Configuring SPAN and RSPAN

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Prerequisites for SPAN and RSPAN

SPAN

You can limit SPAN traffic to specific VLANs by using the **filter vlan** keyword. If a trunk port is being monitored, only traffic on the VLANs specified with this keyword is monitored. By default, all VLANs are monitored on a trunk port.

RSPAN

We recommend that you configure an RSPAN VLAN before you configure an RSPAN source or a destination session.

Restrictions for SPAN and RSPAN

SPAN

The restrictions for SPAN are as follows:

- On each device, you can configure 66 sessions. A maximum of 8 source sessions can be configured and the remaining sessions can be configured as RSPAN destinations sessions. A source session is either a local SPAN session or an RSPAN source session.
- For SPAN sources, you can monitor traffic for a single port or VLAN or a series or range of ports or VLANs for each session. You cannot mix source ports and source VLANs within a single SPAN session.

- The destination port cannot be a source port; a source port cannot be a destination port.
- You cannot have two SPAN sessions using the same destination port.
- When you configure a device port as a SPAN destination port, it is no longer a normal device port; only monitored traffic passes through the SPAN destination port.
- Entering SPAN configuration commands does not remove previously configured SPAN parameters. You must enter the **no monitor session** {*session_number* | **all** | **local** | **remote**} global configuration command to delete configured SPAN parameters.
- For local SPAN, outgoing packets through the SPAN destination port carry the original encapsulation headers—untagged, ISL, or IEEE 802.1Q—if the **encapsulation replicate** keywords are specified. If the keywords are not specified, the packets are sent in native form.
- You can configure a disabled port to be a source or destination port, but the SPAN function does not start until the destination port and at least one source port or source VLAN are enabled.
- You cannot mix source VLANs and filter VLANs within a single SPAN session.

Traffic monitoring in a SPAN session has the following restrictions:

- Sources can be ports or VLANs, but you cannot mix source ports and source VLANs in the same session.
- Wireshark does not capture egress packets when egress span is active.
- You can run both a local SPAN and an RSPAN source session in the same device or device stack. The device or device stack supports a total of 66 source and RSPAN destination sessions.
- You can configure two separate SPAN or RSPAN source sessions with separate or overlapping sets of SPAN source ports and VLANs. Both switched and routed ports can be configured as SPAN sources and destinations.
- You can have multiple destination ports in a SPAN session, but no more than 64 destination ports per device stack.
- SPAN sessions do not interfere with the normal operation of the device. However, an oversubscribed SPAN destination, for example, a 10-Mb/s port monitoring a 100-Mb/s port, can result in dropped or lost packets.
- When SPAN or RSPAN is enabled, each packet being monitored is sent twice, once as normal traffic and once as a monitored packet. Monitoring a large number of ports or VLANs could potentially generate large amounts of network traffic.
- You can configure SPAN sessions on disabled ports; however, a SPAN session does not become active unless you enable the destination port and at least one source port or VLAN for that session.
- The device does not support a combination of local SPAN and RSPAN in a single session.
  - An RSPAN source session cannot have a local destination port.
  - An RSPAN destination session cannot have a local source port.
  - An RSPAN destination session and an RSPAN source session that are using the same RSPAN VLAN cannot run on the same device or device stack.
- SPAN sessions capture only Dynamic Host Configuration Protocol (DHCP) ingress packets when DHCP snooping is enabled on the device.

RSPAN

The restrictions for RSPAN are as follows:

- RSPAN does not support BPDU packet monitoring or other Layer 2 device protocols.
- The RSPAN VLAN is configured only on trunk ports and not on access ports. To avoid unwanted traffic in RSPAN VLANs, make sure that the VLAN remote-span feature is supported in all the participating devices.
- RSPAN VLANs are included as sources for port-based RSPAN sessions when source trunk ports have active RSPAN VLANs. RSPAN VLANs can also be sources in SPAN sessions. However, since the device does not monitor spanned traffic, it does not support egress spanning of packets on any RSPAN VLAN identified as the destination of an RSPAN source session on the device.
- If you enable VTP and VTP pruning, RSPAN traffic is pruned in the trunks to prevent the unwanted flooding of RSPAN traffic across the network for VLAN IDs that are lower than 1005.
- It is recommended not to configure RSPAN VLAN as Native VLAN.
- RSPAN sessions do not capture DHCP-inject packets. DHCP-inject packets refer to DHCP packets (DISCOVER, OFFER, REQUEST, and ACK packets) which are modified by the CPU and inserted back into the network.

Information About SPAN and RSPAN

The following sections provide information about SPAN and RSPAN.

SPAN and RSPAN

You can analyze network traffic passing through ports or VLANs by using SPAN or RSPAN to send a copy of the traffic to another port on the device or on another device that has been connected to a network analyzer or other monitoring or security device. SPAN copies (or mirrors) traffic received or sent (or both) on source ports or source VLANs to a destination port for analysis. SPAN does not affect the switching of network traffic on the source ports or VLANs. You must dedicate the destination port for SPAN use. Except for traffic that is required for the SPAN or RSPAN session, destination ports do not receive or forward traffic.

Only traffic that enters or leaves source ports or traffic that enters or leaves source VLANs can be monitored by using SPAN; traffic routed to a source VLAN cannot be monitored. For example, if incoming traffic is being monitored, traffic that gets routed from another VLAN to the source VLAN cannot be monitored; however, traffic that is received on the source VLAN and routed to another VLAN can be monitored.

You can use the SPAN or RSPAN destination port to inject traffic from a network security device. For example, if you connect a Cisco Intrusion Detection System (IDS) sensor appliance to a destination port, the IDS device can send TCP reset packets to close down the TCP session of a suspected attacker.

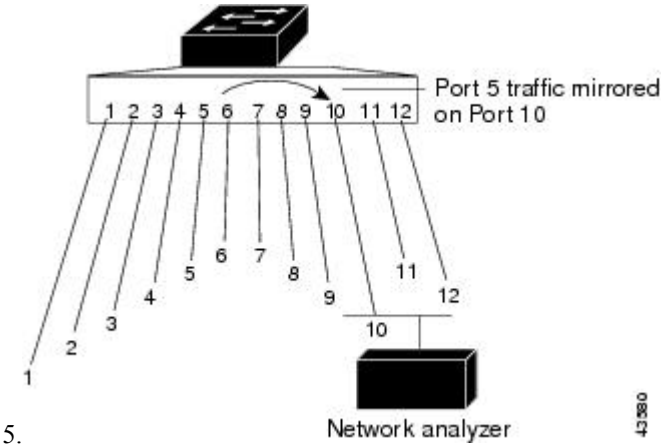
Local SPAN

Local SPAN supports a SPAN session entirely within one device; all source ports or source VLANs and destination ports are in the same device or device stack. Local SPAN copies traffic from one or more source ports in any VLAN or from one or more VLANs to a destination port for analysis.

Local SPAN supports a SPAN session entirely within one switch; all source ports and destination ports are in the same switch. Local SPAN copies traffic from one or more source ports to a destination port for analysis.

Figure 1: Example of Local SPAN Configuration on a Single Device

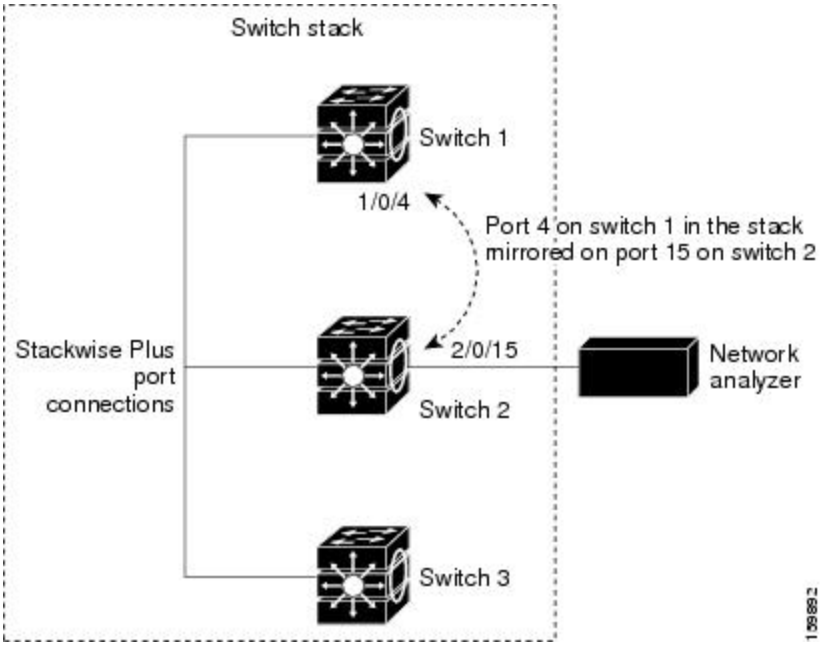
All traffic on port 5 (the source port) is mirrored to port 10 (the destination port). A network analyzer on port 10 receives all network traffic from port 5 without being physically attached to port



5.

Figure 2: Example of Local SPAN Configuration on a Device Stack

This is an example of a local SPAN in a device stack, where the source and destination ports reside on different stack members.

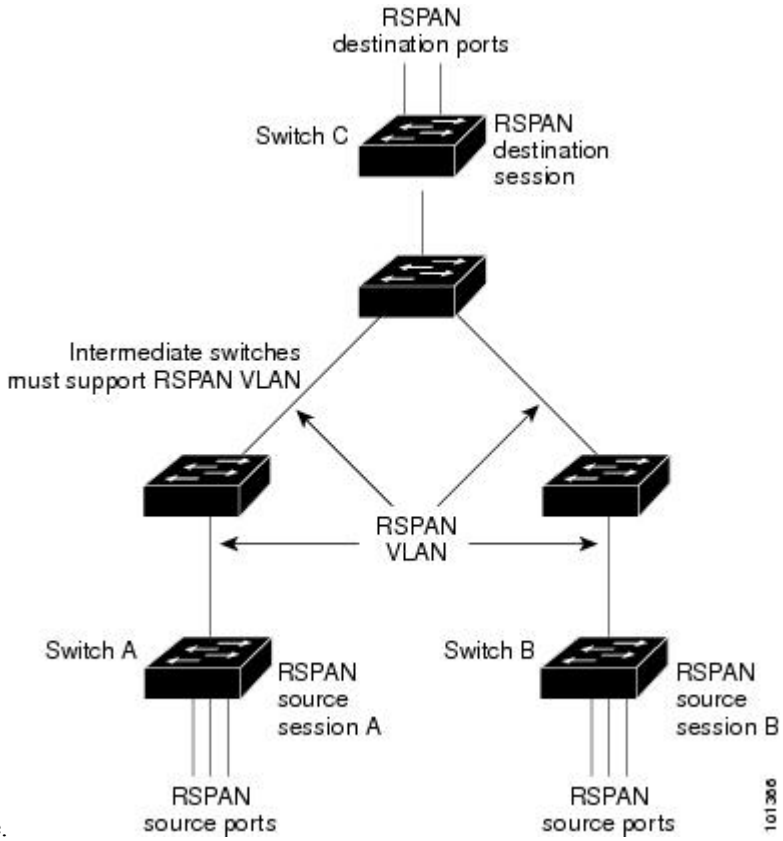


Remote SPAN

RSPAN supports source ports, source VLANs, and destination ports on different devices (or different device stacks), enabling remote monitoring of multiple devices across your network.

Figure 3: Example of RSPAN Configuration

The figure below shows source ports on Device A and Device B. The traffic for each RSPAN session is carried over a user-specified RSPAN VLAN that is dedicated for that RSPAN session in all participating devices. The RSPAN traffic from the source ports or VLANs is copied into the RSPAN VLAN and forwarded over trunk ports carrying the RSPAN VLAN to a destination session monitoring the RSPAN VLAN. Each RSPAN source device must have either ports or VLANs as RSPAN sources. The destination is always a physical port, as shown on Device C in the figure.



SPAN and RSPAN Concepts and Terminology

SPAN Sessions

SPAN sessions (local or remote) allow you to monitor traffic on one or more ports, or one or more VLANs, and send the monitored traffic to one or more destination ports.

A local SPAN session is an association of a destination port with source ports or source VLANs, all on a single network device. Local SPAN does not have separate source and destination sessions. Local SPAN sessions gather a set of ingress and egress packets specified by the user and form them into a stream of SPAN data, which is directed to the destination port.

RSPAN consists of at least one RSPAN source session, an RSPAN VLAN, and at least one RSPAN destination session. You separately configure RSPAN source sessions and RSPAN destination sessions on different network devices. To configure an RSPAN source session on a device, you associate a set of source ports or source VLANs with an RSPAN VLAN. The output of this session is the stream of SPAN packets that are sent to the RSPAN VLAN. To configure an RSPAN destination session on another device, you associate the

destination port with the RSPAN VLAN. The destination session collects all RSPAN VLAN traffic and sends it out the RSPAN destination port.

An RSPAN source session is very similar to a local SPAN session, except for where the packet stream is directed. In an RSPAN source session, SPAN packets are relabeled with the RSPAN VLAN ID and directed over normal trunk ports to the destination device.

An RSPAN destination session takes all packets received on the RSPAN VLAN, strips off the VLAN tagging, and presents them on the destination port. The session presents a copy of all RSPAN VLAN packets (except Layer 2 control packets) to the user for analysis.

Traffic monitoring in a SPAN session has these restrictions:

- Sources can be ports or VLANs, but you cannot mix source ports and source VLANs in the same session.
- You can run both a local SPAN and an RSPAN source session in the same device or device stack. The device or device stack supports a total of 66 source and RSPAN destination sessions.
- You can configure two separate SPAN or RSPAN source sessions with separate or overlapping sets of SPAN source ports and VLANs. Both switched and routed ports can be configured as SPAN sources and destinations.
- You can have multiple destination ports in a SPAN session, but no more than 64 destination ports per device stack.
- SPAN sessions do not interfere with the normal operation of the device. However, an oversubscribed SPAN destination, for example, a 10-Mb/s port monitoring a 100-Mb/s port, can result in dropped or lost packets.
- When SPAN or RSPAN is enabled, each packet being monitored is sent twice, once as normal traffic and once as a monitored packet. Therefore monitoring a large number of ports or VLANs could potentially generate large amounts of network traffic.
- You can configure SPAN sessions on disabled ports; however, a SPAN session does not become active unless you enable the destination port and at least one source port or VLAN for that session.
- The device does not support a combination of local SPAN and RSPAN in a single session.
  - An RSPAN source session cannot have a local destination port.
  - An RSPAN destination session cannot have a local source port.
  - An RSPAN destination session and an RSPAN source session that are using the same RSPAN VLAN cannot run on the same device or device stack.

Monitored Traffic

SPAN sessions can monitor these traffic types:

- Receive (Rx) SPAN—Receive (or ingress) SPAN monitors as much as possible all of the packets received by the source interface or VLAN before any modification or processing is performed by the device. A copy of each packet received by the source is sent to the destination port for that SPAN session.

  Packets that are modified because of routing or Quality of Service (QoS)—for example, modified Differentiated Services Code Point (DSCP)—are copied before modification.

  Features that can cause a packet to be dropped during receive processing have no effect on ingress SPAN; the destination port receives a copy of the packet even if the actual incoming packet is dropped. These

features include IP standard and extended input Access Control Lists (ACLs), ingress QoS policing, VLAN ACLs, and egress QoS policing.

- Transmit (Tx) SPAN—Transmit (or egress) SPAN monitors as much as possible all of the packets sent by the source interface after all modification and processing is performed by the device. A copy of each packet sent by the source is sent to the destination port for that SPAN session. The copy is provided after the packet is modified.

  Packets that are modified because of routing (for example, with modified time-to-live (TTL), MAC address, or QoS values) are duplicated (with the modifications) at the destination port.

  Features that can cause a packet to be dropped during transmit processing also affect the duplicated copy for SPAN. These features include IP standard and extended output ACLs and egress QoS policing.

- Both—In a SPAN session, you can also monitor a port or VLAN for both received and sent packets. This is the default.

The default configuration for local SPAN session ports is to send all packets untagged. However, when you enter the **encapsulation replicate** keywords while configuring a destination port, these changes occur:

- Packets are sent on the destination port with the same encapsulation (untagged or IEEE 802.1Q) that they had on the source port.
- Packets of all types, including BPDU and Layer 2 protocol packets, are monitored.

Therefore, a local SPAN session with encapsulation replicate enabled can have a mixture of untagged and IEEE 802.1Q tagged packets appear on the destination port.

Device congestion can cause packets to be dropped at ingress source ports, egress source ports, or SPAN destination ports. In general, these characteristics are independent of one another. For example:

- A packet might be forwarded normally but dropped from monitoring due to an oversubscribed SPAN destination port.
- An ingress packet might be dropped from normal forwarding, but still appear on the SPAN destination port.
- An egress packet dropped because of device congestion is also dropped from egress SPAN.

In some SPAN configurations, multiple copies of the same source packet are sent to the SPAN destination port. For example, a bidirectional (both Rx and Tx) SPAN session is configured for the Rx monitor on port A and Tx monitor on port B. If a packet enters the device through port A and is switched to port B, both incoming and outgoing packets are sent to the destination port. Both packets are the same unless a Layer 3 rewrite occurs, in which case the packets are different because of the packet modification.

Source Ports

A source port (also called a monitored port) is a switched or routed port that you monitor for network traffic analysis.

In a local SPAN session or RSPAN source session, you can monitor source ports or VLANs for traffic in one or both directions.

The device supports any number of source ports (up to the maximum number of available ports on the device) and any number of source VLANs (up to the maximum number of VLANs supported).

You cannot mix ports and VLANs in a single session.

A source port has these characteristics:

- It can be monitored in multiple SPAN sessions.
- Each source port can be configured with a direction (ingress, egress, or both) to monitor.
- It can be any port type (for example, EtherChannel, Gigabit Ethernet, and so forth).
- For EtherChannel sources, you can monitor traffic for the entire EtherChannel or individually on a physical port as it participates in the port channel.
- It can be an access port, trunk port, routed port, or voice VLAN port.
- It cannot be a destination port.
- Source ports can be in the same or different VLANs.
- You can monitor multiple source ports in a single session.

Source VLANs

VLAN-based SPAN (VSPAN) is the monitoring of the network traffic in one or more VLANs. The SPAN or RSPAN source interface in VSPAN is a VLAN ID, and traffic is monitored on all the ports for that VLAN.

VSPAN has these characteristics:

- All active ports in the source VLAN are included as source ports and can be monitored in either or both directions.
- On a given port, only traffic on the monitored VLAN is sent to the destination port.
- If a destination port belongs to a source VLAN, it is excluded from the source list and is not monitored.
- If ports are added to or removed from the source VLANs, the traffic on the source VLAN received by those ports is added to or removed from the sources being monitored.
- You cannot use filter VLANs in the same session with VLAN sources.
- You can monitor only Ethernet VLANs.

VLAN Filtering

When you monitor a trunk port as a source port, by default, all VLANs active on the trunk are monitored. You can limit SPAN traffic monitoring on trunk source ports to specific VLANs by using VLAN filtering.

- VLAN filtering applies only to trunk ports or to voice VLAN ports.
- VLAN filtering applies only to port-based sessions and is not allowed in sessions with VLAN sources.
- When a VLAN filter list is specified, only those VLANs in the list are monitored on trunk ports or on voice VLAN access ports.
- SPAN traffic coming from other port types is not affected by VLAN filtering; that is, all VLANs are allowed on other ports.
- VLAN filtering affects only traffic forwarded to the destination SPAN port and does not affect the switching of normal traffic.

Destination Port

Each local SPAN session or RSPAN destination session must have a destination port (also called a monitoring port) that receives a copy of traffic from the source ports or VLANs and sends the SPAN packets to the user, usually a network analyzer.

A destination port has these characteristics:

- For a local SPAN session, the destination port must reside on the same device or device stack as the source port. For an RSPAN session, it is located on the device containing the RSPAN destination session. There is no destination port on a device or device stack running only an RSPAN source session.
- When a port is configured as a SPAN destination port, the configuration overwrites the original port configuration. When the SPAN destination configuration is removed, the port reverts to its previous configuration. If a configuration change is made to the port while it is acting as a SPAN destination port, the change does not take effect until the SPAN destination configuration had been removed.
- If the port was in an EtherChannel group, it is removed from the group while it is a destination port. If it was a routed port, it is no longer a routed port.
- It can be any Ethernet physical port.
- It cannot be a secure port.
- It cannot be a source port.
- It can be an EtherChannel group (**ON** mode only), on Cisco Catalyst 9500 Series Switches - High Performance.
- It can participate in only one SPAN session at a time (a destination port in one SPAN session cannot be a destination port for a second SPAN session).
- When it is active, incoming traffic is disabled. The port does not transmit any traffic except that required for the SPAN session. Incoming traffic is never learned or forwarded on a destination port.
- If ingress traffic forwarding is enabled for a network security device, the destination port forwards traffic at Layer 2.
- It does not participate in any of the Layer 2 protocols (STP, VTP, CDP, DTP, PagP).
- A destination port that belongs to a source VLAN of any SPAN session is excluded from the source list and is not monitored.
- The maximum number of destination ports in a device or device stack is 64.

Local SPAN and RSPAN destination ports function differently with VLAN tagging and encapsulation:

- For local SPAN, if the **encapsulation replicate** keywords are specified for the destination port, these packets appear with the original encapsulation (untagged, ISL, or IEEE 802.1Q). If these keywords are not specified, packets appear in the untagged format. Therefore, the output of a local SPAN session with **encapsulation replicate** enabled can contain a mixture of untagged, ISL, or IEEE 802.1Q-tagged packets.
- For RSPAN, the original VLAN ID is lost because it is overwritten by the RSPAN VLAN identification. Therefore, all packets appear on the destination port as untagged.

RSPAN VLAN

The RSPAN VLAN carries SPAN traffic between RSPAN source and destination sessions. RSPAN VLAN has these special characteristics:

- All traffic in the RSPAN VLAN is always flooded.
- No MAC address learning occurs on the RSPAN VLAN.
- RSPAN VLAN traffic only flows on trunk ports.
- RSPAN VLANs must be configured in VLAN configuration mode by using the **remote-span** VLAN configuration mode command.
- STP can run on RSPAN VLAN trunks but not on SPAN destination ports.
- An RSPAN VLAN cannot be a private-VLAN primary or secondary VLAN.

For VLANs 1 to 1005 that are visible to VLAN Trunking Protocol (VTP), the VLAN ID and its associated RSPAN characteristic are propagated by VTP. If you assign an RSPAN VLAN ID in the extended VLAN range (1006 to 4094), you must manually configure all intermediate devices.

It is normal to have multiple RSPAN VLANs in a network at the same time with each RSPAN VLAN defining a network-wide RSPAN session. That is, multiple RSPAN source sessions anywhere in the network can contribute packets to the RSPAN session. It is also possible to have multiple RSPAN destination sessions throughout the network, monitoring the same RSPAN VLAN and presenting traffic to the user. The RSPAN VLAN ID separates the sessions.

SPAN and RSPAN Interaction with Other Features

SPAN interacts with these features:

- Routing—SPAN does not monitor routed traffic. VSPAN only monitors traffic that enters or exits the device, not traffic that is routed between VLANs. For example, if a VLAN is being Rx-monitored and the device routes traffic from another VLAN to the monitored VLAN, that traffic is not monitored and not received on the SPAN destination port.
- STP—A destination port does not participate in STP while its SPAN or RSPAN session is active. The destination port can participate in STP after the SPAN or RSPAN session is disabled. On a source port, SPAN does not affect the STP status. STP can be active on trunk ports carrying an RSPAN VLAN.
- CDP—A SPAN destination port does not participate in CDP while the SPAN session is active. After the SPAN session is disabled, the port again participates in CDP.
- VTP—You can use VTP to prune an RSPAN VLAN between devices.
- VLAN and trunking—You can modify VLAN membership or trunk settings for source or destination ports at any time. However, changes in VLAN membership or trunk settings for a destination port do not take effect until you remove the SPAN destination configuration. Changes in VLAN membership or trunk settings for a source port immediately take effect, and the respective SPAN sessions automatically adjust accordingly.
- EtherChannel—You can configure an EtherChannel group as a source port. When a group is configured as a SPAN source, the entire group is monitored.

  If a physical port is added to a monitored EtherChannel group, the new port is added to the SPAN source port list. If a port is removed from a monitored EtherChannel group, it is automatically removed from the source port list.

A physical port that belongs to an EtherChannel group can be configured as a SPAN source port and still be a part of the EtherChannel. In this case, data from the physical port is monitored as it participates in the EtherChannel. However, if a physical port that belongs to an EtherChannel group is configured as a SPAN destination, it is removed from the group. After the port is removed from the SPAN session, it rejoins the EtherChannel group. Ports removed from an EtherChannel group remain members of the group, but they are in the inactive or suspended state.

If a physical port that belongs to an EtherChannel group is a destination port and the EtherChannel group is a source, the port is removed from the EtherChannel group and from the list of monitored ports.

- Multicast traffic can be monitored. For egress and ingress port monitoring, only a single unedited packet is sent to the SPAN destination port. It does not reflect the number of times the multicast packet is sent.
- A private-VLAN port cannot be a SPAN destination port.
- A secure port cannot be a SPAN destination port.

  For SPAN sessions, do not enable port security on ports with monitored egress when ingress forwarding is enabled on the destination port. For RSPAN source sessions, do not enable port security on any ports with monitored egress.
- An IEEE 802.1x port can be a SPAN source port. You can enable IEEE 802.1x on a port that is a SPAN destination port; however, IEEE 802.1x is disabled until the port is removed as a SPAN destination.

  For SPAN sessions, do not enable IEEE 802.1x on ports with monitored egress when ingress forwarding is enabled on the destination port. For RSPAN source sessions, do not enable IEEE 802.1x on any ports that are egress monitored.

SPAN and RSPAN and Device Stacks

Because the stack of switches represents one logical switch, local SPAN source ports and destination ports can be in different switches in the stack. Therefore, the addition or deletion of switches in the stack can affect a local SPAN session, as well as an RSPAN source or destination session. An active session can become inactive when a switch is removed from the stack or an inactive session can become active when a switch is added to the stack.

Flow-Based SPAN

You can control the type of network traffic to be monitored in SPAN or RSPAN sessions by using flow-based SPAN (FSPAN) or flow-based RSPAN (FRSPAN), which apply access control lists (ACLs) to the monitored traffic on the source ports. The FSPAN ACLs can be configured to filter IPv4, IPv6, and non-IP monitored traffic.

You apply an ACL to a SPAN session through the interface. It is applied to all the traffic that is monitored on all interfaces in the SPAN session.The packets that are permitted by this ACL are copied to the SPAN destination port. No other packets are copied to the SPAN destination port.

The original traffic continues to be forwarded, and any port, VLAN, and router ACLs attached are applied. The FSPAN ACL does not have any effect on the forwarding decisions. Similarly, the port, VLAN, and router ACLs do not have any effect on the traffic monitoring. If a security input ACL denies a packet and it is not forwarded, the packet is still copied to the SPAN destination ports if the FSPAN ACL permits it. But if the security output ACL denies a packet and it is not sent, it is not copied to the SPAN destination ports. However, if the security output ACL permits the packet to go out, it is only copied to the SPAN destination ports if the FSPAN ACL permits it. This is also true for an RSPAN session.

You can attach three types of FSPAN ACLs to the SPAN session:

- IPv4 FSPAN ACL— Filters only IPv4 packets.
- IPv6 FSPAN ACL— Filters only IPv6 packets.
- MAC FSPAN ACL— Filters only non-IP packets.

If a VLAN-based FSPAN session configured on a stack cannot fit in the hardware memory on one or more devices, it is treated as unloaded on those devices, and traffic meant for the FSPAN ACL and sourcing on that device is not copied to the SPAN destination ports. The FSPAN ACL continues to be correctly applied, and traffic is copied to the SPAN destination ports on the devices where the FSPAN ACL fits in the hardware memory.

When an empty FSPAN ACL is attached, some hardware functions copy all traffic to the SPAN destination ports for that ACL. If sufficient hardware resources are not available, even an empty FSPAN ACL can be unloaded.

Default SPAN and RSPAN Configuration

Table 1: Default SPAN and RSPAN Configuration

Feature	Default Setting
SPAN state (SPAN and RSPAN)	Disabled.
Source port traffic to monitor	Both received and sent traffic (**both**).
Encapsulation type (destination port)	Native form (untagged packets).
Ingress forwarding (destination port)	Disabled.
VLAN filtering	On a trunk interface used as a source port, all VLANs are monitored.
RSPAN VLANs	None configured.

Configuring SPAN and RSPAN

SPAN Configuration Guidelines

- To remove a source or destination port or VLAN from the SPAN session, use the **no monitor session** *session_number* **source interface** *interface-id* {**interface** *interface-id* | **vlan** *vlan-id*} global configuration command or the **no monitor session** *session_number* **destination interface** *interface-id* global configuration command. For destination interfaces, the **encapsulation** options are ignored with the **no** form of the command.
- To monitor all VLANs on the trunk port, use the **no monitor session** *session_number* **filter** global configuration command.

RSPAN Configuration Guidelines

- All the SPAN configuration guidelines apply to RSPAN.
- As RSPAN VLANs have special properties, you should reserve a few VLANs across your network for use as RSPAN VLANs; do not assign access ports to these VLANs.
- You can apply an output ACL to RSPAN traffic to selectively filter or monitor specific packets. Specify these ACLs on the RSPAN VLAN in the RSPAN source .
- For RSPAN configuration, you can distribute the source ports and the destination ports across multiple in your network.
- Access ports (including voice VLAN ports) on the RSPAN VLAN are put in the inactive state.
- You can configure any VLAN as an RSPAN VLAN as long as these conditions are met:
  - The same RSPAN VLAN is used for an RSPAN session in all the .
  - All participating support RSPAN.

FSPAN and FRSPAN Configuration Guidelines

- When at least one FSPAN ACL is attached, FSPAN is enabled.
- When you attach at least one FSPAN ACL that is not empty to a SPAN session, and you have not attached one or more of the other FSPAN ACLs (for instance, you have attached an IPv4 ACL that is not empty, and have not attached IPv6 and MAC ACLs), FSPAN blocks the traffic that would have been filtered by the unattached ACLs. Therefore, this traffic is not monitored.

How to Configure SPAN and RSPAN

The following sections provide information on how to configure SPAN and RSPAN.

Creating a Local SPAN Session

Follow these steps to create a SPAN session and specify the source (monitored) ports or VLANs and the destination (monitoring) ports.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:**	Enters global configuration mode.

	Command or Action	Purpose
	`Device# configure terminal`	
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session all`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.

Step 4	**monitor session** *session_number* **source** {**interface** *interface-id* | **vlan** *vlan-id*} [**,** | **-**] [**both** | **rx** | **tx**]
	Example:
	`Device(config)# monitor session 1 source interface gigabitethernet1/0/1`
		Specifies the SPAN session and the source port (monitored port).
		• For *session_number*, the range is 1 to 66.
		• For *interface-id*, specify the source port to monitor. Valid interfaces include physical interfaces and port-channel logical interfaces (**port-channel** *port-channel-number*). Valid port-channel numbers are 1 to 48.
		• For *vlan-id*, specify the source VLAN to monitor. The range is 1 to 4094 (excluding the RSPAN VLAN).
		Note A single session can include multiple sources (ports or VLANs) defined in a series of commands, but you cannot combine source ports and source VLANs in one session.
		• (Optional) [**,** | **-**] Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen.
		• (Optional) **both** | **rx** | **tx**—Specifies the direction of traffic to monitor. If you do not specify a traffic direction, the source interface sends both sent and received traffic.
		  • **both**—Monitors both received and sent traffic.
		  • **rx**—Monitors received traffic.

	Command or Action	Purpose
		• **tx**—Monitors sent traffic. **Note** You can use the **monitor session** *session_number* **source** command multiple times to configure multiple source ports.
Step 5	**monitor session** *session_number* **destination** {**interface** *interface-id* [**,** | -] [**encapsulation {replicate | dot1q}**]} **Example:** `Device(config)# monitor session 1 destination interface gigabitethernet1/0/2 encapsulation replicate`	Specifies the SPAN session and the destination port (monitoring port). The port LED remains green when the configuration changes take effect, and even after removing the configuration. **Note** For local SPAN, you must use the same session number for the source and destination interfaces. • For *session_number*, specify the session number entered in step 4. • For *interface-id*, specify the destination port. **For the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port; it cannot be an EtherChannel, and it cannot be a VLAN. **For the C9500-32C, C9500-32QC, C9500-48Y4C, and C9500-24Y4C models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port or an EtherChannel. It cannot be a VLAN. • (Optional) [**,** | -] Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen. (Optional) **encapsulation replicate** specifies that the destination interface replicates the source interface encapsulation method. If not selected, the default is to send packets in native form (untagged).

	Command or Action	Purpose
		(Optional) **encapsulation dot1q**specifies that the destination interface accepts the source interface incoming packets with IEEE 802.1Q encapsulation. **Note** You can use **monitor session** *session_number* **destination** command multiple times to configure multiple destination ports.
Step 6	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 7	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 8	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Creating a Local SPAN Session and Configuring Incoming Traffic

Follow these steps to create a SPAN session, to specify the source ports or VLANs and the destination ports, and to enable incoming traffic on the destination port for a network security device (such as a Cisco IDS Sensor Appliance).

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session all`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.
Step 4	**monitor session** *session_number* **source** {**interface** *interface-id* | **vlan** *vlan-id*} [**,** | **-**] [**both** | **rx** | **tx**] **Example:** `Device(config)# monitor session 2 source gigabitethernet1/0/1 rx`	Specifies the SPAN session and the source port (monitored port).
Step 5	**monitor session** *session_number* **destination** {**interface** *interface-id* [**,** | **-**] [**encapsulation replicate**] [**ingress** {**dot1q vlan** *vlan-id* | **untagged vlan** *vlan-id* | **vlan** *vlan-id*}]} **Example:** `Device(config)# monitor session 2 destination interface gigabitethernet1/0/2 encapsulation replicate ingress dot1q vlan 6`	Specifies the SPAN session, the destination port, the packet encapsulation, and the ingress VLAN and encapsulation. • For *session_number*, specify the session number entered in Step 4. • For *interface-id*, specify the destination port. **For the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port; it cannot be an EtherChannel, and it cannot be a VLAN. **For the C9500-32C, C9500-32QC, C9500-48Y4C, and C9500-24Y4C models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port or an EtherChannel. It cannot be a VLAN. • (Optional) [**,** | **-**]—Specifies a series or range of interfaces. Enter a space before and after the comma or hyphen. • (Optional) **encapsulation replicate** specifies that the destination interface replicates the source interface

	Command or Action	Purpose
		encapsulation method. If not selected, the default is to send packets in native form (untagged). • (Optional) **encapsulation dot1q**specifies that the destination interface accepts the source interface incoming packets with IEEE 802.1Q encapsulation. • **ingress** enables forwarding of incoming traffic on the destination port and to specify the encapsulation type: • **dot1q vlan** *vlan-id*—Accepts incoming packets with IEEE 802.1Q encapsulation with the specified VLAN as the default VLAN. • **untagged vlan** *vlan-id* or **vlan** *vlan-id*—Accepts incoming packets with untagged encapsulation type with the specified VLAN as the default VLAN.
Step 6	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 7	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 8	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Specifying VLANs to Filter

Follow these steps to limit SPAN source traffic to specific VLANs.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session all`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.
Step 4	**monitor session** *session_number* **source interface** *interface-id* **Example:** `Device(config)# monitor session 2 source interface gigabitethernet1/0/2 rx`	Specifies the characteristics of the source port (monitored port) and SPAN session. • For *session_number*, the range is 1 to 66. • For *interface-id*, specify the source port to monitor. The interface specified must already be configured as a trunk port.
Step 5	**monitor session** *session_number* **filter vlan** *vlan-id* [**,** | **-**] **Example:** `Device(config)# monitor session 2 filter vlan 1 - 5 , 9`	Limits the SPAN source traffic to specific VLANs. • For *session_number*, enter the session number specified in Step 4. • For *vlan-id*, the range is 1 to 4094. • (Optional) Use a comma (**,**) to specify a series of VLANs, or use a hyphen (-) to specify a range of VLANs. Enter a space before and after the comma; enter a space before and after the hyphen.
Step 6	**monitor session** *session_number* **destination** {**interface** *interface-id* [**,** | **-**] [**encapsulation replicate**]}	Specifies the SPAN session and the destination port (monitoring port).

	Command or Action	Purpose
	Example: `Device(config)# monitor session 2 destination interface gigabitethernet1/0/1`	• For *session_number*, specify the session number entered in Step 4. • For *interface-id*, specify the destination port. **For the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port; it cannot be an EtherChannel, and it cannot be a VLAN. **For the C9500-32C, C9500-32QC, C9500-48Y4C, and C9500-24Y4C models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port or an EtherChannel. It cannot be a VLAN. • (Optional) [**,** | **-**] Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen. • (Optional) **encapsulation replicate** specifies that the destination interface replicates the source interface encapsulation method. If not selected, the default is to send packets in native form (untagged).
Step 7	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 8	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 9	**copy running-config startup-config** **Example:** `Device# copy running-config`	(Optional) Saves your entries in the configuration file.

	Command or Action	Purpose
	`startup-config`	

Configuring a VLAN as an RSPAN VLAN

Follow these steps to create a new VLAN, then configure it to be the RSPAN VLAN for the RSPAN session.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**vlan** *vlan-id* **Example:** `Device(config)# vlan 100`	Enters a VLAN ID to create a VLAN, or enters the VLAN ID of an existing VLAN, and enters VLAN configuration mode. The range is 2 to 1001 and 1006 to 4094. The RSPAN VLAN cannot be VLAN 1 (the default VLAN) or VLAN IDs 1002 through 1005 (reserved for Token Ring and FDDI VLANs).
Step 4	**remote-span** **Example:** `Device(config-vlan)# remote-span`	Configures the VLAN as an RSPAN VLAN.
Step 5	**end** **Example:** `Device(config-vlan)# end`	Returns to privileged EXEC mode.
Step 6	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.

	Command or Action	Purpose
Step 7	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

What to do next

You must create the RSPAN VLAN in all devices that will participate in RSPAN. If the RSPAN VLAN-ID is in the normal range (lower than 1005) and VTP is enabled in the network, you can create the RSPAN VLAN in one device, and VTP propagates it to the other devices in the VTP domain. For extended-range VLANs (greater than 1005), you must configure RSPAN VLAN on both source and destination devices and any intermediate devices.

Use VTP pruning to get an efficient flow of RSPAN traffic, or manually delete the RSPAN VLAN from all trunks that do not need to carry the RSPAN traffic.

To remove the remote SPAN characteristic from a VLAN and convert it back to a normal VLAN, use the **no remote-span** VLAN configuration command.

To remove a source port or VLAN from the SPAN session, use the **no monitor session** *session_number* **source** {**interface** *interface-id* | **vlan** *vlan-id*} global configuration command. To remove the RSPAN VLAN from the session, use the **no monitor session** *session_number* **destination remote vlan** *vlan-id*.

Creating an RSPAN Source Session

Follow these steps to create and start an RSPAN source session and to specify the monitored source and the destination RSPAN VLAN.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session 1`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions.

	Command or Action	Purpose
		• **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.

Step 4	**monitor session** *session_number* **source** {**interface** *interface-id* | **vlan** *vlan-id*} [**,** | **-**] [**both** | **rx** | **tx**]
	Example:
	`Device(config)# monitor session 1 source interface gigabitethernet1/0/1 tx`
		Specifies the RSPAN session and the source port (monitored port).
		• For *session_number*, the range is 1 to 66.
		• Enter a source port or source VLAN for the RSPAN session:
		  • For *interface-id*, specifies the source port to monitor. Valid interfaces include physical interfaces and port-channel logical interfaces (**port-channel** *port-channel-number*). Valid port-channel numbers are 1 to 48.
		  • For *vlan-id*, specifies the source VLAN to monitor. The range is 1 to 4094 (excluding the RSPAN VLAN).
		  A single session can include multiple sources (ports or VLANs), defined in a series of commands, but you cannot combine source ports and source VLANs in one session.
		• (Optional) [**,** | **-**]—Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen.
		• (Optional) **both** | **rx** | **tx**—Specifies the direction of traffic to monitor. If you do not specify a traffic direction, the source interface sends both sent and received traffic.
		  • **both**—Monitors both received and sent traffic.
		  • **rx**—Monitors received traffic.
		  • **tx**—Monitors sent traffic.

Step 5	**monitor session** *session_number* **destination remote vlan** *vlan-id* **Example:**	Specifies the RSPAN session, the destination RSPAN VLAN, and the destination-port group.

	Command or Action	Purpose
	`Device(config)# monitor session 1 destination remote vlan 100`	• For *session_number*, enter the number defined in Step 4. • For *vlan-id*, specify the source RSPAN VLAN to monitor.
Step 6	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 7	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 8	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Specifying VLANs to Filter

Follow these steps to configure the RSPAN source session to limit RSPAN source traffic to specific VLANs.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:**	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66.

	Command or Action	Purpose
	`Device(config)# no monitor session 2`	• **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.
Step 4	**monitor session** *session_number* **source interface** *interface-id* **Example:** `Device(config)# monitor session 2 source interface gigabitethernet1/0/2 rx`	Specifies the characteristics of the source port (monitored port) and SPAN session. • For *session_number*, the range is 1 to 66. • For *interface-id*, specify the source port to monitor. The interface specified must already be configured as a trunk port.
Step 5	**monitor session** *session_number* **filter vlan** *vlan-id* [**,** | -] **Example:** `Device(config)# monitor session 2 filter vlan 1 - 5 , 9`	Limits the SPAN source traffic to specific VLANs. • For *session_number*, enter the session number specified in step 4. • For *vlan-id*, the range is 1 to 4094. • (Optional) **,** | - Use a comma (**,**) to specify a series of VLANs or use a hyphen (-) to specify a range of VLANs. Enter a space before and after the comma; enter a space before and after the hyphen.
Step 6	**monitor session** *session_number* **destination remote vlan** *vlan-id* **Example:** `Device(config)# monitor session 2 destination remote vlan 902`	Specifies the RSPAN session and the destination remote VLAN (RSPAN VLAN). • For *session_number*, enter the session number specified in Step 4. • For *vlan-id*, specify the RSPAN VLAN to carry the monitored traffic to the destination port.
Step 7	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 8	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.

	Command or Action	Purpose
Step 9	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Creating an RSPAN Destination Session

You configure an RSPAN destination session on a different device or device stack; that is, not the device or device stack on which the source session was configured.

Follow these steps to define the RSPAN VLAN on that device, to create an RSPAN destination session, and to specify the source RSPAN VLAN and the destination port.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**vlan** *vlan-id* **Example:** `Device(config)# vlan 901`	Specifies the VLAN ID of the RSPAN VLAN created from the source device, and enters VLAN configuration mode. If both devices are participating in VTP and the RSPAN VLAN ID is from 2 to 1005, Steps 3 through 5 are not required because the RSPAN VLAN ID is propagated through the VTP network.
Step 4	**remote-span** **Example:** `Device(config-vlan)# remote-span`	Identifies the VLAN as the RSPAN VLAN.
Step 5	**exit** **Example:** `Device(config-vlan)# exit`	Returns to global configuration mode.

	Command or Action	Purpose
Step 6	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session 1`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.
Step 7	**monitor session** *session_number* **source remote vlan** *vlan-id* **Example:** `Device(config)# monitor session 1 source remote vlan 901`	Specifies the RSPAN session and the source RSPAN VLAN. • For *session_number*, the range is 1 to 66. • For *vlan-id*, specify the source RSPAN VLAN to monitor.
Step 8	**monitor session** *session_number* **destination interface** *interface-id* **Example:** `Device(config)# monitor session 1 destination interface gigabitethernet2/0/1`	Specifies the RSPAN session and the destination interface. • For *session_number*, enter the number defined in Step 7. In an RSPAN destination session, you must use the same session number for the source RSPAN VLAN and the destination port. • For *interface-id*, specify the destination interface. The destination interface must be a physical interface. • Though visible in the command-line help string, **encapsulation replicate** is not supported for RSPAN. The original VLAN ID is overwritten by the RSPAN VLAN ID, and all packets appear on the destination port as untagged.
Step 9	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 10	**show running-config** **Example:**	Verifies your entries.

	Command or Action	Purpose
	`Device# show running-config`	
Step 11	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Creating an RSPAN Destination Session and Configuring Incoming Traffic

Follow these steps to create an RSPAN destination session, to specify the source RSPAN VLAN and the destination port, and to enable incoming traffic on the destination port for a network security device (such as a Cisco IDS Sensor Appliance).

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session 2`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.
Step 4	**monitor session** *session_number* **source remote vlan** *vlan-id* **Example:** `Device(config)# monitor session 2 source remote vlan 901`	Specifies the RSPAN session and the source RSPAN VLAN. • For *session_number*, the range is 1 to 66. • For *vlan-id*, specify the source RSPAN VLAN to monitor.

	Command or Action	Purpose
Step 5	**monitor session** *session_number* **destination** {**interface** *interface-id* [**,** | -] [**ingress** {**dot1q vlan** *vlan-id* | **untagged vlan** *vlan-id* | **vlan** *vlan-id*}]} **Example:** `Device(config)# monitor session 2 destination interface gigabitethernet1/0/2 ingress vlan 6`	Specifies the SPAN session, the destination port, the packet encapsulation, and the incoming VLAN and encapsulation. • For *session_number*, enter the number defined in Step 5. In an RSPAN destination session, you must use the same session number for the source RSPAN VLAN and the destination port. • For *interface-id*, specify the destination interface. The destination interface must be a physical interface. • Though visible in the command-line help string, **encapsulation replicate** is not supported for RSPAN. The original VLAN ID is overwritten by the RSPAN VLAN ID, and all packets appear on the destination port as untagged. • (Optional) [**,** | -] Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen. • Enter **ingress** with additional keywords to enable forwarding of incoming traffic on the destination port and to specify the encapsulation type: • **dot1q vlan** *vlan-id*—Forwards incoming packets with IEEE 802.1Q encapsulation with the specified VLAN as the default VLAN. • **untagged vlan** *vlan-id* or **vlan** *vlan-id*—Forwards incoming packets with untagged encapsulation type with the specified VLAN as the default VLAN.
Step 6	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.

	Command or Action	Purpose
Step 7	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 8	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring an FSPAN Session

Follow these steps to create a SPAN session, specify the source (monitored) ports or VLANs and the destination (monitoring) ports, and configure FSPAN for the session.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session 2`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.
Step 4	**monitor session** *session_number* **source** {**interface** *interface-id* | **vlan** *vlan-id*} [**,** | **-**] [**both** | **rx** | **tx**] **Example:**	Specifies the SPAN session and the source port (monitored port). • For *session_number*, the range is 1 to 66.

	Command or Action	Purpose
	`Device(config)# monitor session 2 source interface gigabitethernet1/0/1`	• For *interface-id*, specifies the source port to monitor. Valid interfaces include physical interfaces and port-channel logical interfaces (**port-channel** *port-channel-number*). Valid port-channel numbers are 1 to 48. • For *vlan-id*, specify the source VLAN to monitor. The range is 1 to 4094 (excluding the RSPAN VLAN). **Note** A single session can include multiple sources (ports or VLANs) defined in a series of commands, but you cannot combine source ports and source VLANs in one session. • (Optional) [**,** | -]—Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen. • (Optional) [**both** | **rx** | **tx**]—Specifies the direction of traffic to monitor. If you do not specify a traffic direction, the SPAN monitors both sent and received traffic. • **both**—Monitors both sent and received traffic. This is the default. • **rx**—Monitors received traffic. • **tx**—Monitors sent traffic. **Note** You can use the **monitor session** *session_number* **source** command multiple times to configure multiple source ports.
Step 5	**monitor session** *session_number* **destination** {**interface** *interface-id* [**,** | -] [**encapsulation replicate**]} **Example:** `Device(config)# monitor session 2 destination interface gigabitethernet1/0/2 encapsulation replicate`	Specifies the SPAN session and the destination port (monitoring port). • For *session_number*, specify the session number entered in Step 4. • For **destination**, specify the following parameters: • For *interface-id*, specify the destination port.

	Command or Action	Purpose
		For the C9500-12Q, C9500-16X, C9500-24Q, C9500-40X models of the Cisco Catalyst 9500 Series Switches: The destination interface must be a physical port; it cannot be an EtherChannel, and it cannot be a VLAN. **For the C9500-32C, C9500-32QC, C9500-48Y4C, and C9500-24Y4C models of the Cisco Catalyst 9500 Series Switches:** The destination interface must be a physical port or an EtherChannel. It cannot be a VLAN. • (Optional) [**,** | -] Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen. • (Optional) **encapsulation replicate** specifies that the destination interface replicates the source interface encapsulation method. If not selected, the default is to send packets in native form (untagged). **Note** For local SPAN, you must use the same session number for the source and destination interfaces. You can use **monitor session** *session_number* **destination** command multiple times to configure multiple destination ports.
Step 6	**monitor session** *session_number* **filter** {**ip** | **ipv6** | **mac**} **access-group** {*access-list-number* | *name*} **Example:** `Device(config)# monitor session 2 filter ipv6 access-group 4`	Specifies the SPAN session, the types of packets to filter, and the ACLs to use in an FSPAN session. • For *session_number*, specify the session number entered in Step 4. • For *access-list-number*, specify the ACL number that you want to use to filter traffic. • For *name*, specify the ACL name that you want to use to filter traffic.

	Command or Action	Purpose
Step 7	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 8	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 9	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring an FRSPAN Session

Follow these steps to start an RSPAN source session, specify the monitored source and the destination RSPAN VLAN, and configure FRSPAN for the session.

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**no monitor session** {*session_number* | **all** | **local** | **remote**} **Example:** `Device(config)# no monitor session 2`	Removes any existing SPAN configuration for the session. • For *session_number*, the range is 1 to 66. • **all**—Removes all SPAN sessions. • **local**—Removes all local sessions. • **remote**—Removes all remote SPAN sessions.

	Command or Action	Purpose
Step 4	**monitor session** *session_number* **source** {**interface** *interface-id* | **vlan** *vlan-id*} [**,** | **-**] [**both** | **rx** | **tx**] **Example:** `Device(config)# monitor session 2 source interface gigabitethernet1/0/1`	Specifies the SPAN session and the source port (monitored port). • For *session_number*, the range is 1 to 66. • For *interface-id*, specifies the source port to monitor. Valid interfaces include physical interfaces and port-channel logical interfaces (**port-channel** *port-channel-number*). Valid port-channel numbers are 1 to 48. • For *vlan-id*, specify the source VLAN to monitor. The range is 1 to 4094 (excluding the RSPAN VLAN). **Note** A single session can include multiple sources (ports or VLANs) defined in a series of commands, but you cannot combine source ports and source VLANs in one session. • (Optional) [**,** | **-**]—Specifies a series or range of interfaces. Enter a space before and after the comma; enter a space before and after the hyphen. • (Optional) [**both** | **rx** | **tx**]—Specifies the direction of traffic to monitor. If you do not specify a traffic direction, the SPAN monitors both sent and received traffic. • **both**—Monitors both sent and received traffic. This is the default. • **rx**—Monitors received traffic. • **tx**—Monitors sent traffic. **Note** You can use the **monitor session** *session_number* **source** command multiple times to configure multiple source ports.
Step 5	**monitor session** *session_number* **destination remote vlan** *vlan-id* **Example:** `Device(config)# monitor session 2 destination remote vlan 5`	Specifies the RSPAN session and the destination RSPAN VLAN. • For *session_number*, enter the number defined in Step 4.

	Command or Action	Purpose
		• For *vlan-id*, specify the destination RSPAN VLAN to monitor.
Step 6	**vlan** *vlan-id* **Example:** `Device(config)# vlan 10`	Enters the VLAN configuration mode. For *vlan-id*, specify the source RSPAN VLAN to monitor.
Step 7	**remote-span** **Example:** `Device(config-vlan)# remote-span`	Specifies that the VLAN you specified in Step 5 is part of the RSPAN VLAN.
Step 8	**exit** **Example:** `Device(config-vlan)# exit`	Returns to global configuration mode.
Step 9	**monitor session** *session_number* **filter** {**ip** | **ipv6** | **mac**} **access-group** {*access-list-number* | *name*} **Example:** `Device(config)# monitor session 2 filter ip access-group 7`	Specifies the RSPAN session, the types of packets to filter, and the ACLs to use in an FRSPAN session. • For *session_number*, specify the session number entered in Step 4. • For *access-list-number*, specify the ACL number that you want to use to filter traffic. • For *name*, specify the ACL name that you want to use to filter traffic.
Step 10	**end** **Example:** `Device(config)# end`	Returns to privileged EXEC mode.
Step 11	**show running-config** **Example:** `Device# show running-config`	Verifies your entries.
Step 12	**copy running-config startup-config** **Example:** `Device# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Monitoring SPAN and RSPAN Operations

The following table describes the command used to display SPAN and RSPAN operations configuration and results to monitor operations:

Table 2: Monitoring SPAN and RSPAN Operations

Command	Purpose
show monitor	Displays the current SPAN, R configuration.

Configuration Examples for SPAN and RSPAN

The following sections provide configuration examples for SPAN and RSPAN

Example: Configuring Local SPAN

This example shows how to set up SPAN session 1 for monitoring source port traffic to a destination port. First, any existing SPAN configuration for session 1 is deleted, and then bidirectional traffic is mirrored from source Gigabit Ethernet port 1 to destination Gigabit Ethernet port 2, retaining the encapsulation method.

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 1
Device(config)# monitor session 1 source interface gigabitethernet1/0/1
Device(config)# monitor session 1 destination interface gigabitethernet1/0/2
encapsulation replicate
Device(config)# end
```

This example shows how to remove port 1 as a SPAN source for SPAN session 1:

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 1 source interface gigabitethernet1/0/1
Device(config)# end
```

This example shows how to disable received traffic monitoring on port 1, which was configured for bidirectional monitoring:

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 1 source interface gigabitethernet1/0/1 rx
```

The monitoring of traffic received on port 1 is disabled, but traffic sent from this port continues to be monitored.

This example shows how to remove any existing configuration on SPAN session 2, configure SPAN session 2 to monitor received traffic on all ports belonging to VLANs 1 through 3, and send it to destination Gigabit Ethernet port 2. The configuration is then modified to also monitor all traffic on all ports belonging to VLAN 10.

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 2
Device(config)# monitor session 2 source vlan 1 - 3 rx

Device(config)# monitor session 2 destination interface gigabitethernet1/0/2
Device(config)# monitor session 2 source vlan 10
Device(config)# end
```

This example shows how to remove any existing configuration on SPAN session 2, configure SPAN session 2 to monitor received traffic on Gigabit Ethernet source port 1, and send it to destination Gigabit Ethernet port 2 with the same egress encapsulation type as the source port, and to enable ingress forwarding with VLAN 6 as the default ingress VLAN:

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 2
Device(config)# monitor session 2 source gigabitethernet0/1 rx
Device(config)# monitor session 2 destination interface gigabitethernet0/2 encapsulation
replicate ingress vlan 6
Device(config)# end
```

This example shows how to remove any existing configuration on SPAN session 2, configure SPAN session 2 to monitor traffic received on Gigabit Ethernet trunk port 2, and send traffic for only VLANs 1 through 5 and VLAN 9 to destination Gigabit Ethernet port 1:

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 2
Device(config)# monitor session 2 source interface gigabitethernet1/0/2 rx
Device(config)# monitor session 2 filter vlan 1 - 5 , 9
Device(config)# monitor session 2 destination interface gigabitethernet1/0/1
Device(config)# end
```

Examples: Creating an RSPAN VLAN

This example shows how to create the RSPAN VLAN 901:

```
Device> enable
Device# configure terminal
Device(config)# vlan 901
Device(config-vlan)# remote span
Device(config-vlan)# end
```

This example shows how to remove any existing RSPAN configuration for session 1, configure RSPAN session 1 to monitor multiple source interfaces, and configure the destination as RSPAN VLAN 901:

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 1
Device(config)# monitor session 1 source interface gigabitethernet1/0/1 tx
Device(config)# monitor session 1 source interface gigabitethernet1/0/2 rx
Device(config)# monitor session 1 source interface port-channel 2
Device(config)# monitor session 1 destination remote vlan 901
Device(config)# end
```

This example shows how to remove any existing configuration on RSPAN session 2, configure RSPAN session 2 to monitor traffic received on trunk port 2, and send traffic for only VLANs 1 through 5 and 9 to destination RSPAN VLAN 902:

```
Device> enable
Device# configure terminal
Device(config)# no monitor session 2
Device(config)# monitor session 2 source interface gigabitethernet1/0/2 rx
Device(config)# monitor session 2 filter vlan 1 - 5 , 9
Device(config)# monitor session 2 destination remote vlan 902
Device(config)# end
```

This example shows how to configure VLAN 901 as the source remote VLAN and port 1 as the destination interface:

```
Device> enable
Device# configure terminal
Device(config)# monitor session 1 source remote vlan 901
Device(config)# monitor session 1 destination interface gigabitethernet2/0/1
Device(config)# end
```

This example shows how to configure VLAN 901 as the source remote VLAN in RSPAN session 2, to configure Gigabit Ethernet source port 2 as the destination interface, and to enable forwarding of incoming traffic on the interface with VLAN 6 as the default receiving VLAN:

```
Device> enable
Device# configure terminal
Device(config)# monitor session 2 source remote vlan 901
Device(config)# monitor session 2 destination interface gigabitethernet1/0/2 ingress vlan 6
Device(config)# end
```

Feature History for SPAN and RSPAN

This table provides release and related information for the features explained in this module.

These features are available in all the releases subsequent to the one they were introduced in, unless noted otherwise.

Release	Feature	Feature Information
Cisco IOS XE Everest 16.5.1a	Switch Port Analyzer (SPAN)	Allows monitoring of device traffic on a port or VLAN using a sniffer/analyzer or RMON probe. This feature was introduced.

Release	Feature	Feature Information
Cisco IOS XE Everest 16.5.1a	Flow-based Switch Port Analyzer (SPAN)	Provides a method to capture only required data between end hosts by using specified filters. The filters are defined in terms of access lists that limit IPv4, IPv6 or IPv4 + IPv6, or non-IP traffic (MAC) between specified source and destination addresses. This feature was introduced.
Cisco IOS XE Everest 16.5.1a	Switch Port Analyzer (SPAN) - distributed egress SPAN	Provides distributed egress SPAN functionality onto line cards in conjunction with ingress SPAN already been distributed to line cards. By distributing egress SPAN functionalities onto line cards, the performance of the system is improved. This feature was introduced.