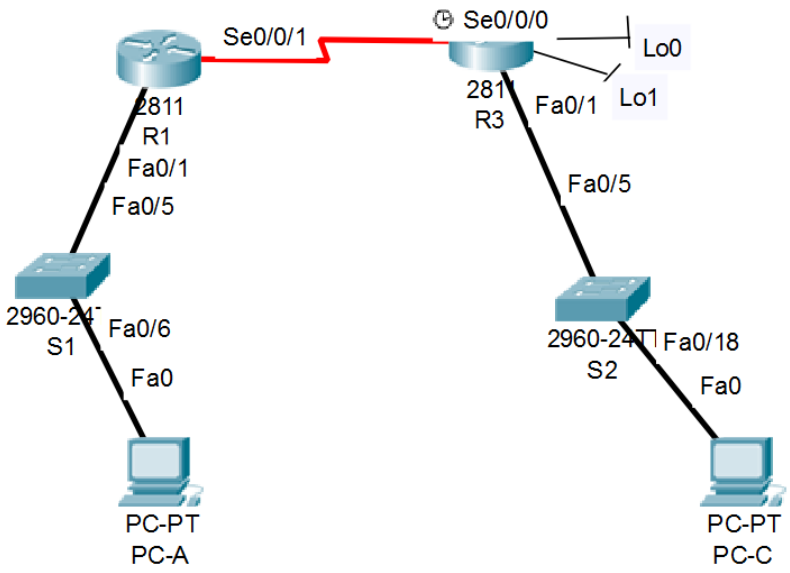
# Static Routing

## Topology




## Addressing Table

| Device | Interface | IP Address | Subnet Mask | Default Gateway |
|---|---|---|---|---|
| R1 | F0/1 | 192.168.0.1 | 255.255.255.0 | N/A |
| | S0/0/1 | 10.1.1.1 | 255.255.255.252 | N/A |
| R3 | F0/1 | 192.168.1.1 | 255.255.255.0 | N/A |
| | S0/0/0 (DCE) | 10.1.1.2 | 255.255.255.252 | N/A |
| | Lo0 | 209.165.200.225 | 255.255.255.224 | N/A |
| | Lo1 | 198.133.219.1 | 255.255.255.0 | N/A |
| PC-A | NIC | 192.168.0.10 | 255.255.255.0 | 192.168.0.1 |
| PC-C | NIC | 192.168.1.10 | 255.255.255.0 | 192.168.1.1 |

## Objectives

**Part 1: Set Up the Topology and Initialize Devices**

**Part 2: Configure Basic Device Settings and Verify Connectivity**

**Part 3: Configure Static Routes**

- Configure a recursive static route.
- Configure a directly connected static route.
- Configure and remove static routes.

**Part 4: Configure and Verify a Default Route**

**Note**: Make sure that the routers and switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

### Required Resources

- 2 Routers (Cisco 2800 series with Cisco IOS)
- 2 Switches (Cisco 2960 with Cisco IOS)
- 2 PCs
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet and serial cables as shown in the topology

## Part 1: Set Up the Topology and Initialize Devices

### Step 1: Cable the network as shown in the topology.

### Step 2: Initialize and reload the router and switch if required.

## Part 2: Configure Basic Device Settings and Verify Connectivity

In Part 2, you will configure basic settings, such as the interface IP addresses, device access, and passwords. You will verify LAN connectivity and identify routes listed in the routing tables for R1 and R3.

### Step 1: Configure the PC interfaces.

### Step 2: Configure basic settings on the routers.

a. Configure device names, as shown in the Topology and Addressing Table.

b. Disable DNS lookup.

c. Assign **pass** as the enable, console, and vty passwords.

d. Save the running configuration to the startup configuration file.

### Step 3: Configure IP settings on the routers.

a. Configure the R1 and R3 interfaces with IP addresses according to the Addressing Table.

b. The S0/0/0 connection is the DCE connection and requires the **clock rate** command. The R3 S0/0/0 configuration is displayed below.

```
R3(config)# interface s0/0/0
R3(config-if)# ip address 10.1.1.2 255.255.255.252
R3(config-if)# clock rate 128000
R3(config-if)# no shutdown
```

### Step 4: Configure the router for SSH access.

a. Enable SSH connections and create a user in the local database of R1.
Settings:

1) Domain name: **RS-Lab.com**

2) User name: **admin** Privilege level: **15** Password: **adminpass1**
3) Key length: **1024**.

b. Remotely access R1 from the other PC using an SSH client.

Was remote access successful? _____

### Step 5: Verify connectivity of the LANs.

a. Test connectivity by pinging from each PC to the default gateway that has been configured for that host.

From PC-A, is it possible to ping the default gateway? _____

From PC-C, is it possible to ping the default gateway? _____

b. Test connectivity by pinging between the directly connected routers.

From R1, is it possible to ping the S0/0/0 interface of R3? _____

If the answer is **no** to any of these questions, troubleshoot the configurations and correct the error.

c. Test connectivity between devices that are not directly connected.

From PC-A, is it possible to ping PC-C? _____

From PC-A, is it possible to ping Lo0? _____

From PC-A, is it possible to ping Lo1? _____

Were these pings successful? Why or why not?

_____

**Note:** It may be necessary to disable the PC firewall to ping between PCs.

### Step 6: Gather information.

a. Check the status of the interfaces on R1 with the **show ip interface brief** command.

How many interfaces are activated on R1? _____

b. Check the status of the interfaces on R3.

How many interfaces are activated on R3? _____

c. View the routing table information for R1 using the **show ip route** command.

What networks are present in the Addressing Table of this lab, but not in the routing table for R1?

_____

d. View the routing table information for R3.

What networks are present in the Addressing Table in this lab, but not in the routing table for R3?

_____

Why are all the networks not in the routing tables for each of the routers?

_____

_____

## Part 3: Configure Static Routes

In Part 3, you will employ multiple ways to implement static and default routes, you will confirm that the routes have been added to the routing tables of R1 and R3, and you will verify connectivity based on the introduced routes.

### Step 1: Configure a recursive static route.

With a recursive static route, the next-hop IP address is specified. Because only the next-hop IP is specified, the router must perform multiple lookups in the routing table before forwarding packets. To configure recursive static routes, use the following syntax:

```
Router(config)# ip route network-address subnet-mask ip-address
```

a. On the R1 router, configure a static route to the 192.168.1.0 network using the IP address of the Serial 0/0/0 interface of R3 as the next-hop address. Write the command you used in the space provided.

_____

b. View the routing table to verify the new static route entry.

How is this new route listed in the routing table?

_____

**Open Wireshark on PC-C and start a capture for ICMP traffic.**

From host PC-A ping the host PC-C.

Did PC-C receive the ICMP echo request? _____

Did the ping succeed? _____ why?

_____

### Step 2: Configure a directly connected static route.

With a directly connected static route, the *exit-interface* parameter is specified, which allows the router to resolve a forwarding decision in one lookup. A directly connected static route is typically used with a point-to-point serial interface. To configure directly connected static routes with an exit interface specified, use the following syntax:

```
Router(config)# ip route network-address subnet-mask exit-intf
```

a. On the R3 router, configure a static route to the 192.168.0.0 network using S0/0/0 as the exit interface. Write the command you used in the space provided. _____

b. View the routing table to verify the new static route entry.

How is this new route listed in the routing table?

_____

c. From host PC-A, is it possible to ping the host PC-C? _____

This ping should be successful.

**Note**: It may be necessary to disable the PC firewall to ping between PCs.

### Step 3: Configure a static route.

a. On the R1 router, configure a static route to the 198.133.219.0 network using one of the static route configuration options from the previous steps. Write the command you used in the space provided.

_____

b. On the R1 router, configure a static route to the 209.165.200.224 network on R3 using the other static route configuration option from the previous steps. Write the command you used in the space provided.

_____

c. View the routing table to verify the new static route entry.

How is this new route listed in the routing table?

_____

d. From host PC-A, is it possible to ping the R1 address 198.133.219.1? _____

This ping should be successful.

### Step 4: Remove static routes for loopback addresses.

a. On R1, use the **no** command to remove the static routes for the two loopback addresses from the routing table. Write the commands you used in the space provided.

_____

_____

b. View the routing table to verify the routes have been removed.

How many network routes are listed in the routing table on R1? _____

Is the Gateway of last resort set? _____

## Part 4: Configure and Verify a Default Route

A default static route is a static route with 0.0.0.0 as the destination IP address and subnet mask. This is commonly referred to as a “quad zero” route.

In a default route, either the next-hop IP address or exit interface can be specified. To configure a default static route, use the following syntax:

```
Router(config)# ip route 0.0.0.0 0.0.0.0 {ip-address or exit-intf}
```

a. Configure the R1 router with a default route using the exit interface of S0/0/1. Write the command you used in the space provided.

_____

b. View the routing table to verify the new static route entry.

How is this new route listed in the routing table?

_____

What is the Gateway of last resort?

_____

c. From host PC-A, is it possible to ping the 209.165.200.225? _____

d. From host PC-A, is it possible to ping the 198.133.219.1? _____

These pings should be successful.

**Done**