Media Monitoring Configuration Guide, Cisco IOS XE Release 3S

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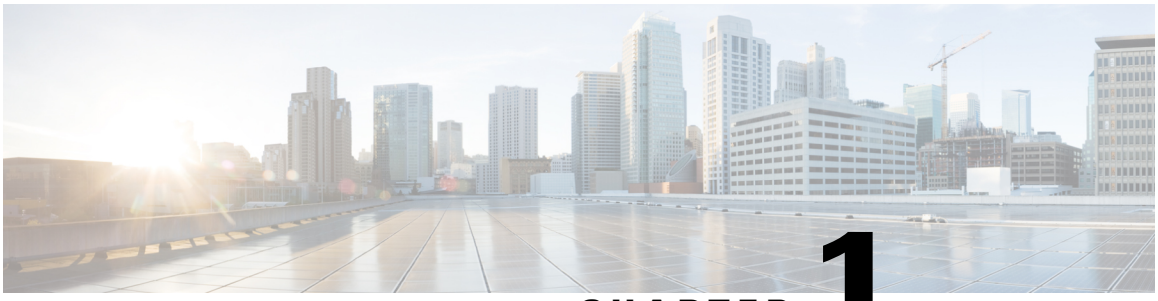

CHAPTER 1

Configuring Cisco Mediatrace

This chapter contains information about and instructions for configuring Cisco Mediatrace.

Cisco Mediatrace enables you to isolate and troubleshoot network degradation problems for data streams. Although it can be used to monitor any type of flow, it is primary used with video flows. It can also be used for non-flow related monitoring along a media flow path.

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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 at the end of this module.

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 Configuring Cisco Mediatrace

Overview of Cisco Mediatrace

Cisco Mediatrace helps to isolate and troubleshoot network degradation problems by enabling a network administrator to discover an IP flow's path, dynamically enable monitoring capabilities on the nodes along the path, and collect information on a hop-by-hop basis. This information includes, among other things, flow statistics, and utilization information for incoming and outgoing interfaces, CPUs, and memory, as well as any changes to IP routes or the Cisco Mediatrace monitoring state.

This information can be retrieved in either of two ways:

- By issuing an exec command to perform an on-demand collection of statistics from the hops along a media flow. During this one-shot operation, the hops along the media flow are discovered and shown to you, along with a set of other specified information.
- By configuring Cisco Mediatrace to start a recurring monitoring session at a specific time and on specific days. The session can be configured to specify which metrics to collect, and how frequently they are collected. The hops along the path are automatically discovered as part of the operation.

After collecting the metrics you specified, you can view a report on the metrics.

Cisco Mediatrace is part of the Cisco Medianet family of products. For more information about the design, configuration, and troubleshooting of Mediatrace when used in conjunction with other Cisco products, including a Quick Start Guide and Deployment Guide, see the Cisco Medianet Knowledge Base Portal, located at http://www.cisco.com/web/solutions/medianet/knowledgebase/index.html.

Metrics That You Can Collect Using Cisco Mediatrace

You can collect the following categories of metrics using Mediatrace:

- Common Metrics for Each Responder
- System Metrics: TCP Profile
- System Metrics: RTP Profile
- System Metrics: INTF Profile
- System Metrics: CPU Profile
- System Metrics: MEMORY Profile
- App-Health Metrics: MEDIATRACE-HEALTH Profile
- Metrics for the Mediatrace Request Summary from Initiator

The individual metrics under each of these categories are listed the appropriate section below.

Metics for Mediatrace Request Summary from Initiator

- Request Timestamp
- Request Status

- Number of Hops Responded
- Number of Hops with Valid Data
- Number of Hops with Error
- Number of hops with no data record
- Last Route Change Timestamp
- Route Index

Common Metrics for Each Responder

- Metrics Collection Status
- Reachability address
- Ingress Interface
- Egress Interface
- Mediatrace IP TTL
- Hostname
- Mediatrace Hop Count

Perf-Monitor Metrics: TCP Profile

- Flow Sampling Start Timestamp
- Loss of measurement confidence
- Media Stop Event Occurred
- IP Packet Drop Count
- IP Byte Count
- IP Packet Count
- IP Byte Rate
- IP DSCP
- IP TTL
- IP Protocol
- Media Byte Count
- TCP Connect Round Trip Delay
- TCP Lost Event Count

Perf-Monitor Metrics: RTP Profile

- Flow Sampling Start Timestamp
- Loss of measurement confidence

- Media Stop Event Occurred
- IP Packet Drop Count
- IP Byte Count
- IP Packet Count
- IP Byte Rate
- Packet Drop Reason
- IP DSCP
- IP TTL
- IP Protocol
- Media Byte Rate Average
- Media Byte Count
- Media Packet Count
- RTP Interarrival Jitter Average
- RTP Packets Lost
- RTP Packets Expected (pkts):
- RTP Packet Lost Event Count:
- RTP Loss Percent

System Metrics: INTF Profile

- Collection timestamp
- Octet input at Ingress
- Octet output at Egress
- Packets received with errors at Ingress
- Packets with errors at Egress
- Packets discarded at Ingress
- Packets discarded at Egress
- Ingress interface speed
- Egress interface speed

System Metrics: CPU Profile

- CPU Utilization (1min)
- CPU Utilization (5min)
- Collection timestamp

System Metrics: MEMORY Profile

- Processor memory utilization %
- Collection timestamp

App-Health Metrics: MEDIATRACE-HEALTH Profile

- Requests Received
- Time Last Request Received
- Initiator of Last Request
- Requests Dropped
- Max Concurrent Sessions supported
- Sessions currently active
- Sessions Teared down
- Sessions Timed out
- Hop Info Requests Received
- Performance Monitor Requests Received
- Performance Monitor Requests failed
- Static Policy Requests Received
- Static Policy Requests Failed
- System Data Requests Received
- System Data Requests Failed
- Application Health Requests Received
- Local route change events
- Time of last route change event
- Number of unknown requests received

Overview of Configuring Cisco Mediatrace

Information can be retrieved from Mediatrace by using in either:

- A pre-scheduled, recurring monitoring session.
- An one-shot, on-demand collection of statistics, known as a Mediatrace poll.

Before you can implement a Mediatrace session or poll, you enable Mediatrace on each network node that you want to collect flow information from. You must enable the Mediatrace Initiator on the network node that you will use to configure, initiate, and control the Mediatrace sessions or polls. On each of the network nodes that you want top collect information from, you must enable the Mediatrace Responder.

To configure a Cisco Mediatrace session, you can set session parameters by associating either of two types of pre-packaged profiles with the session:

- video-monitoring profiles
- system-data profiles

You can also configure your own parameters for a Cisco Mediatrace session by configuring the following types of profiles and associating them with the session:

- Path-specifier profile
- Flow-specifier profile
- Sessions-parameters profile

Therefore, the next section describes how to perform the following tasks in order to configure a Cisco Mediatrace session:

1. Enable mediatrace
2. Setup a video-monitoring profile
3. Setup a system-data profile
4. Setup a path-specifier profile
5. Setup a flow-specifier profile
6. Setup a sessions-params profile
7. Associate profiles with a mediatrace session
8. Schedule a mediatrace session

The next section also describes how to execute a mediatrace poll, which is an on-demand fetch of data from the hops on a specific path.

In addition, the next section describes how to manage mediatrace sessions by performing the following tasks:

- Clear incomplete Cisco Mediatrace sessions
- Troubleshoot a Cisco Mediatrace session

Limitations

- Mediatrace does not support IPv6.
- Resource Reservation Protocol (RSVP) does not forward an incoming Path message on the same interface (i.e., through the interface from where it receives the path message). It displays an error some message on the console, “ingress interface = egress interface”. But the Path is sent out on the incoming interface in case of an Performance Routing (PfR) border router.

How to Configure Cisco Mediatrace

How to Enable Cisco Mediatrace

For each node you want to monitor using Cisco Mediatrace, you must enable at least the Cisco Mediatrace Responder. You must also enable the Cisco Mediatrace Initiator for all nodes that you want to initiate Mediatrace sessions or polls.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace initiator** {**source-ip** ip-address | **source-interface** *interface-name*} [**force**] **[max-sessions** *number* **]**
4. **mediatrace responder [max-sessions** *number* **]**
5. **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	**mediatrace initiator** {**source-ip** ip-address | **source-interface** *interface-name*} [**force**] **[max-sessions** *number* **]** **Example:** `Router(config)# mediatrace initiator source-ip 10.10.1.1 max-sessions 4`	Enables the Cisco Mediatrace or initiator. You can also use the following keywords: • *ip-address* --Any reachable IP address. • *interface-name* --Any local interface that connects to the initiator. • **max-sessions** --Sets the number of Cisco Mediatrace sessions.

	Command or Action	Purpose
Step 4	**mediatrace responder [max-sessions** *number* **]** **Example:** `Router(config)# mediatrace responder max-sessions 4`	Enables the Cisco Mediatrace responder. You can also use the following keywords: • **max-sessions** --Sets the number of Cisco Mediatrace sessions.
Step 5	**end** **Example:** `Router(config)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace responder app-health**command to verify whether the responder is collecting events, requests, and other Cisco Mediatrace related statistics properly.

For more information about this command, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Configure a Cisco Mediatrace Video Profile on the Mediatrace Initiator

Cisco Mediatrace provides pre-packaged video-monitoring profiles that contain all of the parameter settings you need to start a video media monitoring session. You can also configure your own video-monitoring profiles on the Mediatrace Initiator.

To initiate a new video media monitoring session, you can associate one of these profiles with a Cisco Mediatrace session when you configure it.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace profile perf-monitor** *name*
4. admin-params
5. **sampling-interval** *seconds*
6. **exit**
7. **metric-list** {**tcp** | **rtp**}
8. **clock-rate** {*type-number* | *type-name*} *rate*
9. **max-dropout** *number*
10. **max-reorder** *number*
11. **min-sequential** *number*
12. **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	**mediatrace profile perf-monitor** *name* **Example:** `Router(config)# mediatrace profile perf-monitor vprofile-2`	Enters perf-prof configuration mode so that you can configure parameters for a Cisco Mediatrace pre-packaged video-monitoring profile.
Step 4	admin-params **Example:** `Router(config-mt-prof-perf)# admin-params`	Enters admin parameters configuration mode so that you can configure video-monitoring admin parameters.
Step 5	**sampling-interval** *seconds* **Example:** `Router(config-mt-prof-perf-params)# sampling-interval 40`	Specifies the interval, in seconds, between samples taken of video-monitoring metrics.

	Command or Action	Purpose
Step 6	**exit** **Example:** `Router(config-mt-prof-perf-params)# exit`	Exits the current configuration mode and returns to perf-prof configuration mode.
Step 7	**metric-list** {**tcp** | **rtp**} **Example:** `Router(config-mt-prof-perf)# metric-list rtp`	Specifies whether the metrics being monitored are for TCP or RTP.
Step 8	**clock-rate** {*type-number* | *type-name*} *rate* **Example:** `Router(config-mt-prof-perf-rtp-params)# clock-rate 64`	(Optional) Specifies the clock rate used to sample RTP video-monitoring metrics. Each payload type has a specific clock rate associated with it and is can specified with either a type number or type name. For the available values of the payload type name, see the Cisco Media Monitoring Command Reference .
Step 9	**max-dropout** *number* **Example:** `Router(config-mt-prof-perf-rtp-params)# max-dropout 2`	(Optional) Specifies the maximum number of dropouts allowed when sampling RTP video-monitoring metrics. Dropouts are the number of packets to ignore ahead the current packet in terms of sequence number.
Step 10	**max-reorder** *number* **Example:** `Router(config-mt-prof-perf-rtp-params)# max-reorder 4`	(Optional) Specifies the maximum number of reorders allowed when sampling RTP video-monitoring metrics. Reorders are the number of packets to ignore behind the current packet in terms of sequence number.
Step 11	**min-sequential** *number* **Example:** `Router(config-mt-prof-perf-rtp-params)# min-sequential 2`	(Optional) Specifies the minimum number of packets in a sequence used to classify a RTP flow .
Step 12	**end** **Example:** `Router(config-mt-prof-perf-rtp-params)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace profile perf-monitor** command to verify that the parameter values for your pre-packaged video-monitoring profiles are set correctly.

For more information about this command, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Configure a Cisco Mediatrace System Profile

Cisco Mediatrace provides pre-packaged system-data monitoring profiles that contain all of the parameter settings you need to start a system-data monitoring session. You can also configure your own system-data monitoring profiles. To initiate a new system-data monitoring session, you can associate one of these profiles with a Cisco Mediatrace session when you configure it.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace profile system** *name*
4. **metric-list** {**intf** | **cpu** | **memory**}
5. **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	**mediatrace profile system** *name* **Example:** `Router(config)# mediatrace profile system system-2`	Enters system profile configuration mode so that you can configure parameters for a Cisco Mediatrace system profile.

	Command or Action	Purpose
Step 4	**metric-list** {**intf** | **cpu** | **memory**} **Example:** `Router(config-sys)# metric-list memory`	Specifies whether the metrics being monitored are for interfaces, the CPU, or the memory.
Step 5	**end** **Example:** `Router(config-sys)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace profile system**commandto verify that the parameter values for your pre-packaged system-data profiles are set correctly.

For more information about this command, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Configure a Cisco Mediatrace Path-Specifier Profile

A Cisco Mediatrace session configuration requires a path-specifier profile which defines the parameters that are used to discover the network hops that will be monitored for troubleshooting. The RSVP transport protocol, specified by optional **disc-proto** keyword, is used to do this hop discovery. The parameter values for the flow-specifier should match the values for the media flow that will be traced.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace path-specifier** *name* [**disc-proto rsvp**] {**gsid** *gsid* | **destination ip** *ip-address* **port** *nnnn* }
4. **source ip** *ip-address* **port** *nnnn*
5. **l2-params gateway** *ip-address* **vlan** *vlan-id*
6. **gsid** *gsid*
7. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Router> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**mediatrace path-specifier** *name* [**disc-proto rsvp**] {**gsid** *gsid* | **destination ip** *ip-address* **port** *nnnn* } **Example:** `Router(config)# mediatrace path-specifier path-4 disc-proto rsvp destination ip 10.1.1.1 port 400`	Enters path-specifier configuration mode so that you can configure parameters for a Cisco Mediatrace path-specifier profile. This command requires the name, destination address, and port of the path.
Step 4	**source ip** *ip-address* **port** *nnnn* **Example:** `Router(config-mt-path)# source ip 10.1.1.2 port 600`	Specifies the IP address of the source of the metrics being monitored.
Step 5	**l2-params gateway** *ip-address* **vlan** *vlan-id* **Example:** `Router(config-mt-path)# l2-params gateway 10.10.10.4 vlan 22`	Specifies the IP address and ID of the virtual LAN of the level-2 gateway. **Note** This command is available only on Catalyst platforms.
Step 6	**gsid** *gsid* **Example:** `Router(config-mt-path)# gsid 60606060`	Specifies the metadata global session ID of the flow being monitored.
Step 7	**end** **Example:** `Router(config-mt-path)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace path-specifier** command to verify that the parameter values for your path-specifier profiles are set correctly.

For more information about this command, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Configure a Cisco Mediatrace Flow-Specifier Profile

A Cisco Mediatrace session configuration requires a flow-specifier profile which defines the source IP address, destination IP address, source port, destination port, and protocol that identifies a flow. You can associate a profile with an actual Cisco Mediatrace session later when you configure it

For RTP media flows, select UDP as protocol.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace flow-specifier** *name*
4. **source-ip** *ip-address* [**source-port** *port*]
5. **dest-ip** *ip-address* [**dest-port** *port*]
6. **gsid** *gsid*
7. **ip-protocol** {**tcp** | **udp**}
8. **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	**mediatrace flow-specifier** *name* **Example:** `Router(config)# mediatrace flow-specifier flow-6`	Enters flow-specifier configuration mode so that you can configure parameters for a Cisco Mediatrace flow-specifier profile.
Step 4	**source-ip** *ip-address* [**source-port** *port*] **Example:** `Router(config-mt-flowspec)# source-ip 10.1.1.2 source-port 600`	(Optional) Specifies the IP address of the source of the metrics being monitored.

	Command or Action	Purpose
Step 5	**dest-ip** *ip-address* [**dest-port** *port*] **Example:** `Router(config-mt-flowspec)# dest-ip 10.1.1.2 dest-port 600`	Specifies the IP address of the destination of the metrics being monitored.
Step 6	**gsid** *gsid* **Example:** `Router(config-mt-flowspec)# gsid 60606060`	Specifies the metadata global session ID of the flow being monitored.
Step 7	**ip-protocol** {**tcp** | **udp**} **Example:** `Router(config-mt-flowspec)# ip-protocol tcp`	Specifies whether the metrics being monitored are for TCP or UDP.
Step 8	**end** **Example:** `Router(config-mt-flowspec)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace flow-specifier** command to verify that the parameter values for your flow-specifier profiles are set correctly.

For more information about this command, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Configure a Cisco Mediatrace Session Parameters Profile

A Cisco Mediatrace session configuration requires a session-params profile, which defines the characteristics of a Cisco Mediatrace session and help it to operate smoothly. You can associate a profile with an actual Cisco Mediatrace session later when you configure it

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace session-params** *name*
4. **response-timeout** *seconds*
5. **frequency** {*frequency* | **on-demand**} **inactivity-timeout** *seconds*
6. **history** *buckets*
7. **route-change reaction-time** *seconds*
8. **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	**mediatrace session-params** *name* **Example:** `Router(config-mt-sesparam)# mediatrace session-params qos-2`	Enters session-params configuration mode so that you can configure parameters for a Cisco Mediatrace session-params profile.
Step 4	**response-timeout** *seconds* **Example:** `Router(config-mt-sesparam)# response-timeout 8`	Specifies the amount of time, in seconds, the initiator will wait for a response from the responder.
Step 5	**frequency** {*frequency* | **on-demand**} **inactivity-timeout** *seconds* **Example:** `Router(config-mt-sesparam)# frequency 4 inactivity-timeout 2`	Specifies the interval, in seconds, between samples taken of session-params metrics and the amount of time, in seconds, the initiator will remain active without any activity from the responder.

	Command or Action	Purpose
Step 6	**history** *buckets* **Example:** `Router(config-mt-sesparam)# history 2`	Specifies the number of historical data sets kept, up to a maximum of ten.
Step 7	**route-change reaction-time** *seconds* **Example:** `Router(config-mt-sesparam)# route-change reaction-time 8`	Specifies the amount of time, in seconds, the initiator will wait for the responder to react to its additional route changes. The range is seconds.
Step 8	**end** **Example:** `Router(config-mt-sesparam)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace session-param**command to verify that the parameter values for your session-parameters profiles are set correctly.

For more information about this command, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Configure a Cisco Mediatrace Session

The Cisco Mediatrace session configuration links the various profiles to a session. Only one of each type of profile can be associated with a Cisco Mediatrace session.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace** *session-number*
4. **trace-route**
5. **path-specifier** {[**forward**] *path-name* | **reverse** *path-name* }
6. **session-params** *name*
7. **profile system** *name*
8. **profile perf-monitor** *name* **flow-specifier** *flow-specifier-name*
9. **profile snmp** *name*
10. **profile custom** *name*
11. **last-node** { **auto** | **address** *address* }
12. **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	**mediatrace** *session-number* **Example:** `Router(config)# mediatrace 157`	Enters session configuration mode.
Step 4	**trace-route** **Example:** `Router(config-mt-session)# trace-route`	Enables the running of trace route for the Cisco Mediatrace session. By default trace route is enabled. To stop running trace route, use the **no** form of this command.
Step 5	**path-specifier** {[**forward**] *path-name* | **reverse** *path-name* } **Example:** `Router(config-mt-session)# path-specifier path-4`	Associates a path-specifier profile with the Cisco Mediatrace session.

	Command or Action	Purpose
Step 6	**session-params** *name* **Example:** `Router(config-mt-session)# session-params session-6`	Associates a session-parameters profile with the Cisco Mediatrace session.
Step 7	**profile system** *name* **Example:** `Router(config-mt-session)# profile system sys-2`	Associates a system profile with the Cisco Mediatrace session.
Step 8	**profile perf-monitor** *name* **flow-specifier** *flow-specifier-name* **Example:** `Router(config-mt-session)# profile perf-monitor monitor-6 flow-specifier flow-4`	Associates a perf-monitor profile and flow-specifier with the Cisco Mediatrace session.
Step 9	**profile snmp** *name* **Example:** `Router(config-mt-session)# profile snmp snmp-2`	Associates an SNMP profile with the Cisco Mediatrace session.
Step 10	**profile custom** *name* **Example:** `Router(config-mt-session)# profile custom cp-2`	Associates an SNMP profile with the Cisco Mediatrace session.
Step 11	**last-node** { **auto** | **address** *address* } **Example:** `Router(config-mt-session)# last-node address 10.1.1.1`	Configures the last node for the Cisco Mediatrace session.
Step 12	**end** **Example:** `Router(config-mt-session)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace session**command to display the parameter settings for a specific session or all sessions.

Use the **show mediatrace responder app-health** command and the **show mediatrace responder sessions**command to determine the status of the nodes being monitored.

If Cisco Mediatrace is not collecting all of the data that you want, use the **debug mediatrace**command.

For more information about these commands, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Schedule a Cisco Mediatrace Session

Once you have configured a Cisco Mediatrace session, you can schedule it to begin when you want to start collecting the data. If the Cisco Mediatrace session is designed to collect performance monitoring metrics, it goes out to enable the Performance Monitor when the session begins.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mediatrace schedule** *session ID* [*life* {**forever** | *secs*}] [**start-time** {*hh*:*mm*:[:*ss*][*month day*| *day month*] | **pending** | **now** | **after** *hh*:*mm*:*ss*}] [**ageout** *secs*] [**recurring**]
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.
Step 3	**mediatrace schedule** *session ID* [*life* {**forever** | *secs*}] [**start-time** {*hh*:*mm*:[:*ss*][*month day*| *day month*]	**pending**	**now**	**after** *hh*:*mm*:*ss*}] [**ageout** *secs*] [**recurring**]	Specifcies when the session will occur. Use these settings: • *session ID* --Which session to run. • **life** --Amount of time the session lasts, either the number of seconds or forever.

	Command or Action	Purpose
	Example: `Router(config)# mediatrace schedule 22 life 40 start-time 10:00:00 AUG 20 recurring`	• **start-time** --When the session starts, whether it is at a specified time and date, pending an event, immediately, or after a specified time and date. • **ageout** --Timeout before removing the session configuration on the initiator. • **recurring** --Session reoccurs at the specified time.
Step 4	**end** **Example:** `Router(config-mt-sched)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

Use the **show mediatrace session**command to verify that the intended values are set for the parameters for a specific session or all sessions.

Use the **show mediatrace responder app-health** command and the **show mediatrace responder sessions**command to determine the status of the nodes being monitored.

If Cisco Mediatrace is not collecting all of the data that you want, use the **debug mediatrace**command.

For more information about these commands, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Clear a Cisco Mediatrace Session

You can clear incomplete mediatrace sessions on the Initiator by using the **clear mediatrace incomplete-sessions**command as described below. This coammand also cleans up all Performance Monitor settings that were configured by Cisco Mediatrace. For sessions created by the config commands, use the **no mediatrace schedule**command. The cleanup triggers a "session teardown" message to RSVP followed by a cleanup of the local mediatrace sessions database.

SUMMARY STEPS

1. **enable**
2. **clear mediatrace incomplete-sessions**
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	**clear mediatrace incomplete-sessions** **Example:** `Router# clear mediatrace incomplete-sessions`	Clears incomplete mediatrace sessions.
Step 3	**end** **Example:** `Router# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the status of your Cisco Mediatrace session, use the **show mediatrace responder sessions**command.

For more information about these commands, see the How to Troubleshoot and Monitor a Cisco Mediatrace Session, on page 25.

How to Execute a Cisco Mediatrace Poll

Cisco Mediatrace polls are used to perform an on-demand fetch of data from the hops on a specific path. Some examples of how it can be used are:

- To retrieve data using a pre-configured session. In this case, no other parameters have to be specified inline. The pre-configured session must be have the frequency type set to on-demand.
- To retrieve the system data, hop or video monitoring information from hops along the specified path. You can specify the path as a pre-configured path-specifier or an inline path specification, in case you do not have config mode privileges. Note that by default, Cisco Mediatrace tries to configure nodes along the path to report passive monitoring metrics, and then waits for a configurable amount of time before going out again to collect the data.
- The **configless** keyword can be used to fetch data from the nodes along a media path, which already have Performance Monitor policies configured using the Performance Monitor commands. Some key things to keep in mind when fetching data using this method are that:

- The default perf-monitor profile or associated perf-monitor profile will have a sampling interval. If the sampling interval of the static policy does not match the one in the associated perf-monitor profile, no data is returned.
- If there is no Performance Monitor policy configured on a Responder node, the Cisco Mediatrace responder does not try to configure Performance Monitor and simply reports error to the initiator.

SUMMARY STEPS

1. **enable**
2. **mediatrace poll** {**no-traceroute** | **session** *number* | [**timeout** *value*] **path-specifier**{**name** *path-name* | **gsid** *gsid* | {[**disc-proto rsvp**] **destination ip** *ip-address* [**port** *nnnnn*] | **source ip** *ip-address* [**port** *nnnnn*] **destination ip** *ip-address* [**port** *nnnn*] [**ip-protocol**{**tcp** | **udp**}]} {**app-health** | **hops** | **l2-params gateway** *ip-address* | **system** [**profile** *system-profile-name*] | [**configless**] **perf-monitor** [**profile** *profile-name*]} {**flow-specifier** *name* | **source-ip** *ipaddress* [**source-port** *nnnnn*] **dest-ip** *ipaddress* [**dest-port** *nnnnn*] **ip-protocol** {**tcp** | **udp**}}}}
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	**mediatrace poll** {**no-traceroute**	**session** *number*	[**timeout** *value*] **path-specifier**{**name** *path-name*	**gsid** *gsid*	{[**disc-proto rsvp**] **destination ip** *ip-address* [**port** *nnnnn*]	**source ip** *ip-address* [**port** *nnnnn*] **destination ip** *ip-address* [**port** *nnnn*] [**ip-protocol**{**tcp**	**udp**}]} {**app-health**	**hops**	**l2-params gateway** *ip-address*	**system** [**profile** *system-profile-name*]	[**configless**] **perf-monitor** [**profile** *profile-name*]} {**flow-specifier** *name*	**source-ip** *ipaddress* [**source-port** *nnnnn*] **dest-ip** *ipaddress* [**dest-port** *nnnnn*] **ip-protocol** {**tcp**	**udp**}}}} **Example:** **Example:** `Router# mediatrace poll session 22`	Performs an on-demand fetch of data from the hops on a specific path. You can specify the hops using one of the following types of information: • A session definition or its constituent parameters • A system profile definition or its constituent parameters • A combination of a path-specifier profile definition and a perf-monitor profile definition or their constituent parameters **Note** The **l2-params gateway** keyword is available only on Catalyst platforms.
Step 3	**end** **Example:** `Router# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

If Cisco Mediatrace is not collecting all of the data that you want:

- Use the **show mediatrace session**command to verify that the intended values are set for the parameters for a specific session or all sessions.
- Use the **show mediatrace responder app-health** command and the **show mediatrace responder sessions**command to determine the status of the nodes being monitored.
- Use the **debug mediatrace**command to view error messages.

Examples

Tip For examples of poll output, see Configuration Examples for Cisco Mediatrace, on page 32.

The following example shows how to fetch the default system metrics when the source IP address, source port, and destination port are not known. Cisco Mediatrace uses the best local IP address as source IP address to find which hops are using RSVP.

mediatrace poll path dest *ip-address* **system**

The following example shows how to fetch the default system metrics when the source and destination port numbers are not known. RSVP finds the hop between the specified source and destination.

mediatrace poll path source *ip-address* **dest** *ip-address* **system**

The following example shows how to fetch the default system metrics when the source and destination port numbers are known. RSVP finds the hop using this information.

mediatrace poll path source-ip *ip-address* **source - port** *nnnn* **dest-ip** *ip-address* **dest - port** *nnnn* **ip-protocol udp system**

The following example shows how to fetch the default set of RTP metrics when the source and destination port numbers are not known. Cisco Mediatrace uses the path source and destination IP addresses to find the hops as well as filter the Performance Monitor data.

mediatrace poll path source *ip-address* **dest** *ip-address* **perf-monitor**

The following example shows how to fetch the default set of RTP metrics. Cisco Mediatrace uses the path parameters to discover hops and uses the inline flow specifier profile as a filter for Performance Monitor data.

mediatrace poll path source *ip-address* **dest** *ip-address* **perf-monitor source-ip** *ip-address* **source - port** *nnnn* **dest-ip** *ip-address* **dest - port** *nnnn* **ip-protocol udp**

The following example shows how to fetch the default set of TCP metrics. Cisco Mediatrace uses the path parameters to discover hops and uses the inline flow-specifier profile as a filter for Performance Monitor data.

mediatrace poll path source *ip-address* **dest** *ip-address* **perf-monitor source-ip** *ip-address* **source - port** *nnnn* **dest-ip** *ip-address* **dest - port** *nnnn* **ip-protocol tcp**

The following example shows how to fetch the default set of RTP metrics. Cisco Mediatrace uses the best local IP address as source IP address for finding hops on the path and uses the inline flow specifier profile as a filter for Performance Monitor data.

mediatrace poll path dest *ip-address* **perf-monitor source-ip** *ip-address* **source - port** *nnnn* **dest-ip** *ip-address* **dest - port** *nnnn* **ip-protocol udp**

The following example shows how to fetch the default set of TCP metrics. Cisco Mediatrace uses the best local IP address as source IP address for finding hops on the path and uses the inline flow-specifier profile as a filter for Performance Monitor data.

mediatrace poll path dest *ip-address* **perf-monitor source-ip** *ip-address* **source - port** *nnnn* **dest-ip** *ip-address* **dest - port** *nnnn* **ip-protocol tcp**

The following example shows how to fetch the default set of RTP metrics from the static policy that is already configured on the hops. The command does not configure the Performance Monitor. Cisco Mediatrace uses the path parameters to discover hops and use the inline flow specifier profile as a filter for Performance Monitor data.

mediatrace poll path source *ip-address* **dest** *ip-address* **configless perf-monitor flow-specifier source** *ip-address* **port** *nnnn* **dest** *ip-address* **port** *nnnn* **ip-protocol udp**

Poll Output Example

This example shows the output is produced by the following hops poll command:

```
mediatrace poll path-specifier source 10.10.130.2 destination 10.10.132.2 hops
Started the data fetch operation.
Waiting for data from hops.
This may take several seconds to complete...
Data received for hop 1
Data received for hop 2
Data fetch complete.
Results:
Data Collection Summary:
  Request Timestamp: 22:47:56.788 PST Fri Oct 29 2010
  Request Status: Completed
  Number of hops responded (includes success/error/no-record): 2
  Number of hops with valid data report: 2
  Number of hops with error report: 0
  Number of hops with no data record: 0
Detailed Report of collected data:
    Number of Mediatrace hops in the path: 2
    Mediatrace Hop Number: 1 (host=responder1, ttl=254)
      Reachability Address: 10.10.12.3
      Ingress Interface: Gi0/1
      Egress Interface: Gi0/2
    Mediatrace Hop Number: 2 (host=responder2, ttl=253)
      Reachability Address: 10.10.34.3
      Ingress Interface: Gi0/1
      Egress Interface: Gi0/2
```

How to Troubleshoot and Monitor a Cisco Mediatrace Session

Use the **show** commands described in this section to troubleshoot to monitor a Cisco Mediatrace session.

Tip For sample outputs, see the Examples section, in this chapter.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **show mediatrace profile perf-monitor** [*name*]
4. **show mediatrace profile system** [*name*]
5. **show mediatrace flow-specifier** [*name*]
6. **show mediatrace path-specifier** [*name*]
7. **show mediatrace initiator**
8. **show mediatrace session-params** [*name*]
9. **show mediatrace session** [**config**| **data**| **stats**| **hops**] [**brief**| *ID*]
10. **show mediatrace responder app-health**
11. **show mediatrace responder sessions [** *global-session-id* **| brief | details]**
12. **debug mediatrace** {**event** | **trace** | **error**} [**initiator** | **responder**| *session-id*]
13. **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	**show mediatrace profile perf-monitor** [*name*] **Example:** `Router(config)# show mediatrace profile perf-monitor vprofile-4`	Displays the parameters configured for all pre-packaged video-monitoring profiles or the specified profile.
Step 4	**show mediatrace profile system** [*name*] **Example:** `Router(config)# show mediatrace profile system system-8`	Displays the parameters configured for all pre-packaged system-data monitoring profiles or the specified profile.

	Command or Action	Purpose
Step 5	**show mediatrace flow-specifier** [*name*] **Example:** `Router(config)# show mediatrace flow-specifier flow-2`	Displays the parameters configured for all flow-specifier profiles or the specified flow-specifier profile.
Step 6	**show mediatrace path-specifier** [*name*] **Example:** `Router(config)# show mediatrace path-specifier path-6`	Displays the parameters configured for all path-specifier profiles or the specified path-specifier profile.
Step 7	**show mediatrace initiator** **Example:** `Router(config)# show mediatrace initiator`	Displays the parameters configured for the initiator profile.
Step 8	**show mediatrace session-params** [*name*] **Example:** `Router(config)# show mediatrace session-params sysparams-2`	Displays the monitoring parameters for the session like frequency, response timeout, ands so on. the parameters configured for all pre-packaged system-data monitoring profiles or the specified profile.
Step 9	**show mediatrace session** [**config**| **data**| **stats**| **hops**] [**brief**| *ID*] **Example:** `Router(config)# show mediatrace session data 1002`	Displays the parameters configured for all session profiles or the specified session profile. Use the following keywords to display the corresponding information: • **config** --Configuration of the session. • **data** --All data records collected and still cached at the Initiator. • **stats** --Statistics for this service path or session. • **hops** --Prior service paths (if available) and current service paths discovered. Also shows where and when the last route change happened. • **brief** -- Only a list of sessions with ID, destination/source address/port, and their role association as Initiator or Responder. • *ID* -- Session ID and some state information.
Step 10	**show mediatrace responder app-health** **Example:** `Router(config)# show mediatrace responder app-health`	Displays the current status of the responder.

	Command or Action	Purpose
Step 11	**show mediatrace responder sessions [** *global-session-id* **| brief | details]** **Example:** `Router(config)# show mediatrace responder sessions`	Displays the information about all or specific active sessions on local responder. Use the following keywords to display the corresponding information • *global-session-id* -- ID of the session for which information is displayed. • **brief** --Displays only the destination and source address/port of the path, their role as either Initiator or Responder, and some state information. • **details** --Displays all information.
Step 12	**debug mediatrace** {**event** | **trace** | **error**} [**initiator** | **responder**| *session-id*] **Example:** `Router(config)# debug mediatrace event 24`	Enables debugging for a particular path, or a particular session, or for all Initiator and Responder functions. You can use the following options: • **event** -- Displays only event information. • **trace** -- Displays only trace information. • **error** -- Displays only errors. • **initiator** -- Displays information for only the initiator. • **responder** -- Displays information for only the responder. • *session-id* -- Displays information for only the session.
Step 13	**end** **Example:** `Router(config)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Examples

Note For a complete description of the output for the following show commands, see the *Cisco Media Monitoring Command Reference*.

The following example displays video-monitoring profiles:

```
Router# show mediatrace profile perf-monitor
Perf-monitor Profile: vprof-4
Metric List: rtp
RTP Admin Parameter:
  Max Dropout: 5
  Max Reorder: 5
  Min Sequential: 5
```

```
Admin Parameter:
  Sampling Interval (sec): 30
```

The following example displays system-data profiles:

```
Router# show mediatrace profile
system

System Profile: sys-1
Metric List: intf
```

The following example displays flow-specifier profiles:

```
Router# show mediatrace
 flow-specifier flow-1
Flow Specifier: flow-1
    Source address/port:
    Destination address/port:
    Protocol: udp
```

The following example displays path-specifier profiles:

```
Router# show mediatrace
 path-specifier flow-1
Path Configuration: ps1
    Destination address/port: 10.10.10.1
    Source address/port: 10.10.10.4
    Gateway address/vlan:
    Discovery protocol: rsvp
```

The following example displays the initiator profile:

```
Router# show mediatrace
 initiator
Version: Mediatrace 1.0
Mediatrace Initiator status: enabled
Source IP: 1.1.1.1
Number of Maximum Allowed Active Session: 127
Number of Configured Session: 1
Number of Active Session    : 0
Number of Pending Session   : 0
Number of Inactive Session  : 1
Note: the number of active session may be higher than max active session
      because the max active session count was changed recently.
```

The following example displays session profiles:

```
Router# show mediatrace session-params
Session Parameters: s-1
    Response timeout (sec): 60
    Frequency: On Demand
    Inactivity timeout (sec): 300
    History statistics:
       Number of history buckets kept: 3
    Route change:
       Reaction time (sec): 5
```

The following example displays Mediatrace session statistics:

```
Router# show mediatrace session stats 2
Session Index: 2
Global Session Id: 86197709
Session Operation State: Active
Operation time to live: Forever
Data Collection Summary:
  Request Timestamp: 23:55:04.228 PST Fri Oct 29 2010
  Request Status: Completed
  Number of hops responded (includes success/error/no-record): 2
  Number of Non Mediatrace hops responded: 0
  Number of hops with valid data report: 2
  Number of hops with error report: 0
  Number of hops with no data record: 0
```

```
Detailed Report of collected data:
  Last Route Change Timestamp:
  Route Index: 0
    Number of Mediatrace hops in the path: 2
    Mediatrace Hop Number: 1 (host=responder1, ttl=254)
      Metrics Collection Status: Success
      Reachability Address: 10.10.12.3
      Ingress Interface: Gi0/1
      Egress Interface: Gi0/2
      Traceroute data:
        Address List: 1.2.2.3
        Round Trip Time List (msec): 12 msec
```

Note The rest of the data for hop 1 is similar to the data for hop 2, as shown below.

```
Mediatrace Hop Number: 2 (host=responder2, ttl=253)
      Metrics Collection Status: Success
      Reachability Address: 10.10.34.3
      Ingress Interface: Gi0/1
      Egress Interface: Gi0/2
      Metrics Collected:
        Collection timestamp: 23:55:04.237 PST Fri Oct 29 2010
        Octet input at Ingress (KB): 929381.572
        Octet output at Egress (MB): 1541.008502
        Pkts rcvd with err at Ingress (pkts): 0
        Pkts errored at Egress (pkts): 0
        Pkts discarded at Ingress (pkts): 0
        Pkts discarded at Egress (pkts): 0
        Ingress i/f speed (mbps): 1000.000000
        Egress i/f speed (mbps): 1000.000000
```

The following example displays Mediatrace session configuration information:

```
Router# show mediatrace session config 2
Global Session Id: 93642270
---------------------------
Session Details:
    Path-Specifier: ps1
    Session Params: sp1
    Collectable Metrics Profile: intf1
    Flow Specifier:
Schedule:
   Operation frequency (seconds): 30  (not considered if randomly scheduled)
   Next Scheduled Start Time: Start Time already passed
   Group Scheduled : FALSE
   Randomly Scheduled : FALSE
   Life (seconds): Forever
   Entry Ageout (seconds): never
   Recurring (Starting Everyday): FALSE
   Status of entry (SNMP RowStatus): Active
History Statistics:
   Number of history Buckets kept: 10
```

The following example displays Mediatrace session hops:

```
show mediatrace session hops 2
Session Index: 2
Global Session Id: 93642270
Session Operation State: Active
Data Collection Summary:
  Request Timestamp: 13:40:32.515 PST Fri Jun 18 2010
  Request Status: Completed
  Number of hops responded (includes success/error/no-record): 3
  Number of hops with valid data report: 3
  Number of hops with error report: 0
  Number of hops with no data record: 0
Detailed Report of collected data:
  Last Route Change Timestamp:
  Route Index: 0
```

```
    Number of Mediatrace hops in the path: 3
    Mediatrace Hop Number: 1 (host=responder1, ttl=254)
      Ingress Interface: Gi0/1
      Egress Interface: Gi1/0
    Mediatrace Hop Number: 2 (host=responder2, ttl=253)
      Ingress Interface: Gi0/1
      Egress Interface: Gi1/0
    Mediatrace Hop Number: 3 (host=responder3, ttl=252)
      Ingress Interface: Gi0/1
      Egress Interface: Gi0/2
```

The following example displays Mediatrace session data:

```
Router# show mediatrace session data 2
Session Index: 2
Global Session Id: 35325453
Session Operation State: Active
Bucket index: 1
Data Collection Summary:
  Request Timestamp: 13:02:47.969 PST Fri Jun 18 2010
  Request Status: Completed
  Number of hops responded (includes success/error/no-record): 3
  Number of hops with valid data report: 3
  Number of hops with error report: 0
  Number of hops with no data record: 0
Detailed Report of collected data:
  Last Route Change Timestamp:
  Route Index: 0
    Number of Mediatrace hops in the path: 3
    Mediatrace Hop Number: 1 (host=responder1, ttl=254)
      Metrics Collection Status: Success
      Ingress Interface: Gi0/1
      Egress Interface: Gi1/0
      Metrics Collected:
        Collection timestamp: 13:04:57.781 PST Fri Jun 18 2010
        Octet input at Ingress (KB): 10982.720
        Octet output at Egress (KB): 11189.176
    Pkts rcvd with err at Ingress (pkts): 0
        Pkts errored at Egress (pkts): 0
        Pkts discarded at Ingress (pkts): 0
        Pkts discarded at Egress (pkts): 0
        Ingress i/f speed (mbps): 1000.000000
        Egress i/f speed (mbps): 1000.000000
    Mediatrace Hop Number: 2 (host=responder2, ttl=253)
      Metrics Collection Status: Success
      Ingress Interface: Gi0/1
      Egress Interface: Gi1/0
      Metrics Collected:
        Collection timestamp: 13:04:57.792 PST Fri Jun 18 2010
        Octet input at Ingress (MB): 1805.552836
        Octet output at Egress (MB): 1788.468650
        Pkts rcvd with err at Ingress (pkts): 0
        Pkts errored at Egress (pkts): 0
        Pkts discarded at Ingress (pkts): 0
        Pkts discarded at Egress (pkts): 0
        Ingress i/f speed (mbps): 1000.000000
        Egress i/f speed (mbps): 1000.000000
```

The following example displays application health information for the Mediatrace responder:

```
Router# show mediatrace responder app-health
Mediatrace App-Health Stats:
   Number of all requests received: 0
   Time of the last request received:
   Initiator ID of the last request received:  0
   Requests dropped due to queue full: 0
   Responder current max sessions: 45
   Responder current active sessions: 0
   Session down or tear down requests received: 0
   Session timed out and removed: 0
   HOPS requests received: 0
   VM dynamic polling requests received: 0
   VM dynamic polling failed: 0
```

```
   VM configless polling requests received: 0
   VM configless polling failed: 0
   SYSTEM data polling requests received: 0
   SYSTEM data polling requests failed: 0
   APP-HEALTH polling requests received: 0
   Route Change or Interface Change notices received: 0
   Last time Route Change or Interface Change:
   Unknown requests received: 0
```

The following example displays brief session information for the Mediatrace responder:

```
Router# show mediatrace responder sessions brief
Local Responder configured session list:
Current configured max sessions: 45
Current number of active sessions: 0
session-id initiator-name       src-ip          src-port   dst-ip          dst-port det-l
  2   host-18     10.10.10.2     200   10.10.10.8     200
```

Configuration Examples for Cisco Mediatrace

Example Basic Mediatrace Configuration

The topology for this example includes:

- One mediatrace initiator (10.10.12.2)
- Two mediatrace responders between:
  - A media source (10.10.130.2)
  - A destination (10.10.132.2)

In this example, there is an RTP traffic stream from the source (address=10.10.130.2, port=1000, to the destination (address=10.10.132.2, port=2000).

The basic configuration of the mediatrace responder is as follows:

```
mediatrace responder
snmp-server community public RO
```

The basic configuration of the mediatrace initiator is as follows:

```
mediatrace initiator source-ip 10.10.12.2
mediatrace profile system intf1
mediatrace profile perf-monitor rtp1
mediatrace path-specifier path1 destination ip 10.10.132.2 port 2000
 source ip 10.10.130.2 port 1000
mediatrace flow-specifier flow1
 source-ip 10.10.130.2 source-port 1000
 dest-ip 10.10.132.2 dest-port 2000
mediatrace session-params sp1
 response-timeout 10
 frequency 60 inactivity-timeout 180
mediatrace 1
 path-specifier path1
 session-params sp1
 profile perf-monitor rtp1 flow-specifier flow1
mediatrace schedule 1 life forever start-time now
mediatrace 2
 path-specifier path1
 session-params sp1
```

```
 profile system intf1
mediatrace schedule 2 life forever start-time now
```

A sample reverse mediatrace configuration is given below.

```
Device# show mediatrace initiator
Mediatrace Initiator Software Version: 3.0
Mediatrace Protocol Version: 1
Mediatrace Initiator status: enabled

Source IP: 10.10.1.1
Source IPv6:

Number of Maximum Allowed Active Session: 8
Number of Configured Session: 3
Number of Active Session    : 2
Number of Pending Session   : 0
Number of Inactive Session  : 1
Number of Total Proxy Session     : 1
Number of Active Proxy Session    : 1
Number of Pending Proxy Session   : 0
Number of Inactive Proxy Session  : 0

Note: the number of active session may be higher than max active session
      because the max active session count was changed recently.

Device# show run
Device# show running-config | show mediatrace
mediatrace responder
mediatrace initiator source-ip 10.10.1.1
mediatrace profile perf-monitor MT_PERF_RTP
mediatrace path-specifier MT_PATH destination ip 10.11.1.10 port 21064
 source ip 10.10.1.11 port 28938
mediatrace path-specifier MT_PATH2 destination ip 10.10.10.10 port 16514
 source ip 10.10.1.10 port 16558
mediatrace flow-specifier MT_FLOW
 source-ip 10.10.1.11 source-port 28938
 dest-ip 10.10.1.50 dest-port 21064
mediatrace flow-specifier MT_FLOW2
 source-ip 10.1.1.50 source-port 21064
 dest-ip 10.1.1.11 dest-port 28938
mediatrace session-params MT_PARAMS
 response-timeout 50
 frequency 60 inactivity-timeout 180
 history data-sets-kept 10
mediatrace reverse 155
 path-specifier forward/reverse MT_PATH/MT_PATH2
 session-params MT_PARAMS
 profile perf-monitor MT_PERF_RTP flow-specifier MT_FLOW2
mediatrace schedule 155 life forever start-time now
mediatrace 157
 path-specifier MT_PATH
 session-params MT_PARAMS
 profile perf-monitor MT_PERF_RTP flow-specifier MT_FLOW
mediatrace schedule 157 life forever start-time now
```

Where to Go Next

For more information about configuring the products in the Medianet product family, see the other chapter in this guide or see the *Cisco Media Monitoring Configuration Guide*.

Additional References

Related Documents

Related Topic	Document Title
Design, configuration, and troubleshooting resources for Cisco Mediatrace and other Cisco Medianet products, including a Quick Start Guide and Deployment Guide.	See the Cisco Medianet Knowledge Base Portal, located at http://www.cisco.com/web/solutions/medianet/knowledgebase/index.html.
IP addressing commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco Media Montoring Command Reference*

Standards

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

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified	--

RFCs

RFC[1]	Title
RFC 2205	*RSVP: Resource ReSerVation Protocol* http://www.ietf.org/rfc/rfc2205.txt

1 These references are only a sample of the many RFCs available on subjects related to IP addressing and IP routing. Refer to the IETF RFC site at http://www.ietf.org/rfc.html for a full list of RFCs.

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/techsupport

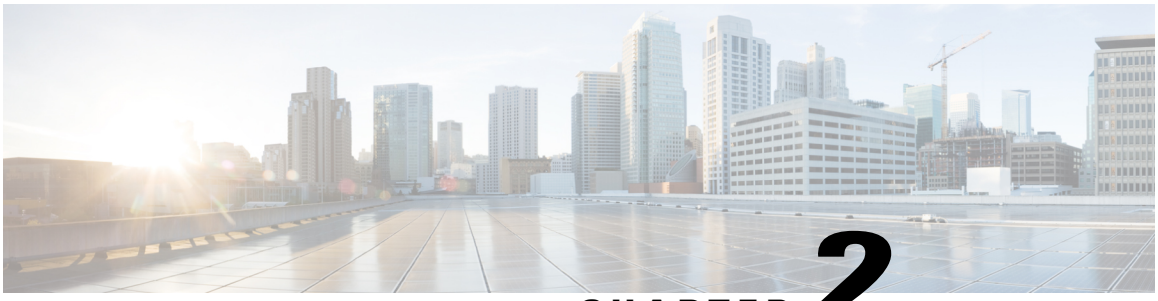
Feature Information for Cisco Mediatrace

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 Cisco Mediatrace

Feature Name	Releases	Feature Information
Cisco Mediatrace 1.0	15.1(3)T 12.2(58)SE 15.1(4)M1 15.0(1)SY 15.1(1)SY 15.1(1)SY1 15.2(1)S Cisco IOS XE Release 3.5S 15.1(2)SY	This feature enables you to isolate and troubleshoot network degradation problems for data streams. The following commands were introduced or modified by this feature: **admin-params**, **clear mediatrace**, **incomplete-sessions**, **clock-rate** (RTP parameters), **dest-ip** (flow), **frequency** (session parameters), **history** (session parameters), **ip-protocol** (flow), **max-dropout**, **max-reorder**, **mediatrace**, **mediatrace initiator**, **mediatrace responder**, **mediatrace path-specifier**, **mediatrace poll**, **mediatrace profile perf-monitor**, **mediatrace profile system**, **mediatrace schedule**, **mediatrace session-params**, **metric-list** (monitoring profile), **metric-list** (system profile), **min-sequential**, **path-specifier**, **profile perf-monitor**, **profile system**, **response-timeout** (session parameters), **route-change reaction-time**, **sampling-interval**, **session-params**, **show mediatrace flow-specifier**, **show mediatrace initiator**, **show mediatrace path-specifier**, **show mediatrace profile system**, **show mediatrace profile perf-monitor**, **show mediatrace responder app-health**, **show mediatrace responder sessions**, **show mediatrace session**, **show mediatrace session-params**, **source-ip** (flow), and **source ip** (path).



CHAPTER 2

Configuring Cisco Performance Monitor

This document contains information about and instructions for configuring Cisco Performance Monitor.

- Finding Feature Information, page 37
- Information About Cisco Performance Monitor, page 37
- How to Configure Troubleshoot and Maintain Cisco Performance Monitor, page 44
- Configuration Example for Cisco Performance Monitor, page 119
- Where to Go Next, page 121
- Additional References, page 121
- Feature Information for Cisco Performance Monitor, page 123

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 at the end of this module.

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 Cisco Performance Monitor

Overview of Cisco Performance Monitor

Cisco Performance Monitor enables you to monitor the flow of packets in your network and become aware of any issues that might impact the flow before it starts to significantly impact the performance of the application in question. Performance monitoring is especially important for video traffic because high quality interactive video traffic is highly sensitive to network issues. Even minor issues that may not affect other applications can have dramatic effects on video quality.

Because Cisco Performance Monitor uses similar software components and commands as Cisco NetFlow and Cisco Flexible NetFlow, familiarity with these products will help you to understand how to configure Cisco Performance Monitor. These products provide statistics on packets flowing through a router and are the standard for acquiring IP operational data from IP networks. They provide data to support network and security monitoring, network planning, traffic analysis, and IP accounting. For more information about Cisco NetFlow and Cisco Flexible NetFlow, see the documents listed in the Additional References section.

For more information about the design, configuration, and troubleshooting of Performance Monitor and other Cisco Medianet products, including a Quick Start Guide and Deployment Guide, see the Cisco Medianet Knowledge Base Portal, located at http://www.cisco.com/web/solutions/medianet/knowledgebase/index.html.

Prerequisites for Configuring Cisco Performance Monitor

The following prerequisites must be met before you can configure Cisco Performance Monitor:

IPv4 Traffic

- The networking device must be configured for IPv4 routing.
- One of the following must be enabled on your router and on any interfaces on which you want to enable Cisco Performance Monitor: Cisco Express Forwarding or distributed Cisco Express Forwarding.

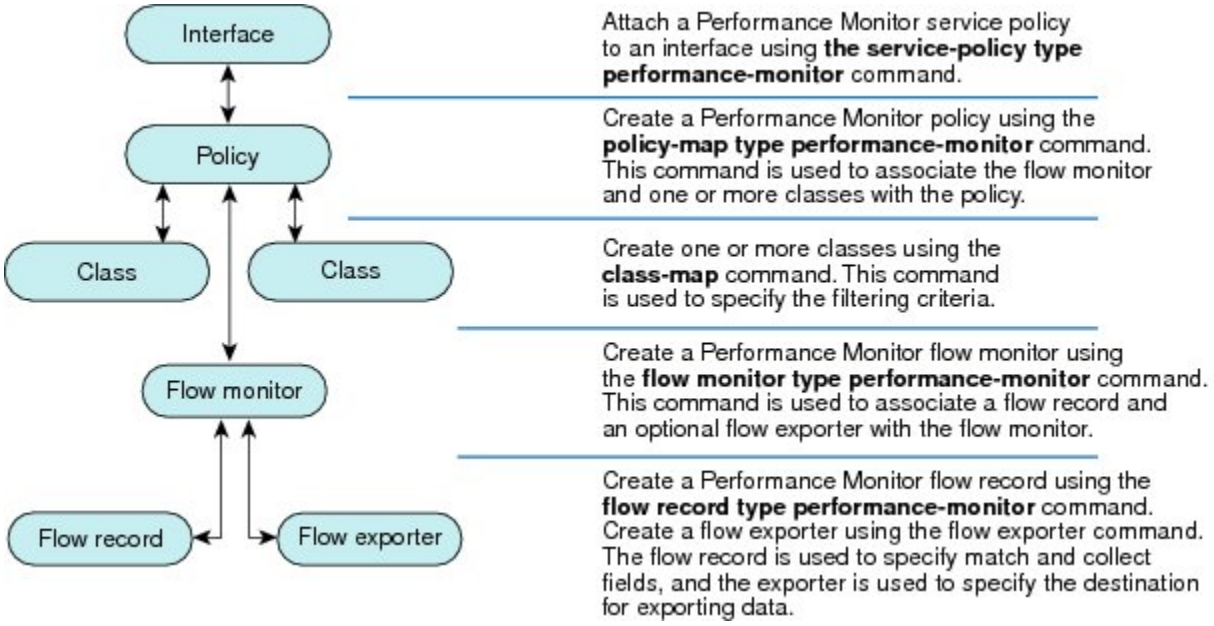
Configuration Components of Cisco Performance Monitor

To configure Cisco Performance Monitor, configure many of the same basic elements that you normally configure for Flexible NetFlow:

- Interface
- Policy
- Class
- Flow monitor
- Flow record
- Flow exporter

The figure below shows how these elements are related to each other. The elements at the bottom of the figure are configured first.

Figure 1: Cisco Performance Monitor Components



As shown above, a policy includes one or more classes. Each class has a flow monitor associated with it, and each flow monitor has a flow record and an optional flow exporter associated with it. These elements are configured in the following order:

1. Configure a flow record to specify the key and non-key fields that you want to monitor. This is configured using **match** and **collect** commands. You can also optimally configure a flow exporter to specify the export destination. For Cisco Performance Monitor, you must configure a **performance-monitor** type flow record.
2. Configure a flow monitor that includes the flow record and flow exporter. For Cisco Performance Monitor, you must configure a **performance-monitor** type flow monitor.
3. Configure a class to specify the filtering criteria using the **class-map** command.
4. Configure a policy to include one or more classes and one or more **performance-monitor** type flow monitors using the **policy-map** command. For Cisco Performance Monitor, you must configure **performance-monitor** type policies.
5. Associate a **performance-monitor** type policy to the appropriate interface using the **service-policy type performance-monitor** command.

Data That You Can Monitor Using Cisco Performance Monitor

You can monitor the following information by configuring a flow record with **collect** or **match** commands for the corresponding non-key fields:

Tip For more information about these statistics, see the **show performance monitor status**command in the*Cisco Media Monitoring Command Reference.*

- IP Packet Count
- IP TTL
- IP TTL minimum
- IP TTL maximum
- Flow to Interface Mapping
- IP Flow destination address and port, source address and port, and protocol
- RTP Synchronization Source (SSRC)
- IP Octets Count
- Media Stream Packet Count
- Media Stream Octect Count
- Media Byte Rate
- Media Byte Count
- Media Packet Rate
- Media Packet Loss Count
- Media Packet Loss Rate
- Packets Expected Count
- Measured Rate
- Media Loss Event Count
- Round Trip Time (RTT)
- Interarrival Jitter (RFC3550) max
- Interarrival Jitter (RFC3550) min 2
- Interarrival Jitter (RFC3550) mean
- Media Rate Variation
- Monitor Event
- Media Error
- Media Stop
- IP Byte Count
- IP Byte Rate
- IP Source Mask
- IP Destination Mask

- Epoch of A Monitoring Interval
- Packet Forwarding Status
- Packet Drops
- DSCP and IPv6 Traffic Class
- TCP: Maximum Segment Size
- TCP: Window Size Maximum
- TCP: Window Size Maximum
- TCP: Window Size Average
- Out Of Order Bytes
- Out Of Order Packets

SNMP MIB Support for Cisco Performance Monitor

Cisco Performance Monitor provides support for the use of the industry-standard Simple Network Management Protocol (SNMP) to monitor media streams. This support is implemented with the addition of the following Cisco proprietary SNMP Management Information Base (MIB) modules:

- CISCO-FLOW-MONITOR-TC-MIB—Defines the textual conventions common to the following MIB modules.
- CISCO-FLOW-MONITOR-MIB—Defines the framework that describes the flow monitors supported by a system, the flows that it has learned, and the flow metrics collected for those flows.
- CISCO-RTP-METRICS-MIB—Defines objects that describe the quality metrics collected for RTP streams, similar to those described by an RTCP Receiver Report packet (RFC 3550).
- CISCO-IP-CBR-METRICS-MIB—Defines objects that describe the quality metrics collected for IP streams that have a Constant Bit Rate (CBR).

For detailed information about these MIBs, and to locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at http://www.cisco.com/go/mibs .

This feature also includes two new command-line interface (CLI) commands and one modified CLI command. The commands are as follows:

- **snmp-server host—**Enables the delivery of flow monitoring SNMP notifications to a recipient.
- **snmp-server enable traps flowmon—**Enables flow monitoring SNMP notifications. By default, flow monitoring SNMP notifications are disabled.
- **snmp mib flowmon alarm history—**Sets the maximum number of entries maintained by the flow monitor alarm history log.

For more information about these commands, see the Cisco IOS Master Command List .

Limitations for the Catalyst 6500 Platform

Cisco Performance Monitor has the following limitations on the Catalyst 6000 platform:

- There are some limitations on which types of interfaces can be monitored. The next two tables list which types of interfaces are supported for ingress and egress monitoring on the Catalyst 6500 platform.

Table 2: Support for Ingress Interfaces

Interface Type	Support
Layer 3 Routed Port	Yes
Layer 3 Sub-interface (a)	No
Layer 3 port channels	Yes
Layer 3 port-channel sub-interface (a)	No
Layer 3 SVI (b)	Partial (see the third bullet below)
L3 Tunnels	No
Layer 2 Physical (Switched) Ports	Yes
Layer 2 Port-channels	Yes
Layer 2 Vlans	Yes

Table 3: Support for Egress Interfaces

Interface Type	Support
Layer 3 Routed Port	Yes
Layer 3 Sub-interface (a)	Yes
Layer 3 port channels	Yes
Layer 3 port-channel sub-interface (a)	Yes
Layer 3 SVI (b)	Yes
L3 Tunnels	No
Layer 2 Physical (Switched) Ports	No
Layer 2 Port-channels	No

Interface Type	Support
Layer 2 Vlans	Yes

- Performance monitoring on VRFs is not supported.
- Performance Monitoring of multicast flows is not supported.
- Routed traffic from a trunk port on a VLAN interface cannot not be monitored because it is not possible to identify the source VLAN interface for the traffic. You will see the following syslog message: "Routed traffic from trunk ports will not be monitored by ingress policy on VLAN interface."

  For a workaround, you can configure a performance monitoring policy on a trunk interface. This monitoring will result in additional CPU usage.
- You cannot use match all type Class maps. Only match any type of lookups are supported. If you configure performance monitoring to use match-all type class maps, it will result in the cloning of packet to the CPU. Packets will then again be classified in the CPU when match-all classes are properly applied and packet are dropped if required. This causes higher than expected CPU usage.
- Performance monitoring policy on the egress of a VLAN interface will not monitor traffic getting bridged within the VLAN. This is due to hardware limitation. Workaround is to apply the policy at the ingress of VLAN interface as well as egress. Policy on the ingress of the VLAN interface will monitor bridged packets.
- Cloned packets from Egress policies can only be software rate-limited. No hardware-based protection is available for these packets. Therefore, you might see high interrupt CPU usage during scenarios when many flows are being monitored.
- Egress performance monitoring makes use of a recirculation mechanism on the Catalyst 6500 platform. This introduces several microseconds of additional latency to the frame switching.
- Performance monitoring is not supported for the packets switched using the Fast (CEF) Path.
- Lawful intercept and performance monitoring makes use of the same mechanism for cloning the packets. The Lawful Intercept feature takes precedence over performance monitoring. Therefore, performance monitoring does not function when the Lawful Intercept feature is enabled. When this occurs, a syslog message is created.
- Performance monitoring makes use of same mechanism as other features, such as Optimized ACL logging, VACL Capture, IPv6 Copy, and so on. The feature that is enabled first takes precedence. The other features are blocked from being configured and a syslog message is created.

Limitations for IPv6 Support

Support for IPv6 with Performance Monitor has the following limitations:

- The following topologies are supported with IPv6: Non-MPLS, DMVPN (on most platforms), and dual stack.
- The following topologies are not supported with IPv6: MPLS/VRF (6PE and 6VPE), GETVPN and IPV6 over IPV4 tunnel.
- Mediatrace does not support IPv6.

- Exporting data to a IPv6 address is not supported on the ASR1K platform.
- Flexible NetFlow does not support IPv6 multicast.
- DMVPN is not supported with IPv6 on the ASR1K platform.

How to Configure Troubleshoot and Maintain Cisco Performance Monitor

Note Many of the Flexible NetFlow commands, keywords, and arguments used in used in these tasks are available in previous releases. For more information about these existing Flexible NetFlow commands, keywords, and arguments, refer to the *Cisco IOS Flexible NetFlow Command Reference*.

Configuring a Flow Exporter for Cisco Performance Monitor

Flow exporters are used to send the data that you collect with Cisco Performance Monitor to a remote system such as a NetFlow Collection Engine. Flow exporters use user datagram protocol (UDP) as the transport protocol and use the Version 9 export format.

To configure a flow exporter for the flow monitor, in order to export the data that is collected by Cisco Performance Monitor to a remote system for further analysis and storage, perform the following optional task. For Cisco Performance Monitor, flow exporters are configured the same way as they are configured for Cisco IOS Flexible NetFlow. For more information. see *Configuring Data Export for Cisco IOS Flexible NetFlow with Flow Exporters*.

Note You can export to a destination using either an IPv4 or IPv6 address.

Note Each flow exporter supports only one destination. If you want to export the data to multiple destinations, you must configure multiple flow exporters and assign them to the flow monitor.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **flow exporter** *exporter-name*
4. **description** *description*
5. **destination** {*ip-address* | *hostname*} [**vrf** *vrf-name*]
6. **export-protocol** {**netflow-v5** | **netflow-v9** | **ipfix** }
7. **dscp** *dscp*
8. **source** *interface-type interface-number*
9. **option** {**application-attributes** | **application table** | **exporter-stats** | **interface-table** | **metadata-table** | **sampler-table** | **vrf-table**} [**timeout** *seconds*]
10. **output-features**
11. **template data timeout** *seconds*
12. **transport udp** *udp-port*
13. **ttl** *seconds*
14. **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	**flow exporter** *exporter-name* **Example:** `Device(config)# flow exporter EXPORTER-1`	Creates the flow exporter and enters Flexible NetFlow flow exporter configuration mode. • This command also allows you to modify an existing flow exporter.
Step 4	**description** *description* **Example:** `Device(config-flow-exporter)# description Exports to the datacenter`	(Optional) Configures a description to the exporter that will appear in the configuration and the display of the **show flow exporter** command.

	Command or Action	Purpose
Step 5	**destination** {*ip-address* | *hostname*} [**vrf** *vrf-name*] **Example:** `Device(config-flow-exporter)# destination 172.16.10.2`	Specifies the IP address or hostname of the system to which the exporter sends data. **Note** You can export to a destination using either an IPv4 or IPv6 address.
Step 6	**export-protocol** {**netflow-v5** | **netflow-v9** | **ipfix** } **Example:** `Device(config-flow-exporter)# export-protocol netflow-v9`	Specifies the protocol used by the exporter. **Note** The export of extracted fields from NBAR is only supported over IPFIX.
Step 7	**dscp** *dscp* **Example:** `Device(config-flow-exporter)# dscp 63`	(Optional) Configures differentiated services code point (DSCP) parameters for datagrams sent by the exporter. • The range for the *dscp* argument is from 0 to 63. Default: 0.
Step 8	**source** *interface-type interface-number* **Example:** `Device(config-flow-exporter)# source ethernet 0/0`	(Optional) Specifies the local interface from which the exporter will use the IP address as the source IP address for exported datagrams.
Step 9	**option** {**application-attributes** | **application table** | **exporter-stats** | **interface-table** | **metadata-table** | **sampler-table** | **vrf-table**} [**timeout** *seconds*] **Example:** `Device(config-flow-exporter)# option exporter-stats timeout 120`	(Optional) Enables the use of option tables to decrease the amount of data exported. These tables allow the exporter to just export an ID that represents the complete value of the metadata and is mapped to the value by the option table. For example, the interface table maps the SNMP index to the interface name and the VRF table maps the VRF ID to the name. • You can enable the use of any combination of option tables concurrently. • The range for the *seconds* argument is 1 to 86,400. Default: 600.
Step 10	**output-features** **Example:** `Device(config-flow-exporter)# output-features`	(Optional) Enables sending export packets using quality of service (QoS) and encryption.
Step 11	**template data timeout** *seconds*	(Optional) Configure the resending of templates based on a timeout.

	Command or Action	Purpose
	Example: `Device(config-flow-exporter)# template data timeout 120`	• The range for the *seconds* argument is 1 to 86400 (86400 seconds = 24 hours).
Step 12	**transport udp** *udp-port* **Example:** `Device(config-flow-exporter)# transport udp 650`	Configures UDP as the transport protocol and specifies the UDP port on which the destination system is listening for exported datagrams. • The range for the *udp-port* argument is from 1 to 65536.
Step 13	**ttl** *seconds* **Example:** `Device(config-flow-exporter)# ttl 15`	(Optional) Configures the time-to-live (TTL) value for datagrams sent by the exporter. • The range for the *seconds* argument is from 1 to 255.
Step 14	**end** **Example:** `Device(config-flow-exporter)# end`	Exits flow exporter configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your flow exporter, use the **show flow exporter** command.

Configuring a Flow Record for Cisco Performance Monitor

The basic concepts and techniques for configuring a flow record for Cisco Performance Monitor are the same as flow records for Flexible NetFlow. The flow record specifies how the data collected data is aggregated and presented. The only significant difference is that, for Cisco Performance Monitor, the command includes **type performance-monitor**.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **flow record type performance-monitor** *record-name*
4. **match application** {**name** [**account-on-resolution**] | **vendor** | **version**}
5. **match connection transaction-id**
6. **match flow** {**direction** | **sampler**}
7. **match interface** {**input** | **output**}
8. **match ipv4** {**destination**{**address** | **prefix** [**minimum-mask** *mask*]} | **protocol** | **source** {**address** | **prefix** [**minimum-mask** *mask*]}
9. **match ipv4 fragmentation** {**flags** |**offset**}
10. **match ipv4** {**section** {**header size** *header-size* | **payload size** *payload-size*}
11. **match ipv4 total-length**
12. **match ipv4 ttl**
13. **match ipv6** {**dscp** | **flow-label** | **next-header** | **payload-length** | **precedence** | **protocol** | **traffic-class** | **version**}
14. **match ipv6 destination** {**address** | {**mask** | **prefix**} [**minimum-mask** *mask*]}
15. **match ipv6 extension map**
16. **match ipv6 fragmentation** {**flags** | **id** | **offset**}
17. **match ipv6 hop-limit**
18. **match ipv6 length** {**header** | **payload** | **total**}
19. **match ipv6** {**section** {**header size** *header-size* | **payload size** *payload-size*}
20. **match ipv6 source** {**address** | {**mask** | **prefix**} [**minimum-mask** *mask*]}
21. **match metadata** {**global-session-id** | **multi-party-session-id**}
22. **match routing** {**destination** | **source**}
23. **match routing is-multicast**
24. **match routing multicast replication-factor**
25. **match transport** {**destination-port** | **igmp** | **rtp** [**ssrc**] | **source-port**}
26. **match transport icmp ipv4** {**code** | **type**}
27. **match transport icmp ipv6** {**code** | **type**}
28. **match transport tcp** {**acknowledgement-number** | **destination-port** | **flags** {[**ack**] | [**cwr**] | [**ece**] | [**fin**] | [**psh**] | [**syn**] | [**urg**]} | **header-length** | **maximum-segment-size** | **sequence-number** | **urgent-pointer** | **window-size** | **window-size-maximum** | **window-size-minimum** | **window-size-average**}
29. **match transport udp** {**destination-port** | **message-length** | **source-port**}
30. **collect application media** {**bytes**{**rate** | **counter**}| **packets** {**rate**|**counter**} | **events**}
31. **collect application** {**name** [**account-on-resolution**]| **description** | **http host** | **nntp group-name** | **pop3 server** | **rstp host-name** | **sip** {**destination** | **source**} | **smtp** {**sender** | **server**} | **vendor** | **version**}
32. **collect connection**
33. **collect counter** {**bytes** [**long** | **rate**] |**packets**[**dropped** [**long**] | **long**]}
34. **collect datalink mac source address** {**input** | **output**}
35. **collect flow direction**

36. **collect interface** {**input** | **output**}
37. **collect ipv4** {**destination mask** [**minimum-mask** *mask*]} | **dscp** | **source mask** [**minimum-mask** *mask*] | **ttl** [**minimum** | **maximum**]}
38. **collect ipv4 fragmentation** {**flags** | **offset**}
39. **collect ipv4** {**section** {**header size** *header-size* | **prefix**[**payload size** *payload-size*}
40. **collect ipv4 total-length** [**maximum** | **minimum**]
41. **collect ipv6** {**dscp** | **flow-label** | **next-header** | **payload-length** | **precedence** | **protocol** | **traffic-class** | **version**}
42. **collect ipv6 destination** {**address** {**mask** | **prefix**} [**minimum-mask** *mask*]}
43. **collect ipv6 extension-map**
44. **collect ipv6 fragmentation** {**flags** | **offset**}
45. **collect ipv6 hop-limit** [**maximum**] [**minimum**]
46. **collect ipv6 length**{**header** | **payload** | **total** [**maximum**] [**minimum**] }
47. **collect ipv6** {**section** {**header size** *header-size* | **prefix** [**payload size** *payload-size*}
48. **collect ipv6 source** {**address** {**mask** | **prefix**} [**minimum-mask** *mask*]}
49. **collect metadata** {**global-session-id** | **multi-party-session-id**}
50. **collect monitor event**
51. **collect routing forwarding-status** [**reason**]
52. **collect routing is-multicast**
53. **collect routing multicast replication-factor**
54. **collect timestamp internal**
55. **collect timestamp sys-uptime** {**first** | **last**}
56. **collect transport** {**destination-port** | **igmp type** | **source-port** | **event packet-loss counter** | **packets** {**expected counter** | **lost** {**counter** | **rate**} | **out-of-order**} | **round-trip-time** | **rtp jitter** {**minimum** | **mean** | **maximum**}}
57. **collect transport icmp ipv4**
58. **collect transport icmp ipv6**
59. **collect transport tcp** {**acknowledgement-number** | **destination-port** | **flags** {[**ack**] | [**cwr**] | [**ece**] | [**fin**] | [**psh**] | [**syn**] | [**urg**]} | **header-length** | **maximum-segment-size** | **sequence-number** | **urgent-pointer** | **window-size** | **window-size-maximum** | **window-size-minimum** | **window-size-average**}
60. **collect transport udp** {**destination-port** | **message-length** | **source-port**}
61. **end**

DETAILED STEPS

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

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**flow record type performance-monitor** *record-name* **Example:** `Device(config)# flow record type performance-monitor record-8`	Creates a flow record and enters flow record configuration mode. • This command also allows you to modify an existing flow record.
Step 4	**match application** {**name** [**account-on-resolution**] | **vendor** | **version**} **Example:** `Device(config-flow-record)# match application name`	Specifies that the application name, vendor, or version will be used as a key field.
Step 5	**match connection transaction-id** **Example:** `Device(config-flow-record)# match connection transaction-id`	Specifies that the application name will be used as a key field.
Step 6	**match flow** {**direction** | **sampler**} **Example:** `Device(config-flow-record)# match flow direction`	Specifies that the flow direction field will be used as a key field.
Step 7	**match interface** {**input** | **output**} **Example:** `Device(config-flow-record)# match flow direction`	Specifies that the input interface field will be used as a key field.
Step 8	**match ipv4** {**destination**{**address** | **prefix** [**minimum-mask** *mask*]} | **protocol** | **source** {**address** | **prefix** [**minimum-mask** *mask*]} **Example:** `Device(config-flow-record)# match ipv4 destination address`	Specifies that one or more of the IPv4 fields will be used as a key field.

	Command or Action	Purpose
Step 9	**match ipv4 fragmentation** {**flags** |**offset**} **Example:** `Device(config-flow-record)# match ipv4 fragmentation flags`	Specifies that one or more of the IPv4 fields will be used as a key field.
Step 10	**match ipv4** {**section** {**header size** *header-size* | **payload size** *payload-size*} **Example:** `Device(config-flow-record)# match ipv4 section header size 8`	Specifies that one or more of the IPv4 fields will be used as a key field.
Step 11	**match ipv4 total-length** **Example:** `Device(config-flow-record)# match ipv4 total-length`	Specifies that the IPv4 total length field will be used as a key field.
Step 12	**match ipv4 ttl** **Example:** `Device(config-flow-record)# match ipv4 ttl`	Specifies that the IPv4 ttl field will be used as a key field.
Step 13	**match ipv6** {**dscp** | **flow-label** | **next-header** | **payload-length** | **precedence** | **protocol** | **traffic-class** | **version**} **Example:** `Device(config-flow-record)# match ipv6 dscp`	Specifies that the IPv6 DSCP field will be used as a key field.
Step 14	**match ipv6 destination** {**address** | {**mask** | **prefix**} [**minimum-mask** *mask*]} **Example:** `Device(config-flow-record)# match ipv4 destination address`	Specifies that the IPv6 destination address field will be used as a key field.
Step 15	**match ipv6 extension map** **Example:** `Device(config-flow-record)# match ipv6 extension map`	Specifies that the IPv6 extension map field will be used as a key field.

	Command or Action	Purpose
Step 16	**match ipv6 fragmentation** {**flags** | **id** | **offset**} **Example:** `Device(config-flow-record)# match ipv6 fragmentation flags`	Specifies that the IPv6 fragmentation flags field will be used as a key field.
Step 17	**match ipv6 hop-limit** **Example:** `Device(config-flow-record)# match ipv6 hop-limit`	Specifies that the IPv6 hop limit field will be used as a key field.
Step 18	**match ipv6 length** {**header** | **payload** | **total**} **Example:** `Device(config-flow-record)# match ipv6 length total`	Specifies that the IPv6 total length field will be used as a key field.
Step 19	**match ipv6** {**section** {**header size** *header-size* | **payload size** *payload-size*} **Example:** `Device(config-flow-record)# match ipv6 section header size 8`	Specifies that the IPv6 section header size field will be used as a key field.
Step 20	**match ipv6 source** {**address** | {**mask** | **prefix**} [**minimum-mask** *mask*]} **Example:** `Device(config-flow-record)# match ipv6 source address`	Specifies that the IPv6 source address field will be used as a key field.
Step 21	**match metadata** {**global-session-id** | **multi-party-session-id**} **Example:** `Device(config-flow-record)# match metadata global-session-id`	Specifies that a metadata session ID field will be used as a key field.
Step 22	**match routing** {**destination** | **source**} **Example:** `Device(config-flow-record)# match routing source`	Specifies that the routing source flag field will be used as a key field.
Step 23	**match routing is-multicast** **Example:** `Device(config-flow-record)# match routing is-multicast`	Specifies that the routing is-multicast flag field will be used as a key field.

	Command or Action	Purpose
Step 24	**match routing multicast replication-factor** **Example:** `Device(config-flow-record)# match routing multicast replication-factor`	Specifies that the routing multicast replication-factor flag field will be used as a key field.
Step 25	**match transport** {**destination-port** | **igmp** | **rtp** [**ssrc**] | **source-port**} **Example:** `Device(config-flow-record)# match transport destination-port`	Specifies that one or more of the transport layer fields will be used as a key field, including the Synchronization Source (SSRC) field in the Real-Time Transport Protocol (RTP) packet header.
Step 26	**match transport icmp ipv4** {**code** | **type**} **Example:** `Device(config-flow-record)# match transport icmp ipv4 code`	Specifies that the IPv4 ICMP transport code field will be used as a key field.
Step 27	**match transport icmp ipv6** {**code** | **type**} **Example:** `Device(config-flow-record)# match transport icmp ipv6 code`	Specifies that the IPv6 ICMP transport code field will be used as a key field.
Step 28	**match transport tcp** {**acknowledgement-number** | **destination-port** | **flags** {[**ack**] | [**cwr**] | [**ece**] | [**fin**] | [**psh**] | [**syn**] | [**urg**]} | **header-length** | **maximum-segment-size** | **sequence-number** | **urgent-pointer** | **window-size** | **window-size-maximum** | **window-size-minimum** | **window-size-average**} **Example:** `Device(config-flow-record)# match transport tcp destination-port`	Specifies that the IPv6 TCP transport destination port field will be used as a key field.
Step 29	**match transport udp** {**destination-port** | **message-length** | **source-port**} **Example:** `Device(config-flow-record)# match transport udp destination-port`	Specifies that the IPv6 UDP transport destination port field will be used as a key field.
Step 30	**collect application media** {**bytes**{**rate** | **counter**}| **packets** {**rate**|**counter**} | **events**}	Specifies that the application media bytes, packets, or events will be used as a nonkey field. An application event occurs when either one of the

	Command or Action	Purpose
	Example: `Device(config-flow-record)# collect application media events`	thresholds specified by a react statement for the flow was crossed at least once in the monitoring interval or no media packets were seen.
Step 31	**collect application** {**name** [**account-on-resolution**]| **description** | **http host** | **nntp group-name** | **pop3 server** | **rstp host-name** | **sip** {**destination** | **source**} | **smtp** {**sender** | **server**} | **vendor** | **version**} **Example:** `Device(config-flow-record)# collect application name`	Specifies that the application name will be used as a nonkey field.
Step 32	**collect connection** **Example:** `Device(config-flow-record)# collect connection initiator`	Specifies that the connection initiator will be used as a nonkey field.
Step 33	**collect counter** {**bytes** [**long** | **rate**] |**packets**[**dropped** [**long**] | **long**]} **Example:** `Device(config-flow-record)# collect counter bytes long`	Specifies the number of bytes or packets that will be used as a nonkey field.
Step 34	**collect datalink mac source address** {**input** | **output**} **Example:** `Device(config-flow-record)# collect flow direction`	Specifies that the flow direction field will be used as a nonkey field.
Step 35	**collect flow direction** **Example:** `Device(config-flow-record)# collect flow direction`	Specifies that the flow direction field will be used as a nonkey field.
Step 36	**collect interface** {**input** | **output**} **Example:** `Device(config-flow-record)# collect interface input`	Specifies that the input or output interface will be used as a nonkey field.
Step 37	**collect ipv4** {**destination mask** [**minimum-mask** *mask*]} | **dscp** | **source mask** [**minimum-mask** *mask*] | **ttl** [**minimum** | **maximum**]}	Specifies that the IPv4 DSCP field will be used as a nonkey field.

	Command or Action	Purpose
	Example: `Device(config-flow-record)# collect ipv4 dscp`	
Step 38	**collect ipv4 fragmentation** {**flags** | **offset**} **Example:** `Device(config-flow-record)# collect ipv4 fragmentation flags`	Specifies that the IPv4 fragmentation flags field will be used as a nonkey field.
Step 39	**collect ipv4** {**section** {**header size** *header-size* | **prefix**[**payload size** *payload-size*} **Example:** `Device(config-flow-record)# collect ipv4 section header size 8`	Specifies that the IPv4 section header size field will be used as a nonkey field.
Step 40	**collect ipv4 total-length** [**maximum** | **minimum**] **Example:** `Device(config-flow-record)# collect ipv4 total-length`	Specifies that the IPv4 total-length field will be used as a nonkey field.
Step 41	**collect ipv6** {**dscp** | **flow-label** | **next-header** | **payload-length** | **precedence** | **protocol** | **traffic-class** | **version**} **Example:** `Device(config-flow-record)# collect ipv6 dscp`	Specifies that the IPv6 DSCP field will be used as a nonkey field.
Step 42	**collect ipv6 destination** {**address** {**mask** | **prefix**} [**minimum-mask** *mask*]} **Example:** `Device(config-flow-record)# collect ipv6 destination mask`	Specifies that the IPv6 destination mask field will be used as a nonkey field.
Step 43	**collect ipv6 extension-map** **Example:** `Device(config-flow-record)# collect ipv6 extension-map`	Specifies that the IPv6 extension-map field will be used as a nonkey field.
Step 44	**collect ipv6 fragmentation** {**flags** | **offset**} **Example:** `Device(config-flow-record)# collect ipv6 fragmentation flags`	Specifies that the IPv6 fragmentation flags field will be used as a nonkey field.

	Command or Action	Purpose
Step 45	**collect ipv6 hop-limit** [**maximum**] [**minimum**] **Example:** `Device(config-flow-record)# collect ipv6 hop-limit`	Specifies that the IPv6 hop-limit field will be used as a nonkey field.
Step 46	**collect ipv6 length**{**header** | **payload** | **total** [**maximum**] [**minimum**] } **Example:** `Device(config-flow-record)# collect ipv6 length total`	Specifies that the IPv6 total length field will be used as a nonkey field.
Step 47	**collect ipv6** {**section** {**header size** *header-size* | **prefix** [**payload size** *payload-size*} **Example:** `Device(config-flow-record)# collect ipv6 section header size 8`	Specifies that the IPv6 section header size field will be used as a nonkey field.
Step 48	**collect ipv6 source** {**address** {**mask** | **prefix**} [**minimum-mask** *mask*]} **Example:** `Device(config-flow-record)# collect ipv6 source mask`	Specifies that the IPv6 source mask field will be used as a nonkey field.
Step 49	**collect metadata** {**global-session-id** | **multi-party-session-id**} **Example:** `Device(config-flow-record)# collect meatdata global-session-id`	Specifies that a metadata session ID field will be used as a nonkey field.
Step 50	**collect monitor event** **Example:** `Device(config-flow-record)# collect monitor event`	Specifies that the monitor event field will be used as a nonkey field. A monitor event occurs when no media application packets were seen
Step 51	**collect routing forwarding-status** [**reason**] **Example:** `Device(config-flow-record)# collect routing forwarding-status`	Specifies that the one or more of the routing attributes will be used as a nonkey field.

	Command or Action	Purpose
Step 52	**collect routing is-multicast** **Example:** `Device(config-flow-record)# collect routing is-multicast`	Specifies that the routing is-multicast field will be used as a nonkey field.
Step 53	**collect routing multicast replication-factor** **Example:** `Device(config-flow-record)# collect routing multicast replication-factor`	Specifies that the routing multicast replication-factor field will be used as a nonkey field.
Step 54	**collect timestamp internal** **Example:** `Device(config-flow-record)# collect timestamp internal`	Specifies that the system timestamp of the first seen or last seen packet in a flow will be used as a nonkey field.
Step 55	**collect timestamp sys-uptime** {**first** | **last**} **Example:** `Device(config-flow-record)# collect timestamp sys-uptime`	Specifies that the system timestamp of the sys-uptime will be used as a nonkey field.
Step 56	**collect transport** {**destination-port** | **igmp type** | **source-port** | **event packet-loss counter** | **packets** {**expected counter** | **lost** {**counter** | **rate**} | **out-of-order**} | **round-trip-time** | **rtp jitter** {**minimum** | **mean** | **maximum**}} **Example:** `Device(config-flow-record)# collect transport packets expected counter`	Specifies that one or more of the transport layer fields will be used as a nonkey field. These fields include metrics for: • Packet-loss counter • Expected packets counter • Jitter
Step 57	**collect transport icmp ipv4** **Example:** `Device(config-flow-record)# collect transport icmp ipv4`	Specifies that the transport ICMP IPv4 field will be used as a nonkey field.
Step 58	**collect transport icmp ipv6** **Example:** `Device(config-flow-record)# collect transport icmp ipv6`	Specifies that the transport ICMP IPv6 field will be used as a nonkey field.
Step 59	**collect transport tcp** {**acknowledgement-number** | **destination-port** | **flags** {[**ack**] | [**cwr**] | [**ece**] | [**fin**] | [**psh**] |	

	Command or Action	Purpose
	[**syn**] | [**urg**]} | **header-length** | **maximum-segment-size** | **sequence-number** | **urgent-pointer** | **window-size** | **window-size-maximum** | **window-size-minimum** | **window-size-average**} **Example:** `Device(config-flow-record)# collect transport tcp destination-port`	
Step 60	**collect transport udp** {**destination-port** | **message-length** | **source-port**} **Example:** `Device(config-flow-record)# collect transport udp destination-port`	Specifies that the transport UDP destination port field will be used as a nonkey field.
Step 61	**end** **Example:** `Device(config-flow-record)# end`	Exits flow record configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your flow record, use the **show flow record type performance-monitor** command.

Configuring a Usage Record for AVC Phase 2

To configure an input usage record, perform the following required task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. flow record flow-record-name
4. match interface input
5. match flow direction
6. match connection client {ipv4 | ipv6} address
7. match connection client transport port
8. match connection server {ipv4 | ipv6} address
9. match connection server transport port
10. match ipv4 {initiator | responder} address
11. match ipv6 {initiator | responder} address
12. match transport {initiator | responder} port
13. match routing vrf {input | output}
14. match datalink {destination-vlan-id | source-vlan-id}
15. match datalink vlan {input | output}
16. match datalink mac {destination | source} address {input | output}
17. match flow {class | qos-class}
18. match policy performance-monitor classification hierarchy
19. match services waas segment
20. collect interface output
21. collect flow direction
22. collect timestamp sys-uptime first
23. collect timestamp sys-uptime last
24. collect counter bytes long
25. collect counter packets
26. collect connection client {ipv4 | ipv6} address
27. collect connection client counter {bytes long | packets long | packets retransmitted}
28. collect connection client transport port
29. collect connection new-connections
30. collect connection sum-duration
31. collect routing vrf {input | output}
32. collect connection delay application {sum | min | max}
33. collect connection delay network {client-to-server | to-server [histogram { bucket1 | bucket2 | bucket3 | bucket4 | bucket5 | bucket6 | bucket7}] {sum | min | max}
34. collect connection delay response {client-to-server | to-client | to-server} {sum | min | max}
35. collect connection performance application-delay {sum | min | max}
36. collect connection performance initiator bytes long
37. collect connection performance initiator count re-transmitted-packets
38. collect connection performance initiator network-delay {sum | min | max}

39. collect connection performance initiator packets long
40. collect connection performance network-delay {sum | min | max}
41. collect connection performance new-transaction-time
42. collect connection performance total-transaction-time {sum | min | max}
43. collect connection performance total-transaction-time {sum | min | max}
44. collect connection performance responder bytes long
45. collect connection performance responder response-time {sum | min | max}
46. collect connection performance responder network-delay {sum | min | max}
47. collect connection performance responder count {histogram { bucket1 | bucket2 | bucket3 | bucket4 | bucket5 | bucket6 | bucket7} | late-responses | responses}
48. collect connection performance responder packets long
49. collect connection performance total-delay {sum | min | max}
50. collect connection performance total-transaction-time {sum | min | max}
51. collect connection server {ipv4 | ipv6} address
52. collect connection server counter {bytes long | packets long | packets retransmitted}
53. collect connection server transport port
54. collect connection transaction {counter complete | duration {sum | min | max}}
55. collect datalink {destination-vlan-id | source-vlan-id}
56. collect datalink mac {destination | source} address {input | output}
57. collect datalink vlan {input | output}
58. collect policy performance-monitor classification hierarchy
59. collect services waas {passthrough-reason | segment}
60. collect timestamp absolute {first | last}
61. collect transport tcp {option map | window-size {sum | minimum | maximum} | maximum-segment-size}
62. 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	flow record flow-record-name **Example:** `Router(config)# flow record my-input-usage-monitor`	Creates a flow record and enters flow record configuration mode.
Step 4	match interface input **Example:** `Router(config-flow-record)# match interface input`	Configures the input interface for the packet as a key field for the flow record. input—Traffic arrives on the Cisco router's input interface.
Step 5	match flow direction **Example:** `Router(config-flow-record)# match flow direction`	Configures the direction of the flow record as a key field. The direction is either input or output.
Step 6	match connection client {ipv4 | ipv6} address **Example:** `Router(config-flow-record)# match connection client ipv6 address`	Configures the Ipv6 address of the client as a key field for a flow record.
Step 7	match connection client transport port **Example:** `Router(config-flow-record)# match connection client transport port`	Configures the connection port of the client as a key field for a flow record.
Step 8	match connection server {ipv4 | ipv6} address **Example:** `Router(config-flow-record)# match connection server ipv6 address`	Configures the Ipv6 address of the server as a key field for a flow record.
Step 9	match connection server transport port **Example:** `Router(config-flow-record)# match connection server transport port`	Configures the connection port of the server as a key field for a flow record.
Step 10	match ipv4 {initiator | responder} address **Example:** `Router(config-flow-record)# match ipv4 initiator address`	(Optional) For IPv4 networks, configures the IPv4 address of the initiator or responder as a key field. The direction is either input or output.

	Command or Action	Purpose
Step 11	match ipv6 {initiator | responder} address **Example:** `Router(config-flow-record)# match ipv6 initiator address`	(Optional) For IPv6 networks, configures the IPv6 address of the initiator or responder as a key field. The direction is either input or output.
Step 12	match transport {initiator | responder} port **Example:** `Router(config-flow-record)# match transport initiator port`	(Optional) Configures the transport port of the initiator or responder as a key field.
Step 13	match routing vrf {input | output} **Example:** `Router(config-flow-record)# match routing vrf input`	(Optional) Configures the virtual routing and forwarding (VRF) ID for incoming or outgoing packets as a key field.
Step 14	match datalink {destination-vlan-id | source-vlan-id} **Example:** `Router(config-flow-record)# match datalink destination-vlan-id`	(Optional) Configures the destination VLAN ID as a key field.
Step 15	match datalink vlan {input | output} **Example:** `Router(config-flow-record)# match datalink vlan input`	(Optional) Configures the VLAN ID for incoming or outgoing packets as a key field.
Step 16	match datalink mac {destination | source} address {input | output} **Example:** `Router(config-flow-record)# match datalink mac destination address output`	(Optional) Configures the destination MAC address as a key field.
Step 17	match flow {class | qos-class} **Example:** `Router(config-flow-record)# match flow class`	Configures the use of the class ID as a key field for a flow record.
Step 18	match policy performance-monitor classification hierarchy **Example:** `Router(config-flow-record)# match policy performance-monitor classification hierarchy`	Configures the use of the Performance Monitor policy classification hierarchy as a key field for a flow record.

	Command or Action	Purpose
Step 19	match services waas segment **Example:** `Router(config-flow-record)# match services waas segment`	Configures the use of the WAAS segment as a key field for a flow record.
Step 20	collect interface output **Example:** `Router(config-flow-record)# collect interface output`	Configures the output interface as a non-key field for a flow record and enables collecting the output interface fields from the flows for the flow record.
Step 21	collect flow direction **Example:** `Router(config-flow-record)# collect flow direction`	Configures the flow direction as a non-key field for a flow record.
Step 22	collect timestamp sys-uptime first **Example:** `Router(config-flow-record)# collect timestamp sys-uptime first`	Configures the system uptime of the first seen packet in a flow as a nonkey field for a flow record. • first—Configures the system uptime for the time the first packet was seen from the flows as a nonkey field and enables collecting time stamps based on the system uptime for the time the first packet was seen from the flows.
Step 23	collect timestamp sys-uptime last **Example:** `Router(config-flow-record)# collect timestamp sys-uptime last`	Configures the system uptime of the last seen packet in a flow as a nonkey field for a flow record. • last—Configures the system uptime for the time the last packet was seen from the flows as a nonkey field and enables collecting time stamps based on the system uptime for the time the most recent packet was seen from the flows.
Step 24	collect counter bytes long **Example:** `Router(config-flow-record)# collect counter bytes long`	Configures the number of bytes in a flow as a nonkey field for a flow record. • bytes—Configures the number of bytes seen in a flow as a nonkey field and enables collecting the total number of bytes from the flow. • long—Enables collecting the total number of bytes or packets from the flow by using a 64-bit counter rather than a 32-bit counter.

	Command or Action	Purpose
Step 25	collect counter packets **Example:** `Router(config-flow-record)# collect counter packets`	Configures the number of packets in a flow as a nonkey field for a flow record. • packets—Configures the number of packets seen in a flow as a nonkey field and enables collecting the total number of packets from the flow.
Step 26	collect connection client {ipv4 | ipv6} address **Example:** `Router(config-flow-record)# collect connection client ipv6 address`	Configures the Ipv6 address of the client as a nonkey field for a flow record.
Step 27	collect connection client counter {bytes long | packets long | packets retransmitted} **Example:** `Router(config-flow-record)# collect connection client counter packets retransmitted`	Configures the number of the client packets retransmitted as a nonkey field for a flow record.
Step 28	collect connection client transport port **Example:** `Router(config-flow-record)# collect connection client transport port`	Configures the client connection port as a nonkey field for a flow record.
Step 29	collect connection new-connections **Example:** `Router(config-flow-record)# collect connection new-connections`	Counts the number of TCP or UDP connections which were opened during the observation period. The observation period may be specified by the flow start and end timestamps.
Step 30	collect connection sum-duration **Example:** `Router(config-flow-record)# collect connection sum-duration`	Aggregates the total time, in seconds, for all the TCP or UDP connections, which were in use during the observation period. For example, if there are five concurrent connections each for 10 seconds, the value would be 50 seconds.
Step 31	collect routing vrf {input | output} **Example:** `Router(config-flow-record)# collect routing vrf output`	Configures the virtual routing and forwarding (VRF) ID for incoming or outgoing packets output as a nonkey field for a flow record.

	Command or Action	Purpose
Step 32	collect connection delay application {sum | min | max} **Example:** `Router(config-flow-record)# collect connection delay application sum`	Configures the total amount of application delay as a nonkey field for a flow record.
Step 33	collect connection delay network {client-to-server | to-server [histogram { bucket1 | bucket2 | bucket3 | bucket4 | bucket5 | bucket6 | bucket7}] {sum | min | max} **Example:** `Router(config-flow-record)# collect connection delay network client-to-server sum`	Configures the total amount of network delay between the client and the server as a nonkey field for a flow record.
Step 34	collect connection delay response {client-to-server | to-client | to-server} {sum | min | max} **Example:** `Router(config-flow-record)# collect connection delay response client-to-server sum`	Configures the total amount of response delay between the client and the server as a nonkey field for a flow record.
Step 35	collect connection performance application-delay {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance application-delay sum`	Configures the total application delay as a nonkey field for a flow record.
Step 36	collect connection performance initiator bytes long **Example:** `Router(config-flow-record)# collect connection performance initiator bytes long`	Configures the number of long bytes for the Mediatrace initiator as a nonkey field for a flow record.
Step 37	collect connection performance initiator count re-transmitted-packets **Example:** `Router(config-flow-record)# collect connection performance initiator count re-transmitted-packets`	Configures the number of retrransmitted packets for the Mediatrace initiator as a nonkey field for a flow record.
Step 38	collect connection performance initiator network-delay {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance initiator network-delay sum`	Configures the total network delay for the Mediatrace initiator as a nonkey field for a flow record.

	Command or Action	Purpose
Step 39	collect connection performance initiator packets long **Example:** `Router(config-flow-record)# collect connection performance initiator packets long`	Configures the number of long packets for the Mediatrace initiator as a nonkey field for a flow record.
Step 40	collect connection performance network-delay {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance network-delay sum`	Configures the total network delay as a nonkey field for a flow record.
Step 41	collect connection performance new-transaction-time **Example:** `Router(config-flow-record)# collect connection performance new-transaction`	Configures the new transaction field as a nonkey field for a flow record.
Step 42	collect connection performance total-transaction-time {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance total-transaction-time sum`	Configures the total transaction time as a nonkey field for a flow record.
Step 43	collect connection performance total-transaction-time {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance total-transaction-time sum`	Configures the total transaction time as a nonkey field for a flow record.
Step 44	collect connection performance responder bytes long **Example:** `Router(config-flow-record)# collect connection performance responder bytes long`	Configures the number of long bytes for the Mediatrace responder as a nonkey field for a flow record.
Step 45	collect connection performance responder response-time {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance responder response-time sum`	Configures the total response time for the Mediatrace responder as a nonkey field for a flow record.

	Command or Action	Purpose
Step 46	collect connection performance responder network-delay {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance responder network-delay sum`	Configures the total network delay for the Mediatrace responder as a nonkey field for a flow record.
Step 47	collect connection performance responder count {histogram { bucket1 | bucket2 | bucket3 | bucket4 | bucket5 | bucket6 | bucket7} | late-responses | responses} **Example:** `Router(config-flow-record)# collect connection performance responder count late-responses`	Configures the number of late responses for the Mediatrace responder as a nonkey field for a flow record.
Step 48	collect connection performance responder packets long **Example:** `Router(config-flow-record)# collect connection performance responder packets long`	Configures the number of long packets for the Mediatrace responder as a nonkey field for a flow record.
Step 49	collect connection performance total-delay {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance total-delay sum`	Configures the total connection delay as a nonkey field for a flow record.
Step 50	collect connection performance total-transaction-time {sum | min | max} **Example:** `Router(config-flow-record)# collect connection performance total-transaction-time sum`	Configures the total transaction time as a nonkey field for a flow record.
Step 51	collect connection server {ipv4 | ipv6} address **Example:** `Router(config-flow-record)# collect connection server ipv6 address`	Configures the IPv6 address of the server as a nonkey field for a flow record.
Step 52	collect connection server counter {bytes long | packets long | packets retransmitted} **Example:** `Router(config-flow-record)# collect connection server counter packets retransmitted`	Configures the number of the server packets retransmitted as a nonkey field for a flow record.

	Command or Action	Purpose
Step 53	collect connection server transport port **Example:** `Router(config-flow-record)# collect connection server transport port`	Configures the server connection port as a nonkey field for a flow record.
Step 54	collect connection transaction {counter complete | duration {sum | min | max}} **Example:** `Router(config-flow-record)# collect connection transaction duration sum`	Configures the total duration of the transaction as a nonkey field for a flow record.
Step 55	collect datalink {destination-vlan-id | source-vlan-id} **Example:** `Router(config-flow-record)# collect datalink destination-vlan-id`	(Optional) Configures the destination VLAN ID as a nonkey field.
Step 56	collect datalink mac {destination | source} address {input | output} **Example:** `Router(config-flow-record)# collect datalink mac destination address input`	(Optional) Configures the destination MAC address as a nonkey field.
Step 57	collect datalink vlan {input | output} **Example:** `Router(config-flow-record)# collect datalink vlan input`	(Optional) Configures the VLAN ID for incoming or outgoing packets as a nonkey field.
Step 58	collect policy performance-monitor classification hierarchy **Example:** `Router(config-flow-record)# collect policy performance-monitor classification hierarchy`	Configures the use of the Performance Monitor policy classification hierarchy as a nonkey field for a flow record.
Step 59	collect services waas {passthrough-reason | segment} **Example:** `Router(config-flow-record)# collect services waas segment`	Configures the use of the WAAS segment as a nonkey field for a flow record.

	Command or Action	Purpose
Step 60	collect timestamp absolute {first | last} **Example:** `Router(config-flow-record)# collect timestamp absolute first`	Configures the use of the first timestamp as a nonkey field for a flow record.
Step 61	collect transport tcp {option map | window-size {sum | minimum | maximum} | maximum-segment-size} **Example:** `Router(config-flow-record)# collect connection performance initiator network-delay sum`	Configures the total network delay for the Mediatrace initiator as a nonkey field for a flow record.
Step 62	end **Example:** `Router(config-flow-record)# end`	Exits flow record configuration mode and returns to privileged EXEC mode.

Configuring a Flow Monitor for Cisco Performance Monitor

The basic concepts for configuring a flow monitor for Cisco Performance Monitor are the same as flow monitors for Flexible NetFlow. Each flow monitor has a separate cache assigned to it and requires a record to define the contents and layout of its cache entries.

When you configure a flow monitor, you must use either:

- An existing flow record that you configured
- One of the following default predefined records:
  - The default RTP record (**default-rtp**)
  - The default TCP record (**default-tcp**)
  - Flexible NetFlow's "NetFlow IPv4 original input"

Note To modify a flow record, you must remove it from all flow monitors it is associated with.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **flow monitor type performance-monitor** *monitor-name*
4. **description** *description*
5. **cache** {**entries**| **timeout**| **type**}
6. **statistics** {**packet**}
7. **exporter** *exporter-name*
8. **record** {*record-name*| **default-rtp**| **default-tcp**|**netflow ipv4 original-input**}
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	**flow monitor type performance-monitor** *monitor-name* **Example:** `Device(config)# flow monitor type performance-monitor FLOW-MONITOR-2`	Creates a flow monitor and enters flow monitor configuration mode. • This command also allows you to modify an existing flow monitor.
Step 4	**description** *description* **Example:** `Device(config-flow-monitor)# description Used for monitoring IPv4 traffic`	(Optional) Creates a description for the flow monitor.
Step 5	**cache** {**entries**| **timeout**| **type**} **Example:** `Device(config-flow-monitor)# cache timeout 20`	(Optional) Creates a cache for the flow monitor.

	Command or Action	Purpose
Step 6	**statistics** {**packet**} **Example:** `Device(config-flow-monitor)# statistics`	(Optional) specifies whether statistics are collected for the flow monitor.
Step 7	**exporter** *exporter-name* **Example:** `Device(config-flow-monitor)# exporter export-4`	Specifies the flow exporter for the flow monitor.
Step 8	**record** {*record-name*| **default-rtp**| **default-tcp**|**netflow ipv4 original-input**} **Example:** `Device(config-flow-monitor)# record default-rtp`	Specifies the flow record for the flow monitor.
Step 9	**end** **Example:** `Device(config-flow-monitor)# end`	Exits flow monitor configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your flow monitor, use the **show flow monitor type performance-monitor** command and the **show running-config flow monitor** command.

Configuring a Flow Class for Cisco Performance Monitor

The basic concepts and techniques for configuring a class for Cisco Performance Monitor are the same as for any other type of class. The class specifies the filter that determines which flow traffic to monitor. The filter is configured using various match commands in class-map mode.

If you do not already have a flow monitor configured, you can either:

Note Nested class maps are not supported. In other words, you cannot use the **class-map** command while in class-map configuration mode (config-cmap).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **class-map** *class-name*
4. **description** *description*
5. **match** {*access-group* {*access-group* | **name** *access-group-name*} | **any** | **class-map** *class-map-name* | **cos** *cos-value* | **destination-address mac** *address* | **discard-class** *class-number* | **dscp** *dscp-value* | **flow** {**direction** | **sampler**} | **fr-de** | **fr-dlci** *dlci-number* | **input-interface** *interface-name* | **ip** {**rtp** *starting-port-number port-range* | **precedence** | **dscp**} | **mpls experimental topmost** *number* | **not** *match-criterion*| **packet length** {**max** *maximum-length-value* [**min** *minimum-length-value*] | **min** *minimum-length-value* [**max** *maximum-length-value*]} | **precedence** {*precedence-criteria1* | *precedence-criteria2* | *precedence-criteria3* | *precedence-criteria4*} | **protocol** *protocol-name* | **qos-group** *qos-group-value* | **source-address** *mac address-destination*| **vlan** {*vlan-id* | *vlan-range* | *vlan-combination*}}
6. **rename** *class-name*
7. **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	**class-map** *class-name* **Example:** `Device(config)# class-map class-4`	Specifies a class to include in the policy. Repeat this command for each class that you want to include in the policy.
Step 4	**description** *description* **Example:** `Device(config-cmap)# description match any packets`	(Optional) Creates a description for the flow class.
Step 5	**match** {*access-group* {*access-group* | **name** *access-group-name*} | **any** | **class-map** *class-map-name* | **cos** *cos-value* | **destination-address mac** *address* | **discard-class** *class-number* | **dscp** *dscp-value* | **flow** {**direction** | **sampler**} | **fr-de** | **fr-dlci** *dlci-number* | **input-interface** *interface-name* | **ip** {**rtp** *starting-port-number port-range* | **precedence**	Specifies the classification criteria. For more information and examples, see the *Cisco Media Monitoring Command Reference*.

	Command or Action	Purpose
	| **dscp**} | **mpls experimental topmost** *number* | **not** *match-criterion*| **packet length** {**max** *maximum-length-value* [**min** *minimum-length-value*] | **min** *minimum-length-value* [**max** *maximum-length-value*]} | **precedence** {*precedence-criteria1* | *precedence-criteria2* | *precedence-criteria3* | *precedence-criteria4*} | **protocol** *protocol-name* | **qos-group** *qos-group-value* | **source-address** *mac address-destination*| **vlan** {*vlan-id* | *vlan-range* | *vlan-combination*}} **Example:** `Device(config-cmap)# match any`	
Step 6	**rename** *class-name* **Example:** `Device(config-cmap)# rename class-4`	Specifies a new name for the flow class.
Step 7	**end** **Example:** `Device(config-cmap)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your flow class, use the **show policy-map type performance-monitor** or **show class-map** command.

Configuring a Flow Policy for Cisco Performance Monitor Using an Existing Flow Monitor

The basic concepts and techniques for configuring a class for Cisco Performance Monitor are the same as for any other type of class. The class specifies which flow monitor is included. The only significant difference is that, for Cisco Performance Monitor, the **policy-map** command includes **type performance-monitor**.

If you do not already have a flow monitor configured or do not want to use any of your existing flow monitors for a new class, you can configure it using the flow monitor inline option and specifying which flow record and flow exporter are included.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map type performance-monitor** *policy-name*
4. **parameter-map type performance-monitor system-default-aor**
5. **class** {*class-name* | **class-default**}
6. **flow monitor** *monitor-name*
7. **monitor metric ip-cbr**
8. **rate layer3** {byte-*rate* {**bps** | **kbps** | **mbps** | **gbps**} | **packet**}
9. **exit**
10. **monitor metric rtp**
11. **clock-rate** {*type-number* | *type-name* | **default**} *rate*
12. **max-dropout** *number*
13. **max-reorder** *number*
14. **min-sequential** *number*
15. **ssrc maximum** *number*
16. exit
17. **monitor parameters**
18. **flows** *number*
19. **interval duration** *number*
20. **history** *number*
21. **timeout** *number*
22. **exit**
23. **react** *ID* {**media-stop** | **mrv** | **rtp-jitter-average** | **transport-packets-lost-rate**}
24. **action** {**snmp** | **syslog**}
25. **alarm severity** {**alert** | **critical** | **emergency** | **error** | **info**}
26. **alarm type** {**discrete** | **grouped** {**count** *number* | **percent** *number*}
27. **threshold value** {**ge** *number* | **gt** *number* | **le** *number* | **lt** *number* | **range** *rng-start rng-end*}
28. **description** *description*
29. **end**

DETAILED STEPS

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

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**policy-map type performance-monitor** *policy-name* **Example:** `Device(config)# policy-map type performance-monitor FLOW-MONITOR-4`	Creates a policy and enters policy configuration mode. • This command also allows you to modify an existing policy.
Step 4	**parameter-map type performance-monitor system-default-aor** **Example:** `Device(config-pmap)# parameter-map type performance-monitor system-default-aor`	Creates a parameter map for Performance Monitor. The only map available is the system-default -aor map
Step 5	**class** {*class-name* | **class-default**} **Example:** `Device(config-pmap)# class class-4`	Specifies a class to include in the policy. Repeat this command for each class that you want to include in the policy.
Step 6	**flow monitor** *monitor-name* **Example:** `Device(config-pmap-c)# flow monitor FLOW-MONITOR-4`	Enters flow monitor configuration mode. If you do not want to use an existing flow monitor, you can use the **inline** option to configure a new one, as described in the Configuring a Flow Policy for Cisco Performance Monitor Without Using an Existing Flow Monitor, on page 79.
Step 7	**monitor metric ip-cbr** **Example:** `Device(config-pmap-c)# monitor metric ip-cbr`	(Optional) Enters IP-CBR monitor metric configuration mode.
Step 8	**rate layer3** {byte-*rate* {**bps** | **kbps** | **mbps** | **gbps**} | **packet**} **Example:** `Device(config-pmap-c-mipcbr)# rate layer3 248 mbps`	(Optional) Specifies the rate for monitoring the metrics. • *byte-rate* --Data rate in Bps, kBps, mBps, or gBps. The range is 1 to 65535. • **packet** --Packet rate in packets per second.

	Command or Action	Purpose
Step 9	**exit** **Example:** `Device(config-pmap-c-mipcbr)# exit`	Returns to policy class configuration mode.
Step 10	**monitor metric rtp** **Example:** `Device(config-pmap-c)# monitor metric rtp`	Enters RTP monitor metric configuration mode.
Step 11	**clock-rate** {*type-number* | *type-name* | **default**} *rate* **Example:** `Device(config-pmap-c-mrtp)# clock-rate 8 9600`	Specifies the clock rate used to sample RTP video-monitoring metrics. For more information about the clock-type numbers and names, see the *Cisco Media Monitoring Command Reference.* The range for *rate* is 1 kHz to 192 kHz.
Step 12	**max-dropout** *number* **Example:** `Device(config-pmap-c-mrtp)# max-dropout 2`	Specifies the maximum number of dropouts allowed when sampling RTP video-monitoring metrics.
Step 13	**max-reorder** *number* **Example:** `Device(config-pmap-c-mrtp)# max-reorder 4`	Specifies the maximum number of reorders allowed when sampling RTP video-monitoring metrics.
Step 14	**min-sequential** *number* **Example:** `Device(config-pmap-c-mrtp)# min-sequential 2`	Specifies the minimum number of sequential packets required to identify a stream as being an RTP flow.
Step 15	**ssrc maximum** *number* **Example:** `Device(config-pmap-c-mrtp)# ssrc maximum 20`	Specifies the maximum number of SSRCs that can be monitored within the same flow. A flow is defined by the protocol, source/destination address, and source/destination port).
Step 16	exit **Example:** `Device(config-pmap-c-mrtp)# exit`	Returns to policy class configuration mode.

	Command or Action	Purpose
Step 17	**monitor parameters** **Example:** `Device(config-pmap-c)# monitor parameters`	Enters monitor parameters configuration mode.
Step 18	**flows** *number* **Example:** `Device(config-pmap-c-mparam)# flows 40`	Specifies the maximum number of flows for each monitor cache.
Step 19	**interval duration** *number* **Example:** `Device(config-pmap-c-mparam)# interval duration 40`	Specifies the interval, in seconds, between samples taken of video-monitoring metrics.
Step 20	**history** *number* **Example:** `Device(config-pmap-c-mparam)# history 4`	Specifies the number of historical buckets of collected video-monitoring metrics.
Step 21	**timeout** *number* **Example:** `Device(config-pmap-c-mparam)# timeout 20`	Specifies the number of intervals before a stopped flow is removed from the database.
Step 22	**exit** **Example:** `Device(config-pmap-c-mparam)# exit`	Returns to policy class configuration mode.
Step 23	**react** *ID* {**media-stop** | **mrv** | **rtp-jitter-average** | **transport-packets-lost-rate**} **Example:** `Device(config-pmap-c)# react 41 rtp-jitter-average`	Enters a mode where you can specify what reaction occurs when a threshold is violated for the following metrics: • *ID*-- ID for react configuration. Range is 1 to 65535. • **media-stop** --No traffic is found for the flow. • **mrv** --Ratio calculated by dividing the difference between the actual rate and the expected rate, by the expected rate. • **rtp-jitter-average** --Average jitter. • **transport-packets-lost-rate** --Ratio calculated by dividing the number of lost packets by the expected packet count.

	Command or Action	Purpose
Step 24	**action** {**snmp** | **syslog**} **Example:** `Device(config-pmap-c-react)# action syslog`	Specifies how violations of the thresholds with be reported.
Step 25	**alarm severity** {**alert** | **critical** | **emergency** | **error** | **info**} **Example:** `Device(config-pmap-c-react)# alarm severity critical`	Specifies which level of alarm will be reported. The default setting is **info**.
Step 26	**alarm type** {**discrete** | **grouped** {**count** *number* | **percent** *number*} **Example:** `Device(config-pmap-c-react)# alarm type discrete`	Specifies which types of levels are considered alarms that require reporting. The default setting is **discrete**.
Step 27	**threshold value** {**ge** *number* | **gt** *number* | **le** *number* | **lt** *number* | **range** *rng-start rng-end*} **Example:** `Device(config-pmap-c-react)# threshold value ge 20`	Specifies which types of threshold values are considered alarms that require reporting. If no value is set but the application name is configured as a key field, then the system uses the value for the threshold that it finds in the default map. If no value is set and the application name is not configured as a key field, then the default value is used for the threshold. If more than one react command is configured for the same policy and class but only one of the react configurations has threshold values set, then the values of the configured react take precedence and the rest of the threshold values are ignored. If more than one react command is configured for the same policy and none of them have the threshold value configured, then the default threshold value is applied for the configuration with the lowest react ID.
Step 28	**description** *description* **Example:** `Device(config-cmap-c-react)# description rtp-jitter-average above 40`	(Optional) Creates a description for the reaction.
Step 29	**end** **Example:** `Device(config-pmap-c-react)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your flow policy, use the **show policy-map type performance-monitor** command.

Configuring a Flow Policy for Cisco Performance Monitor Without Using an Existing Flow Monitor

The basic concepts and techniques for configuring a class for Cisco Performance Monitor are the same as for any other type of class. The class specifies which flow monitor is included. The only significant difference is that, for Cisco Performance Monitor, the **policy-map** command includes**type performance-monitor**.

If you do not already have a flow monitor configured or do not want to use any of your existing flow monitors for a new class, you can configure it under the class configuration mode, by specifying which flow record and flow exporter are included.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **policy-map type performance-monitor** *policy-name* **class** class-name
4. **parameter-map type performance-monitor system-default-aor**
5. **class** {*class-name* | **class-default**}
6. **flow monitor inline**
7. **record** {*record-name* | **default-rtp** | **default-tcp**}
8. **exporter** *exporter-name*
9. **exit**
10. monitor metric ip-cbr
11. **rate layer3** {*byte-rate* {**bps** | **kbps** | **mbps** | **gbps**} | **packet**}
12. **exit**
13. **monitor metric rtp**
14. **clock-rate** {*type-number*| *type-name*} *rate*
15. **max-dropout** *number*
16. **max-reorder** *number*
17. **min-sequential** *number*
18. **ssrc maximum** *number*
19. exit
20. **monitor parameters**
21. **flows** *number*
22. **interval duration** *number*
23. **history** *number*
24. **timeout** *number*
25. **exit**
26. **react** *ID* {**media-stop** | **mrv** | **rtp-jitter-average** | **transport-packets-lost-rate**}
27. **action** {**snmp** | **syslog**}
28. **alarm severity** {**alert** | **critical** | **emergency** | **error** | **info**}
29. **alarm type** {**discrete** | **grouped {count** *number* | **percent** *number*}
30. **threshold value** {**ge** *number* | **gt** *number* | **le** *number* | **lt** *number* | **range** *rng-start rng-end*
31. **description** *description*
32. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Device> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**policy-map type performance-monitor** *policy-name* **class** class-name **Example:** `Device(config)# policy-map type performance-monitor FLOW-MONITOR-4`	Creates a policy and enters policy configuration mode. • This command also allows you to modify an existing policy.
Step 4	**parameter-map type performance-monitor system-default-aor** **Example:** `Device(config-pmap)# parameter-map type performance-monitor system-default-aor`	Creates a parameter map for Performance Monitor. The only map available is the system-default -aor map
Step 5	**class** {*class-name* | **class-default**} **Example:** `Device(config-pmap)# class class-4`	Specifies a class to include in the policy. Repeat this command for each class that you want to include in the policy.
Step 6	**flow monitor inline** **Example:** `Device(config-pmap-c)# flow monitor inline`	Enters inline mode and enables you to configure a new flow monitor.
Step 7	**record** {*record-name* | **default-rtp** | **default-tcp**} **Example:** `Device(config-pmap-c-flowmon)# record default-tcp`	Specifies a flow record to associate with the flow monitor.
Step 8	**exporter** *exporter-name* **Example:** `Device(config-pmap-c-flowmon)# exporter exporter-4`	Specifies a flow record to associate with the flow exporter.

	Command or Action	Purpose
Step 9	**exit** **Example:** `Device(config-pmap-c-flowmon)# exit`	Returns to policy class configuration mode.
Step 10	monitor metric ip-cbr **Example:** `Device(config-pmap-c)# monitor metric ip-cbr`	(Optional) Enters IP-CBR monitor metric configuration mode.
Step 11	**rate layer3** {*byte-rate* {**bps** | **kbps** | **mbps** | **gbps**} | **packet**} **Example:** `Device(config-pmap-c-mipcbr)# rate layer3 248 mbps`	(Optional) Specifies the rate for monitoring the metrics. • *byte-rate*—Data rate in Bps, kBps, mBps, or gBps. The range is 1 to 65535. • **packet**—Packet rate in packets per second.
Step 12	**exit** **Example:** `Device(config-pmap-c-mipcbr)# exit`	Returns to policy class configuration mode.
Step 13	**monitor metric rtp** **Example:** `Device(config-pmap-c)# monitor metric rtp`	Enters RTP monitor metric configuration mode.
Step 14	**clock-rate** {*type-number*| *type-name*} *rate* **Example:** `Device(config-pmap-c-mrtp)# clock-rate 8 9600`	Specifies the clock rate used to sample RTP video-monitoring metrics. For more information about the clock-type numbers and names, see the *Cisco Media Monitoring Command Reference*. The range for *rate* is 1 kHz to 192 kHz.
Step 15	**max-dropout** *number* **Example:** `Device(config-pmap-c-mrtp)# max-dropout 2`	Specifies the maximum number of dropouts allowed when sampling RTP video-monitoring metrics.
Step 16	**max-reorder** *number* **Example:** `Device(config-pmap-c-mrtp)# max-reorder 4`	Specifies the maximum number of reorders allowed when sampling RTP video-monitoring metrics.

	Command or Action	Purpose
Step 17	**min-sequential** *number* **Example:** `Device(config-pmap-c-mrtp)# min-sequential 2`	Specifies the minimum number of sequential packets required to identify a stream as being an RTP flow.
Step 18	**ssrc maximum** *number* **Example:** `Device(config-pmap-c-mrtp)# ssrc maximum 20`	Specifies the maximum number of SSRCs that can be monitored within the same flow. A flow is defined by the protocol, source/destination address, and source/destination port).
Step 19	exit **Example:** `Device(config-pmap-c-mrtp)# exit`	Returns to policy class configuration mode.
Step 20	**monitor parameters** **Example:** `Device(config-pmap-c)# monitor parameters`	Enters monitor parameters configuration mode.
Step 21	**flows** *number* **Example:** `Device(config-pmap-c-mparam)# flows 40`	Specifies the maximum number of flows for each monitor cache.
Step 22	**interval duration** *number* **Example:** `Device(config-pmap-c-mparam)# interval duration 40`	Specifies the duration of the intervals, in seconds, for collecting monitoring metrics.
Step 23	**history** *number* **Example:** `Device(config-pmap-c-mparam)# history 4`	Specifies the number of historical intervals of collected monitoring metrics to display.
Step 24	**timeout** *number* **Example:** `Device(config-pmap-c-mparam)# timeout 20`	Specifies the number intervals before a stopped flow is removed from the database.

	Command or Action	Purpose
Step 25	**exit** **Example:** `Device(config-pmap-c-mparam)# exit`	Returns to policy class configuration mode.
Step 26	**react** *ID* {**media-stop** | **mrv** | **rtp-jitter-average** | **transport-packets-lost-rate**} **Example:** `Device(config-pmap-c)# react 41 rtp-jitter-average`	Enters a mode where you can specify what reaction occurs when a threshold is violated for the following metrics: • *ID*—ID for react configuration. Range is 1 to 65535. • **media-stop**—No traffic is found for the flow. • **mrv**—Ratio calculated by dividing the difference between the actual rate and the expected rate, by the expected rate. • **rtp-jitter-average**—Average jitter. • **transport-packets-lost-rate**—Ratio calculated by dividing the number of lost packets by the expected packet count.
Step 27	**action** {**snmp** | **syslog**} **Example:** `Device(config-pmap-c-react)# action syslog`	Specifies how violations of the thresholds with be reported.
Step 28	**alarm severity** {**alert** | **critical** | **emergency** | **error** | **info**} **Example:** `Device(config-pmap-c-react)# alarm severity critical`	Specifies which level of alarm will be reported.The default setting is **info**.
Step 29	**alarm type** {**discrete** | **grouped {count** *number* | **percent** *number*} **Example:** `Device(config-pmap-c-react)# alarm severity critical`	Specifies which types of levels are considered alarms that require reporting. The default setting is **discrete**.
Step 30	**threshold value** {**ge** *number* | **gt** *number* | **le** *number* | **lt** *number* | **range** *rng-start rng-end* **Example:** `Device(config-pmap-c-react)# threshold value ge 20`	Specifies which types of threshold values are considered alarms that require reporting. If no value is set but the application name is configured as a key field, then the system uses the value for the threshold that it finds in the default map. If no value is set and the application name is not configured as a key field, then the default value is used for the threshold.

	Command or Action	Purpose
		If more than one react command is configured for the same policy and class but only one of the react configurations has threshold values set, then the values of the configured react take precedence and the rest of the threshold values are ignored. If more than one react command is configured for the same policy and none of them have the threshold value configured, then the default threshold value is applied for the configuration with the lowest react ID.
Step 31	**description** *description* **Example:** `Device(config-cmap-c-react)# description rtp-jitter-average above 40`	(Optional) Creates a description for the reaction.
Step 32	**end** **Example:** `Device(config-pmap-c-react)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your flow policy, use the **show policy-map type performance-monitor** command.

Applying a Cisco Performance Monitor Policy to an Interface Using an Existing Flow Policy

Before it can be activated, a Cisco Performance Monitor policy must be applied to at least one interface. To activate a Cisco Performance Monitor policy, perform the following required task.

Note You can apply a Cisco Performance Monitor policy to an IPv6 interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **service-policy type performance-monitor** {**input** | **output**} *policy-name*
5. **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 0/0`	Specifies an interface and enters interface configuration mode. You can specify an IPv6 interface.
Step 4	**service-policy type performance-monitor** {**input** | **output**} *policy-name* **Example:** **Example:** `Device(config-if)# service-policy type performance-monitor input mypolicy-map-4` **Example:**	Attaches a policy map to an input interface or virtual circuit (VC), or an output interface or VC, to be used as the service policy for that interface or VC. • **input—**Attaches the specified policy map to the input interface or input VC. • **output—**Attaches the specified policy map to the output interface or output VC. • *policy-name***—**name of a service policy map (created by the **policy-map** command) to be attached. The name can be a maximum of 40 alphanumeric characters.
Step 5	**end** **Example:** `Device(config-if)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

Troubleshooting Tips

To check the configuration and status of your service policy, use the following commands:

- **show performance monitor history**
- **show performance monitor status**
- **show policy-map ypre performance-monitor interface**

Applying a Cisco Performance Monitor Policy to an Interface Without Using an Existing Flow Policy

Before it can be activated, a Cisco Performance Monitor policy must be applied to at least one interface. To activate a Cisco Performance Monitor policy, perform the following required task.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **service-policy type performance-monitor inline** {**input** | **output**}
5. **match** {*access-group* {*access-group* | **name** *access-group-name*} | **any** | **class-map***class-map-name* | **cos** *cos-value* | **destination-address mac** address | **discard-class** *class-number* | **dscp** *dscp-value* | **flow** {**direction** | **sampler**} | **fr-de** | **fr-dlci** *dlci-number* | **input-interface** *interface-name* | **ip** {**rtp** *starting-port-number port-range* | **precedence** | **dscp**} | **mpls experimental topmost** *number* | **not** *match-criterion*| **packet length** {**max** *maximum-length-value* [**min** *minimum-length-value*] | **min** *minimum-length-value* [**max** *maximum-length-value*]} | **precedence** {*precedence-criteria1* | *precedence-criteria2* | *precedence-criteria3* | *precedence-criteria4*} | **protocol** *protocol-name* | **qos-group** *qos-group-value* | **source-address** *mac address-destination*| **vlan** {*vlan-id* | *vlan-range* | *vlan-combination*}}
6. **flow monitor** {*monitor-name*| **inline**}
7. **record** {r*ecord-name*| **default-rtp**| **default-tcp**}
8. **exporter** *exporter-name*
9. **exit**
10. **monitor metric ip-cbr**
11. **rate layer3** {*byte-rate* {**bps** | **kbps** | **mbps** | **gbps**} | **packet**}
12. **exit**
13. **monitor metric rtp**
14. **clock-rate** {*type-number*| *type-name*} *rate*
15. **max-dropout** *number*
16. **max-reorder** *number*
17. **min-sequential** *number*
18. **ssrc maximum** *number*
19. exit
20. **monitor parameters**
21. **flows** *number*
22. **interval duration** *number*
23. **history** *number*
24. **timeout** *number*
25. **exit**
26. **react** *ID* {**media-stop** | **mrv** | **rtp-jitter-average** | **transport-packets-lost-rate**}
27. **action** {**snmp** | **syslog**}
28. **alarm severity** {**alert** | **critical** | **emergency**| **error** | **info**}
29. **alarm type** {**discrete**| **grouped**{**count** *number* | **percent** *number*}}
30. **threshold value** {**ge** *number* | **gt** *number* | **le** *number* | **lt** *number* | **range** *rng-start rng-end*}
31. **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 0/0`	Specifies an interface and enters interface configuration mode. You can specify an IPv6 interface.
Step 4	**service-policy type performance-monitor inline** {**input** | **output**} **Example:** **Example:** `Device(config-if)# service-policy type performance-monitor inline input`	Attaches a policy map to an input interface or virtual circuit (VC), or an output interface or VC, to be used as the service policy for that interface or VC. • **input—**Attaches the specified policy map to the input interface or input VC. • **output—**Attaches the specified policy map to the output interface or output VC.
Step 5	**match** {*access-group* {*access-group* | **name** *access-group-name*} | **any** | **class-map***class-map-name* | **cos** *cos-value* | **destination-address mac** address | **discard-class** *class-number* | **dscp** *dscp-value* | **flow** {**direction** | **sampler**} | **fr-de** | **fr-dlci** *dlci-number* | **input-interface** *interface-name* | **ip** {**rtp** *starting-port-number port-range* | **precedence** | **dscp**} | **mpls experimental topmost** *number* | **not** *match-criterion*| **packet length** {**max** *maximum-length-value* [**min** *minimum-length-value*] | **min** *minimum-length-value* [**max** *maximum-length-value*]} | **precedence** {*precedence-criteria1* | *precedence-criteria2* | *precedence-criteria3* | *precedence-criteria4*} | **protocol** *protocol-name* | **qos-group** *qos-group-value* | **source-address** *mac address-destination*| **vlan** {*vlan-id* | *vlan-range* | *vlan-combination*}}	Specifies the classification criteria. For more information and examples, see the *Cisco Media Monitoring Command Reference* .

	Command or Action	Purpose
	Example: `Device(config-if-spolicy-inline)# match any`	
Step 6	**flow monitor** {*monitor-name*| **inline**} **Example:** `Device(config-if-spolicy-inline)# flow monitor inline`	Specifies an existing flow monitor to associate with a flow policy. If you do not want to use an existing flow monitor, you can use the **inline** option to configure a new one. If needed, you can also use the **inline** option to specify a flow record and flow exporter.
Step 7	**record** {r*ecord-name*| **default-rtp**| **default-tcp**} **Example:** `Device(config-spolicy-inline-flowmon)# record default-tcp`	(Optional) If you do not want to use an existing flow monitor, and instead used the **inline** option, use this command to configure a flow record.
Step 8	**exporter** *exporter-name* **Example:** `Device(config-spolicy-inline-flowmon)# exporter exporter-4`	(Optional) If you do not want to use an existing flow monitor, and instead used the **inline** option, use this command to configure a flow exporter.
Step 9	**exit** **Example:** `Device(config-spolicy-inline-flowmon)# exit`	Returns to service-policy inline configuration mode.
Step 10	**monitor metric ip-cbr** **Example:** `Device(config-if-spolicy-inline)# monitor metric ip-cbr`	Enters IP-CBR monitor metric configuration mode.
Step 11	**rate layer3** {*byte-rate* {**bps** | **kbps** | **mbps** | **gbps**} | **packet**} **Example:** `Device(config-spolicy-inline-mipcbr)# rate layer3 248 mbps`	Specifies the rate for monitoring the metrics. • *byte-rate*—Data rate in Bps, kBps, mBps, or gBps. The range is 1 to 65535. • **packet**—Packet rate in packets per second.
Step 12	**exit** **Example:** `Device(config-spolicy-inline-mipcbr)# exit`	Returns to service-policy inline configuration mode.

	Command or Action	Purpose
Step 13	**monitor metric rtp** **Example:** `Device(config-if-spolicy-inline)# monitor metric rtp`	Enters RTP monitor metric configuration mode.
Step 14	**clock-rate** {*type-number*| *type-name*} *rate* **Example:** `Device(config-spolicy-inline-mrtp)# clock-rate 8 9600`	Specifies the clock rate used to sample RTP video-monitoring metrics. For more information about the clock-type numbers and names, see the *Cisco Media Monitoring Command Reference.* The range for *rate* is 1 kHz to 192 kHz.
Step 15	**max-dropout** *number* **Example:** `Device(config-spolicy-inline-mrtp)# max-dropout 2`	Specifies the maximum number of dropouts allowed when sampling RTP video-monitoring metrics.
Step 16	**max-reorder** *number* **Example:** `Device(config-spolicy-inline-mrtp)# max-reorder 4`	Specifies the maximum number of reorders allowed when sampling RTP video-monitoring metrics.
Step 17	**min-sequential** *number* **Example:** `Device(config-spolicy-inline-mrtp)# min-sequential 2`	Specifies the minimum number of sequential packets required to identify a stream as being an RTP flow.
Step 18	**ssrc maximum** *number* **Example:** `Device(config-spolicy-inline-mrtp)# ssrc maximum 20`	Specifies the maximum number of SSRCs that can be monitored within the same flow. A flow is defined by the protocol, source/destination address, and source/destination port).
Step 19	exit **Example:** `Device(config-spolicy-inline-mrtp)# exit`	Returns to service-policy inline configuration mode.
Step 20	**monitor parameters** **Example:** `Device(config-if-spolicy-inline)# monitor parameters`	Enters monitor parameters configuration mode.

	Command or Action	Purpose
Step 21	**flows** *number* **Example:** `Device(config-spolicy-inline-mparam)# flows 40`	Specifies the maximum number of flows for each monitor cache.
Step 22	**interval duration** *number* **Example:** `Device(config-spolicy-inline-mparam)# interval duration 40`	Specifies the duration of the intervals, in seconds, for collecting monitoring metrics.
Step 23	**history** *number* **Example:** `Device(config-spolicy-inline-mparam)# history 4`	Specifies the number of historical intervals of collected monitoring metrics to display.
Step 24	**timeout** *number* **Example:** `Device(config-spolicy-inline-mparam)# timeout 20`	Specifies the number of intervals before a stopped flow is removed from the database.
Step 25	**exit** **Example:** `Device(config-spolicy-inline-mparam)# exit`	Returns to service-policy inline configuration mode.
Step 26	**react** *ID* {**media-stop** | **mrv** | **rtp-jitter-average** | **transport-packets-lost-rate**} **Example:** `Device(config-if-spolicy-inline)# react 6 rtp-jitter-average`	Enters a mode where you can specify what reaction occurs when a threshold is violated for the following metrics: • *ID*— ID for react configuration. Range is 1 to 65535. • **media-stop** —No traffic is found for the flow. • **mrv** —Ratio calculated by dividing the difference between the actual rate and the expected rate, by the expected rate. • **rtp-jitter-average** —Average jitter. • **transport-packets-lost-rate** —Ratio calculated by dividing the number of lost packets by the expected packet count.

	Command or Action	Purpose
Step 27	**action** {**snmp** | **syslog**} **Example:** `Device(config-spolicy-inline-react)# action syslog`	Specifies how violations of the thresholds with be reported.
Step 28	**alarm severity** {**alert** | **critical** | **emergency**| **error** | **info**} **Example:** `Device(config-spolicy-inline-react)# alarm severity critical`	Specifies which level of alarm will be reported.
Step 29	**alarm type** {**discrete**| **grouped**{**count** *number* | **percent** *number*}} **Example:** `Device(config-pspolicy-inline-react)# alarm severity critical`	Specifies which types of levels are considered alarms that require reporting.
Step 30	**threshold value** {**ge** *number* | **gt** *number* | **le** *number* | **lt** *number* | **range** *rng-start rng-end*} **Example:** `Device(config-spolicy-inline-react)# threshold value ge 20`	Specifies which types of threshold values are considered alarms that require reporting. If no value is set but the application name is configured as a key field, then the system uses the value for the threshold that it finds in the default map. If no value is set and the application name is not configured as a key field, then the default value is used for the threshold. If more than one react command is configured for the same policy and class but only one of the react configurations has threshold values set, then the values of the configured react take precedence and the rest of the threshold values are ignored. If more than one react command is configured for the same policy and none of them have the threshold value configured, then the default threshold value is applied for the configuration with the lowest react ID.
Step 31	**end** **Example:** `Device(config-spolicy-inline-react)# end`	Exits the current configuration mode and returns to privileged EXEC mode.

What to Do Next

To check the configuration and status of your service policy, use the **show performance monitor status** command and **show performance monitor history** command.

Verifying That Cisco Performance Monitor Is Collecting Data

To verify that Cisco Performance Monitor is collecting data, perform the following optional task.

Note Flows are correlated so that if the same policy is applied on the same input and output interface, the **show** command will display a single flow for the input and output interfaces and the interface name and direction for the flow are not displayed.

If no data is being collected, complete the remaining tasks in this section.

Before You Begin

The interface to which you applied the input flow monitor must be receiving traffic that meets the criteria defined by the original flow record before you can display the flows in the flow monitor cache.

where *filter* = {**ip** {*source-addr source-prefix* | **any**} {*dst-addr dst-prefix* | **any**} | {**tcp** | **udp**} {*source-addr source-prefix* | **any**} {[**eq**| **lt**| **gt** *number*| **range** *min max*| **ssrc** {*ssrc-number* | **any**} | {{*dst-addr dst-prefix* | **any**} **eq**| **lt**| **gt** *number*| **range** *min max*| **ssrc** {*ssrc-number* | **any**}}

SUMMARY STEPS

1. **enable**
2. **show policy-map type performance-monitor** [**interface** *interface-name*][**class** *class-name*][**input** | **output**]
3. **show performance monitor status** [**interface** *interface name*[*filter*] | **policy** *policy-map-name* **class** *class-map-name*[*filter*]} | *filter*]
4. **show performance monitor history** [**interval**{**all**| *number*[**start** *number*]} | **interface** *interface name*[*filter*] | **policy** *policy-map-name* **class** *class-map-name*[*filter*]} | *filter*]

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show policy-map type performance-monitor** [**interface** *interface-name*][**class** *class-name*][**input** | **output**]

For a description of the fields displayed by this command, see *Cisco Media Monitoring Command Reference*.

The following example shows the output for one flow policy:

Example:

```
Policy Map type performance-monitor PM-POLICY-4
  Class PM-CLASS-4
    flow monitor PM-MONITOR-4
      record PM-RECORD-4
      exporter PM-EXPORTER-4
    monitor parameters
      interval duration 30
      timeout 10
      history 10
      flows 8000
    monitor metric rtp
      min-sequential 5
      max-dropout 5
      max-reorder 5
      clock-rate default 90000
      ssrc maximum 5
```

Table 4: show policy-map type performance-monitor Field Descriptions

Field	Description
Policy Map type performance-monitor	Name of the Cisco Performance Monitor flow policy.
flow monitor	Name of the Cisco Performance Monitor flow monitor.
record	Name of the Cisco Performance Monitor flow record.
exporter	Name of the Cisco Performance Monitor flow exporter.
monitor parameter	Parameters for the flow policy.
interval duration	The configured duration of the collection interval for the policy.
timeout	The configured amount of time wait for a response when collecting data for the policy.
history	The configured number of historical collections to keep for the policy.
flows	The configured number of flows to collect for the policy.
monitor metric rtp	RTP metrics for the flow policy.
min-sequential	The configured minimum number of packets in a sequence used to classify an RTP flow.
max-dropout	The configured maximum number of packets to ignore ahead of the current packet in terms of sequence number.
max-reorder	The configured maximum number of packets to ignore behind the current packet in terms of sequence number.

Field	Description
clock-rate default	The configured clock rate for the RTP packet timestamp clock that is used to calculate the packet arrival latency.
ssrc maximum	The configured maximum number of SSRCs that can be monitored within the same flow. A flow is defined by the protocol, source/destination address, and source/destination port. The range is from 1 to 50.

Step 3 **show performance monitor status** [**interface** *interface name*[*filter*] | **policy** *policy-map-name* **class** *class-map-name*[*filter*]} | *filter*]
where *filter* = {**ip** {*source-addr source-prefix* | **any**} {*dst-addr dst-prefix* | **any**} | {**tcp** | **udp**} {*source-addr source-prefix* | **any**} {[**eq**| **lt**| **gt** *number*| **range** *min max*| **ssrc** {*ssrc-number* | **any**} | {{*dst-addr dst-prefix* | **any**} **eq**| **lt**| **gt** *number*| **range** *min max*| **ssrc** {*ssrc-number* | **any**}}

This command displays the cumulative statistics for the specified number of most recent intervals. The number of intervals is configured using the **history** command. The default settings for this commands is 10 of the most recent collection intervals. The duration of collection intervals is specified by the **interval duration** command.

To view statistics for other intervals, use the **show performance monitor history** command as described in the next step. For more information about these commands, see the *Cisco Media Monitoring Command Reference*

Step 4 **show performance monitor history** [**interval**{**all**| *number*[**start** *number*]} | **interface** *interface name*[*filter*] | **policy** *policy-map-name* **class** *class-map-name*[*filter*]} | *filter*]
where *filter* = {**ip** {*source-addr source-prefix* | **any**} {*dst-addr dst-prefix* | **any**} | {**tcp** | **udp**} {*source-addr source-prefix* | **any**} {[**eq**| **lt**| **gt** *number*| **range** *min max*| **ssrc** {*ssrc-number* | **any**} | {{*dst-addr dst-prefix* | **any**} **eq**| **lt**| **gt** *number*| **range** *min max*| **ssrc** {*ssrc-number* | **any**}}

This command displays the statistics collected by Cisco Performance Monitor during any or all intervals, including the current one. The duration of collection intervals is specified by the **interval duration** command.

For more information about this command, see the *Cisco Media Monitoring Command Reference.*

The following example shows the output for the **show performance monitor history** command**:**

Note If the same policy is applied on the same input and output interface, the display shows a single flow for the input and output interfaces and the interface name and direction for the flow are not displayed.

Example:

```
Codes: *   - field is not configurable under flow record
       NA  - field is not applicable for configured parameters
Match: ipv4 source address = 21.21.21.1, ipv4 destination address = 1.1.1.1,
transport source-port = 10240, transport destination-port = 80, ip protocol = 6,
 Policy: RTP_POL, Class: RTP_CLASS

 start time                                  14:57:34
                                             ============
 *history bucket number                     : 1
 routing forwarding-status                  : Unknown
 transport packets expected counter         : NA
 transport packets lost counter             : NA
 transport round-trip-time           (msec) : 4
 transport round-trip-time sum       (msec) : 8
 transport round-trip-time samples          : 2
 transport event packet-loss counter        : 0
```

```
interface input                           : Null
interface output                          : Null
counter bytes                             : 8490
counter packets                           : 180
counter bytes rate                        : 94
counter client bytes                     : 80
counter server bytes                     : 200
counter client packets                   : 6
counter server packets                   : 6
transport tcp window-size minimum        : 1000
transport tcp window-size maximum        : 2000
transport tcp window-size average        : 1500
transport tcp maximum-segment-size       : 0
application media bytes counter           : 1270
application media bytes rate              : 14
application media packets counter         : 180
application media event                   : Stop
monitor event                             : false

[data set,id=257] Global session ID|Multi-party session ID|
[data] 11                      |22
```

Table 5: show performance monitor status and show performance-monitor history Field Descriptions

Field	Description
history bucket number	Number of the bucket of historical data collected.

Field	Description
routing forwarding-status reason	

Field	Description
	Forwarding status is encoded using eight bits with the two most significant bits giving the status and the six remaining bits giving the reason code. Status is either unknown (00), Forwarded (10), Dropped (10) or Consumed (11). The following list shows the forwarding status values for each status category. **Unknown** • 0 **Forwarded** • Unknown 64 • Forwarded Fragmented 65 • Forwarded not Fragmented 66 **Dropped** • Unknown 128, • Drop ACL Deny 129, • Drop ACL drop 130, • Drop Unroutable 131, • Drop Adjacency 132, • Drop Fragmentation & DF set 133, • Drop Bad header checksum 134, • Drop Bad total Length 135, • Drop Bad Header Length 136, • Drop bad TTL 137, • Drop Policer 138, • Drop WRED 139, • Drop RPF 140, • Drop For us 141, • Drop Bad output interface 142, • Drop Hardware 143, **Consumed** • Unknown 192,

Field	Description
	• Terminate Punt Adjacency 193, • Terminate Incomplete Adjacency 194, • Terminate For us 195
transport packets expected counter	Number of packets expected.
transport packets lost counter	Number of packets lost.
transport round-trip-time (msec)	Number of milliseconds required to complete a round trip.
transport round-trip-time sum (msec)	Total number of milliseconds required to complete a round trip for all samples.
transport round-trip-time samples	Total number of samples used to calculate a round trip times
transport event packet-loss counter	Number of loss events (number of contiguous sets of lost packets).
interface input	Incoming interface index.
interface output	Outgoing interface index.
counter bytes	Total number of bytes collected for all flows.
counter packets	Total number of IP packets sent for all flows.
counter bytes rate	Average number of packets or bits (as configured) processed by the monitoring system per second during the monitoring interval for all flows.
counter client bytes	Number of bytes sent by the client.
counter server bytes	Number of bytes sent by the server.
counter client packets	Number of packets sent by the client.
counter servers packets	Number of packets sent by the server.
transport tcp window-size-maximum	Maximum size of the TCP window.
transport tcp window-size-minimum	Minimum size of the TCP window.
transport tcp window-size-average	Average size of the TCP window.
transport tcp maximum-segment-size	Maximum TCP segment size.

Field	Description
application media bytes counter	Number of IP bytes from by media applications received for a specific media stream.
application media bytes rate	Average media bit rate (bps) for all flows during the monitoring interval.
application media packets counter	Number of IP packets produced from media applications received for a specific media stream.
application media event	Bit 1 is not used. Bit 2 indicates that no media application packets were seen, in other words, a Media Stop Event occurred.
monitor event	Bit 1 indicates that one of the thresholds specified by a react statement for the flow was crossed at least once in the monitoring interval. Bit 2 indicates that there was a loss-of-confidence in measurement.

Displaying Option Tables.

You can view the mapping contained in the various option table by using the following **show** command .

SUMMARY STEPS

1. **enable**
2. **show metadata** {**application attributes** | **application table** | **exporter stats** | **interface table** | **metadata version table** | **sampler table** | **vrf table**}

DETAILED STEPS

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

	Command or Action	Purpose

Step 2	**show metadata** {**application attributes** | **application table** | **exporter stats** | **interface table** | **metadata version table** | **sampler table** | **vrf table**}
	
	Example:
		The following example shows how to display the mapping of the application ID to the application name by using the **show metadata application table** command :
		
		`ID Name Vendor Version`
		`----------`
		`100673296 webex-audio - -`
		`100673297 webex-video - -`

Displaying Information Specific to the Catalyst 6500 Platform

To display or clear information for the Feature Manager and other functionality specific to the Catalyst 6500 platform, perform the following optional task.

SUMMARY STEPS

1. **enable**
2. **clear fm performance-monitor counters**
3. **debug fm performance-monitor** {**all** | **dynamic** | **event** | **unusual** | **verbose** | **vmr**}
4. **platform performance-monitor rate-limit pps** *number*
5. **show platform software feature-manager performance-monitor** {**all** | **counters** | **interface** *interface-type interface-number* | **rdt-indices** }
6. **show platform software feature-manager tcam dynamic performance-monitor** {**handle ip** *ip-address* | **interface** *interface-type interface-number* }
7. **show platform hardware acl entry interface** *interface-type interface-number* **security** {**in** | **out** } {**ip** | **ipv6** } [**detail**]
8. **show platform software ccm interface** *interface-type interface-number* **security** {**interface** *interface-type interface-number* | **class-group** *class-group-ID* }

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **clear fm performance-monitor counters**

The **clearfm performance-monitor counters** command clears counters for the Performance Monitor component of Feature Monitor.

Example:

```
Device# clear fm performance-monitor counters
Device#
```

Step 3 **debug fm performance-monitor** {**all** | **dynamic** | **event** | **unusual** | **verbose** | **vmr**}
This command enables all levels of debugging for the Performance Monitor component of Feature Manager.

Example:

```
Device# debug fm performance-monitor all
Device#
```

Step 4 **platform performance-monitor rate-limit pps** *number*
This command sets the rate limit for the Performance Monitor component of Feature Monitor.

Example:

```
Device# platform performance-monitor rate-limit pps 2000
Device#
```

Step 5 **show platform software feature-manager performance-monitor** {**all** | **counters** | **interface** *interface-type interface-number* | **rdt-indices** }
This command displays information about the Performance Monitor component of Feature Manager.

Example:

```
Device# show platform software feature-manager performance-monitor all
Device#

Interface: FastEthernet2/3
Policy: video-flow-test          Group ID: A0000001
--------------------------------------------------------------------------------
Feature: VM Ingress L3
================================================================================
DPort  - Destination Port  SPort  - Source Port       Pro    - Protocol
RFTCM  - R-Recirc. Flag    MRLCS  - M-Multicast Flag  Res    - VMR Result
       - F-Fragment flag          - R-Reflexive flag  Prec   - Drop Precedence
       - T-Trailing Fragments     - L-Layer 3 only    GrpId  - Qos Group Id
       - C-From CPU               - C-Capture Flag    Adj.   - Adj. Index
       - M-L2 Lookup Miss         - S-RPF suppress    Pid    - NF Profile Index
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V       224.0.0.0         0.0.0.0                 0          0      0         -----       0
       -----
       M       240.0.0.0         0.0.0.0                  0          0      0         00000    0
       0
      PERMIT_RESULT

     2 V         0.0.0.0          0.0.0.0                 0          0      0         -----
 0       -----
       M          0.0.0.0         0.0.0.0                  0          0      0         00000     0
        0
```

```
      L3_DENY_RESULT

+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          10.10.10.0            0          0      17        -----         0
     ---C-
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT

     2 V         0.0.0.0          10.10.20.0            0          0      17        -----         0
     ---C-
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT

     3 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
L3_DENY_RESULT

+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
      PERMIT_RESULT


Interface: FastEthernet2/3
Policy: video-flow-test          Group ID: A0000001
------------------------------------------------------------------------------
Feature: VM Egress L3
==============================================================================
+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
PERMIT_RESULT

     2 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
      L3_DENY_RESULT

+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+-----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          10.10.10.0            0          0      17        -----         0
     -----
```

```
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT Adjacency: 0x5512D8F4

     2 V         0.0.0.0          10.10.20.0            0          0      17        -----        0
     -----
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT Adjacency: 0x5512D8F4

     3 V         0.0.0.0          0.0.0.0                 0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                  0          0      0         00000     0
        0
       L3_DENY_RESULT

+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+


     3 V         0.0.0.0          0.0.0.0                 0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                  0          0      0         00000     0
        0
     PERMIT_RESULT Adjacency: 0x5512D8F4


Adjacency: 0x5512D8F4
        FeatureId: 0x84  AdjId: 0xFFFFFFFF Flags: RecirculationAdj|

        Cause: 0x0 Priority: 0xC Device#

Interface: FastEthernet2/3
Policy: video-flow-test          Group ID: A0000001
------------------------------------------------------------------------------
Feature: VM Ingress L3
==============================================================================
DPort  - Destination Port  SPort  - Source Port       Pro    - Protocol
RFTCM  - R-Recirc. Flag    MRLCS  - M-Multicast Flag  Res    - VMR Result
       - F-Fragment flag          - R-Reflexive flag  Prec   - Drop Precedence
       - T-Trailing Fragments     - L-Layer 3 only    GrpId  - Qos Group Id
       - C-From CPU               - C-Capture Flag    Adj.   - Adj. Index
       - M-L2 Lookup Miss         - S-RPF suppress    Pid    - NF Profile Index
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V       224.0.0.0         0.0.0.0                 0          0      0         -----       0
       -----
       M       240.0.0.0         0.0.0.0                  0          0      0         00000    0
       0
      PERMIT_RESULT

     2 V         0.0.0.0          0.0.0.0                 0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                  0          0      0         00000     0
        0
      L3_DENY_RESULT

+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          10.10.10.0            0          0      17        -----        0
     ---C-
```

```
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT

     2 V         0.0.0.0          10.10.20.0            0          0      17        -----        0
     ---C-
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT

     3 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
L3_DENY_RESULT

+-----+--+----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
      PERMIT_RESULT


Interface: FastEthernet2/3
Policy: video-flow-test          Group ID: A0000001
-------------------------------------------------------------------------------
Feature: VM Egress L3
===============================================================================
+-----+--+----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
PERMIT_RESULT

     2 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0          0.0.0.0                   0          0      0         00000     0
        0
      L3_DENY_RESULT

+-----+--+----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+------------------+-------+-------+----+---------+------+---------+-----+--------+


     1 V         0.0.0.0          10.10.10.0            0          0      17        -----        0
     -----
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT Adjacency: 0x5512D8F4

     2 V         0.0.0.0          10.10.20.0            0          0      17        -----        0
     -----
       M          0.0.0.0          255.255.255 0      0          0      255      00000     0
 0
      PERMIT_RESULT Adjacency: 0x5512D8F4
```

```
     3 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0         0.0.0.0                   0          0      0         00000     0
        0
       L3_DENY_RESULT

+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+
| Indx | T |   Dest Ip Addr | Source Ip Addr | DPort | SPort | Pro | RFTCM | Prec | MRLCS | Pid |
Stats Id|
+-----+--+----------------+-----------------+-------+-------+----+---------+------+---------+-----+--------+


     3 V         0.0.0.0          0.0.0.0                  0          0      0         -----
 0       -----
       M          0.0.0.0         0.0.0.0                   0          0      0         00000     0
        0
     PERMIT_RESULT Adjacency: 0x5512D8F4


Adjacency: 0x5512D8F4
        FeatureId: 0x84  AdjId: 0xFFFFFFFF Flags: RecirculationAdj|

        Cause: 0x0 Priority: 0xC
```

Step 6 **show platform software feature-manager tcam dynamic performance-monitor** {**handle ip** *ip-address* | **interface** *interface-type interface-number* }
This command displays information about dynamic and static policies for a specific host.

Example:

```
Device# show platform software feature-manager tcam dynamic performance-monitor handle ip 10.1.1.0
-------------------------------------------------------------------------------
HANDLE                        Feature ID   No of entries     MD5
-------------------------------------------------------------------------------
10.1.1.0             VM Ingress L3                          2
```

Step 7 **show platform hardware acl entry interface** *interface-type interface-number* **security** {**in** | **out** } {**ip** | **ipv6** } [**detail**]
This command displays inbound access control list (ACL) entries for IP on an interface.

Example:

```
Device# show platform hardware acl entry interface fastEthernet 1/1 security in ip detail

mls_if_index:2000400A dir:0 feature:0 proto:0


pass#0 features
UAPRSF: U-urg, A-ack, P-psh, R-rst, S-syn, F-fin
MLGFI: M-mpls_plus_ip_pkt, L-L4_hdr_vld, G-gpid_present,F-global_fmt_match, I-ife/ofe
's' means set; 'u' means unset; '-' means don't care
-------------------------------------------------------------------------------------------------------------
INDEX  LABEL FS ACOS    AS     IP_SA      SRC_PORT       IP_DA      DST_PORT        F FF
L4PROT

TCP-F:UAPRSF MLGFI OtherL4OPs                                    RSLT                  CNT
-------------------------------------------------------------------------------------------------------------
fno:0

tcam:B, bank:0, prot:0    Aces

I  V  16375   2049  0    0     0         0.0.0.0              -         0.0.0.0               - 0
 0      0      -       -----          -
0x0000000800000038            10331192<-
```

```
I  M  16375 0x1FFF  0 0x00 0x000         0.0.0.0               -         0.0.0.0               - 0
 0    0x0
```

Step 8 **show platform software ccm interface** *interface-type interface-number* **security** {**interface** *interface-type interface-number* | **class-group** *class-group-ID* }

This command displays information about ternary content addressable memory (TCAM) Cisco CallManager (CCM) entries on an interface.

Example:

```
Device# show platform software ccm interface fastEthernet 2/3 in

 Target-Class : id 0xA0000000, dir CCM_INPUT, if_type 1, if_info 0x14823998

 Class-Group List: 0xA0000001
b1-cs217#

b1-cs217#sh platform software ccm interface fastEthernet 2/3 out

 Target-Class : id 0xA0000002, dir CCM_OUTPUT, if_type 1, if_info 0x14823998

 Class-Group List: 0xA0000001
```

This command displays information about ternary content addressable memory (TCAM) Cisco CallManager (CCM) entries for a class group

Example:

```
Device# show platform software ccm class-group A0000001
 Class-group    : video-flow-test, id 0xA0000001
 Target input   : 0xA0000000
 Target Output  : 0xA0000002
        Class   : video-flow, id 0xA98681, type 1
                  Filter          : type MATCH_NUMBERED_ACCESS_GROUP, id 0xF0000002
                  Filter params   : ACL Index: 101 Linktype: 7

                  Feature         : PERFORMANCE_MONITOR
                  Params          :
                    Feature Object : 0x54224218
                      Name          :
                      Meter context  : 0x54264440
                      Sibling        : 0x0
                      Dynamic        : FALSE
                    Feature Object : 0x54221170
                      Name          :
                      Meter context  : 0x54263858
                      Sibling        : 0x0
                      Dynamic        : FALSE
                  Intf List       : 0xA0000000  0xA0000002
        Class   : class-default, id 0xADA3F1, type 39
                  Filter          : type MATCH_ANY, id 0xF0000003
                  Filter params   : any

                  Feature         : FEATURE_EMPTY
                  Params          :
                    Feature Object : 0x1741629C
                      Name          :
                      Meter context  : 0x0
                      Sibling        : 0x0
                      Dynamic        : FALSE
                  Intf List       : 0xA0000000  0xA0000002
```

Displaying the Performance Monitor Cache and Clients

To display the cache and the clients for Cisco Performance Monitor, perform the following optional task.

SUMMARY STEPS

1. **enable**
2. **show performance monitor cache** [**policy** *policy-map-name* **class** *class-map-name*][**interface** *interface name*]
3. **show performance monitor clients detail all**

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show performance monitor cache** [**policy** *policy-map-name* **class** *class-map-name*][**interface** *interface name*]

Example:

```
MMON Metering Layer Stats:
  static pkt cnt: 3049
  static cce sb cnt: 57
  dynamic pkt cnt: 0
  Cache type:                               Permanent
  Cache size:                                    2000
  Current entries:                                  8
  High Watermark:                                   9
  Flows added:                                      9
  Updates sent            (  1800 secs)             0
IPV4 SRC ADDR    IPV4 DST ADDR    IP PROT  TRNS SRC PORT  TRNS DST PORT
ipv4 ttl ipv4 ttl min ipv4 ttl max  ipv4 dscp bytes long perm pktslong perm  user space vm
==============================================================================================
10.1.1.1         10.1.2.3              17           4000           1967
0             0             0  0x00                          80
1 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3              17           6000           1967
0             0             0  0x00                          80
1  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3              17           4000           2000
0             0             0  0x00                          44
1  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
```

```
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3               6            6000           3000
0             0              0  0x00                            84
2  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3              17            1967           6001
0             0              0  0x00                            36
1  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3              17            1967           4001
0             0              0  0x00                            36
1  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3               6            3001           6001
0             0              0  0x00                           124
3  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
10.1.1.1         10.1.2.3              17            2001           4001
0             0              0  0x00                            44
1  0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
0x00000000
```

Step 3 **show performance monitor clients detail all**

Example:

```
Client name for ID 1 : Mediatrace-131419052
   Type: Mediatrace
   Age: 443 seconds
   Monitor Object: _MMON_DYN_-class-map-69
        Flow spec: (dvmc-acl#47) 10.10.130.2 1000 10.10.132.2 2000 17
        monitor parameters
                interval duration 60
                timeout 2
                history 1
                flows 100
        monitor metric rtp
                min-sequential 10
                max-dropout 5
                max-reorder 5
```

```
        clock-rate 112 90000
        clock-rate default 90000
        ssrc maximum 20
monitor metric ip-cbr
        rate layer3 packet 20
Flow record: dvmc_fnf_fdef_47
        Key fields:
                ipv4 source address
                ipv4 destination address
                transport source-port
                transport destination-port
                ip protocol
        Non-key fields:
                monitor event
                application media event
                routing forwarding-status
                ip dscp
                ip ttl
                counter bytes rate
                application media bytes rate
                transport rtp jitter mean
                transport packets lost counter
                transport packets expected counter
                transport event packet-loss counter
                transport packets lost rate
                timestamp interval
                counter packets dropped
                counter bytes
                counter packets
                application media bytes counter
                application media packets counter
Monitor point: _MMON_DYN_-policy-map-70 GigabitEthernet0/3 output
Classification Statistic:
        matched packet: 545790
        matched byte: 64403220
```

Displaying the Clock Rate for Cisco Performance Monitor Classes

To display the clock rate for one or more classes, perform the following optional task.

SUMMARY STEPS

1. **enable**
2. **show performance monitor clock rate** [**policy** *policy-map-name* **class** *class-map-name*]

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show performance monitor clock rate** [**policy** *policy-map-name* **class** *class-map-name*]

If no class name is specified, information for all classes are displayed.

Example:

```
Device# show performance monitor clock rate policy all-apps class telepresence-CS4
Load for five secs: 6%/2%; one minute: 5%; five minutes: 5% Time source is NTP, 17:41:35.508 EST Wed
 Feb 16 2011
RTP clock rate for Policy: all-apps, Class: telepresence-CS4
     Payload type     Clock rate(Hz)
     pcmu     (0  )     8000
     gsm      (3  )     8000
     g723     (4  )     8000
     dvi4     (5  )     8000
     dvi4-2   (6  )     16000
     lpc      (7  )     8000
     pcma     (8  )     8000
     g722     (9  )     8000
     l16-2    (10 )     44100
     l16      (11 )     44100
     qcelp    (12 )     8000
     cn       (13 )     8000
     mpa      (14 )     90000
     g728     (15 )     8000
     dvi4-3   (16 )     11025
     dvi4-4   (17 )     22050
     g729     (18 )     8000
     celb     (25 )     90000
     jpeg     (26 )     90000
     nv       (28 )     90000
     h261     (31 )     90000
     mpv      (32 )     90000
     mp2t     (33 )     90000
     h263     (34 )     90000
              (96 )     48000
              (112)     90000
     default            90000
```

Displaying the Current Status of a Flow Monitor

To display the current status of a flow monitor, perform the following optional task.

Before You Begin

The interface to which you applied the input flow monitor must be receiving traffic that meets the criteria defined by the original flow record before you can display the flows in the flow monitor cache.

SUMMARY STEPS

1. **enable**
2. **show flow monitor type performance-monitor**

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show flow monitor type performance-monitor**
The **show flow monitor type performance-monitor** command shows the current status of the flow monitor that you specify.

Example:

```
Device# show flow monitor type performance-monitor
Flow Monitor type performance-monitor monitor-4:
  Description:           User defined
  Flow Record:           record-4
  Flow Exporter:         exporter-4
  No. of Inactive Users: 0
  No. of Active Users:   0
```

Verifying the Flow Monitor Configuration

To verify the configuration commands that you entered, perform the following optional task.

Before You Begin

The interface to which you applied the input flow monitor must be receiving traffic that meets the criteria defined by the original flow record before you can display the flows in the flow monitor cache.

SUMMARY STEPS

1. **enable**
2. **show running-config flow monitor**

DETAILED STEPS

Step 1 **enable**
The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show running-config flow monitor**
The **show running-config flow monitor** command shows the configuration commands of the flow monitor that you specify.

Example:

```
Device# show running-config flow monitor
Current configuration:
!
flow monitor FLOW-MONITOR-1
 description Used for basic IPv4 traffic analysis
 record netflow ipv4 original-input
!
!
flow monitor FLOW-MONITOR-2
 description Used for basic IPv6 traffic analysis
 record netflow ipv6 original-input
!
```

Verifying That Cisco IOS Flexible NetFlow and Cisco Performance Monitor Is Enabled on an Interface

To verify that Flexible NetFlow and Cisco Performance Monitor is enabled on an interface, perform the following optional task.

SUMMARY STEPS

1. **enable**
2. **show flow interface** *type number*

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Router> enable
Router#
```

Step 2 **show flow interface** *type number*

The **show flow interface** command verifies that Flexible NetFlow and Cisco Performance Monitor is enabled on an interface.

Example:

```
Router# show flow interface ethernet 0/0
Interface Ethernet0/0
  FNF:  monitor:          FLOW-MONITOR-1
        direction:        Input
        traffic(ip):      on
  FNF:  monitor:          FLOW-MONITOR-2
```

```
direction:       Input
traffic(ipv6):   on
```

Displaying the Flow Monitor Cache

To display the data in the flow monitor cache, perform the following optional task.

Before You Begin

The interface to which you applied the input flow monitor must be receiving traffic that meets the criteria defined by the original flow record before you can display the flow data in the flow monitor cache.

SUMMARY STEPS

1. **enable**
2. **show flow monitor name** *monitor-name* **cache format record**

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show flow monitor name** *monitor-name* **cache format record**

The **show flow monitor name** *monitor-name* **cache format record** command string displays the status, statistics, and the flow data in the cache for a flow monitor.

Example:

```
Device# show flow monitor name FLOW-MONITOR-1 cache format record
Cache type:                               Normal
  Cache size:                               4096
  Current entries:                             8
  High Watermark:                              8
  Flows added:                                24
  Flows aged:                                 16
    - Active timeout   (  1800 secs)           0
    - Inactive timeout (    15 secs)          16
    - Event aged                               0
    - Watermark aged                           0
    - Emergency aged                           0
IPV4 SOURCE ADDRESS:       10.251.10.1
IPV4 DESTINATION ADDRESS:  172.16.10.2
TRNS SOURCE PORT:          0
TRNS DESTINATION PORT:     2048
INTERFACE INPUT:           Et0/0
FLOW SAMPLER ID:           0
IP TOS:                    0x00
```

```
IP PROTOCOL:                1
ip source as:               0
ip destination as:          0
ipv4 next hop address:      172.16.7.2
ipv4 source mask:           /0
ipv4 destination mask:      /24
tcp flags:                  0x00
interface output:           Et1/0
counter bytes:              733500
counter packets:            489
timestamp first:            720892
timestamp last:             975032
.
.
.
IPV4 SOURCE ADDRESS:        172.16.6.1
IPV4 DESTINATION ADDRESS:   224.0.0.9
TRNS SOURCE PORT:           520
TRNS DESTINATION PORT:      520
INTERFACE INPUT:            Et0/0
FLOW SAMPLER ID:            0
IP TOS:                     0xC0
IP PROTOCOL:                17
ip source as:               0
ip destination as:          0
ipv4 next hop address:      0.0.0.0
ipv4 source mask:           /24
ipv4 destination mask:      /0
tcp flags:                  0x00
interface output:           Null
counter bytes:              52
counter packets:            1
timestamp first:            973804
timestamp last:             973804
Device# show flow monitor name FLOW-MONITOR-2 cache format record
Cache type:                               Normal
  Cache size:                                 4096
  Current entries:                               6
  High Watermark:                                8
  Flows added:                                1048
  Flows aged:                                 1042
    - Active timeout   (  1800 secs)            11
    - Inactive timeout (    15 secs)          1031
    - Event aged                                 0
    - Watermark aged                             0
    - Emergency aged                             0
IPV6 FLOW LABEL:            0
IPV6 EXTENSION MAP:         0x00000040
IPV6 SOURCE ADDRESS:        2001:DB8:1:ABCD::1
IPV6 DESTINATION ADDRESS:   2001:DB8:4:ABCD::2
TRNS SOURCE PORT:           3000
TRNS DESTINATION PORT:      55
INTERFACE INPUT:            Et0/0
FLOW DIRECTION:             Input
FLOW SAMPLER ID:            0
IP PROTOCOL:                17
IP TOS:                     0x00
ip source as:               0
ip destination as:          0
ipv6 next hop address:      ::
ipv6 source mask:           /48
ipv6 destination mask:      /0
tcp flags:                  0x00
interface output:           Null
counter bytes:              521192
counter packets:            9307
timestamp first:            9899684
timestamp last:             11660744
.
.
.
```

```
IPV6 FLOW LABEL:           0
IPV6 EXTENSION MAP:        0x00000000
IPV6 SOURCE ADDRESS:       FE80::A8AA:BBFF:FEBB:CC03
IPV6 DESTINATION ADDRESS:  FF02::9
TRNS SOURCE PORT:          521
TRNS DESTINATION PORT:     521
INTERFACE INPUT:           Et0/0
FLOW DIRECTION:            Input
FLOW SAMPLER ID:           0
IP PROTOCOL:               17
IP TOS:                    0xE0
ip source as:              0
ip destination as:         0
ipv6 next hop address:     ::
ipv6 source mask:          /10
ipv6 destination mask:     /0
tcp flags:                 0x00
interface output:          Null
counter bytes:             92
counter packets:           1
timestamp first:           11653832
timestamp last:            11653832
```

Displaying the Current Status of a Flow Exporter

To display the current status of a flow exporter, perform the following optional task.

SUMMARY STEPS

1. **enable**
2. **show flow exporter** [*exporter-name*]

DETAILED STEPS

Step 1 **enable**

The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show flow exporter** [*exporter-name*]

The **show flow exporter** command shows the current status of the flow exporter that you specify.

Example:

```
Device# show flow exporter EXPORTER-1
Flow Exporter EXPORTER-1:
  Description:              Exports to Chicago datacenter
  Transport Configuration:
    Destination IP address: 172.16.10.2
    Source IP address:      172.16.7.1
    Transport Protocol:     UDP
```

```
Destination Port:       65
Source Port:            56041
DSCP:                   0x0
TTL:                    255
```

Verifying the Flow Exporter Configuration

To verify the configuration commands that you entered to configure the flow exporter, perform the following optional task.

SUMMARY STEPS

1. **enable**
2. **show running-config flow exporter** *exporter-name*

DETAILED STEPS

Step 1 **enable**
The **enable** command enters privileged EXEC mode (enter the password if prompted).

Example:

```
Device> enable
Device#
```

Step 2 **show running-config flow exporter** *exporter-name*
The **show running-config flow exporter** command shows the configuration commands of the flow exporter that you specify.

Example:

```
Device# show running-config flow exporter EXPORTER-1
Building configuration...
!
flow exporter EXPORTER-1
 description Exports to datacenter
 destination 172.16.10.2
 transport udp 65
!
```

Enabling Debugging

To enable debugging for Cisco Performance Monitor, perform the following optional task in privileged EXEC mode.

SUMMARY STEPS

1. **debug performance monitor** {**database** | **dynamic** | **event** | **export** | **flow-monitor** | **metering** | **provision** | **sibling** | **snmp** | **tca** | **timer**}

DETAILED STEPS

debug performance monitor {**database** | **dynamic** | **event** | **export** | **flow-monitor** | **metering** | **provision** | **sibling** | **snmp** | **tca** | **timer**}
The **debug performance monitor** command enables debugging for the following performance monitor components:

- Flow database
- Dynamic monitoring
- Performance events
- Exporting
- Flow monitors
- Metering layer
- Provisioning
- Sibling management
- SNMP
- TCA
- Timers

The following example shows how to enable debugging for dynamic monitoring:

Example:

```
Device# debug performance monitor dynamic
```

Configuration Example for Cisco Performance Monitor

Example Monitor for Lost RTP Packets and RTP Jitter

This example show a configuration that monitors the number of lost RTP packets, the amount of RTP jitter, and other basic statistics for the **gig1** interface. In this example, Cisco Performance Monitor is also configured to make an entry in the syslog when the any of the following events occur on the interface:

- The percentage of lost RTP packets is between 5 percent and 9 percent.
- The percentage of lost RTP packets is greater than 10 percent.

- A media stop event has occurred.

```
! Set the filter spec for the flows to monitor.
access-list 101 ip permit host 10.10.2.20 any
! Use the flow record to define the flow keys and metric to collect.
flow record type performance-monitor video-monitor-record
 match ipv4 source
 match ipv4 destination
 match transport source-port
 match transport destination-port
 match rtp ssrc
 collect timestamp
 collect counter byte
 collect counter packet
 collect mse
 collect media-error
 collect counter rtp interval-jitter
 collect counter rtp packet lost
 collect counter rtp lost event
! Set the exporting server. The export message format is based on FNFv.9.
flow export video-nms-server
 export-protocol netflow-v9
 destination cisco-video-management
 transport udp 32001
! Set the flow filter in the class-map.
class-map match-all video-class
 access-group  ipv4 101
! Set the policy map with the type performance-monitor for video monitor.
policy-map type performance-monitor video-monitor
 ! Set the video monitor actions.
 class video-class
  ! Specify where the metric data is being exported to.
  export  flow video-nms-server
  flow monitor inline
   record video-monitor-record
! Set the monitoring modeling parameters.
monitor parameters
 ! Set the measurement timeout to 10 secs.
 interval duration 10
 ! Set the timeout to 10 minutes.
 timeout 10
 ! Specify that 30 flow intervals can be kept in performance database.
 history 30
 priority 7
 ! Set rtp flow verification criteria.
 monitor metric rtp
 ! Configure a RTP flow criteria: at least 10 packets in sequence.
 min-sequential   10
 ! Ignore packets that are more than 5 packet ahead in terms of seq  number.  max-dropout
 5
 ! Ignore packets that are more than 5 packets behind in terms of seq  number.
 max-reorder 5
 ! Set the clock rate frequency for rtp packet timestamp clock.
 clock-rate 89000
 ! Set the maximum number of ssrc allowed within this class.
 ssrc maximum  100
 ! Set TCA for alarm.
 react 100 transport-packets-lost-rate
  description critical  TCA
  ! Set the threshold to greater than 10%.
  threshold gt 10
  ! Set the threshold to the average number based on the last five intervals.
  threshold type average 5
  action  syslog
  alarm severity critical
 react 110 transport-packets-lost-rate
  description medium TCA
  ! Set the threshold to between 5% and 9% of packet lost.
  threshold range gt 5 le 9
  threshold type average 10
  action  syslog
```

```
  alarm type grouped percent 30
 react 3000 media-stop
  action syslog
  alarm severity critical
  alarm type grouped percent 30

interface gig1
 service-policy type performance-monitor video-mon in
```

Where to Go Next

For more information about configuring the products in the Medianet product family, see the other chapter in this guide or see the *Cisco Media Monitoring Configuration Guide*.

Additional References

Related Documents

Related Topic	Document Title
Design, configuration, and troubleshooting resources for Performance Monitor and other Cisco Medianet products, including a Quick Start Guide and Deployment Guide.	See the Cisco Medianet Knowledge Base Portal, located at http://www.cisco.com/web/solutions/medianet/knowledgebase/index.html
IP addressing commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco Media Monitoring Command Reference*
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Configuration commands for Flexible NetFlow	*Cisco IOS Flexible NetFlow Command Reference*
Overview of Flexible NetFlow	"Cisco IOS Flexible NetFlow Overview"
Flexible NetFlow Feature Roadmap	"Cisco IOS Flexible NetFlow Features Roadmap"
Configuring flow exporters to export Flexible NetFlow data.	"Configuring Data Export for Cisco IOS Flexible NetFlow with Flow Exporters"
Customizing Flexible NetFlow	"Customizing Cisco IOS Flexible NetFlow Flow Records and Flow Monitors"
Configuring flow sampling to reduce the overhead of monitoring traffic with Flexible NetFlow	"Using Cisco IOS Flexible NetFlow Flow Sampling to Reduce the CPU Overhead of Analyzing Traffic"
Configuring Flexible NetFlow using predefined records	"Configuring Cisco IOS Flexible NetFlow with Predefined Records"

Related Topic	Document Title
Using Flexible NetFlow Top N Talkers to analyze network traffic	"Using Cisco IOS Flexible NetFlow Top N Talkers to Analyze Network Traffic"
Configuring IPv4 multicast statistics support for Flexible NetFlow	"Configuring IPv4 Multicast Statistics Support for Cisco IOS Flexible NetFlow"

Standards

Standard	Title
None	—

MIBs

MIB	MIBs Link
• CISCO-FLOW-MONITOR-TC-MIB • CISCO-FLOW-MONITOR-MIB • CISCO-RTP-METRICS-MIB • CISCO-IP-CBR-METRICS-MIB	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
RFC 3954	*Cisco Systems NetFlow Services Export Version 9* http://www.ietf.org/rfc/rfc3954.txt
RFC 3550	*RTP: A Transport Protocol for Real-Time Applications* http://www.ietf.org/rfc/rfc3550.txt

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 Cisco Performance Monitor

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 6: Feature Information for Cisco Performance Monitor

Feature Name	Releases	Feature Information
Cisco Performance Monitor 1.0	15.1(3)T 12.2(58)SE 15.1(4)M1 15.0(1)SY Cisco IOS XE Release 3.5S 15.1(1)SG Cisco IOS XE Release 3.3 SG	

Feature Name	Releases	Feature Information
		This feature enables you to monitor the flow of packets in your network and become aware of any issues that might impact the flow before it starts to significantly impact your applications' performance. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.5S. There are some limitations to the monitoring of ingress or egress data on certain types of interfaces for the Cisco IOS XE Release 3.3 SG and Cisco IOS release 15.1(1)SG. For more information, see the "Limitations" section. For all other releases, the following commands were introduced or modified by this feature: **action**(policy react and policy inline react), **alarm severity** (policy react and policy inline react), **alarm type**(policy react and policy inline react), **class-map**, **clock-rate**(policy RTP), **collect application media**, **clear fm performance-monitor counters**, **collect counter**, **collect flow direction**, **collect interface**, **collect ipv4**, **collect ipv4 destination**, **collect ipv4 source**, **collect ipv4 ttl**, **collect monitor event**, **collect routing**, **collect timestamp interval**, **collect transport event packet-loss counter**, **collect transport packets**, **collect transport rtp jitter**, **debug fm performance-monitor counters**, **debug performance-monitor counters**, **description** (Performance Monitor), **destination dscp** (Flexible NetFlow), **export-protocol**, **exporter**, **flow monitor type performance-monitor**, **flow record type**

Feature Name	Releases	Feature Information
		performance-monitor, **flows**, **history** (monitor parameters), **interval duration**, **match access-group**, **match any**, **match class-map**, **match cos**, **match destination-address mac**, **match discard-class**, **match dscp**, **match flow**, **match fr-de**, **match fr-dlci**, **match input-interface**, **match ip dscp**, **match ip precedence**, **match ip rtp**, **match ipv4**, **match ipv4 destination**, **match ipv4 source**, **match mpls experimental topmost**, **match not**, **match packet length** (class-map), **match precedence**, **match protocol**, **match qos-group**, **match source-address mac**, **match transport destination-port**, **match transport rtp ssrc**, **match transport source-port**, **match vlan**, **max-dropout** (policy RTP), **max-reorder** (policy RTP), **min-sequential** (policy RTP), **monitor metric ip-cbr**, **monitor metric rtp**, **monitor parameters**, **option** (Flexible NetFlow), **output-features**, **platform performance-monitor rate-limit**, **policy-map type performance-monitor**, **rate layer3**, **react** (policy), **record** (Performance Monitor), **rename** (policy), **service-policy type performance-monitor**, **show performance monitor history**, **show performance monitor status**, **show platform hardware acl entry interface**, **show platform software ccm**, **show platform software feature-manager performance-monitor**, **show platform software feature-manager tcam**, **show policy-map type performance-monitor**, **snmp-server host**, **snmp-server**

Feature Name	Releases	Feature Information
		enable traps flowmon, **snmp mib flowmon alarm history** , **source**(Flexible NetFlow), **ssrc maximum**, **template data timeout**, **threshold value** (policy react and policy inline react), **timeout** (monitor parameters), **transport** (Flexible NetFlow), and **ttl** (Flexible NetFlow).

Feature Name	Releases	Feature Information
Cisco Performance Monitor (phase 2)	15.2(2)T Cisco IOS XE Release 3.5S	

Feature Name	Releases	Feature Information
		This feature enables you monitor IPv6 fields and also use all other Flexible Netflow collect and match commands not supported in the previous release. Flows are now correlated so that if the same policy is applied on the same input and output interface, the show command will display a single flow for the input and output interfaces. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.5S. The following commands were introduced or modified by this feature: **collect datalink mac**, **collect ipv4 fragmentation**, **collect ipv4 section**, **collect ipv4 total-length**, **collect ipv6**, **collect ipv6 destination**, **collect ipv6 extensionmap**, **collect ipv6 fragmentation**, **collect ipv6 hop-count**, **collect ipv6 length**, **collect ipv6 section**, **collect ipv6 source**, **collect routing is-multicast**, **collect routing multicast replication-factor**, **collect timestamp sys-uptime**, **collect transport**, **collect transport icmp ipv4**, **collect transport icmp ipv6**, **collect transport tcp**, **collect transport udp**, **match application name**, **match connection transaction-id**, **match datalink dot1q vlan**, **match datalink mac**, **match datalink vlan**, **match interface**, **match ipv4 fragmentation**, **match ipv4 section**, **match ipv4 total-length**, **match ipv4 ttl**, **match ipv6**, **match ipv6 destination**, **match ipv6 extension map**, **match ipv6 fragmentation**, **match ipv6 hop-limit**, **match ipv6 length**, **match ipv6 section**, **match ipv6**

Feature Name	Releases	Feature Information
		source, **match routing**, **match routing is-multicast**, **match routing multicast replication-factor**, **match transport**, **match transport icmp ipv4**, **match transport icmp ipv6**, **match transport tcp**, **match transport udp**
Cisco Performance Monitor (phase 3)	15.2(3)T Cisco IOS XE Release 3.7S	This feature enables you to configure multiple exporters and monitor metadata fields and new TCP metrics. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.7S. The following commands were introduced or modified by this feature: **collect application**, **collect transport tcp bytes out-of-order**, **collect transport packets out-of-order**, **collect transport tcp maximum-segment-size**, **collect transport tcp window-size maximum**, **collect transport tcp window-size minimum**, **collect transport tcp window-size average**, **match application**, **match transport tcp bytes out-of-order**, **match transport packets out-of-order**, **match transport tcp maximum-segment-size**, **match transport tcp window-size maximum**, **match transport tcp window-size minimum**, **match transport tcp window-size average**
Performance Monitoring - IPv6 support	Cisco IOS XE Release 3.6S	This feature enables you to attach a monitor to IPv6 interfaces. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.6S.

Feature Name	Releases	Feature Information
Performance Monitoring - transport packet out of order	Cisco IOS XE Release 3.6S	This feature enables you to monitor the total number of out-of-order TCP packets. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.6S. The following commands were introduced or modified by this feature: **collect transport tcp bytes out-of-order** and **collect transport packets out-of-order**.
Flexible NetFlow: IPFIX Export Format	15.2(4)M Cisco IOS XE Release 3.7S	Enables sending export packets using the IPFIX export protocol. The export of extracted fields from NBAR is only supported over IPFIX. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.7S. The following command was introduced: **export-protocol**.
Flexible NetFlow: Export to an IPv6 Address	Cisco IOS XE Release 3.7S	This feature enables Flexible NetFlow to export data to a destination using an IPv6 address. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.7S. The following command was introduced: **destination**.

Feature Name	Releases	Feature Information
Flexible NetFlow: Extracted Fields Support	Cisco IOS XE Release 3.7S	Enables the collection of extracted fields using NBAR. The export of extracted fields is only supported over IPFIX. Support for this feature was added for Cisco ASR 1000 Series Aggregation Services routers in Cisco IOS XE Release 3.7S. The following commands were introduced or modified by this feature: **collect http host**, **collect nntp group-name**, **collect pop3 server** , **collect rtsp host-name**, **collect sip destination**, **collect sip source**, **collect smtp server**, ,and **collect smtp sender**.
Application Visibility and Control (AVC) 2.0, which includes the following features: • Enable visualization of application usage under performance-monitoring policy • Enable performance of application usage • Enable Prime integration with router packet capture • Enable visualization of service path • FNF: Account On Resolution (AOR) for WAAS Segment • FNF: Account On Resolution (AOR) for performance monitoring policy-map	Cisco IOS XE Release 3.8S	AVC 2.0 provides extensive new functionality, including the integration of AVC with the Media Monitoring technology. This book only describes how to configure a flow record for AVC 2.0. For a complete explanation of AVC 2.0, see the *AVC Configuration Guide* at [illegible]