



# Configuring Traffic Mirroring

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This module describes the configuration of the traffic mirroring feature. Traffic mirroring is sometimes called port mirroring, or switched port analyzer (SPAN).

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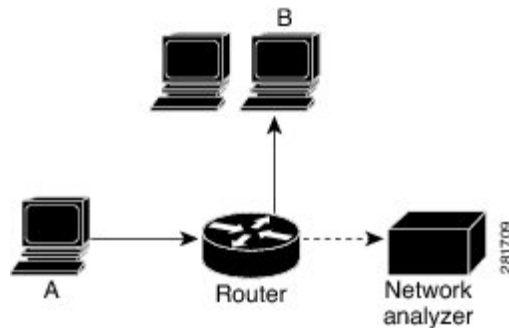
## Introduction to Traffic Mirroring

Traffic mirroring, sometimes called port mirroring or Switched Port Analyzer (SPAN), is a Cisco proprietary feature that enables you to monitor network traffic passing in or out of a set of ports. You can then pass this traffic to a destination port on the same router.

Traffic mirroring copies traffic from one or more source ports and sends the copied traffic to one or more destinations for analysis by a network analyzer or other monitoring device. Traffic mirroring does not affect the flow of traffic on the source interfaces or sub-interfaces. It allows the mirrored traffic to be sent to a destination interface or sub-interface.

For example, you can attach a traffic analyzer to the router and capture Ethernet traffic that is sent by host A to host B.

Figure 1: Traffic Mirroring Operation



When local traffic mirroring is enabled, the traffic analyzer gets directly attached to the port that is configured to receive a copy of every packet that host A sends. This port is called a traffic mirroring port.

**Note**

- From Release 7.4.2, you can mirror incoming (Rx) and outgoing (Tx) traffic from the source ports to separate destinations on Cisco NCS routers. During a session, you can configure one destination port for incoming traffic and one for outgoing traffic.

## Traffic Mirroring Types

The following types of traffic mirroring are supported:

- **Local traffic mirroring:** This is the most basic form of traffic mirroring. The network analyzer or sniffer is attached directly to the destination interface. In other words, all monitored ports are located on the same router as the destination port.
- **Remote traffic mirroring:** The network analyzer is reached through a GRE tunnel over an IP network.

**Note**

A copy of every packet includes the Layer 2 header if the ethernet keyword is configured. As this renders the mirrored packets unroutable, the end point of the GRE tunnel must be the network analyzer.

- **ACL-based traffic mirroring:** Traffic is mirrored based on the configuration of the interface ACL.

You can mirror traffic based on the definition of an interface access control list. When you are mirroring Layer 3 traffic, the ACL is configured using the **ipv4 access-list** or the **ipv6 access-list** command with the **capture** option. The **permit** and **deny** commands determine the behavior of regular traffic. The **capture** option designates the packet is to be mirrored to the destination port, and it is supported only on permit type of access control entries (ACEs).

**Note**

Prior to Release 6.5.1, ACL-based traffic mirroring required the use of UDK (User-Defined TCAM Key) with the **enable-capture** option so that the **capture** option can be configured in the ACL.

- **Encapsulated remote SPAN (ERSPAN):** ERSPAN enables generic routing encapsulation (GRE) for all captured traffic and allows it to be extended across Layer 3 domains.
- **SPAN to File:** SPAN to File is an extension of the pre-existing SPAN feature that allows network packets to be mirrored to a file instead of an interface. This helps in the analysis of the packets at a later stage.
- **File Mirroring:** File mirroring feature enables the router to copy files or directories automatically from `/harddisk:/mirror` location in active RP to `/harddisk:/mirror` location in standby RP or RSP without user intervention or EEM scripts.

## ERSPAN

Encapsulated Remote Switched Port Analyzer (ERSPAN) transports mirrored traffic over an IP network. The traffic is encapsulated at the source router and is transferred across the network. The packet is decapsulated at the destination router and then sent to the destination interface.

ERSPAN involves mirroring traffic through a GRE tunnel to a remote site. For more information on configuring the GRE tunnel that is used as the destination for the monitor sessions, see the chapter *Configuring GRE Tunnels*.

## Restrictions

### Generic Restrictions

The following are the generic restriction(s) related to traffic mirroring:

- Partial mirroring and sampled mirroring are not supported.
- Sub-interface configured as source interface is not supported on SPAN.
- The destination bundle interfaces flap when:
  - both the mirror source and destination are bundle interfaces in LACP mode and
  - mirror packets next-hop is a router or a switch instead of a traffic analyzer.

This behavior is observed due to a mismatch of LACP packets on the next-hop bundle interface due to the mirroring of LACP packets on the source bundle interface.

- Both SPAN and ERSPAN features cannot be configured on a router simultaneously. Either SPAN or ERSPAN feature can be configured on the same router.

### SPAN Restrictions

The following restrictions apply to SPAN:

- SPAN only supports port-level source interfaces.

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### ERSPAN Restrictions

The following restrictions apply to ERSPAN:

- The value of ERSPAN session-ID is always zero. IOS XR Command for configuring ERSPAN is not available.
- ERSPAN next-hop must have ARP resolved. Any other traffic or protocol will trigger ARP.
- ERSPAN cannot travel over MPLS.
  - Additional routers may encapsulate in MPLS.
- ERSPAN decapsulation is not supported.
- ERSPAN does not work if the GRE next hop is reachable over sub-interface. For ERSPAN to work, the next hop must be reachable over the main interface.
- When you use the same ACEs defined in both the IPv4 and IPv6 ACLs, the router doesn't perform ERSPAN mirroring for the ACLs that have the priority set as 2 ms.

### SPAN-ACL Restrictions

The following restrictions apply to SPAN-ACL:

- SPAN-ACL is only supported in the Rx direction, that is, in the ingress direction v4 or v6 ACL.
- MPLS traffic cannot be captured with SPAN-ACL.
  - ACL for any MPLS traffic is not supported.

## Configure Traffic Mirroring

These tasks describe how to configure traffic mirroring:

## Configure Remote Traffic Mirroring

### Procedure

---

#### Step 1 **configure**

##### Example:

```
RP/0/RP0/CPU0:router# configure
Enters global configuration mode.
```

#### Step 2 **monitor-session *session-name***

##### Example:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1 ethernet
RP/0/RP0/CPU0:router(config-mon)#
```

Defines a monitor session and enters monitor session configuration mode.

**Step 3** destination interface *tunnel-ip***Example:**

```
RP/0/RP0/CPU0:router(config-mon)# destination interface tunnelip3
```

Specifies the destination subinterface to which traffic is replicated.

**Step 4** exit**Example:**

```
RP/0/RP0/CPU0:router(config-mon)# exit
RP/0/RP0/CPU0:router(config)#
```

Exits monitor session configuration mode and returns to global configuration mode.

**Step 5** interface *type number***Example:**

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/0/1/0
```

Enters interface configuration mode for the specified source interface. The interface number is entered in *rack/slot/module/port* notation. For more information about the syntax for the router, use the question mark (?) online help function.

**Step 6** monitor-session *session-name* ethernet direction rx-onlyport-only**Example:**

```
RP/0/RP0/CPU0:router(config-if)# monitor-session mon1 ethernet
direction rx-only port-only
```

Specifies the monitor session to be used on this interface. Use the **direction** keyword to specify that only ingress or egress traffic is mirrored.

**Step 7** end or commit**Example:**

```
RP/0/RP0/CPU0:router(config-if)# end
```

or

```
RP/0/RP0/CPU0:router(config-if)# commit
```

Saves configuration changes.

- When you issue the **end** command, the system prompts you to commit changes:

```
Uncommitted changes found, commit them before exiting (yes/no/cancel)?
[cancel]:
```

- Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.

- Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.

- Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.

- Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.

### Step 8 **show monitor-session [session-name] status [detail] [error]**

#### Example:

```
RP/0/RP0/CPU0:router# show monitor-session
```

Displays information about the traffic mirroring session.

#### Example

This example shows the basic configuration for traffic mirroring with physical interfaces.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# monitor-session ms1
RP/0/RP0/CPU0:router(config-mon)# destination interface HundredGigE0/2/0/15
RP/0/RP0/CPU0:router(config-mon)# commit

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE0/2/0/19
RP/0/RP0/CPU0:router(config-if)# monitor-session ms1 ethernet direction rx-only port-level
RP/0/RP0/CPU0:router(config-if)# commit
```

This example shows sample output of the show monitor-session command with the status keyword:

```
RP/0/RSP0/CPU0:router# show monitor-session status
Monitor-session cisco-rtpl
Destination interface HundredGigE 0/5/0/38
=====
Source Interface Dir Status
-----
TenGigE0/5/0/4 Both Operational
TenGigE0/5/0/17 Both Operational
RP/0/RSP0/CPU0:router# show monitor-session status detail
Monitor-session sess1
Destination interface is not configured
Source Interfaces
-----
TenGigE0/1/0/0
Direction: Both
ACL match: Disabled
Portion: Full packet
Status: Not operational (destination interface not known).
TenGigE0/1/0/1
Direction: Both
ACL match: Disabled
Portion: First 100 bytes

RP/0/RSP0/CPU0:router# show monitor-session status error
Monitor-session ms1
Destination interface TenGigE0/2/0/15 is not configured
```

```

=====
Source Interface Dir Status
-----
Monitor-session ms2
Destination interface is not configured
=====
Source Interface Dir Status
-----
RP/0/RP0/CPU0:router# show monitor-session test status
Monitor-session test (ipv4)
Destination Nexthop 255.254.254.4
=====
Source Interface Dir Status
-----
Gi0/0/0/2.2 Rx Not operational (source same as destination)
Gi0/0/0/2.3 Rx Not operational (Destination not active)
Gi0/0/0/2.4 Rx Operational
Gi0/0/0/4 Rx Error: see detailed output for explanation
RP/0/RP0/CPU0:router# show monitor-session test status error
Monitor-session test
Destination Nexthop ipv4 address 255.254.254.4
=====
Source Interface Status
-----
Gi0/0/0/4 < Error: FULL Error Details >

```

## Attaching the Configurable Source Interface

### Procedure

#### Step 1

**configure**

**Example:**

```
RP/0/RP0/CPU0:router# configure
```

Enters global configuration mode.

#### Step 2

**interface** *type number*

**Example:**

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/0/1/0
```

Enters interface configuration mode for the specified source interface. The interface number is entered in *rack/slot/module/port* notation. For more information about the syntax for the router, use the question mark (?) online help function.

#### Step 3

**ipv4 access-group** *acl-name* {**ingress** | **egress**}

**Example:**

```
RP/0/RP0/CPU0:router(config-if)# ipv4 access-group acl1 ingress
```

Controls access to an interface.

**Step 4**    **monitor-session** *session-name* **ethernet direction rx-onlyport-level acl****Example:**

```
RP/0/RP0/CPU0:router(config-if)# monitor-session mon1 ethernet direction rx-only port-level
acl
RP/0/RP0/CPU0:router(config-if-mon)#
```

Attaches a monitor session to the source interface and enters monitor session configuration mode.

**Note**        **rx-only** specifies that only ingress traffic is replicated.

**Step 5**    **acl****Example:**

```
RP/0/RP0/CPU0:router(config-if-mon)# acl
```

Specifies that the traffic mirrored is according to the defined ACL.

**Note**        If an ACL is configured by name, then this step overrides any ACL that may be configured on the interface.

**Step 6**    **exit****Example:**

```
RP/0/RP0/CPU0:router(config-if-mon)# exit
RP/0/RP0/CPU0:router(config-if)#
```

Exits monitor session configuration mode and returns to interface configuration mode.

**Step 7**    **end** or **commit****Example:**

```
RP/0/RP0/CPU0:router(config-if)# end
```

or

```
RP/0/RP0/CPU0:router(config-if)# commit
```

Saves configuration changes.

- When you issue the **end** command, the system prompts you to commit changes:

```
Uncommitted changes found, commit them before exiting (yes/no/cancel)?
[cancel]:
```

- Entering **yes** saves configuration changes to the running configuration file, exits the configuration session, and returns the router to EXEC mode.
  - Entering **no** exits the configuration session and returns the router to EXEC mode without committing the configuration changes.
  - Entering **cancel** leaves the router in the current configuration session without exiting or committing the configuration changes.
- Use the **commit** command to save the configuration changes to the running configuration file and remain within the configuration session.



**Step 8** `show monitor-session [session-name] status [detail] [error]`

**Example:**

```
RP/0/RP0/CPU0:router# show monitor-session status
```

Displays information about the monitor session.

## Configuring UDF-Based ACL for Traffic Mirroring

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<p><b>configure</b></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router# configure</pre>	Enters global configuration mode.
<b>Step 2</b>	<p><b>udf</b> <i>udf-name</i> <b>header</b> {<b>inner</b>   <b>outer</b>} {<b>12</b>   <b>13</b>   <b>14</b>} <b>offset</b> <i>offset-in-bytes</i> <b>length</b> <i>length-in-bytes</i></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config)# udf udf3 header outer 14 offset 0 length 1 (config-mon)#</pre> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config)# udf udf3 header inner 14 offset 10 length 2 (config-mon)#</pre> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config)# udf udf3 header outer 14 offset 50 length 1 (config-mon)#</pre>	<p>Configures individual UDF definitions. You can specify the name of the UDF, the networking header from which offset, and the length of data to be extracted.</p> <p>The <b>inner</b> or <b>outer</b> keywords indicate the start of the offset from the unencapsulated Layer 3 or Layer 4 headers, or if there is an encapsulated packet, they indicate the start of offset from the inner L3/L4.</p> <p><b>Note</b> The maximum offset allowed, from the start of any header, is 63 bytes</p> <p>The <b>length</b> keyword specifies, in bytes, the length from the offset. The range is from 1 to 4.</p>
<b>Step 3</b>	<p><b>ipv4 access-list</b> <i>acl-name</i></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config)# ipv4 access-list acl1</pre>	Creates ACL and enters IP ACL configuration mode. The length of the <i>acl-name</i> argument can be up to 64 characters.
<b>Step 4</b>	<p><b>permit</b> <i>regular-ace-match-criteria</i> <b>udf</b> <i>udf-name1 value1 ... udf-name8 value8</i></p> <p><b>Example:</b></p>	Configures ACL with UDF match.

	Command or Action	Purpose
	<pre>RP/0/RP0/CPU0:router(config-ipv4-acl)# 10 permit ipv4 any any udf udf1 0x1234 0xffff udf3 0x56 0xff capture RP/0/RP0/CPU0:router(config-ipv4-acl)# 30 permit ipv4 any any dscp af11 udf udf5 0x22 0x22 capture</pre>	
<b>Step 5</b>	<p><b>exit</b></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config-ipv4-acl)# exit</pre>	Exits IP ACL configuration mode and returns to global configuration mode.
<b>Step 6</b>	<p><b>interface</b> <i>type number</i></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/0/1/0</pre>	Configures interface and enters interface configuration mode.
<b>Step 7</b>	<p><b>ipv4 access-group</b> <i>acl-name ingress</i></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config-if)# ipv4 access-group acl1 ingress</pre>	Applies access list to an interface.
<b>Step 8</b>	<p><b>commit</b></p> <p><b>Example:</b></p> <pre>RP/0/RP0/CPU0:router(config-if)# commit</pre>	Applies access list to an interface.

## Additional Information on Traffic Mirroring

### Traffic Mirroring Terminology

- Ingress Traffic — Traffic that comes into the router.
- Egress Traffic — Traffic that goes out of the router.
- Source (SPAN) interface — An interface that is monitored using the SPAN feature.
- Source port—A port that is monitored with the use of traffic mirroring. It is also called a monitored port.
- Destination port—A port that monitors source ports, usually where a network analyzer is connected. It is also called a monitoring port.
- Monitor session—A designation for a collection of SPAN configurations consisting of a single destination and, potentially, one or many source interfaces.

## Characteristics of Source Port

A source port, also called a monitored port, is a routed port that you monitor for network traffic analysis. In a single traffic mirroring session, you can monitor source port traffic. The router support a maximum of up to 800 source ports.

A source port has these characteristics:

- It can be any data port type, such as Bundle Interface, 100 Gigabit Ethernet, or 10 Gigabit Ethernet.



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**Note**

- Bridge group virtual interfaces (BVI) are not supported.
  - Bundle members cannot be used as source ports.
- 

- Each source port can be monitored in only one traffic mirroring session.
- When a port is used as a source port, the same port cannot be used as a destination port.
- Each source port can be configured with a direction (ingress, egress, or both) to monitor local traffic mirroring. Remote traffic mirroring is supported both in the ingress and egress directions. For bundles, the monitored direction applies to all physical ports in the group.

## Characteristics of Monitor Session

A monitor session is a collection of traffic mirroring configurations consisting of a single destination and, potentially, many source interfaces. For any given monitor session, the traffic from the source interfaces (called *source ports*) is sent to the monitoring port or destination port. If there are more than one source port in a monitoring session, the traffic from the several mirrored traffic streams is combined at the destination port. The result is that the traffic that comes out of the destination port is a combination of the traffic from one or more source ports.

Monitor sessions have these characteristics:

- A single router can have a maximum of four monitor sessions. However, both SPAN and CFM share common mirror profiles. If you configure SPAN and CFM together on the router, the maximum number of monitor sessions may reduce to two.
- A single monitor session can have only one destination port.
- A single destination port can belong to only one monitor session.
- A monitor session can have a maximum of 800 source ports, as long as the maximum number of source ports from all monitoring sessions does not exceed 800.

## Characteristics of Destination Port

Each session must have a destination port that receives a copy of the traffic from the source ports.

A destination port has these characteristics:

- A destination port must reside on the same router as the source port for local traffic mirroring. For remote mirroring, the destination is always a GRE tunnel.

- A destination port for local mirroring can be any Ethernet physical port, EFP, GRE tunnel interface, or bundle interface. It can be a Layer 2 or Layer 3 transport interface.




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**Note** Bundle members cannot be used as destination ports.

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- A destination port on router cannot be a VLAN subinterface.
- At any one time, a destination port can participate in only one traffic mirroring session. A destination port in one traffic mirroring session cannot be a destination port for a second traffic mirroring session. In other words, no two monitor sessions can have the same destination port.
- A destination port cannot also be a source port.

## Traffic Mirroring Configuration Examples

This section contains examples of how to configure traffic mirroring:

### Traffic Mirroring with Physical Interfaces (Local): Example

This example shows the basic configuration for traffic mirroring with physical interfaces.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# monitor-session ms1
RP/0/RP0/CPU0:router(config-mon)# destination interface HundredGigE0/0/1/0
RP/0/RP0/CPU0:router(config-mon)# commit

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE0/0/0/0
RP/0/RP0/CPU0:router(config-if)# monitor-session ms1 ethernet direction rx-only port-level
RP/0/RP0/CPU0:router(config-if)# commit
```

### Viewing Monitor Session Status: Example

This example shows sample output of the **show monitor-session** command with the **status** keyword:

```
RP/0/RP0/CPU0:router# show monitor-session status

Monitor-session cisco-rtpl
Destination interface HundredGigE 0/0/1/0
=====
Source Interface   Dir   Status
-----
TenGigE0/0/0/4    Both Operational
TenGigE0/0/0/17   Both Operational

RP/0/RSP0/CPU0:router# show monitor-session status detail

Monitor-session sess1
Destination interface is not configured
Source Interfaces
-----
```

```
TenGigE0/0/0/0
  Direction: Both
  ACL match: Disabled
  Portion: Full packet
  Status: Not operational (destination interface not known).
TenGigE0/0/0/1
  Direction: Both
  ACL match: Disabled
  Portion: First 100 bytes
```

```
RP/0/RP0/CPU0:router# show monitor-session status error
```

```
Monitor-session ms1
Destination interface TenGigE0/0/0/15 is not configured
```

```
=====
Source Interface  Dir  Status
-----
```

```
Monitor-session ms2
Destination interface is not configured
```

```
=====
Source Interface  Dir  Status
-----
```

```
RP/0/RP0/CPU0:router# show monitor-session test status
```

```
Monitor-session test (ipv4)
```

```
Destination Nexthop 255.254.254.4
```

```
=====
Source Interface  Dir      Status
-----
```

```
Gi0/0/0/2.2      Rx      Not operational (source same as destination)
Gi0/0/0/2.3      Rx      Not operational (Destination not active)
Gi0/0/0/2.4      Rx      Operational
Gi0/0/0/4        Rx      Error: see detailed output for explanation
```

```
RP/0/RP0/CPU0:router# show monitor-session test status error
```

```
Monitor-session test
Destination Nexthop ipv4 address 255.254.254.4
```

```
=====
Source Interface      Status
-----
```

```
Gi0/0/0/4          < Error: FULL Error Details >
```

## Troubleshooting Traffic Mirroring

When you encounter any issue with traffic mirroring, begin troubleshooting by checking the output of the **show monitor-session status** command. This command displays the recorded state of all sessions and source interfaces:

```
# show monitor-session status
Monitor-session 5
rx destination interface tunnel-ip5
tx destination is not specified
=====
Source Interface  Dir  Status
-----
```

```
Te0/0/0/23 (port) Rx Operational
```

In the preceding example, the line marked as `<Session status>` can indicate one of these configuration errors:

Session Status	Explanation
Session is not configured globally	The session does not exist in global configuration. Review the <b>show</b> command output and ensure that a session with a correct name has been configured.
Destination interface <code>&lt;intf&gt;</code> ( <code>&lt;down-state&gt;</code> )	The destination interface is not in Up state in the Interface Manager. You can verify the state using the <b>show interfaces</b> command. Check the configuration to determine what might be keeping the interface from coming up (for example, a sub-interface needs to have an appropriate encapsulation configured).

The `<Source interface status>` can report these messages:

Source Interface Status	Explanation
Operational	Everything appears to be working correctly in traffic mirroring. Please follow up with the platform teams in the first instance, if mirroring is not operating as expected.
Not operational (Session is not configured globally)	The session does not exist in global configuration. Check the <b>show</b> command output to ensure that a session with the right name has been configured.
Not operational (destination not known)	The session exists, but it either does not have a destination interface specified or the destination interface named for the session does not exist. For example, if the destination is a sub-interface that has not been created.
Not operational (source same as destination)	The session exists, but the destination and source are the same interface. Traffic mirroring does not work.
Not operational (destination not active)	The destination interface or pseudowire is not in the Up state. See the corresponding <i>Session status</i> error messages for suggested resolutions.
Not operational (source state <code>&lt;down-state&gt;</code> )	The source interface is not in the Up state. You can verify the state using the <b>show interfaces</b> command. Check the configuration to see what might be keeping the interface from coming up (for example, a sub-interface needs to have an appropriate encapsulation configured).
Error: see detailed output for explanation	Traffic mirroring has encountered an error. Run the <b>show monitor-session status detail</b> command to display more information.

The **show monitor-session status detail** command displays full details of the configuration parameters and any errors encountered. For example:

```
RP/0/RP0/CPU0:router show monitor-session status detail
```

```
Monitor-session sess1
Destination interface is not configured
Source Interfaces
```

```

-----
TenGigE0/0/0/1
  Direction: Both
  ACL match: Disabled
  Portion: Full packet
  Status: Not operational (destination interface not known)
TenGigE0/0/0/2
  Direction: Both
  ACL match: Disabled
  Portion: First 100 bytes
  Status: Not operational (destination interface not known). Error: 'Viking SPAN PD' detected
the 'warning' condition 'PRM connection
      creation failure'.
Monitor-session foo
  Destination next-hop TenGigE 0/0/0/0
  Source Interfaces
-----
TenGigE 0/0/0/1.100:
  Direction: Both
  Status: Operating
TenGigE 0/0/0/2.200:
  Direction: Tx
  Status: Error: <blah>

Monitor session bar
  No destination configured
  Source Interfaces
-----
TenGigE 0/0/0/3.100:
  Direction: Rx
  Status: Not operational(no destination)

```

Here are additional trace and debug commands:

```

RP/0/RP0/CPU0:router# show monitor-session platform trace ?

all      Turn on all the trace
errors   Display errors
events   Display interesting events

RP/0/RP0/CPU0:router# show monitor-session trace ?

process  Filter debug by process

#

RP/0/RP0/CPU0:router# debug monitor-session process all
RP/0/RP0/CPU0:router# debug monitor-session process ea
RP/0/RP0/CPU0:router# debug monitor-session process ma
RP/0/RP0/CPU0:router# show monitor-session process mgr

detail   Display detailed output
errors   Display only attachments which have errors
internal Display internal monitor-session information
|        Output Modifiers

RP/0/RP0/CPU0:router# show monitor-session status

```

```
RP/0/RP0/CPU0:router# show monitor-session status errors
RP/0/RP0/CPU0:router# show monitor-session status internal
```

## Verifying UDF-based ACL

Use the **show monitor-session status detail** command to verify the configuration of UDF on ACL.

```
RP/0/RP0/CPU0:leaf1# show monitor-session 1 status detail

Fri May 12 19:40:39.429 UTC
Monitor-session 1
  Destination interface tunnel-ip3
  Source Interfaces
  -----
TenGigE0/0/0/15
  Direction:  Rx-only
  Port level: True
  ACL match:  Enabled
  Portion:    Full packet
  Interval:   Mirror all packets
  Status:     Not operational (destination not active)
```

## SPAN to File

**Table 1: Feature History Table**

Feature Name	Release Information	Feature Description
SPAN to File - PCAPng File Format	Release 7.3.1	<p>PCAPng is the next generation of packet capture format that contains a dump of data packets captured over a network and stored in a standard format.</p> <p>The PCAPng file contains different types of information blocks, such as the section header, interface description, enhanced packet, simple packet, name resolution, and interface statistics. These blocks can be used to rebuild the captured packets into recognizable data.</p> <p>The PCAPng file format:</p> <ul style="list-style-type: none"> <li>• Provides the capability to enhance and extend the existing capabilities of data storage over time</li> <li>• Allows you to merge or append data to an existing file.</li> <li>• Enables to read data independently from network, hardware, and operating system of the machine that made the capture.</li> </ul>

SPAN to File is an extension of the pre-existing SPAN feature that allows network packets to be mirrored to a file instead of an interface. This helps in the analysis of the packets at a later stage. The file format is PCAP, which helps that data to be used by tools, such as tcpdump or Wireshark.

SPAN to File feature:



- Supports a maximum of four active sessions.
- A maximum of 1000 source ports are supported across the system. Individual platforms may support lower numbers. The SPAN session may be any of these currently supported classes: Ethernet, IPv4, IPv6, MPLS-IPv4, and MPLS-IPv6.
- Provides a buffer range of 1000-1000000 KB. The default buffer size is set to 1000 KB.
- Provides support for SPAN source.
  - Each source port can be monitored in only one traffic mirroring session.
  - Each source port can be configured with a direction (ingress, egress, or both) to monitor local traffic mirroring.

When a file is configured as a destination for a SPAN session, a buffer is created on each node to which the network packets are logged. The buffer is for all packets on the node regardless of which interface they are from, that is, multiple interfaces may be providing packets for the same buffer. The buffers are deleted when the session configuration is removed. The file is written by each node to a location on the active RP which contains the node ID of the node on which the buffer was located.

If multiple interfaces are attached to a session, then interfaces on the same node are expected to have their packets sent to the same file. Bundle interfaces can be attached to a session with a file destination, which is similar to attaching individual interfaces.

### Limitations

SPAN to File has the following limitations:

- Supports only port-level
- VLAN is not supported
- Bundle members are not supported
- Filtering based on Egress ACL is not supported
- Source port statistics is not supported

## Action Commands for SPAN to File

Action commands are added to start and stop network packet collection. The commands may only be run on sessions where the destination is a file. The action command auto-completes names of globally configured SPAN to File sessions. See the table below for more information on action commands.

**Table 2: Action Commands for SPAN to File**

Action	Command	Description
Start	<code>monitor-session &lt;name&gt;</code> <code>packet-collection start</code>	Issue this command to start writing packets for the specified session to the configured buffer.

Action	Command	Description
Stop	<pre>monitor-session &lt;name&gt; packet-collection stop [ discard-data   write directory &lt;dir&gt; filename &lt;filename&gt; ]</pre>	<p>Issue this command to stop writing packets to the configured buffer. If the <code>discard-data</code> option is specified, the buffer is simply cleared, whereas if the <code>write</code> option is specified, the buffer is written to disk before clearing.</p> <p>If the buffer is to be written, it is done so in <code>.pcap</code> format to this location:  <code>/&lt;directory&gt;/&lt;node_id&gt;/&lt;filename&gt;.pcap</code>.</p> <p>If the user adds a <code>.pcap</code> extension when specifying the filename, this is removed so that the extension is not added twice.</p>

## Configuring SPAN to File

Use the following command to configure SPAN to File:

```
monitor-session <name> [ethernet|ipv4|ipv6|mpls-ipv4|mpls-ipv6]
destination file [size <kbytes>] [buffer-type linear]
```

The `monitor-session <name> [ethernet|ipv4|ipv6|mpls-ipv4|mpls-ipv6]` part of the command creates a monitor-session with the specified name and class and is a pre-existing chain point from the current SPAN feature. The `destination file [size <kbytes>] [buffer-type linear]` part of the command adds a new “file” option to the existing “destination”.

`destination file` has the following configuration options:

- Buffer size.
- Two types of buffer:
  - Circular: Once the buffer is full, the start is overwritten.
  - Linear: Once the buffer is full, no further packets are logged.




---

**Note** The default buffer-type is circular. Only linear buffer is explicitly configurable. Changing any of the parameters (buffer size or type) recreates the session, and clears any buffers of packets.

---

All configuration options which are applied to an attachment currently supported for other SPAN types should also be supported by SPAN to file. This may include:

- ACLs
- Write only first X bytes of packet.
- Mirror interval from 512 to 16k.



**Note** These options are implemented by the platform when punting the packet.

Once a session has been created, then interfaces may be attached to it using the following configuration:

```
interface GigabitEthernet 0/0/0/0
    monitor-session <name> [ethernet|ipv4|ipv6|mpls-ipv4|mpls-ipv6]
```

The attachment configuration is unchanged by SPAN to File feature.

### Configuration Examples

To configure a `mon1` monitor session, use the following commands:

```
monitor-session mon1 ethernet
    destination file size 230000
    !
```

In the above example, omitting the `buffer-type` option results in default circular buffer.

To configure a `mon2` monitor session, use the following commands:

```
monitor-session mon2 ethernet
    destination file size 1000 buffer-type linear
    !
```

To attach monitor session to a physical or bundle interface, use the following commands:

```
RP/0/RSP0/CPU0:router#show run interface Bundle-Ether 1
Fri Apr 24 12:12:59.348 EDT
interface Bundle-Ether1
monitor-session ms7 ethernet
!
```

### Running Configuration

```
!! IOS XR Configuration 7.1.1.124I
!! Last configuration change at Tue Nov 26 19:29:05 2019 by root
!
hostname OC
logging console informational
!
monitor-session mon1 ethernet
    destination file size 230000 buffer-type circular
!
monitor-session mon2 ethernet
    destination file size 1000 buffer-type linear

!
interface Bundle-Ether1
monitor-session ms7 ethernet
end
```

### Verification

To verify packet collection status:

```
RP/0/RP0/CPU0:router#show monitor-session status
Monitor-session mon1
Destination File - Packet collecting
=====
Source Interface      Dir      Status
-----
Hu0/9/0/2            Rx      Operational
```

```

Monitor-session mon2
Destination File - Packet collecting
=====
Source Interface      Dir      Status
-----
BE2.1                 Rx       Operational

```

If packet collection is not active, the following line is displayed:

```

Monitor-session mon2
Destination File - Not collecting

```

## VLAN Subinterface as Source for Traffic Mirroring

*Table 3: Feature History Table*

Feature Name	Release Information	Feature Description
VLAN Subinterface as Source for Traffic Mirroring	Release 7.5.2	<p>You can now configure the VLAN subinterface as a source for traffic mirroring for:</p> <ul style="list-style-type: none"> <li>• Traffic ingressing at the interface</li> <li>• Traffic egressing at the interface</li> <li>• Traffic egressing and ingressing at the same interface</li> </ul> <p>You could configure mirror functionality only at the main interface level in earlier releases.</p>

VLAN subinterface provides the flexibility to monitor ingress or egress or both directions traffic from all the active subinterfaces of the source VLAN. The active subinterfaces in the source VLAN are considered as source subinterfaces. When subinterfaces are added or removed from the source VLAN, the corresponding traffic is added or removed from the monitoring sources.

### Restrictions

The following restrictions apply to VLAN subinterface as source for traffic mirroring:

- Supports maximum 4 reception and transmission sessions together for mirroring. This restriction is applicable for subinterfaces and ports as source.

## VLAN Interface as Source for Traffic Mirroring

### Configuration Example

```

Router# configure
Router(config)# monitor-session mon1 ethernet
Router(config-mon)# destination interface tunnel-ip 3
Router(config-mon)# exit
Router(config)# interface HundredGigE 0/1/0/1.10
Router(config-subif)#

```

```
monitor-session mon1 ethernet
Router(config-if-mon)# commit
```

### Running Configuration

```
Router# show run monitor-session mon1
monitor-session mon1 ethernet
destination interface tunnel-ip3
!
```

```
Router# show run interface HundredGigE 0/1/0/1.10
interface HundredGigE0/1/0/1.10
 encapsulation dot1q 10
  ipv4 address 101.1.2.1 255.255.255.252
  monitor-session mon1 ethernet
  !
  !
  !
```

### Verification

```
Router# show monitor-session status
Monitor-session mon1
Destination interface tunnel-ip3
=====
Source Interface Dir Status
-----
HundredGigE 0/1/0/1.10 Both Operational
```

