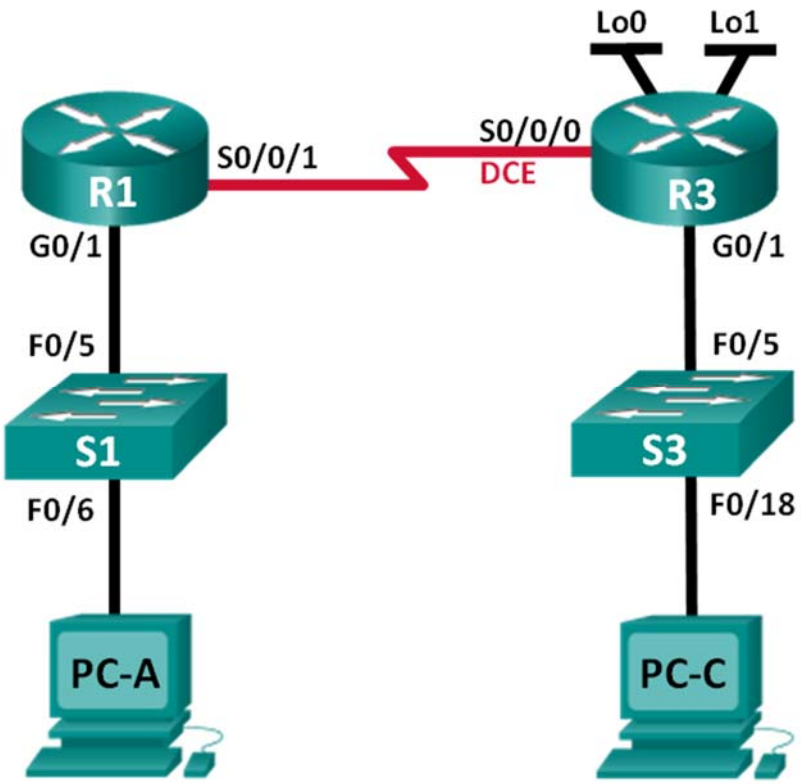
# Lab – Configuring IPv4 Static and Default Routes (Solution)

## Topology




### Addressing Table

| Device | Interface | IP Address | Subnet Mask | Default Gateway |
|---|---|---|---|---|
| R1 | G0/1 | 192.168.0.1 | 255.255.255.0 | N/A |
| | S0/0/1 | 10.1.1.1 | 255.255.255.252 | N/A |
| R3 | G0/1 | 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**

## Background / Scenario

A router uses a routing table to determine where to send packets. The routing table contains a set of routes that describe which gateway or interface the router uses to reach a specified network. Initially, the routing table contains only directly connected networks. To communicate with distant networks, routes must be specified and added to the routing table.

In this lab, you will manually configure a static route to a specified distant network based on a next-hop IP address or exit interface. You will also configure a static default route. A default route is a type of static route that specifies a gateway to use when the routing table does not contain a path for the destination network.

**Note**: This lab provides minimal assistance with the actual commands necessary to configure static routing. However, the required commands are provided in Appendix A. Test your knowledge by trying to configure the devices without referring to the appendix.

**Note**: The routers used with CCNA hands-on labs are Cisco 1941 Integrated Services Routers (ISRs) with Cisco IOS Release 15.2(4)M3 (universalk9 image). The switches used are Cisco Catalyst 2960s with Cisco IOS Release 15.0(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of this lab for the correct interface identifiers.

**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 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 2 Switches (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)
- 2 PCs (Windows 7, Vista, or XP with terminal emulation program, such as Tera Term)
- 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.

# 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 **class** as the enable password and assign **cisco** as the console and vty password.

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: 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? _____ Yes

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

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

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

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? _____ No

From PC-A, is it possible to ping Lo0? _____ No

From PC-A, is it possible to ping Lo1? _____ No

Were these pings successful? Why or why not?

_____

_____

No, the router does not contain routes to the distant networks.

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

### Step 5: Gather information.

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

```
R1# show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
Embedded-Service-Engine0/0 unassigned      YES unset  administratively down down
```

```
GigabitEthernet0/0         unassigned      YES unset  administratively down down
GigabitEthernet0/1         192.168.0.1     YES manual up                    up
Serial0/0/0                unassigned      YES unset  administratively down down
Serial0/0/1                10.1.1.1        YES manual up                    up
```

How many interfaces are activated on R1? _____ Two

b. Check the status of the interfaces on R3.

```
R3# show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
Embedded-Service-Engine0/0 unassigned      YES unset  administratively down down
GigabitEthernet0/0         unassigned      YES unset  administratively down down
GigabitEthernet0/1         192.168.1.1     YES manual up                    up
Serial0/0/0                10.1.1.2        YES manual up                    up
Serial0/0/1                unassigned      YES unset  administratively down down
Loopback0                  209.165.200.225 YES manual up                    up
Loopback1                  198.133.219.1   YES manual up                    up
```

How many interfaces are activated on R3? _____ Four

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

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/1
L        10.1.1.1/32 is directly connected, Serial0/0/1
      192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.0.0/24 is directly connected, GigabitEthernet0/1
L        192.168.0.1/32 is directly connected, GigabitEthernet0/1
```

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

_____

192.168.1.0, 198.133.219.0, 209.165.200.224

d. View the routing table information for R3.

```
R3# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
```

```
        ia - IS-IS inter area, * - candidate default, U - per-user static route
        o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
        + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/0
L        10.1.1.2/32 is directly connected, Serial0/0/0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, GigabitEthernet0/1
L        192.168.1.1/32 is directly connected, GigabitEthernet0/1
      198.133.219.0/24 is variably subnetted, 2 subnets, 2 masks
C        198.133.219.0/24 is directly connected, Loopback1
L        198.133.219.1/32 is directly connected, Loopback1
       209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.200.224/27 is directly connected, Loopback0
L        209.165.200.225/32 is directly connected, Loopback0
```

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

_____

192.168.0.0

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

_____

_____

The routers are not configured with static or dynamic routing; therefore, the routers only know about the directly connected networks.

# 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.

**Note**: This lab provides minimal assistance with the actual commands necessary to configure static routing. However, the required commands are provided in Appendix A. Test your knowledge by trying to configure the devices without referring to the appendix.

## 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.

_____

```
R1(config)# ip route 192.168.1.0 255.255.255.0 10.1.1.2
```

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

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/1
L        10.1.1.1/32 is directly connected, Serial0/0/1
      192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.0.0/24 is directly connected, GigabitEthernet0/1
L        192.168.0.1/32 is directly connected, GigabitEthernet0/1
S     192.168.1.0/24 [1/0] via 10.1.1.2
```

How is this new route listed in the routing table?

_____

```
S      192.168.1.0/24 [1/0] via 10.1.1.2
```

From host PC-A, is it possible to ping the host PC-C? _____ No

These pings should fail. If the recursive static route is correctly configured, the ping arrives at PC-C. PC-C sends a ping reply back to PC-A. However, the ping reply is discarded at R3 because R3 does not have a return route to the 192.168.0.0 network in the routing table.

## 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.

_____

```
R3(config)# ip route 192.168.0.0 255.255.255.0 s0/0/0
```

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

```
R3# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
```

```
       + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/0
L        10.1.1.2/32 is directly connected, Serial0/0/0
S     192.168.0.0/24 is directly connected, Serial0/0/0
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, GigabitEthernet0/1
L        192.168.1.1/32 is directly connected, GigabitEthernet0/1
      198.133.219.0/24 is variably subnetted, 2 subnets, 2 masks
C        198.133.219.0/24 is directly connected, Loopback1
L        198.133.219.1/32 is directly connected, Loopback1
      209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.200.224/27 is directly connected, Loopback0
L        209.165.200.225/32 is directly connected, Loopback0
```

How is this new route listed in the routing table?

_____

```
S     192.168.0.0/24 is directly connected, Serial0/0/0
```

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

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.

_____

```
R1(config)# ip route 198.133.219.0 255.255.255.0 S0/0/1
```

or

```
R1(config)# ip route 198.133.219.0 255.255.255.0 10.1.1.2
```

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.

_____

```
R1(config)# ip route 209.165.200.224 255.255.255.224 S0/0/1
```

or

```
R1(config)# ip route 209.165.200.224 255.255.255.224 10.1.1.2
```

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

**Note**: You may have different routing table outputs depending on the type of configured static routes.

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/1
L        10.1.1.1/32 is directly connected, Serial0/0/1
      192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.0.0/24 is directly connected, GigabitEthernet0/1
L        192.168.0.1/32 is directly connected, GigabitEthernet0/1
S     192.168.1.0/24 [1/0] via 10.1.1.2
S     198.133.219.0/24 is directly connected, Serial0/0/1
      209.165.200.0/27 is subnetted, 1 subnets
S        209.165.200.224 [1/0] via 10.1.1.2
```

How is this new route listed in the routing table?

_____

```
S     198.133.219.0/24 is directly connected, Serial0/0/1
```

or

```
S     198.133.219.0/24 [1/0] via 10.1.1.2
```

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

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.

_____

```
R1(config)# no ip route 209.165.200.224 255.255.255.224 10.1.1.2
R1(config)# no ip route 198.133.219.0 255.255.255.0 S0/0/1
```

**Note**: A static route can be removed with the **no** command without specifying the exit interface or next-hop ip address as displayed below.

```
R1(config)# no ip route 209.165.200.224 255.255.255.224
R1(config)# no ip route 198.133.219.0 255.255.255.0
```

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

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
```

```
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/1
L        10.1.1.1/32 is directly connected, Serial0/0/1
      192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.0.0/24 is directly connected, GigabitEthernet0/1
L        192.168.0.1/32 is directly connected, GigabitEthernet0/1
S     192.168.1.0/24 [1/0] via 10.1.1.2
```

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

Is the Gateway of last resort set? _____ No

## Part 4: Configure and Verify a Default Route

In Part 4, you will implement a default route, confirm that the route has been added to the routing table, and verify connectivity based on the introduced route.

A default route identifies the gateway to which the router sends all IP packets for which it does not have a learned or static 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.

_____

```
R1(config)# ip route 0.0.0.0 0.0.0.0 s0/0/1
```

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

```
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

S*    0.0.0.0/0 is directly connected, Serial0/0/1
      10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        10.1.1.0/30 is directly connected, Serial0/0/1
L        10.1.1.1/32 is directly connected, Serial0/0/1
      192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
```

```
C        192.168.0.0/24 is directly connected, GigabitEthernet0/1
L        192.168.0.1/32 is directly connected, GigabitEthernet0/1
S     192.168.1.0/24 [1/0] via 10.1.1.2
```

How is this new route listed in the routing table?

_____

```
S*    0.0.0.0/0 is directly connected, Serial0/0/1
```

What is the Gateway of last resort?

_____

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

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

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

These pings should be successful.

## Reflection

1. A new network 192.168.3.0/24 is connected to interface G0/0 on R1. What commands could be used to configure a static route to that network from R3?

_____

_____

Answers will vary. ip route 192.168.3.0 255.255.255.0 10.1.1.1, ip route192.168.3.0 255.255.255.0 s0/0/0, or ip route 0.0.0.0 0.0.0.0 s0/0/0.

2. Is there a benefit to configuring a directly connected static route instead of a recursive static route?

_____

_____

Configuring a directly attached static route allows the routing table to resolve the exit interface in a single search instead of in two searches as needed for recursive static routes.

3. Why is it important to configure a default route on a router?

_____

A default route prevents the router from dropping packets to unknown destinations.

## Router Interface Summary Table

| Router Interface Summary | | | | |
|---|---|---|---|---|
| **Router Model** | **Ethernet Interface #1** | **Ethernet Interface #2** | **Serial Interface #1** | **Serial Interface #2** |
| 1800 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 1900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2801 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/1/0 (S0/1/0) | Serial 0/1/1 (S0/1/1) |
| 2811 | Fast Ethernet 0/0 (F0/0) | Fast Ethernet 0/1 (F0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |
| 2900 | Gigabit Ethernet 0/0 (G0/0) | Gigabit Ethernet 0/1 (G0/1) | Serial 0/0/0 (S0/0/0) | Serial 0/0/1 (S0/0/1) |

**Note**: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.

## Appendix A: Configuration Commands for Parts 2, 3, and 4

The commands listed in Appendix A are for reference only. This Appendix does not include all the specific commands necessary to complete this lab.

## Basic Device Settings

**Configure IP settings on the router.**

```
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
```

## Static Route Configurations

**Configure a recursive static route.**

```
R1(config)# ip route 192.168.1.0 255.255.255.0 10.1.1.2
```

**Configure a directly connected static route.**

```
R3(config)# ip route 192.168.0.0 255.255.255.0 s0/0/0
```

**Remove static routes.**

```
R1(config)# no ip route 209.165.200.224 255.255.255.224 serial0/0/1
```

or

```
R1(config)# no ip route 209.165.200.224 255.255.255.224 10.1.1.2
```

or

```
R1(config)# no ip route 209.165.200.224 255.255.255.224
```

### Default Route Configuration

```
R1(config)# ip route 0.0.0.0 0.0.0.0 s0/0/1
```

## Device Configs - R1 and R3

## Router R1 (after Part 4)

```
R1#show run
Building configuration...

Current configuration : 1547 bytes
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
!
!
!
!
!
!
!
no ip domain lookup
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
!
!
!
!
!
redundancy
!
!
!
```

```
!
!
! interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
!
interface GigabitEthernet0/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 192.168.0.1 255.255.255.0
 duplex auto
 speed auto
!
interface Serial0/0/0
 no ip address
 shutdown
 clock rate 2000000
!
interface Serial0/0/1
 ip address 10.1.1.1 255.255.255.252
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 Serial0/0/1
ip route 192.168.1.0 255.255.255.0 10.1.1.2
!
!
!
!
control-plane
!
!
banner motd ^CUnauthorized access prohibited!^C
!
line con 0
 password 7 01100F175804
 logging synchronous
 login
line aux 0
line 2
 no activation-character
```

```
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 password 7 01100F175804
 logging synchronous
 login
 transport input all
!
scheduler allocate 20000 1000
!
end
```

### Router R3

```
R3#show run
Building configuration...

Current configuration : 1700 bytes
!
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
!
enable secret 4 06YFDUHH61wAE/kLkDq9BGho1QM5EnRtoyr8cHAUg.2
!
no aaa new-model
memory-size iomem 15
!
!
!
!
!
!
!
no ip domain lookup
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
```

```
!
!
!
!
vtp domain TSHOOT
vtp mode transparent
!
redundancy
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
interface Loopback0
 ip address 209.165.200.225 255.255.255.224
!
interface Loopback1
 ip address 198.133.219.1 255.255.255.0
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 192.168.1.1 255.255.255.0
duplex auto
 speed auto
!
interface Serial0/0/0
 ip address 10.1.1.2 255.255.255.252
 clock rate 256000
!
interface Serial0/0/1
 no ip address
```

```
 shutdown
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 192.168.0.0 255.255.255.0 Serial0/0/0
!
!
!
!
control-plane
!
!
banner motd ^CUnauthorized access prohibited!^C
!
line con 0
 password 7 110A1016141D
 logging synchronous
 login
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 password 7 00071A150754
logging synchronous
 login
 transport input all
!
scheduler allocate 20000 1000
!
end
```