

# Response Time Reporter Enhancements

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## Feature Summary

The Response Time Reporter (RTR) Enhancement feature allows you to monitor network performance, network resources, and applications by measuring response times and availability.

Use the Response Time Reporter Enhancement feature to troubleshoot problems by checking the time delays between devices and the time delays on the path from the source device to the destination device at the protocol level.

You can also use this feature to send any combination of SNMP traps and SNA Alerts/Resolutions when one of the following has occurred: a user-configured threshold is exceeded, a connection is lost and reestablished, or when a timeout occurs. Thresholds can also be used to trigger additional collection of time delay statistics.

You can use this feature to perform preliminary problem analysis by scheduling the response time reporter and collecting the results as history and accumulated statistics. You can then use the statistics to model and predict future network topologies.

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**Note** The terms probe and collector are used interchangeably in this document.

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## Benefits

The Response Time Reporter Enhancement feature extends IP support and allows you to measure various types of IP traffic, such as UDP and TCP. Specifically, the enhancements enable you to perform the following tasks:

- Define a tcpConnect probe.
- Define a udpEcho probe.
- Specify the path on which to measure the ICMP echo response time.
- Define the IP Type of Service (ToS) bit setting to for request and response packets. (Only valid on echo type probe in this release.)
- Reset the probe.
- Enable the responder.
- Display authentication information.
- Display responder information.

## Platforms

This feature is supported on the following platforms:

- Cisco 12000 Series Gigabit Switch router
- Cisco 1600 Series routers
- Cisco 2500 Series routers
- Cisco 2600 Series routers
- Cisco 3600 Series access servers/routers
- Cisco 3800 Series
- Cisco 38xx Series
- Cisco 4000/m Series routers
- Cisco 4500 Series routers
- Cisco 7200 Series and 7500 Series routers
- Cisco uBR7200 Series Cable routers
- Cisco AS5200, AS5300, and AS5800 access servers
- Cisco C5RSM
- Cisco MC3810

## Supported MIBs and RFCs

The response time reporter supports the Cisco Round Trip Time Monitor (RTTMON) MIB and the following MIB enhancements:

- Additions to `rttEchoAdminTable`
- Extension of `RttMonTarget Address` textual convention to include descriptions for `udpEcho` and `tcpEcho`
- Additions to `rttMonEchoPathAdminTable`
- Additions to `RttMonProtocol`

For descriptions of supported MIBs and how to use MIBs, see Cisco's MIB website on CCO at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

No RFCs are supported by this feature.

## Configuration Tasks

To configure the response time reporter feature, complete the tasks in the following sections. Refer to the "Command Reference" section for detailed syntax description of the commands used in these tasks. Configuring the probe and scheduling the probe are required tasks; the remaining tasks are optional.

- Enable the Responder
- Configure Response Time Reporter Control Message Authentication
- Configure the Probe

- Configure Optional Probe Characteristics
- Capture Statistics and Collect Error Information
- Collect History
- Set Reaction Conditions
- Schedule the Probe
- Reset the Probe
- Monitor the Response Time Reporter Feature

See the “Configuration Examples” section for example configurations.

## Enable the Responder

The responder is an enhancement that extends response time reporter support to new types of probes, such as the UDP echo responder and TCP connection probes. The RTR responder code must exist on target routers to support probes to non-native services such as the UDP echo and TCP connection probes. If UDP and TCP services (ports) are chosen for a probe to which a router does not normally respond, the RTR responder must be enabled to respond to RTR probe packets. If services that are already provided by the target router (such as Telnet or HTTP) are chosen, the RTR responder does not need to be enabled. For non-Cisco devices, the RTR responder can not be configured and RTR can probe only services native to those devices.

To enable the responder, use the following command in global configuration mode:

Command	Purpose
<b>rtr responder</b>	Enables the RTR responder.

## Configure Response Time Reporter Control Message Authentication

RTR uses a control message protocol to communicate with the Cisco routers that are the target of RTR probe operations. For security reasons, users have the option to enable authentication on the RTR Control Protocol. The authentication is provided using MD5 authentication. This authentication requires key definition on the source and target RTR routers. The existing Cisco IOS software commands are used to define the keys. Refer to the *Configuration Fundamentals Configuration Guide* for more information on these commands. The **rtr key-chain** command notifies RTR that it should use a specific key for authentication.

To configure the RTR authentication, use the following command in global configuration mode:

Command	Purpose
<b>rtr key-chain</b> <i>name</i>	Configures RTR authentication.

## Configure the Probe

Response time and availability information is collected by *probes* (devices specifically placed in a network to collect data about the network) that you configure on the router. You must configure the probe type before you can configure any of the other characteristics.

The tasks in this section describe how to:

- Define an echo Probe
- Define a pathEcho Probe
- Define a tcpConnect Probe
- Define a udpEcho Probe

### Define an echo Probe

You can measure response time from source to target by defining an echo probe. To define an echo probe, use the following commands starting in global configuration mode:

Step	Command	Purpose
1	<b>rtr</b> <i>number</i>	Enter RTR configuration mode.
2	<b>type echo protocol</b> <i>type type-target</i>	Defines an echo probe.

### Define a pathEcho Probe

You can measure time from hop to hop by defining a pathEcho probe. To define a pathEcho probe, use the following commands starting in global configuration mode:

Step	Command	Purpose
1	<b>rtr</b> <i>number</i>	Enter RTR configuration mode.
2	<b>type pathEcho protocol</b> <i>type type-target</i>	Defines a pathEcho probe.

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**Note** When the probe type is **pathEcho**, statistics are recorded for each hop along the path that the probe takes to reach its destination.

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### Define a tcpConnect Probe

You can measure TCP connection time from source to target by defining a tcpConnect probe. To define a tcpConnect probe, use the following commands starting in global configuration mode:

Step	Command	Purpose
1	<b>rtr</b> <i>number</i>	Enter RTR configuration mode.
2	<b>type tcpConnect dest-ipaddr</b> { <i>name</i>   <i>ip addr</i> } <b>dest-port</b> <i>port number</i> [ <b>source-ipaddr</b> { <i>name</i>   <i>ip addr</i> } <b>source-port</b> <i>port number</i> ] [ <b>control</b> { <b>enable</b>   <b>disable</b> }]	Defines a tcpConnect probe.

## Define a udpEcho Probe

You can measure UDP response time from source to target by defining a udpEcho probe. To define a udpEcho probe, use the following commands starting in global configuration mode:

Step	Command	Purpose
1	<b>rtr</b> <i>number</i>	Enter RTR configuration mode.
2	<b>type udpEcho dest-ipaddr</b> { <i>name</i>   <i>ip addr</i> } <b>dest-port</b> <i>port number</i> [ <b>source-ipaddr</b> { <i>name</i>   <i>ip addr</i> } <b>source-port</b> <i>port number</i> ] [ <b>control</b> { <b>enable</b>   <b>disable</b> }]	Defines a udpEcho probe.

## Configure Optional Probe Characteristics

To configure optional characteristics, use one or more of the following commands in response time reporter configuration mode:

Command	Purpose
<b>frequency</b> <i>seconds</i>	Sets the frequency for RTR probe operation.
<b>lsr-path</b> { <i>name</i>   <i>ip addr</i> } [ <i>name</i>   <i>ip addr</i> ] ...	Specifies the path on which to measure the ICMP echo response time.
<b>owner</b> <i>text</i>	Configures the SNMP owner of the probe.
<b>request-data-size</b> <i>bytes</i>	Sets the protocol data size in the payload of the probe's request packet.
<b>response-data-size</b> <i>bytes</i>	Sets the protocol data size in the payload of the probe's response packet.
<b>tag</b> <i>text</i>	Logically links probes together in a group.
<b>timeout</b> <i>milliseconds</i>	Sets the amount of time the probe waits for a response from its request packet.
<b>threshold</b> <i>milliseconds</i>	Sets the rising threshold (hysteresis) that generates a reaction event and stores history information for the probe.
<b>tos</b> <i>number</i>	Defines the IP ToS byte for request packets. (Only valid on the echo probe in this release.)
<b>verify-data</b>	Checks each probe response for corruption.

## Capture Statistics and Collect Error Information

The main purpose of the probe is to capture statistics and collect error information. By default, the following information is captured and collected:

- Minimum and maximum response times
- Number of completions
- Sum of completion times
- Sum of the squares of completion times
- Accumulation of errors for noncompletions
- Total attempts (errors plus number of completions)
- Statistical distributions of response times

A statistical distribution of response times can be thought of as a set of buckets that holds the results of a probe. Each bucket holds the completion count that falls into that specific time interval. To modify the time intervals use the **statistics-distribution-interval** command. To modify the number of buckets use the **distributions-of-statistics-kept** command. For example, if the **statistics-distribution-interval** is 20 ms and the **distributions-of-statistics-kept** is 3 (buckets *a*, *b* and *c*) and 3 round-trip time (RTT) operations are performed with response times of 10 ms, 15 ms, and 30 ms, then the completion count for the buckets is 2 for *a*, 1 for *b*, and 0 for *c*.

In most situations, you do not need to modify the time intervals or number of buckets (also referred to as *size*). You should change the size only when distribution adjustments are needed (for example, when performing statistical modeling of your network).

To control how many and what type of statistics are collected on the router, use the following optional commands in response time reporter configuration mode:

Command	Purpose
<b>statistics-distribution-interval</b> <i>milliseconds</i>	Sets the time interval for each statistical distribution.
<b>distributions-of-statistics-kept</b> <i>size</i>	Sets the number of buckets or statistical distributions kept during the probe's lifetime. Size is the number of buckets that contain data counts for their intervals.
<b>hops-of-statistics-kept</b> <i>size</i>	Collects pathEcho statistical distributions per hop per path. Size specifies the number of hops for which statistics are collected per path for each probe.
<b>paths-of-statistics-kept</b> <i>size</i>	Collects statistical distributions for multiple paths. Size specifies the number of paths for which statistical distribution buckets are maintained per hour for each probe.
<b>hours-of-statistics-kept</b> <i>hours</i>	Sets the number of hours for which statistics are maintained for the probe.

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**Note** When the **distribution-of-statistics-kept** command is set to default (1), you do not need to set the **statistics-distribution-interval** command because it has no effect on the statistics kept. For more information, refer to the command in the “Router and Network Monitoring Commands” chapter of the *Configuration Fundamentals Command Reference*.

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## Collect History

The RTR can collect data samples for a given probe; these samples are called *history data*. By default, history data is not collected. When history collection is enabled, RTR collects the last *n* data points. The number of data points are configured using the **buckets-of-history-kept** command.

Additionally, when collecting history, RTR introduces the concept of *lives*. A life is defined as the operational lifetime of a probe. When a probe is stopped and restarted, data is kept in new life entries (if the number of entries is 2 or less). If the number of entries is more than 2, the oldest entry is overwritten by the new entry.

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**Note** Collecting history increases the RAM usage. Collect history only when you think there is a problem in the network. For general network response time information, use the statistics collected by RTR. Refer to the “Capture Statistics and Collect Error Information” section for more information on statistics collection.

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To control how much and what type of history is collected on the router, use the following commands in response time reporter configuration mode. The first command is required; the remaining commands are optional.

Step	Command	Purpose
1	<b>samples-of-history-kept</b> <i>samples</i>	For a pathEcho probe, sets the number of hops in a path. For all other probes, RTR sets the number of samples to 1.
2	<b>buckets-of-history-kept</b> <i>size</i>	For a pathEcho probe, sets the number of paths to store. For all other probes, sets the number ( <i>size</i> ) of data points to be kept.
3	<b>lives-of-history-kept</b> <i>lives</i>	Enables history collection and sets the number of lives maintained in the history table for the probe.
4	<b>filter-for-history</b> { <b>none</b>   <b>all</b>   <b>overthreshold</b>   <b>failures</b> }	Defines the type of information kept in the history table for the probe. This is a required command to enable history. All, overthreshold, or failures must be specified for history to work.

To disable history collection, use the default value (0) for the **lives-of-history-kept** command rather than the **filter-for-history none** command. The **lives-of-history-kept** command disables history collection before the probe’s operation is attempted, and the **filter-for-history** command with the **none** keyword checks for history inclusion after the probe’s operation attempt is made.

## Set Reaction Conditions

You can configure the probe to send threshold notifications and use those notifications to trigger additional collection of time delay statistics. You can also configure the probe to send notifications when the probe loses connection, reestablishes connections, times out, and first succeeds after a timeout.

To configure the probe’s reaction conditions, use the following optional commands in global configuration mode:

Step	Command	Purpose
1	<b>rtr reaction-configuration</b> <i>number</i> [ <b>connection-loss-enable</b> ] [ <b>timeout-enable</b> ] [ <b>threshold-falling</b> <i>milliseconds</i> ] [ <b>threshold-type</b> <i>option</i> ] [ <b>action-type</b> <i>option</i> ]	Configures certain actions (for example, checking for connection losses or timeouts) to occur based on events controlled by the RTR.
2	<b>rtr reaction-trigger</b> <i>number target-number</i>	Defines the target probe to make the transition from a pending state to an active state when one of the trigger action-type options is defined for the probe.

## Schedule the Probe

After you have configured the probe, you must schedule the probe to begin capturing statistics and collecting error information. When scheduling a probe, it can start immediately or start at a certain month, day, or hour. The **pending** keyword is used when setting the probe to start at a later time. The **pending** keyword is also an internal state of the probe visible through SNMP. The pending state is also used when a probe is a reaction probe waiting to be triggered.

To schedule an RTR probe, use the following command in global configuration mode:

Command	Purpose
<b>rtr schedule</b> <i>number</i> [ <b>life</b> <i>seconds</i> ] [ <b>start-time</b> { <b>pending</b>   <b>now</b>   <i>hh:mm</i> [ <i>month day</i>   <i>day month</i> ]}] [ <b>ageout</b> <i>seconds</i> ]	Schedules the probe by configuring the time parameters.

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**Note** After you schedule the probe with the **rtr schedule** command, you cannot change the probe's configuration with the **rtr** global configuration command. To change the configuration of a scheduled probe, use the **no** form of the **rtr** command. The **no** form of the command removes all the probe's configuration information including the probe's schedule, reaction configuration, and reaction triggers. You can now create a new configuration for the probe.

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If the probe is in a pending state (the default), you can define the conditions under which the probe makes the transition from pending to active with the **rtr reaction-trigger** command. When the probe is in an active state it immediately begins collecting information.

## Reset the Probe

To shut down the RTR (stop all probes and clear the RTR configuration), use the following command in global configuration mode:

Command	Purpose
<b>rtr reset</b>	Stops all probes and clears the RTR configuration information.



**Caution** Use the **rtr reset** command only in extreme situations such as the incorrect configuration of a number of probes. The **rtr reset** command reconfigures the router to its startup configuration

In addition to stopping all probes and clearing the RTR configuration information, the **rtr reset** command returns the RTR feature to the startup condition. This command does not reread the configuration stored in NVRAM. You must retype the RTR's configuration or perform a **config memory** command.

## Monitor the Response Time Reporter Feature

To display information about the status and configuration of the RTR feature, use the following commands in EXEC mode. You can display information in a tabular or full format. Tabular format displays information in a column reducing the number of screens required to display the information. Full format displays all information using identifiers next to each displayed value.

Command	Purpose
<b>show rtr application</b> [tabular   full]	Displays global information about the RTR feature.
<b>show rtr authentication</b>	Displays authentication information.
<b>show rtr collection-statistics</b> [number] [tabular   full]	Displays error totals collected for all probes or a specified probe.
<b>show rtr configuration</b> [number] [tabular   full]	Displays configuration values including all defaults for all probes or a specified probe.
<b>show rtr distributions-statistics</b> [number] [tabular   full]	Displays statistical distribution information (captured response times) for all probes or a specified probe.
<b>show rtr history</b> [number] [tabular   full]	Displays history collected for all probes or a specified probe.
<b>show rtr operational-state</b> [number] [tabular   full]	Displays the operational state of all probes or a specified probe.
<b>show rtr reaction-trigger</b> [number] [tabular   full]	Displays the reaction trigger information for all probes or a specified probe.
<b>show rtr responder</b>	Displays responder information.
<b>show rtr totals-statistics</b> [number] [tabular   full]	Displays the total statistic values (accumulation of error counts and completions) for all probes or a specified probe.

## Configuration Examples

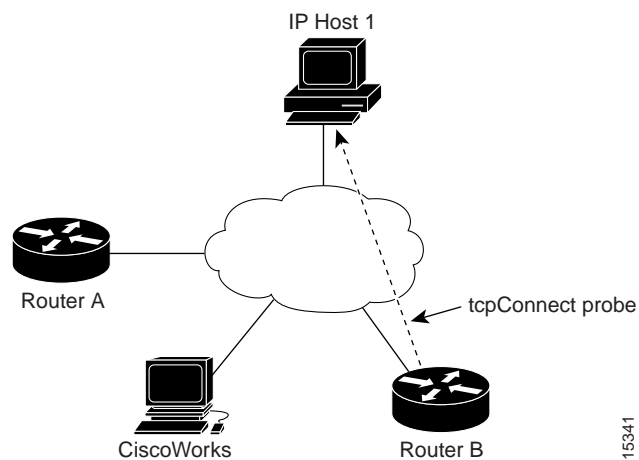
The following sections contain examples of setting up probes on the router to monitor network performance and send notifications:

- Configure a tcpConnect Probe
- Configure a udpEcho Probe
- Perform Normative Analysis for SNA LU2
- Perform Troubleshooting for IP/ICMP
- Configure a Trigger for Connection Loss

## Configure a tcpConnect Probe

The example in Figure 1 shows a tcpConnect probe configured from Router B to the Telnet port (TCP port 23) of IP Host 1 (IP address 10.0.0.1).

**Figure 1**      **Configuring a tcpConnect Probe**



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### Configuration for Router B

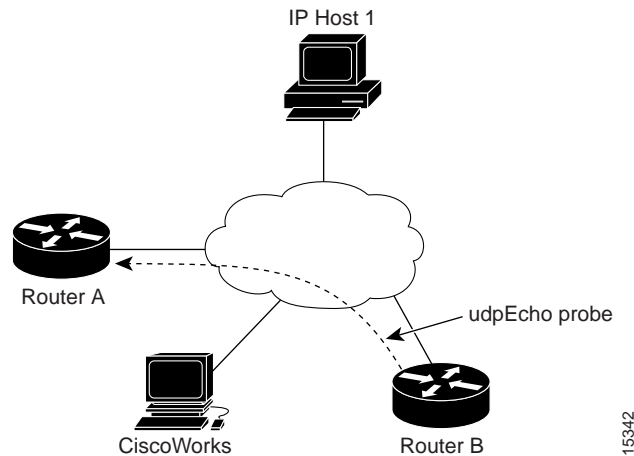
```
RouterB(config)# rtr 5
RouterB(config-rtr)# type tcpConn dest-ipaddr 10.0.0.1 dest-port 23 control disable
RouterB(config-rtr)# exit
RouterB(config)# rtr schedule 5 start now
```

In the example the control protocol for the probe is disabled. RTR collector uses the RTR control protocol to notify the RTR responder on the responder router to enable the target port temporarily. This action allows the responder to respond to the probe packet. In this case, because the target is not a router and a well known TCP port is used, there is no need to send the control message.

## Configure a udpEcho Probe

The example in Figure 2 shows a udpEcho probe configured from Router B to UDP port 888 on Router A (IP address 20.0.0.1).

**Figure 2** Configuring a udpEcho Probe




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**Note** Configuring RTR control protocol authentication is optional. However, if you configure authentication for Router B, you must configure the same authentication for Router A.

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### Configuration for Router A

```
RouterA(config)# key chain rtr-key
RouterA(config-keychain)# key 1
RouterA(config-keychain-key)# key-string secrete
RouterA(config-keychain-key)# exit
RouterA(config-keychain)# exit
RouterA(config)# rtr key-chain rtr-key
RouterA(config)# rtr responder
```

In the configuration for Router B we create a keychain called “rtr-key.” The **rtr key-chain** command enables RTR MD5 authentication on the control messages.

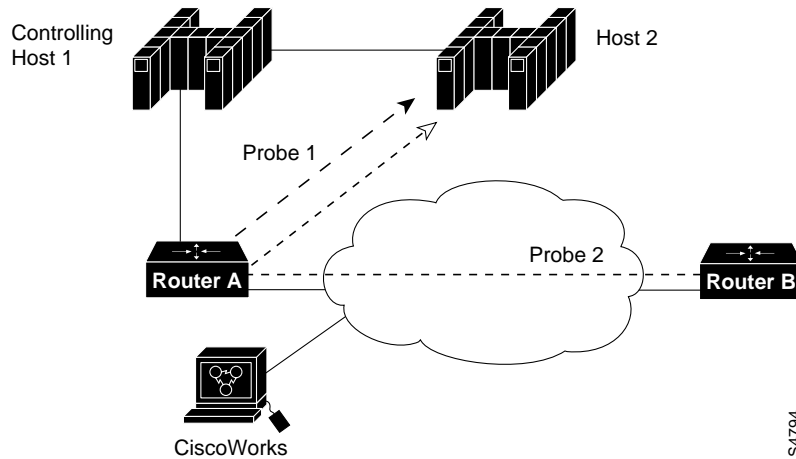
### Configuration for Router B

```
RouterB(config)# key chain rtr-key
RouterB(config-keychain)# key 1
RouterB(config-keychain-key)# key-string secrete
RouterB(config-keychain-key)# exit
RouterB(config-keychain)# exit
RouterB(config)# rtr key-chain rtr-key
RouterB(config)# rtr 6
RouterB(config-rtr)# type udpEcho dest-ipaddr 20.0.0.1 dest-port 888 control enable
RouterB(config-rtr)# exit
RouterB(config)# rtr schedule 6 start now
```

## Perform Normative Analysis for SNA LU2

The example in Figure 3 shows probe 1 configured from Router A to Host 2, and Probe 2 is configured from Router B to Host 2. This configuration allows normative analysis of the network to determine a baseline from which triggers (and general reactions) are configured. Also, two SNA PUs must be configured: CWBC0A and CWBC0B. For information on configuring PUs, see the **dspu host** or the **sna host** commands in the *Bridging and IBM Networking Command Reference*.

**Figure 3** Configure Probes for Normative Analysis—SNA LU2



### Configuration for Router A

```
RouterA(config)# rtr 1
RouterA(config-rtr)# type echo protocol snaLU2EchoAppl CWBC0A
RouterA(config-rtr)# exit
RouterA(config)# rtr schedule 1 start-time now
RouterA(config)# exit
```

### Configuration for Router B

```
RouterB(config)# rtr 2
RouterB(config-rtr)# type echo protocol snaLU2EchoAppl CWBC0B
RouterB(config-rtr)# exit
RouterB(config)# rtr schedule 1 start-time now
RouterB(config)# exit
```

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## Configuration Files for Router A and Router B

After you save the configurations for Router A and Router B (using the **copy running-config startup-config** command), information is stored in the configuration files. Kept commands are added automatically to the configuration file because they differ depending on the type you specify for the probe. The following information is stored:

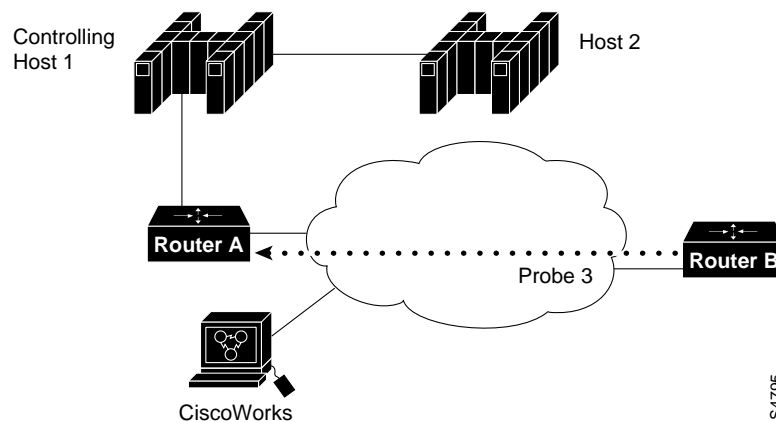
```
!Router A Configuration File
! Router A's PU Configuration
sna host CWBC0A xid-snd 05dcc00a rmac 4001.3745.1088 rsap 4 lsap 12 focalpoint
rtr 1
  type echo protocol snaLU2EchoAppl CWBC0A
  paths-of-statistics-kept 1
  hops-of-statistics-kept 1
  samples-of-history-kept 1
rtr schedule 1 start-time now

!Router B Configuration File
!Router B's PU Configuration from the Configuration File:
sna host CWBC0B xid-snd 05dcc00b rmac 4001.3745.1088 rsap 4 lsap 12 focalpoint
rtr 2
  type echo protocol snaLU2EchoAppl CWBC0B
  paths-of-statistics-kept 1
  hops-of-statistics-kept 1
  samples-of-history-kept 1
rtr schedule 2 start-time now
```

## Perform Troubleshooting for IP/ICMP

The example in Figure 4 shows that Probe 3 is configured from Router B to Router A to perform network troubleshooting and identify network problems that configure triggers and general reactions.

**Figure 4** Configure a Probe for Troubleshooting—IP/ICMP



This example sets up a pathEcho (with history) pending entry from Router B to Router A via IP/ICMP. It attempts to execute 3 times in 25 seconds (first attempt starts at 0 seconds) and keeps those 3 times with 3 buckets. The entry can be started 5 times before wrapping over stored history (**lives-of-history-kept = 5**). Because this configuration keeps history, it uses more RAM on the router.

### Configuration for Router B

```
RouterB(config)# rtr 3
RouterB(config-rtr)# type pathEcho protocol ipIcmpEcho RouterA
RouterB(config-rtr)# frequency 10
RouterB(config-rtr)# lives-of-history-kept 5
RouterB(config-rtr)# buckets-of-history-kept 3
RouterB(config-rtr)# filter-for-history all
RouterB(config-rtr)# exit
RouterB(config)# rtr schedule 3 life 25
RouterB(config)# exit
```

### Configuration File for Router B

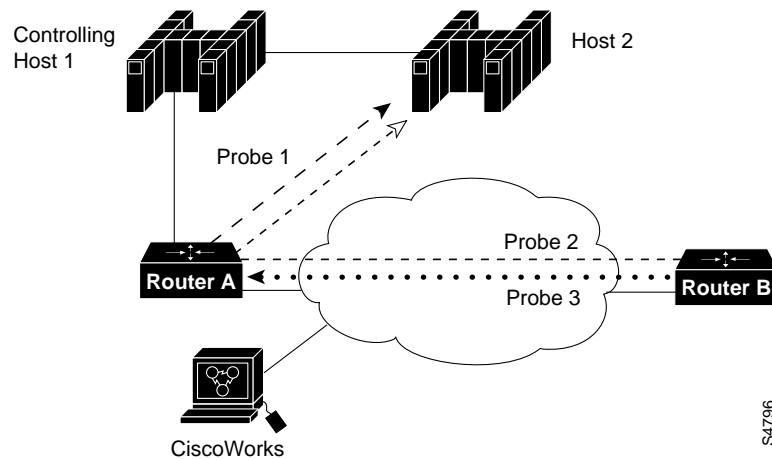
After you save the configuration (using the **copy running-config startup-config** command) the information is stored in the configuration file. Note the addition of commands in the configuration file. They are automatically included because they differ depending on the type you specify for the probe. The following information is stored:

```
rtr 3
  type pathEcho protocol ipIcmpEcho 172.28.161.21
  frequency 10
  response-data-size 1
  lives-of-history-kept 5
  buckets-of-history-kept 3
  filter-for-history all
rtr schedule 3 life 25 start-time pending
```

## Configure a Trigger for Connection Loss

Figure 5 shows Probes 1, 2, and 3 in the network. This example shows how to configure a trigger if Probe 2 encounters a connection loss from Router B to Host 2. If a connection loss occurs between Router B and Host 2, a trap is issued, an SNA NMVT Alert is issued, and the Probe 3 state is changed to active.

**Figure 5** Configure a Trigger for Connection Loss



### Router B Configuration

```
RouterB(config)# rtr reaction-configuration 2 connection-loss-enable
                  action-type trapNmvtAndTrigger
RouterB(config)# rtr reaction-trigger 2 3
```

**Note** The probe numbers must be unique within only one router. The examples shown use three different probe numbers for clarity.

## Command Reference

The following commands are new or modified in Cisco IOS Release 12.0(3)T.

- **lsr-path**
- **rtr key-chain**
- **rtr responder**
- **show rtr authentication**
- **show rtr responder**
- **tos**
- **type echo**
- **type pathEcho**
- **type tcpConnect**
- **type udpEcho**

The following commands have not been modified, but are necessary to configure RTR:

- **buckets-of-history-kept**
- **distributions-of-statistics-kept**
- **filter-for-history**
- **frequency**
- **hops-of-statistics-kept**
- **hours-of-statistics-kept**
- **lives-of-history-kept**
- **owner**
- **paths-of-statistics-kept**
- **request-data-size**
- **response-data-size**
- **rtr**
- **rtr reaction-configuration**
- **rtr reaction-trigger**
- **rtr reset**
- **rtr schedule**
- **samples-of-history-kept**
- **show rtr application**
- **show rtr collection-statistics**
- **show rtr configuration**
- **show rtr distributions-statistics**
- **show rtr history**
- **show rtr operational-state**

- **show rtr reaction-trigger**
- **show rtr totals-statistics**
- **statistics-distribution-interval**
- **tag**
- **threshold**
- **timeout**
- **verify-data**

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**Note** The new, modified, and existing commands are arranged alphabetically in a single section.

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## buckets-of-history-kept

To set the number of history buckets that are kept during the RTR probe's lifetime, use the **buckets-of-history-kept** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**buckets-of-history-kept** *size*  
**no buckets-of-history-kept**

### Syntax Description

*size*                                      Number of history buckets kept during the RTR probe's lifetime. The default is 50 buckets.

### Default

50 buckets

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

An RTR probe collects history and captures statistics. By default, history is not collected. When a problem arises where history is useful (for example, a large number of timeouts are occurring), you can configure the **lives-of-history-kept** command to collect history. You can optionally adjust the **buckets-of-history-kept**, **filter-for-history**, and **samples-of-history-kept** commands.

RTR keeps the last *n* buckets of data.

---

**Note** Collecting history increases the RAM usage. Collect history only when you think there is a problem in the network. For general network response time information, use the statistics collected by RTR. Refer to the "Capture Statistics and Collect Error Information" section for more information on statistics collection.

---

If history is collected, each bucket contains one or more history entries from the probe. When the probe type is pathEcho, an entry is created for each hop along the path that the probe takes to reach its destination. The type of entry stored in the history table is controlled by the **filter-for-history** command. The total number of entries stored in the history table is controlled by the combination of **samples-of-history-kept**, **buckets-of-history-kept**, and **lives-of-history-kept** commands.

Each time the probe starts an RTR operation, a new bucket is created until the number of history buckets matches the specified size or the probe's lifetime expires. History buckets do not wrap. The probe's lifetime is defined by the **rtr schedule** command. The probe starts an RTR operation based on the seconds specified by the **frequency** command.

## Example

In the following example, probe 1 is configured to keep 25 history buckets during the probe's lifetime:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.161.21
  buckets-of-history-kept 25
  lives-of-history-kept 1
```

## Related Commands

- filter-for-history**
- lives-of-history-kept**
- rtr**
- rtr schedule**
- samples-of-history-kept**

## distributions-of-statistics-kept

To set the number of statistic distributions kept per hop during the RTR probe's lifetime, use the **distributions-of-statistics-kept** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**distributions-of-statistics-kept** *size*  
**no distributions-of-statistics-kept**

### Syntax Description

*size*                                      Number of statistic distributions kept per hop. The default is 1 distribution.

### Default

1 distribution

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

In most situations, you do not need to change the statistic distribution size for the RTR. Only change the size when distributions are needed (for example, when performing statistical modeling of your network).

---

**Note** Increasing the statistics distributions also increases the RAM usage. The total number of statistics distributions captured are the value of **distributions-of-statistics-kept** multiplied by the value of **hops-of-statistics-kept** multiplied by the value of **paths-of-statistics-kept** multiplied by the value of **hours-of-statistics-kept**.

---

When the number of distributions reaches the specified size, no further distribution information is stored.

### Example

In the following example, the distribution is set to 5 and the distribution interval is set to 10 ms. In this configuration the first distribution contains statistics from 0 to 9 ms, the second distribution contains statistics from 10 to 19 ms, the third distribution contains statistics from 20 to 29 ms, the fourth distribution contains statistics from 30 to 39 ms, and the fifth distribution contains statistics from 40 ms to infinity.

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.161.21
  distributions-of-statistics-kept 5
  statistics-distribution-interval 10
```

Related Commands

**hops-of-statistics-kept**  
**hours-of-statistics-kept**  
**paths-of-statistics-kept**  
**rtr**  
**statistics-distribution-interval**

## filter-for-history

To define the type of information kept in the history table for the RTR probe, use the **filter-for-history** response time reporter configuration command. Use the **no** form of this command to return to the default value.

```
filter-for-history { none | all | overThreshold | failures }  
no filter-for-history { none | all | overThreshold | failures }
```

### Syntax Description

<b>none</b>	No history is kept. This is the command default.
<b>all</b>	Keeps a history of all probe operations attempted.
<b>overThreshold</b>	Keeps a history of packets that are over the threshold.
<b>failures</b>	Keeps a history of packets that fail for any reason.

### Default

No history is kept.

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **filter-for-history** command to control what is stored in the history table for the RTR. To control how much history is saved in the history table, use the **lives-of-history-kept**, **buckets-of-history-kept**, and the **samples-of-history-kept** commands.

A probe collects history and captures statistics. By default, history is not collected. When a problem arises where history is useful (for example, a large number of timeouts are occurring), you can configure the **lives-of-history-kept** command to collect history.

---

**Note** Collecting history increases the RAM usage. Collect history only when you think there is a problem in the network. For general network response time information, use the statistics collected by RTR. Refer to the “Capture Statistics and Collect Error Information” section for more information on statistics collection.

---

### Example

In the following example, only probe packets that fail are kept in the history table:

```
rtr 1  
  type echo protocol ipIcmpEcho 172.16.161.21  
  lives-of-history-kept 1  
  filter-for-history failures
```

Related Commands

**buckets-of-history-kept**  
**lives-of-history-kept**  
**rtr**  
**samples-of-history-kept**

## frequency

To set the rate at which the RTR probe starts a response time operation, use the **frequency** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**frequency** *second*  
**no frequency**

### Syntax Description

*second*                      Number of seconds between the probe's RTR operations. The default value is 60 seconds.

### Default

60 seconds

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.



**Caution** For normal operation, do not set the frequency value to less than 60 seconds for the following reasons: it is not needed when keeping statistics (the default), and it can slow down the WAN because of the potential overhead that numerous probes can cause.

If the probe takes longer to execute the current RTR operation than the specified frequency value, a statistics counter called *busy* is incremented in lieu of starting a second operation.

The value specified for the **frequency** command cannot be less than the value specified for the **timeout** command.

### Example

In the following example, the probe is configured to execute an RTR operation every 90 seconds:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.1.176
  frequency 90
```

### Related Commands

**rtr**  
**timeout**

## hops-of-statistics-kept

To set the number of hops for which statistics are maintained per path for the RTR probe, use the **hops-of-statistics-kept** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**hops-of-statistics-kept** *size*  
**no hops-of-statistics-kept**

### Syntax Description

*size*                      Number of hops for which statistics are maintained per path. The default is 16 hops for type pathEcho and 1 hop for all other types.

### Default

16 hops for type pathEcho  
 1 hop for all other types

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

One hop is the passage of a timed packet from this router to another network device. The other network device is a device along the path to the destination (including the destination) when the probe type is pathEcho, or is just the destination when the type is echo.

When the number of hops reaches the specified size, no further hop information is stored.

### Example

In the following example, the statistics for probe 2 are maintained for only 10 hops:

```
rtr 2
  type pathecho protocol ipIcmpEcho 172.16.1.177
  hops-of-statistics-kept 10
```

### Related Commands

**distributions-of-statistics-kept**  
**hours-of-statistics-kept**  
**paths-of-statistics-kept**  
**rtr**  
**statistics-distribution-interval**



## lives-of-history-kept

To set the number of lives maintained in the history table for the RTR probe, use the **lives-of-history-kept** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**lives-of-history-kept** *lives*  
**no lives-of-history-kept**

### Syntax Description

*lives*                      Number of lives maintained in the history table for the probe. The default is 0 lives.

### Default

0 lives

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The default value means that history is not collected for the probe. To disable history collection, use the default value for the **lives-of-history-kept** command rather than the **filter-for-history none** command. The **lives-of-history-kept** command disables history collection before the probe's operation is attempted, and the **filter-for-history** command checks for history inclusion after the probe makes an operation attempt.

When the number of lives exceeds the specified value, the history table wraps (the oldest information is replaced by newer information).

When a probe makes a transition from pending to active, a life starts. When a probe's life ends, the probe makes a transition from active to pending.

### Example

In the following example, the history for probe 1 is maintained for 5 lives:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.1.176
  lives-of-history-kept 5
```

### Related Commands

**buckets-of-history-kept**  
**filter-for-history**  
**rtr**  
**samples-of-history-kept**

## lsr-path

To define a loose source routing (LSR) path for IP echo probe, use the **lsr-path** response time reporter configuration command. Use the **no** form of this command to remove the definition.

```
lsr-path {name | ip addr} [{name | ip addr}] ...  
no lsr-path
```

### Syntax Description

<i>name</i>	IP host name.
<i>ip addr</i>	IP address.

### Default

LSR path is disabled.

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

The maximum number of hops available is 8 when an LSR path is configured.

### Example

In the following example, LSR is defined for the echo probe with IP address 172.16.1.176:

```
rtr 1  
  type echo protocol ipIcmpEcho 172.16.1.176  
  lsr-path 172.18.4.149 172.18.26.155
```

### Related Commands

**rtr**

---

## owner

To configure the SNMP owner of the RTR probe, use the **owner** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**owner** *text*  
**no owner**

### Syntax Description

<i>text</i>	Name of the SNMP owner from 0 to 255 ASCII characters. The default is no owner.
-------------	---

### Default

No owner is specified.

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The owner name contains one or more of the following: ASCII form of the network management station's transport address, network management station name (the domain name), and network management personnel's name, location, or phone number. In some cases, the agent is the owner of the probe. In these cases, the name can begin with "agent."

### Example

In the following example, the owner is set for probe 1:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.1.176
  owner 172.16.1.189 cwb.cisco.com John Doe RTP 555-1212
```

### Related Commands

**rtr**



## request-data-size

To set the protocol data size in the payload of the RTR probe's request packet, use the **request-data-size** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**request-data-size** *byte*  
**no request-data-size**

### Syntax Description

*byte*                      Size of the protocol data in the payload of the probe's request packet. Range is 0 to the protocol's maximum payload capacity. The default is 1 byte for the ICMP echo probe and 4 bytes for udpEcho probe.

### Default

1 byte for ICMP echo probe  
4 bytes for udpEcho probe

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

When the protocol name has the suffix "appl," the packet uses both a request and respond data size (see the **response-data-size** command), and the data size is 12 bytes smaller than the normal payload size (this 12-byte data size is the ARR Header used to control send and data response sizes).

### Example

In the following example, the request packet size for probe 3 is set to 40 bytes:

```
rtr 3
  type echo protocol snalu0echoappl cwbc0a
  request-data-size 40
```

### Related Commands

**response-data-size**  
**rtr**



## rtr

To configure an RTR probe, use the **rtr** global configuration command. Use the **no** form of this command to remove all configuration information for a probe including the probe's schedule, reaction configuration, and reaction triggers.

**rtr** *number*  
**no rtr** *number*

### Syntax Description

*number*                      Number of the RTR probe to configure.

### Default

None

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

A probe is used for the purpose of collecting response time information.

RTR allows a maximum of 500 probes.

The RTR feature allows customers to monitor the performance of their network, network resources, and applications by measuring response times and availability. With this feature, you can perform troubleshooting, problem notification, and preliminary problem analysis. For more information, refer to the "Monitoring the Router and Network" chapter in the *Configuration Fundamentals Configuration Guide* and the Cisco Round-Trip Time Monitor (RTTMON) MIB.

The **rtr** command places you in response time reporter configuration mode.

---

**Note** After you schedule a probe with the **rtr schedule** command, you cannot modify the probe's configuration. To modify the probe's configuration after it is scheduled, use the **no rtr** command. You can now reenter the probe's configuration with the **rtr** command.

---

Use the following response time reporter configuration commands to configure the probe's characteristics:

- **buckets-of-history-kept**
- **distributions-of-statistics-kept**
- **filter-for-history**
- **frequency**
- **hops-of-statistics-kept**
- **hours-of-statistics-kept**

- **lives-of-history-kept**
- **owner**
- **paths-of-statistics-kept**
- **request-data-size**
- **response-data-size**
- **samples-of-history-kept**
- **statistics-distribution-interval**
- **tag**
- **threshold**
- **type echo**
- **timeout**
- **verify-data**

After you configure a probe, you must schedule it. For information on scheduling a probe, refer to the **rtr schedule** command. You can also optionally set reaction triggers for the probe. For information on reaction triggers, refer to the **rtr reaction-configuration** and **rtr reaction-trigger** commands.

To display the probe's current configuration settings, use the **show rtr configuration EXEC** command.

### Example

In the following example, probe 1 is configured to perform end-to-end response time operations using an SNA LU Type 0 connection with the host name *cwbc0a*. Only the **type** command is required; all others are optional.

```
rtr 1
  type echo protocol snalu0echoappl cwbc0a
  request-data-size 40
  response-data-size 1440
```

---

**Note** If probe 1 exists and is not scheduled, you are placed in response time reporter configuration command mode. If the probe already exists and is scheduled, this command will fail.

---

### Related Commands

**rtr reaction-configuration**  
**rtr reaction-trigger**  
**rtr reset**  
**rtr schedule**

## rtr key-chain

To enable RTR control message authentication and specify an MD5 key chain, use the **rtr key-chain** global configuration command. Use the **no** form of this command to remove control message authentication.

```
rtr key-chain name  
no rtr key-chain
```

### Syntax Description

<i>name</i>	Name of MD5 key chain.
-------------	------------------------

### Default

None

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

The authentication configuration on the RTR collector and responder must be the same. Both sides must configure the same key chain or both sides must not use authentication.

### Example

In the following example, the RTR control message uses MD5 authentication, and the key chain name is rtr:

```
rtr key-chain rtr
```

### Related Commands

**rtr**

## rtr reaction-configuration

To configure certain actions to occur based on events under the control of the RTR, use the **rtr reaction-configuration** global configuration command. Use the **no** form of this command to return to the probe's default values.

```
rtr reaction-configuration number [connection-loss-enable] [timeout-enable]
    [threshold-falling milliseconds] [threshold-type option] [action-type option]
no rtr reaction-configuration number
```

### Syntax Description

<i>number</i>	Number of the existing RTR probe to configure.
<b>connection-loss-enable</b>	(Optional) Enables checking for connection loss in connection-oriented protocols. The default is disabled.
<b>timeout-enable</b>	(Optional) Enables checking for RTR operation timeouts based on the timeout value configured for the probe with the <b>timeout</b> command. The default is disabled.
<b>threshold-falling</b> <i>milliseconds</i>	(Optional) Sets the falling threshold (standard RMON-type hysteresis mechanism) in milliseconds. When the falling threshold is met, generate a resolution reaction event. The probe's rising over threshold is set with the <b>threshold</b> command. The default value is 3000 ms.
<b>threshold-type</b> <i>option</i>	(Optional) Specifies the algorithm used by the RTR to calculate over threshold and falling threshold violations. Option can be one of the following keywords: <ul style="list-style-type: none"> <li>• <b>never</b>—Do not calculate threshold violations (the default).</li> <li>• <b>immediate</b>—When the response time exceeds the rising over threshold or drops below the falling threshold, immediately perform the action defined by <b>action-type</b>.</li> <li>• <b>consecutive</b> [<i>occurrences</i>]—When the response time exceeds the rising threshold consecutively five times or drops below the falling threshold consecutively five times, perform the action defined by <b>action-type</b>. Optionally specify the number of consecutive occurrences. The default is 5.</li> <li>• <b>xofy</b> [<i>x-value y-value</i>]—When the response time exceeds the rising threshold five out of the last five times or drops below the falling threshold five out of the last five times, perform the action defined by <b>action-type</b>. Optionally, specify the number of violations that must occur and the number that must occur within a specified time. The default is 5 for both x-value and y-value.</li> </ul>

- **average** [*attempts*]—When the average of the last five response times exceeds the rising threshold or when the average of the last five response times drops below the falling threshold, perform the action defined by **action-type**. Optionally, specify the number of operations to average. The default is the average of the last five response time operations. For example: if the probe's threshold is 5000 ms and the probe's last 3 attempts results are 6000, 6000, and 5000 ms, the average would be  $6000 + 6000 + 5000 = 17000/3 > 5000$ , thus violating the 5000-ms threshold.

**action-type option**

(Optional) Specify what action or combination of actions the probe performs when you configure the **connection-loss-enable** or **timeout-enable** commands or threshold events occur. For the **action-type** to occur for threshold events, the **threshold-type** must be defined to anything other than **never**. The *option* argument can be one of the following keywords:

- **none**—No action is taken.
- **trapOnly**—Send an SNMP trap on both over threshold and falling threshold violations.
- **nmvtOnly**—Send an SNA NMVT Alert on over threshold violations and an SNA NMVT Resolution on falling threshold violations.
- **triggerOnly**—Operational state of one or more target probe makes the transition from “pending” to “active” on over threshold and falling threshold violations. The target probes are defined with the **rtr reaction-trigger** command. A target probe continues until its life expires as specified by the target probe's life value configured with the **rtr schedule** command. A triggered target probe must finish its life before it can be triggered again.
- **trapAndNmvt**—Sends a combination of **trapOnly** and **nmvtOnly** alerts.
- **trapAndTrigger**—Sends a combination of **trapOnly** and **triggerOnly** alerts.
- **nmvtAndTrigger**—Sends a combination of **nmvtOnly** and **triggerOnly** alerts.
- **trapNmvtAndTrigger**—Sends a combination of **trapOnly**, **nmvtOnly**, and **triggerOnly** alerts.

## Default

No reactions are generated.

## Command Mode

Global configuration

## Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Triggers are used for diagnostics purposes and are not used in normal operation.

Use triggers to determine where delays are happening in the network when excessive delays are seen on an end-to-end basis.

The reaction applies only to attempts to the target (that is, attempts to any hops along the path in pathEcho do not generate reactions).

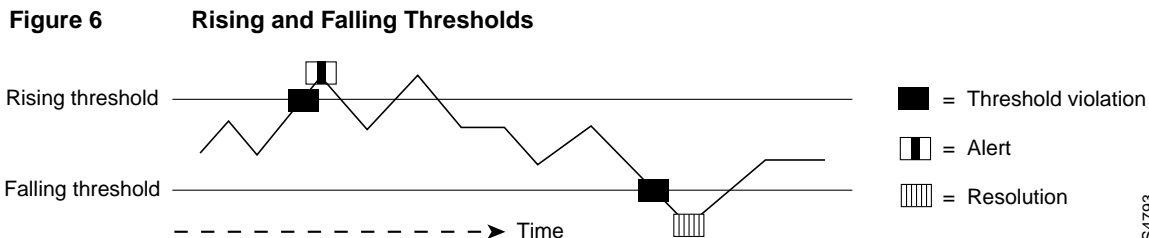
To specify trap as an action-type option, you must configure the **snmp-server community**, **snmp-server enable**, and **snmp-server host** commands. Refer to the *Configuration Fundamentals Configuration Guide* for more information on these commands.

## Examples

In the following example, probe 19 sends an SNMP trap when there is an over threshold or falling threshold violation:

```
rtr reaction-configuration 19 threshold-type immediate action-type trapOnly
```

Figure 6 shows that an alert (rising trap) is issued immediately when the response time exceeds the rising threshold and a resolution (falling trap) is issued immediately when the response time drops below the falling threshold.



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In the following example, traps are sent when probe 1 times out.

```
snmp-server enable traps rtr
snmp-server host 172.69.1.129 traps public rtr

rtr 1
type echo protocol ipIcmpEcho 172.69.1.129
exit
rtr reaction-configuration 1 timeout-enable action-type trapOnly
```

## Related Commands

**rtr**  
**rtr reaction-trigger**  
**threshold**  
**timeout**

## rtr reaction-trigger

To define a second RTR probe to make the transition from a pending state to an active state when one of the trigger action-type options are defined with the **rtr reaction-configuration** command, use the **rtr reaction-trigger** command. Use the **no** form of this command to remove the trigger combination.

```
rtr reaction-trigger number target-number
no rtr reaction-trigger number
```

### Syntax Description

<i>number</i>	Number of the probe in the active state that has the <b>action-type</b> set with the <b>rtr reaction-configuration</b> command.
<i>target-number</i>	Number of the probe in the pending state that is waiting to be triggered with the <b>rtr</b> command.

### Default

None

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Triggers are used for diagnostics purposes and are not used in normal router operation.

The target probe must be scheduled to start using the **rtr schedule** command with the **start-time pending** option configured.

### Example

In the following example, the state of probe 1 is changed from pending to active when probe 2's **action-type** occurs:

```
rtr reaction-trigger 2 1
```

### Related Commands

```
rtr
rtr reaction-configuration
rtr schedule
```

## rtr reset

To shut down the RTR (stop all probes and clear the RTR configuration), use the **rtr reset** global configuration command.

**rtr reset**

### Syntax Description

This command has no arguments or keywords.

### Default

None

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.



**Caution** Use the **rtr reset** command only in extreme situations (for example, if the incorrect number of probes is configured).

The **rtr reset** command stops all probes, clears RTR configuration information, and returns the RTR feature to the startup condition. This command does not reread the RTR configuration stored in the startup configuration file in NVRAM. You must retype the configuration or perform a **config memory** command.

### Example

The following example resets the RTR feature:

```
rtr reset
```

### Related Commands

**rtr**

## rtr responder

To enable the RTR responder, use the **rtr responder** global configuration command. Use the **no** form of this command to disable the responder.

**rtr responder**  
**no rtr responder**

### Syntax Description

This command has no arguments or keywords.

### Default

None

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

### Example

The following example enables the RTR responder:

```
rtr responder
```

### Related Commands

**rtr**

## rtr schedule

To configure the time parameters for an RTR probe, use the **rtr schedule** global configuration command. Use the **no** form of this command to stop the probe and restart it with the default parameters (pending).

```
rtr schedule number [life seconds] [start-time {pending | now | hh:mm [month day |  
                  day month]}] [ageout seconds]  
no rtr schedule number
```

### Syntax Description

<i>number</i>	Number of the RTR probe to schedule.
<b>life</b> <i>seconds</i>	(Optional) Number of seconds the probe actively collects information. The default is 3600 seconds (1 hour).
<b>start-time</b>	(Optional) Time when the probe starts collecting information. If the <b>start-time</b> argument is not specified, no information is collected until the <b>start-time</b> is configured or a trigger occurs that performs a <b>start-time now</b> .
<b>pending</b>	No information is collected. This is the default value.
<b>now</b>	Information is immediately collected.
<i>hh:mm</i>	Information is collected at the specified time (use a 24-hour clock). The time is the current day if you do not specify the month and day.
<i>month</i>	(Optional) Name of the month. If month is not specified, the current month is used. This requires a day.
<i>day</i>	(Optional) Number of the day in the range 1 to 31. If day is not specified, the current day is used. This requires a month.
<b>ageout</b> <i>seconds</i>	(Optional) Number of seconds the probe stays active when it is not collecting information. The default is 0 seconds (never ages out).

### Default

Pending state (the probe is started but not actively collecting information).

### Command Mode

Global configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

After you schedule the probe with the **rtr schedule** command, you cannot change the probe's configuration with the **rtr** global configuration command. To change the probe's configuration, use the **no** form of the **rtr** command and reenter the configuration information.

If the probe is in a pending state, you can define the conditions under which the probe makes the transition from pending to active with the **rtr reaction-trigger** and **rtr reaction-configuration** commands. When the probe is in an active state, it immediately begins collecting information.

The following time line shows the probe's age-out process:

W-----X-----Y-----Z

Where:

- W is the time the probe was configured with the **rtr** command.
- X is the probe's start time or start of life (when the probe became active).
- Y is the end of life as configured with the **rtr schedule** command (life seconds have counted down to zero).
- Z is the probe's age out.

The **ageout** starts counting down at W and Y, is suspended between X and Y, and is reset to its configured size at Y.

It is possible for the probe to age out before it executes (Z can occur before X). To ensure that the probe does not age out, the difference between the probe's configuration time and start time (X and W) must be less than the **ageout seconds**.

---

**Note** The total RAM required to hold the history and statistics tables is allocated at this time. This is to prevent router memory problems when the router is heavily loaded and to lower the amount of overhead the feature causes on a router when it is active.

---

## Example

In the following example, probe 25 begins collecting data at 3:00 p.m. on April 5. This probe ages out after 12 hours of inactivity, which can be before it starts or after it has finished with its life. When this probe ages out, all configuration information for the probe is removed (the configuration information is no longer in the running configuration file in RAM).

```
rtr schedule 25 life 43200 start-time 15:00 apr 5 ageout 43200
```

## Related Commands

**rtr**  
**rtr reaction-configuration**  
**rtr reaction-trigger**

## samples-of-history-kept

To set the number of entries kept in the history table for each bucket in the RTR probe, use the **samples-of-history-kept** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**samples-of-history-kept** *samples*  
**no samples-of-history-kept**

### Syntax Description

*samples*                      Number of entries for each bucket kept in the history table. The default is 16 entries for type pathEcho and 1 entry for all other probes.

### Default

16 entries for type pathEcho  
 1 entry for all other probes

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **samples-of-history-kept** command to control how many entries are saved in the history table. To control the type of information that gets saved in the history table, use the **filter-for-history** command. To set how many buckets are created in the history table, use the **buckets-of-history-kept** command.

A probe collects history and captures statistics. By default, history is not collected. When a problem arises where history is useful (for example, a large number of timeouts are occurring), you can configure the **lives-of-history-kept** command to collect history.

---

**Note** Collecting history increases the RAM usage. Collect history only when you think there is a problem in the network. For general network response time information, use the statistics collected by RTR. Refer to the “Capture Statistics and Collect Error Information” section for more information on statistics collection.

---

### Example

In the following example, 10 entries are kept in the history table for each of the of probe’s 3 lives:

```
rtr 1
  type pathecho protocol ipIcmpEcho 172.16.1.176
  lives-of-history-kept 3
  samples-of-history-kept 10
```

Related Commands

**buckets-of-history-kept**  
**filter-for-history**  
**lives-of-history-kept**  
**rtr**  
**show rtr history**

## show rtr application

Use the **show rtr application** EXEC command to display global information about the RTR feature.

**show rtr application** [**tabular** | **full**]

### Syntax Description

<b>tabular</b>	(Optional) Displays information in a column format reducing the number of screens required to display the information.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value. This is the default.

### Default

All information is displayed.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **show rtr application** command to display information such as supported operation types and supported protocols.

### Sample Display

The following is sample output from the **show rtr application** command in full format:

```
Router# show rtr application full

      Response Time Reporter
Version: 1.0.0 Initial Round Trip Time MIB
Max Packet Data Size (ARR and Data): 16384
Time of Last Change in Whole RTR: *16:49:53.000 UTC Thu May 16 1996
System Max Number of Entries: 20

      Supported Operation Types
Type of Operation to Perform: echo
Type of Operation to Perform: pathEcho

      Supported Protocols
Protocol Type: ipIcmpEcho
Protocol Type: snaRUEcho
Protocol Type: snaLU0EchoAppl
Protocol Type: snaLU2EchoAppl
```

### Related Commands

**show rtr configuration**

## show rtr authentication

Use the **show rtr authentication** EXEC command to display RTR authentication information.

**show rtr authentication**

### Syntax Description

This command has no arguments or keywords.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

Use the **show rtr authentication** command to display information such as supported operation types and supported protocols.

### Sample Display

The following is sample output from the **show rtr application** command:

```
Router# show rtr authentication  
  
RTR control message uses MD5 authentication, key chain name is: rtr
```

### Related Commands

**show rtr configuration**

## show rtr collection-statistics

Use the **show rtr collection-statistics** EXEC command to display statistical information for all RTR probes or a specified probe.

**show rtr collection-statistics** [*number*] [**tabular** | **full**]

### Syntax Description

<i>number</i>	(Optional) Number of the RTR probe to display.
<b>tabular</b>	(Optional) Displays information in a column format to reduce the number of screens required to display the information.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value. This is the default.

### Default

All information is displayed.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **show rtr collection-statistics** command to display information such as the number of failed operations and the failure reason. You can also use the **show rtr distribution-statistics** and **show rtr totals-statistics** commands to display additional statistical information.

### Sample Display

The following is sample output from the **show rtr collection-statistics** command in full format:

```
Router# show rtr collection-statistics 1 full

          Collected Statistics
Entry Number: 1
Start Time Index: *17:15:41.000 UTC Thu May 16 1996
Path Index: 1
Hop in Path Index: 1
Number of Failed Operations due to a Disconnect: 0
Number of Failed Operations due to a Timeout: 0
Number of Failed Operations due to a Busy: 0
Number of Failed Operations due to a No Connection: 0
Number of Failed Operations due to an Internal Error: 0
Number of Failed Operations due to a Sequence Error: 0
Number of Failed Operations due to a Verify Error: 0
Target Address: 172.16.1.176
```

Related Commands

**show rtr configuration**  
**show rtr distributions-statistics**  
**show rtr totals-statistics**

## show rtr configuration

Use the **show rtr configuration** EXEC command to display configuration values including all defaults for all RTR probes or the specified probe.

**show rtr configuration** [*number*] [**tabular** | **full**]

### Syntax Description

<i>number</i>	(Optional) Number of the RTR probe to display.
<b>tabular</b>	(Optional) Displays information in a column format to reduce the number of screens required to display the information.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value. This is the default.

### Default

All information is displayed.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

### Sample Display

The following is sample output from the **show rtr configuration** command in full format:

```
Router# show rtr configuration 1 full

          Complete Configuration Table (includes defaults)
Entry Number: 1
Owner: "Sample Owner"
Tag: "Sample Group"
Type of Operation to Perform: echo
Reaction and History Threshold (milliseconds): 5000
Operation Frequency (seconds): 60
Operation Timeout (milliseconds): 5000
Verify Data: FALSE
Status of Entry (SNMP RowStatus): active
Protocol Type: ipIcmpEcho
Target Address: 1.0.0.1
Source Address: 0.0.0.0
Target Port: 0
Source Port: 0
Request Size (ARR data portion): 28
Response Size (ARR data portion): 1
Control Packets: enabled
Loose Source Routing: disabled
LSR Path:
Type of Service Parameters: 0x0
Life (seconds): 3600
```

```
Next Scheduled Start Time:Pending Trigger
Entry Ageout:never
Connection Loss Reaction Enabled:FALSE
Timeout Reaction Enabled:FALSE
Threshold Reaction Type:never
Threshold Falling (milliseconds):3000
Threshold Count:5
Threshold Count2:5
Reaction Type:none
Number of Statistic Hours kept:2
Number of Statistic Paths kept:1
Number of Statistic Hops kept:1
Number of Statistic Distribution Buckets kept:1
Statistic Distribution Interval (milliseconds):20
Number of History Lives kept:0
Number of History Buckets kept:15
Number of History Samples kept:1
History Filter Type:none
```

## Related Commands

```
show rtr application
show rtr collection-statistics
show rtr distributions-statistics
show rtr history
show rtr operational-state
show rtr reaction-trigger
show rtr totals-statistics
```

## show rtr distributions-statistics

Use the **show rtr distributions-statistics** EXEC command to display statistic distribution information (captured response times) for all RTR probes or a specified probe.

**show rtr distributions-statistics** [*number*] [**tabular** | **full**]

### Syntax Description

<i>number</i>	(Optional) Number of the RTR probe to display.
<b>tabular</b>	(Optional) Displays information in a column format to reduce the number of screens required to display the information. This is the default.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value.

### Default

Information is displayed in tabular format.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The distributions statistics include the following information:

- Sum of completion times (used to calculate the mean time)
- Sum of the completion times squared (used to calculate standard deviation)
- Maximum and minimum completion time
- Number of completed attempts

You can also use the **show rtr collection-statistics** and **show rtr totals-statistics** commands to display additional statistical information.

## Sample Display

The following is sample output from the **show rtr distributions-statistics** command in tabular format:

```
Router# show rtr distributions-statistics tabular

Captured Statistics
Multiple Lines per Entry
Line 1
Entry      = Entry Number
StartT     = Start Time of Entry (hundredths of seconds)
Pth        = Path Index
Hop        = Hop in Path Index
Dst        = Time Distribution Index
Comps      = Operations Completed
OvrTh      = Operations Completed Over Thresholds
SumCmp     = Sum of Completion Times (milliseconds)
Line 2
SumCmp2L  = Sum of Completion Times Squared Low 32 Bits (milliseconds)
SumCmp2H  = Sum of Completion Times Squared High 32 Bits (milliseconds)
TMax      = Completion Time Maximum (milliseconds)
TMin      = Completion Time Minimum (milliseconds)
Entry StartT      Pth Hop Dst Comps      OvrTh      SumCmp
SumCmp2L SumCmp2H  TMax      TMin
1      17417068    1  1  1  2          0          128
      8192      0          64      64
```

## Related Commands

**show rtr collection-statistics**  
**show rtr configuration**  
**show rtr totals-statistics**

## show rtr history

Use the **show rtr history** EXEC command to display history collected for all RTR probes or a specified probe.

**show rtr history** [*number*] [**tabular** | **full**]

### Syntax Description

- number* (Optional) Number of the RTR probe to display.
- tabular** (Optional) Displays information in a column format to reduce the number of screens required to display the information. This is the default.
- full** (Optional) Displays all information using identifiers next to each displayed value.

### Default

Information displayed in tabular format.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The response return codes are listed in Table 1.

**Table 1 Response Return Codes**

<b>Code</b>	<b>Meaning</b>
1	Okay
2	Disconnected
3	Over threshold
4	Timeout
5	Busy
6	Not connected
7	Dropped
8	Sequence error
9	Verify error
10	Application specific

## Sample Display

The following is sample output from the **show rtr history** command in tabular format:

```
Router# show rtr history tabular

      Point by point History
      Multiple Lines per Entry
Line 1
Entry   = Entry Number
LifeI   = Life Index
BucketI = Bucket Index
SampleI = Sample Index
SampleT = Sample Start Time
CompT   = Completion Time (milliseconds)
Sense   = Response Return Code
Line 2 has the Target Address
Entry LifeI      BucketI  SampleI  SampleT  CompT  Sense
2      1          1         1        17436548  16     1
  AB 45 A0 16
2      1          2         1        17436551  4      1
  AC 12 7  29
2      1          2         2        17436551  1      1
  AC 12 5  22
2      1          2         3        17436552  4      1
  AB 45 A7 22
2      1          2         4        17436552  4      1
  AB 45 A0 16
```

## Related Commands

**show rtr configuration**

## show rtr operational-state

Use the **show rtr operational-state** EXEC command to display the operational state of all RTR probes or a specified probe.

**show rtr operational-state** [*number*] [**tabular** | **full**]

### Syntax Description

<i>number</i>	(Optional) Number of the RTR probe to display.
<b>tabular</b>	(Optional) Displays information in a column format to reduce the number of screens required to display the information.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value. This is the default.

### Default

Full information is displayed.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **show rtr operational-state** command to determine whether a connection loss, timeout, or over threshold occurred; how much life the probe has left; whether the probe is active; and the completion time. This command also displays the results of the latest operation attempt.

### Sample Display

The following is sample output from the **show rtr operational-state** command in full format:

```
Router# show rtr operational-state 1 full

          Current Operational State
Entry Number: 1
Modification Time: *17:15:41.000 UTC Thu May 16 1996
Diagnostics Text:
Last Time this Entry was Reset: Never
Number of Octets in use by this Entry: 2438
Connection Loss Occurred: FALSE
Timeout Occurred: FALSE
Over Thresholds Occurred: FALSE
Number of Operations Attempted: 6
Current Seconds Left in Life: 3336
Operational State of Entry: active
Latest Completion Time (milliseconds): 60
Latest Operation Return Code: ok
Latest Operation Start Time: *17:19:41.000 UTC Thu May 16 1996
Latest Target Address: 172.16.1.176
```

Related Commands

**show rtr configuration**

## show rtr reaction-trigger

Use the **show rtr reaction-trigger** EXEC command to display the reaction trigger information for all RTR probes or a specified probe.

**show rtr reaction-trigger** [*number*] [**tabular** | **full**]

### Syntax Description

<i>number</i>	(Optional) Number of the RTR probe to display.
<b>tabular</b>	(Optional) Displays information in a column format to reduce the number of screens required to display the information.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value. This is the default.

### Default

Full information is displayed.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **show rtr reaction-trigger** command to display the configuration status and operational state of target probes that are triggered as defined with the **rtr reaction-configuration** command.

### Sample Display

The following is sample output from the **show rtr reaction-trigger** command in full format:

```
Router# show rtr reaction-trigger 1 full
      Reaction Table
Entry Number: 1
Target Entry Number: 2
Status of Entry (SNMP RowStatus): active
Operational State: pending
```

### Related Commands

**show rtr configuration**

## show rtr responder

Use the **show rtr responder** EXEC command to display RTR responder information.

**show rtr responder**

### Syntax Description

This command has no arguments or keywords.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

Use the **show rtr responder** command to display information about recent sources of RTR control messages, such as who has sent recent control messages and who has sent invalid control messages.

### Sample Display

The following is sample output from the **show rtr responder** command:

```
Router# show rtr responder

RTR Responder is: Enabled
Number of control message received: 19 Number of errors: 1
Recent sources:
    4.0.0.1 [19:11:49.035 UTC Sat Dec 2 1995]
    4.0.0.1 [19:10:49.023 UTC Sat Dec 2 1995]
    4.0.0.1 [19:09:48.707 UTC Sat Dec 2 1995]
    4.0.0.1 [19:08:48.687 UTC Sat Dec 2 1995]
    4.0.0.1 [19:07:48.671 UTC Sat Dec 2 1995]

Recent error sources:
    4.0.0.1 [19:10:49.023 UTC Sat Dec 2 1995] RTT_AUTH_FAIL
```

### Related Commands

**show rtr configuration**

## show rtr totals-statistics

Use the **show rtr totals-statistics** EXEC command to display the total statistical values (accumulation of error counts and completions) for all RTR probes or a specified probe.

```
show rtr totals-statistics [number] [tabular | full]
```

### Syntax Description

<i>number</i>	(Optional) Number of the RTR probe to display.
<b>tabular</b>	(Optional) Displays information in a column format to reduce the number of screens required to display the information.
<b>full</b>	(Optional) Displays all information using identifiers next to each displayed value. This is the default.

### Default

Full information is displayed.

### Command Mode

EXEC

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The total statistics consist of the following items:

- Probe number
- Start time of the current hour of statistics
- Age of the current hour of statistics
- Number of attempted operations

You can also use the **show rtr distributions-statistics** and **show rtr collection-statistics** commands to display additional statistical information.

### Sample Display

The following is sample output from the **show rtr totals-statistics** command in full format:

```
Router# show rtr totals-statistics full

      Statistic Totals
Entry Number: 1
Start Time Index: *17:15:41.000 UTC Thu May 16 1996
Age of Statistics Entry (hundredths of seconds): 48252
Number of Initiations: 10
```

Related Commands

**show rtr collection-statistics**  
**show rtr configuration**  
**show rtr distributions-statistics**

## statistics-distribution-interval

To set the time interval for each statistics distribution kept for the RTR, use the **statistics-distribution-interval** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**statistics-distribution-interval** *milliseconds*  
**no statistics-distribution-interval**

### Syntax Description

*milliseconds*                      Number of milliseconds used for each statistics distribution kept. The default is 20 ms.

### Default

20 ms

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

In most situations, you do not need to change the statistical distribution interval or size. Change the interval or size only when distributions are needed, (for example, when performing statistical modeling of your network). To set the statistical distributions size, use the **distributions-of-statistics-kept** response time reporter configuration command.

### Example

In the following example, the distribution is set to 5 and the distribution interval is set to 10 ms. The first distribution will contain statistics from 0 to 9 ms, the second distribution will contain statistics from 10 to 19 ms, the third distribution will contain statistics from 20 to 29 ms, the fourth distribution will contain statistics from 30 to 39 ms, and the fifth distribution will contain statistics from 40 ms to infinity.

```
rtr 1
  type echo protocol ipIcmpEcho 172.28.161.21
  distribution-of-statistics-kept 5
  statistics-distribution-interval 10
```

### Related Commands

**distributions-of-statistics-kept**  
**hops-of-statistics-kept**  
**hours-of-statistics-kept**  
**paths-of-statistics-kept**  
**rtr**

## tag

To create a user-specified identifier for an RTR probe, use the **tag** RTR configuration command. It is normally used to logically link probes in a group. Use the **no** form of this command to remove a tag from a probe.

```
tag text  
no tag
```

### Syntax Description

<i>text</i>	Name of a group that this probe belongs to. From 0 to 16 ASCII characters.
-------------	--

### Default

None

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Tags can be used to support automation (for example, by using the same tag for two different probes on two different routers echoing the same target).

### Example

In the following example, probe 1 is tagged with the label *bluebell*:

```
rtr 1  
  type echo protocol ipIcmpEcho 172.16.1.176  
  tag bluebell
```

### Related Commands

**rtr**

## threshold

To set the rising threshold (hysteresis) that generates a reaction event and stores history information for the RTR probe, use the **threshold** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**threshold** *millisecond*  
**no threshold**

### Syntax Description

*millisecond*                      Number of milliseconds required for a rising threshold to be declared.  
The default value is 5000 ms.

### Default

5000 ms

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

The value specified for the **threshold** command must not exceed the value specified for the **timeout** command.

The threshold value is used by the **rtr reaction-configuration** and **filter-for-history** commands.

### Example

In the following example, the threshold for probe 1 is set to 2500 ms:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.1.176
  threshold 2500
```

### Related Commands

**filter-for-history**  
**rtr**  
**rtr reaction-configuration**

## timeout

To set the amount of time the RTR probe waits for a response from its request packet, use the **timeout** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**timeout** *millisecond*  
**no timeout**

### Syntax Description

*millisecond*                      Number of milliseconds the probe waits to receive a response from its request packet. The default is 5000 ms.

### Default

5000 ms

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Use the **timeout** command to set how long the probe waits to receive a response, and use the **frequency** command to set the rate at which the probe starts an RTR operation.

The value specified for the **timeout** command cannot be greater than the value specified for the **frequency** command.

### Example

In the following example, the timeout is set for 2500 ms:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.1.176
  timeout 2500
```

### Related Commands

**frequency**  
**rtr**

## tos

To define a type of service byte in the IP header of an RTR probe, use the **tos** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**tos** *number*  
**no tos**

### Syntax Description

<i>number</i>	Service type byte in the IP header. The range is 0 to 255. The default is 0.
---------------	--

### Default

The default type of service value is 0.

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

### Example

In the following example, probe 1 is configured as an echo probe using the IP/ICMP Echo protocol and the destination IP address 172.16.1.175. The ToS value is set to 0x80:

```
rtr 1
  type echo protocol ipIcmpEcho 172.16.1.176
  tos 0x80
```

### Related Commands

**rtr**

## type echo

To configure an echo probe, use the **type echo** response time reporter configuration command. You must configure the probe's type before you can configure any of the other characteristics of the probe. Use the **no** form of this command to remove the type configuration for the probe.

```
type echo protocol type type-target
no type echo protocol type type-target
```

### Syntax Description

<b>echo</b>	Perform end-to-end RTR operations only.
<b>protocol</b> <i>type type-target</i>	<p>Protocol used by the probe. Type can be one of the following keywords (whether the keyword is available depends on the Cisco IOS software features installed on your router) followed by the required type parameter:</p> <ul style="list-style-type: none"> <li>• <b>ipIcmpEcho</b> {<i>ip-address</i>   <i>ip-host-name</i>}—IP/ICMP Echo that requires a destination IP address or IP host name.</li> <li>• <b>snaRUEcho</b> <i>sna-host-name</i>—SNA's SSCP Native Echo that requires the host name defined for the SNA's PU connection to VTAM.</li> <li>• <b>snaLU0EchoAppl</b> <i>sna-host-name</i> [<i>sna-application</i>] [<i>sna-mode</i>]—SNA LU type 0 connection to Cisco's NSPECHO host application that requires the host name defined for the SNA's PU connection to VTAM. Optionally, specify the host application name (the default is NSPECHO) and SNA mode to access the application.</li> <li>• <b>snaLU2EchoAppl</b> <i>sna-host-name</i> [<i>sna-application</i>] [<i>sna-mode</i>]—SNA LU type 2 connection to Cisco's NSPECHO host application that requires the host name defined for the SNA's PU connection to VTAM. Optionally, specify the host application name (the default is NSPECHO) and SNA mode to access the application.</li> </ul>

### Default

None

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Support of echo to a protocol and pathEcho to a protocol is dependent on the protocol type and implementation. In general most protocols support echo and few protocols support pathEcho.

---

**Note** Keywords are not case sensitive and are shown in mixed case for readability only.

---

### Example

In the following example, probe 10 is created and configured as echo using the IP/ICMP Echo protocol and the destination IP address 172.16.1.175:

```
rtr 10
  type echo protocol ipIcmpEcho 172.16.1.175
```

### Related Commands

**rtr**  
**show rtr configuration**

## type pathEcho

To configure a pathEcho probe, use the **type pathEcho** response time reporter configuration command. You must configure the probe's type before you can configure any of the other characteristics of the probe. Use the **no** form of this command to remove the type configuration for the probe.

```
type pathEcho protocol type type-target
no type pathEcho protocol type type-target
```

### Syntax Description

<b>pathEcho</b>	Perform RTR operations using a route discovery algorithm to find a path to the destination and echo each device on the path.
<b>protocol</b> <i>type type-target</i>	<p>Protocol used by the probe. Type can be one of the following keywords (whether the keyword is available depends on the Cisco IOS software features installed on your router) followed by the required type parameter:</p> <ul style="list-style-type: none"> <li>• <b>ipIcmpEcho</b> {<i>ip-address</i>   <i>ip-host-name</i>}—IP/ICMP Echo that requires a destination IP address or IP host name.</li> <li>• <b>snaRUEcho</b> <i>sna-host-name</i>—SNA's SSCP Native Echo that requires the host name defined for the SNA's PU connection to VTAM.</li> <li>• <b>snaLU0EchoAppl</b> <i>sna-host-name</i> [<i>sna-application</i>] [<i>sna-mode</i>]—SNA LU type 0 connection to Cisco's NSPECHO host application that requires the host name defined for the SNA's PU connection to VTAM. Optionally, specify the host application name (the default is NSPECHO) and SNA mode to access the application.</li> <li>• <b>snaLU2EchoAppl</b> <i>sna-host-name</i> [<i>sna-application</i>] [<i>sna-mode</i>]—SNA LU type 2 connection to Cisco's NSPECHO host application that requires the host name defined for the SNA's PU connection to VTAM. Optionally, specify the host application name (the default is NSPECHO) and SNA mode to access the application.</li> </ul>

### Default

None

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Support of echo to a protocol and pathEcho to a protocol is dependent on the protocol type and implementation. In general most protocols support echo and few protocols support pathEcho.

---

**Note** Keywords are not case sensitive and are shown in mixed case for readability only.

---

### Example

In the following example, probe 10 is created and configured as pathEcho using the IP/ICMP Echo protocol and the destination IP address 172.16.1.175:

```
rtr 10
  type pathEcho protocol ipIcmpEcho 172.16.1.175
```

### Related Commands

**rtr**  
**show rtr configuration**

## type tcpConnect

To define a tcpConnect probe use the **type tcpConnect** response time reporter configuration command. Use the **no** form of this command to remove the type configuration for the probe.

```
type tcpConnect dest-ipaddr {name | ip addr} dest-port port number [source-ipaddr {name | ip addr} source-port port number] [control {enable | disable}]
no type tcpConnect dest-ipaddr {name | ip addr} dest-port port number
```

### Syntax Description

<b>dest-ipaddr</b> <i>name</i> / <i>ip addr</i>	Destination of tcpConnect probe. IP host name or IP address.
<b>dest-port</b> <i>port number</i>	Destination port number.
<b>source-ipaddr</b> <i>name</i> / <i>ip addr</i>	Source IP host name or IP address.
<b>source-port</b> <i>port number</i>	(Optional) Port number of the source. When a port number is not specified, RTR picks the best IP address (nearest to the target) and available UDP port.
<b>control</b>	(Optional) Specifies that the RTR control protocol should be used when running this probe. The control protocol is required when the probe's target is a Cisco router that does not natively provide the service (TCP service in this case). Combined with the <b>enable</b> or <b>disable</b> keyword, enables or disables sending a control message to the destination port. The default is that the control protocol is enabled.
<b>enable</b>	Enable the RTR collector to send a control message to the destination port prior to sending a probe packet.
<b>disable</b>	Disable the RTR from sending a control message to the responder prior to sending a probe packet.

### Default

The control protocol is enabled. Prior to sending a probe packet to the responder, the RTR collector sends a control message to the responder to enable the destination port.

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

You must configure the probe's type before you can configure any of the other characteristics of the probe.

### Example

In the following example, probe 11 is created and configured as a tcpConnect probe using the destination IP address 172.16.1.175 and the destination port 2400:

```
rtr 11
  type tcpConnect dest-ipaddr 172.16.1.175 dest-port 2400
```

### Related Commands

**rtr**  
**show rtr configuration**

## type udpEcho

To define a udpEcho probe use the **type udpEcho** response time reporter configuration command. Use the **no** form of this command to remove the type configuration for the probe.

```
type udpEcho dest-ipaddr {name | ip addr} dest-port port number [source-ipaddr {name | ip addr} source-port port number] [control {enable | disable}]
no type udpEcho dest-ipaddr {name | ip addr} dest-port port number
```

### Syntax Description

<b>dest-ipaddr</b> <i>name</i> / <i>ip addr</i>	Destination of the udpEcho probe. IP host name or IP address.
<b>dest-port</b> <i>port number</i>	Destination port number.
<b>source-ipaddr</b> <i>name</i> / <i>ip addr</i>	Source IP host name or IP address.
<b>source-port</b> <i>port number</i>	(Optional) Port number of the source. When a port number is not specified, RTR picks the best IP address (nearest to the target) and available UDP port
<b>control</b>	(Optional) Specifies that the RTR control protocol should be used when running this probe. The control protocol is required when the probe's target is a Cisco router that does not natively provide the service (UDP service in this case). Combined with the <b>enable</b> or <b>disable</b> keyword, enables or disables sending of a control message to the destination port. The default is that the control protocol is enabled.
<b>enable</b>	Enable the RTR collector to send a control message to the destination port prior to sending a probe packet.
<b>disable</b>	Disable the RTR from sending a control message to the responder prior to sending a probe packet.

### Default

The control protocol is enabled. Prior to sending a probe packet to the responder, the RTR collector sends a control message to the responder to enable the destination port.

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 12.0(3)T.

You must configure the probe's type before you can configure any of the other characteristics of the probe.

The source IP address and port number are optional. If they are not specified, RTR selects the IP address nearest to the target and an available UDP port.

### Example

In the following example, probe 12 is created and configured as udpEcho probe using the destination IP address 172.16.1.175 and destination port 2400:

```
rtr 12
  type udpEcho dest-ipaddr 172.16.1.175 dest-port 2400
```

### Related Commands

**rtr**  
**show rtr configuration**

## verify-data

To cause the RTR probe to check each response for corruption, use the **verify-data** response time reporter configuration command. Use the **no** form of this command to return to the default value.

**verify-data**  
**no verify-data**

### Syntax Description

This command has no arguments or keywords.

### Default

Disabled

### Command Mode

Response time reporter configuration

### Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

Only use the **verify-data** command when corruption may be a problem in your network.



**Caution** Do not enable this feature during normal operation because it causes unnecessary overhead. Use the **verify-data** command only if you suspect there is a problem in your network.

### Example

In the following example, probe 5 is configured to verify the data for each response:

```
rtr 5
  type echo protocol ipIcmpEcho 172.16.1.174
  request-data-size 2
  verify-data
```

### Related Commands

**rtr**  
**show rtr configuration**

