Configuring IP Multilayer Switching

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This module describes how to configure IP Multilayer Switching (MLS).

Note This module is a brief summary of the information contained in the Catalyst 5000 Series Multilayer Switching User Guide . The commands and configurations described in this guide apply only to the devices that provide routing services. Commands and configurations for Catalyst 5000 series switches are documented in the Catalyst 5000 Series Multilayer Switching User Guide and the Catalyst 5000 Series Software Configuration Guide . For configuration information for the Catalyst 6000 series switch, see the Configuring and Troubleshooting IP MLS on Catalyst 6500/6000 Switches with an MSFC document or see the “Configuring IP Multilayer Layer 3 Switching” chapter in the Catalyst 6500 Series Switch Cisco IOS Software Configuration Guide.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 at the end of this document.

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.

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Prerequisites for Configuring IP MLS

To ensure a successful MLS configuration, you must also configure the Catalyst switches in your network. For more information about Catalyst 5000 series switches, see the Catalyst 5000 Series Multilayer Switching User Guide and the Catalyst 5000 Series Software Configuration Guide . For more information about Catalyst 6000 series switches, see the Configuring and Troubleshooting IP MLS on Catalyst 6500/6000 Switches with an MSFC document or see the "Configuring IP Multilayer Layer 3 Switching" chapter in the Catalyst 6500 Series Switch Cisco IOS Software Configuration Guide.

Information About Configuring IP MLS

MLS provides high-performance Layer 3 switching for Cisco routers and switches. MLS switches IP data packets between subnets using advanced application-specific integrated circuit (ASIC) switching hardware. Standard routing protocols, such as Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (Enhanced IGRP), Routing Information Protocol (RIP), and Intermediate System-to-Intermediate System (IS-IS), are used for route determination.

For conceptual information about IP Multilayer Switching, see the "Multilayer Switching Overview" module.

How to Configure MLS

To configure your Cisco router for MLS, perform the tasks described in the following sections. The first section contains a required task; the remaining tasks are optional.

- Configuring MLS on a Router, page 2
- Monitoring MLS, page 4
- Monitoring MLS for an Interface, page 6
- Monitoring MLS Interfaces for VTP Domains, page 6
- Configuring NetFlow Data Export, page 8

Configuring MLS on a Router

To configure MLS on your router, complete the following steps.

Note Depending upon your configuration, you might not have to perform all the steps in the procedure.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mls rp ip**
4. **interface** *type number*
5. **mls rp vtp-domain** *domain-name*
6. **mls rp vlan-id** [*vlan-id*]
7. **mls rp ip**
8. **mls rp management-interface**
9. (Optional) Repeat Step 4 through Step 8 for each interface that will support MLS.
10. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**mls rp ip** **Example:** `Router(config)# mls rp ip`	Globally enables MLSP. MLSP is the protocol that runs between the MLS-SE and the MLS-RP. **Note** To globally disable MLS on the router, use the **no mls rp ip** command.
Step 4	**interface** *type number* **Example:** `Router(config)# interface vlan 1`	Selects a router interface and enters interface configuration mode. • Enter the interface type and interface number.
Step 5	**mls rp vtp-domain** *domain-name* **Example:** `Router(config-if)# mls rp vtp-domain engineering`	Selects the router interface to be Layer 3 switched and then adds that interface to the same VLAN Trunking Protocol (VTP) domain as the switch. This interface is referred to as the MLS interface. This command is required only if the Catalyst switch is in a VTP domain. • Enter the domain name.

	Command or Action	Purpose
Step 6	**mls rp vlan-id** [*vlan-id*] **Example:** `Router(config-if)# mls rp vlan-id 1`	Assigns a VLAN ID to the MLS interface. MLS requires that each interface has a VLAN ID. This step is not required for RSM VLAN interfaces or ISL-encapsulated interfaces. • Enter the VLAN number.
Step 7	**mls rp ip** **Example:** `Router(config-if)# mls rp ip`	Enables each MLS interface.
Step 8	**mls rp management-interface** **Example:** `Router(config-if)# mls rp management-interface`	Selects one MLS interface as a management interface. MLSP packets are sent and received through this interface. This can be any MLS interface connected to the switch.
Step 9	(Optional) Repeat Step 4 through Step 8 for each interface that will support MLS.	
Step 10	**end** **Example:** `Router(config-if)# end`	Returns to privileged EXEC mode.

Note The interface-specific commands in this section apply only to Ethernet, Fast Ethernet, VLAN, and Fast EtherChannel interfaces on the Catalyst RSM/Versatile Interface Processor 2 (VIP2) or a directly attached external router.

Monitoring MLS

To display MLS details including specifics for MLSP, complete the following steps.

SUMMARY STEPS

1. **enable**
2. **show mls rp**
3. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show mls rp** **Example:** `Router# show mls rp`	Displays MLS details for all interfaces. The information displayed includes the following: • MLS status (enabled or disabled) for switch interfaces and subinterfaces • Flow mask used by this MLS-enabled switch when creating Layer 3-switching entries for the router • Current settings of the keepalive timer, retry timer, and retry count • MLSP-ID used in MLSP messages • List of interfaces in all VTP domains that are enabled for MLS
Step 3	**end** **Example:** `Router# end`	Exits privileged EXEC mode.

• Monitoring MLS Example, page 5

Monitoring MLS Example

After entering the **show mls rp**command, the following is displayed:

```
Router# show mls rp
multilayer switching is globally enabled
mls id is 00e0.fefc.6000
mls ip address 10.20.26.64
mls flow mask is ip-flow

vlan domain name: WBU
   current flow mask: ip-flow
   current sequence number: 80709115
   current/maximum retry count: 0/10
   current domain state: no-change
   current/next global purge: false/false
   current/next purge count: 0/0
   domain uptime: 13:03:19
   keepalive timer expires in 9 seconds
   retry timer not running
   change timer not running
   fcp subblock count = 7

   1 management interface(s) currently defined:
      vlan 1 on Vlan1

   7 mac-vlan(s) configured for multi-layer switching:

      mac 00e0.fefc.6000
         vlan id(s)
         1    10   91   92   93   95   100
```

```
router currently aware of following 1 switch(es):
   switch id 0010.1192.b5ff
```

Monitoring MLS for an Interface

To show MLS information for a specific interface, complete the following steps:

SUMMARY STEPS

1. **enable**
2. **show mls rp interface** *type number*
3. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show mls rp interface** *type number* **Example:** `Router# show mls rp interface vlan 10`	Displays MLS details for a specific interface. • Enter the interface type and interface number.
Step 3	**end** **Example:** `Router# end`	Exits privileged EXEC mode.

• Monitoring MLS for an Interface Example, page 6

Monitoring MLS for an Interface Example

After entering the **show mls rp interface** command, the following is displayed:

```
Router# show mls rp interface vlan 10
mls active on Vlan10, domain WBU
router#
```

Monitoring MLS Interfaces for VTP Domains

To show MLS information for a specific VTP domain, complete the following steps.

SUMMARY STEPS

1. **enable**
2. **show mls rp vtp-domain** *domain-name*
3. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show mls rp vtp-domain** *domain-name* **Example:** `Router# show mls rp vtp-domain WBU`	Displays MLS interfaces for a specific VTP domain. • Enter the VTP domain name.
Step 3	**end** **Example:** `Router# end`	Exits privileged EXEC mode.

• Monitoring MLS Interfaces for VTP Domains Example, page 7

Monitoring MLS Interfaces for VTP Domains Example

After entering the **show mls rp vtp-domain**command, the following is displayed:

```
router# show mls rp vtp-domain WBU
vlan domain name: WBU
   current flow mask: ip-flow
   current sequence number: 80709115
   current/maximum retry count: 0/10
   current domain state: no-change
   current/next global purge: false/false
   current/next purge count: 0/0
   domain uptime: 13:07:36
   keepalive timer expires in 8 seconds
   retry timer not running
   change timer not running
   fcp subblock count = 7

   1 management interface(s) currently defined:
      vlan 1 on Vlan1

   7 mac-vlan(s) configured for multi-layer switching:

      mac 00e0.fefc.6000
         vlan id(s)
         1    10   91   92   93   95   100
```

```
router currently aware of following 1 switch(es):
   switch id 0010.1192.b5ff
```

Configuring NetFlow Data Export

To configure your Cisco router for NetFlow Data Export (NDE), complete the following steps.

Note You need to enable NDE only if you want to export MLS cache entries to a data collection application.

Prerequisite

To ensure a successful NDE configuration, you must also configure the Catalyst switch. For more information, see the Catalyst 5000 Series Multilayer Switching User Guide .

Specifying an NDE Address on the Router

To specify an NDE address on the router, complete the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mls rp nde-address** *ip-address*
4. **end**

DETAILED STEPS

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

	Command or Action	Purpose
Step 3	**mls rp nde-address** *ip-address* **Example:** `Router(config)# mls rp nde-address 192.168.0.0`	Specifies an NDE IP address for the router doing the Layer 3 switching. The router and the Catalyst 5000 series switch use the NDE IP address when sending MLS statistics to a data collection application. • Enter the IP address.
Step 4	**end** **Example:** `Router(config)# end`	Exits global configuration mode.

Configuration Examples for MLS

Note In these examples, VLAN interfaces 1 and 3 are in VTP domain named Engineering. The management interface is configured on the VLAN 1 interface. Only information relevant to MLS is shown in the configurations.

Router Configuration Without Access Lists Example

This sample configuration shows a router configured without access lists on any of the VLAN interfaces. The flow mask is configured to be destination-ip.

```
Router# show running-config
Building configuration...

Current configuration:
.
.
.
mls rp ip
interface Vlan1
 ip address 192.168.0.0 255.255.255.0
 mls rp vtp-domain Engineering
 mls rp management-interface
 mls rp ip
interface Vlan2
 ip address 192.168.2.73 255.255.255.0
interface Vlan3
 ip address 192.168.3.73 255.255.255.0
 mls rp vtp-domain Engineering
 mls rp ip
 .
 .
```

```
 end
router#
Router# show mls rp
multilayer switching is globally enabled
mls id is 0006.7c71.8600
mls ip address 192.168.26.56
mls flow mask is destination-ip
number of domains configured for mls 1
vlan domain name: Engineering
   current flow mask: destination-ip
   current sequence number: 82078006
   current/maximum retry count: 0/10
   current domain state: no-change
   current/next global purge: false/false
   current/next purge count: 0/0
   domain uptime: 02:54:21
   keepalive timer expires in 11 seconds
   retry timer not running
   change timer not running

   1 management interface(s) currently defined:
      vlan 1 on Vlan1

   2 mac-vlan(s) configured for multi-layer switching:

      mac 0006.7c71.8600
         vlan id(s)
         1    3

   router currently aware of following 1 switch(es):
      switch id 00e0.fe4a.aeff
```

Router Configuration with a Standard Access List Example

This configuration is the same as the previous example but with a standard access list configured on the VLAN 3 interface. The flow mask changes to source-destination-ip.

```
.
interface Vlan3
 ip address 192.168.3.73 255.255.255.0
 ip access-group 2 out
 mls rp vtp-domain Engineering
 mls rp ip
.
Router# show mls rp
multilayer switching is globally enabled
mls id is 0006.7c71.8600
mls ip address 192.20.26.56
mls flow mask is source-destination-ip

number of domains configured for mls 1
vlan domain name: Engineering
   current flow mask: source-destination-ip
   current sequence number: 82078007
   current/maximum retry count: 0/10
   current domain state: no-change
   current/next global purge: false/false
   current/next purge count: 0/0
   domain uptime: 02:57:31
   keepalive timer expires in 4 seconds
   retry timer not running
   change timer not running

   1 management interface(s) currently defined:
      vlan 1 on Vlan1

   2 mac-vlan(s) configured for multi-layer switching:

      mac 0006.7c71.8600
         vlan id(s)
         1    3
```

```
   router currently aware of following 1 switch(es):
      switch id 00e0.fe4a.aeff
```

Router Configuration with an Extended Access List Example

This configuration is the same as the previous examples but with an extended access list configured on the VLAN 3 interface. The flow mask changes to ip-flow.

```
.
interface Vlan3
 ip address 192.16.3.73 255.255.255.0
 ip access-group 101 out
 mls rp vtp-domain Engineering
 mls rp ip
.
Router# show mls rp
multilayer switching is globally enabled
mls id is 0006.7c71.8600
mls ip address 192.16.26.56
mls flow mask is ip-flow

number of domains configured for mls 1
vlan domain name: Engineering
   current flow mask: ip-flow
   current sequence number: 82078009
   current/maximum retry count: 0/10
   current domain state: no-change
   current/next global purge: false/false
   current/next purge count: 0/0
   domain uptime: 03:01:52
   keepalive timer expires in 3 seconds
   retry timer not running
   change timer not running

   1 management interface(s) currently defined:
      vlan 1 on Vlan1

   2 mac-vlan(s) configured for multi-layer switching:

      mac 0006.7c71.8600
         vlan id(s)
         1    3

   router currently aware of following 1 switch(es):
      switch id 00e0.fe4a.aeff
```

Additional References

The following sections provide references related to configuring IP multilayer switching.

Related Documents

Related Topic	Document Title
IP LAN switching commands: complete command syntax, command mode, defaults, usage guidelines, and examples	*Cisco IOS LAN Switching Services Command Reference*
MLS overview	“Multilayer Switching Overview” module

Related Topic	Document Title
MLS on a Catalyst 5000 series switch	Catalyst 5000 Series Multilayer Switching User Guide Catalyst 5000 Series Software Configuration Guide
MLS on a Catalyst 6500/6000 series switch	Configuring and Troubleshooting IP MLS on Catalyst 6500/6000 Switches with an MSFC "Configuring IP Multilayer Layer 3 Switching" chapter in the *Catalyst 6500 Series Switch Cisco IOS Software Configuration Guide*

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

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 releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing standards has not been modified by this feature.	--

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/cisco/web/support/index.html

Feature Information for Configuring MLS

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 Configuring MLS

Feature Name	Releases	Feature Information
This table is intentionally left blank because no features were introduced or modified in Cisco IOS Release 12.2(1) or later. This table will be updated when feature information is added to this module.	--	--

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