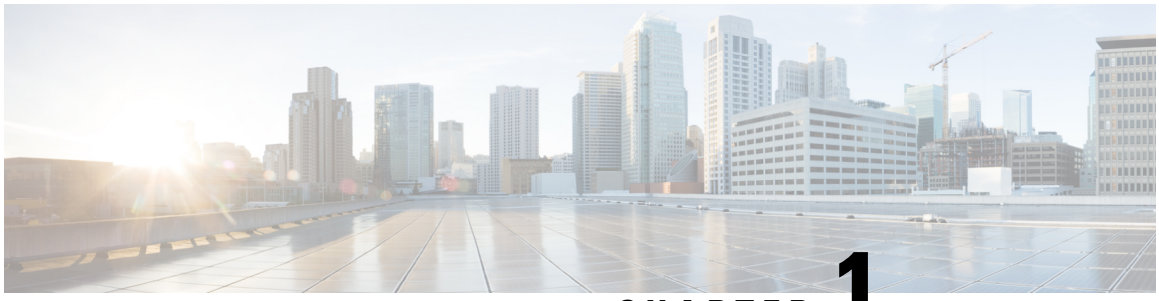
Multitopology Routing Configuration Guide, Cisco IOS XE Gibraltar 16.11.x

First Published: 2013-03-29

Last Modified: 2019-04-17

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

CONTENTS



CHAPTER 1

Read Me First

Important Information about Cisco IOS XE 16

Effective Cisco IOS XE Release 3.7.0E for Catalyst Switching and Cisco IOS XE Release 3.17S (for Access and Edge Routing) the two releases evolve (merge) into a single version of converged release—the Cisco IOS XE 16—providing one release covering the extensive range of access and edge products in the Switching and Routing portfolio.

Feature Information

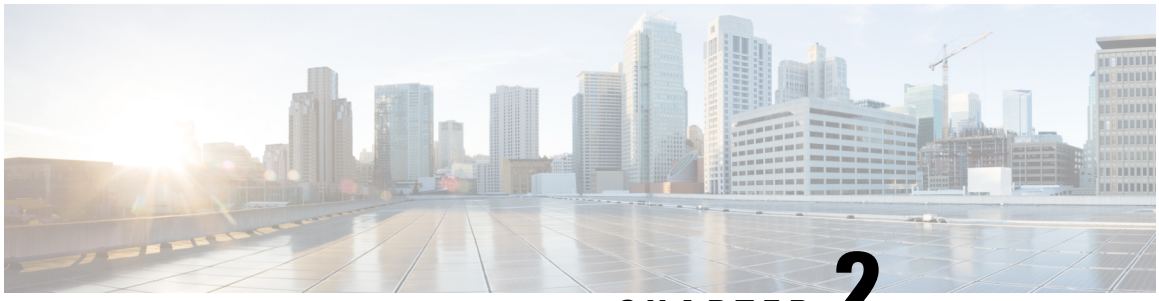
Use Cisco Feature Navigator to find information about feature support, platform support, and Cisco software image support. An account on Cisco.com is not required.

Related References

- Cisco IOS Command References, All Releases

Obtaining Documentation and Submitting a Service Request

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business impact you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco Marketplace.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.



CHAPTER 2

BGP Support for MTR

The BGP Support for MTR feature provides Border Gateway Protocol (BGP) support for multiple logical topologies over a single physical network. This module describes how to configure BGP for Multitopology Routing (MTR).

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

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.

Prerequisites for BGP Support for MTR

- Be familiar with all the concepts in the “Information About BGP Support for MTR” section.
- Configure and activate a global Multitopology Routing (MTR) topology configuration.

Restrictions for BGP Support for MTR

- Redistribution within a topology is permitted. Redistribution from one topology to another is not permitted. This restriction is designed to prevent routing loops. You can use topology translation or topology import functionality to move routes from one topology to another.
- Only a single multicast topology can be configured, and only the base topology can be specified if a multicast topology is created.

Information About BGP Support for MTR

Routing Protocol Support for MTR

You must enable IP routing on the device for Multitopology Routing (MTR) to operate. MTR supports static and dynamic routing in Cisco software. You can enable dynamic routing per topology to support interdomain and intradomain routing. Route calculation and forwarding are independent for each topology. MTR support is integrated into Cisco software for the following protocols:

- Border Gateway Protocol (BGP)
- Integrated Intermediate System-to-Intermediate System (IS-IS)

You apply the per-topology configuration in router address family configuration mode of the global routing process (router configuration mode). The address family and subaddress family are specified when the device enters address family configuration mode. You specify the topology name and topology ID by entering the **topology** command in address family configuration mode.

You configure each topology with a unique topology ID under the routing protocol. The topology ID is used to identify and group Network Layer Reachability Information (NLRI) for each topology in updates for a given protocol. In OSPF, EIGRP, and IS-IS, you enter the topology ID during the first configuration of the **topology** command for a class-specific topology. In BGP, you configure the topology ID by entering the **bgp tid** command under the topology configuration.

You can configure class-specific topologies with different metrics than the base topology. Interface metrics configured on the base topology can be inherited by the class-specific topology. Inheritance occurs if no explicit inheritance metric is configured in the class-specific topology.

You configure BGP support only in router configuration mode. You configure Interior Gateway Protocol (IGP) support in router configuration mode and in interface configuration mode.

By default, interfaces are not included in nonbase topologies. For routing protocol support for EIGRP, IS-IS, and OSPF, you must explicitly configure a nonbase topology on an interface. You can override the default behavior by using the **all-interfaces** command in address family topology configuration mode. The **all-interfaces** command causes the nonbase topology to be configured on all interfaces of the device that are part of the default address space or the virtual routing and forwarding (VRF) instance in which the topology is configured.

BGP Network Scope

To implement Border Gateway Protocol (BGP) support for Multitopology Routing (MTR), the scope hierarchy is required, but the scope hierarchy is not limited to MTR use. The scope hierarchy introduces new configuration modes such as router scope configuration mode. The device enters router scope configuration mode when you configure the **scope** command in router configuration mode. When this command is entered, a collection of routing tables is created.

You configure BGP commands under the scope hierarchy for a single network (globally), or on a per-virtual routing and forwarding (VRF) basis; these configurations are referred to as scoped commands. The scope hierarchy can contain one or more address families.

MTR CLI Hierarchy Under BGP

The Border Gateway Protocol (BGP) CLI provides backward compatibility for pre-Multitopology Routing (MTR) BGP configuration and provides a hierarchical implementation of MTR. Router configuration mode is backward compatible with the pre-address family and pre-MTR configuration CLI. Global commands that affect all networks are configured in this configuration mode. For address family and topology configuration, you configure general session commands and peer templates to be used in address family configuration mode or in topology configuration mode.

After configuring any global commands, you define the scope either globally or for a specific virtual routing and forwarding (VRF) instance. The device enters address family configuration mode when you configure the **address-family** command in router scope configuration mode or in router configuration mode. Unicast is the default address family if no subaddress family identifier (SAFI) is specified. MTR supports only the IPv4 address family with a SAFI of unicast or multicast.

When the device enters address family configuration mode from router configuration mode, the software configures BGP to use pre-MTR-based CLI. This configuration mode is backward compatible with pre-existing address family configurations. Entering address family configuration mode from router scope configuration mode configures the device to use the hierarchical CLI that supports MTR. Address family configuration parameters that are not specific to a topology are entered in this address family configuration mode.

The device enters BGP topology configuration mode when you configure the **topology** command in address family configuration mode. You can configure up to 32 topologies (including the base topology) on a device. You configure the topology ID by entering the **bgp tid** command. All address family and subaddress family configuration parameters for the topology are configured here.

Note Configuring a scope for a BGP routing process removes CLI support for pre-MTR-based configuration.

The following example shows the hierarchy levels that are used when you configure BGP for MTR implementation:

```
router bgp <autonomous-system-number>
 ! Global commands

 scope {global | vrf <vrf-name>}
  ! Scoped commands

  address-family {<afi>} [<safi>]
   ! Address family specific commands
```

```
topology {<topology-name> | base}
 ! topology specific commands
```

BGP Sessions for Class-Specific Topologies

Multitopology Routing (MTR) is configured under the Border Gateway Protocol (BGP) on a per-session basis. The base unicast and multicast topologies are carried in the global (default) session. A separate session is created for each class-specific topology that is configured under a BGP routing process. Each session is identified by its topology ID. BGP performs a best-path calculation individually for each class-specific topology. A separate Routing Information Base (RIB) and Forwarding Information Base (FIB) are maintained for each session.

Topology Translation Using BGP

Depending on the design and policy requirements for your network, you might need to install routes from a class-specific topology on one device in a class-specific topology on a neighboring device. Topology translation functionality using the Border Gateway Protocol (BGP) provides support for this operation. Topology translation is BGP neighbor-session based. You configure the **neighbor translate-topology** command by using the IP address and topology ID from the neighbor.

The topology ID identifies the class-specific topology of the neighbor. The routes in the class-specific topology of the neighbor are installed in the local class-specific Routing Information Base (RIB). BGP performs a best-path calculation on all installed routes and installs these routes into the local class-specific RIB. If a duplicate route is translated, BGP selects and installs only one instance of the route per standard BGP best-path calculation behavior.

Topology Import Using BGP

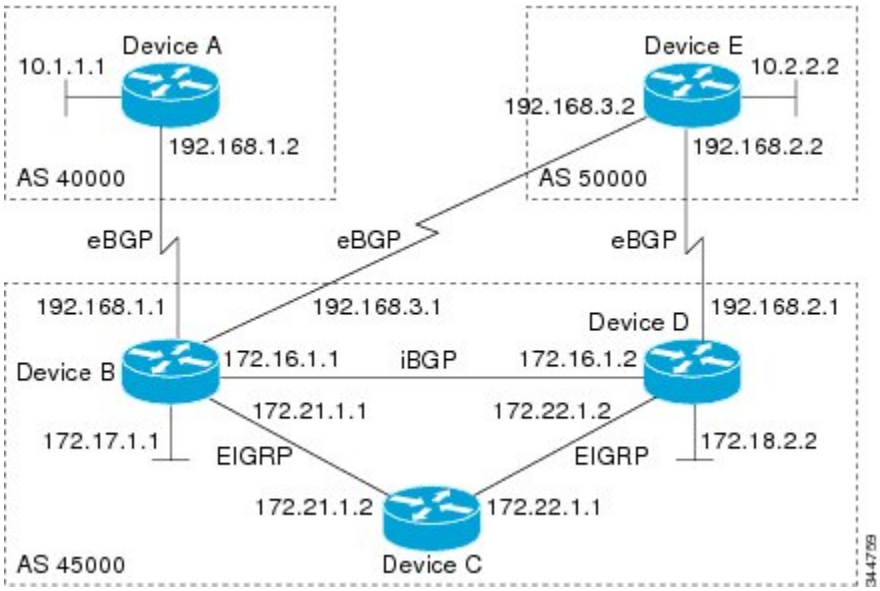
Importing topologies using the Border Gateway Protocol (BGP) is similar to topology translation. The difference is that routes are moved between class-specific topologies on the same device. You configure this function by entering the **import topology** command and specify the name of the class-specific topology or base topology. Best-path calculations are run on the imported routes before they are installed into the topology Routing Information Base (RIB). This **import topology** command also includes a **route-map** keyword to allow you to filter routes that are moved between class-specific topologies.

How to Configure BGP Support for MTR

Activating an MTR Topology by Using BGP

Perform this task to activate a Multitopology Routing (MTR) topology inside an address family by using the Border Gateway Protocol (BGP). This task is configured on Device B in the figure below and must also be configured on Device D and Device E. In this task, a scope hierarchy is configured to apply globally, and a neighbor is configured in router scope configuration mode. Under the IPv4 unicast address family, an MTR topology that applies to video traffic is activated for the specified neighbor. There is no interface configuration mode for BGP topologies.

Figure 1: BGP Network Diagram



SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router bgp** *autonomous-system-number*
4. **scope** {**global** | **vrf** *vrf-name*}
5. **neighbor** {*ip-address* | *peer-group-name*} **remote-as** *autonomous-system-number*
6. **neighbor** {*ip-address* | *peer-group-name*} **transport** {**connection-mode** {**active** | **passive**} | **path-mtu-discovery** | **multi-session** | **single-session**}
7. **address-family ipv4** [**mdt** | **multicast** | **unicast**]
8. **topology** {**base** | *topology-name*}
9. **bgp tid** *number*
10. **neighbor** *ip-address* **activate**
11. **neighbor** {*ip-address* | *peer-group-name*} **translate-topology** *number*
12. **end**
13. **clear ip bgp topology** {* | *topology-name*} {*as-number* | **dampening** [*network-address* [*network-mask*]] | **flap-statistics** [*network-address* [*network-mask*]] | **peer-group** *peer-group-name* | **table-map** | **update-group** [*number* | *ip-address*]} [**in** [**prefix-filter**] | **out** | **soft** [**in** [**prefix-filter**] | **out**]]
14. **show ip bgp topology** {* | *topology*} **summary**

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 bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 45000`	Enters router configuration mode to create or configure a BGP routing process.
Step 4	**scope** {**global** | **vrf** *vrf-name*} **Example:** `Device(config-router)# scope global`	Defines the scope for the BGP routing process and enters router scope configuration mode. • BGP general session commands that apply to a single network, or a specified virtual and routing forwarding (VRF) instance, are entered in this configuration mode. • Use the **global** keyword to specify that BGP uses the global routing table. • Use the **vrf** *vrf-name* keyword and argument to specify that BGP uses a specific VRF routing table. The VRF must already exist.
Step 5	**neighbor** {*ip-address* | *peer-group-name*} **remote-as** *autonomous-system-number* **Example:** `Device(config-router-scope)# neighbor 172.16.1.2 remote-as 45000`	Adds the IP address of the neighbor in the specified autonomous system to the multiprotocol BGP neighbor table of the local device.
Step 6	**neighbor** {*ip-address* | *peer-group-name*} **transport** {**connection-mode** {**active** | **passive**} | **path-mtu-discovery** | **multi-session** | **single-session**} **Example:** `Device(config-router-scope)# neighbor 172.16.1.2 transport multi-session`	Enables a TCP transport session option for a BGP session. • Use the **connection-mode** keyword to specify the type of connection, either active or passive. • Use the **path-mtu-discovery** keyword to enable the TCP transport path maximum transmission unit (MTU) discovery. • Use the **multi-session** keyword to specify a separate TCP transport session for each address family. • Use the **single-session** keyword to specify that all address families use a single TCP transport session.
Step 7	**address-family ipv4** [**mdt** | **multicast** | **unicast**] **Example:**	Specifies the IPv4 address family and enters router scope address family configuration mode.

	Command or Action	Purpose
	`Device(config-router-scope)# address-family ipv4`	• Use the **mdt** keyword to specify IPv4 multicast distribution tree (MDT) address prefixes. • Use the **multicast** keyword to specify IPv4 multicast address prefixes. • Use the **unicast** keyword to specify the IPv4 unicast address family. By default, the device is placed in address family configuration mode for the IPv4 unicast address family if the **unicast** keyword is not specified with the **address-family ipv4** command. • Nontopology-specific configuration parameters are configured in this configuration mode.
Step 8	**topology** {**base** | *topology-name*} **Example:** `Device(config-router-scope-af)# topology VIDEO`	Configures the topology instance in which BGP routes class-specific or base topology traffic, and enters router scope address family topology configuration mode.
Step 9	**bgp tid** *number* **Example:** `Device(config-router-scope-af-topo)# bgp tid 100`	Associates a BGP routing process with the specified topology ID. • Each topology must be configured with a unique topology ID.
Step 10	**neighbor** *ip-address* **activate** **Example:** `Device(config-router-scope-af-topo)# neighbor 172.16.1.2 activate`	Enables the BGP neighbor to exchange prefixes for the network service access point (NSAP) address family with the local device. **Note** If you have configured a peer group as a BGP neighbor, do not use this command because peer groups are automatically activated when any peer group parameter is configured.
Step 11	**neighbor** {*ip-address* | *peer-group-name*} **translate-topology** *number* **Example:** `Device(config-router-scope-af-topo)# neighbor 172.16.1.2 translate-topology 200`	(Optional) Configures BGP to install routes from a topology on another device to a topology on the local device. • The topology ID is entered for the *number* argument to identify the topology on the device.
Step 12	**end** **Example:** `Device(config-router-scope-af-topo)# end`	(Optional) Exits router scope address family topology configuration mode and returns to privileged EXEC mode.
Step 13	**clear ip bgp topology** {***** | *topology-name*} {*as-number* | **dampening** [*network-address* [*network-mask*]] | **flap-statistics** [*network-address* [*network-mask*]] |	Resets BGP neighbor sessions under a specified topology or all topologies.

	Command or Action	Purpose
	peer-group *peer-group-name* | **table-map** | **update-group** [*number* | *ip-address*]} [**in** [**prefix-filter**] | **out** | **soft** [**in** [**prefix-filter**] | **out**]] **Example:** `Device# clear ip bgp topology VIDEO 45000`	
Step 14	**show ip bgp topology** {***** | *topology*} **summary** **Example:** `Device# show ip bgp topology VIDEO summary`	(Optional) Displays BGP information about a topology. • Most standard BGP keywords and arguments can be entered following the **topology** keyword. **Note** Only the syntax required for this task is shown. For more details, see the *Cisco IOS IP Routing: BGP Command Reference*.

What to Do Next

Repeat this task for every topology that you want to enable, and repeat this configuration on all neighbor devices that are to use the topologies.

If you want to import routes from one Multitopology Routing (MTR) topology to another on the same device, see the "Importing Routes from an MTR Topology by Using BGP" section.

Importing Routes from an MTR Topology by Using BGP

Perform this task to import routes from one Multitopology Routing (MTR) topology to another on the same device, when multiple topologies are configured on the same device. In this task, a prefix list is defined to permit prefixes from the 10.2.2.0 network, and this prefix list is used with a route map to filter routes moved from the imported topology. A global scope is configured, address family IPv4 is entered, the VIDEO topology is specified, the VOICE topology is imported, and the routes are filtered using the route map named 10NET.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip prefix-list** *list-name* [**seq** *number*] {**deny** | **permit**} *network/length* [**ge** *ge-length*] [**le** *le-length*]
4. **route-map** *map-name* [**permit** | **deny**] [*sequence-number*]
5. **match ip address** {*access-list-number* [*access-list-number ...* | *access-list-name...*] | *access-list-name* [*access-list-number ...* | *access-list-name*] | **prefix-list** *prefix-list-name* [*prefix-list-name...*]}
6. **exit**
7. **router bgp** *autonomous-system-number*
8. **scope** {**global** | **vrf** *vrf-name*}
9. **address-family ipv4** [**mdt** | **multicast** | **unicast**]
10. **topology** {**base** | *topology-name*}
11. **import topology** {**base** | *topology-name*} [**route-map** *map-name*]
12. **end**

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.
Step 3	**ip prefix-list** *list-name* [**seq** *number*] {**deny** | **permit**} *network/length* [**ge** *ge-length*] [**le** *le-length*] **Example:** `Device(config)# ip prefix-list TEN permit 10.2.2.0/24`	Configures an IP prefix list. • In this example, prefix list TEN permits advertising of the 10.2.2.0/24 prefix depending on a match set by the **match ip address** command.
Step 4	**route-map** *map-name* [**permit** | **deny**] [*sequence-number*] **Example:** `Device(config)# route-map 10NET`	Creates a route map and enters route-map configuration mode. • In this example, the route map named 10NET is created.
Step 5	**match ip address** {*access-list-number* [*access-list-number ...* | *access-list-name...*] | *access-list-name* [*access-list-number ...* | *access-list-name*] | **prefix-list** *prefix-list-name* [*prefix-list-name...*]} **Example:** `Device(config-route-map)# match ip address prefix-list TEN`	Configures the route map to match a prefix that is permitted by a standard access list, an extended access list, or a prefix list. • In this example, the route map is configured to match prefixes permitted by prefix list TEN.
Step 6	**exit** **Example:** `Device(config-route-map)# exit`	Exits route-map configuration mode and returns to global configuration mode.
Step 7	**router bgp** *autonomous-system-number* **Example:** `Device(config)# router bgp 50000`	Enters router configuration mode to create or configure a Border Gateway Protocol (BGP) routing process.
Step 8	**scope** {**global** | **vrf** *vrf-name*} **Example:** `Device(config-router)# scope global`	Defines the scope to the BGP routing process and enters router scope configuration mode. • BGP general session commands that apply to a single network, or a specified virtual routing and forwarding

	Command or Action	Purpose
		(VRF) instance, are entered in this configuration mode. • Use the **global** keyword to specify that BGP uses the global routing table. • Use the **vrf** *vrf-name* keyword and argument to specify that BGP uses a specific VRF routing table. The VRF must already exist.
Step 9	**address-family ipv4** [**mdt** | **multicast** | **unicast**] **Example:** `Device(config-router-scope)# address-family ipv4`	Enters router scope address family configuration mode to configure an address family session under BGP. • Nontopology-specific configuration parameters are configured in this configuration mode.
Step 10	**topology** {**base** | *topology-name*} **Example:** `Device(config-router-scope-af)# topology VIDEO`	Configures the topology instance in which BGP routes class-specific or base topology traffic, and enters router scope address family topology configuration mode.
Step 11	**import topology** {**base** | *topology-name*} [**route-map** *map-name*] **Example:** `Device(config-router-scope-af-topo)# import topology VOICE route-map 10NET`	(Optional) Configures BGP to move routes from one topology to another on the same device. • The **route-map** keyword can be used to filter routes that moved between topologies.
Step 12	**end** **Example:** `Device(config-router-scope-af-topo)# end`	(Optional) Exits router scope address family topology configuration mode and returns to privileged EXEC mode.

Configuration Examples for BGP Support for MTR

Example: BGP Topology Translation Configuration

The following example shows how to configure the Border Gateway Protocol (BGP) in the VIDEO topology and how to configure topology translation with the 192.168.2.2 neighbor:

```
router bgp 45000
 scope global
  neighbor 172.16.1.1 remote-as 50000
  neighbor 192.168.2.2 remote-as 55000
  neighbor 172.16.1.1 transport multi-session
  neighbor 192.168.2.2 transport multi-session
   address-family ipv4
    topology VIDEO
```

```
     bgp tid 100
     neighbor 172.16.1.1 activate
     neighbor 192.168.2.2 activate
     neighbor 192.168.2.2 translate-topology 200
     end
clear ip bgp topology VIDEO 50000
```

Example: BGP Global Scope and VRF Configuration

The following example shows how to configure a global scope for a unicast topology and also for a multicast topology. After the device exits the router scope configuration mode, a scope is configured for the virtual routing and forwarding (VRF) instance named DATA.

```
router bgp 45000
 scope global
  bgp default ipv4-unicast
  neighbor 172.16.1.2 remote-as 45000
  neighbor 192.168.3.2 remote-as 50000
  address-family ipv4 unicast
   topology VOICE
   bgp tid 100
   neighbor 172.16.1.2 activate
   exit
  address-family ipv4 multicast
   topology base
    neighbor 192.168.3.2 activate
    exit
   exit
  exit
 scope vrf DATA
  neighbor 192.168.1.2 remote-as 40000
  address-family ipv4
   neighbor 192.168.1.2 activate
   end
```

Examples: BGP Topology Verification

The following example shows summary output for the **show ip bgp topology** command. Information is displayed about Border Gateway Protocol (BGP) neighbors configured to use the Multitopology Routing (MTR) topology named VIDEO.

```
Device# show ip bgp topology VIDEO summary

BGP router identifier 192.168.3.1, local AS number 45000
BGP table version is 1, main routing table version 1
Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
172.16.1.2      4 45000     289     289        1    0    0 04:48:44        0
192.168.3.2     4 50000       3       3        1    0    0 00:00:27        0
```

The following partial output displays BGP neighbor information under the VIDEO topology:

```
Device# show ip bgp topology VIDEO neighbors 172.16.1.2

BGP neighbor is 172.16.1.2,  remote AS 45000, internal link
  BGP version 4, remote router ID 192.168.2.1
  BGP state = Established, up for 04:56:30
  Last read 00:00:23, last write 00:00:21, hold time is 180, keepalive interval is 60
seconds
```

```
  Neighbor sessions:
    1 active, is multisession capable
  Neighbor capabilities:
    Route refresh: advertised and received(new)
  Message statistics, state Established:
    InQ depth is 0
    OutQ depth is 0
                         Sent       Rcvd
    Opens:                  1          1
    Notifications:          0          0
    Updates:                0          0
    Keepalives:           296        296
    Route Refresh:          0          0
    Total:                297        297
  Default minimum time between advertisement runs is 0 seconds
 For address family: IPv4 Unicast topology VIDEO
  Session: 172.16.1.2 session 1
  BGP table version 1, neighbor version 1/0
  Output queue size : 0
  Index 1, Offset 0, Mask 0x2
1 update-group member
  Topology identifier: 100
.
.
.
  Address tracking is enabled, the RIB does have a route to 172.16.1.2
  Address tracking requires at least a /24 route to the peer
  Connections established 1; dropped 0
  Last reset never
  Transport(tcp) path-mtu-discovery is enabled
Connection state is ESTAB, I/O status: 1, unread input bytes: 0
Minimum incoming TTL 0, Outgoing TTL 255
Local host: 172.16.1.1, Local port: 11113
Foreign host: 172.16.1.2, Foreign port: 179
.
.
.
```

Example: Importing Routes from an MTR Topology by Using BGP

The following example shows how to configure an access list to be used by a route map named VOICE to filter routes imported from the Multitopology Routing (MTR) topology named VOICE. Only routes with the prefix 192.168.1.0 are imported.

```
access-list 1 permit 192.168.1.0 0.0.0.255
route-map BLUE
 match ip address 1
 exit
router bgp 50000
 scope global
  neighbor 10.1.1.2 remote-as 50000
  neighbor 172.16.1.1 remote-as 60000
   address-family ipv4
    topology VIDEO
     bgp tid 100
     neighbor 10.1.1.2 activate
     neighbor 172.16.1.1 activate
     import topology VOICE route-map VOICE
     end
clear ip bgp topology VIDEO 50000
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Multitopology Routing (MTR) commands	Cisco IOS Multitopology Routing Command Reference
Border Gateway Protocol (BGP) commands	Cisco IOS IP Routing: BGP Command Reference
BGP concepts and tasks	*IP Routing: BGP Configuration Guide*

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

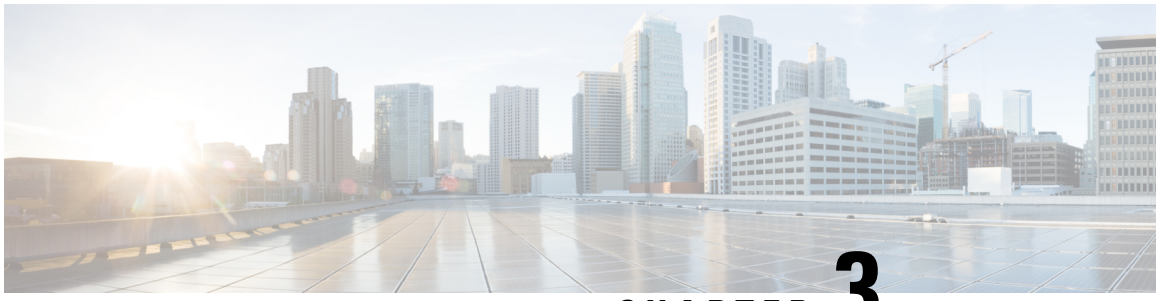
Feature Information for BGP Support for MTR

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 BGP Support for MTR

Feature Name	Releases	Feature Information
BGP Support for MTR	12.2(33)SRB 15.0(1)S	This feature provides Border Gateway Protocol (BGP) support for multiple logical topologies over a single physical network. In Cisco IOS XE Release 2.5, support was added for the Cisco ASR 1000 Series Routers. The following commands were introduced or modified: **address-family ipv4**, **bgp tid**, **clear ip bgp topology**, **import topology**, **neighbor translate-topology**, **neighbor transport**, **scope**, **show ip bgp topology**, **topology**.



CHAPTER 3

IS-IS Support for MTR

The IS-IS Support for MTR feature provides Intermediate System-to-Intermediate System (IS-IS) support for multiple logical topologies over a single physical network. This module describes how to configure IS-IS for Multitopology Routing (MTR) for both unicast and multicast topologies.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

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.

Prerequisites for IS-IS Support for MTR

- Be familiar with the concepts in the “Routing Protocol Support for MTR” section.
- Configure and activate a global topology configuration.
- You must configure a multicast topology before activating the Intermediate System-to-Intermediate System (IS-IS) protocol in the multicast topology. For details, see the “MTR support for Multicast” feature module.
- Activate a Multitopology Routing (MTR) topology on an IS-IS device.

- Configure the MTR topology to globally configure all interfaces by using the **all-interfaces** address family topology configuration command, or configure the IS-IS topology in interface configuration mode to configure only IS-IS interfaces. The order in which you perform the two tasks does not matter.

Restrictions for IS-IS Support for MTR

Only the IPv4 address family (multicast and unicast) and IPv6 address family unicast are supported. For information about configuring Multitopology IS-IS for IPv6, see the *IS-IS Configuration Guide.*

Information About IS-IS Support for MTR

Routing Protocol Support for MTR

You must enable IP routing on the device for Multitopology Routing (MTR) to operate. MTR supports static and dynamic routing in Cisco software. You can enable dynamic routing per topology to support interdomain and intradomain routing. Route calculation and forwarding are independent for each topology. MTR support is integrated into Cisco software for the following protocols:

- Border Gateway Protocol (BGP)
- Integrated Intermediate System-to-Intermediate System (IS-IS)

You apply the per-topology configuration in router address family configuration mode of the global routing process (router configuration mode). The address family and subaddress family are specified when the device enters address family configuration mode. You specify the topology name and topology ID by entering the **topology** command in address family configuration mode.

You configure each topology with a unique topology ID under the routing protocol. The topology ID is used to identify and group Network Layer Reachability Information (NLRI) for each topology in updates for a given protocol. In OSPF, EIGRP, and IS-IS, you enter the topology ID during the first configuration of the **topology** command for a class-specific topology. In BGP, you configure the topology ID by entering the **bgp tid** command under the topology configuration.

You can configure class-specific topologies with different metrics than the base topology. Interface metrics configured on the base topology can be inherited by the class-specific topology. Inheritance occurs if no explicit inheritance metric is configured in the class-specific topology.

You configure BGP support only in router configuration mode. You configure Interior Gateway Protocol (IGP) support in router configuration mode and in interface configuration mode.

By default, interfaces are not included in nonbase topologies. For routing protocol support for EIGRP, IS-IS, and OSPF, you must explicitly configure a nonbase topology on an interface. You can override the default behavior by using the **all-interfaces** command in address family topology configuration mode. The **all-interfaces** command causes the nonbase topology to be configured on all interfaces of the device that are part of the default address space or the virtual routing and forwarding (VRF) instance in which the topology is configured.

Interface Configuration Support for MTR

The configuration of a Multitopology Routing (MTR) topology in interface configuration mode allows you to enable or disable MTR on a per-interface basis. By default, a class-specific topology does not include any interfaces.

You can include or exclude individual interfaces by configuring the **topology** interface configuration command. You specify the address family and the topology (base or class-specific) when entering this command. The subaddress family can be specified. If no subaddress family is specified, the unicast subaddress family is used by default.

You can include globally all interfaces on a device in a topology by entering the **all-interfaces** command in routing topology configuration mode. Per-interface topology configuration applied with the **topology** command overrides global interface configuration.

The interface configuration support for MTR has these characteristics:

- Per-interface routing configuration: Interior Gateway Protocol (IGP) routing and metric configurations can be applied in interface topology configuration mode. Per-interface metrics and routing behaviors can be configured for each IGP.
- Open Shortest Path First (OSPF) interface topology configuration: Interface mode OSPF configurations for a class-specific topology are applied in interface topology configuration mode. In this mode, you can configure an interface cost or disable OSPF routing without removing the interface from the global topology configuration.
- Enhanced Interior Gateway Routing Protocol (EIGRP) interface topology configuration: Interface mode EIGRP configurations for a class-specific topology are applied in interface topology configuration mode. In this mode, you can configure various EIGRP features.
- Intermediate System-to-Intermediate System (IS-IS) interface topology configuration: Interface mode IS-IS configurations for a class-specific topology are applied in interface topology configuration mode. In this mode, you can configure an interface cost or disable IS-IS routing without removing the interface from the global topology configuration.

How to Configure IS-IS Support for MTR

Activating an MTR Topology by Using IS-IS

Note Only Multitopology Routing (MTR) commands are shown in this task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **router isis** [*area-tag*]
4. **net** *network-entity-title*
5. **metric-style wide** [**transition**] [**level-1** | **level-2** | **level-1-2**]

6. **address-family ipv4** [**multicast** | **unicast**]
7. **topology** *topology-name* **tid** *number*
8. **end**
9. **show isis neighbors 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.
Step 3	**router isis** [*area-tag*] **Example:** `Device(config)# router isis`	Enables the Intermediate System-to-Intermediate System (IS-IS) routing protocol and optionally specifies an IS-IS process. • Enters router configuration mode.
Step 4	**net** *network-entity-title* **Example:** `Device(config-router)# net 31.3131.3131.3131.00`	Configures an IS-IS network entity title (NET) for a Connectionless Network Service (CLNS) routing process.
Step 5	**metric-style wide** [**transition**] [**level-1**	**level-2**	**level-1-2**] **Example:** `Device(config-router)# metric-style wide`	Globally changes the metric value for all IS-IS interfaces. **Note** Wide style metrics are required for prefix tagging.
Step 6	**address-family ipv4** [**multicast**	**unicast**] **Example:** `Device(config-router)# address-family ipv4`	Enters router address family configuration mode.
Step 7	**topology** *topology-name* **tid** *number* **Example:** `Device(config-router-af)# topology DATA tid 100`	Configures IS-IS support for the topology and assigns a Topology Identifier (TID) number for each topology. • In this example, IS-IS support for the DATA topology is configured.
Step 8	**end** **Example:** `Device(config-router-af)# end`	Exits router address family configuration mode and returns to privileged EXEC mode.

	Command or Action	Purpose
Step 9	**show isis neighbors detail** **Example:** `Device# show isis neighbors detail`	(Optional) Displays information about IS-IS neighbors, including MTR information for the TID values for the device and its IS-IS neighbors.

What to Do Next

If a Border Gateway Protocol (BGP) topology configuration is required, see the "BGP Support for MTR" feature module.

Activating an MTR Topology in Interface Configuration Mode by Using IS-IS

Before you begin

Define a topology globally before performing the per-interface topology configuration.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address** *ip-address mask* [**secondary**]
5. **ip router isis** [*area-tag*]
6. **topology ipv4** [**multicast** | **unicast**] {*topology-name* [**disable** | **base**]}
7. **isis topology disable**
8. **topology ipv4** [**multicast** | **unicast**] {*topology-name* [**disable** | **base**]}
9. **end**

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.
Step 3	**interface** *type number* **Example:** `Device(config)# interface Ethernet 2/0`	Specifies the interface type and number, and enters interface configuration mode.

	Command or Action	Purpose
Step 4	**ip address** *ip-address mask* [**secondary**] **Example:** `Device(config-if)# ip address 192.168.7.17 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 5	**ip router isis** [*area-tag*] **Example:** `Device(config-if)# ip router isis`	Configures an Intermediate System-to-Intermediate System (IS-IS) routing process for IP on an interface and attaches an area designator to the routing process. **Note** If a tag is not specified, a null tag is assumed and the process is referenced with a null tag.
Step 6	**topology ipv4** [**multicast** | **unicast**] {*topology-name* [**disable** | **base**]} **Example:** `Device(config-if)# topology ipv4 DATA`	Configures a Multitopology Routing (MTR) topology instance on an interface and enters interface topology configuration mode. **Note** In this example, the topology instance DATA is configured for an MTR network that has a global topology named DATA.
Step 7	**isis topology disable** **Example:** `Device(config-if-topology)# isis topology disable`	(Optional) Prevents an IS-IS process from advertising the interface as part of the topology. **Note** In this example, the topology instance DATA will not advertise the interface as part of the topology.
Step 8	**topology ipv4** [**multicast** | **unicast**] {*topology-name* [**disable** | **base**]} **Example:** `Device(config-if-topology)# topology ipv4 VOICE`	Configures an MTR topology instance on an interface. **Note** In this example, the topology instance VOICE is configured for an MTR network that has a global topology named VOICE.
Step 9	**end** **Example:** `Device(config-if-topology)# end`	Exits interface topology configuration mode and returns to privileged EXEC mode.

Monitoring Interface and Topology IP Traffic Statistics for MTR

Use any of the following commands in any order to monitor interface and topology IP traffic statistics for Multitopology Routing (MTR).

SUMMARY STEPS

1. **enable**
2. **show ip interface** [*type number*] [**topology** {*name* | **all** | **base**}] [**stats**]

3. **show ip traffic** [**topology** {*name* | **all** | **base**}]
4. **clear ip interface** *type number* [**topology** {*name* | **all** | **base**}] [**stats**]
5. **clear ip traffic** [**topology** {*name* | **all** | **base**}]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show ip interface** [*type number*] [**topology** {*name*	**all**	**base**}] [**stats**] **Example:** `Device# show ip interface FastEthernet 1/10 stats`	(Optional) Displays IP traffic statistics for all interfaces or statistics related to the specified interface. • If you specify an interface type and number, information for that specific interface is displayed. If you specify no optional arguments, information for all the interfaces is displayed. • If the **topology** *name* keyword and argument are used, statistics are limited to the IP traffic for that specific topology. • The **base** keyword displays the IPv4 unicast base topology.
Step 3	**show ip traffic** [**topology** {*name*	**all**	**base**}] **Example:** `Device# show ip traffic topology VOICE`	(Optional) Displays global IP traffic statistics (an aggregation of all the topologies when MTR is enabled) or statistics related to a particular topology. • The **base** keyword is reserved for the IPv4 unicast base topology.
Step 4	**clear ip interface** *type number* [**topology** {*name*	**all**	**base**}] [**stats**] **Example:** `Device# clear ip interface FastEthernet 1/10 topology all`	(Optional) Resets interface-level IP traffic statistics. • If the **topology** keyword and a related keyword are not used, only the interface-level aggregate statistics are reset. • If all topologies need to be reset, use the **all** keyword as the topology name.
Step 5	**clear ip traffic** [**topology** {*name*	**all**	**base**}] **Example:** `Device# clear ip traffic topology all`	(Optional) Resets IP traffic statistics. • If no topology name is specified, global statistics are cleared.

Configuration Examples for IS-IS Support for MTR

Example: Activating an MTR Topology by Using IS-IS

The following example shows how to configure both the Multitopology Routing (MTR) topologies DATA and VIDEO and Intermediate System-to-Intermediate System (IS-IS) support for MTR. The DATA and VIDEO topologies are enabled on three IS-IS neighbors in a network.

Device 1

```
global-address-family ipv4
 topology DATA
 topology VOICE
 end
interface Ethernet 0/0
 ip address 192.168.128.2 255.255.255.0
 ip router isis
 topology ipv4 DATA
 isis topology disable
 topology ipv4 VOICE
 end
router isis
 net 33.3333.3333.3333.00
 metric-style wide
 address-family ipv4
  topology DATA tid 100
  topology VOICE tid 200
  end
```

Device 2

```
global-address-family ipv4
 topology DATA
 topology VOICE
 all-interfaces
  forward-base
  maximum routes 1000 warning-only
  shutdown
  end
interface Ethernet 0/0
 ip address 192.168.128.1 255.255.255.0
 ip router isis
 topology ipv4 DATA
  isis topology disable
  topology ipv4 VOICE
  end
interface Ethernet 1/0
 ip address 192.168.130.1 255.255.255.0
 ip router isis
 topology ipv4 DATA
  isis topology disable
  topology ipv4 VOICE
  end
router isis
 net 32.3232.3232.3232.00
 metric-style wide
```

```
 address-family ipv4
  topology DATA tid 100
  topology VOICE tid 200
  end
```

Device 3

```
global-address-family ipv4
 topology DATA
  topology VOICE
  all-interfaces
  forward-base
  maximum routes 1000 warning-only
  shutdown
  end
interface Ethernet 1/0
 ip address 192.168.131.1 255.255.255.0
 ip router isis
 topology ipv4 DATA
  isis topology disable
  topology ipv4 VOICE
  end
router isis
 net 31.3131.3131.3131.00
 metric-style wide
 address-family ipv4
  topology DATA tid 100
  topology VOICE tid 200
  end
```

Entering the **show isis neighbors detail** command verifies topology translation with the IS-IS neighbor Device 1:

```
Device# show isis neighbors detail

System Id      Type Interface IP Address      State Holdtime Circuit Id
R1             L2   Et0/0     192.168.128.2   UP    28       R5.01
  Area Address(es): 33
  SNPA: aabb.cc00.1f00
  State Changed: 00:07:05
  LAN Priority: 64
  Format: Phase V
  Remote TID:  100, 200
  Local TID:   100, 200
```

Example: MTR IS-IS Topology in Interface Configuration Mode

The following example shows how to prevent the Intermediate System-to-Intermediate System (IS-IS) process from advertising interface Ethernet 1/0 as part of the DATA topology:

```
interface Ethernet 1/0
 ip address 192.168.130.1 255.255.255.0
 ip router isis
 topology ipv4 DATA
  isis topology disable
  topology ipv4 VOICE
  end
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Multitopology Routing (MTR) commands	Cisco IOS Multitopology Routing Command Reference
Intermediate System-to-Intermediate System (IS-IS) commands	Cisco IOS IP Routing: IS-IS Command Reference
IS-IS concepts and tasks	*IP Routing: IS-IS Configuration Guide*
Configuring a multicast topology	"MTR Support for Multicast" feature module in the *Multitopology Routing Configuration Guide*
Configure Multitopology IS-IS for IPv6	*IP Routing: IS-IS Configuration Guide*

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

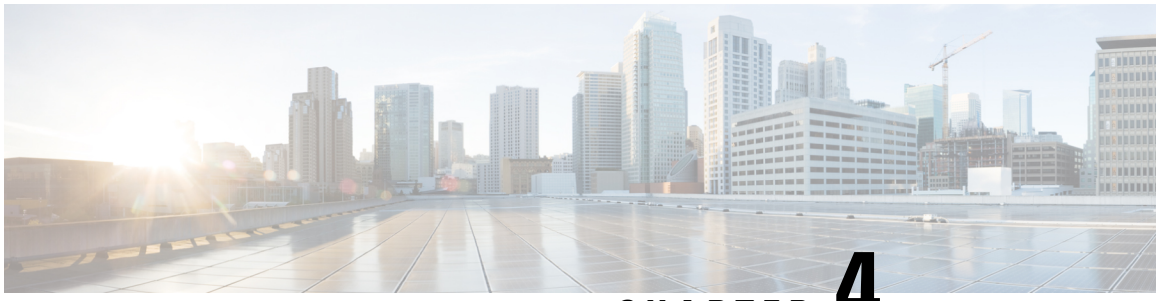
Feature Information for IS-IS Support for MTR

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 2: Feature Information for IS-IS Support for MTR

Feature Name	Releases	Feature Information
IS-IS Support for MTR	12.2(33)SRB Cisco IOS XE Release 2.5	This feature provides Intermediate System-to-Intermediate System (IS-IS) support for multiple logical topologies over a single physical network. In Cisco IOS XE Release 2.5, support was added for the Cisco ASR 1000 Series Routers. The following commands were introduced or modified: **address-family ipv4**, **isis topology disable**, **show isis neighbors**, **topology**.



CHAPTER 4

MTR in VRF

The MTR in VRF feature extends to IPv4 VRF contexts the Cisco IOS software's capability that allows users to configure one or more non-congruent multicast topologies in global IPv4 routing context. These contexts can be used to forward unicast and multicast traffic over different links in the network, or in the case of non-base topologies to provide a Live-Live multicast service using multiple non-congruent multicast topologies mapped to different (S,G) groups.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

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.

Information About MTR in VRF

MTR in VRF Overview

The MTR in VRF feature extends to IPv4 VRF contexts, Cisco IOS software's capability that allows users to configure one or more non-congruent multicast topologies in global IPv4 routing context. These contexts can be used to forward unicast and multicast traffic over different links in the network, or in the case of non-base topologies to provide a Live-Live multicast service using multiple non-congruent multicast topologies mapped to different (S,G) groups.

The Cisco IOS Software allows a set of attributes, primarily used by BGP/MPLS L3VPNs, to be configured on a per-address family basis within a VRF. The MTR in VRF feature allows these attributes to be independently configured for the multicast sub-address families within a VRF address family.

How to Configure VRF in MTR

Configuring MTR in VRF

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **vrf definition** *vrf-name*
4. **rd** *route-distinguisher*
5. **ipv4 multicast multitoplogy**
6. **address-family ipv4**
7. **exit-address-family**
8. **address-family ipv4 multicast**
9. **topology** *topology-instance-name*
10. **all-interfaces**
11. **exit**
12. **exit-address-family**
13. **exit**
14. **interface** *type number*
15. **interface** *type number*
16. **vrf forwarding** *vrf-name*
17. **ip address** *ip-address mask*
18. **ip pim sparse-dense-modeip**
19. **end**

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.
Step 3	**vrf definition** *vrf-name* **Example:**	Configures a VRF routing table and enters VRF configuration mode.

	Command or Action	Purpose
	`Device(config)# vrf definition vd1`	
Step 4	**rd** *route-distinguisher* **Example:** `Device(config-vrf)# rd 10:1`	Creates routing and forwarding tables for a VRF.
Step 5	**ipv4 multicast multitoplogy** **Example:** `Device(config-vrf)# ipv4 multicast multitoplogy`	Enables IPv4 multicast support for multi-topology routing (MTR) in a VRF instance.
Step 6	**address-family ipv4** **Example:** `Device(config-vrf)# address-family ipv4`	Specifies the IPv4 address family type and enters address family configuration mode.
Step 7	**exit-address-family** **Example:** `Device(config-vrf-af)# exit-address-family`	Exits address family configuration mode and removes the IPv4 address family.
Step 8	**address-family ipv4 multicast** **Example:** `Device(config-vrf)# address-family ipv4 multicast`	Specifies the IPv4 address family multicast type and enters VRF address family configuration mode.
Step 9	**topology** *topology-instance-name* **Example:** `Device(config-vrf-af)# topology red`	Specifies a topology instance and a name to it and enters VRF address family topology configuration mode.
Step 10	**all-interfaces** **Example:** `Device(config-vrf-af-topology)# all-interfaces`	Configure the topology instance to use all interfaces on the device.
Step 11	**exit** **Example:** `Device(config-vrf-af-topology)# exit`	Exits VRF address-family topology configuration mode and enters VRF address-family configuration mode.
Step 12	**exit-address-family** **Example:** `Device(config-vrf-af)# exit-address-family`	Exits address family configuration mode and removes the IPv4 address family.
Step 13	**exit** **Example:** `Device(config-vrf)# exit`	Exits VRF configuration mode and enters global configuration mode.
Step 14	**interface** *type number* **Example:**	Selects the Ethernet interface and enters the interface configuration mode.

	Command or Action	Purpose
	`Device(config)# interface ethernet 0/1`	
Step 15	**interface** *type number* **Example:** `Device(config)# interface ethernet 0/1`	Selects the Ethernet interface and enters the interface configuration mode.
Step 16	**vrf forwarding** *vrf-name* **Example:** `Device(config-if)# vrf forwwarding vrf1`	Associates a VRF instance with the interface.
Step 17	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 10.1.10.1 255.255.255.0`	Sets a primary or secondary IP address for an interface.
Step 18	**ip pim sparse-dense-modeip** **Example:** `Device(config-if)# ip pim sparse-dense-mode`	Enables Protocol Independent Multicast (PIM) on an interface.
Step 19	**end** **Example:** `Device(config-if)# end`	Exits the interface configuration mode and enters privileged EXEC mode.

Configuring Examples for MTR in VRF

Example for MTR in VRF

```
Device> enable
Device# configuration terminal
Device(config)# vrf definition vd1
Device(config-vrf)# rd 10:1
Device(config-vrf)# ipv4 multicast multitoplogy
Device(config-vrf)# address-family ipv4
Device(config-vrf)# exit-address-family
Device(config-vrf)# address-family ipv4 multicast
Device(config-vrf-af)# topology red
Device(config-vrf-af-topology)# all-interfaces
Device(config-vrf-af-topology)# exit
Device(config-vrf-af)# exit-address-family
Device(config-vrf)# exit
Device(config)# vrf forwarding vrf1
Device(config)# ip address 10.1.10.1 255.255.255.0
Device(config)# ip pim sparse-dense-mode
Device(config)# end
```

Additional References for MTR in VRF

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Multitopology Routing (MTR) commands	Cisco IOS Multitopology Routing Command Reference
IP multicast commands	Cisco IOS Multicast Command Reference
IP multicast concepts and tasks	*IP Multicast Configuration Guide Library*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

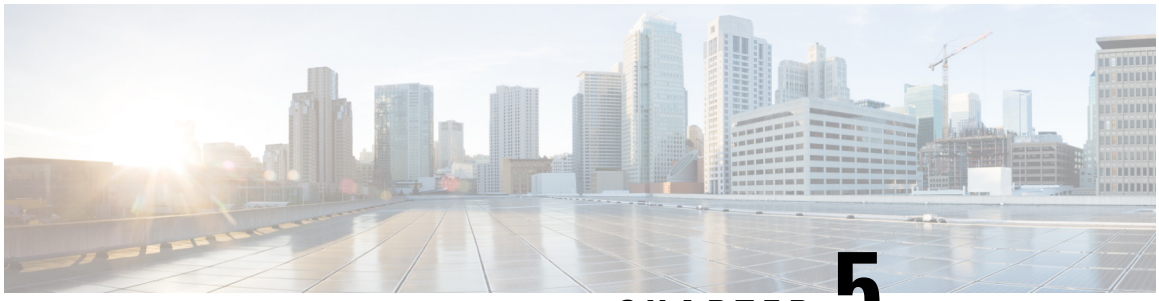
Feature Information for MTR in VRF

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 3: Feature Information for MTR in VRF

Feature Name	Releases	Feature Information
MTR in VRF		The MTR in VRF feature extends to IPv4 VRF contexts the Cisco IOS software's capability that allows users to configure one or more non-congruent multicast topologies in global IPv4 routing context. These contexts can be used to forward unicast and multicast traffic over different links in the network, or in the case of non-base topologies to provide a Live-Live multicast service using multiple non-congruent multicast topologies mapped to different (S,G) groups.



CHAPTER 5

Knob for Ping and Traceroute with VRF to Choose Global DNS Server

This feature provides a knob for ping and trace route with VRF to choose global DNS server when no DNS servers are defined in a VRF. This module explains how to configure Knob for Ping and Traceroute with VRF to choose Global DNS Server.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

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.

Prerequisites for Knob for Ping and Traceroute with VRF to Choose Global DNS Server

- VRF must be configured.

Information About Knob for Ping and Traceroute with VRF to Choose Global DNS Server

Overview of Knob for Ping and Traceroute with VRF to Choose Global DNS Server

Prior to the Knob for Ping and Traceroute with VRF to choose Global DNS Server feature, ping or traceroute in VRF would look up only in the specified name server to resolve the domain name. If DNS server is specified in the VRF, the DNS is used to resolve the domain name. If DNS server is not specified in the VRF, the DNS fails to resolve the domain name.

With the implementation of the Knob for Ping and Traceroute with VRF to choose Global DNS Server feature, ping and traceroute uses VRF DNS server (if the server is already configured in a VRF), otherwise global DNS server is used to resolve the domain name. The **ip global-nameserver** command acts as a knob that facilitates the ping and traceroute to use the VRF DNS server or the global DNS server when the server is not configured in a VRF.

How to Configure Knob for Ping and Traceroute with VRF to Choose Global DNS Server

Configuring a Knob for Ping and Traceroute with VRF to Choose Global DNS Server

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip global-nameserver**
4. **exit**

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:**	Enters global configuration mode.

	Command or Action	Purpose
	`Device# configure terminal`	
Step 3	**ip global-nameserver** **Example:** `Device(config)# ip global-nameserver`	Configures a knob for ping and traceroute to use VRF DNS server for resolving the domain name.
Step 4	**exit** **Example:** `Device(config)# exit`	Exits global configuration mode.

Configuration Examples for Knob for Ping and Traceroute with VRF to Choose Global DNS Server

Example: Knob for Ping and Traceroute with VRF to Choose Global DNS Server

```
Device> enable
Device# configure terminal
Device(config)# ip global-nameserver
Device(config)# exit
```

Additional References for Knob for Ping and Traceroute with VRF to Choose Global DNS Server

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Multitopology Routing (MTR) commands	Cisco IOS Multitopology Routing Command Reference
MTR in VRF	*Multitopology Routing Configuration Guide*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Knob for Ping and Traceroute with VRF to Choose Global DNS Server

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 4: Feature Information for Knob for Ping and Traceroute with VRF to Choose Global DNS Server

Feature Name	Releases	Feature Information
Knob for Ping and Traceroute with VRF to Choose Global DNS Server	Cisco IOS XE Release 3.12S	This feature provides a knob for ping and trace route with VRF to choose global DNS server when no DNS servers are defined in a VRF. The following commands were introduced or modified: **ip global-nameserver**.