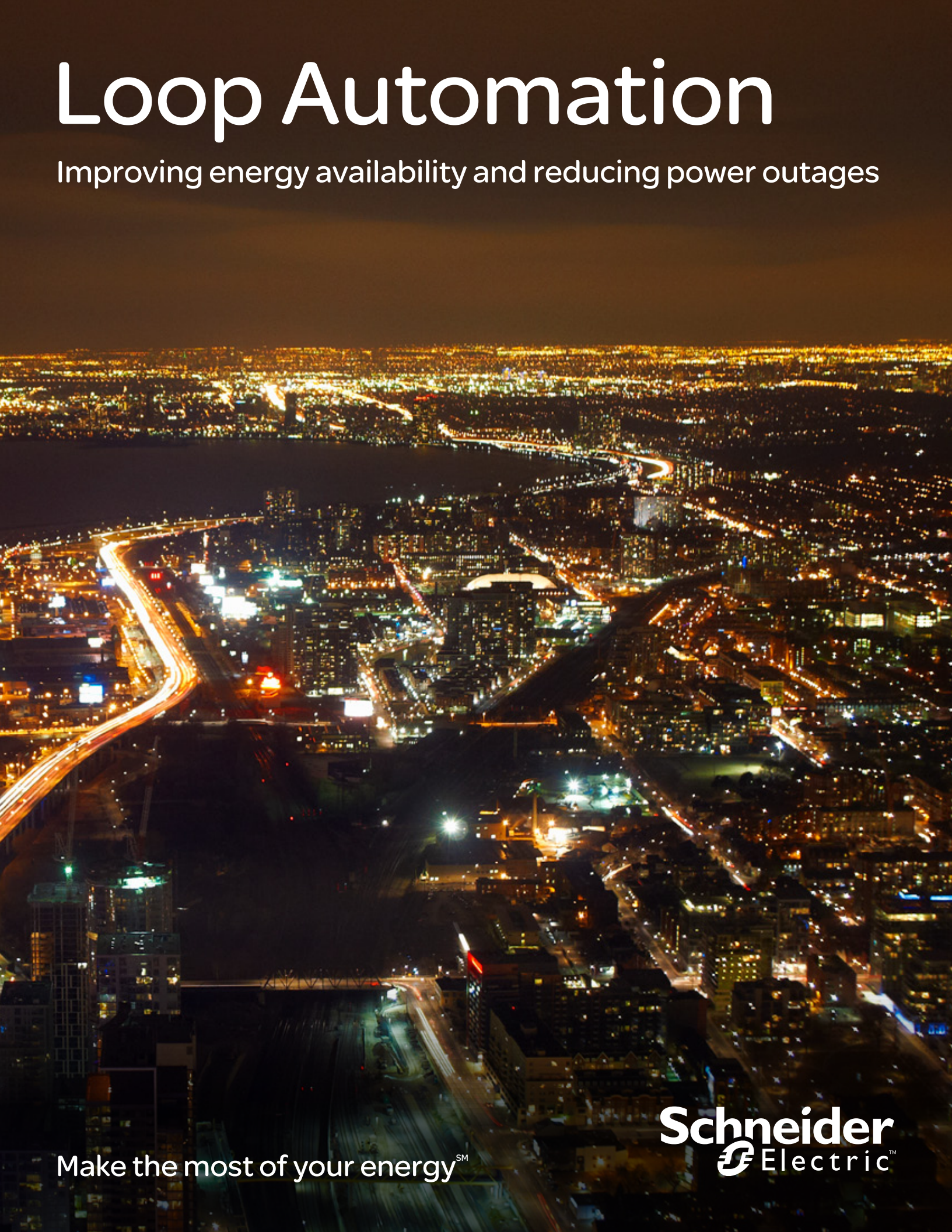
Loop Automation

Improving energy availability and reducing power outages



Make the most of your energy℠

Schneider Electric™

Introduction

Electricity is becoming increasingly important in our everyday lives. This demand puts immense pressure on electricity providers to improve the reliability of supply to their customers.

Fault Location, Isolation and Service Restoration (FLISR) – also known as Fault Detection, Isolation and Restoration (FDIR) – are highly effective self-healing applications that help utilities deliver the required reliability by identifying a fault on a Feeder, isolating it and restoring supply to non-faulted sections of the network, without any intervention from an operator.

Description

The Loop Automation Suite is Schneider Electric's FLISR/FDIR solution for automated overhead distribution systems with pole-mounted automatic circuit reclosers (ACRs) and sectionalizers (SECs). It reduces the duration and scale of power outages, providing the distribution grid with self-healing capabilities. It consists of the following applications:

Classic Loop Automation

Classic Loop Automation is the original implementation of Loop Automation, consolidated in the industry with over 15 years of application. This solution works using source/load voltage detection, protection flags and timers. With Classic Loop Automation, no additional communications equipment is required.

Intelligent Loop Automation

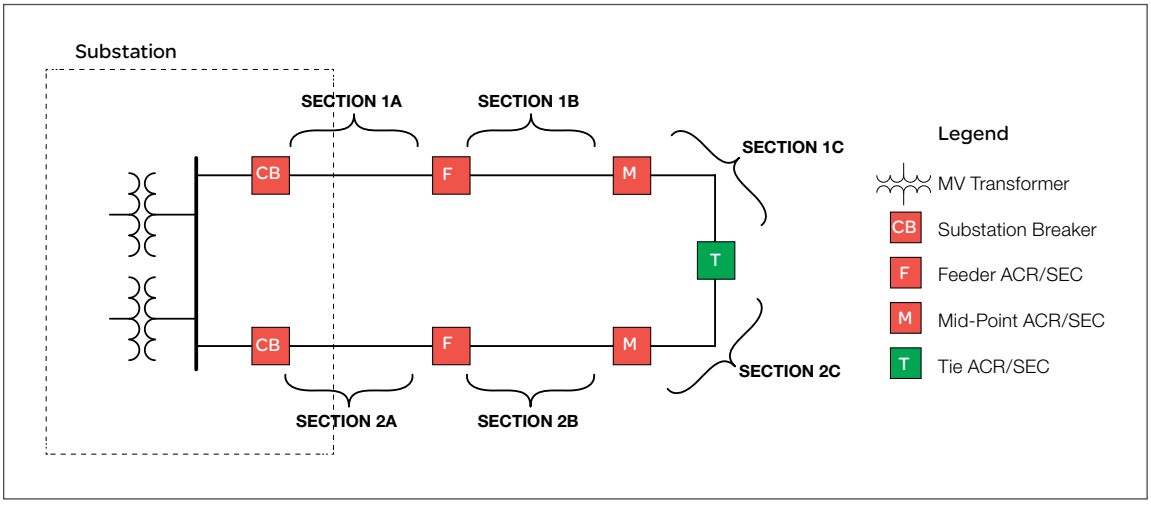
An evolution of the Classic Loop Automation algorithm, Intelligent Loop Automation utilizes peer-to-peer communications to exchange messages between Feeder, Mid-Point and Tie devices. This exchange reduces stress to switchgear, and other electrical equipment, and increases operator safety by eliminating unnecessary re-energization of faults. This solution also performs power capacity verification.

Benefits

- Improved network availability
- Decreased number (SAIFI) and duration (SAIDI) of outages by quickly detecting and isolating a fault, and restoring power to non-faulted sections.
- Reduced size of zones affected by faults, thus maximizing energy delivery to customers.
- O&M and capital costs are reduced by minimizing field crew repair time and limiting stress on electrical assets.
- Improve mean-time to repair the electrical network.

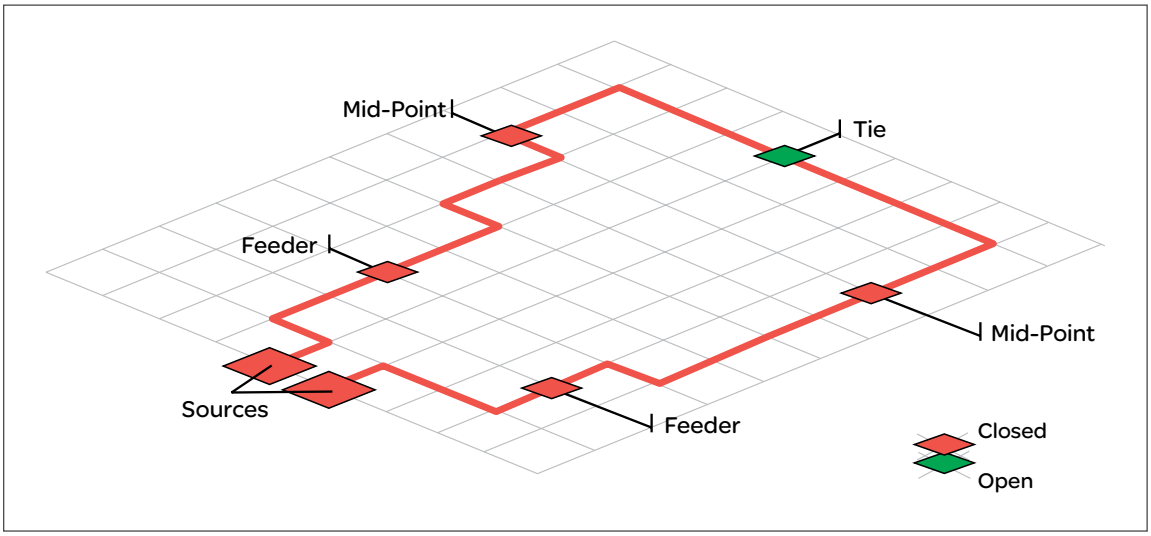
Topology and Device Types

The Loop Automation applications consist of a number of ACR/SEC devices distributed in an open ring topology.



Loop Automation is triggered by supply voltage being lost on a section of the ring or by a protection lockout. Each device in a Loop Automation scheme operates independently according to its predefined role, each with its own set of operating rules.

- **Feeder:** Feeder devices are positioned close to the power supply or inside a substation. It is a normally-closed device.
- **Mid-Point:** Mid-Points are devices positioned anywhere between a Feeder and a Tie.
- **Tie:** A Tie device is the normally-open point of the ring, interconnecting two Feeders.



The number of midpoints may be extended by utilizing additional switchgear and a Remote Terminal Unit (RTU) to orchestrate system behavior.

Classic Loop Automation

The basic rules of Loop Automation *(Classic Loop Automation Rules)* are:

(1) Feeder devices trip when their source supply is lost.

(2) Mid-Point devices activate their alternative (or reverse) protection group when they lose source supply and, if the Mid-Point is an automatic recloser, it will also change to *single-shot mode* (autoreclose off). After supply is restored, Mid-Points will have auto-reclose turned back on automatically.

(3) Tie devices close when they detect that supply from either load or source side is lost.

These simple rules disconnect, isolate and reconfigure the grid for all possible faults.

Intelligent Loop Automation

Intelligent Loop Automation adds additional functionality to Classic Loop Automation.

(4) A Feeder or Mid-Point that goes to lockout (the locked out device) sends a trip request to its downstream device using peer-to-peer communication.

(5) A Feeder will also send a trip request to its downstream device if it trips to lockout after losing its source supply *(Classic Loop Automation Rule 1)*.

(6) If Tie control mode is *Message*, the locked out device sends a close request to the ring Tie upon confirmation of a successful trip operation of its downstream device.

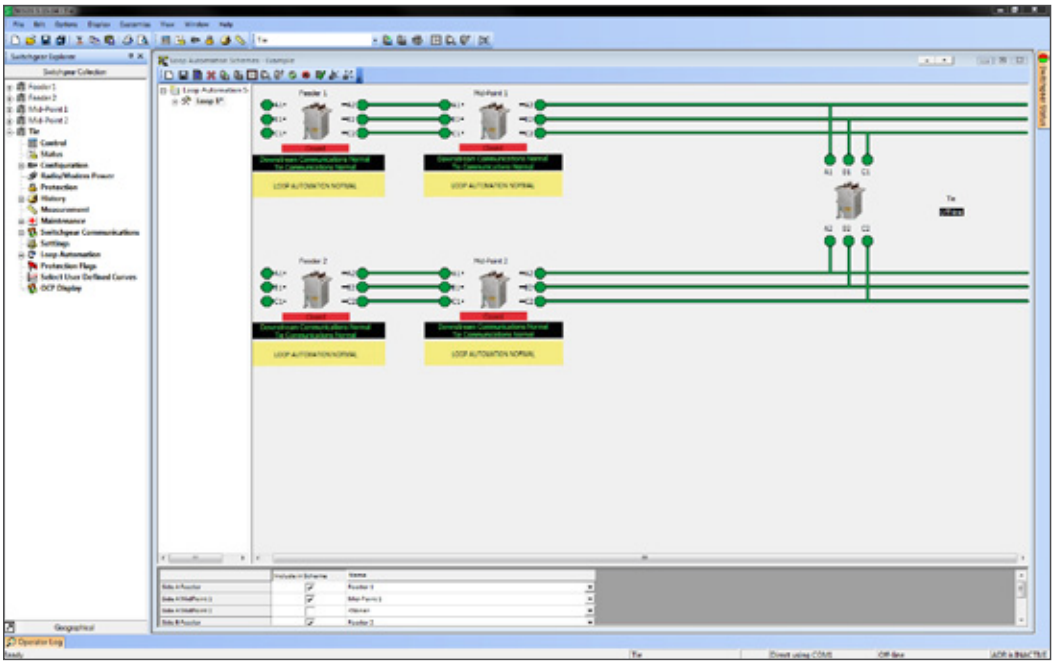
(6a) If this confirmation doesn't come (e.g. communications are unavailable), the locked out device will not send a close request to the Tie. Restoration of supply will not occur.

(7) If Tie control mode is *Timer*, a Tie will operate as per its basic *Classic Loop Automation Rule 3* - regardless of receiving a close request or not. This mode maintains the availability of the scheme and enables an automatic attempt to restore supply regardless of the availability of the peer-to-peer communications.

(8) If Tie control mode is *Message*, a Tie will operate only if it receives a Loop Automation close request.

Loop Automation Scheme Configuration

The Loop Automation Scheme Tool, part of Schneider Electric's powerful WSOS software platform, enables easy creation, configuration, validation and monitoring of individual Loop Automation schemes.



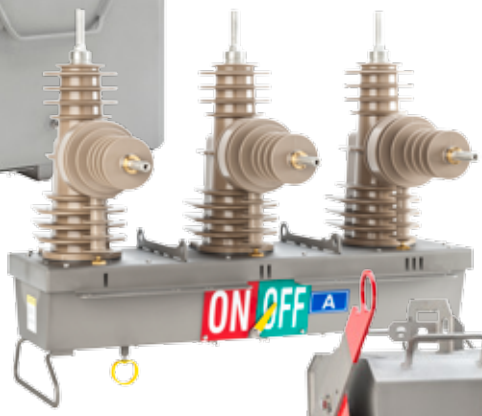
Supported Switchgear

Schneider Electric's Loop Automation is supported on controllers from the ADVC Controller Range connected to the following switchgear:

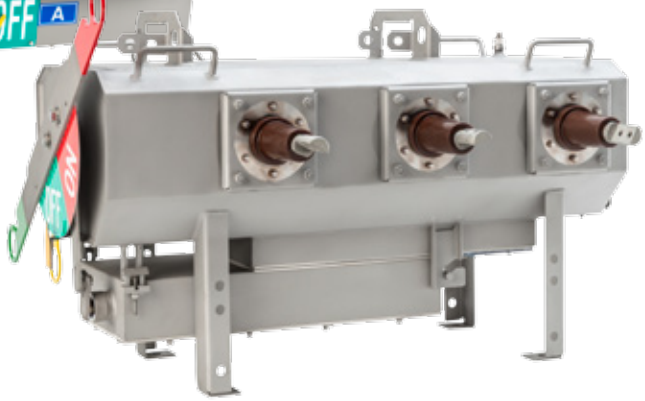
- N-Series 3-Phase ACR/SEC
- U-Series 3-Phase ACR/SEC
- W-Series Single-Phase ACR
- RL-Series SEC

ADVC Controller

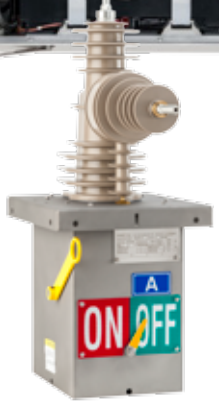
N-Series 3-Phase ACR/SEC



U-Series 3-Phase ACR/SEC

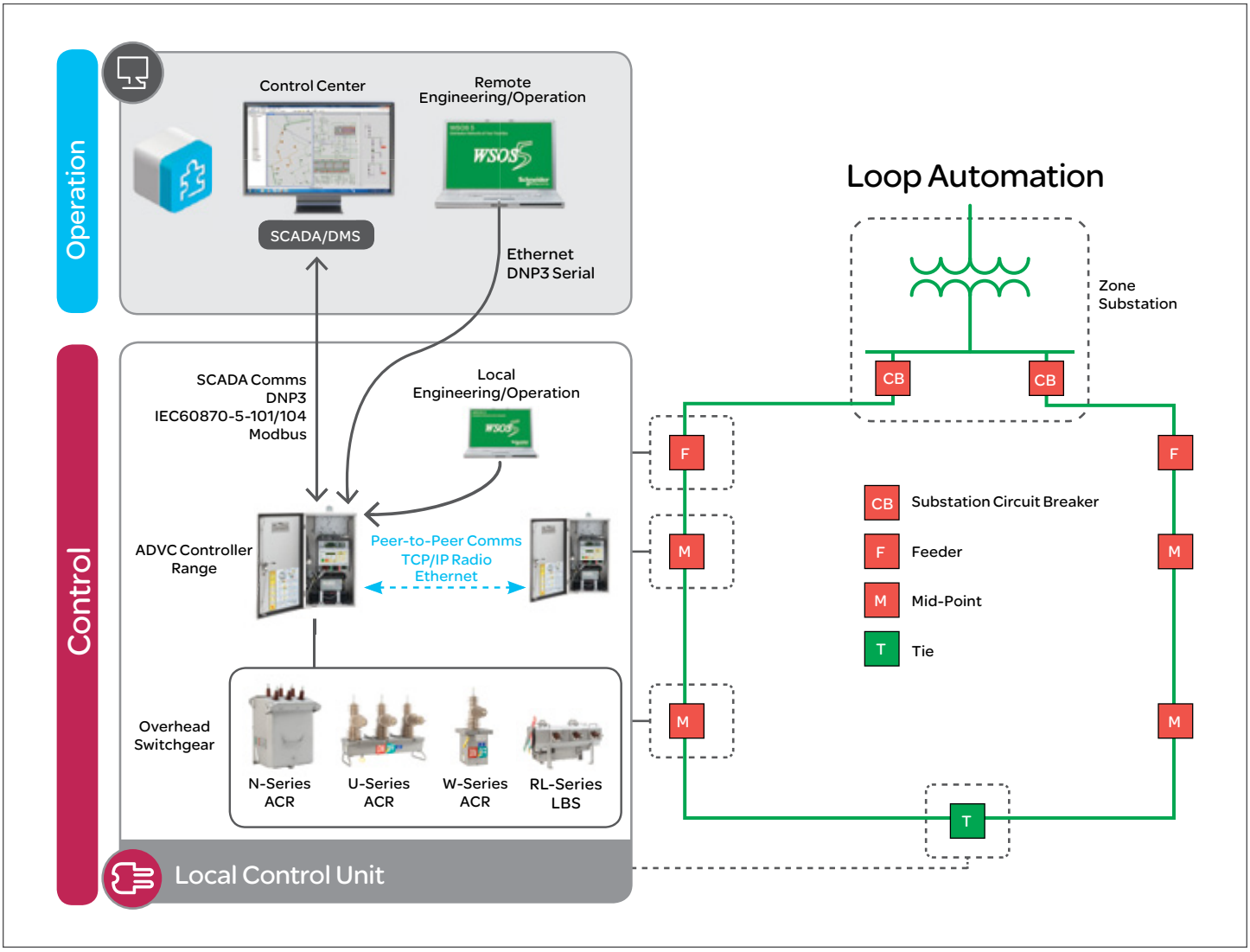


RL-Series SEC



W-Series Single-Phase ACR

Solution Architecture



Advantages

- Existing recloser or sectionalizer installations may be upgraded to run Loop Automation schemes, simply requiring a controller firmware upgrade and configuration.
- Classic Loop Automation enables grid automation without communications. Intelligent Loop Automation takes advantage of peer-to-peer communications for added safety and improved operation.
- Intelligent Loop Automation ensures that the fault is not reenergized after its disconnection and that power capacity is adequate for the restoration.
- Utilizing a Schneider Electric feeder Remote Terminal Unit (RTU), loop automation schemes can support a larger number switchgear and controls, regardless of the mix of providers.
- Readily integrates with SCADA/DMS, using industry-standard protocols.
- Easy to configure and manage using WSOS5 Loop Automation Scheme software.
- Loop Automation, has been proven over 15 years of application, proving itself as an effective overhead distribution automation solution. It was largely deployed globally, with multiple applications in the USA, Australia, Brazil and Hong Kong.
- Easy to commission, deploy and maintain.
- Customers upstream from the fault are isolated from the problem, and may only experience a momentary interruption of service.
- Switchgear controllers automatically reconfigure their protection settings upon a fault and reset to normal after the fault is cleared.
- Suitable solution for all utilities who have radially operated, interconnected, mesh, overhead or underground networks.
- Loop Automation can be applied regardless of the exisiting grid automation level, being compatible with different SCADA/DMS implementations and applicable even when there is no remote control at all.
- World-class product and application support by a major global company with local US service and support.

For more information...

Scan the QR code to email one of our subject matter experts about our feeder automation solutions or visit us at **www.schneider-electric.us/go/utility.**

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