OSPFv2 Local RIB

With the OSPFv2 Local RIB feature, each OSPF protocol instance has its own local Routing Information Base (RIB). The OSPF local RIB serves as the primary state for OSPF SPF route computation. The global RIB is not updated with intermediate results during the SPF. Instead, the global RIB is updated only when routes are added, deleted, or changed, thereby reducing global RIB computation. This reduced update activity may result in fewer dropped packets.

This feature is enabled by default and does not need to be configured. This document describes some optional configuration tasks to modify how the global and local RIBs function, although it is recommended to keep the default settings.

Prerequisites for OSPFv2 Local RIB

Before this feature is configured, the OSPF routing protocol must be configured.

Restrictions for OSPFv2 Local RIB

This feature is available only for IP Version 4 networks.

Information About OSPFv2 Local RIB

A router that is running OSPFv2 maintains a local RIB in which it stores all routes to destinations that it has learned from its neighbors. At the end of each SPF, OSPF attempts to install the best (that is, the least-cost) routes to a destination present in the local RIB into the global IPv4 routing table. The global RIB will be updated only when routes are added, deleted, or changed. Routes in the local RIB and Forwarding Information Base (FIB) will not compute when intermediate results are computed during SPF, resulting in fewer dropped packets in some circumstances.

By default, the contents of the global RIB are used to compute inter-area summaries, NSSA translation, and forwarding addresses for type-5 and type-7 LSAs. Each of these functions can be configured to use the contents of the OSPF local RIB instead of the global RIB for their computation. Using the local RIB for the computation may be slightly faster in some circumstances, but because the local RIB has information for only a particular instance of OSPF, using it for the computation may yield incorrect results. Potential problems that may occur include routing loops and null routes. It is recommended that you not change the default values because they are conservative and preserve the current global RIB behavior.

By default, OSPF installs discard routes to null0 for any area range (internal) or summary-address (external) prefixes that it advertises to other routers. Installation of a discard route can prevent routing loops in cases where portions of a summary do not have a more specific route in the RIB. Normally, internal discard routes are installed with an administrative distance of 110, while external discard routes have an administrative distance of 254.

There may be rare circumstances, however, when some other values are needed. For example, if one OSPF process installs a route that exactly matches an area range configured on another OSPF process, the internal discard routes for the second OSPF process could be given a higher (less desirable) administrative distance.

How to Configure OSPFv2 Local RIB

Although it is recommended to keep the default settings for the commands described in the following sections, it is optional to change the defaults settings.

Changing the Default Local RIB Criteria

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id* [**vrf** *vpn-name*]
4. **local-rib-criteria** [**forwarding-address**] [**inter-area-summary**] [**nssa-translation**]
5. **end**
6. **show ip ospf** *process-id* **rib** [**redistribution**] [*network-prefix*] [*network-mask*] [**detail**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

		Command or Action	**Purpose**
Step 3		**router ospf** *process-id* [**vrf** *vpn-name*] **Example:** Device(config)# router ospf 23	Configures an OSPFv2 routing process and enters router configuration mode.
Step 4		**local-rib-criteria** [**forwarding-address**] [**inter-area-summary**] [**nssa-translation**] **Example:** Device(config-router)# local-rib-criteria forwarding-address	Specifies that the OSPF local RIB will be used for route validation.
Step 5		**end** **Example:** Device(config-router)# end	Returns to privileged EXEC mode.
Step 6		**show ip ospf** *process-id* **rib** [**redistribution**] [*network-prefix*] [*network-mask*] [**detail**] **Example:** Device# show ip ospf 23 rib	Displays information for the OSPF local RIB or locally redistributed routes.

Changing the Administrative Distance for Discard Routes

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Note   It is recommended that you keep the default settings. However, you can follow the steps in this section to change the administrative distance for discard routes.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router ospf** *process-id* [**vrf** *vpn-name*]
4. **discard-route** [**external** [*distance*]] [**internal** [*distance*]]
5. **end**
6. **show ip route** [*ip-address* [*mask*] [**longer-prefixes**] | *protocol* [*process-id*] | **list** [*access-list-number* | *access-list-name*] | **static download**]

DETAILED STEPS

	Command or Action	**Purpose**
Step 1	**enable** **Example:**	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
	`Device> enable`	
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**router ospf** *process-id* [**vrf** *vpn-name*] **Example:** `Device(config)# router ospf 23`	Configures an OSPFv2 routing process and enters router configuration mode.
Step 4	**discard-route** [**external** [*distance*]] [**internal** [*distance*]] **Example:** `Device(config-router)# discard-route external 150`	Reinstalls either an external or internal discard route that was previously removed. **Note** You can now specify the administrative distance for internal and external discard routes.
Step 5	**end** **Example:** `Device(config-router)# end`	Returns to privileged EXEC mode.
Step 6	**show ip route** [*ip-address* [*mask*] [**longer-prefixes**] | *protocol* [*process-id*] | **list** [*access-list-number* | *access-list-name*] | **static download**] **Example:** `Device# show ip route ospf 23`	Displays the current state of the routing table. **Note** Entering the **show ip route** command will verify the changed administrative distance values for external and internal discard routes.

Example

The sample output displayed for the **show ip route** command confirms that the administrative distance for the IP route 192.168.0.0/24 is 110.

```
Device# show ip route 192.168.0.0 255.255.255.0

Routing entry for 192.168.0.0/24

            Known via "ospf 1", distance 110, metric 0, type intra area

     Routing Descriptor Blocks:

     * directly connected, via Null0
```

```
            Route metric is 0, traffic share count is 1
```

Troubleshooting Tips

You can research the output from the **debug ip ospf rib** command to learn about the function of the local RIB and the interaction between the route redistribution process and the global RIB. For example, you can learn why the routes that OSPF placed in the global RIB are not the same ones that you anticipated.

Configuration Examples for OSPFv2 Local RIB

Example: Changing the Default Local RIB Criteria

In the following example, the **local-rib-criteria** command is entered without any keywords to specify that the local RIB will be used as criteria for all of the following options: forwarding address, inter-area summary, and NSSA translation.

```
router ospf 1
 router-id 10.0.0.6
 local-rib-criteria
```

Example: Changing the Administrative Distance for Discard Routes

In the following example, the administrative distance for external and internal discard routes is set to 25 and 30, respectively.

```
router ospf 1
 router-id 10.0.0.6
 log-adjacency-changes
 discard-route external 25 internal 30
 area 4 range 10.2.0.0 255.255.0.0
 summary-address 192.168.130.2 255.255.255.0
 redistribute static subnets
 network 192.168.129.2 0.255.255.255 area 0
 network 192.168.130.12 0.255.255.255 area 0
```

The output from the **show ip route** command verifies that the administrative distance for the internal route 10.2.0.0/16 is set to 30.

```
Device# show ip route 10.2.0.0 255.255.0.0
Routing entry for 10.2.0.0/16
Known via "ospf 1", distance 30, metric 1, type intra area
  Routing Descriptor Blocks:
  * directly connected, via Null0
      Route metric is 1, traffic share count is 1
```

The output from the **show ip route** command verifies that the administrative distance for the external route 192.168.130.2/24 is set to 25.

```
Device# show ip route 192.168.130.2 255.255.255.0
Routing entry for 192.168.130.2/24
 Known via "ospf 1", distance 25, metric 20, type intra area
```

```
        Routing Descriptor Blocks:
        * directly connected, via Null0
            Route metric is 20, traffic share count is 1
```

Additional References

The following sections provide references related to OSPFv2 Local RIB.

Related Documents

Related Topic	Document Title
Configuring OSPF	Configuring OSPF
OSPF commands	*Cisco IOS IP Routing: OSPF Command Reference*
Cisco IOS master command list, all releases	Cisco IOS Master Command List, All Releases

Standards

Standard	Title
None	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS XE releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	--

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for OSPFv2 Local RIB

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for the OSPFv2 Local RIB

Feature Name	Releases	Feature Information
OSPFv2 Local RIB	Cisco IOS XE Release 2.1	With the OSPFv2 Local RIB feature, each OSPF protocol instance has its own local Routing Information Base (RIB). The OSPF local RIB serves as the primary state for OSPF SPF route computation. The global RIB is not updated with intermediate results during the SPF. Instead, the global RIB is updated only when routes are added, deleted, or changed, thereby reducing global RIB computation. This reduced update activity may result in fewer dropped packets. This feature is enabled by default and does not need to be configured. This document describes some optional configuration tasks to modify how the global and local RIBs function, although it is recommended to keep the default settings. The following commands were introduced or modified: **debug ip ospf rib**, **discard-route**, **local-rib-criteria**, **show ip ospf rib**.

Table 2: Feature Information for the OSPFv2 Local RIB

Feature Name	Releases	Feature Information
OSPFv2 Local RIB	Cisco IOS XE Release 17.4	This feature was introduced.