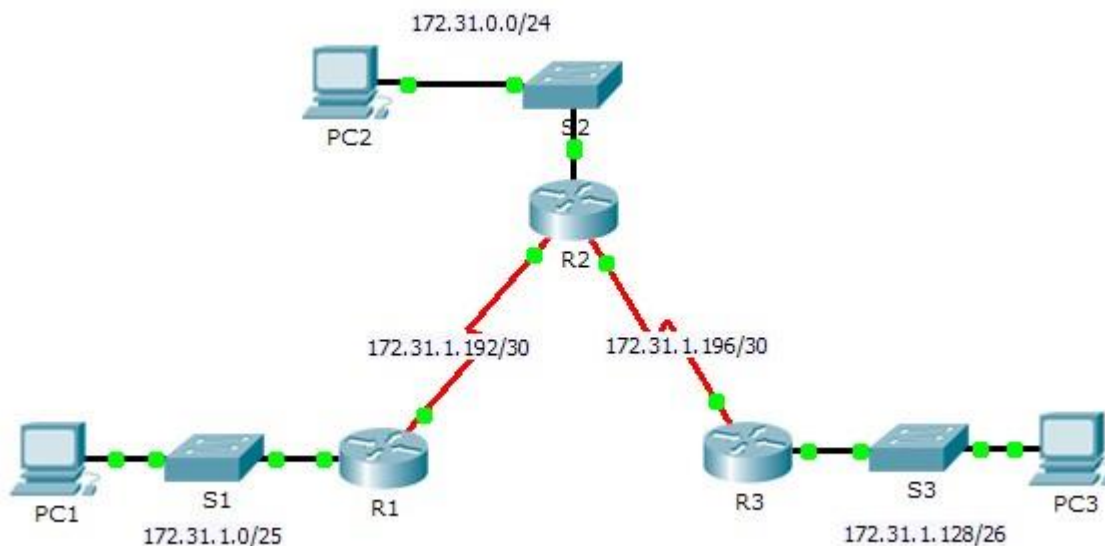# Packet Tracer - Configuring IPv4 Static and Default Routes

**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?

   **For R1 and R3, 2 networks are directly connected**

   **For R2, 3 networks are directly connected**

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

   **For R1 and R3, 3 static routes are required**

   **For R2, 2 static routes are required**

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

   Why were you unsuccessful?  **Routing (remote networks) was not configured**

# 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 configuring IP route by the next hop IP address.**

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

   **Firstly, it looks for the matching network address and gets the next hop IP address. Then it looks for the interface which matches the network address of that next hop IP address. That's why 2 routing table lookups are required.**

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?

   **For PC2, the packet was able to reach to it, but in acknowledgement it couldn't send the packet to PC1, due to not being connected remotely from PC2 to PC1.**

**For PC3, the packet was dropped from R2. Because it didn't know where to go after R2.**

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

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

**Only the exit interface is given in the routing table and command. So it finds out the exit interface directly, no need to look up recursively.**

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? **C = directly connected network, S = directly attached static route**

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

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

**Default route matches every network address and allows the packet to go though the specified exit interface. So when the network address doesn't match any of the addresses of the routing table, it takes the default route.**

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? **S\* = Default static route**

## 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.

**Here, we specify the exit interface along with the next hop IP address. It comes handy when the routers are connected through a switch.**

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

**From R3 => ip route 172.31.0.0 255.255.255.0 s0/0/0 172.31.1.197**

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

**From R3 => ip route 172.31.1.192 255.255.255.252 s0/0/0 172.31.1.197**

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

**From R3 => ip route 172.31.1.0 255.255.255.128 s0/0/0 172.31.1.197**

## 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** | |