Configuring SPAN

This chapter describes how to configure an Ethernet switched port analyzer (SPAN) to analyze traffic between ports on Cisco NX-OS devices.

About SPAN

SPAN analyzes all traffic between source ports by directing the SPAN session traffic to a destination port with an external analyzer attached to it.

You can define the sources and destinations to monitor in a SPAN session on the local device.

SPAN Sources

The interfaces from which traffic can be monitored are called SPAN sources. Sources designate the traffic to monitor and whether to copy ingress (Rx), egress (Tx), or both directions of traffic. SPAN sources include the following:

- Ethernet ports (but not subinterfaces)

Characteristics of Source Ports

SPAN source ports have the following characteristics:

- A port configured as a source port cannot also be configured as a destination port.

SPAN Destinations

SPAN destinations refer to the interfaces that monitor source ports. Destination ports receive the copied traffic from SPAN sources. SPAN destinations include the following:

- Ethernet ports in either access or trunk mode

Characteristics of Destination Ports

SPAN destination ports have the following characteristics:

- A port configured as a destination port cannot also be configured as a source port.
- A destination port can be configured in only one SPAN session at a time.
- Destination ports do not participate in any spanning tree instance. SPAN output includes bridge protocol data unit (BPDU) Spanning Tree Protocol hello packets.

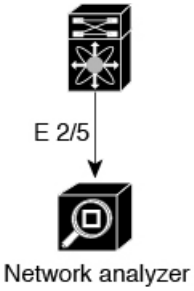
SPAN Sessions

You can create SPAN sessions to designate sources and destinations to monitor.

See the *Cisco Nexus 9000 Series NX-OS Verified Scalability Guide* for information on the number of supported SPAN sessions.

This figure shows a SPAN configuration. Packets on three Ethernet ports are copied to destination port Ethernet 2/5. Only traffic in the direction specified is copied.

Figure 1: SPAN Configuration



Source Port	Direction	Destination Ports
E 2/1	Rx	E 2/5
E 2/2	Rx, Tx	
E 2/3	Tx	

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Localized SPAN Sessions

A SPAN session is localized when all of the source interfaces are on the same line card. A session destination interface can be on any line card.

ACL TCAM Regions

You can change the size of the ACL ternary content addressable memory (TCAM) regions in the hardware. For information on the TCAM regions used by SPAN sessions, see the "Configuring IP ACLs" chapter of the *Cisco Nexus 9000 Series NX-OS Security Configuration Guide*.

High Availability

The SPAN feature supports stateless and stateful restarts. After a reboot or supervisor switchover, the running configuration is applied. For more information on high availability, see the Cisco Nexus 9000 Series NX-OS High Availability and Redundancy Guide.

Prerequisites for SPAN

SPAN has the following prerequisites:

- You must first configure the ports on each device to support the desired SPAN configuration. For more information, see the *Cisco Nexus 9000 Series NX-OS Interfaces Configuration Guide*.

Guidelines and Limitations for SPAN

Note For scale information, see the release-specific *Cisco Nexus 9000 Series NX-OS Verified Scalability Guide*.

SPAN has the following configuration guidelines and limitations:

- Traffic that is denied by an ACL may still reach the SPAN destination port because SPAN replication is performed on the ingress side prior to the ACL enforcement (ACL dropping traffic).
- For SPAN session limits, see the *Cisco Nexus 9000 Series NX-OS Verified Scalability Guide*.
- All SPAN replication is performed in the hardware. The supervisor CPU is not involved.
- You can configure a SPAN session on the local device only. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards.
- Packets with FCS errors are not mirrored in a SPAN session.
- FEX and SPAN port-channel destinations are not supported on the Cisco Nexus 9500 platform switches with an -EX or –FX type line card.
- You can configure only one destination port in a SPAN session.
- A destination port can be configured in only one SPAN session at a time.
- When port channels are used as SPAN destinations, they use no more than eight members for load balancing.
- SPAN does not support destinations on Cisco Nexus 9408PC-CFP2 line card ports.
- Configuring two SPAN or ERSPAN sessions on the same source interface with only one filter is not supported. If the same source is used in multiple SPAN or ERSPAN sessions either all the sessions must have different filters or no sessions should have filters.
- The following guidelines apply to SPAN copies of access port dot1q headers:
  - When traffic ingresses from a trunk port and egresses to an access port, an egress SPAN copy of an access port on a switch interface always has a dot1q header.

  - When traffic ingresses from an access port and egresses to a trunk port, an ingress SPAN copy of an access port on a switch interface does not have a dot1q header.
  - When traffic ingresses from an access port and egresses to an access port, an ingress/egress SPAN copy of an access port on a switch interface does not have a dot1q header.

- You cannot configure a port as both a source and destination port.
- Enabling UniDirectional Link Detection (UDLD) on the SPAN source and destination ports simultaneously is not supported. If UDLD frames are expected to be captured on the source port of such SPAN session, disable UDLD on the destination port of the SPAN session.
- SPAN is not supported for management ports.
- Statistics are not support for the filter access group.
- SPAN is supported in Layer 3 mode; however, SPAN is not supported on Layer 3 subinterfaces or Layer 3 port-channel subinterfaces.
- When a SPAN session contains source ports that are monitored in the transmit or transmit and receive direction, packets that these ports receive might be replicated to the SPAN destination port even though the packets are not actually transmitted on the source ports. Some examples of this behavior on source ports are as follows:
  - Traffic that results from flooding
  - Broadcast and multicast traffic
- SPAN sessions cannot capture packets with broadcast or multicast MAC addresses that reach the supervisor, such as ARP requests and Open Shortest Path First (OSPF) protocol hello packets, if the source of the session is the supervisor Ethernet in-band interface. To capture these packets, you must use the physical interface as the source in the SPAN sessions.
- VLAN SPAN monitors only the traffic that enters Layer 2 ports in the VLAN.
- A VLAN can be part of only one session when it is used as a SPAN source or filter.
- VLAN ACL redirects to SPAN destination ports are not supported.
- When using a VLAN ACL to filter a SPAN, only **action forward** is supported; **action drop** and **action redirect** are not supported.
- For VXLAN/VTEP, SPAN source or destination is supported on any port.
- The number of SPAN sessions per line card reduces to two if the same interface is configured as a bidirectional source in more than one session. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards.
- A single forwarding engine instance supports four SPAN sessions. For Cisco Nexus 9300 Series switches, if the first three sessions have bidirectional sources, the fourth session has hardware resources only for Rx sources. This limitation might also apply to Cisco Nexus 9500 Series switches, depending on the SPAN source's forwarding engine instance mappings. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards.
- An access-group filter in a SPAN session must be configured as vlan-accessmap. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards.

- Supervisor-generated stream of bytes module header (SOBMH) packets have all of the information to go out on an interface and can bypass all forwarding lookups in the hardware, including SPAN and ERSPAN. CPU-generated frames for Layer 3 interfaces and the Bridge Protocol Data Unit (BPDU) class of packets are sent using SOBMH. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards. The Cisco Nexus 9636C-R and 9636Q-R both support inband SPAN and local SPAN.
- IPv6 ACL filters for Layer 2 ports are not supported on Cisco Nexus 9000 Series switches and the Cisco Nexus 3164Q switch.
- Cisco NX-OS does not span Link Layer Discovery Protocol (LLDP) or Link Aggregation Control Protocol (LACP) packets when the source interface is not a host interface port channel.

The following guidelines and limitations apply to egress (Tx) SPAN:

- The following limitations apply to egress (Tx) SPAN and these switches:
  - Cisco Nexus 92160YC-X
  - Cisco Nexus 92304QC
  - Cisco Nexus 9272Q
  - Cisco Nexus 9236C
  - Cisco Nexus 92300YC

  ACL filtering is not supported (applies to both unicast and Broadcast, Unknown Unicast and Multicast (BUM) traffic)

  VLAN filtering is supported, but only for unicast traffic

  VLAN filtering is not supported for BUM traffic
- SPAN copies for multicast packets are made prior to rewrite. Therefore, the TTL, VLAN ID, any remarking due to egress policy, and so on, are not captured in the SPAN copy.
- If SPAN is mirroring the traffic which ingresses on an interface in an ASIC instance and egresses on a Layer 3 interface (SPAN Source) on a different ASIC instance, then TX mirrored packet will have a VLAN ID 4095 on Cisco Nexus 9500 platform modular switches using non-EX line cards.
- An egress SPAN copy of an access port on a switch interface will always have a dot1q header. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards.
- The flows for post-routed unknown unicast flooded packets are in the SPAN session, even if the SPAN session is configured to not monitor the ports on which this flow is forwarded. This limitation applies to Network Forwarding Engine (NFE) and NFE2-enabled EOR switches and SPAN sessions that have Tx port sources.
- Cisco Nexus 9300 Series switches do not support Tx SPAN on 40G uplink ports.

Note This limitation does not apply to Nexus 9300-EX/FX/FX2 platform switches that have the 100G interfaces.

The following guidelines and limitations apply to ingress (Rx) SPAN:

- A SPAN copy of Cisco Nexus 9300 Series switch 40G uplink interfaces will miss the dot1q information when spanned in the Rx direction.

Note This limitation does not apply to Nexus 9300-EX/FX/FX2 platform switches that have the 100G interfaces.

- Session filtering functionality (VLAN or ACL filters) is supported only for Rx sources. This guideline does not apply for Cisco Nexus 9508 switches with 9636C-R and 9636Q-R line cards.

The following guidelines and limitations apply to FEX ports:

- The FEX NIF interfaces or port-channels cannot be used as a SPAN source or SPAN destination. If the FEX NIF interfaces or port-channels are specified as a SPAN source or SPAN destination, the software displays an unsupported error.
- Cisco Nexus 9300 and 9500 platform switches support FEX ports as SPAN sources in the ingress direction for all traffic and in the egress direction only for known Layer 2 unicast traffic flows through the switch and FEX. Routed traffic might not be seen on FEX HIF egress SPAN.
- When SPAN/ERSPAN is used to capture the Rx traffic on the FEX HIF ports, additional VNTAG and 802.1q tags are present in the captured traffic.
- VLAN and ACL filters are not supported for FEX ports.
- If the sources used in bidirectional SPAN sessions are from the same FEX, the hardware resources are limited to two SPAN sessions.

The following guidelines and limitations apply to Cisco Nexus 9200 and 9300-EX Series switches:

The following guidelines and limitations apply to SPAN truncation:

- Truncation is supported only for local and SPAN source sessions. It is not supported for SPAN destination sessions.
- Configuring MTU on a SPAN session truncates all of the packets egressing on the SPAN destination (for that session) to the MTU value specified.
- The cyclic redundancy check (CRC) is recalculated for the truncated packet.
- The bytes specified are retained starting from the header of the packets. The rest are truncated if the packet is longer than the MTU.

Default Settings for SPAN

The following table lists the default settings for SPAN parameters.

Parameters	Default
SPAN sessions	Created in the shut state

Configuring SPAN

Note Cisco NX-OS commands for this feature may differ from those in Cisco IOS.

Configuring a SPAN Session

You can configure a SPAN session on the local device only. By default, SPAN sessions are created in the shut state.

Note For bidirectional traditional sessions, you can configure the sessions without specifying the direction of the traffic.

Before you begin

You must configure the destination ports in access or trunk mode. For more information, see the *Cisco Nexus 9000 Series NX-OS Interfaces Configuration Guide*.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	**interface** *ethernet slot/port*
	Example:
	`switch(config)# interface ethernet 2/5`
	`switch(config-if)#`
		Enters interface configuration mode on the selected slot and port.

Step 3	**switchport** **Example:** `switch(config-if)# switchport`	Configures switchport parameters for the selected slot and port or range of ports.
Step 4	**switchport monitor** **Example:** `switch(config-if)# switchport monitor`	Configures the switchport interface as a SPAN destination.
Step 5	(Optional) Repeat Steps 2 through 4 to configure monitoring on additional SPAN destinations.	—

	Command or Action	Purpose
Step 6	**no monitor session** *session-number* **Example:** `switch(config)# no monitor session 3`	Clears the configuration of the specified SPAN session. The new session configuration is added to the existing session configuration.

Step 7	**monitor session** *session-number* [**shut**]
	Example:
	Example:
	`switch(config)# monitor session 3 shut`
	`switch(config-monitor)#`
		Enters the monitor configuration mode. The new session configuration is added to the existing session configuration. By default, the session is created in the shut state, and the session is a local SPAN session. The optional keyword shut specifies a shut state for the selected session.

Step 8	**description** *description* **Example:** `switch(config-monitor)# description my_span_session_3`	Configures a description for the session. By default, no description is defined. The description can be up to 32 alphanumeric characters.

Step 9	**source** {**interface** *type* [**rx** | **tx** | **both**] | [**rx**]}
	Example:
	`switch(config-monitor)# source interface ethernet 2/1-3, ethernet 3/1 rx`
	Example:
	`switch(config-monitor)# source interface port-channel 2`
		You can configure one or more sources, as either a series of comma-separated entries or a range of numbers.
		You can specify the traffic direction to copy as ingress (rx), egress (tx), or both.
		For a unidirectional session, the direction of the source must match the direction specified in the session.

Step 10	(Optional) **filter access-group** *acl-filter* **Example:** `switch(config-monitor)# filter access-group ACL1`	Associates an ACL with the SPAN session.
Step 11	Required: **destination interface** *type slot*/*port* **Example:** `switch(config-monitor)# destination interface ethernet 2/5`	Configures a destination for copied source packets. **Note** The SPAN destination port must be either an access port or a trunk port. **Note** You must enable monitor mode on the destination port.
Step 12	Required: **no shut** **Example:** `switch(config-monitor)# no shut`	Enables the SPAN session. By default, the session is created in the shut state.
Step 13	(Optional) **show monitor session** {**all** | *session-number* | **range** *session-range*} [**brief**] **Example:**	Displays the SPAN configuration.

	Command or Action	Purpose
	`switch(config-monitor)# show monitor session 3`	
Step 14	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Shutting Down or Resuming a SPAN Session

You can shut down SPAN sessions to discontinue the copying of packets from sources to destinations. You can shut down one session in order to free hardware resources to enable another session. By default, SPAN sessions are created in the shut state.

You can resume (enable) SPAN sessions to resume the copying of packets from sources to destinations. In order to enable a SPAN session that is already enabled but operationally down, you must first shut it down and then enable it.

You can configure the shut and enabled SPAN session states with either a global or monitor configuration mode command.

Procedure

	Command or Action	Purpose

Step 1	**configure terminal**
	Example:
	`switch# configure terminal`
	`switch(config)#`
		Enters global configuration mode.

Step 2	[**no**] **monitor session** {*session-range* | **all**} **shut** **Example:** `switch(config)# monitor session 3 shut`	Shuts down the specified SPAN sessions. By default, sessions are created in the shut state. The **no** form of the command resumes (enables) the specified SPAN sessions. By default, sessions are created in the shut state. **Note** If a monitor session is enabled but its operational status is down, to enable the session, you must first specify the **monitor session shut** command followed by the **no monitor session shut** command.

Step 3	**monitor session** *session-number*
	Example:
	`switch(config)# monitor session 3`
	`switch(config-monitor)#`
		Enters the monitor configuration mode. The new session configuration is added to the existing session configuration.

	Command or Action	Purpose
Step 4	[**no**] **shut** **Example:** `switch(config-monitor)# shut`	Shuts down the SPAN session. By default, the session is created in the shut state. The **no** form of the command enables the SPAN session. By default, the session is created in the shut state.
Step 5	(Optional) **show monitor** **Example:** `switch(config-monitor)# show monitor`	Displays the status of SPAN sessions.
Step 6	(Optional) **copy running-config startup-config** **Example:** `switch(config)# copy running-config startup-config`	Copies the running configuration to the startup configuration.

Verifying the SPAN Configuration

To display the SPAN configuration, perform one of the following tasks:

Command	Purpose
show monitor session {**all** | *session-number* | **range** *session-range*} [**brief**]	Displays the SPAN session configuration.

Configuration Examples for SPAN

Configuration Example for a SPAN Session

To configure a SPAN session, follow these steps:

Procedure

Step 1 Configure destination ports in access mode and enable SPAN monitoring.

Example:

```
switch# configure terminal
switch(config)# interface ethernet 2/5
switch(config-if)# switchport
switch(config-if)# switchport monitor
switch(config-if)# no shut
switch(config-if)# exit
switch(config)#
```

Step 2 Configure a SPAN session.

Example:

```
switch(config)# no monitor session 3
switch(config)# monitor session 3
switch(config-monitor)# source interface ethernet 2/1-3, ethernet 3/1 rx
switch(config-monitor)# source interface port-channel 2
switch(config-monitor)# destination interface ethernet 2/5
switch(config-monitor)# no shut
switch(config-monitor)# exit
switch(config)# show monitor session 3
switch(config)# copy running-config startup-config
```

Configuration Example for a Unidirectional SPAN Session

To configure a unidirectional SPAN session, follow these steps:

Procedure

Step 1 Configure destination ports in access mode and enable SPAN monitoring.

Example:

```
switch# configure terminal
switch(config)# interface ethernet 2/5
switch(config-if)# switchport
switch(config-if)# switchport monitor
switch(config-if)# no shut
switch(config-if)# exit
switch(config)#
```

Step 2 Configure a SPAN session.

Example:

```
switch(config)# no monitor session 3
switch(config)# monitor session 3 rx
switch(config-monitor)# source interface ethernet 2/1-3, ethernet 3/1
switch(config-monitor)# destination interface ethernet 2/5
switch(config-monitor)# no shut
switch(config-monitor)# exit
switch(config)# show monitor session 3
switch(config)# copy running-config startup-config
```

Configuration Example for a SPAN ACL

This example shows how to configure a SPAN ACL:

```
switch# configure terminal
switch(config)# ip access-list match_11_pkts
switch(config-acl)# permit ip 11.0.0.0 0.255.255.255 any
switch(config-acl)# exit
```

```
switch(config)# ip access-list match_12_pkts
switch(config-acl)# permit ip 12.0.0.0 0.255.255.255 any
switch(config-acl)# exit
switch(config-access-map)# match ip address match_11_pkts
switch(config-access-map)# action forward
switch(config-access-map)# exit
switch(config-access-map)# match ip address match_12_pkts
switch(config-access-map)# action forward
switch(config-access-map)# exit
switch(config)# monitor session 1
switch(config-erspan-src)# filter access_group span_filter
```

Additional References

Related Documents

Related Topic	Document Title
FEX	*Cisco Nexus 2000 Series NX-OS Fabric Extender Software Configuration Guide for Cisco Nexus 9000 Series Switches*