



Using Segment Routing Traffic Matrix

This module provides information about the Segment Routing Traffic Matrix (SR-TM) and the Traffic Collector process, and describes how to configure the TM border and the Traffic Collector and to display traffic information.

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Segment Routing Traffic Matrix

A network's traffic matrix is a description, measure, or estimation of the aggregated traffic flows that enter, traverse, and leave a network.

The Segment Routing Traffic Matrix (SR-TM) is designed to help users understand traffic patterns on a router. The Traffic Matrix border divides the network into two parts: internal (interfaces that are inside the border) and external (interfaces that are outside the border). By default, all interfaces are internal. You can configure an interface as external.

Traffic Collector Process

The Traffic Collector collects packet and byte statistics from router components such as prefix counters, tunnel counters, and the TM counter. The TM counter increments when traffic that comes from an external interface to the network is destined for a segment routing prefix-SID. The Traffic Collector keeps histories of the statistics and makes them persistent across process restarts, failovers, and ISSU. Histories are retained for a configurable length of time.

Pcounters

A Pcounter is a packet and byte pair of counters. There is one Pcounter per tunnel. There are two Pcounters per prefix-SID:

- Base Pcounter – any packet that is switched on the prefix-SID forwarding information base (FIB) entry
- TM Pcounter – any packet from an external interface and switched on the prefix-SID FIB entry

The Traffic Collector periodically collects the Base Pcounters and TM Pcounters of all prefix-SIDs, and the Pcounters of all tunnel interfaces.

For each Pcounter, the Traffic Collector calculates the number of packets and bytes that have been forwarded during the last interval. The Traffic Collector keeps a history of the per-interval statistics for each of the Pcounters. Each entry in the history contains:

- The start and end time of the interval
- The number of packets forwarded during the interval
- The number of bytes forwarded during the interval

Feature Support and Limitations

- Pcounters for IPv4 SR Prefix SIDs are supported.
- Pcounters for IPv6 SR Prefix SIDs are not supported.
- TM Pcounters increment for incoming SR-labeled and IP traffic destined for an SR Prefix SID.
- External interface support can be enabled on all Ethernet interfaces except Management, Bundle, and sub interfaces. Tunnels may not be set as external interfaces.
- Default VRF is supported. Non-default VRF is not supported.

Configuring Traffic Collector

Perform these tasks to configure the traffic collector.

SUMMARY STEPS

1. **configure**
2. **traffic-collector**
3. **statistics collection-interval** *value*
4. **statistics history-size** *value*
5. **statistics history-timeout** *value*
6. **interface** *type l3-interface-address*
7. Use the **commit** or **end** command.

DETAILED STEPS

	Command or Action	Purpose
Step 1	configure Example: RP/0/RP0/CPU0:router# configure	Enters XR Config mode.
Step 2	traffic-collector Example:	Enables traffic collector and places the router in traffic collector configuration mode.

	Command or Action	Purpose
	<pre>RP/0/RP0/CPU0:router(config)# traffic-collector</pre>	
Step 3	<p>statistics collection-interval <i>value</i></p> <p>Example:</p> <pre>RP/0/RP0/CPU0:router(config-tc)# statistics collection-interval 5</pre>	<p>(Optional) Sets the frequency that the traffic collector collects and posts data, in minutes. Valid values are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60. The default interval is 1.</p>
Step 4	<p>statistics history-size <i>value</i></p> <p>Example:</p> <pre>RP/0/RP0/CPU0:router(config-tc)# statistics history-size 10</pre>	<p>(Optional) Specifies the number of entries kept in the history database. Valid values are from 1 to 10. The default is 5.</p> <p>Note The number of entries affects how the average packet and average byte rates are calculated. The rates are calculated over the range of the histories and are not averages based in real time.</p>
Step 5	<p>statistics history-timeout <i>value</i></p> <p>Example:</p> <pre>RP/0/RP0/CPU0:router(config-tc)# statistics history-timeout 24</pre>	<p>(Optional) When a prefix SID or a tunnel-te interface is deleted, the history-timeout sets the length of time, in hours, that the prefix SID and tunnel statistics are retained in the history before they are removed. The minimum is one hour; the maximum is 720 hours. The default is 48.</p> <p>Note Enter 0 to disable the history timeout. (No history is retained.)</p>
Step 6	<p>interface <i>type l3-interface-address</i></p> <p>Example:</p> <pre>RP/0/RP0/CPU0:router(config-tc)# interface TenGigE0/1/0/3</pre>	Identifies interfaces that handle external traffic. Only L3 interfaces are supported for external traffic.
Step 7	Use the commit or end command.	<p>commit —Saves the configuration changes and remains within the configuration session.</p> <p>end —Prompts user to take one of these actions:</p> <ul style="list-style-type: none"> • Yes — Saves configuration changes and exits the configuration session. • No —Exits the configuration session without committing the configuration changes. • Cancel —Remains in the configuration session, without committing the configuration changes.

This completes the configuration for the traffic collector.

Displaying Traffic Information

The following show commands display information about the interfaces and tunnels:



Note For detailed information about the command syntax for the following **show** commands, see the *Segment Routing Command Reference Guide*.

- Display the configured external interfaces:

```
RP/0/RSP0/CPU0:router# show traffic-collector external-interface
Interface                Status
-----                -
Te0/1/0/3                Enabled
Te0/1/0/4                Enabled
```

- Display the counter history database for a prefix-SID:

```
RP/0/RSP0/CPU0:router# show traffic-collector ipv4 counters prefix 10.1.1.10/32 detail
Prefix: 10.1.1.10/32 Label: 16010 State: Active
Base:
  Average over the last 5 collection intervals:
    Packet rate: 9496937 pps, Byte rate: 9363979882 Bps

  History of counters:
    23:01 - 23:02: Packets 9379529, Bytes: 9248215594
    23:00 - 23:01: Packets 9687124, Bytes: 9551504264
    22:59 - 23:00: Packets 9539200, Bytes: 9405651200
    22:58 - 22:59: Packets 9845278, Bytes: 9707444108
    22:57 - 22:58: Packets 9033554, Bytes: 8907084244
TM Counters:
  Average over the last 5 collection intervals:
    Packet rate: 9528754 pps, Byte rate: 9357236821 Bps

  History of counters:
    23:01 - 23:02: Packets 9400815, Bytes: 9231600330
    23:00 - 23:01: Packets 9699455, Bytes: 9524864810
    22:59 - 23:00: Packets 9579889, Bytes: 9407450998
    22:58 - 22:59: Packets 9911734, Bytes: 9733322788
    22:57 - 22:58: Packets 9051879, Bytes: 8888945178
```

This output shows the average Pcounter (packets, bytes), the Pcounter history, and the collection interval of the Base and TM for the specified prefix-SID.

- Display the counter history database for a policy:

```
RP/0/RSP0/CPU0:router# show traffic-collector counters tunnels srte_c_12_ep_6.6.6.2
detail
Tunnel: srte_c_12_ep_6.6.6.2 State: Active
  Average over the last 5 collection intervals:
    Packet rate: 9694434 pps, Byte rate: 9597489858 Bps

  History of counters:
    23:14 - 23:15: Packets 9870522 , Bytes: 9771816780
```

```

23:13 - 23:14: Packets 9553048 , Bytes: 9457517520
23:12 - 23:13: Packets 9647265 , Bytes: 9550792350
23:11 - 23:12: Packets 9756654 , Bytes: 9659087460
23:10 - 23:11: Packets 9694434 , Bytes: 9548235180

```

This output shows the average Pcounter (packets, bytes), the Pcounter history, and the collection interval for the policy.

Configuring Telemetry Session to Export SR-TM Statistics

The following configuration shows how to enable the SR-TM and the corresponding model-driven streaming Telemetry paths for exporting SR-TM statistics. Refer to the *Telemetry Configuration Guide for Cisco NCS 6000 Series Routers* for details on telemetry.

```

/* Configure the SR-TM */

traffic-collector
interface TenGigE0/3/0/0/8
!
statistics
  history-size 10
  history-timeout 1
!
!
/* Configure streaming telemetry */

telemetry model-driven
destination-group test-collector-1
  address-family ipv4 10.1.201.250 port 1624
  encoding self-describing-gpb
  protocol tcp
!
!
destination-group test-collector-2
  address-family ipv4 10.30.110.147 port 31500
  encoding self-describing-gpb
  protocol tcp
!
!

/* Configure telemetry paths for SR-TM */

sensor-group test-sg-SRTM
  sensor-path Cisco-IOS-XR-infra-tc-oper:traffic-collector/summary
  sensor-path Cisco-IOS-XR-infra-tc-oper:traffic-collector/afs/af/counters/tunnels/tunnel
  sensor-path Cisco-IOS-XR-infra-tc-oper:traffic-collector/afs/af/counters/prefixes/prefix
  sensor-path
Cisco-IOS-XR-infra-tc-oper:traffic-collector/external-interfaces/external-interface
  sensor-path
Cisco-IOS-XR-infra-tc-oper:traffic-collector/vrf-table/default-vrf/afs/af/counters/tunnels/tunnel
  sensor-path
Cisco-IOS-XR-infra-tc-oper:traffic-collector/vrf-table/default-vrf/afs/af/counters/prefixes/prefix
!
subscription test-subscription
  sensor-group-id test-sg-SRTM sample-interval 60000
  destination-id test-collector-1
  destination-id test-collector-2
  source-interface Loopback0
!
!

```

