How to configure Default Routing in Cisco Routers

This tutorial explains how to configure and use a default route in routing through a practical example in the Packet Tracer. Learn how to configure default routing in Cisco routers.

When a packet arrives on an interface of a router, the router checks the destination network address of the arrived-packet and finds that destination address in the routing table. If the router finds an entry for the destination network, the router forwards the incoming packet from the interface that is specified in the entry.

If the router does not find an entry for the destination network, the router checks the default route. If the default route is available, the router forwards the incoming packet from the interface that is specified in the default route.

If the default route is not available, the router drops the incoming packet. A router uses a default route to forward all incoming packets; those destination addresses are not available in the routing table.

Usually, a default route is used in the following situations.

- To forward all packets to a single destination.
- To forward all unknown packets (whose destination network addresses are not available in the routing table) to a server or a device for logging and troubleshooting purposes.
- To forward all packets to a device or a router that knows how to reach remote networks or has a routing table that has entries for all remote networks.

In the below section, we will understand how to configure a default route to forward all packets to a single destination through a practical example.

We will understand the remaining situations in the next parts of this article. This tutorial is the second part of the "Configure Default Routes in Cisco Router" article. Other parts of this article are the following.

Configure default routing for a single exit point

If two sites are connected through a single connection, instead of a routing protocol that consumes precious bandwidth by sending broadcast messages, they can use a default route. For example, suppose a company has a central office and several remote sites. Each remote site has only one possible physical route to send packets to the central office. Since each site has only one route to reach the central office, it can use a default route.
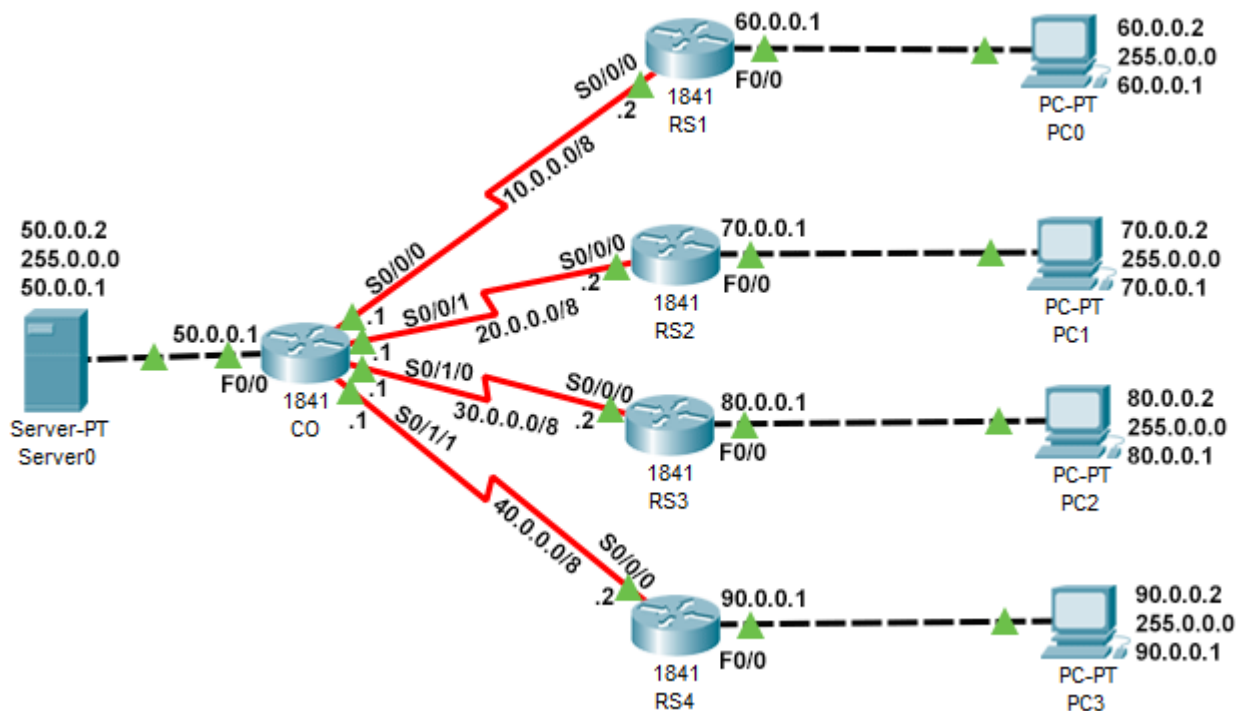
To configure a default route from all four remote sites (RS1, RS2, RS3, and RS4) use the following global configuration command.

Router(config)#ip route 0.0.0.0 0.0.0.0 [exit-interface or IP address of the next-hop]

If you want to use the exit-interface in the configuration, specify the name of the local interface that is connected to the central office.

If you want to use the IP address of the next-hop in the configuration, specify the IP address of the interface of the central office's router that is connected to this (local) router.

Let's use both options in the configuration.

Configure a default route on RS1 and RS2 using the exit-interface option.
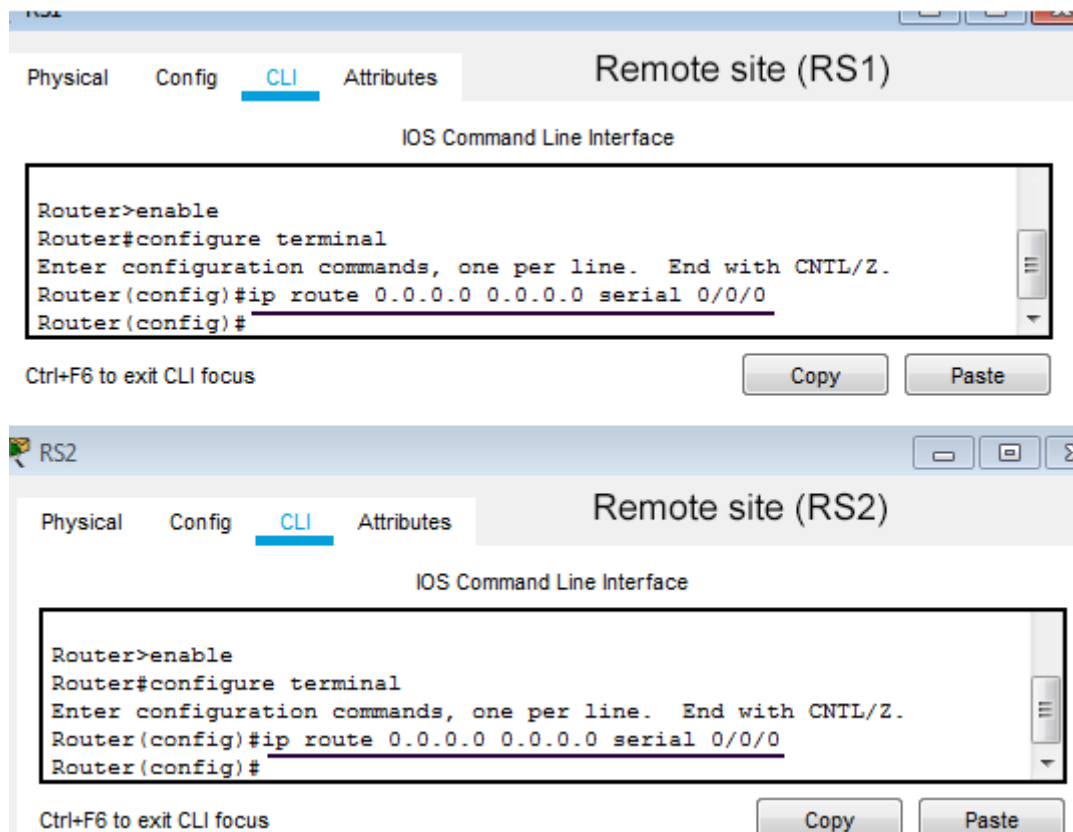
Remote site 1 (RS1)

Router(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0

Remote site 2 (RS2)

Router(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0

Since both routers RS1 and RS2 are connected to the central office through their serial 0/0/0 interfaces, I specified the value **"serial 0/0/0"** in the exit-interface option of both commands.

The following image shows both commands in the packet tracer.

Remote site (RS1)

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0
Router(config)#
```

Ctrl+F6 to exit CLI focus   Copy   Paste

RS2

Remote site (RS2)

Physical   Config   CLI   Attributes

IOS Command Line Interface

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/0
Router(config)#
```

Ctrl+F6 to exit CLI focus   Copy   Paste

Configure a default route on RS1 and RS2 using the IP address of the next-hop option.

Remote site 3 (RS3)
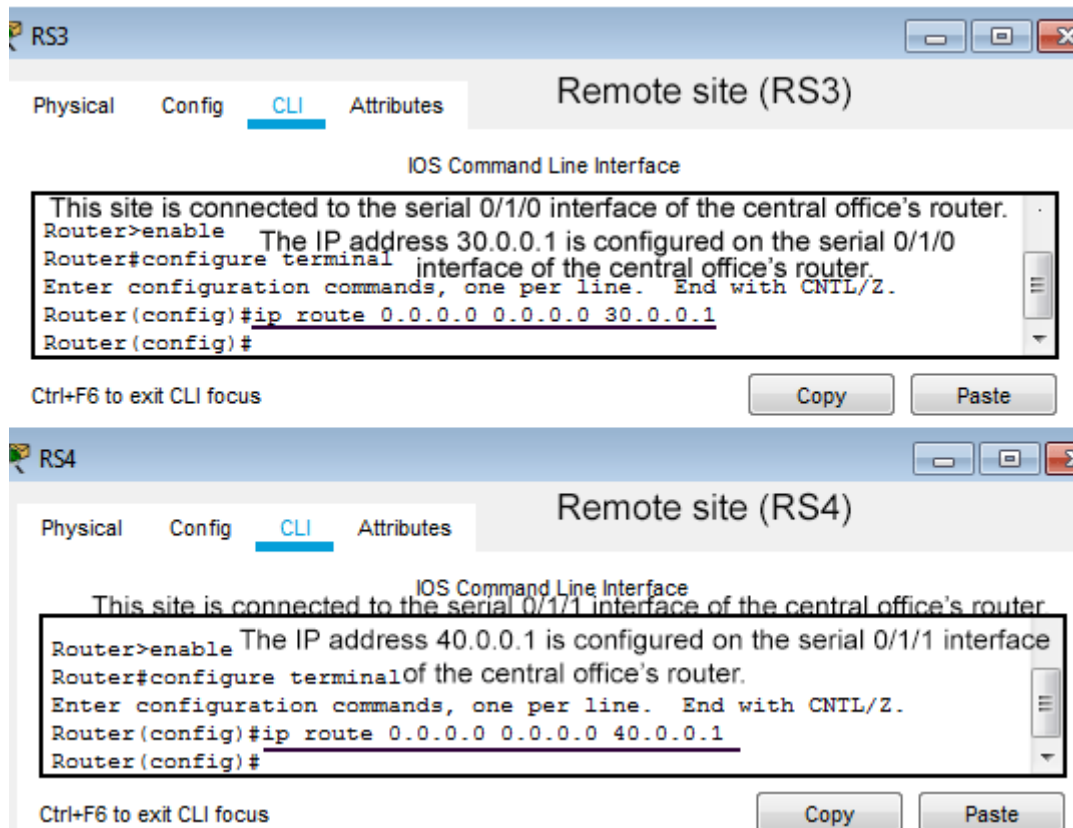
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.1

Remote site 4 (RS4)

Router(config)#ip route 0.0.0.0 0.0.0.0 40.0.0.1

Remote sites RS3 and RS4 are connected to the central office's router's serial 0/1/0 and serial 0/1/1 interfaces, respectively. IP addresses 30.0.0.1 and 40.0.0.1 are configured on serial 0/1/0 and serial 0/1/1 interfaces, respectively. Thus, to configure default routes, I specified these addresses in the next-hop options of both commands.

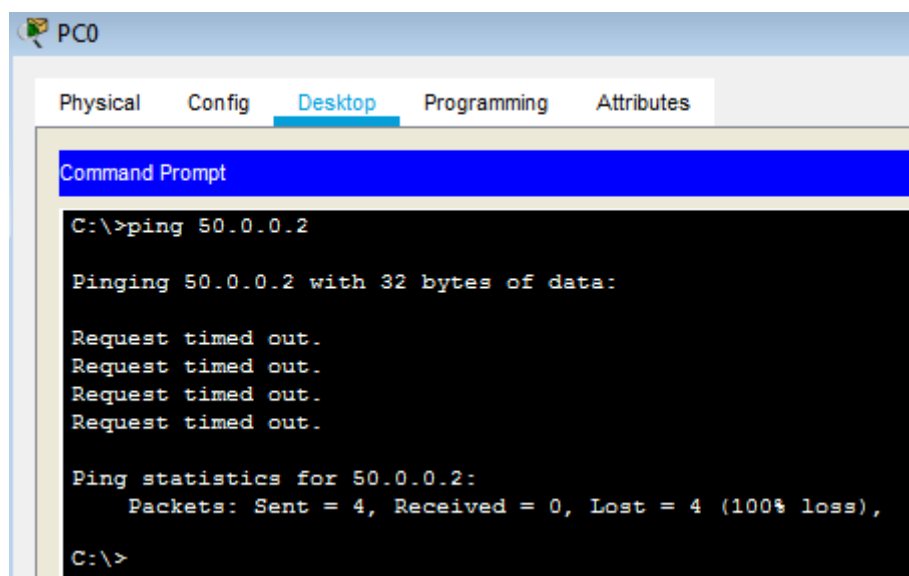The following image shows both commands in the packet tracer.

RS3

Remote site (RS3)

Physical Config CLI Attributes

IOS Command Line Interface

```
This site is connected to the serial 0/1/0 interface of the central office's router.
Router>enable   The IP address 30.0.0.1 is configured on the serial 0/1/0
Router#configure terminal  interface of the central office's router.
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 30.0.0.1
Router(config)#
```

Ctrl+F6 to exit CLI focus   Copy   Paste

RS4

Remote site (RS4)

Physical Config CLI Attributes

IOS Command Line Interface
This site is connected to the serial 0/1/1 interface of the central office's router

```
Router>enable  The IP address 40.0.0.1 is configured on the serial 0/1/1 interface
Router#configure terminal of the central office's router.
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip route 0.0.0.0 0.0.0.0 40.0.0.1
Router(config)#
```

Ctrl+F6 to exit CLI focus   Copy   Paste

As discussed earlier, when a packet arrives on an interface of a router, the router finds the destination network of the incoming packet in the routing table. If the routing table contains an entry for the destination network, the router uses that entry to forward the packet.

If the routing table does not contain an entry for the destination network, the router uses the default route to forward the packet. Since we did not configure any other route except the default route on any remote site, all remote sites will use their default routes to forward all incoming packets.

After this configuration, all remote sites can forward their data packets to the central office but they will not get any return data packet from the central office as we haven't configured any routing information on the router of the central office.

To verify this, ping the server of the central office from the PC of the remote site RS1. The following image shows the response of the ping command with the output.

PC0

Physical Config Desktop Programming Attributes

Command Prompt

```
C:\>ping 50.0.0.2

Pinging 50.0.0.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 50.0.0.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

Since the central office's router has multiple exit points, we can't use a default route for the routing on this router. We can also not configure a routing protocol on this router, as a routing protocol depends on routing broadcasts from neighboring routers and we did not configure a routing protocol on any remote site.

In this situation, we can configure the static routing on the central office's router. To configure static routing on the central office's router, use the following global configuration commands.

```
Router(config)#ip route 60.0.0.0 255.0.0.0 10.0.0.2
Router(config)#ip route 70.0.0.0 255.0.0.0 20.0.0.2
Router(config)#ip route 80.0.0.0 255.0.0.0 30.0.0.2
Router(config)#ip route 90.0.0.0 255.0.0.0 40.0.0.2
```

To learn how to configure static routes in Cisco routers, check this tutorial.

Static Routing Configuration Guide with Examples

The following image shows these commands with output.
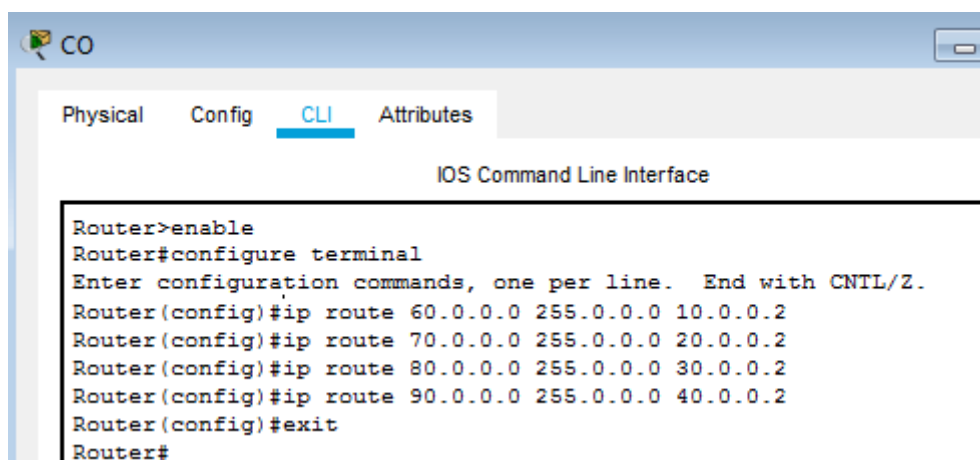
Once the static routing has configured on the central office's router, all remote sites can not only exchange data from the central office's network but can also communicate with each other through the central office's router.

To verify this, ping the server of the central office and PCs of other remote sites from the PC of the remote site RS1.