

Cisco Routing: "ip default-gateway" vs. Static Default Routes

One point of confusion for some CCNA and CCNP candidates is the difference between configuring a static default route and using the Cisco routing command `ip default-network`.

At first glance, they appear to do the same thing. Both configure a destination to which packets should be routed if there is no more specific route in the routing table.

The major difference between these two options is that configuring a static default route only defines a default route for the router you're configuring it on, while `ip default-network` will propagate the route via its routing protocol.

Let's examine the routing tables of a hub-and-spoke network using the `ip default-network` command. R1 is the hub and R2 and R3 are the spokes. They are directly connected via the network 172.12.123.0 /24, and each has a loopback with a 32-bit mask that are numbered according to the router number (1.1.1.1, etc.) RIP is running on all three routers and the loopbacks are advertised.

R1 has another serial interface with the IP address 10.1.1.1 /24, and this network has been flagged as a default network with the command `ip default-network 10.0.0.0`. It is not being advertised by RIP.

The routing protocol will then advertise this route. With RIP, the default network is advertised as 0.0.0.0. (With IGRP, it appears as the network number, but is marked as an IGRP External route.) This route has been designated a candidate default route on R1, as we see with the asterisk next to the 10.0.0.0 /24 network (code table removed for brevity):

```
R1#show ip route
```

```
Gateway of last resort is not set
```

```
1.0.0.0/32 is subnetted, 1 subnets
C 1.1.1.1 is directly connected, Loopback0
R 2.0.0.0/8 [120/1] via 172.12.123.2, 00:00:11, Serial0
R 3.0.0.0/8 [120/1] via 172.12.123.3, 00:00:11, Serial0
172.12.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.12.21.0/30 is directly connected, BRI0
C 172.12.123.0/24 is directly connected, Serial0
* 10.0.0.0/24 is subnetted, 1 subnets
C 10.1.1.0 is directly connected, Serial1
```

On R2 and R3, a default RIP route is now seen (code tables again deleted):

```
R2#show ip route
```

```
Gateway of last resort is 172.12.123.1 to network 0.0.0.0
```

```
R 1.0.0.0/8 [120/1] via 172.12.123.1, 00:00:00, Serial0.213
2.0.0.0/32 is subnetted, 1 subnets
C 2.2.2.2 is directly connected, Loopback0
R 3.0.0.0/8 [120/2] via 172.12.123.1, 00:00:00, Serial0.213
172.12.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.12.21.0/30 is directly connected, BRI0
C 172.12.123.0/24 is directly connected, Serial0.213
R* 0.0.0.0/0 [120/1] via 172.12.123.1, 00:00:00, Serial0.213
```

```
R3#show ip route
```

```
Gateway of last resort is 172.12.123.1 to network 0.0.0.0
```

```
R 1.0.0.0/8 [120/1] via 172.12.123.1, 00:00:27, Serial0.31
R 2.0.0.0/8 [120/2] via 172.12.123.1, 00:00:28, Serial0.31
3.0.0.0/32 is subnetted, 1 subnets
C 3.3.3.3 is directly connected, Loopback0
172.12.0.0/24 is subnetted, 1 subnets
C 172.12.123.0 is directly connected, Serial0.31
R* 0.0.0.0/0 [120/1] via 172.12.123.1, 00:00:28, Serial0.31
```

And the default route works, since we can ping 10.1.1.1 from both R2 and R3. Since they have no other match in their routing tables, they use the default route.

```
R2#ping 10.1.1.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:

```
!!!!
```

Success rate is 100 percent (5/5), round-trip min/avg/max = 68/68/68 ms

```
R3#ping 10.1.1.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:

```
!!!!
```

Success rate is 100 percent (5/5), round-trip min/avg/max = 68/68/68 ms

When deciding whether to use a default static route or a default network, keep in mind that if you want the routing protocol to propagate the default route, the ip default-network command will do that for you. But if you want only the local router to have the default route, a static IP route is the way to go.

Short note about the author

Chris Bryant, CCIE #12933, is the owner of The Bryant Advantage, the home of the world's clearest, most concise, most comprehensive CCNA Study Guide available today. He offers free CCNA, CCNP, and Home Lab Setup Tutorials on the website, as well as online boot camps, video training, and binary/subnetting help. Join the revolution against overpriced and incomplete CCNA and CCNP study guides - visit www.thebryantadvantage.com today!

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