NOKIA

Nokia Service Router Linux

TROUBLESHOOTING TOOLKIT
RELEASE 22.3

3HE 18308 AAAA TQZZA
Issue 01

March 2022

Nokia is committed to diversity and inclusion. We are continuously reviewing our customer documentation and consulting with standards bodies to ensure that terminology is inclusive and aligned with the industry. Our future customer documentation will be updated accordingly.

Table of contents

1 About this guide

This document describes how to use and configure diagnostic tools for the Nokia Service Router Linux (SR Linux).

This document is intended for network technicians, administrators, operators, service providers, and others who need to understand how to use and configure diagnostic tools.

Note:

This manual covers the current release and may also contain some content that will be released in later maintenance loads. See the *SR Linux Release Notes* for information about features supported in each load.

1.1 Precautionary and information messages

The following are information symbols used in the documentation.

DANGER: Danger warns that the described activity or situation may result in serious personal injury or death. An electric shock hazard could exist. Before you begin work on this equipment, be aware of hazards involving electrical circuitry, be familiar with networking environments, and implement accident prevention procedures.

WARNING: Warning indicates that the described activity or situation may, or will, cause equipment damage, serious performance problems, or loss of data.

Caution: Caution indicates that the described activity or situation may reduce your component or system performance.

Note: Note provides additional operational information.

Tip: Tip provides suggestions for use or best practices.

1.2 Conventions

Nokia SR Linux documentation uses the following command conventions.

- **Bold** type indicates a command that the user must enter.
- Input and output examples are displayed in `Courier` text.
- An open right angle bracket indicates a progression of menu choices or simple command sequence (often selected from a user interface).

  Example: **start** > **connect to**
- A vertical bar (|) indicates a mutually exclusive argument.
- Square brackets ([ ]) indicate optional elements.

- Braces ({ }) indicate a required choice. When braces are contained within square brackets, they indicate a required choice within an optional element.
- *Italic* type indicates a variable.

Generic IP addresses are used in examples. Replace these with the appropriate IP addresses used in the system.

2 What’s new

There have been no updates in this document since it was last released.

3 sFlow

sFlow is used to monitor data traffic flows traversing different points in a network. The sFlow functionality uses an sFlow agent and an sFlow collector. The agent is software that runs on a network element and samples and reports flow headers and statistics. The collector is software that typically runs on a remote server and receives the flow headers and statistics from one or more sFlow agents.

Sampling and reporting is accomplished as the sFlow agent running on a network element takes periodic samples of ingress traffic and reports the data to one or more collectors. The network element does not need to maintain a local flow cache. Instead, the sampled header information is immediately sent to the collector without additional processing.

The SR Linux supports sFlow version 5 behavior and formats. On 7250 IXR chassis-based systems, sFlow is implemented in hardware. On 7220 IXR-D2, D3 and IXR-H systems, sFlow functionality is implemented in software. sFlow behavior is identical on both platforms.

3.1 sFlow sampling

sFlow works by sampling flow data and reporting the samples to the configured sFlow collectors. Based on the configured system sampling rate, the forwarding plane samples ingress packet flows and sends the sampled headers to the sFlow agent in the control plane.

All ingress packets are subject to sampling. Each sample includes the top 256 bytes of the sampled packet, starting at the outer Ethernet header. The sampled packets are sent to the configured sFlow collectors with the sampled data in sFlow raw packet data format.

For sampled IPv4 packets, the IPv4 header data fields are sent with the raw data. For sampled IPv6 packets, the IPv6 header data fields are sent with the raw data.

3.2 sFlow collector reporting

sFlow reports sampled headers and statistics to the configured collectors using IP/UDP datagrams. UDP port 6343 is the default destination port, but you can optionally configure a different port. Sampled packets are sent as soon as the samples are taken, and interface statistics are sent based on the configured poll-interval (default 20 seconds). SR Linux supports up to 8 remote sFlow collectors. Each collector can only have one IPv4 address. The flow and counter samples are aggregated in a sflow datagram packet in software implementation.

3.3 sFlow counter samples

Another aspect of the sFlow agent is streaming of interface statistics to configured sFlow collectors. Statistics are only sent to a collector if sFlow has been enabled on an interface. Interface statistics are sent based on a default poll-interval of 20 seconds with a separate timer for each interface. When the interval expires. the current value of each associated statistics are sent to the configured collectors.

The interface counter sample contains:

- Interface index
- Interface type
- Interface speed
- Oper and admin status
- Input octets
- Input packets
- Input broadcast packets
- Input discards packets
- Output errors
- Output octets
- Output packets
- Output broadcast packets
- Output discards packets

3.4 Configuring the sFlow agent

To configure the sFlow agent on the system, you enable sFlow, and optionally configure the sampling rate (by default, 1 out of every 10,000 packets) and sample size (by default, 256 bytes are sampled from each packet).

Example:

The following example enables sFlow on the system and configures the system sampling rate and sample size. Note that the sample size and polling interval are not configurable. The following default sample size applies:

- 7220 IXR-D2, D3 and 7220 IXR-H systems: 256 bytes
- 7250 IXR 6/10: 220 bytes

```
--{ * candidate shared }--[  ]--
    system {
        sflow {
            admin-state enable
            }
        }
    }
```

3.5 Configuring sFlow collectors

The sFlow agent sends sampled packets to sFlow collectors. You can configure up to 8 sFlow collectors to receive the data. To configure an sFlow collector, you specify its IP address, associated network instance, and IP address to be used as the source IP address in sFlow packets sent from the SR Linux to the collector. You can optionally specify a destination port (by default, this is UDP port 6343).

Note:

Configuring a network-instance is mandatory. Also, a collector cannot be reached using the **mgmt** network-instance.

Example:

The following example configures two sFlow collectors. The IP address for each collector is configured, as well as its network instance and source IP address. Each collector receives all samples.

```
--{ * candidate shared }--[  ]--
    system {
        sflow {
            collector 1 {
                collector-address 1.3.4.4
                source-address 2.2.2.2
                network-instance default
            collector 2 {
                collector-address 2.3.4.4
                source-address 2.3.2.2
                network-instance default
                port 4310
                }
            }
        }
    }
```

3.6 Configuring sFlow for an interface

When sFlow is configured for an interface, the ingress packets are taken for sampling according to the sample-rate.

Example:

The following example enables sFlow on an interface.

```
--{ * candidate shared }--[  ]--
    interface ethernet-1/1 {
        sflow {
            admin-state enable
        }
    }
```

3.7 Displaying the state of the sFlow agent

To display the system-wide state of the sFlow agent, including any sFlow parameters, collector configuration, and general statistics, use the **info from state** command in candidate or running mode, or the **info** command in state mode.

Example:

```
# info from state system sflow
    system {
        sflow {
            admin-state enable
            sample-rate 1000
```

```
            sample-size 256
            collector 1 {
                collector-address 10.1.1.24
                network-instance default
                source-address 5.5.5.5
                port 6343
                next-hop 172.24.71.65
            }
            statistics {
                total-samples-taken 5457
                total-sent-packets 26800
            }
        }
    }
```

3.8 Displaying the status of the sFlow agent

Use the **show system sflow status** command in show mode to display the general status of the sFlow agent:

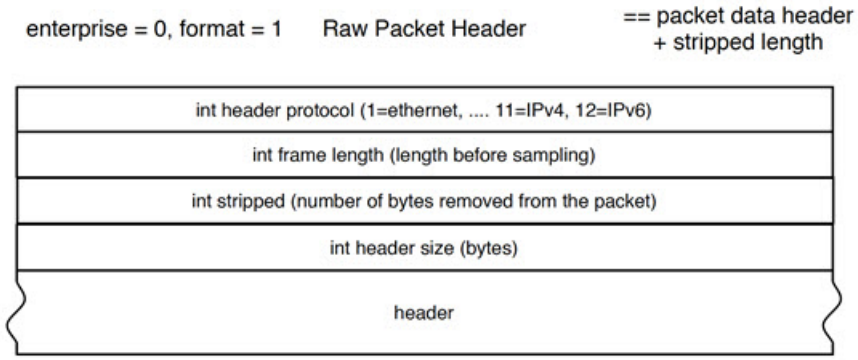
Example:

```
--{ running }--[  ]--
# enter show
# show system sflow status
-------------------------------------
Admin State            : enable
Sample Rate            : 10000
Sample Size            : 256
Total Samples          : 0
Total Collector Packets: 3269158
-------------------------------------
  collector-id     : 8
  collector-address: 172.10.10.10
  network-instance : default
  source-address   : 10.0.0.1
  port             : 6343
  next-hop         : 18.7.8.1
-------------------------------------
```

3.9 sFlow formats

Figure 1: Raw packet header shows an example of a raw packet header for an sFlow format.

Figure 1: Raw packet header



3.10 Sampled data and counter examples

The following is an example of sample data:

Example: Flow sample data

```
InMon sFlow
    Datagram version: 5
    Agent address type: IPv4 (1)
    Agent address: 0.0.0.0
    Sub-agent ID: 2
    Sequence number: 0
    SysUptime: 0
    NumSamples: 1
    Flow sample, seq 0
        0000 0000 0000 0000 0000 .... .... .... = Enterprise: standard sFlow (0)
        .... .... .... .... .... 0000 0000 0001 = sFlow sample type: Flow sample (1)
        Sample length (byte): 141
        Sequence number: 0
        0000 0000 .... .... .... .... .... .... = Source ID class: 0
        .... .... 0000 0000 0000 0000 0011 0110 = Index: 54
        Sampling rate: 1 out of 5 packets
        Sample pool: 0 total packets
        Dropped packets: 0
        Input interface (ifIndex): 54
        .000 0000 0000 0000 0000 0000 0011 0110 = Output interface (ifIndex): 54
        Flow record: 1
        Raw packet header
            0000 0000 0000 0000 0000 .... .... .... = Enterprise: standard sFlow (0)
            Format: Raw packet header (1)
            Flow data length (byte): 101
            Header protocol: Ethernet (1)
            Frame Length: 98
            Payload removed: 0
            Original packet length: 85
            Header of sampled packet:
              000c000200000000001111110800450000520000000004006...
                Ethernet II, Src: 00:00:00_11:11:11 (00:00:00:11:11:11),
                    Dst: BebIndus_02:00:00 (00:0c:00:02:00:00)
                    Destination: BebIndus_02:00:00 (00:0c:00:02:00:00)
```

```
                    Source: 00:00:00_11:11:11 (00:00:00:11:11:11)
                    Type: IPv4 (0x0800)
                Internet Protocol Version 4, Src: 10.100.1.2, Dst: 10.1.1.2
                    0100 .... = Version: 4
                    .... 0101 = Header Length: 20 bytes (5)
                    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
                    Total Length: 82
                    Identification: 0x0000 (0)
                    Flags: 0x00
                    Fragment offset: 0
                    Time to live: 64
                    Protocol: TCP (6)
                    Header checksum: 0x35a1 [validation disabled]
                    [Header checksum status: Unverified]
                    Source: 10.100.1.2
                    Destination: 10.1.1.2767689
                    [Source GeoIP: Unknown]
                    [Destination GeoIP: Unknown]
                Transmission Control Protocol, Src Port: 0, Dst Port: 0, Seq: 0
                LBT-TCP Protocol
                LBMC Protocol
                [Unreassembled Packet: LBT-TCP]
```

The following is a counter sample example:

Example: Counters sample

```
InMon sFlow
    Datagram version: 5
    Agent address: 10.0.0.1 (10.0.0.1)
    Sub-agent ID: 0
    Sequence number: 8
    SysUptime: 6548000
    NumSamples: 1
    Counters sample, seq 1
        Enterprise: standard sFlow (0)
        sFlow sample type: Counters sample (2)
        Sample length (byte): 108
        Sequence number: 1
        Source ID type: 64
        Source ID index: 49150
        Counters records: 1
        Generic interface counters
            Enterprise: standard sFlow (0)
            Format: Generic interface counters (1)
            Flow data length (byte): 88
            Interface index: 1073790974
            Interface Type: 6
            Interface Speed: 25600
            IfDirection: Full-Duplex
            IfAdminStatus: Up
            IfOperStatus: Up
            Input Octets: 0
            Input Packets: 0
            Input Multicast Packets: 0
            Input Broadcast Packets: 0
            Input Discarded Packets: 0
            Input Errors: 0
            Input Unknown Protocol
Packets: 0
            Output Octets: 0
            Output Packets: 0
            Output Multicast Packets: 0
            Output Broadcast Packets: 0
            Output Discarded Packets: 0
```

```
            Output Errors: 0
            Promiscuous Mode: 0
```

4 Interactive traffic-monitoring tool

SR Linux features an interactive traffic-monitoring tool that allows you to capture and monitor traffic based on 5-tuple match criteria. The match criteria is injected into a capture-filter ACL entry that is applied to all subinterfaces; information from matching packets can be displayed on screen or directed to a file.

4.1 Using the interactive traffic-monitoring tool

You can specify the match criteria either by using the **tools system traffic-monitor** CLI command, or by defining capture-filter ACL entries.

If you use the **tools system traffic-monitor** command to specify the match criteria, SR Linux dynamically creates a capture-filter entry with the match criteria. Packets that match the capture-filter entry are sent to the traffic-monitoring tool running on the CPM and displayed until the traffic-monitoring tool is exited, at which time the dynamically created capture-filter entries are removed.

Use the following syntax to configure the **tools system traffic-monitor** command:

tools system traffic-monitor [source-address <*ip-addr/len*>**] [destination-address** <*ip-addr/len*>**] [protocol** <*proto-val*>**] [source-port** <*value* | *range*>**] [destination-port** <*value* | *range*>**] [verbose] [output-file** <*file-name*>**] [hex-output]**

The command parameters are described in Table 1: Traffic monitoring command parameters.

Table 1: Traffic monitoring command parameters

Command/parameter	Description
tools system traffic-monitor	Initiates an interactive monitor session
source-address <*ip-addr/len*>	Source IP address (IPv4 or IPv6) prefix and netmask length value. For example: 10.10.11.0/24
destination-address <*ip-addr/len*>	Destination IP address (IPv4 or IPv6) prefix and netmask length value. For example: 10.10.20.0/24
protocol <*proto-val*>	Specifies the protocol type value to match (required if either port values are specified)
source-port <*value* | *range*>	Source port integer value or port range in the format of port1..port2
destination-port <*value* | *range*>	Destination port integer value or port range in the format of port1..port2
verbose	Displays detailed output

Command/parameter	Description
output-file *<file-name>*	Directs output to a file
hex-output	Displays output in hex format

If you specify the match criteria by defining capture-filter ACL entries, starting the traffic-monitoring tool with the **tools system traffic-monitor** command causes the system to send packets that match the defined capture-filter entries to the CPM and display them until the traffic-monitoring tool is exited. Unlike the dynamically created capture-filter entries, the defined capture-filter entries are not removed from the system when the traffic-monitoring tool is exited.

The following is an example of a capture-filter ACL entry:

Example:

```
acl {
        capture-filter {
            ipv4-filter {
                entry 1 {
                    action {
                        copy {
                        }
                    }
                    match {
                        destination-address 1.1.1.1/32
                        protocol icmp
                        source-address 2.2.2.2/32
                    }
                }
            }
        }
    }
```

Capture filters are applied to traffic after any subinterface filters, but before CPM filters. If a packet is dropped by a subinterface filter, it is not evaluated by a capture filter.

Only a single instance of the traffic-monitoring tool can be running at a time.

If no capture-filter entries are already defined, you must specify the match criteria with the **tools system traffic-monitor** command. If capture-filter entries are already defined, match criteria specified with the **tools system traffic-monitor** command is ignored.

4.1.1 Monitoring ICMP Packets

The following is an example of using the traffic-monitoring tool to monitor ICMP packets. In this example, information about ICMP packets with source address 1.1.1.1/32 and destination address 2.2.2.2/32 is displayed in the monitor window, including the arrival time and source port (ethernet-1/20.1) of each packet. The traffic-monitoring tool captures ICMP packets until you press Ctrl-C.

Example:

```
# tools system traffic-monitor destination-address 1.1.1.1/32 source-address 2.2.2.2/32 protocol icmp
Capturing on 'monit'
1 0.000   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
2 1.803   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
3 2.895   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
4 3.749   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
```

```
5 4.250   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
6 5.759   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
7 6.644   ethernet-1/20.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
^C
7 packets captured
Command execution aborted : 'tools system traffic-monitor destination-address 1.1.1.1/32 source-
address 2.2.2.2/32 protocol icmp'
```

When you execute the **tools system traffic-monitor** command in the example above, it dynamically creates the following traffic monitoring policy:

```
acl {
        capture-filter {
            ipv4-filter {
                entry 1 {
                    action {
                        copy {
                        }
                    }
                    match {
                        destination-address 1.1.1.1/32
                        protocol icmp
                        source-address 2.2.2.2/32
                    }
                }
            }
        }
    }
```

When you terminate the command by pressing Ctrl-C, the dynamically created traffic monitoring policy is removed from all ingress interfaces.

4.1.2 Displaying verbose output

If you include the **verbose** option in the **tools system traffic-monitor** command, it displays the header fields and additional information from the shim header, followed by the original packet.

Example:

The following example shows verbose output for an ICMP packet:

```
# tools system traffic-monitor destination-address 1.1.1.1/32 source-address 2.2.2.2/32 protocol icmp
 verbose
Frame 1: 146 bytes on wire (1168 bits), 146 bytes captured (1168 bits) on interface 0
    Interface id: 0 (monit)
        Interface name: monit
    Encapsulation type: Ethernet (1)
    Arrival Time: Jan  4, 2098 19:53:01.144789891 UTC
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: -255263715.144789891 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 146 bytes (1168 bits)
    Capture Length: 146 bytes (1168 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:srlinux:eth:ethertype:ip:icmp:data]
Srlinux Packet
    Ingress Port: ethernet-1/20.1
```

```
    Padding: 000000
Ethernet II, Src: b0:70:0d:d2:a0:bf, Dst: b0:70:0d:d2:78:bf
    Destination: b0:70:0d:d2:78:bf
        Address: b0:70:0d:d2:78:bf
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Source: b0:70:0d:d2:a0:bf
        Address: b0:70:0d:d2:a0:bf
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 20.20.20.20, Dst: 10.10.10.10
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
        0000 00.. = Differentiated Services Codepoint: Default (0)
        .... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
    Total Length: 84
    Identification: 0xa166 (41318)
    Flags: 0x0000
        0... .... .... .... = Reserved bit: Not set
        .0.. .... .... .... = Don't fragment: Not set
        ..0. .... .... .... = More fragments: Not set
    ...0 0000 0000 0000 = Fragment offset: 0
    Time to live: 63
    Protocol: ICMP (1)
    Header checksum: 0x9e07 [validation disabled]
    [Header checksum status: Unverified]
    Source: 2.2.2.2
    Destination: 1.1.1.1
Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0xd01f [correct]
    [Checksum Status: Good]
    Identifier (BE): 10408 (0x28a8)
    Identifier (LE): 43048 (0xa828)
    Sequence number (BE): 1352 (0x0548)
    Sequence number (LE): 18437 (0x4805)
    Timestamp from icmp data: Jan  4, 2098 19:53:01.000000000 UTC
    [Timestamp from icmp data (relative): 0.144789891 seconds]
    Data (48 bytes)
0000  5a 30 02 00 00 00 00 00 10 11 12 13 14 15 16 17   Z0..............
0010  18 19 1a 1b 1c 1d 1e 1f 20 21 22 23 24 25 26 27   ........ !"#$%&'
0020  28 29 2a 2b 2c 2d 2e 2f 30 31 32 33 34 35 36 37   ()*+,-./01234567
       Data: 5a3002000000000010111213141516171819 1a1b1c1d1e1f…
       [Length: 48]
```

4.1.3 Capturing packets to a file

You can direct the captured packets to a file, which can be used as a source for the SR Linux packet trace utility or for Wireshark.

Example:

The following example directs information about ICMP packets with source address 1.1.1.1/32 and destination address 2.2.2.2/32 to a `.pcap` file.

```
# tools system traffic-monitor destination-address 10.10.10.10/32 source-address 20.20.20.20/32
 protocol icmp output-file /home/linuxadmin/ICMP.pcap
Capturing on 'monit'
6 packets captured
```

```
Command execution aborted : 'tools system traffic-monitor destination-address 10.10.10.10/32
 source-address 20.20.20.20/32 protocol icmp output-file /home/linuxadmin/ICMP.pcap '
```

Before opening the `.pcap` file, remove the shim header (the first 48 bytes of the file). For example:

```
$ editcap -C 0:48  /home/linuxadmin/ICMP.pcap /home/linuxadmin/ICMP_chopped.pcap
```

4.1.4 Capturing bidirectional transit traffic

The 5-tuple matching criteria defined in a **tools system traffic-monitor** command applies in one direction only. To capture traffic in both directions, you define capture filters for each direction, then start the traffic-monitoring tool, which applies both capture filters on all ports.

Example:

The following example defines two capture filter entries: one that matches traffic with source address 1.1.1.1/32 and one that matches traffic with destination address 1.1.1.1/32.

```
acl {
        capture-filter {
            ipv4-filter {
                entry 10 {
                    action {
                        accept {
                        }
                        copy {
                        }
                    }
                    match {
                        source-address 1.1.1.1/32
                    }
                }
                entry 20 {
                    action {
                        accept {
                        }
                        copy {
                        }
                    }
                    match {
                        destination-address 1.1.1.1/32
                    }
                }
            }
        }
    }
```

When you start the traffic-monitoring tool, it captures packets matching both filter entries. For example:

```
# tools system traffic-monitor
Capturing on 'monit'
1 0.000  ethernet-1/20.1 1.1.1.1 2.2.2.2  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
2 1.803  ethernet-1/21.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
3 2.895  ethernet-1/20.1 1.1.1.1 2.2.2.2  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
4 3.749  ethernet-1/21.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
5 4.250  ethernet-1/20.1 1.1.1.1 2.2.2.2  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
6 5.759  ethernet-1/21.1 2.2.2.2 1.1.1.1  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
7 6.644  ethernet-1/20.1 1.1.1.1 2.2.2.2  ICMP 146 Echo (ping) reply id=0x28a8, seq=119/30464, ttl=63
```

5 Switch fabric statistics

The switch fabric statistics tool allows you to monitor and troubleshoot common switch fabric issues at different points in the fabric.

The tool can be used to determine the current utilization level. Utilization data is displayed on a per-slot and line-card basis and includes aggregate line card/slot to switch fabric utilization (bidirectional).

See the *SR Linux Data Model Reference* for details on all switch fabric statistic related commands and descriptions of all parameters.

5.1 Displaying switch fabric statistics

Use this procedure to display switch fabric statistics:

```
# enter show
# tools platform show-fabric-bandwidth
```

Example:

```
/platform/show-fabric-bandwidth:

    Slot     to-fabric Gbps   from-fabric Gbps
    ----------------------------------------
     1        2369             2370
     2        2393             2393
    ----------------------------------------
    Total     4762             4764
```

6 Packet-trace tool

The packet-trace tool is a troubleshooting command that allows the specification of a probe packet that is injected into the specified interface forwarding context. The tool records the forwarding destination or egress port for the probe packet, as well as any matched ACL records.

The packet-trace tool calculates the egress interfaces for an IP forward flow, while taking into account ECMP and LAG hashing.

The tool reports the following output:

- supplied input parameters
- calculated egress interface and port through which a packet with the specified fields is forwarded
- applied ACL (both ingress and egress)
- reason for a discarded packet

See the *SR Linux Data Model Reference* for more information about all packet-trace related commands and descriptions of all parameters.

6.1 Configuring packet-trace tool commands

The **packet-trace** command is a tools command that reports the forwarding behavior for a test packet specified in one of the following formats:

- Scapy file format: file specifying the packet format in Scapy packet definition form
- base64 format: string specifying the packet to send in base64 format
- pcap file format: file containing pcap data

Only physical interface types can be used as the ingress interface for injected packets.

6.1.1 Configuring the packet-trace tool (using Scapy file format)

Use this command to report the forwarding behavior for a specified test packet (file format) that contains a packet formatted in Scapy packet definition form:

tools system packet-trace file <*input file in Scapy format*> **interface** <*interface name*>

Packet trace command parameters for specifying an input file are described in Table 2: Packet trace command parameters using an input file.

Table 2: Packet trace command parameters using an input file

Command/parameter	Description
tools system packet-trace	Reports the forwarding behavior for a specified test packet (file format)

Command/parameter	Description
file *<file name>*	File containing the packet format in Scapy packet definition form. The format of the packet definition should match that of the Linux utility Scapy.
interface *<interface name>*	The name of the configured interface to inject the probe packet

Example: Scapy input file

```
# bash cat /tmp/p1.txt
Ether(dst="50:E0:EF:3A:EA:D2",src="00:01:03:FF:00:41")/Dot1Q(vlan=100)/
IP(dst="100.1.5.1",src="192.35.1.1")/UDP(sport=6722,dport=6789)/"Hi"/
Raw(RandString(size=512))
```

Example: command

```
# tools system packet-trace file /tmp/p1.txt interface ethernet-1/1
```

Example: output (bridged)

```
Ether(dst="50:E0:EF:3A:EA:D2",src="00:01:03:FF:00:41")/Dot1Q(vlan=100)/IP(dst="100.1.5.1",src=
"192.35.1.1")/UDP(sport=6722,dport=6789)/"Hi"/Raw(RandString(size=512))
Generated packet:
###[ Ethernet ]###
  dst       = 50:e0:ef:3a:ea:d2
  src       = 00:01:03:ff:00:41
  type      = VLAN
###[ 802.1Q ]###
     prio      = 0
     id        = 0
     vlan      = 100
     type      = IPv4
###[ IP ]###
        version   = 4
        ihl       = 5
        tos       = 0x0
        len       = 542
        id        = 1
        flags     =
        frag      = 0
        ttl       = 64
        proto     = udp
        chksum    = 0x4ea8
        src       = 192.35.1.1
        dst       = 100.1.5.1
        \options   \
###[ UDP ]###
           sport     = 6722
           dport     = smc_https
           len       = 522
           chksum    = 0x251e
###[ Raw ]###
              load      = 'Hi9cmfMxg4lBV6iXRKbe3t2dUJyiGZb7s2GcTQ8YQ0A2PYnF8ntm45l
GqCezZ6ncYF4ijsc7hqjxSUjIJdq4YhhRrNSnyUsHkhehhSifTpT1EEiQNOzNLWgF6DPdcQ078REyyjnI9hqzTNAk0Xhg
OmLtg55rkufD8nyOotgBgnz2mpQ0igLSEtYe84VDfdiCs5lWTvhGTYCClxsCYmXEozmSsWqBagdw
He1Ia0voCZ3deUUL6B7paAOb8ua5bZa44G7Z7LneJZ0YxH2VjbSqmeukaxyMrkg7NUIxs3aVIwD2jPqra3CBaxokvarX5Ty
IzNuK2qYeAwnjdzBZo2iZTonXomJjoDWB2cqG61iEGPLNg5juC7PTa9fglirYgEI2T9rTm8gpTjG6ZgN90g3w0x0xBgw
```

```
YsNfuXMqp7u9wR8fvfNa4MmZseCC6UUKneSKK0zDyxyHgtSEKwHQgQA0HOh6wZttNQRFzST4YB0cFM1tTeo6mCgw
AplYX8THGImjvis'
/system/packet-trace-base64:
================================================================================
Ingress information for Packet 3 Ingress Interface ethernet-1/1
================================================================================
Type                : Bridged
Interface           : ethernet-1/1 (4401020001)
Net Instance        : macvrf1
================================================================================
================================================================================
Egress information for Packet 3
================================================================================
Interface           : Flooded in macvrf1
Egress Net Instance : macvrf1
================= (routed)=====================================================
```

Example: output (routed)

```
smac='00:AA:33:44:55:66'
dmac= '20:E0:9C:7A:DA:E2'
Ether(src=smac,dst=dmac)/IP(src='120.1.7.1',dst='120.1.5.1')/ICMP()

Generated packet:
 ###[ Ethernet ]###
dst = 20:e0:9c:7a:da:e2
src = 00:aa:33:44:55:66
type = IPv4
###[ IP ]###
     version = 4
     ihl = 5
     tos = 0x0
     len = 28
     id = 1
    flags =
    frag = 0
    ttl = 64
    proto = icmp
    chksum = 0x7edc
     src = 120.1.7.1
     dst = 120.1.5.1
     \options \
###[ ICMP ]###
        type = echo-request
        code = 0
        chksum = 0xf7ff
        id = 0x0
        seq = 0x0
/system/packet-trace-base64:

================================================================================
Ingress information for Packet 1 Ingress Interface ethernet-4/29
================================================================================
Type                : Routed
Interface           : lag5 (14000000005)
Sub interface       : lag5.1
Net Instance        : red
Out Interface       : ethernet-4/22
Nexthop ip          : 192.35.1.1
================================================================================
================================================================================
Egress information for Packet 1 Egress Interface ethernet-4/22
================================================================================
Interface           : ethernet-4/22 (4404020016)
Sub interface       : ethernet-4/22.1
```

```
Mac Address         : 00:01:03:FF:00:08
===============================================================================
```

6.1.2 Configuring the packet-trace tool (using base64 format)

Use this command to report the forwarding behavior for a specified test packet using packets specified in base64 format:

 # tools system packet-trace-base64 interface *<interface name>* **packet** *<value>*

Packet trace command parameters for specifying base64 format are described in Table 3: Packet trace command parameters using base64 string format.

Table 3: Packet trace command parameters using base64 string format

Command/parameter	Description
tools system packet-trace-base64	Reports the forwarding behavior for a specified test packet (packet specified in base64 format)
interface *<interface name>*	The name of the configured interface to inject the probe packet
packet *<value>*	Packet format in base64 string format

Example: command (for routed)

```
# tools system packet-trace-base64 interface ethernet-1/1 packet
  "RQAAOgABAABABnS4AQEBAQICAgIAFABQAAAAAAAAAABQAiAAqscAAEdFVCAvIEhUVFAvMS4wDQoNCg=="
```

Example: output (routed)

```
tools system packet-trace-base64 interface ethernet-1/3 packet
"MjBFMDlDNzlCQUUzMDAwMTA3RkYwMDAwMDgwMDQ1MDAwMDJFMDAwMDAwMDA0MDExNTA3REMwMz
kwMTA3NjQwMTA1MDExQTQyMUE4NTAwMUE1ODVGMDAwMTAyMDMwNDA1MDYwNzA4MDkwQTBCMEMwRDBFMEYxMD
ExM0VGMjA5OTM="
/system/packet-trace-base64:
===============================================================================
Ingress information for Packet 77 Ingress Interface ethernet-1/2
===============================================================================
Type          : Routed
Interface     : ethernet-1/2 (4401020002)
Sub interface : ethernet-1/2.1
Instance id   : 1
Out Interface : ethernet-1/1
Nexthop ip    : 120.1.5.1
===============================================================================
===============================================================================
Egress information for Packet 77 Egress Interface ethernet-1/1
===============================================================================
Interface : ethernet-1/1 (4401020001)
Sub interface : ethernet-1/1.1
Mac Address : 00:22:33:44:55:66
===============================================================================
```

Example: command (for bridged)

```
tools system packet-trace-base64 packet UODvOurSAAED/wBBgQAAZAgARQACHgAB
AABAEU6owCMBAWQBBQEaQhqFAgpUvkhpQzVDODlhcUttaDVsRHNWRnk4WDRpYXRQbW81UllWenFweE9p
NEJNeXpPQWo5UktOVTRGNkFwTENhNVljNlFVMHViRTY2UUJzUkh5TWh0SHhQUTZOaFFTRk5LeXFKNGVn
VVZINDJlOFdBSmt1NlFZeHFicFRmZjEwdHVWdENwcENNMmQ5R1RCeHpseUY3aDZrQjBLMHRXNkF1a2Y0
QllNS3Jld2M5aUVGNGRUc1pPbEs0WVFEdkpxRjFOQ1BMMktXNjlnS212bXJmbTlZT2tHWE01MG9haTdp
R2l0amNzRHdkV3VBZEJ4OHJvek5tbnVQc2FCYVdPeVBWUjJBT0hVa1BrOW1mcldwYTFDVXVOcU8xZzJk
RVExRXhBNFhaYUlnNlJLZjJvc2swMVJZektac0dKZEFUVnBaSkQzM2tnY2c4UDJnM0dYZFYzZnp4VTNH
bEtEQzhRUUlzQTJVYUJOODM4TWNiNmw3MUdZdGNuZlNDdGZFYlB0TU9OS2xSejlhYWZHb3JaQzVMNFdw
TjZXRDVzZWlKelZtYWdrWUM2VThYY2dKWGpDSXJpR01lQjlobnY4RmFjNklDZnpROHFiZE5iZ21TTG9M
N0l0Tk4xZ1NmQ2JkeUE0RVFabHBGYlFEeVFFYUFJZUUycG9lbWRPU2x4a0FWYzBQU3kzZExEYWE=int
erface ethernet-1/1
```

Example: output (bridged)

```
A:rifa# tools system packet-trace-base64 packet UODvOurSAAED/wBBgQAAZAgARQACHgAB
AABAEU6owCMBAWQBBQEaQhqFAgpUvkhpQzVDODlhcUttaDVsRHNWRnk4WDRpYXRQbW81UllWenFweE9p
NEJNeXpPQWo5UktOVTRGNkFwTENhNVljNlFVMHViRTY2UUJzUkh5TWh0SHhQUTZOaFFTRk5LeXFKNGVn
VVZINDJlOFdBSmt1NlFZeHFicFRmZjEwdHVWdENwcENNMmQ5R1RCeHpseUY3aDZrQjBLMHRXNkF1a2Y0
QllNS3Jld2M5aUVGNGRUc1pPbEs0WVFEdkpxRjFOQ1BMMktXNjlnS212bXJmbTlZT2tHWE01MG9haTdp
R2l0amNzRHdkV3VBZEJ4OHJvek5tbnVQc2FCYVdPeVBWUjJBT0hVa1BrOW1mcldwYTFDVXVOcU8xZzJk
RVExRXhBNFhaYUlnNlJLZjJvc2swMVJZektac0dKZEFUVnBaSkQzM2tnY2c4UDJnM0dYZFYzZnp4VTNH
bEtEQzhRUUlzQTJVYUJOODM4TWNiNmw3MUdZdGNuZlNDdGZFYlB0TU9OS2xSejlhYWZHb3JaQzVMNFdw
TjZXRDVzZWlKelZtYWdrWUM2VThYY2dKWGpDSXJpR01lQjlobnY4RmFjNklDZnpROHFiZE5iZ21TTG9M
N0l0Tk4xZ1NmQ2JkeUE0RVFabHBGYlFEeVFFYUFJZUUycG9lbWRPU2x4a0FWYzBQU3kzZExEYWE= int
erface ethernet-1/1
/system/packet-trace-base64:
================================================================================
Ingress information for Packet 4 Ingress Interface ethernet-1/1
================================================================================
Type                : Bridged
Interface           : ethernet-1/1 (4401020001)
Net Instance        : macvrf1
================================================================================
================================================================================
Egress information for Packet 4
================================================================================
Interface           : Flooded in macvrf1
Egress Net Instance : macvrf1
================================================================================
```

6.1.3 Configuring the packet-trace tool (using pcap format)

Use the following command to report the forwarding behavior for a specified test packet using packets specified in pcap format:

 # tools system packet-trace pcap-file <*file name*> **[interface** <*interface name*>**] [max-packet-count** <*value*>**] [packet-number** <*value*>**]**

Packet trace command parameters for specifying pcap format are described in Table 4: Packet trace command parameters using pcap format.

Table 4: Packet trace command parameters using pcap format

Command/parameter	Description
tools system packet-trace	Reports the forwarding behavior for a specified test packet (file format)
pcap-file <*file name*>	Input file in pcap format
interface <*interface name*>	The name of the configured interface to inject the probe packet
max-packet-count <*value*>	Number of packets to read from the file (default: 100)
packet-number <*value*>	Use packet with the specified packet number from the pcap file

Example: packet-trace command using pcap format

```
# tools system packet-trace pcap-file data.pcap max-packet-count 1 packet-number 1
 interface ethernet-1/2
```

Example: output of packet trace in pcap format

```
+-------------------------------------------------------------------------------+
| Number     Time     Ingress   Source    Destina   Protoco   Length    Info   |
|                      port                tion        l                       |
+===============================================================================+
| 1       0.046971   etherne   90.1.7.   2.1.1.4   UDP       2545     6722     |
|                                                                      \u2192  |
|                     t-1/2.1   1         8                           6789 Le |
|                                                                      n=2454  |
Enter packet number (default: [1]): 1
###[ Ethernet ]###
  dst       = 20:e0:9c:7a:da:e2
  src       = 00:aa:33:44:55:66
  type      = IPv4
###[ IP ]###
     version   = 4
     ihl       = 5
     tos       = 0x0
     len       = 2482
     id        = 0
     flags     =
     frag      = 0
     ttl       = 64
     proto     = udp
     chksum    = 0xd09
     src       = 90.1.7.1
     dst       = 2.1.1.48
     \options   \
###[ UDP ]###
        sport     = 6722
        dport     = smc_https
        len       = 2462
        chksum    = 0xcd6b
###[ Raw ]###
```

```
           load      =
'\x00\x01\x02\x03\x04\x05\x06\x07\x08\t\n\x0b\x0c\r\x0e\x0f\x10\x11\x12\x13\x14\
x15\x16\x17\x18\x19\x1a\x1b\x1c\x1d\x1e\x1f
!"#$%&\'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\\]^_
`abcdefghijklmnopqrstuvwxyz{|}~\x7f\x80\x81\x82\x83\x84\x85\x86\x8
7\x88\x89\x8a\x8b\x8c\x8d\x8e\x8f\x90\x91\x92\x93\x94\x95\x96\x97\x98\x99\
x9a\x9b\x9c\x9d\x9e\x9f\xa0\....'
/system/packet-trace-base64:
    ================================================================================
    Ingress information for Packet 10 Ingress Interface ethernet-1/2
    ================================================================================
    Type                : Routed
    Interface           : ethernet-1/2 (4401020002)
    Sub interface       : ethernet-1/2.1
    Instance id         : 1
    Out Interface       : ethernet-1/1
    Nexthop ip          : 117.1.5.1
    ================================================================================
    ================================================================================
    Egress information for Packet 10 Egress Interface ethernet-1/1
    ================================================================================
    Interface           : ethernet-1/1 (4401020001)
    Sub interface       : ethernet-1/1.8
    Mac Address         : 00:22:33:44:55:6D
```

Customer document and product support

Customer documentation

Customer documentation welcome page

Technical support

Product support portal

Documentation feedback

Customer documentation feedback