Remote Intelligent Switch

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Next-Gen Distribution Automation

**DRIVERS**

- Current distribution automation technology relies heavily on human intervention, aging technology architecture, and isn’t optimized for integrating distributed energy resources (DER).
- SCE’s current switching scheme can take several minutes to isolate half the load of an affected circuit and doesn’t support bi-directional power flow.
- No reliable or effective method exists to detect high-impedance faults.

**SCOPE**

- The Next-Generation Distribution Automation project will demonstrate:
  - Remote Intelligent Switch (RIS): auto circuit reconfiguration.
  - Remote Fault Indicators (RFIs): accurately identify faults quickly.
  - Intelligent Fuse: automated branch line protection.
  - High Impedance Fault Detection: detect downed energized lines.

**BENEFITS**

- Integrate DER through greater telemetry and programmable logic controls.
- Minimize quantity of customer service interruptions.
- Quicker fault detection, isolation, and restoration.
- Improve communication between automation devices.
- Identify an effective and reliable method for detecting high impedances.
## RIS Goals and Benefits

<table>
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<tr>
<th>Goals</th>
<th>Benefits</th>
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<tr>
<td>Advanced Automation for fault detection and auto circuit reconfiguration.</td>
<td>Reduced SAIDI with reduced outage O&amp;M cost, supporting drive to first quartile reliability.</td>
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<td>Support multiple communication technology standards.</td>
<td>Supports DER integration.</td>
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<tr>
<td>Incorporate greater levels of telemetry to support DERMS.</td>
<td>Isolate and restore load quickly without Operator intervention</td>
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System Capability: Next Generation Distribution Automation

Capability Description:

- Advanced Automation for fault detection & auto circuit reconfigurations
  - Isolate and restore interrupted load as quickly as possible.
  - Incorporate greater levels of telemetry into an automated switch solution
  - Interoperability with various interrupters, communication systems, protocols, and other deployable field devices
  - Adopt a flexible solution capable of supporting various circuit topologies and communication conditions.
  - Remote configuration, and commissioning capabilities

- Bi-directional protection
- Voltage optimization
- Power flow optimization
- Distributed intelligence (Local & Centralized)
- Interoperability

- Flexibility
  - Handles Multiple communication protocol – DNP3, IEC61850
  - Capable of distributed intelligence and central intelligence
  - Capable of handle low speed and high speed communication
  - Capable of various logic/algorithm programming
RIS Overview

Advanced Automation for fault detection and auto circuit reconfiguration.

- Isolate and restore load quickly
- Incorporate greater levels of telemetry
- Deployment flexibility supporting various circuit topologies
- Interoperability with communication systems, protocols, and interrupters
- Supports DER integration.
2.5 Scheme

- Two Substation Sources
- Two Mid-Switches per circuit
- One Tie-Switch
3.5 Scheme

- Two Substation Sources
- Three Mid-Switches per circuit
- One Tie-Switch
2.5 Extended Scheme

- Four Substation Sources
- Two Mid-Switches per circuit
- Two Tie-Switches per circuit
RIS HARDWARE

G & W VIPER AUTOMATIC RECLOSER

SIEMENS CONTROLLER AND AUTOMATIC RECLOSER
ZONE 1 FAULTS

RIS PERFORMS FAULT ISOLATION, FOLLOWED BY LOAD RESTORATION.

2 ½ SWITCHING SCHEME

Substation Bus

Ckt. A
CB

Zone 1
100 Amps
A1
ICRC OK

Zone 2
100 Amps
A2

Zone 3
100 Amps
TS AB

Ckt. B
CB

Zone 4
100 Amps

Zone 5
100 Amps

Zone 6
100 Amps

B1 RATING = 500 Amps

B1

200

100

300

400

200

100

300

400
ZONE 2 FAULTS
RIS PERFORMS FAULT INTERRUPTION, FAULT ISOLATION, AND LOAD RESTORATION.

2 ½ SWITCHING SCHEME

CB
Ckt. A
Substation Bus
Zone 1
100 Amps
A1
Zone 2
100 Amps
A2
Zone 3
100 Amps
TS AB
Zone 4
100 Amps
Zone 5
100 Amps
B2
Zone 6
100 Amps
B1
CB
Ckt. B

B1 RATING = 500 Amps
100
200
100
300
200
100

ICRC OK
Next Steps – Remote Intelligent Switch

– Slow speed Communication
  • Conduct factory acceptance testing (FAT) – Q3 2016
  • Site acceptance testing (SAT) – Q3 2016
    • Lab Test at Advanced Technology Lab
    • Equipment Demonstration & Evaluation 12kV Facility
  • Pilot Project – Johanna Substation – Q4 2016
    • Install and commission 5 RIS on the Poker & Bingo 12kV Circuits by year-end 2016

– High Speed Communication – 2018-2019
  • When new FAN high speed radio is selected