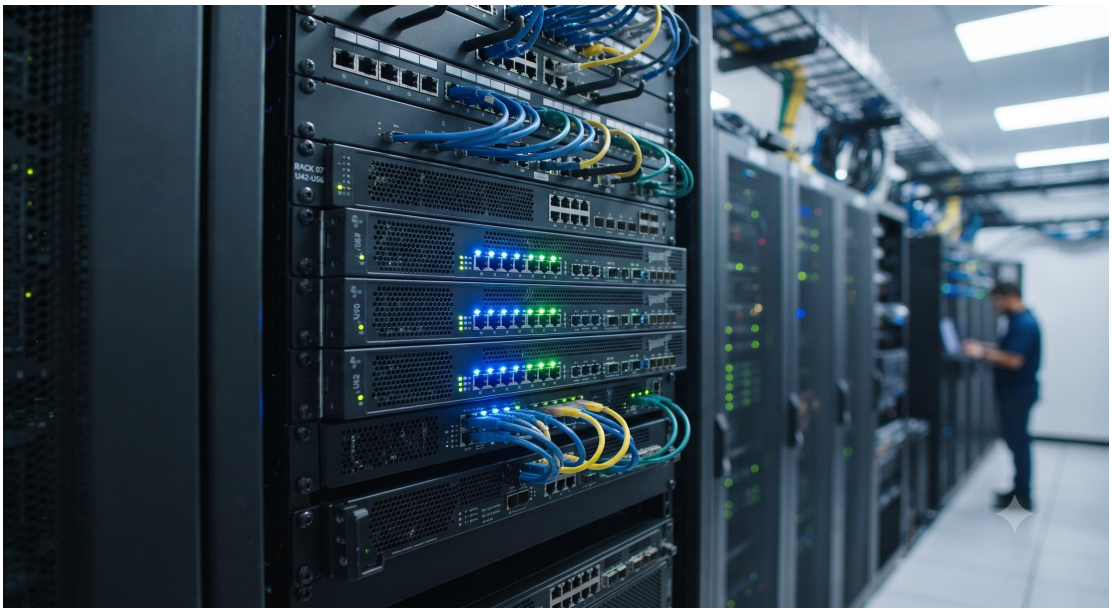
XPONSHOP Secure Erasure Certification Protocol for Reused Router Flash Memories - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

XPONSHOP introduces a groundbreaking hardware-level security paradigm with the Secure Erasure Certification Protocol (SECP), specifically engineered for the lifecycle management of NAND and NOR flash memories in reused carrier-grade routing platforms. As network operators aggressively pursue circular economy initiatives and stringent data privacy mandates (GDPR, CCPA, HIPAA), the inherent risk of residual configuration data, crypto-keys, and proprietary routing tables persisting in decommissioned hardware remains a critical supply chain vulnerability. The XPONSHOP SECP is not a software overlay but a silicon-anchored protocol executed within the flash memory controller, guaranteeing verifiable, irreversible data destruction in accordance with NIST SP 800-88 Revision 1 (Purge and Clear) standards. This document provides a comprehensive technical overview of the SECP architecture, its integration into the XPONSHOP family of reused routing hardware, and the accompanying performance specifications.



HARDWARE ARCHITECTURE & SILICON

The XPONSHOP SECP is implemented via a dedicated, physically isolated Cryptographic Erasure Engine (CEE) embedded within the board management controller (BMC) of the reused routing chassis. The architecture employs a two-pronged approach: a hardware-driven overwrite sequence using pseudo-random data patterns and a proprietary zero-delay block invalidation routine that instantly renders all flash cells in a targeted partition unrecoverable via JTAG or direct memory access. Key silicon components include:

- **SECP Co-Processor:** An ARM Cortex-M7 core dedicated exclusively to managing erasure state machines, ensuring that erasure cycles operate independently of the main CPU and cannot be interrupted by software-level exploits.

- **Volatile Key Cache:** A battery-backed SRAM that stores a unique device-specific encryption key. Upon initiation of the erasure protocol, this key is irrevocably zeroized, rendering all data on the flash chips cryptographically scrambled even before the physical overwrite completes.
- **Redundant Power Capacitor Bank:** Guarantees completion of an in-progress erasure cycle during an unexpected power loss, preventing partial erasure states and maintaining the certification integrity.

KEY FEATURES & ROUTING LOGIC

- **NIST SP 800-88 Purge Compliance:** The SECP executes a minimum of three passes (Single, Complement, Pseudo-Random) with verification read-back, meeting the stringent requirements for sanitizing data in high-security environments.
- **Granular Partition Targeting:** Enables selective erasure of specific flash regions (e.g., NVRAM, bootloader, configuration register) without damaging the hardware-certified MAC addresses or unique device serials, allowing for safe redeployment.
- **Tamper-Evident Logging:** A hardware-protected secure element logs every erasure event with a timestamp, operator ID, and a unique 256-bit hash of the erasure operation, providing an auditable chain-of-custody for compliance officers.

- **Automated Certification Engine (ACE):** Upon successful completion of the protocol, the system generates a cryptographic token (SECP-Cert) that can be uploaded to XPONSHOP's cloud repository. This certificate validates that the flash memory is in a pristine, uninitialized state, effectively eliminating residual data liability for the previous owner.
- **Lifecycle Reset Logic:** Resets the flash wear-leveling counters, preparing the memory for a new deployment with optimal performance and extending the usable lifespan of the reused component.

COMPLIANCE & STANDARDS

- **NIST Special Publication 800-88 Rev. 1:** Media Sanitization (Purge & Clear) for all flash storage.
- **ISO/IEC 27040:** Storage security and data resilience.
- **Common Criteria (CC) EAL 2+:** Assurance for the secure erasure mechanism.
- **IEEE 1613:** Environmental testing for communications networking equipment.
- **RoHS & WEEE:** Compliance for environmental sustainability and recycling directives.
- **FIPS 140-2 (Level 2):** Cryptographic module validation for the key destruction process.

TECHNICAL SPECIFICATIONS

| **FEATURE** | **SPECIFICATION** |

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| **Supported Flash Types** | NAND (SLC/MLC/TLC), NOR (Parallel/Serial) |

| **Erasure Algorithms** | Zero-Overwrite, Pseudo-Random (x2), DoD 5220.22-M, VSITR |

| **Erasure Speed** | Up to 2 GB/min for NAND, 500 MB/min for NOR |

| **Verification Mechanism** | Byte-by-Byte Verification with Error Correction Check |

| **Protocol Activation** | CLI (Secure Shell), Physical Toggle Switch, or Remote Management API |

| **Logging Capacity** | 1,000,000 event entries in on-board secure flash |

| **Environmental** | Operating: 0°C to 45°C; Storage: -40°C to 70°C; Humidity: 5% to 95% (non-condensing) |

| **Power Consumption (SECP Active)** | 15W (max) for the duration of the erasure cycle |

Parameter	**Specification**
Form Factor	Standard 1RU Modular Chassis / Hot-Swappable Flash Module

Switching Capacity (System)	Up to 1.8 Tbps (Backplane Dependent)
Power Supply	Dual Hot-Swappable Redundant AC/DC (100-240V AC / 48V DC)

ORDERING SKU INFORMATION

The SECP capability is a factory-integrated feature standard across all XPONSHOP Reused Router Flash modules (XP-RF-*-SECP). No separate software license key is required. The feature is identified by the "-SECP" suffix in the product SKU.

- **Example SKUs:** XP-RF-256M-SECP, XP-RF-2GB-SECP, XP-RF-8GB-SECP.
- **Compatibility:** 100% backward compatible with legacy XPONSHOP Routing Engines (RE-4000, RE-5000, and RE-7000 series).

