

# 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.
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## 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.
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## 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

## Goals

- Advanced Automation for fault detection and auto circuit reconfiguration.
- Support multiple communication technology standards.
- Incorporate greater levels of telemetry to support DERMS.

## Benefits

- Reduced SAIDI with reduced outage O&M cost, supporting drive to first quartile reliability.
- Supports DER integration.
- Isolate and restore load quickly without Operator intervention

**System Capability:**

## Next Generation Distribution Automation

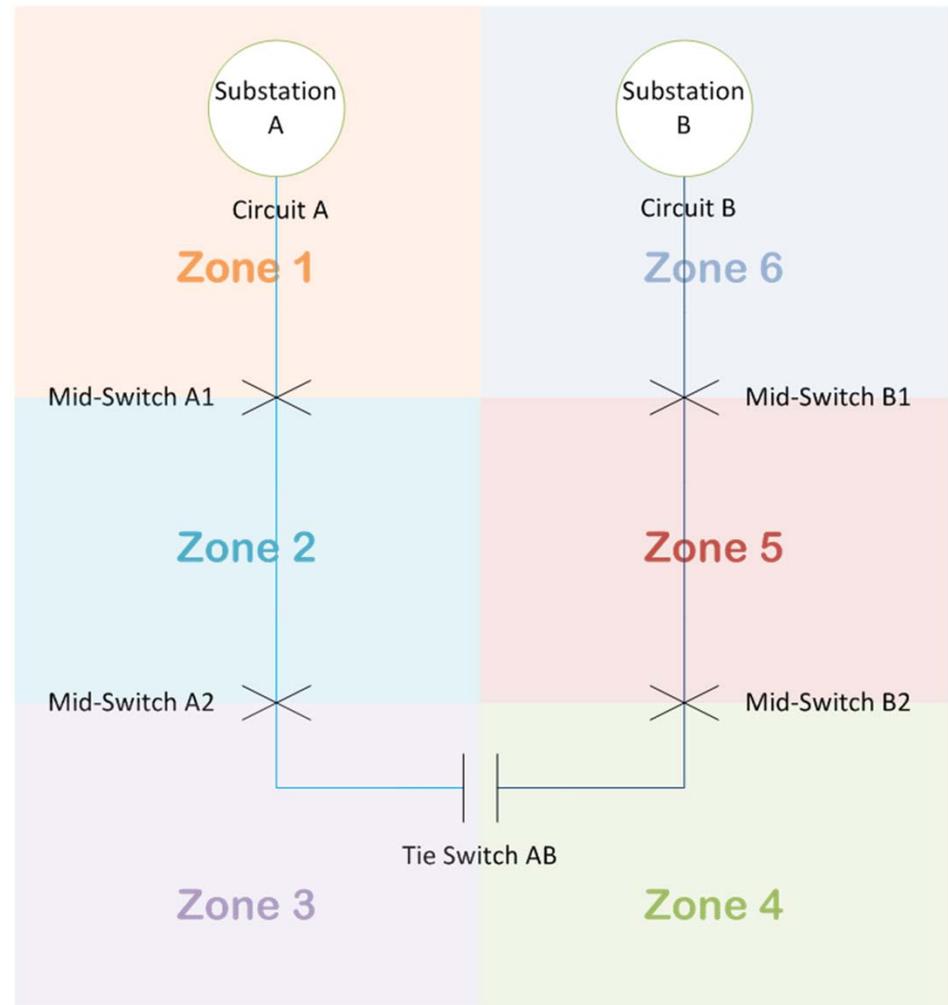
**Capability Description:**

- 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

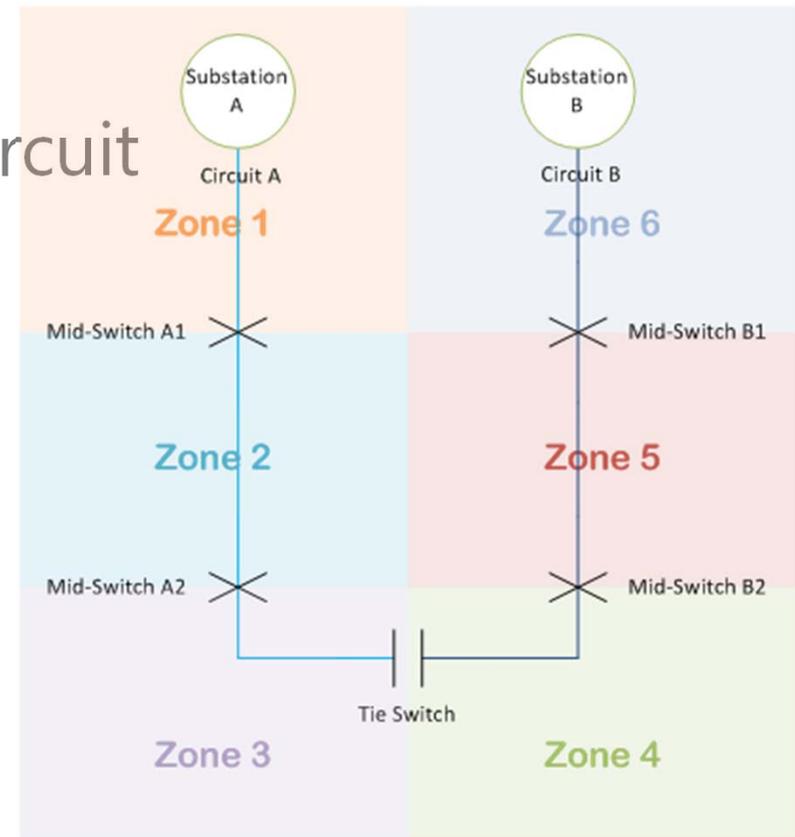
Advanced Automation for fault detection and auto circuit reconfiguration.

- 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.



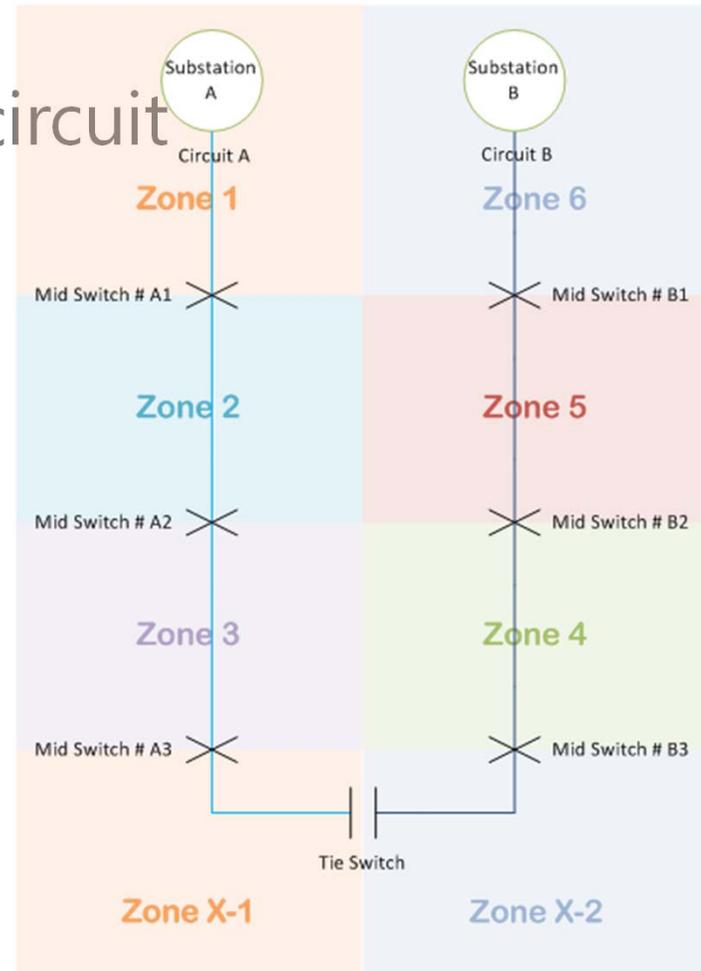
## 2.5 Scheme

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



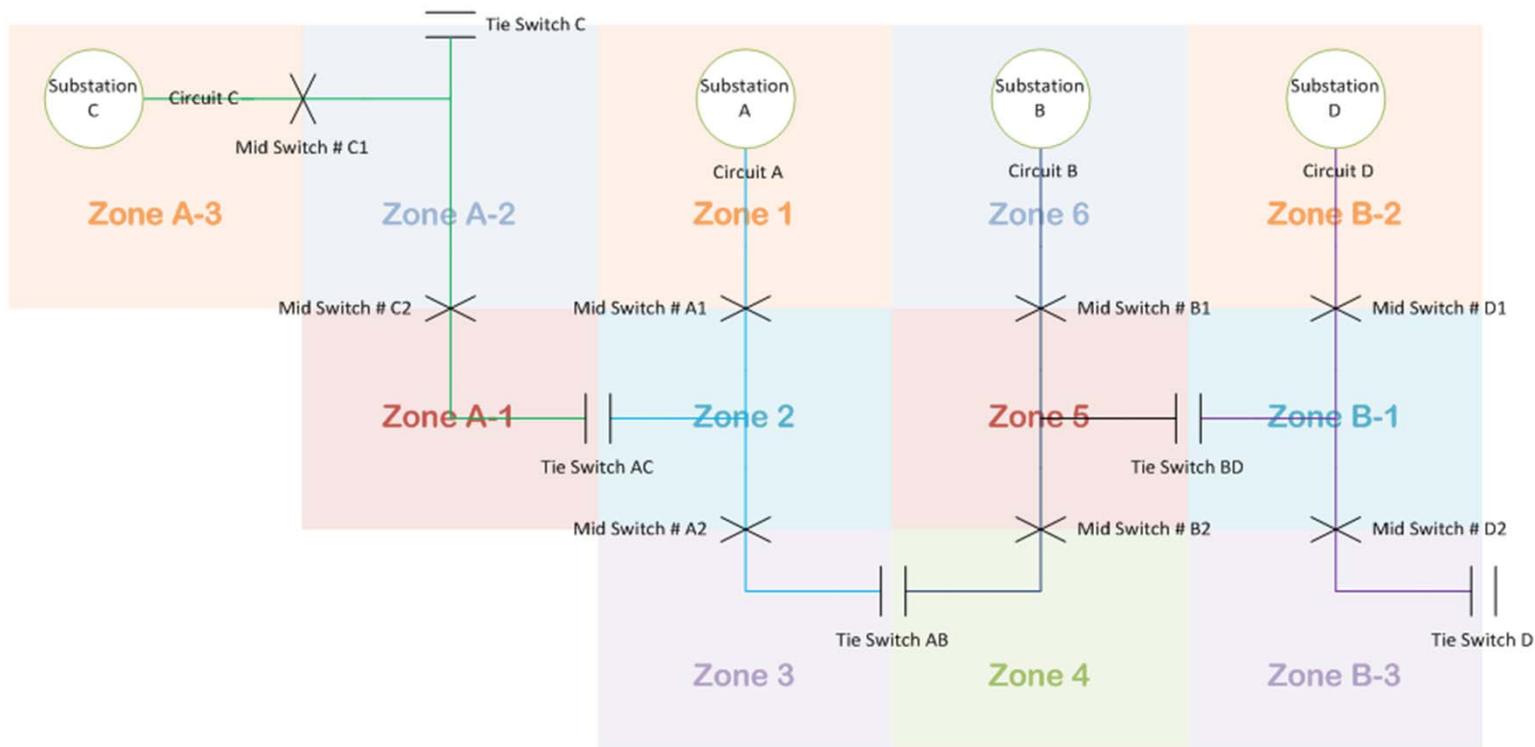
# 3.5 Scheme

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



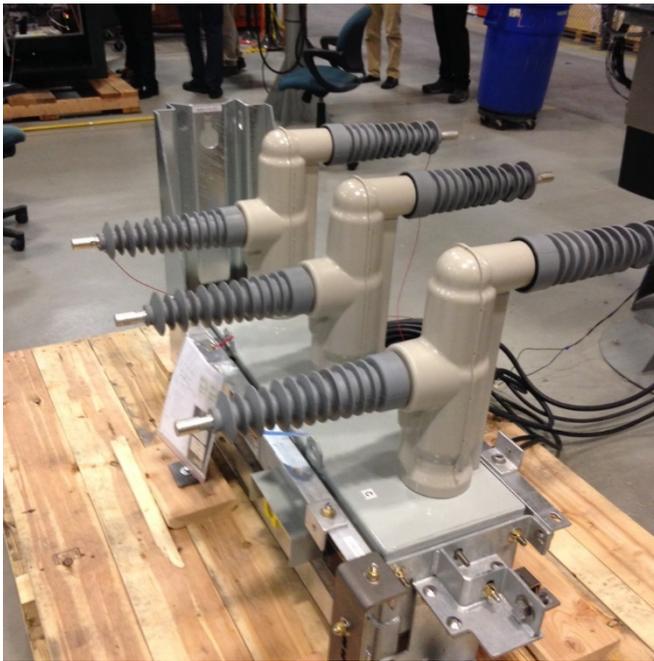
## 2.5 Extended Scheme

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



## RIS HARDWARE

G & W VIPER AUTOMATIC RECLOSER



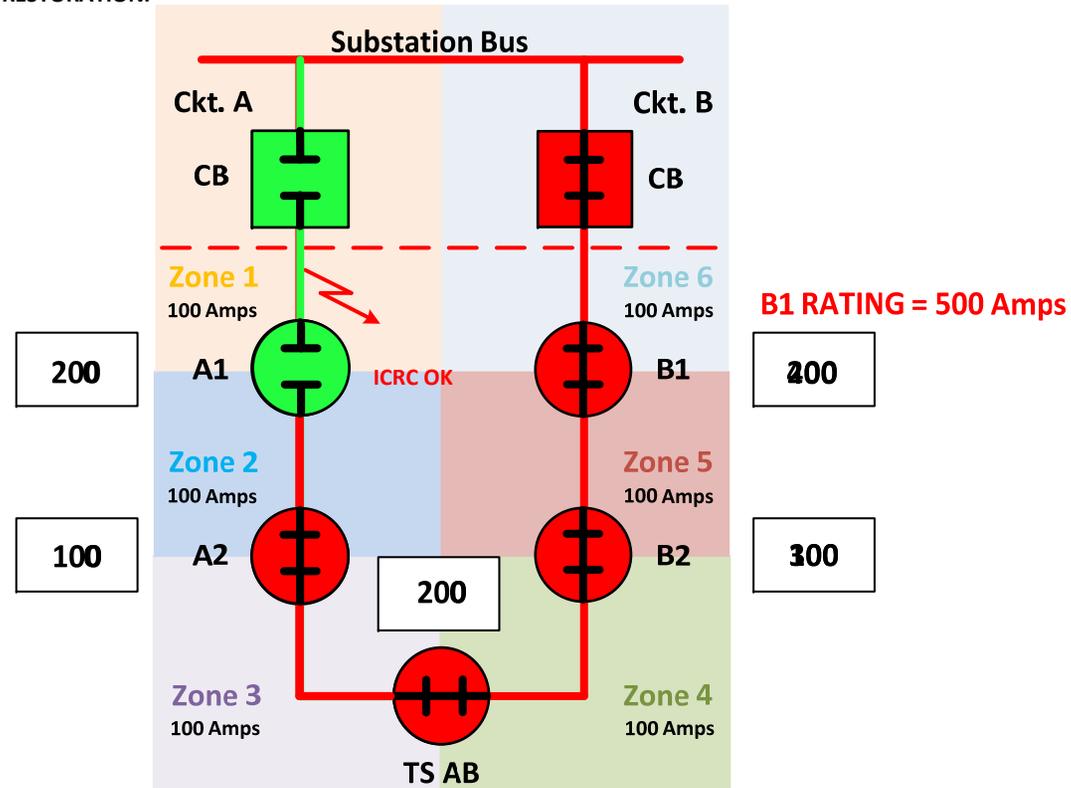
SIEMENS CONTROLLER AND AUTOMATIC RECLOSER



**ZONE 1 FAULTS**

RIS PERFORMS FAULT ISOLATION,  
FOLLOWED BY LOAD RESTORATION.

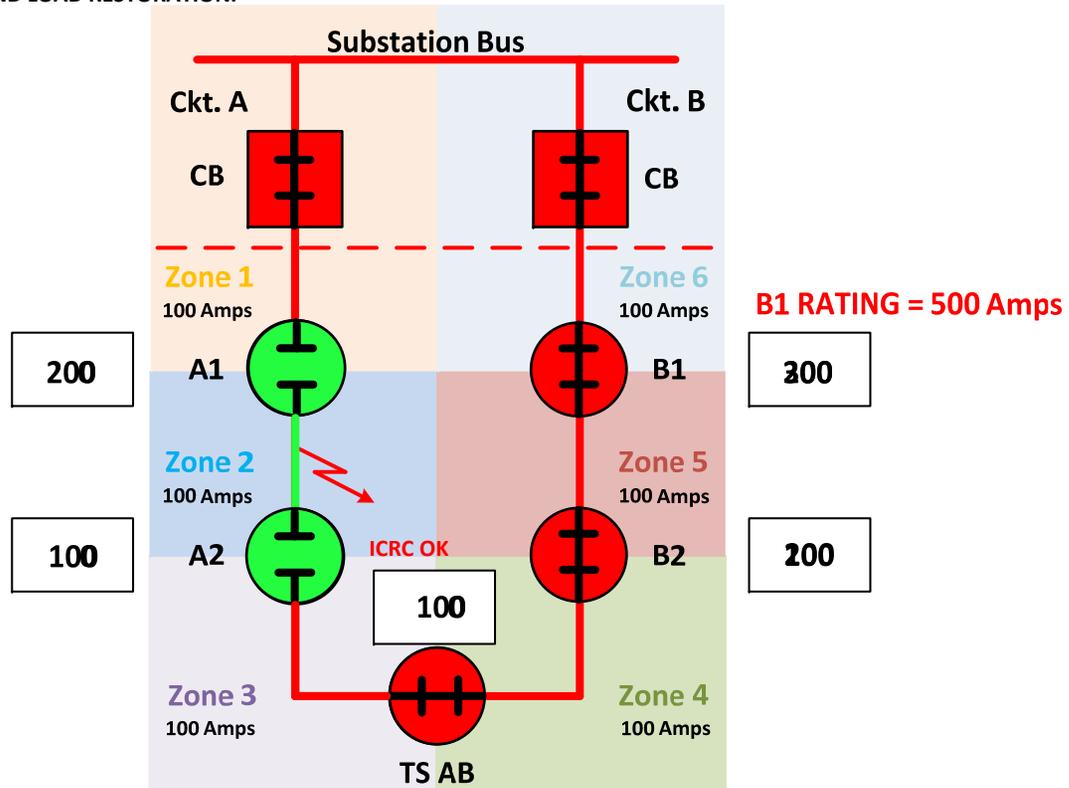
**2 ½ SWITCHING SCHEME**



**ZONE 2 FAULTS**

RIS PERFORMS FAULT INTERRUPTION,  
FAULT ISOLATION, AND LOAD RESTORATION.

**2 ½ SWITCHING SCHEME**



# 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