SEL-3031

Serial Radio Transceiver

The industry-recognized standard for reliable, low-latency wireless communications

- Optimized Mirrored Bits® communications increases speed and reliability for protection and control.
- SEL Hop-Sync™ technology prevents radio frequency interference from co-located radios.
- Operation in a license-free band and a 20-mile range simplify implementation.
- Three independent serial connections support simultaneous applications and protocols.

Key Features

The SEL-3031 Serial Radio Transceiver is a 915 MHz ISM serial data radio that supports point-to-point (P2P) and point-to-multipoint (P2MP) operational modes.

Low Latency Enables Fast Teleprotection and Control

Transfer teleprotection and control commands with a typical 5.5-millisecond latency with SEL Mirrored Bits communications for fast teleprotection, distribution, automation, and distributed generation.

Three Ports in One Radio Reduces Costs

The SEL-3031 can simultaneously communicate with up to three independent ports and protocols in P2P operation. For example, between distributed generation and the point of common coupling, you can use one channel for teleprotection, another for the electric utility SCADA, and one for engineering access.

Dual Radio Operating Modes Provide Flexibility

Rapidly transfer critical information for fast teleprotection, distribution automation, distributed generation, and protection. You can gather SCADA information from remote locations with P2MP radio operation or rapidly transfer critical control and protection commands with low-latency P2P radio operation.

Strong Security Thwarts Attackers

Protect critical electrical infrastructure and repel malicious attacks with the optional encryption card, using session authentication and strong 256-bit Advanced Encryption Standard (AES) technology.

Tough Radio Operates in Extreme Conditions

The SEL-3031 is designed, built, and tested for trouble-free operation in extreme temperature, electromagnetic interference, shock, and vibration conditions.

No Licensing Reduces Delays and Expenses

The SEL-3031 operates on the license-free, 902—928 MHz ISM band to simplify deployment.

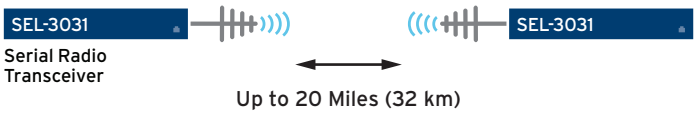
Precise Time Simplifies Analysis

Synchronize the internal clock with IRIG-B for accurately time-stamped event logs.

Modes of Operation

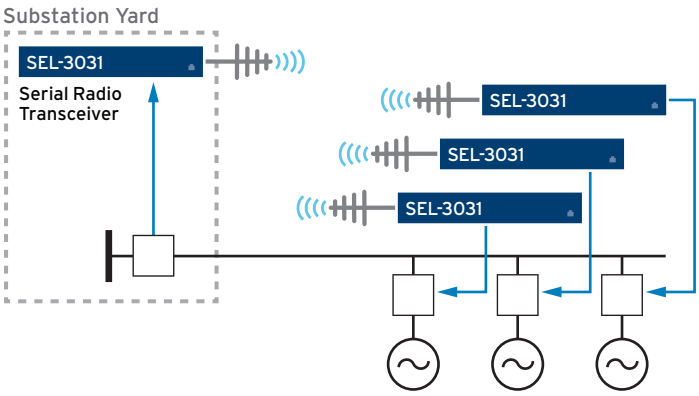
P2P Communications

Configure two SEL-3031 radios in a P2P link to provide fast and reliable communications for up to 20 miles.



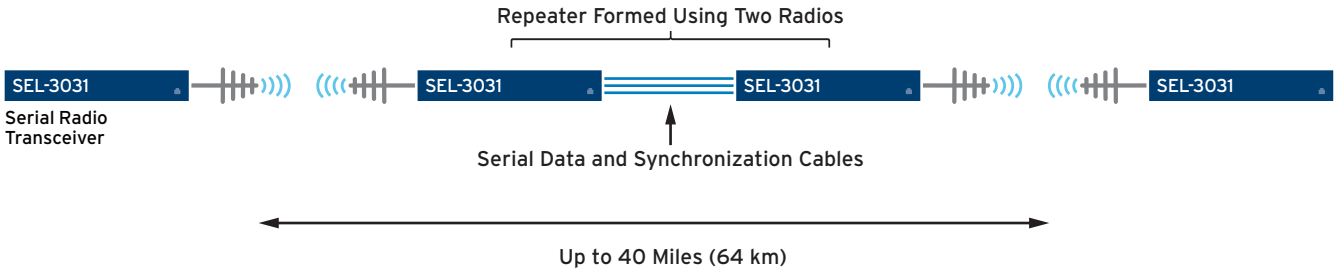
P2MP Communications

Use wireless connections in situations where communication is required and installing cable is neither cost-effective nor practical.



Co-Located Communications

Generally, when there are multiple radios at the same site, the transmission from one radio can easily overpower the weaker signals (from up to 20 miles away) that a nearby radio is trying to receive. SEL Hop-Sync technology synchronizes co-located radios so that they all hop frequencies, transmit, and receive at the same times, meaning none of the local SEL-3031 radios will transmit while any are receiving signals. SEL Hop-Sync technology enables dependable data communications for back-to-back radios used as repeaters and for multiple P2P links from the same station.

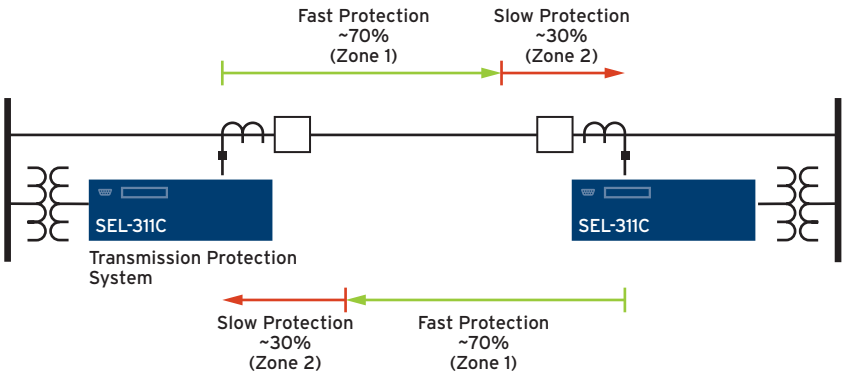


You can connect SEL-3031 radios "back-to-back" to create a repeater. The repeater configuration can extend the length of a link or maintain radio contact when there is an obstacle between two substations.

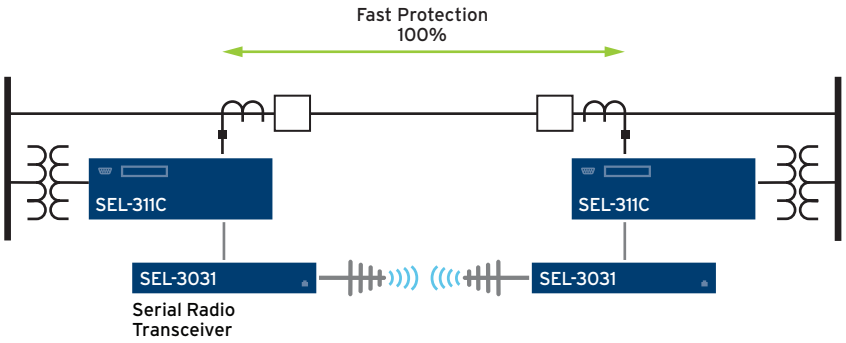
Applications

Speed Up Protection

Many protection schemes use a combination of slow and fast protection zones (step-distance protection) to provide complete fault protection coverage for a line. By adding an SEL-3031 radio link between relays, you can enable fast protection for faults anywhere on the line.



With step-distance protection, relays provide fast protection in Zone 1 and slow protection (20—40 cycle operation) in Zone 2.

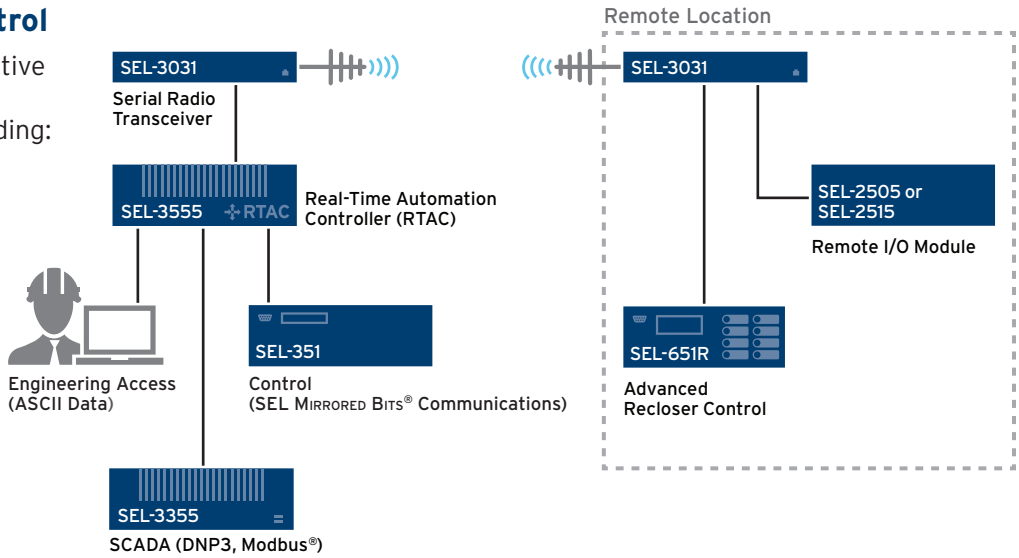


SEL-3031 radios enable fast protection (2—4 cycle operation) over 100 percent of the line. The scheme falls back to step-distance protection if communications fail.

Remote Monitoring and Control

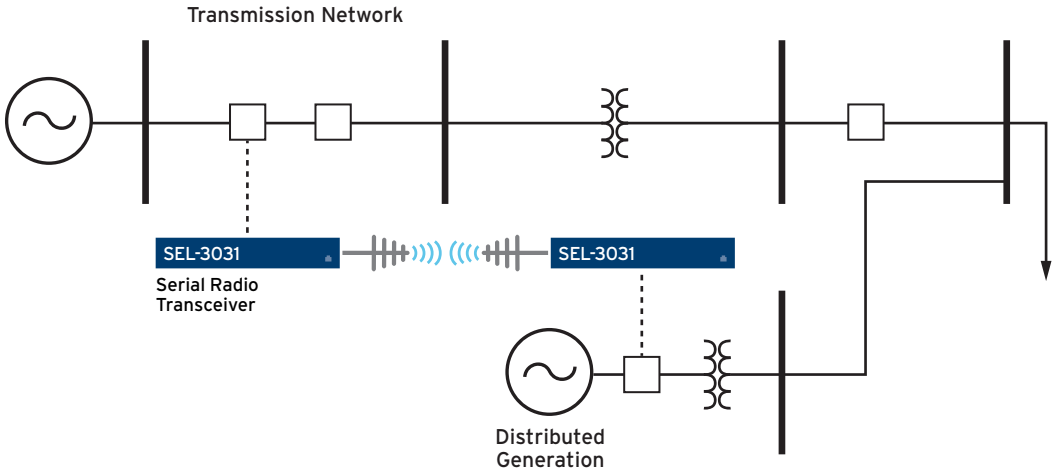
SEL-3031 radio links are a cost-effective way to extend communications to remote devices and locations, including:

- Recloser controls
- Substations
- Capacitor bank controls
- Voltage regulator controls



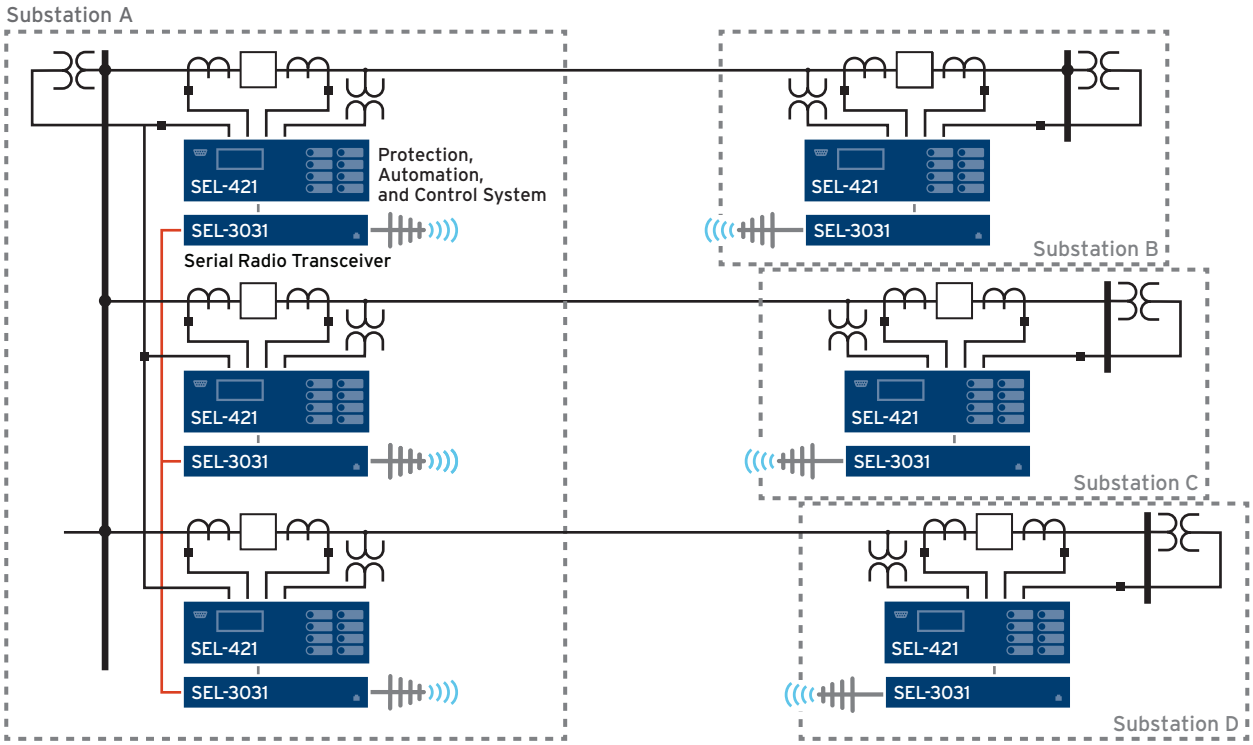
Distributed Generation

SEL-3031 radios provide low-cost control for anti-islanding applications between the utility network and a distributed generation site.



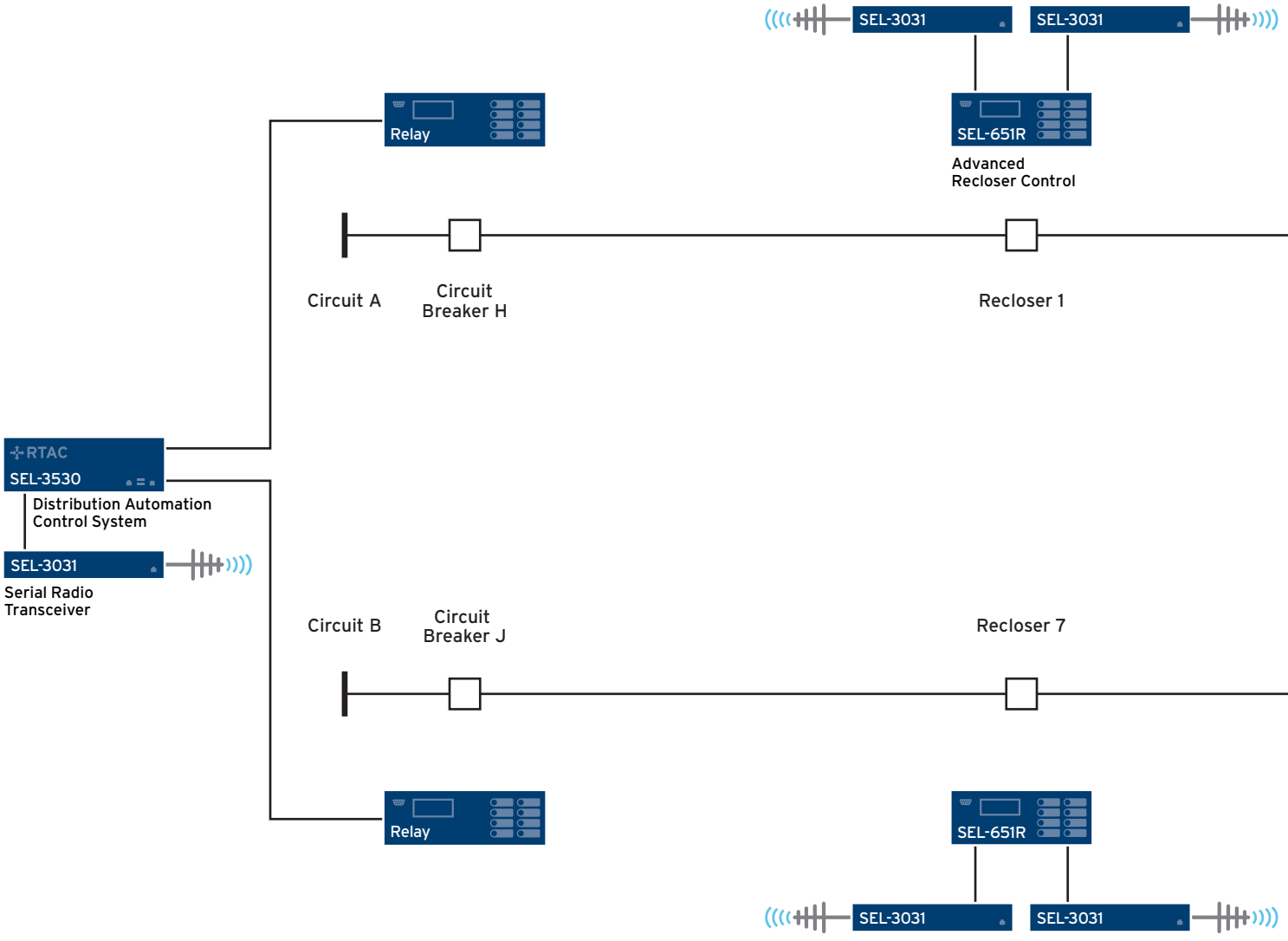
High-Speed Wireless Tripping Using Mirrored Bits Communications and SEL Hop-Sync Technology

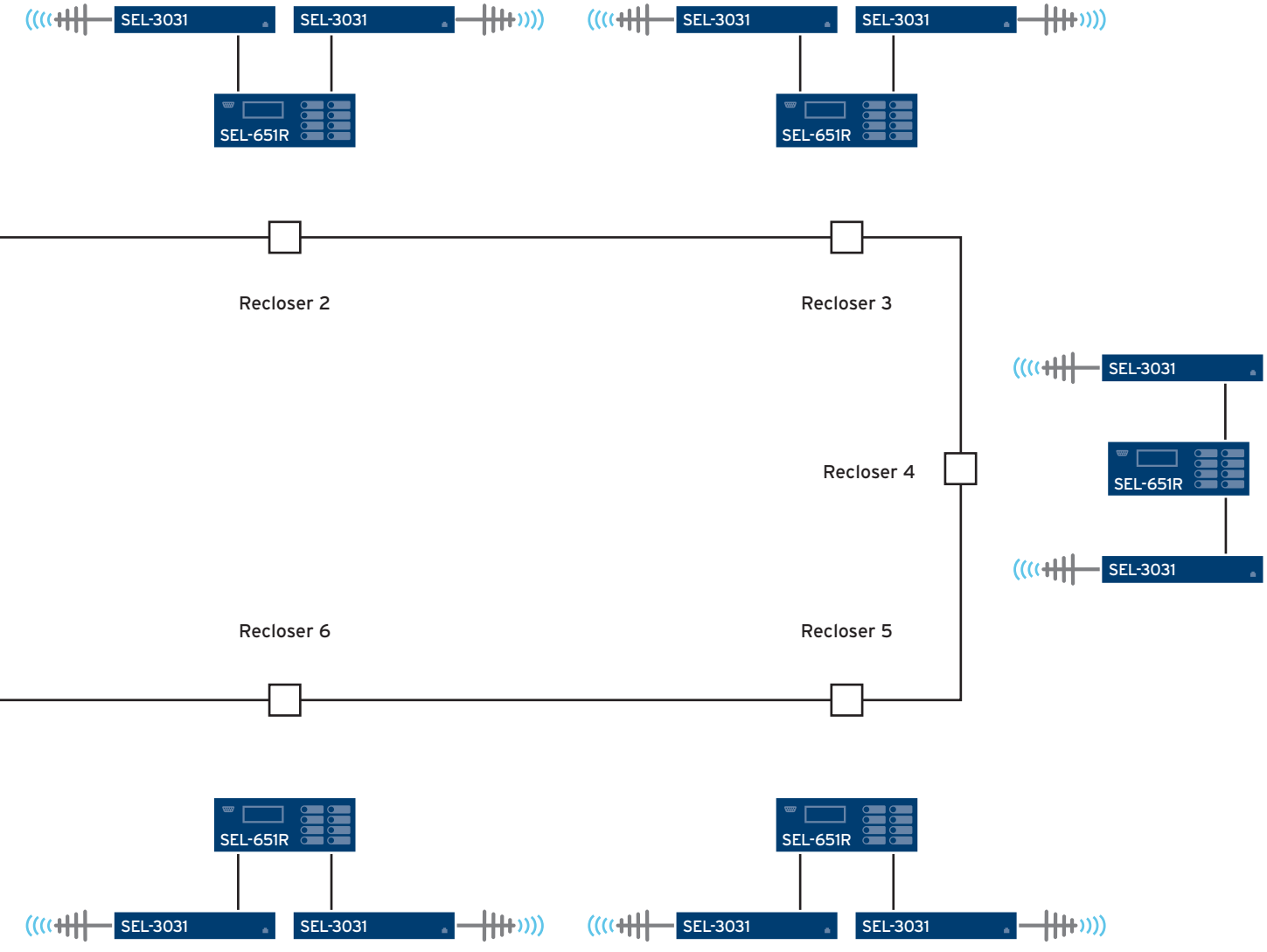
The diagram below shows three co-located radios in a substation (on the left) communicating with remote line protection relays (on the right). Since the radios on the left are all at the same site, reliable operation requires synchronizing the transmissions to avoid transmitting while any are receiving. Designating one of the radios to "SEND SYNC" and the other two to "RECEIVE SYNC" and connecting them with cables provides the required synchronization.



Distribution Feeder Automation

Use the SEL-3031 for distribution feeder automation. The radio provides communications between recloser controls for high-speed restoration schemes. In the event of a fault, relays or reclosers will analyze and isolate the fault. Then, using communications provided by the SEL-3031, the recloser controls can coordinate with each other and restore power to the parts of the feeder that were not directly affected by the fault.

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SEL-3031
SEL-651R
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SEL-651R
Recloser 2
Recloser 3
SEL-3031
SEL-651R
SEL-3031
Recloser 4
Recloser 6
Recloser 5
SEL-651R
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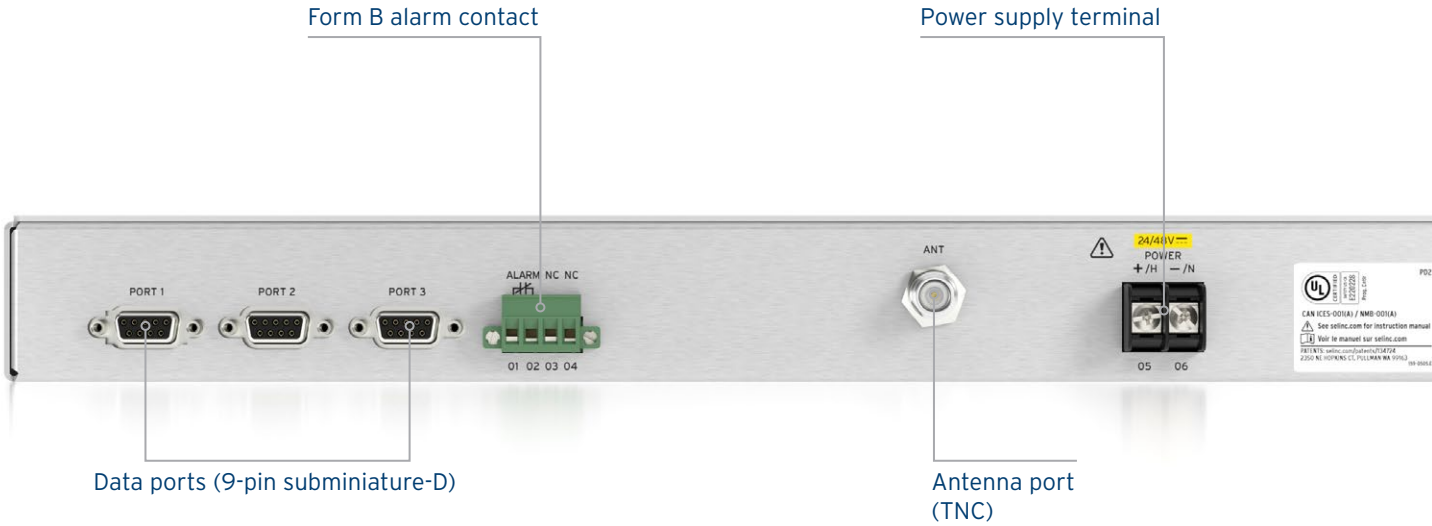
SEL-3031

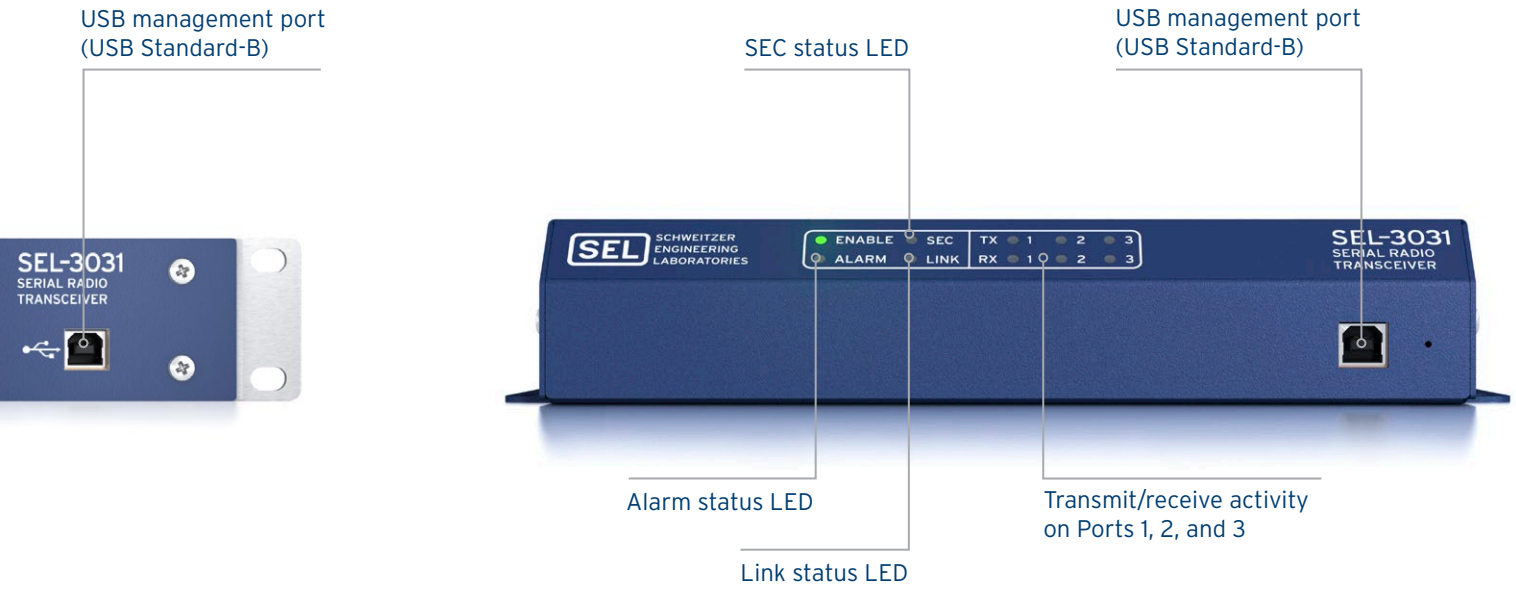
Product Overview

Rack Mount Front

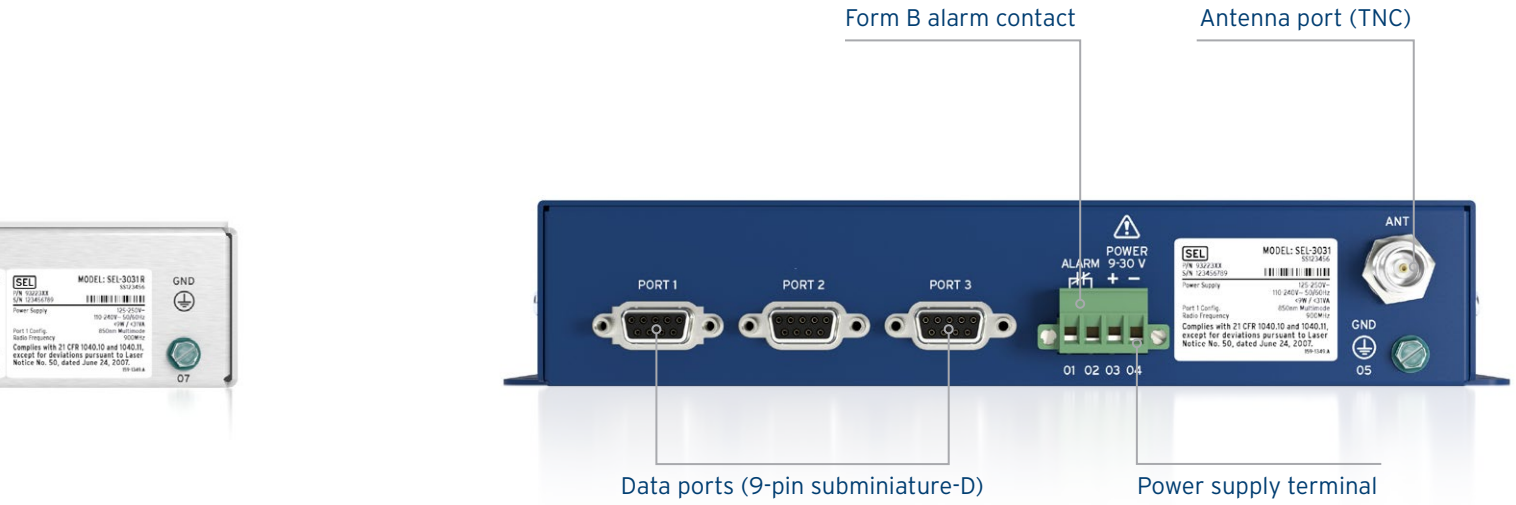
Rack Mount Back



Cabinet Mount Front



Cabinet Mount Back



Radio System Accessories

Custom Enclosures

SEL can provide one or more radios in enclosures with surge protectors, power supplies, and other devices.

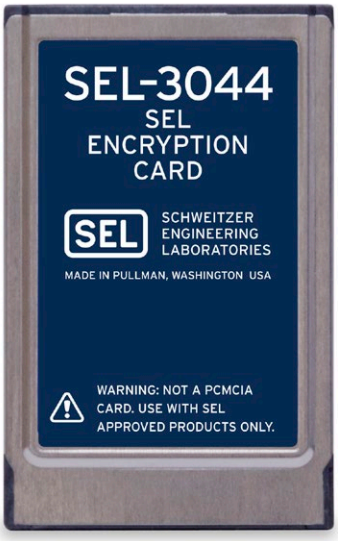
External Power Supply

The SEL-9322 15 Vdc Power Supply is an ac-to-dc or dc-to-dc converter designed for harsh physical and electrical environments, including those found in electric utility substations. The SEL-9322 provides a nominal 15 Vdc at up to 1 A to power communications or instrumentation devices. The low-voltage output can be derived from higher-voltage dc battery sources or from higher-voltage ac sources. The two input options include: 9—30 Vdc, 24—48 Vdc, or 125—250 Vdc or 110—240 Vac.

Encryption Protects Against Eavesdropping and Unauthorized Control

Order the radio with an SEL-3044 SEL Encryption Card to cryptographically secure your valuable data. The SEL-3044 features:

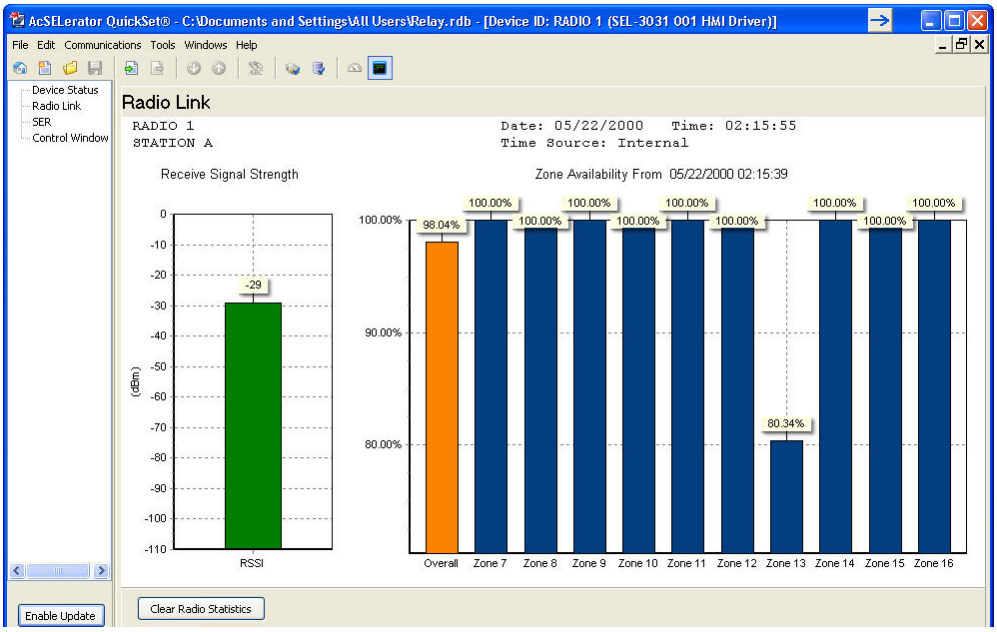
- 256-bit AES technology.
- Easy configuration with minimal settings.
- Verification of data encryption.
- FIPS 140-2 Level 2 compliance (see historical FIPS certificate #1564).
- Security against man-in-the-middle and replay cyber attacks.
- Fixed 9.6 kbps full-duplex throughput per port, or 19.2 kbps on Port 1 (disables Port 2).



ACSELERATOR QuickSet® SEL-5030 Software

QuickSet includes tools to help you manage settings and analyze the performance of the SEL-3031. With QuickSet, you can:

- Create, edit, store, transfer, and manage SEL-3031 settings.
- Obtain device data with the HMI.
- Easily understand performance with graphical displays of signal strength and zone availability.



Additional Accessories

Visit selinc.com/SEL-3031 or contact your SEL representative for more information.

SEL-3031 Specifications

General

Wireless	ISM band 902—928 MHz frequency-hopping spread spectrum (FHSS) P2P or P2MP operation Output power: 1 W (30 dBm) Adjustable power : 20—30 dBm Receiver sensitivity: —97 dBm, —104 dBm with ARQ on
Optional SEL Encryption Card	256-bit AES encryption Session authentication FIPS 140-2 Level 2 compliance (See historical FIPS certificate #1564, currently undergoing revalidation.)
Data	Send data via protocols, such as DNP3, Modbus, SEL Mirrored Bits communications, IEEE C37.118 synchrophasors, and SEL ASCII. IRIG-B time code on Port 2
Built-In Clock	Manually set or time-synchronize using IRIG-B.
Alarm Output	Integrate radio alarm contact with annunciators and alarm panels.
Distance	Communicates up to 20 miles (32 km) in line of sight; longer distances are possible with repeater configurations.
USB Management Port	Access local diagnostics, determine signal strength, create and modify settings, and determine packet quality.
Mounting and Power Supply Options	Wall mount: 9—30 Vdc at <5 W Rack mount: 24—48 Vdc, 110—240 Vac, or 125—250 Vdc
Certifications	FCC Part 15.247; ICES-001; RSS-210 FCC Part 15, Class A; ICES-003 for USA and Canada IFETEL for Mexico ANATEL for Brazil (part number starts with SEL-30311) ENACOM for Argentina UL, cUL: UL 508, CSA C22.2 No. 142

Operation-Related Specifications

P2P Operation (protection and control)	**Three Serial Data Ports**	
	Standard interface	EIA-232 (DCE female 9-pin subminiature-D)
	Port 1 options:	
	EIA-485	Female 9-pin subminiature-D
	Fiber-optic	SEL-2812 compatible (ST connectors)
	Speed	9.6 or 19.2 kbps full duplex per port (unencrypted)
	Optional	38.4 kbps full duplex on Port 1 (disables Port 2)
P2MP Operation (data gathering from multiple remote radios)	**One Serial Data Port**	
	EIA-232, EIA-485, or serial fiber-optic port option	
	Configurable port speeds: 9.6, 19.2, or 38.4 kbps; full duplex per port (unencrypted)	

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