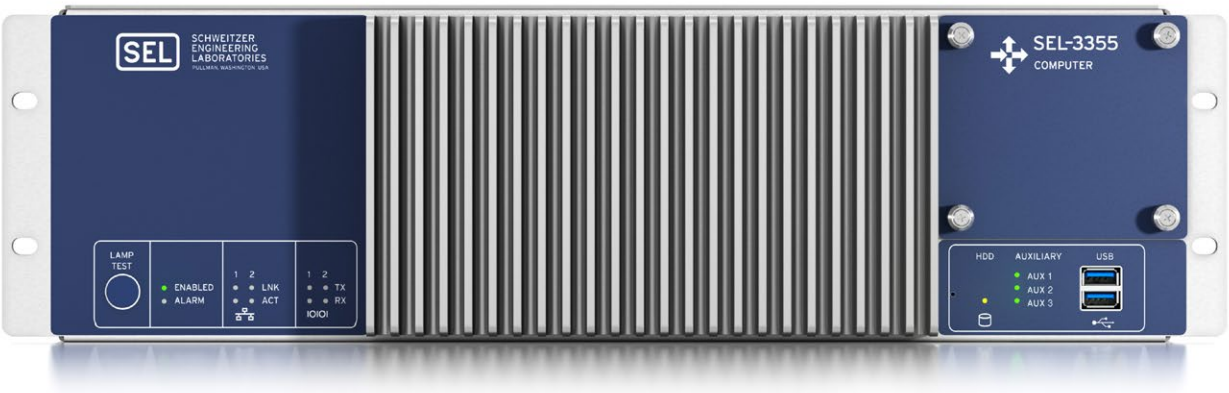
OPNsense on SEL Hardware



Protect operational technology (OT) networks

- Integrate an OPNsense-based firewall and dynamic routing into SEL hardware designed specifically for OT environments.
- Enhance resiliency with dynamic routing between substations and the control center.
- Improve reliability using rugged hardware along with automatic, seamless failover.
- Implement a stateful firewall to stop malware and unauthorized access.

Key Features

The OPNsense on SEL hardware solution integrates a state-of-the-art firewall and dynamic routing into the rugged SEL-3355 computing platform. This advanced cybersecurity system is customizable to match your security needs.

Apply a stateful firewall

OPNsense on SEL hardware tracks the state of network connections (such as TCP streams and UDP communication) to increase filtering while reducing configuration needs. The firewall protects OT networks, such as substation LANs, against ransomware, trojans, viruses, and other malware and uses deep-packet inspection to detect malicious code in incoming packets from WANs. OPNsense on SEL hardware supports multiple network address translation (NAT) options, such as one to one, port forwarding, and outbound NAT, and supports multiple public interfaces.

Prioritize critical OT traffic

Apply traffic shaping in the firewall to limit bandwidth for various IT and OT applications and to prioritize network traffic. Bandwidth limitations can be configured based on the interface, IP source and destination, direction of traffic, and port numbers.

Improve reliability with failover

Configure multiple firewalls for high availability using the Common Address Redundancy Protocol (CARP) for hardware failover. If the primary firewall fails, then the secondary firewall becomes active.

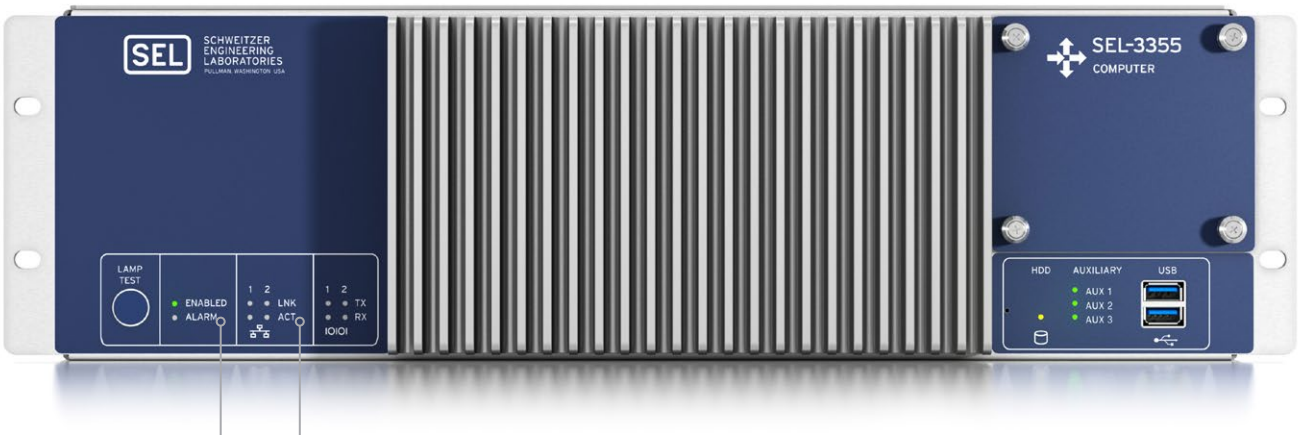
Operate in harsh environments

OPNsense on SEL hardware uses SEL rugged computing platforms, which are tested to protective relay standards and have options for redundant power supplies for increased reliability. These devices have no moving parts and are designed to withstand vibration, electrical surges, fast transients, and extreme temperatures.

Implement dynamic routing

Deploy the OPNsense on SEL hardware solution as a dynamic edge router for the substation. The firewall supports adaptive routing protocols, such as Open Shortest Path First (OSPF), the Border Gateway Protocol (BGP), and the Route Information Protocol (RIP), to improve fault tolerance and reduce configuration needs. It also supports VPNs and is a VPN concentrator that allows multiple VPN tunnels to use a single network.

Product Overview

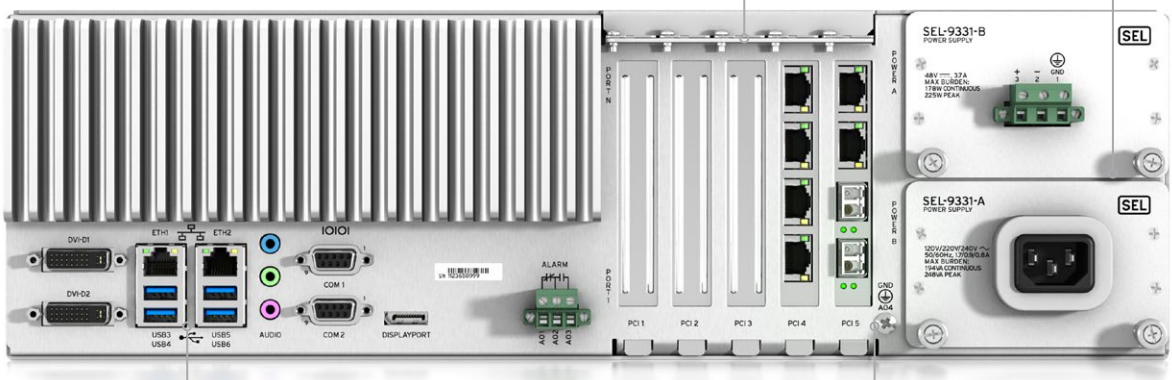


Operational status LEDs—a green "ENABLED" LED indicates normal operation. The "ALARM" LED illuminates red when a nonoptimal system condition exists.

Ethernet status indicators—"LNK" (link) indicates that the port is connected, and "ACT" (activity) indicates when data are being transmitted and received.

Power supply modules—the rated input voltage is clearly marked on the chassis near the terminals.

PCI expansion slots—install SEL or third-party PCI or PCI Express expansion cards for additional network, serial, or other application-specific I/O.



"ETH1" and "ETH2"—onboard independent Gigabit Ethernet interfaces.

Earth ground terminal screw—earth ground connection for the SEL-3355-2.

OPNsense on SEL Hardware Specifications

Stateful Firewall Filtering Options	Source destination protocol port Operating system
IEEE 802.1Q VLAN Support	Maximum of 4,096 VLANs
VPN Support	IPsec OpenVPN
NAT Options	Port forwarding 1:1 of IPs and subnets Outbound NAT NAT reflection
Traffic Shaping	Limit bandwidth Share bandwidth Prioritize traffic Rule-based matching
Intrusion Detection System (IDS)	Built-in IDS based on Suricata by the Open Information Security Foundation
Performance	Unencrypted throughput: ~806 Mbps Encrypted throughput: ~730 Mbps
Dynamic Routing Protocols	OSPFv2 and OSPFv3 BGPv4 RIP
Captive Portal	Active logging and security verification
Bandwidth Limiting Parameters	Interface IP source and destination Direction of traffic Port numbers
Flexible Interface Assignments	VLAN bridge Generic routing encapsulation (GRE) Link aggregation (LAGG) Virtual IP (VIP) Rapid Spanning Tree Protocol (RSTP)

User Authentication	Remote Authentication Dial-In User Service (RADIUS) Lightweight Directory Access Protocol (LDAP) Two-factor authentication
Network Management Interfaces	Simple Network Management Protocol (SNMP), monitor and traps Representational State Transfer (REST) application program interfaces (APIs)
Failover Protocol	CARP
Time Synchronization	Network Time Protocol (NTP)
Communications Ports	Two 1 Gb standard; up to ten 1 Gb using PCIe cards
Operating Temperature	−40° to +75°C (−40° to +167°F) with SEL-3355

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+1.509.332.1890 | info@selinc.com | selinc.com

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