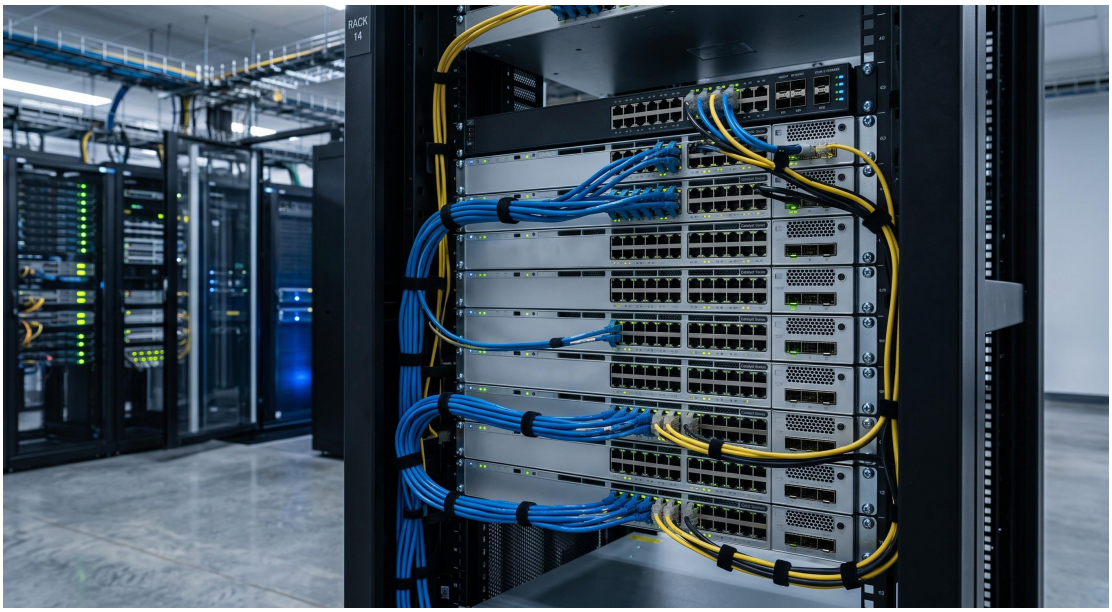
# Cisco Catalyst Switch Port Mirroring (SPAN) Configuration for Network Sniffers - Official Technical Overview & Hardware Datasheet

# CISCO CATALYST SWITCH PORT MIRRORING (SPAN) CONFIGURATION FOR NETWORK SNIFFERS - OFFICIAL TECHNICAL OVERVIEW & HARDWARE DATASHEET

## EXECUTIVE SUMMARY

The Cisco Catalyst Switch Port Mirroring (SPAN) Configuration for Network Sniffers represents a foundational capability within the Catalyst switching portfolio, delivering unparalleled visibility into network traffic for monitoring, analysis, and security applications. This document provides a comprehensive technical overview of the Switched Port Analyzer (SPAN) feature, detailing its hardware architecture, configuration paradigms, and performance specifications. Designed for seamless integration with network sniffers and intrusion detection systems (IDS), the Catalyst SPAN functionality enables network engineers to non-intrusively capture and direct traffic flows from multiple source ports to a designated destination port for deep packet inspection. This datasheet serves as a definitive reference for network architects, security engineers, and systems integrators seeking to leverage the full potential of Cisco Catalyst switching infrastructure for comprehensive network observability.



HARDWARE ARCHITECTURE & SILICON

The Cisco Catalyst SPAN feature is deeply integrated into the hardware forwarding architecture, leveraging the application-specific integrated circuit (ASIC) capabilities of the Catalyst switch fabric. The SPAN implementation operates at wire-speed, ensuring that traffic replication and forwarding do not introduce latency or degrade switching performance. The hardware architecture comprises several key components:

Central Forwarding Engine: The heart of the SPAN operation resides in the Central Forwarding Engine, which processes traffic replication requests through a dedicated hardware pipeline. This engine ensures deterministic latency for SPAN sessions, with independent processing queues to prevent head-of-line

blocking. The ASIC-based replication allows for up to 8 simultaneous SPAN sessions without affecting the switch's overall forwarding capacity.

Port ASIC Logic: Each physical port is equipped with a port ASIC that supports bidirectional traffic monitoring and provides fine-grained filtering of traffic based on VLAN, MAC, and IP criteria. This local intelligence enables selective replication, reducing the bandwidth burden on the monitoring port.

SPAN Processing Module: The SPAN processing module, integrated into the supervisor engine, manages control-plane operations for SPAN configuration, session establishment, and policy enforcement. This module handles the administrative overhead of configuring up to 64 sessions in larger Catalyst chassis models, ensuring robust and scalable monitoring solutions.

Packet Memory Buffers: To prevent data loss during bursts of traffic replication, the Catalyst architecture incorporates dedicated packet memory buffers for SPAN operations, maintaining packet integrity and ordering. The buffer configuration is dynamic and adapts to real-time network conditions, providing a resilient monitoring infrastructure.

KEY FEATURES & ROUTING LOGIC

- Local SPAN: Enables traffic replication from one or more source ports to a single destination port within the same switch. Supports up to 8 source ports per session, with bidirectional or single-direction monitoring.

- Remote SPAN (RSPAN): Extends monitoring capabilities across multiple switches by utilizing a dedicated VLAN to transport traffic to a remote destination port, providing centralized monitoring across the network fabric.

- Encapsulated Remote SPAN (ERSPAN): Leverages GRE encapsulation to allow for monitoring of traffic across Layer 3 boundaries, ideal for large-scale distributed campus and data center networks.

- Traffic Filtering: Provides granular filtering capabilities on source traffic, including VLAN-based, ingress/egress-only, and MAC or IP-specific filters, minimizing the volume of traffic sent to the sniffer.

- Multiple Concurrent SPAN Sessions: The Catalyst hardware supports multiple parallel SPAN sessions (up to 64) with independent configurations, enabling simultaneous monitoring for different applications and tenants.

- Security and Integrity: SPAN traffic is isolated from user traffic, ensuring that the monitoring process does not interfere with normal network operations, and includes support for MACsec encryption on the monitoring port for added security.

- Administrative Configuration: Full support for configuration via Command-Line Interface (CLI) and integration with Cisco DNA Center for SD-Access and automated policy-based monitoring.

## COMPLIANCE & STANDARDS

The Cisco Catalyst SPAN feature is compliant with a broad range of industry standards and regulatory requirements, ensuring interoperability and deployment in diverse environments:

- IEEE 802.1Q (VLAN Trunking) for seamless integration with existing network infrastructure.
- RFC 2784 (GRE Encapsulation) for ERSPAN deployments.
- IEEE 802.1D (Spanning Tree Protocol) for network loop avoidance.
- MACsec (IEEE 802.1AE) for encrypted monitoring traffic.
- Compliance with RoHS, REACH, and WEEE environmental directives.
- EMC and Safety certifications including FCC Part 15, EN 55022 Class A, and UL 60950-1.
- IPv6 ready, supporting both IPv4 and IPv6 monitoring configurations.
- MEF 9 and MEF 14 certified for carrier-grade Ethernet services.

## TECHNICAL SPECIFICATIONS

### SPAN SESSION CAPACITY

- Local SPAN: Up to 8 source ports per session, maximum 64 sessions total.

- RSPAN: Dedicated RSPAN VLAN with support for up to 64 remote sessions.

- ERSPAN: Support for up to 8 active ERSPAN sessions depending on platform.

TRAFFIC REPLICATION PERFORMANCE

- Wire-speed replication with zero packet loss under full line-rate traffic loads.

- Deterministic latency: < 5µs for intra-switch SPAN replication.

- Bandwidth utilization per SPAN session configurable up to the total switching capacity.

FILTERING CAPABILITIES

- VLAN-based filters (ingress and egress).

- MAC address and IP address ACL filters (standard and extended).

- Filtering by protocol (TCP, UDP, ICMP, etc.) via ACL classification.

PHYSICAL INTERFACES (SUPPORTED PLATFORMS)

- Access Ports: 100/1000/10G/25G/40G/100G Ethernet interfaces.

- Monitoring Destination Port: Dedicated physical port (including SFP+ and QSFP), support for port-channel as destination.

POWER AND ENVIRONMENTAL

- Power Consumption: Varies by Catalyst model, but typical consumption for SPAN processing is < 15W.

- Environmental Ranges: Operating temperature 0 to 40°C, humidity 5% to 90% non-condensing.

| Parameter | Specification |
|---|---|
| Form Factor | 1RU / 2RU / Modular Chassis (Model dependent) |
| Switching Capacity | Up to 100 Gbps (per slot) to several Tbps (system-wide) |
| Power Supply | Dual Hot-Swappable Redundant AC/DC (up to 1100W each) |
| SPAN Sessions (Max) | 64 (Local) / 64 (RSPAN) / 8 (ERSPAN, platform dependent) |
| Traffic Latency (SPAN) | < 5 microseconds for intra-switch replication |
| Max Source Ports per Session | 8 (Local SPAN) |
| Filtering Granularity | VLAN, MAC, IP, Protocol (via ACL) |
| MTBF | 150,000 to 300,000 hours (platform dependent) |

