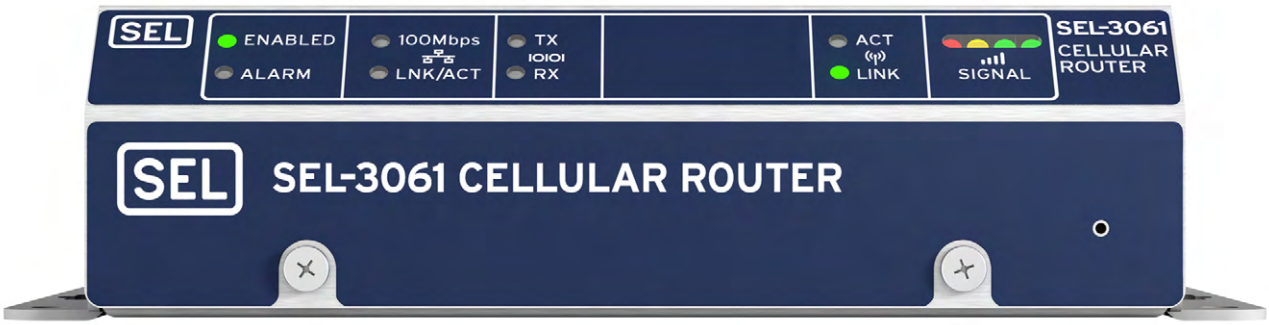
SEL-3061 Cellular Router

Secure Cellular Connectivity



Key Features and Benefits

The SEL-3061 Cellular Router provides secure wireless connectivity to a variety of critical infrastructure devices through the use of cellular networks. With a high data rate, the SEL-3061 serves as a communications backhaul for systems that need communications links to centralized locations. The router supports 4G LTE cellular technologies.

- **Multiple Carrier Support.** Supports AT&T, FirstNet, Verizon, T-Mobile, and other roaming partners.
- **Strong Secure Communication.** Offers as many as five concurrent IPsec VPN connections. X.509 certificates ensure strong authentication with third-party validation.
- **User-Based Accounts with Centralized User-Based Authentication.** Provides separate role-based authorization levels for configuration, maintenance, and usage. Supports Remote Authentication Dial-In User Service (RADIUS).
- **Syslog.** Logs system events for alerts in a consistent fashion for both local and centralized collection.
- **Network Management.** Supports SNMP reads and traps for versions v1, v2c, and v3.
- **Application Versatility.** Serial and Ethernet ports enable communications with a variety of end devices.
- **Dual-Mode Operation.** Gives flexibility of operating as a router or a cellular modem.
- **Stateful Packet Inspection (SPI) Firewall and IP Defense.** Dynamic packet filtering prevents unauthorized traffic from entering your private network. Log all successful or blocked connections to the firewall. IP Defense mitigates the effects of denial-of-service and brute force attacks.
- **Ruggedness.** Provides utility-grade reliability. Designed and tested to relay standards for electromagnetic compatibility and surge immunity. Operates reliably between –40° to +75°C (–40° to 167°F).
- **Resiliency.** Enables the use of two antennas to increase signal strength performance.

Product Overview

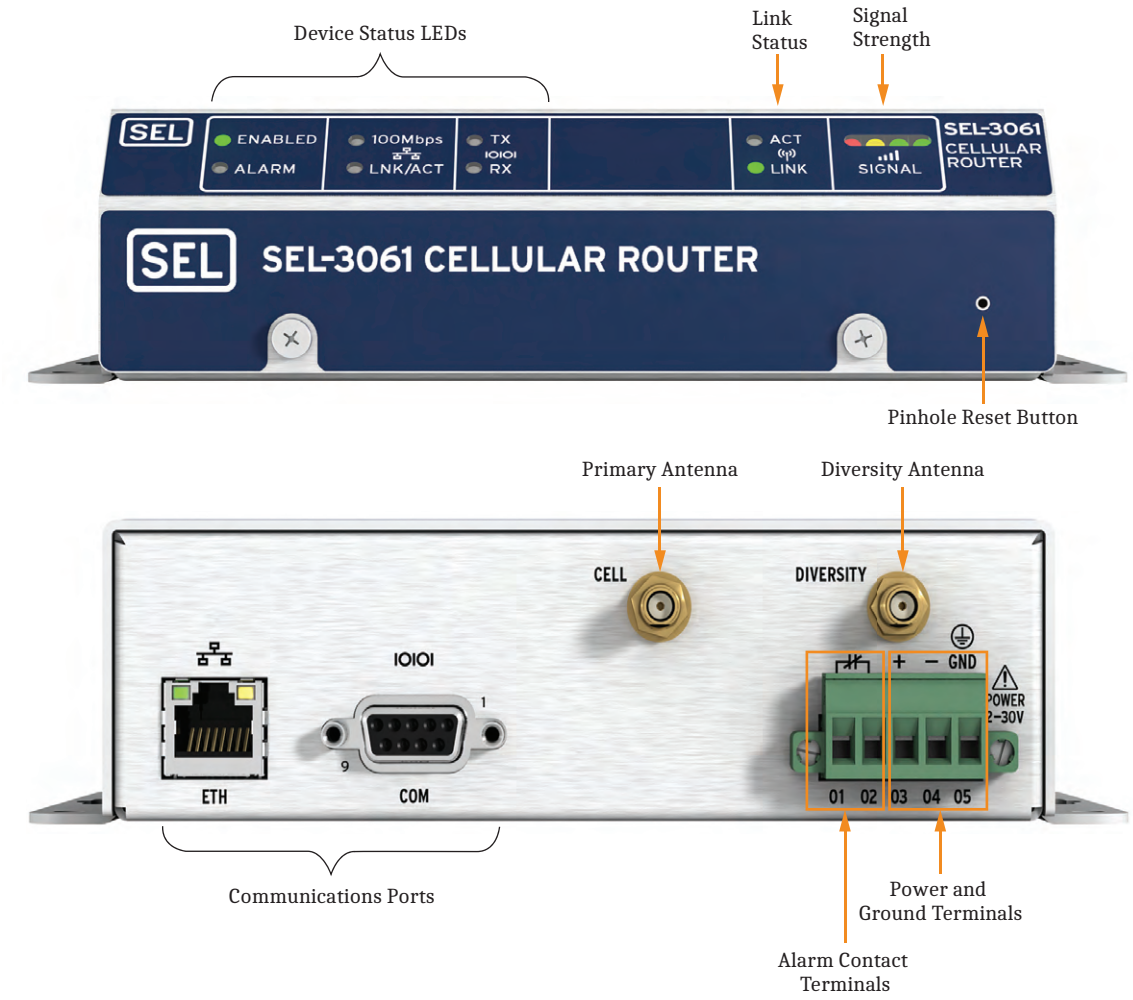


Figure 1 Product Overview

Features

Secure Communication Over Cellular Network

The SEL-3061 offers comprehensive security methods that include VPN, IPsec, SPI firewall, and media access control (MAC) address filtering to ensure the confidentiality and integrity of data communications over a cellular network. The SEL-3061 uses RADIUS and user account privileges to grant access to the device.

Device Management

The SEL-3061 simplifies device monitoring and management via the web interface including over-the-air settings changes and firmware upgrades.

Ubiquitous Connectivity

The SEL-3061 supports 4G LTE cellular technology and uses cellular networks to provide wireless connectivity for a variety of critical infrastructure devices.

Reporting and Alarms

The SEL-3061 uses the Syslog format to log events. The router maintains an internal record of as many as 30,000 event logs in nonvolatile memory that can be downloaded into a CSV file. The Remote Syslog feature supports and reports up to two Syslog Servers. Notifications and alarms can be triggered by the events and sent by

using either SNMP, email, or short message service (SMS) messages. The SEL-3061 has an output alarm contact that pulses for major and minor alarms.

The SEL-3061 supports SNMP to provide state information and notifications (traps) for events that indicate the device health and status. The SEL-3061 includes Management Information Base (MIB) files in zip format to be downloaded to provide information about data and traps available via SNMP.

Application Examples

The SEL-3061 serves as the communications link for field devices or backhaul communications device. For electric utilities, the SEL-3061 provides connectivity to devices such as recloser controls, motor-operated switches, capacitor banks, voltage regulators, meters, and other IEDs. The combination of serial and Ethernet ports on the SEL-3061, along with secure tunneling, provides application flexibility and makes installation easy without sacrificing security.

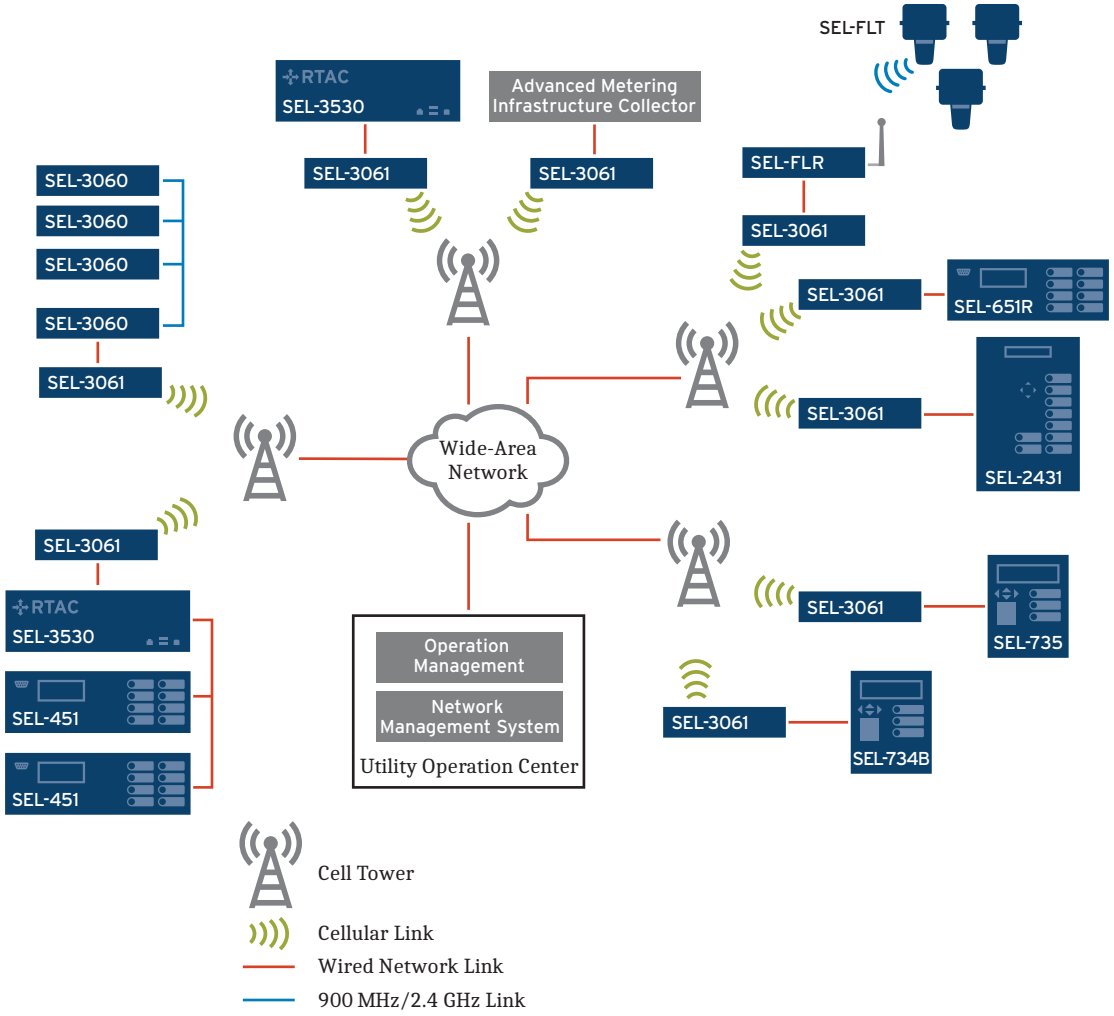


Figure 2 Application Overview

SCADA

The SEL-3061 provides the communications link to aggregate data from field devices and forwards it to SCADA systems and HMIs. The SEL-3061 can be used in data acquisition and slow-to-medium speed control applications. SCADA includes analog and discrete I/O monitoring and metering. The SCADA control includes set-point changes of processes and operations of discrete I/Os. Field devices connect directly to either the Ethernet port or serial port on the SEL-3061. The SEL-3061 links

these devices to a SCADA system via cellular WAN connections and allows the SCADA to poll each device by using DNP3 over TCP/IP and Modbus TCP/IP.

Engineering Access

The SEL-3061 allows users to access IEDs to view and modify settings and download oscillographic event reports through VPNs.

Distributed Data Acquisition

Modern automation systems can be distributed over a large geographical area. These automation systems monitor and process input signals, execute logic, and enable or disable outputs. In some instances, it is necessary to perform data acquisition on the status or value of the connected I/O. A distributed data acquisition system uses an automation controller as the data concentrator and a computer as the SCADA host. The system uses remote, discrete, and analog I/Os. As shown in *Figure 3*, a single SEL-3061 at each site both provides the connectivity between these remote I/Os with the automation controller and backhauls the collected data to the SCADA computer.

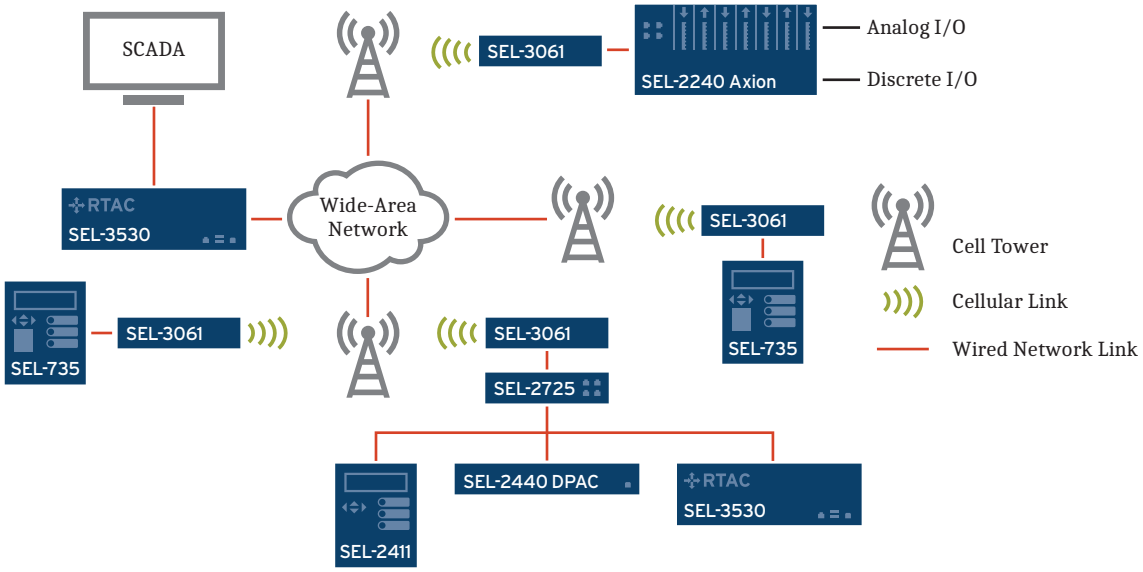


Figure 3 SCADA, Engineering Access, and Distributed Data Acquisition

Distribution Automation

The SEL-3061 provides cellular connectivity to remotely monitor and control recloser controls and sectionalizers for distribution power systems, as shown in *Figure 4*. In cases where customers rely on communications schemes for power restoration, the SEL-3061 provides the connectivity. The main difference between the distribution automation (DA) systems that use line-of-sight radios and DA systems that use an SEL-3061 is that the SEL-3061 and DA can be installed at any IED location that has cellular coverage. The DA controller polls data from each recloser control for monitoring and sends control signals through the WAN and the SEL-3061.

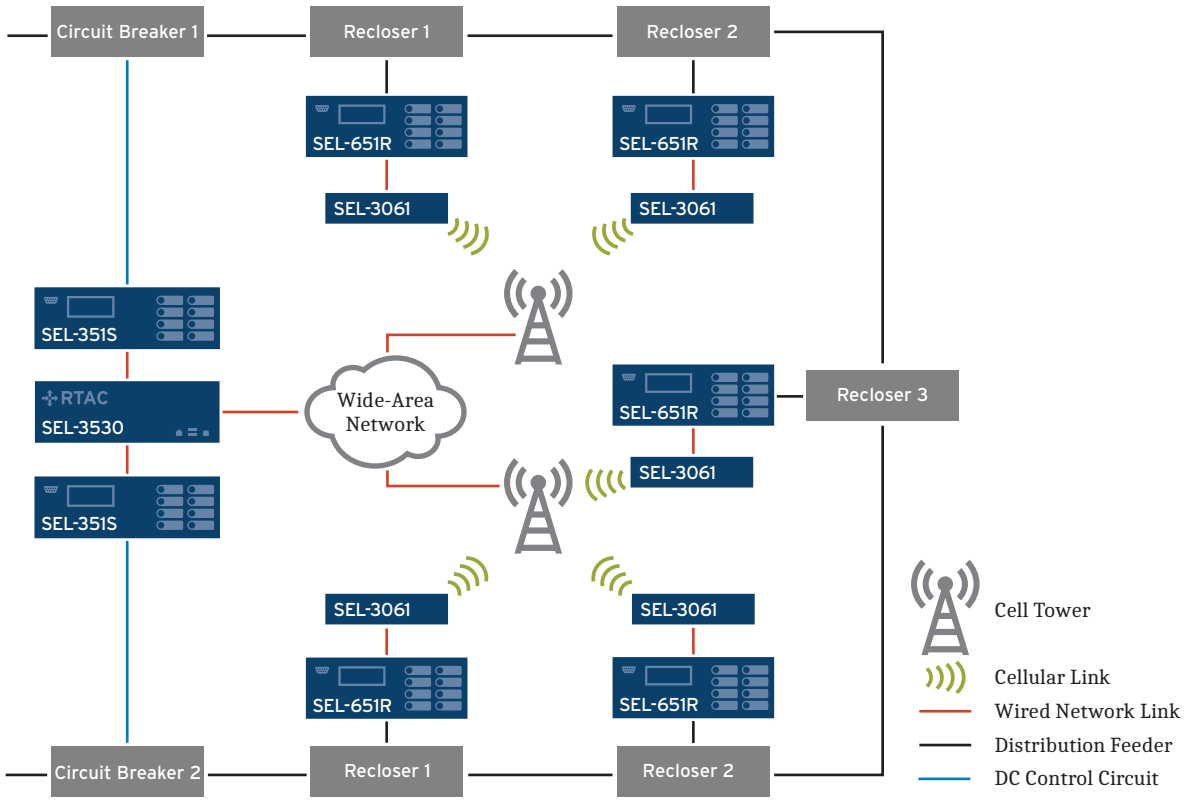


Figure 4 Distribution Automation

SEL-FLT/ SEL-FLR Network Backhaul

The SEL-FLT and SEL-FLR Fault and Load Transmitter and Receiver System provides wide-area load monitoring and fault location from line-powered SEL-FLT devices. The SEL-FLR collects load data and fault information from the SEL-FLT devices and sends the collected data to an Operation Management System (OMS) or Energy Management System (EMS) via a WAN. The SEL-3061 provides the communications link between the OMS and the SEL-FLR. When connected to the SEL-FLR the SEL-3061 provides wireless connectivity for the SEL-FLT/ SEL-FLR networks, as illustrated in *Figure 5*.

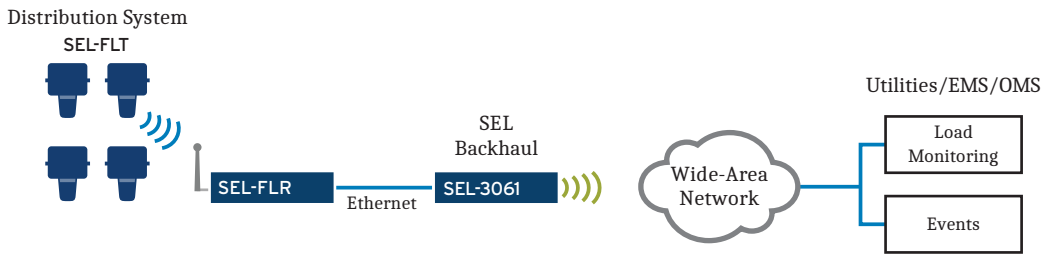


Figure 5 Backhaul Communication for Distribution Line Sensors

Distributed Generation

The SEL-3061 provides the connectivity to remotely monitor and control relays, devices, and equipment at distributed generation (DG) sites. In most applications, an automation controller interfaces with devices located inside the DG facility. The SEL-3061 can be connected to the controller to provide backhaul connectivity for devices located at the DG sites. The SEL-3061 is suitable for monitoring and non-protection speed control of the DG site.

Voltage Regulators

Voltage regulators installed outside the substation use the SEL-3061 to report their status and receive control commands from either a controller or the SCADA system. Connect the voltage regulator to the SEL-3061 by using either the serial or Ethernet interface.

Capacitor Bank Controls

The SEL-3061 provides communication for remote monitoring and automated or manual control of capacitor banks.

Pump Automation Controls

Monitor and control critical infrastructure, such as water and wastewater pumps, by using the SEL-3061 to provide remote access to SEL-2411P Pump Automation Controllers. During both routine operations and natural disasters, the cellular network provides a reliable path from a control center to the field. Use an Ethernet switch to connect more than one controller to a single SEL-3061.

Network Backhaul

A radio or Advanced Metering Infrastructure (AMI) network usually has an access point that concentrates data from remote endpoints. The access point is usually connected to a WAN or another wireless network. The SEL-3061 can be used as the link between the access point and the WAN or the wireless network by providing backhaul for these networks.

Configuration

The SEL-3061 offers an easy-to-use web-based user interface to change router configuration settings, visualize router status, and manage reporting.

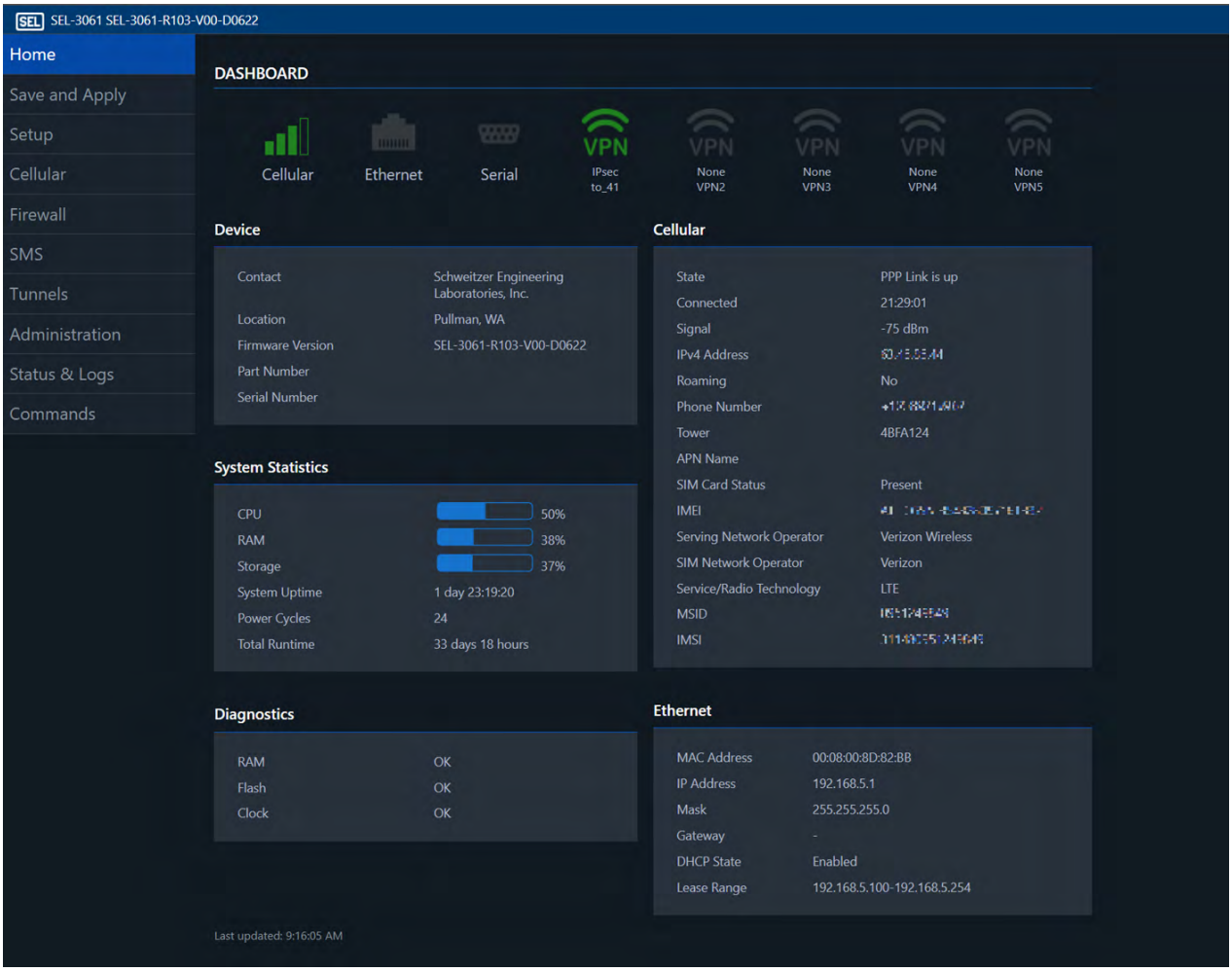


Figure 6 SEL-3061 HTTPS Device Webpage

Accessories

The following accessories are available for use with the SEL-3061.

Table 1 Available Antennas

Part Number	Description
235-0003	Low-profile 3 dBi Omnidirectional, 698–960 MHz, 1710–2700 MHz, N Female Connector

Table 2 Optional Antenna Mounting Hardware

Part Number	Description
915900497	Mounting bracket for two 235-0003 antennas

Table 3 Signal Loss at 2155 MHz

Cable Type	Characteristic Impedance	3.05 m (10 ft)	12.24 m (50 ft)	30.48 m (100 ft)
RG-8X (SEL-C980 or SEL-C964)	50 Ω	2.0 dB	10.1 dB	Do Not Use
LMR-400 (SEL-C966 or SEL-C968)	50 Ω	0.6 dB	3.1 dB	6.2 dB
7/8" HELIAX (SEL-C978)	50 Ω	Do Not Use	0.97 dB	1.94 dB

For more information on the SEL-3061 accessories and antenna installation, refer to the *SEL-3061 Instruction Manual* or the *SEL Radio Accessories Guide*.

Diagrams and Dimensions

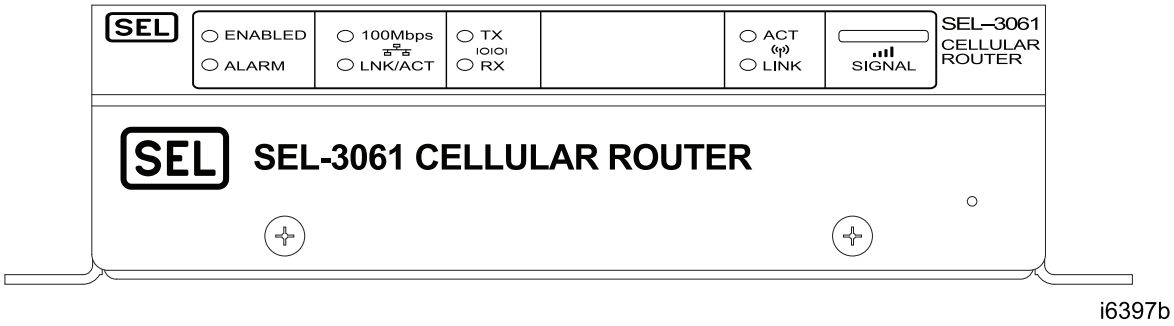


Figure 7 SEL-3061 Front-Panel Diagram

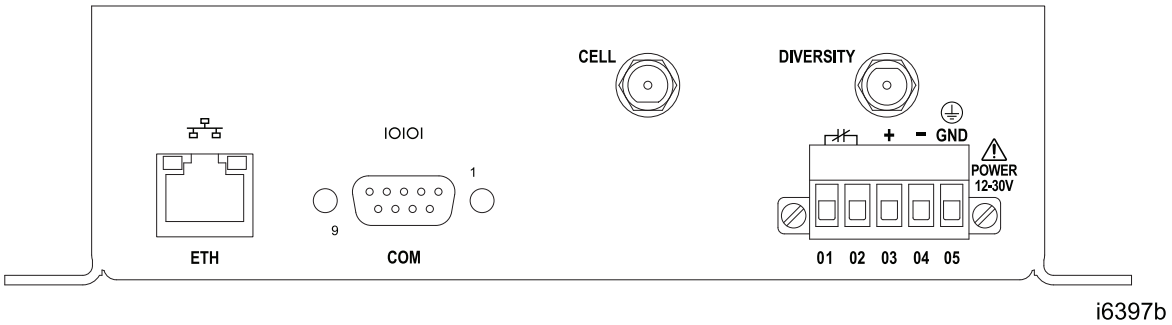


Figure 8 SEL-3061 Rear-Panel Diagram

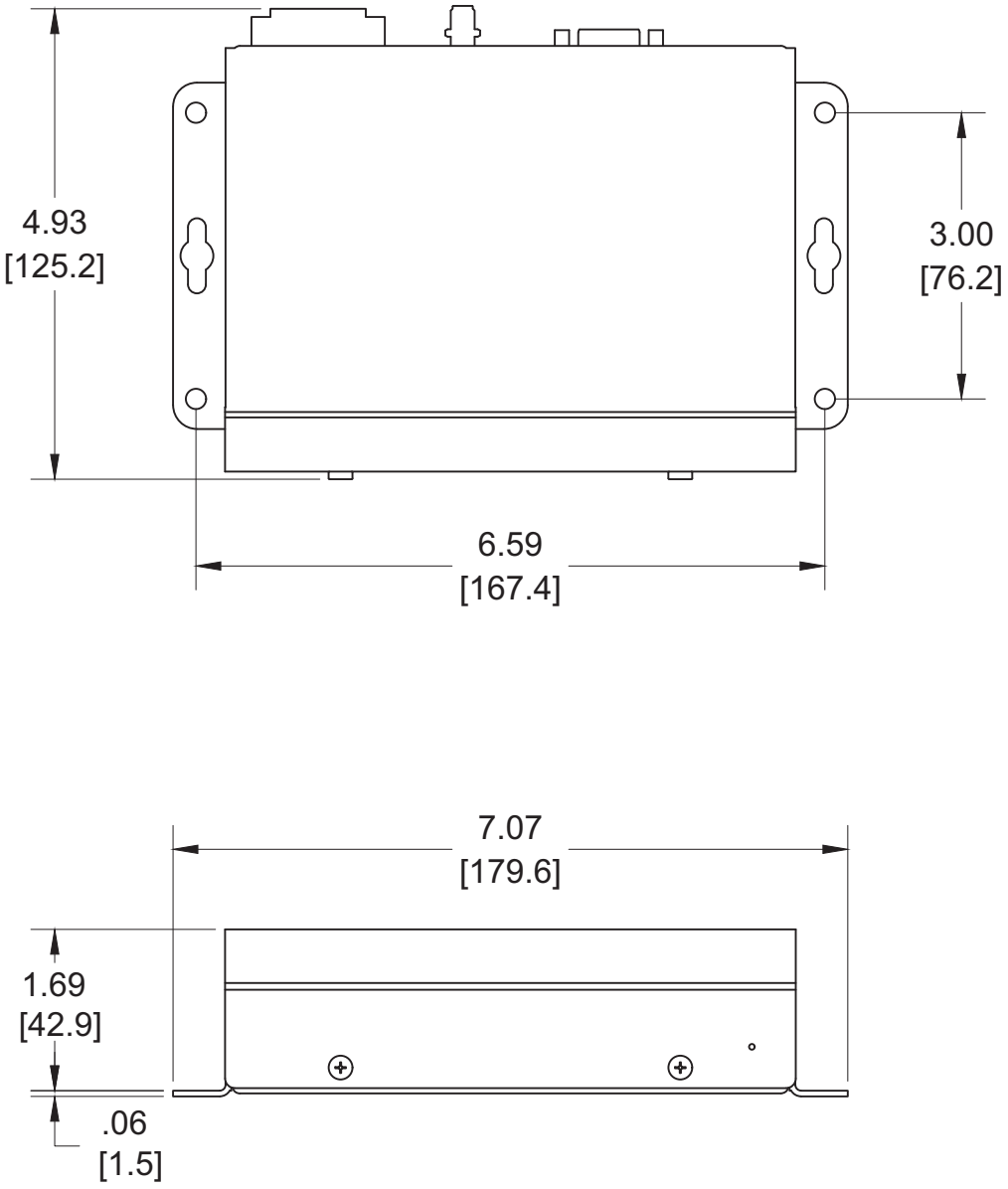


Figure 9 SEL-3061 Dimensions for Rack- and Panel-Mount Models

Specifications

Compliance

Designed and manufactured under an ISO 9001 certified quality management system

Networking

Network Management

HTTPS Web User Interface

Settings Import/Export

Virtual Private Networks

Maximum Concurrent Sessions:	5
Security Protocol:	IPsec
Key Exchange:	IKEv1, IKEv2
Authentication:	Passphrase
Nonaccelerated Encryption Algorithms:	AES, 3DES
Encryption Key Strength:	128-bit, 256-bit

Firewall Functions

Network Address Translation:	Port Forwarding (DNAT)
Network Address Translation:	Outbound NAT (SNAT)

Input Traffic Filtering

Output Traffic Filtering

Forward Traffic Filtering

Ethernet Protocols

Address Resolution Protocol (ARP)

Distributed Network Protocol 3 (DNP3)

Dynamic Host Configuration Protocol (DHCP) Client

Encapsulating Security Payload (ESP)

Hypertext Transfer Protocol Secure (HTTPS)

Internet Control Message Protocol (ICMP)

Internet Key Exchange (IKEv1/v2)

Internet Protocol Security (IPsec) Protocol Suite

Internet Secure Association and Key Management Protocol (ISAKMP)

Modbus TCP/IP

Network Time Protocol (NTP) Client

Online Certificate Revocation Protocol (OCSP)

Remote Authentication Dial-In User Service (RADIUS)

Secure Shell version 2 (SSHv2) Client/Server

Simple Network Management Protocol (SNMP)

Transmission Control Protocol (TCP)

Transport Layer Security (TLS) (v1.2/ v1.3)

User Datagram Protocol (UDP)

Security

User-Based Accounts

Password Length:	8–4096 characters
Password Set:	A–Z, a–z, 0–9, special characters
User Roles:	Administrator, Engineer, Monitor

Syslog

Storage for 30,000 local Syslog messages

SNMP

Monitors diagnostics through SNMP v1, v2c, and v3 read operations

Sends notifications by using SNMP v1, v2c, and v3 traps

Supports as many as three active SNMP servers and SNMP trap servers

Firewall

Implementation:	iptables

Cellular WAN

4G LTE:	B2, B4, B5, B12, B13, B14, B66, B71
3G Fallback (AT&T and T-Mobile Only):	B2, B4, B5
Carriers Supported:	AT&T, FirstNet, Verizon, T-Mobile, and other roaming partners.

Data Rate

As much as 100 Mbps downlink

As much as 50 Mbps uplink

Transmit Output Power

0.2 W (23 dBm), Class 3

General

Operating Temperature

–40° to +75°C (–40° to +167°F)

Storage Temperature

–40° to +85°C (–40° to +185°F)

Operating Environment

Pollution Degree:	2
Relative Humidity:	15%–93%, noncondensing
Maximum Altitude:	2000 m

Dimensions

Wall Mount:	151 mm x 104 mm x 44 mm (5.96 in x 4.08 in x 1.73 in)

Alarm Output

Rated Operational Voltage:	24–250 Vdc
Contact Protection:	270 Vdc, MOV protected
Continuous Carry:	2 A
Pickup Time:	≤8 ms typical
Dropout Time:	≤8 ms typical

Communications Ports

Ethernet Port

Port:	1, rear

10/100BASE-T Copper (RJ45 Connector)

Rear Connectors:	RJ45
Standard:	IEEE 802.3

Serial Port

Port:	1 EIA-232
Rate:	300 bps, 600 bps, 1200 bps, 1800 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, and 57600 bps
Rear Connectors:	9-pin D-Subminiature

Power Supply

Input Voltage Range:	12–30 Vdc
Power Consumption:	<5 W

Product Standards

Measuring Relays and Protection Equipment: IEC 60255-26:2013

Note: Tests apply to the SEL-3061 only and not to data transfer over the cellular WAN.

Type Tests

Environmental Tests

Vibration Resistance:	IEC 60255-21-1:1988 Class 2 Endurance, Class 2 Response IEC 60255-21-3:1993 Class 2
Shock Resistance:	IEC 60255-21-2:1988 Class 1 Shock Withstand Bump, Class 2 Shock Response
Cold:	IEC 60068-2-1:2007 –40°C, 16 hours
Damp Heat, Cyclic:	IEC 60068-2-30:2005 25–55°C, 95% relative humidity, 6 cycles
Dry Heat:	IEC 60068-2-2:2007 +75°C, 16 hours

Dielectric Strength and Impulse Tests

Dielectric (HiPot):	IEC 60255-27:2013 IEEE C37.90-2005
Impulse:	IEC 60255-5:2000 0.5 J, 5 kV 1.0 kV on Ethernet Ports

RFI and Interference Test

Electrostatic Discharge:	IEC 61000-4-2:2009 Severity Level 4 8 kV contact discharge 15 kV air discharge IEEE C37.90.3-2001 Severity Level 3 8 kV contact discharge 15 kV air discharge
Radiated RF Immunity:	IEC 61000-4-3:2005+A1:2008+A2:2010 10 V/m
Fast Transient Burst Immunity:	IEC 61000-4-4:2012 4 kV @ 5.0 kHz for power port 2 kV @ 5.0 kHz for communications ports
Power Frequency Magnetic Field:	IEC 61000-4-8:2009 1000 A/m for 3 seconds, 100 A/m for 1 minute
Interruptions and Voltage:	IEC 61000-4-11:2004 +A1:2017
Variations on DC Input:	IEC 61000-4-17:1999+A1:2001+ A2:2008
Power Port:	IEC 61000-4-29:2000
Surge Withstand:	IEC 61000-4-18:2005+A1:2010
Capability Immunity:	2.5 kV common-mode, 1 kV differential-mode
Conducted RF Immunity:	IEC 61000-4-6:2013 10 Vrms
Surge Immunity:	IEC 61000-4-5:2005 Zone B: 0.5; 1.0 kV; line-to-line Zone B: 0.5; 1.0; 2.0 kV; line-to-earth

EMC Emissions

Radiated Emissions:	CISPR 11:2009+A1:2010 CISPR 22:2008 ANSI C63.4:2015 47 CFR Part 15.107, 109

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15, Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Section 15.21

User's manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Canada ICES-001(A) / NMB-001(A)

Technical Support

We appreciate your interest in SEL products and services. If you have questions or comments, please contact us at:

Schweitzer Engineering Laboratories, Inc.
2350 NE Hopkins Court
Pullman, WA 99163-5603 U.S.A.
Tel: +1.509.338.3838
Fax: +1.509.332.7990
Internet: selinc.com/support
Email: info@selinc.com

SCHWEITZER ENGINEERING LABORATORIES, INC.
2350 NE Hopkins Court • Pullman, WA 99163-5603 U.S.A.
Tel: +1.509.332.1890 • Fax: +1.509.332.7990
selinc.com • info@selinc.com

PDS3061-01