SNMP in Network Switch - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

Simple Network Management Protocol (SNMP) is the foundational pillar of modern network operations, providing the essential telemetry and control plane visibility required for maintaining service-level agreements (SLAs) in enterprise and carrier-grade environments. Integrated natively at the hardware level within this switching platform, SNMP delivers real-time access to critical system metrics — including port utilization, error statistics, temperature thresholds, and power supply status—without imposing a performance penalty on the data plane. This document details the SNMP implementation architecture for the enterprise switching portfolio, specifying the supported Management Information Bases (MIBs), security models, and operational capabilities that enable seamless integration with leading Network Management Systems (NMS) such as SolarWinds, PRTG, and OpenNMS.

The platform's SNMP engine is designed for high-scale polling environments, supporting up to 1,000 concurrent get requests per second while maintaining sub-millisecond response times. This ensures that network operations centers (NOCs) can maintain comprehensive visibility across large-scale deployments without overwhelming the switch's CPU resources, as all SNMP processing is offloaded to a dedicated management CPU core, isolating it from the

forwarding plane.



HARDWARE ARCHITECTURE & SILICON

The SNMP subsystem is tightly coupled with the switch's central processing complex, comprising a 1.2 GHz dual-core ARM Cortex-A72 processor dedicated solely to management functions. This processor runs a hardened Linux-based operating system that hosts the SNMP agent (Net-SNMP v5.9) and manages all northbound communication via the out-of-band management Ethernet port (10/100/1000BASE-T). The management plane is physically isolated from the data forwarding plane, which utilizes a merchant silicon switching ASIC (Broadcom StrataXGS Tomahawk 4) operating at line rate. This architectural separation guarantees that intensive SNMP polling operations do not interfere with packet forwarding, ensuring deterministic latency and jitter for production

traffic.

The hardware design incorporates a dedicated 4 GB DDR4 memory module reserved for management functions, including the SNMP MIB cache. This cache stores frequently accessed Object Identifiers (OIDs) to accelerate response times, reducing CPU load during bulk table walks (e.g., when retrieving the entire IF-MIB interface table). The system also features a 16 MB SPI flash for persistent storage of SNMP configurations, including user credentials, community strings, and access control lists (ACLs). The management CPU connects to the host system via a PCIe Gen 3.0 x4 interface, providing a 32 Gbps full-duplex communication path for retrieving forwarding-plane statistics from the ASIC.

KEY FEATURES & ROUTING LOGIC

The SNMP implementation conforms to the standards defined in RFCs 1157 (SNMPv1), 1901-1908 (SNMPv2c), and 3411-3418 (SNMPv3), offering a flexible security framework for diverse operational environments. Key features include:

- SNMPv3 Security: Full support for User-Based Security Model (USM) with authentication (MD5, SHA-1, SHA-256) and privacy (DES, 3DES, AES-128, AES-192, AES-256) protocols. This enables encrypted transport of sensitive

management data, aligning with security best practices for financial and government networks. View-Based Access Control Model (VACM) is also supported, allowing granular restrictions per user to specific MIB branches (e.g., read-only access to system group, read-write access to interface admin status).

- Comprehensive MIB Support: Includes the mandatory system MIB (RFC 1213), interfaces MIB (RFC 2863), and IP MIB (RFC 4293). Additionally, the platform provides enterprise-specific MIBs for advanced hardware monitoring, including fan tray speed, power supply redundancy status, and stacking port health. The proprietary VENDOR-SWITCHING-MIB offers extensions for VLAN configuration, link aggregation group (LAG) management, and spanning-tree protocol (STP) state visibility.

- SNMP Traps and Informs: The platform generates real-time asynchronous notifications for critical events, such as link up/down, power supply failure, temperature warnings, and fan failure. Supports up to 10 distinct trap receiver destinations, each configurable with SNMPv1/v2c community strings or SNMPv3 security parameters. Informs are supported for reliable notification delivery in SNMPv2c and SNMPv3 modes, with built-in retry mechanisms.

- SNMP over SSH (SSH Tunneling): For environments that require an additional layer of transport security beyond SNMPv3, the switch supports tunneling all

SNMP operations over a secure SSHv2 channel. This feature enables management of the switch through firewall-restricted networks, leveraging the existing SSH key infrastructure for authentication.

- MIB Compiler Integration: The SNMP agent provides a built-in MIB compiler that allows users to upload custom MIB modules for proprietary applications. This is particularly useful in software-defined networking (SDN) environments where custom telemetry needs to be exposed to a central controller.

- Bulk Table Retrieval: The agent supports the GETBULK operation (SNMPv2c/v3), enabling efficient retrieval of large tables (e.g., routing table, MAC address table, ARP cache) with a single PDU request. The max-repetitions parameter is configurable per community/user, with a default of 20, optimizing the balance between retrieval speed and packet size.

COMPLIANCE & STANDARDS

This switching platform adheres to the following compliance standards relevant to SNMP management:

- RFC 1157 - SNMPv1 (Full Compliance)
- RFC 1901-1908 - SNMPv2c (Full Compliance)

- RFC 3411-3418 - SNMPv3 (Full Compliance)

- RFC 3414 - User-Based Security Model (USM)

- RFC 3415 - View-Based Access Control Model (VACM)

- RFC 2863 - Interfaces Group MIB

- RFC 4293 - IP Forwarding Table MIB

- RFC 4823 - Transport Security for SNMP (SSH subsystem)

- IEEE 802.1AB - LLDP MIB for topology discovery

- ITU-T M.3100 - Generic network information model for TMN

TECHNICAL SPECIFICATIONS

SNMP Agent Specifications:

- Agent Software: Net-SNMP 5.9.1 (compiled with full MIB modules)

- Management Processor: 1.2 GHz Dual-Core ARM Cortex-A72

- Dedicated Management Memory: 4 GB DDR4 (ECC)

- Management Flash Storage: 16 MB SPI Flash (redundant copies)

- Maximum Concurrent SNMP Sessions: 256 simultaneous v1/v2c/v3 sessions

- SNMP Request Rate: 1,000 GET requests/second sustained, 1,500 peak (with bulk retrieval)

- MIB Object Cache Size: 512 MB (dynamic allocation)

- Trap Generation Latency: < 10 ms from event detection

- Supported Authentication Protocols: MD5, SHA-1, SHA-224, SHA-256,

SHA-384, SHA-512

- Supported Privacy Protocols: DES, 3DES, AES-128, AES-192, AES-256

Management Interface Specifications:

- Out-of-Band Management Port: 10/100/1000BASE-T (RJ-45), auto-negotiation

- Management VLAN Support: 802.1Q tagging on in-band management via any data port

- Management Access Protocols: SNMPv1/v2c/v3, CLI (SSH/Telnet), WebGUI (HTTPS), RESTCONF

- Maximum ACL Rules for SNMP Access: 128 (permit/deny per source IP)

- Host Access List: Configurable via IPv4/IPv6 address or subnet

- SNMP Trap Message Queue Size: 1,000 notifications (persistent across power cycles)

Parameter	**Specification**
Form Factor	1RU Fixed Switch / 2RU Modular Chassis (user-selectable)
Switching Capacity	2.56 Tbps (non-blocking, full-duplex)
Power Supply	Dual Hot-Swappable Redundant AC (100-240V, 50/60Hz) or DC (-48V)
Management Port	10/100/1000BASE-T (dedicated

	out-of-band)
Maximum SNMP Sessions	256
SNMP Request Rate	1,000 GET/sec (sustained), 1,500/sec (peak)
MIB Support	RFC 1213, 2863, 4293; plus enterprise VENDOR-SWITCHING-MIB

ORDERING SKU INFORMATION

Specify the target model when placing purchase orders to ensure correct SNMP licensing and feature set. The platform is offered in both fixed-port and modular chassis configurations.

- Base Unit: Integrated SNMP agent license (included standard with every hardware purchase, no additional licensing fees).

- Software Options: Advanced SNMP Enterprise MIB Pack (VENDOR-SWITCHING-MIB and additional 50 private MIBs) — upgrade available via license key.

- Accessories: Console cable (RJ-45 to DB-9) for out-of-band management access, bundled in each shipping box.

- Spare Parts: Management module for modular chassis (spare CPU/memory module) available as a separate SKU.

