



Post-Quantum In-Line Network Encryptor (PINE)



PINE is a state-of-the-art FPGA based IP network encryption equipment supporting post-quantum NIST FIPS-203 ML-KEM standard compliant key generation mechanism along with quantum-safe symmetric encryption (AES 256 GCM) of Ethernet frame (L2) and IP packet (L3) payload data at 1 Gbps encryption throughput rate.

Enhanced IPSEC framework supports establishment of multiple security associations between two or more peer PINE encryptors in a point-to-multipoint network topology.

Quantum-Safe

Supports post-quantum NIST FIPS-203 ML-KEM standard key generation and AES-256 GCM symmetric encryption algorithms.

Segments

Defense and Strategic Sectors, PowerGrid infrastructure, Nuclear Stations, Space Network, Banking and Financial Network.

AatmaNirbhar Bharat

Completely designed, developed and fabricated in India.

Crypto Features

- ✦ Hybrid NIST FIPS-203 ML-KEM and Static Keys based encryption key generation
- ✦ AES-256 GCM Symmetric Encryption
- ✦ Side Channel Leakage resistant crypto IP Cores
- ✦ In-built NIST SP 800-90B compliant TRNG
- ✦ Red-Black Encryption Separation

Networking Features

- ✦ Enhanced IPSEC ESP tunnel encapsulation
- ✦ Point-to-Multipoint Network Topology Support
- ✦ 1 Gbps encryption throughput
- ✦ Ethernet frame (L2) and IP Packet (L3) Payload Encryption
- ✦ In-band post-quantum FIPS-203 ML-KEM key generation

Security Features

- ✦ Rugged conduction cooled enclosure
- ✦ Active tamper monitoring with battery backup
- ✦ Field replaceable Lithium battery
- ✦ Circular pin connectors with custom cables for security
- ✦ Emergency Erasure Switch
- ✦ Multi-factor authentication based user identification

System Features

- ✦ FPGA based design for high throughput and low latency
- ✦ Touch screen based on-board system GUI
- ✦ SNMPv3 based NMS Support
- ✦ Tabletop & 19" telecom rack compatible equipment
- ✦ Hot-standby power supplies (AC & DC), 200 W (Typical)
- ✦ 5U (EIA), 8.75" H X 19" W X 23" D, Weight < 25 Kg



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