

CHAPTER 10

Collecting Data for Real-Time Performance Management

Performance management (PM) involves the configuration and measurement of network traffic for the purpose of providing a consistent and predictable level of service. PM provides network and system performance reporting for determining acute and chronic problems, service level reporting, and performance optimization.

PM ensures that the network delivers services with the promised quality. PM data is useful for fine-tuning the performance of the device, and proactively monitoring for catastrophic failures before they occur.

PM includes:

- Collecting, storing, and forwarding data to characterize the integrity of transmission
- Determining when connections fail to meet committed integrity thresholds

Measuring performance can help identify:

- Normal baseline network performance, which can then be compared to abnormal network behavior
- Current or potential utilization problems
- Slow response time
- Application, server, and network availability
- Optimum data transfer times

Performance data collection is the process of collecting performance-related data from network devices and storing them in a database or data file. This information can then be used for locating, diagnosing, and correcting network problems to increase network reliability and effectiveness, and to ensure that fault management can be more than just handling emergencies. The data can also be used to increase the productivity of network users.

PM data collection may be intended to collect:

- Historical performance data
- Real-time performance data



Note

Cisco ANA supports real-time performance management data collection only. This feature is supported only for Cisco IOS XR devices.

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Historical performance analysis provides trend information, but captures data only several times per hour. Therefore, it lacks the capability to show what is happening in real time on the network. Real-time performance management (RTPM) provides a more accurate picture.

The flexible real-time performance-analysis capabilities allow you to select the sample size and the sampling interval. Real-time performance monitoring helps to capture data for a specific entity instance for the specified sampling period.

Related Topics

- [Understanding RTPM Data Collection, page 10-2](#)
- [RTPM Data Collection Process, page 10-8](#)
- [Real-Time Data Collection Example, page 10-9](#)

Understanding RTPM Data Collection

Cisco ANA supports RTPM data collection. Performance data is collected for a given interval and sample size that you configure in the data collection template. See [RTPM Data Collection Process, page 10-8](#) for details.

To enable RTPM, Cisco ANA supports the collection of RTPM counters for the entities as generated by Cisco IOS XR devices. As a part of RTPM threshold data collection support, Cisco ANA supports the following counters:

- Interface Generic Counters. See [Table 10-1 on page 10-2 Interface Generic Counters Supported](#) for details.
- Interface Data Rate Counters. See [Table 10-2 on page 10-3 Interface Data Rate Counters Supported](#) for details.
- BGP Counters. See [Table 10-3 on page 10-3 BGP Counters Supported](#) for details.
- MPLS-LDP Counters. See [Table 10-4 on page 10-4 MPLS-LDP Counters Supported](#) for details.
- Node CPU Counters. See [Table 10-5 on page 10-4 Node CPU Counters Supported](#) for details.
- Node Memory Counters. See [Table 10-6 on page 10-4 Node Memory Counters Supported](#) for details.
- Node Process Counters. See [Table 10-7 on page 10-5 Node Process Counters Supported](#) for details.
- OSPFv2 Counters. See [Table 10-8 on page 10-5 OSPFv2 Counters Supported](#) for details.

Table 10-1 **Interface Generic Counters Supported**

Interface Generic Counter	Description
InBroadcastPkts	Number of inbound broadcast packets.
InMulticastPkts	Number of inbound multicast packets.
InOctets	Number of inbound octets/bytes.
InPackets	Number of inbound packets.
InUcastPkts	Number of inbound unicast packets.
InputCRC	Number of inbound packets discarded with incorrect CRC.
InputFrame	Number of inbound packets with framing errors.

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Interface Generic Counter	Description
InputOverRun	Number of inbound packets with overrun errors.
InputQueueDrops	Number of input queue drops.
InputTotalDrops	Number of inbound correct packets discarded.
InputTotalErrors	Number of inbound incorrect packets discarded.
InputUnknownProto	Number of inbound packets discarded with unknown protocol.
OutBroadcastPkts	Number of outbound broadcast packets.
OutMulticastPkts	Number of outbound multicast packets.
OutOctets	Number of outbound octets/bytes.
OutPackets	Number of outbound packets.
OutUcastPkts	Number of outbound unicast packets.
OutputTotalDrops	Number of outbound correct packets discarded.
OutputTotalErrors	Number of outbound incorrect packets discarded.
OutputUnderRun	Number of outbound packets with underrun errors.

Table 10-2 Interface Data Rate Counters Supported

Interface Data Rate Counter	Descriptions
Bandwidth	Bandwidth in kb/s.
InputDataRate	Input data rate in kb/s.
InputPacketRate	Number of input packets per second.
InputPeakPkts	Maximum number of input packets per second.
InputPeakRate	Peak input data rate in kb/s.
OutputDataRate	Output data rate in kb/s.
OutputPacketRate	Number of output packets per second.
OutputPeakPkts	Maximum number of output packets per second.
OutputPeakRate	Peak output data rate in kb/s.

Table 10-3 BGP Counters Supported

BGP Counter	Description
ConnEstablished	Number of times the connection was established.
ConnectionDrops	Number of times the connection was dropped.
ErrorsReceived	Number of error notifications received.
ErrorsSent	Number of error notifications sent.
InputMessages	Number of messages received.
InputUpdateMessages	Number of update messages received.

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BGP Counter	Description
OutputMessages	Number of messages sent.
OutputUpdateMessages	Number of update messages sent.

Table 10-4 MPLS-LDP Counters Supported

MPLS-LDP Counter	Description
AddressMsgsRcvd	Number of address messages received.
AddressMsgsSent	Number of address messages sent.
AddressWithdrawMsgsRcvd	Number of address withdraw messages received.
AddressWithdrawMsgsSent	Number of address withdraw messages sent.
InitMsgsRcvd	Number of init messages received.
InitMsgsSent	Number of init messages sent.
KeepaliveMsgsRcvd	Number of keepalive messages received.
KeepaliveMsgsSent	Number of keepalive messages sent.
LabelMappingMsgsRcvd	Number of label mapping messages received.
LabelMappingMsgsSent	Number of label mapping messages sent.
LabelReleaseMsgsRcvd	Number of label release messages received.
LabelReleaseMsgsSent	Number of label release messages sent.
LabelWithdrawMsgsRcvd	Number of label withdraw messages received.
LabelWithdrawMsgsSent	Number of label withdraw messages sent.
NotificationMsgsRcvd	Number of notification messages received.
NotificationMsgsSent	Number of notification messages sent.
TotalMsgsRcvd	Total number of messages received.
TotalMsgsSent	Total number of messages sent.

Table 10-5 Node CPU Counters Supported

Node CPU Counter	Description
AverageCpuUsed	Average CPU utilization, in percentage.
NoProcesses	Number of processes.

Table 10-6 Node Memory Counters Supported

Node Memory Counter	Description
CurrMemory	Current memory in use, in bytes.
PeakMemory	Maximum memory used, in kilobytes.

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Node Process Counters	Description
AverageCPUUsed	Average CPU utilization, in percentage.
NumThreads	Number of threads.
PeakMemory	Maximum memory used since startup time, in kilobytes.

Table 10-8 OSPFv2 Counters Supported

OSPFv2 Counters	Description
ChecksumErrors	Number of packets received with checksum errors.
InputDBD	Number of DBD packets received.
InputDBDsLSA	Number of LSA received in DBD packets.
InputHelloPackets	Number of Hello packets received.
InputLSAAcks	Number of LSA acknowledgements received.
InputLSAAcksLSA	Number of LSA received in LSA acknowledgements.
InputLSAUpdates	Number of LSA updates received.
InputLSAUpdatesLSA	Number of LSA received in LSA updates.
InputLSRequests	Number of LS Requests received.
InputLSRequestsLSA	Number of LSA received in LS requests.
InputPackets	Total number of packets received.
OutputDBDs	Number of DBD packets sent.
OutputDBDsLSA	Number of LSA sent in DBD packets.
OutputHelloPackets	Number of Hello packets sent.
OutputLSAAcks	Number of LSA Acknowledgements sent.
OutputLSAAcksLSA	Number of LSA sent in LSA acknowledgements.
OutputLSAUpdateLSA	Number of LSA sent in LSA updates.
OutputLSAUpdates	Number of LSA updates sent.
OutputLSRequests	Number of LS requests sent.
OutputLSRequestsLSA	Number of LSA sent in LS requests.
OutputPackets	Total number of packets sent.

Commands that enable RTPM data collection are available as system-defined commands in Command Builder. [Table 10-9](#) lists the system-defined commands that support RTPM data collection.

DRAFT - 31 MAY 2008 - CISCO CONFIDENTIAL**Table 10-9 System-Defined Commands for RTPM Data Collection**

Commands	Counters	Create and Activate a Template to...
- AddOrModifyInterfaceGenericTemplate - ActivateInterfaceGenericTemplate - DeActivateInterfaceGenericTemplate - DeleteInterfaceGenericTemplate	Interface Generic	Monitor generic counters on an interface.
- AddOrModifyInterfaceDataRateTemplate - ActivateInterfaceDataRateTemplate - DeActivateInterfaceDataRateTemplate - DeleteInterfaceDataRateTemplate	Interface Data Rate	Monitor data rates on an interface.
- AddOrModifyBGPTemplate - ActivateBGPTemplate - DeActivateBGPTemplate - DeleteBGPTemplate	BGP	Enable Border Gateway Protocol (BGP) monitoring
- AddOrModifyMPLSLDPTemplate - ActivateMPLSLDPTemplate - DeActivateMPLSLDPTemplate - DeleteMPLSLDPTemplate	MPLS-LDP	Enable MPLS Label Distribution Protocol monitoring.
- AddOrModifyNodeCPUTemplate - ActivateNodeCPUTemplate - DeActivateNodeCPUTemplate - DeleteNodeCPUTemplate	Node CPU	Monitor the central processing unit on a node.
- AddOrModifyNodeMemoryTemplate - ActivateNodeMemoryTemplate - DeActivateNodeMemoryTemplate - DeleteNodeMemoryTemplate	Node Memory	Monitor memory utilization on a node.
- AddOrModifyNodeProcessTemplate - ActivateNodeProcessTemplate - DeActivateNodeProcessTemplate - DeleteNodeProcessTemplate	Node Process	Monitor a process on a node.
- AddOrModifyOSPFV2Template - ActivateOSPFV2Template - DeActivateOSPFV2Template - DeleteOSPFV2Template	OSPFv2	Monitor an Open Shortest Path First v2 (OSPFv2) process instance.

Related Topics

- [Collecting Data for Real-Time Performance Management, page 10-1](#)

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- [RTPM Data Collection Process, page 10-8](#)
- [Real-Time Data Collection Example, page 10-9](#)

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RTPM Data Collection Process

You can use Command Builder to add, modify, activate, deactivate, and delete RTPM templates. Cisco ANA provides system-defined commands that enable these tasks.

**Note**

System-defined commands for RTPM data collection are available only for devices running Cisco IOS XR software.

See [Chapter 8, “Managing and Deploying Configuration Changes”](#) for information on Command Builder.

RTPM data collection involves the following steps:

1. Configuring PM templates—You can configure a new RTPM template using the Command Builder feature. Commands that enable RTPM data collection are available as system-defined commands in Command Builder.

When you select a Cisco IOS XR device from the device selector, the system-defined commands are automatically populated in the Command browser. Also, from the Objects view, you may right-click the network element to get a list of system-defined commands supported. You can configure these commands to create RTPM templates by specifying the input parameters required. See [Table 10-9](#) for system-defined commands that enable RTPM data collection.

To start configuring the data collection template, click the desired command. See [Running a Command, page 8-13](#) for procedural information on running commands using Command Builder.

To configure a template you should provide:

- Template name.
 - Sample size—Number of repetitions for which the counters will be sampled. Value can range from 1 to 60.
 - Sample interval—Polling interval at which to collect data from the Cisco IOS XR device. Value can range from 1 to 60.
2. Enabling the template on the entity —You can apply the configured RTPM template using the Command Builder feature. See [Running a Command, page 8-13](#) for procedural information on running commands using Command Builder.
 3. Collecting the data counters—After the template is applied, Cisco ANA starts collecting data until the collection stops on the router after the time specified in the template.
 4. Deactivating the template—You may deactivate the template after the data has been collected.

**Note**

The data is not stored in the Cisco ANA database. It is deleted when the RTPM template is deactivated. Also, the data is deleted if the VNE is removed.

5. Deleting the template—If you do not want to reuse the template, you may delete it. You can run the entity-specific delete command to delete the data collection template. See [Real-Time Data Collection Example, page 10-9](#) for details.

After you start the data collection, the counters are listed in the DataCollectionService pane in the Logical Inventory view. The data shown and the time for which it is collected are dependent on the sample time and interval you configure in the RTPM template. More than one RTPM entity template can

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be active at one time in the Cisco IOS XR device. Cisco IOS XR devices also support multiple RTPM templates active at any time for the same entity, for those that collect counters for a particular interface or node.slot.port instance.

**Note**

You can use Router CLI to create, activate, deactivate, or delete templates. This document does not include information on using Router CLI to perform RTPM related tasks. See the Router CLI documentation available on Cisco.com.

Related Topics

- [Collecting Data for Real-Time Performance Management, page 10-1](#)
- [Understanding RTPM Data Collection, page 10-2](#)
- [Real-Time Data Collection Example, page 10-9](#)

Real-Time Data Collection Example

The following example explains collecting BGP-related RTPM data using system-defined commands provided in Command Builder.

**Note**

See [Chapter 8, “Managing and Deploying Configuration Changes”](#) for detailed information on Command Builder. See [Understanding the Command Browser User Interface, page 8-4](#) and [Running a Command, page 8-13](#) for information on Command browser and on running commands.

The first task is to configure the RTPM template. To configure the template, do the following:

- Step 1** Select the Cisco IOS XR device from the device selector. The system-defined commands are populated in the Command browser.
- Step 2** Right-click **AddorModifyBGPTemplate**, and click **Run**. The Add Command Instances dialog box is displayed.
- Step 3** Click **Add >**. The Input Parameters dialog box is displayed.
- Step 4** Enter the following details:
 - **Template**—The template name.
 - **Size**—The sample size. This value determines the number of times the counters will be sampled. The value can range from 1 to 60.
 - **Interval**—The polling interval to collect the data. The value can range from 1 to 60.
- Step 5** Click **OK**. An instance of AddorModifyBGPTemplate is added to the Created Instances pane.
- Step 6** Click **Next**. The Job Schedule and Policy Settings page is displayed.
- Step 7** Specify the values, and click **Finish**.

The next task is to activate the template. To activate the template, do the following:

- Step 1** Right-click **ActivateBGPTemplate** from the Command browser, and click **Run**. The Add Command Instances dialog box is displayed.

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- Step 2** Click **Add >**. The Input Parameters dialog box is displayed.
- Step 3** Enter the following details:
- Template—The template name you specified while adding the template.
 - Neighbor IP—The IP address of the BGP neighbor.
- Step 4** Click **OK**. An instance of `ActivateBGPTemplate` is added to the Command Instances pane.
- Step 5** Click **Next**. The Job Schedule and Policy Setting page is displayed.
- Step 6** Specify the values, and click **Finish**.
- Cisco ANA starts collecting the data based on the parameters specified in the template. The details are displayed in the `DataCollectionService` pane of the Logical Inventory view.
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After the data is collected, you may deactivate the template. When you deactivate the template, Cisco ANA removes all the data from the `DataCollectionService` pane.

To deactivate the template:

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- Step 1** Right-click **DeActivateBGPTemplate**, and click **Run**. The Add Command Instances dialog box is displayed.
- Step 2** Click **Add >**. The Input Parameters dialog box is displayed.
- Step 3** Enter the following details:
- Template—The template name you specified while adding the template.
 - Neighbor IP—The IP address of the BGP neighbor.
- Step 4** Click **OK**. An instance of `DeActivateBGPTemplate` is added to the Command Instances pane.
- Step 5** Click **Next**. The Job Schedule and Policy Setting page is displayed.
- Step 6** Specify the values, and click **Finish**. The data is removed from the `DataCollectionService` pane after the scheduled deactivation job is complete.
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You may also delete the template you have created if you do not want to reuse it.

To delete the template:

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- Step 1** Right-click **DeleteBGPTemplate** from the Command browser, and click **Run**.
- Step 2** Click **Add >**. The Input Parameters dialog box is displayed.
- Step 3** Enter the template name you specified while adding the template, and click **OK**. An instance of `DeleteBGPTemplate` is added to the Command Instances pane.
- Step 4** Click **Next**. The Job Schedule and Policy Setting page is displayed.
- Step 5** Specify the values, and click **Finish**. The template is deleted after the job is run.
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Related Topics

- [Collecting Data for Real-Time Performance Management, page 10-1](#)
- [Understanding RTPM Data Collection, page 10-2](#)

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- [RTPM Data Collection Process, page 10-8](#)

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