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, which 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

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. **commit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure**	
Step 2	**traffic-collector** **Example:** `RP/0/RP0/CPU0:router(config)# traffic-collector`	Enables traffic collector and places the router in traffic collector configuration mode.
Step 3	**statistics collection-interval** *value* **Example:** `RP/0/RP0/CPU0:router(config-tc)# statistics collection-interval 5`	(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.
Step 4	**statistics history-size** *value* **Example:**	(Optional) Specifies the number of entries kept in the history database. Valid values are from 1 to 10. The default is 5.

	Command or Action	Purpose
	`RP/0/RP0/CPU0:router(config-tc)# statistics history-size 10`	**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.
Step 5	**statistics history-timeout** *value* **Example:** `RP/0/RP0/CPU0:router(config-tc)# statistics history-timeout 24`	(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. **Note** Enter 0 to disable the history timeout. (No history is retained.)
Step 6	**interface** *type l3-interface-address* **Example:** `RP/0/RP0/CPU0:router(config-tc)# interface TenGigE 0/1/0/3`	Identifies interfaces that handle external traffic. Only L3 interfaces are supported for external traffic.
Step 7	**commit**	

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 1.1.1.10/32 detail
Prefix: 1.1.1.10/32  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 tunnel:

```
RP/0/RSP0/CPU0:router# show traffic-collector counters tunnels tunnel-te 1 detail
Tunnel: tt1 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 tunnel.