WAN AND LAN NETWORKS OVERVIEW

SEL ICON®
The SEL ICON Integrated Communications Optical Network is a WAN multiplexer optimized for industrial and utility applications. By combining time-division multiplexing (TDM) and Ethernet transport options with a comprehensive range of data interfaces, the ICON makes it easy to migrate legacy network technologies to a packet-based solution.

SEL-2740S
The SEL-2740S Software-Defined Network Switch is the industry’s first field-hardened software-defined networking (SDN)-enabled switch and is designed to improve Ethernet performance in mission-critical applications.

SEL-3610
The SEL-3610 Port Server increases the number of serial ports available to communications processors and computers and allows serial products to communicate securely through Ethernet networks.

SEL-3620/3622
The SEL-3620 Ethernet Security Gateway and SEL-3622 Security Gateway each function as a router, VPN endpoint, and firewall device. They can perform secure and proxy user access for serial- and Ethernet-based intelligent electronic devices (IEDs).

SEL-2730M/2730U
Apply SEL-2730M/2730U 24-Port Ethernet Switches to build reliable, safe Ethernet networks in electrical substations, plants, and other mission-critical sites.

SEL-2740S
The SEL-2726U Eight-Port Ethernet Switch is an unmanaged Ethernet switch with eight 10/100BASE-T ports supporting data transfer rates up to 100 Mbps.

SEL-3025
The SEL-3025 Serial Shield® protects serial communications with bump-in-the-wire security and strong, authenticated access controls.

SEL-2725
The SEL-2725 Five-Port Ethernet Switch allows you to easily connect devices to Ethernet networks.
### APPLICATIONS

<table>
<thead>
<tr>
<th>SONET WAN</th>
<th>Ethernet LAN</th>
<th>Precise Time Distribution</th>
<th>Engineering Access Control</th>
<th>Connect Multiple Wired-Ethernet Devices to Network</th>
<th>Convert Wired 10/100BASE-T Ethernet to Fiber-Optic 100BASE-FX Ethernet</th>
<th>Convert Serial Links to Ethernet Links</th>
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</thead>
<tbody>
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### FEATURES

- Cryptography (Encryption and Authentication)
- User-Based Accounts
- Centralized Authentication Via Lightweight Directory Access Protocol (LDAP)
- Centralized Authentication Via Remote Authentication Dial-In User Service (RADIUS)
- Deny-by-Default Firewall
- Import/Export Configuration Files
- VPN
- Syslog Logging
- Network Management System (NMS) Software
- GPS Receiver
- Real-Time Latency Monitor
- Spanning Tree Protocol (STP)
- VLANs
- Ethernet Class of Service

### ETHERNET PORTS, CONNECTOR

<table>
<thead>
<tr>
<th>Copper 10BASE-T, RJ45</th>
<th>0–16’</th>
<th>0–20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper 10/100BASE-T, RJ45</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Fiber-Optic 100BASE-FX, LC</td>
<td>0–16’</td>
<td>0–20</td>
</tr>
<tr>
<td>Copper Gigabit Ethernet (GigE), RJ45</td>
<td>2–6’</td>
<td>4’</td>
</tr>
<tr>
<td>Fiber-Optic GigE, LC</td>
<td>2’/4’</td>
<td>0–4’</td>
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</table>

SEL-2730M supports STP plus IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP).

SEL ICON can support up to 16 Ethernet ports using 8-port Ethernet Access Modules or Ethernet Bridging Access Modules.

SEL-2730M base configuration supports sixteen 10/100BASE-T copper ports, with the option to substitute 100BASE-FX fiber-optic ports in groups of four.

SEL-2730M base configuration includes 4 copper GigE ports and 4 SFP cages for optional fiber-optic GigE ports.

SEL ICON uses SFP cages for SONET and GigE fiber-optic interfaces.

SEL-8021-1 Line Module supports 2 fiber-optic Gigabit interfaces.

SEL-8036-1 Ethernet Bridging Access Module supports 4 fiber-optic 100BASE-FX/Gigabit interfaces.

SEL-5052 Server NMS Software provides LDAP centralized authentication for the ICON.
WAN AND LAN NETWORKS APPLICATIONS

MAINTAINING CRITICAL SERVICES BETWEEN SITES
Install the SEL ICON® Integrated Communications Optical Network to maintain critical services between sites by quickly restoring traffic when an infrastructure disruption, like fiber failure, occurs.

You can configure the ICON to operate as a SONET or Ethernet multiplexer to address the following network use cases:

- Segregated operational technology (OT)—SONET transport (shown here)
- Segregated OT—Ethernet transport
- Converged IT/OT—Multiprotocol Label Switching (MPLS) or Carrier Ethernet core network
- Analog leased line service migration

IMPROVING MISSION-CRITICAL ETHERNET PERFORMANCE
The breakthrough software-defined networking (SDN) technology in the SEL-2740S Software-Defined Network Switch solves the inherent limitations of Ethernet networks. Every network path is predefined by the user, enabling precise control over how the system responds to network failures. The SEL-2740S fails over in less than 100 μs, ensuring the performance of mission-critical applications under all conditions. This means no more waiting for discovery or convergence times.

REDEFINING SECURITY FOR ETHERNET NETWORKS
The deny-by-default architecture of the SEL-2740S means only preapproved traffic that matches specific rules is allowed onto the network. The switch inspects multiple layers of every packet to see if they match the set of rules you define. If there is a mismatch, the SEL-2740S can immediately drop the packet or forward it to an intrusion detection system for in-depth analysis. In addition, you can change these rules at any time.
MANAGING AND SECURING SYSTEM COMMUNICATIONS
Install the SEL-3620 Ethernet Security Gateway to secure your control system communications with a stateful deny-by-default firewall, strong cryptographic protocols, and logs for system awareness. The SEL-3620 also manages protected intelligent electronic device (IED) passwords and helps create a user audit trail through strong, centralized, user-based authentication and authorization for modern and legacy IEDs.

CONNECTING TO SEL PRODUCTS AND OTHER DEVICES FOR SECURE SERIAL COMMUNICATIONS
Add 17 serial ports with the SEL-3610 Port Server to connect SEL products and other devices and allow secure serial communications through Ethernet networks. The SEL-3610 tunnels serial data over an Ethernet connection using Secure Shell (SSH), Telnet, Modbus®, or raw TCP encapsulation. The SEL-3610 allows you to restrict all access to unconfigured logical and physical ports.

MANAGING TRANSITION FROM ANALOG TO ETHERNET LEASED LINE SERVICES
Apply the bit-based serial conversion technology in the SEL-3622 Security Gateways to seamlessly convert existing bit-based serial protocols, such as Conitel, Tejas, Van Comm, and Redaj, to Ethernet packets on the near side of a link. Then, reconvert that Ethernet data back into bit-based form on the remote side. This allows the SEL-3620 and SEL-3622 to serve as drop-in replacements for analog line-to-line modem technology without disrupting existing equipment and with minimal additional latency.
The SEL ICON is a WAN multiplexer optimized for industrial and utility applications. You can configure the ICON to operate as a SONET or Ethernet multiplexer to address the following network usage cases:

- Segregated operational technology (OT)—SONET transport
- Segregated OT—Ethernet transport
- Converged IT/OT
- Analog leased line service migration

The deterministic packet transport technology in the ICON preserves the performance characteristics of time-division multiplexing (TDM) when converting to Ethernet as a transport protocol. By combining TDM and Ethernet transport options with a comprehensive range of data interfaces, the ICON makes it easy to migrate legacy network technologies to a converged IT/OT packet-based solution. The ICON interoperates with Multiprotocol Label Switching (MPLS) or Carrier Ethernet core networks to provide a hardened OT edge multiplexer for mission-critical applications.

SEL-5051 Client and SEL-5052 Server NMS Software help you maintain a secure, reliable, and efficient communications infrastructure. In the client-server architecture, the SEL-5051 Client Software connects to the SEL-5052 Server Software to provide an efficient solution for managing network access for multiple users. The SEL-5052 Server Software offers centralized user security, settings, alarms, and event management.

### ICON MODULES

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>STARTING PRICE</th>
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</thead>
<tbody>
<tr>
<td><strong>Power Modules</strong></td>
<td></td>
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</tr>
<tr>
<td>8011-02</td>
<td>19-Inch Rack Power Module, High-Voltage AC/DC, 120–240 V, 92 W</td>
<td>$400</td>
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<tr>
<td>8010-02</td>
<td>8-Inch Cube Power Module, High-Voltage AC/DC, 120–240 V, 63 W</td>
<td>$350</td>
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<tr>
<td><strong>Control Modules</strong></td>
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<tr>
<td>8020-01</td>
<td>Line Module</td>
<td>$2,030</td>
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<tr>
<td>8021-01</td>
<td>Protected Line Module</td>
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<tr>
<td><strong>Server Module</strong></td>
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<td>8030-01</td>
<td>Server Module</td>
<td>$600</td>
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<tr>
<td><strong>Access Modules</strong></td>
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<tr>
<td>8035-01</td>
<td>Ethernet Access Module</td>
<td>$700</td>
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<tr>
<td>8036-01</td>
<td>Ethernet Bridging Access Module</td>
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<tr>
<td>8041-04</td>
<td>Transfer Trip 4-Function 125/250 VDC TX/RX Teleprotection Module</td>
<td>$1,200</td>
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<tr>
<td>8050-01</td>
<td>Quattro Module (accepts 2 DS1 or 4 non-DS1 submodules)</td>
<td>$208</td>
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<tr>
<td>8051-01</td>
<td>Nx64F IEEE C37.94 Multimode Quattro Submodule</td>
<td>$216</td>
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<tr>
<td>8051-02</td>
<td>Nx64F IEEE C37.94 Single-Mode Quattro Submodule</td>
<td>$480</td>
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<tr>
<td>8053-01</td>
<td>Async Data Quattro Submodule</td>
<td>$204</td>
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<tr>
<td>8056-01</td>
<td>G.703 Quattro Submodule</td>
<td>$250</td>
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<tr>
<td>8057-01</td>
<td>DS1 Async (Quad DS1 Ports) Quattro Submodule</td>
<td>$450</td>
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<tr>
<td>8057-02</td>
<td>DS1 Sync (Quad DS1 Ports) Quattro Submodule</td>
<td>$800</td>
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<tr>
<td>8057-03</td>
<td>DS1 Psync (Quad DS1 Ports) Quattro Submodule</td>
<td>$800</td>
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<tr>
<td>8065-01</td>
<td>4-Wire VF Dual Ports Quattro Submodule</td>
<td>$320</td>
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<tr>
<td>8066-01</td>
<td>FXS Single-Port Quattro Submodule</td>
<td>$320</td>
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<tr>
<td>8067-01</td>
<td>FXO Dual-Port Quattro Submodule</td>
<td>$320</td>
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<tr>
<td><strong>Encryption Module</strong></td>
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<tr>
<td>8029-01</td>
<td>Crypto OC-48 Module</td>
<td>$3,000</td>
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</tbody>
</table>
The ICON is available in a standard 19" rack-mount chassis or in a compact ICON Cube package for limited-space applications.
SEL-2740S
SOFTWARE-DEFINED NETWORK SWITCH

Starting Price
SEL-2740S: $3,750 USD
SEL-5056: $5,000 USD (free for up to 4 switches)

The SEL-2740S is the industry’s first field-hardened software-defined networking (SDN) switch and is designed to improve substation LANs for mission-critical applications. By providing centralized traffic engineering, the SEL-2740S combined with the SEL-5056 Software-Defined Network Flow Controller give you path- and packet-level control of your communications flows. Together, they provide an innovative solution to enhance cybersecurity, failover performance, and IEC 61850 traffic management within the substation LAN. The SEL-2740S can also act as a transparent Precision Time Protocol (PTP) clock supporting the IEEE C37.238 power system profile to ensure submicrosecond time synchronization of end devices. It withstands harsh environments commonly found in the energy and utility sectors.

CENTRALIZED NETWORK VISIBILITY AND DIAGNOSTICS

Through the SEL-5056 Flow Controller, you can manage your entire network from a centralized point. The controller simplifies the design, implementation, and management of operational technology (OT) mission-critical networks. It enables you to monitor the status and health of the SEL-2740S network and manage changes without affecting existing services. You can graphically configure all flows and redundancies, simplifying settings and accelerating proactive traffic engineering.
Lamp Test button verifies all LEDs are functional and lets you select the LED mode.

Power supply status LEDs.

Three LED modes are available for the Ethernet port status.

Out-of-band flow controller port.

General status indicators.

Ethernet port status LEDs.

Slot D provides 10/100/1,000 Mbps data rate support.

Flow processor and alarm contact.

Four RJ45 10/100BASE-T ports.

Lightweight aluminum case ensures maximum reliability and ease of installation.

Five modular slots for copper or fiber Ethernet interface options (in sets of four).

Dual power supply options for hot-swappable redundancy.
SEL-3620/3622
ETHERNET SECURITY GATEWAY/SECURITY GATEWAY

Starting Price
SEL-3620: $2,800 USD
SEL-3622: $799 USD

The SEL-3620 and SEL-3622 each act as a router, VPN endpoint, and firewall device and can perform secure and proxy user access for serial- and Ethernet-based intelligent electronic devices (IEDs). They help create a user audit trail through strong, centralized, user-based authentication and authorization for modern and legacy IEDs. Each security gateway secures your control system communications with a stateful deny-by-default firewall, strong cryptographic protocols, and logs for system awareness. They also manage protected IED passwords, ensuring that passwords are changed regularly and conform to complexity rules. Device checkout and common, persistent passwords improve IED access.

For enhanced security, the SEL-3620 and SEL-3622 help you protect critical cyber assets by employing strong multifactor authentication technologies, such as RSA SecurID®, that use the Remote Authentication Dial-In User Service (RADIUS). The SEL security gateways resist known and unknown malware attacks with exe-GUARD® embedded antivirus technology. Powerful rootkit resistance, embedded Linux® mandatory access controls, and process whitelisting help mitigate attacks against the gateways and eliminate costly patch management and antivirus signature updates.

The SEL-3620 and SEL-3622 support NERC CIP compliance efforts without needing Technical Feasibility Exceptions (TFEs). They also support the SEL-5827 Virtual Connect Client and SEL-5828 Virtual Port Service Software. These free software applications make remote gateway ports available for existing software and terminal applications on your PC, including those using Modbus® TCP/RTU.

The SEL-3620 has 16 serial ports with 5 V power on Pin 1 and comes in a rack-mount form factor. The SEL-3622 has 4 serial ports in a small form factor that is ideal for mounting in cabinets. It detects physical tampering with an onboard accelerometer, light sensor, and input contact sensor and alerts operators when Ethernet cables are connected or disconnected.

SEL designed and built the SEL-3620 and SEL-3622 in cooperation with the U.S. Department of Energy National SCADA Test Bed and the following companies:

- EnerNex Corporation
- Tennessee Valley Authority
- Sandia National Laboratories
SEL-2730M/2730U
24-PORT ETHERNET SWITCHES

Starting Price
SEL-2730M: $1,850 USD
SEL-2730U: $1,500 USD

selinc.com/products/2730M or selinc.com/products/2730U

Select models typically ship in 2 days

The SEL-2730M Managed 24-Port Ethernet Switch and SEL-2730U Unmanaged 24-Port Ethernet Switch support communications infrastructure for engineering access, SCADA, and real-time data communications while offering the same reliability found in SEL protective relays. Both switches are designed for the harsh conditions found in energy and industrial environments and meet or exceed the IEEE 1613 (Class 1), IEC 61850-3, and IEC 60255 industry standards for vibration, electrical surges, fast transients, extreme temperatures, and electrostatic discharge for communications devices in electrical substations.

The SEL-2730M is easy to use and administer, with a web management interface and advanced configuration options to meet your needs. The SEL-2730U is an unmanaged “no settings” switch with ports that automatically configure for crossover cables, speed, and half- or full-duplex operation.
SEL-3610
PORT SERVER

Starting Price
$1,800 USD

Select models typically ship in 2 days

The SEL-3610 is an EIA-232, EIA-422, or EIA-485 serial-to-serial and Ethernet-to-serial cryptographic port server. It increases the number of available serial ports for communications processors and computers and allows serial products to communicate securely through Ethernet networks. The SEL-3610 tunnels serial data over an Ethernet connection using Secure Shell (SSH), Telnet, Modbus®, or raw TCP or UDP encapsulation. The SEL-3610 provides highly flexible byte- or bit-based serial and Ethernet port mappings and can filter data based on which connections listen or transmit. You can configure the device to establish virtual bonds between one or more logical Ethernet ports and one or more physical serial ports. The SEL-3610 supports enhanced security, including user authentication through the Lightweight Directory Access Protocol (LDAP). It also supports multifactor authentication technologies, such as RSA SecurID®, that use the Remote Authentication Dial-In User Service (RADIUS).

SEL-2725/2725D
FIVE-PORT ETHERNET SWITCHES

Starting Price
$300 USD

Select models typically ship in 2 days

The SEL-2725 is an unmanaged five-port switch and copper-to-fiber-optic media converter. With the SEL-2725, you can build reliable, safe Ethernet networks in electrical substations, plants, and other mission-critical sites. The SEL-2725 can connect to devices in the same cabinet using shielded twisted-pair Category 5 cable and communicate with the substation or LAN over a fiber-optic link.
### SEL-3025
**SERIAL SHIELD®**

**Starting Price**
SEL-3025: $900 USD
PC Serial Security Kit: $400 USD
SEL-3045 Secure SCADA Card: $250 USD (included in kit)

You can use the SEL-3025 with the PC Serial Security Kit to transform normal serial PC communications to cryptographically secure serial PC communications. Simply plug in the USB card dock and install the virtual port software to use a secured serial port with existing software and terminal applications.

The SEL-3025 uses powerful AES 128-/256-bit and SHA-1/-256 key strengths to encrypt and authenticate serial and dial-up links at speeds up to 57,600 bps. The cryptographic module provides confidentiality and integrity for remote monitoring and interactive remote access while locking out hackers and other malicious intruders. With its remote management functionality and wide range of application support, the SEL-3025 is flexible and easy to use.

### SEL-2726U
**EIGHT-PORT ETHERNET SWITCH**

**Starting Price**
$200 USD

The SEL-2726U is a commercial-grade Ethernet switch with eight 10/100BASE-T RJ45 ports. It requires no software, and the ports automatically configure themselves for speed and duplex operation. The switch is built with high-quality components and is enclosed in a tough aluminum chassis for thermal conductivity. It has an operating temperature range of 0° to +40°C (+32° to +104°F).

The SEL-2726U is the dependable choice in Ethernet connectivity, whether you use it in testing stations, laboratories, research and development, manufacturing, or other exacting work areas. Designed for durable and reliable operation, the SEL-2726U is ready for years of daily use in demanding environments.