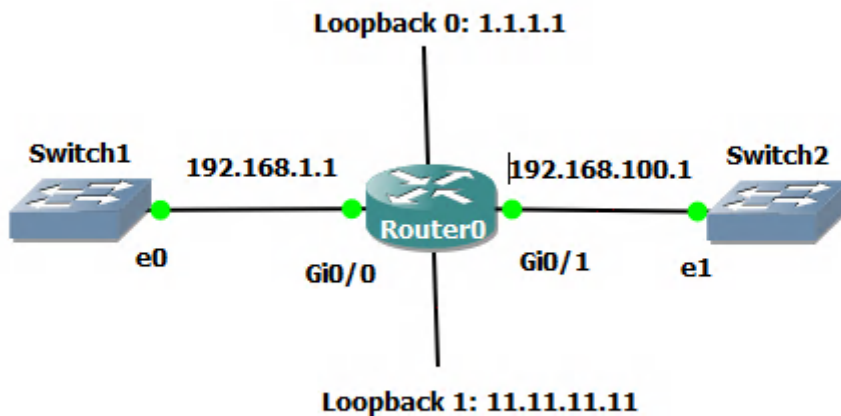


Cisco IOS OSPF Router ID

Network Topology



What is the OSPF Router ID (RID)?

The OSPF Router ID (RID) is a 32-bit value used to uniquely identify an OSPF router in a network. The Router ID takes the form of an IPv4 network address (i.e.; 1.1.1.1). It is used by OSPF routers to identify themselves to each other, and is also used as a key for certain OSPF data structures. The RID is typically chosen as the highest IP address of a router's interfaces that are configured for OSPF. If there are multiple interfaces with the same IP address, the RID will be chosen based on the interface's MAC address or on the order in which the interfaces were configured. The RID is used in the OSPF header of OSPF packets, and is also used in the LSA (Link State Advertisement) packets that OSPF routers exchange to form and maintain their routing tables.

How is the OSPF Router ID Selected?

A router chooses its OSPF Router ID (RID) based on the following priority:

1. The highest IP address of a loopback interface that is configured for OSPF. A loopback interface is a virtual interface that is always up, and is typically used for management purposes.
2. If there is no loopback interface configured, the highest IP address of a physical interface that is configured for OSPF.
3. If there are multiple interfaces with the same IP address, the RID will be chosen based on the interface's MAC address.
4. If all above methods fail to get a unique RID, the router will choose the RID based on the order in which the interfaces were configured.

It is important to note that, once chosen, the RID cannot be changed without restarting the OSPF process on the router. It is also important that all OSPF routers in a single OSPF domain must have unique RIDs.

Router ID in Action with Network Topology Above

The topology above has two physical interfaces and two Loopback interfaces.

Router0# show ip interface brief

```
Router0#show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	192.168.1.1	YES	NVRAM	up	up
GigabitEthernet0/1	192.168.100.1	YES	NVRAM	up	up
GigabitEthernet0/2	unassigned	YES	NVRAM	administratively down	down
GigabitEthernet0/3	unassigned	YES	NVRAM	administratively down	down
Loopback0	1.1.1.1	YES	NVRAM	up	up
Loopback1	11.11.11.11	YES	NVRAM	up	up

We can start the OSPF router process with the following command:

```
Router0(config)#router ospf 1
Router0(config-router)#end
```

Now let's check the OSPF Router ID by issuing the command:

Router0#show ip protocols

```
Router0#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
  Routing Information Sources:
    Gateway         Distance      Last Update
  Distance: (default is 4)

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 11.11.11.11
  Number of areas in this router is 0. 0 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
  Routing Information Sources:
    Gateway         Distance      Last Update
  Distance: (default is 110)
```

As can be seen above the ospf 1 process has chosen the Loopback interface with the highest IP address as its Router ID as we expected from #1 in the explanation above. Now let's remove the Loopback interfaces and see how that effects the OSPF Router ID.

```
Router0#configure terminal
Router0(config)#no interface loopback 0
Router0(config)#no interface loopback 1
Router0(config)#do show ip interface brief
```

```
Router0(config)#do show ip interface brief
Interface                IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0       192.168.1.1     YES NVRAM    up          up
GigabitEthernet0/1       192.168.100.1   YES NVRAM    up          up
GigabitEthernet0/2       unassigned      YES NVRAM    administratively down down
GigabitEthernet0/3       unassigned      YES NVRAM    administratively down down
```

Confirmed that the Loopback interfaces have been removed. Let's check the OSPF Router ID now.

```
Router0(config)#end
Router0#show ip protocols
```

```
Router0#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
  Routing Information Sources:
    Gateway         Distance      Last Update
  Distance: (default is 4)

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  ! Router ID 11.11.11.11
  Number of areas in this router is 0. 0 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
  Routing Information Sources:
    Gateway         Distance      Last Update
  Distance: (default is 110)
```

The Router ID has not changed! Just like the note above states the OSPF Router ID once chosen cannot be changed without a restart of the OSPF process. How can we restart the OSPF process? With this command:

```
Router0#clear ip ospf process
```

```
Router0#clear ip ospf process
Reset ALL OSPF processes? [no]: yes
```

Now we can check the Router ID again.

```
Router0#show ip protocols
```

```
Router0#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
  Routing Information Sources:
    Gateway         Distance      Last Update
  Distance: (default is 4)

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 192.168.100.1
  Number of areas in this router is 0. 0 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
  Routing Information Sources:
    Gateway         Distance      Last Update
  Distance: (default is 110)
```

After the reset of the OSPF process the Router ID has been selected from the physical interface with the highest IP address. Again, just like we would expect from #2 from the explanation above.

Now, what if we did not want the OSPF process to choose its own Router ID? What if we wanted to manually set the Router ID, can we do that? Yes! As long as we make sure to set it in the correct format of the 32-bit value with a 4 octet IPv4 decimal notation address.

```
Router0#configure terminal
Router0(config)#router ospf 1
Router0(config-router)#router-id 10.10.10.10
Router0(config-router)#end
Router0#show ip protocols
```

```
Router0#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "application"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Maximum path: 32
  Routing for Networks:
  Routing Information Sources:
    Gateway          Distance      Last Update
  Distance: (default is 4)

Routing Protocol is "ospf 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Router ID 10.10.10.10
  Number of areas in this router is 0. 0 normal 0 stub 0 nssa
  Maximum path: 4
  Routing for Networks:
  Routing Information Sources:
    Gateway          Distance      Last Update
  Distance: (default is 110)
```

As you can see the Router ID is now set to what we manually entered 10.10.10.10.

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