

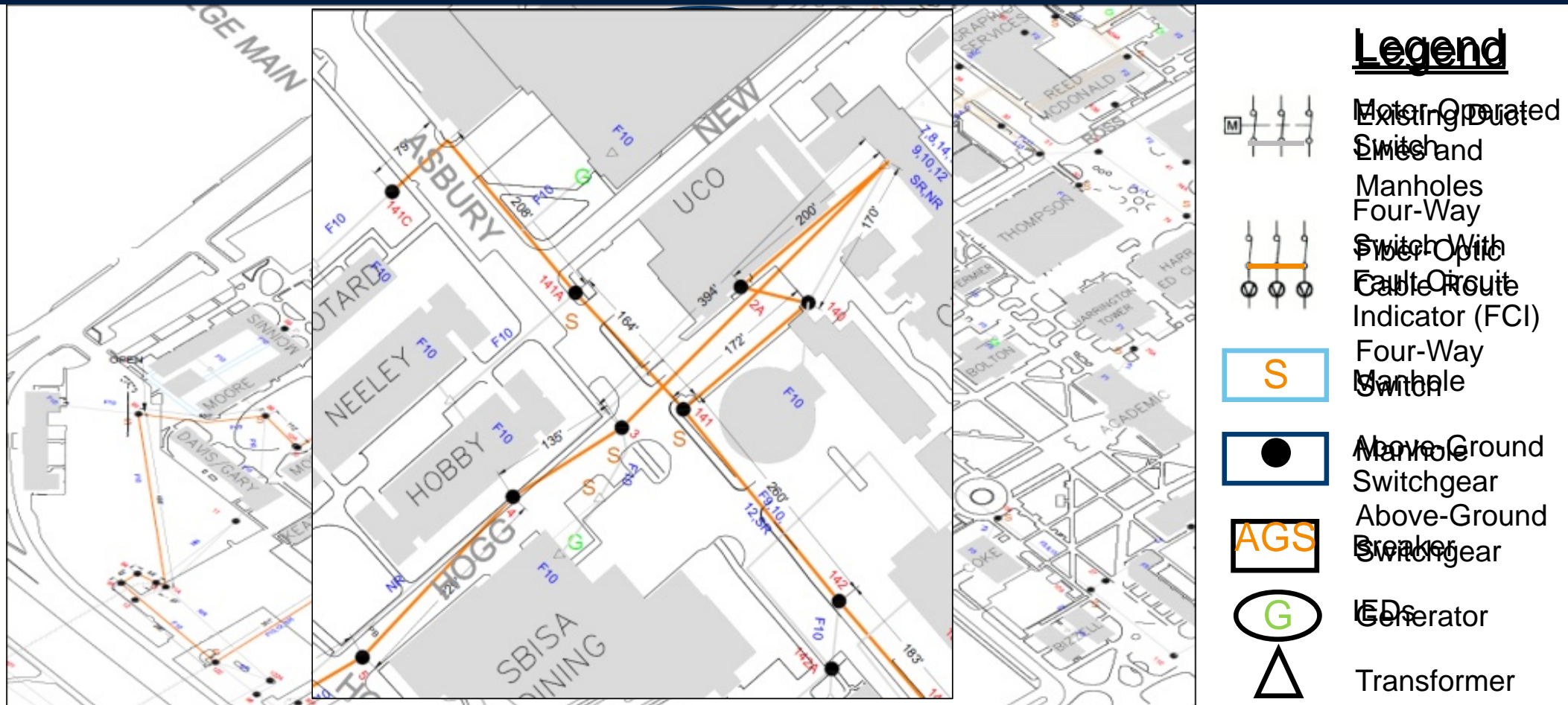
University Implements Distribution Automation to Enhance System Reliability and Optimize Operations

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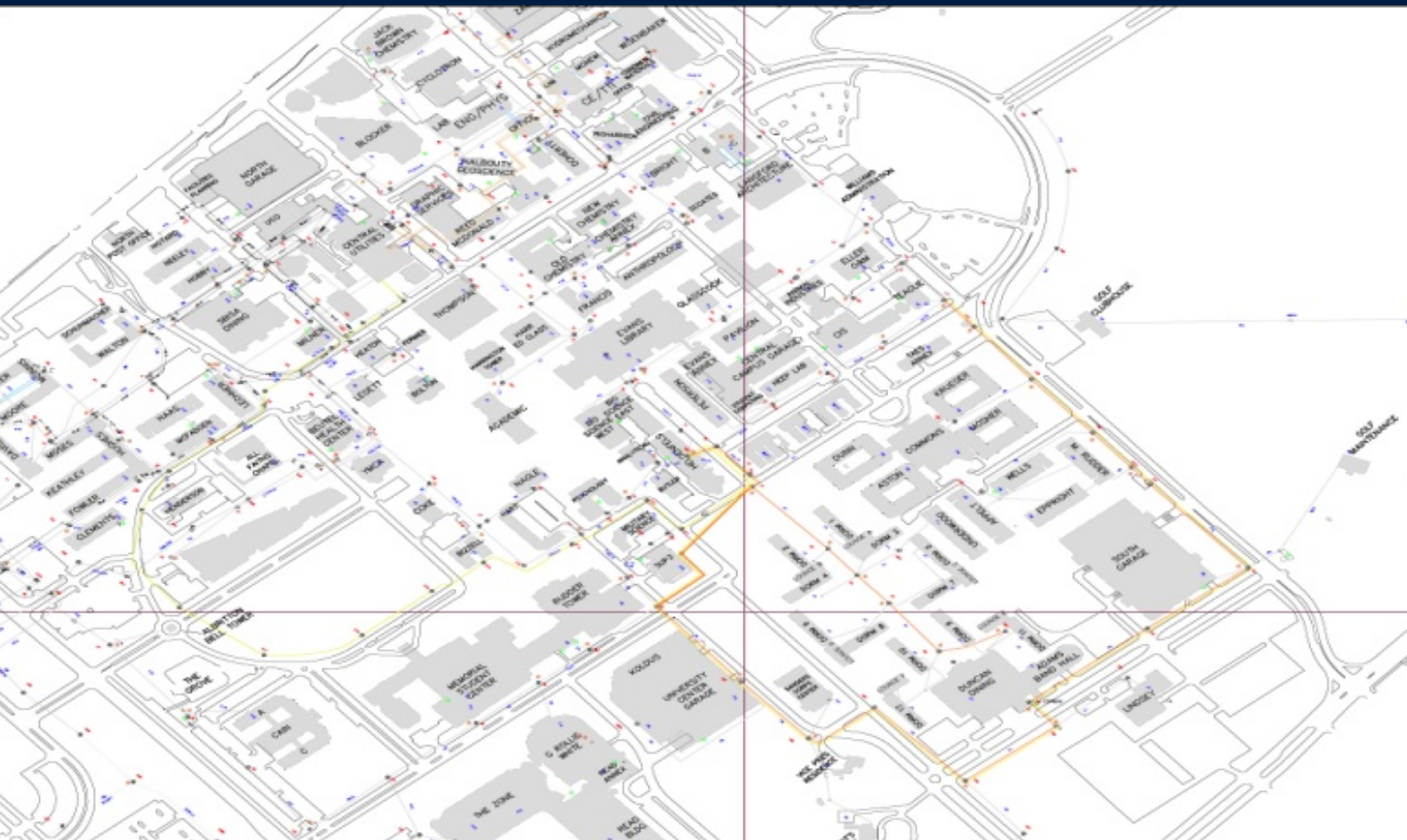
Distribution Automation System

Feeders A and B

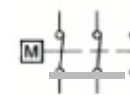


Distribution Automation System

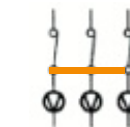
Feeders C and D



Legend



Motor Operated Existing Dual Switch and



Manholes Four-Way Switch With Fiber-Optic Cable Route Indicator (FCI)



Four-Way Manhole



Above-Ground Manhole Switchgear



Above-Ground Breaker Switchgear



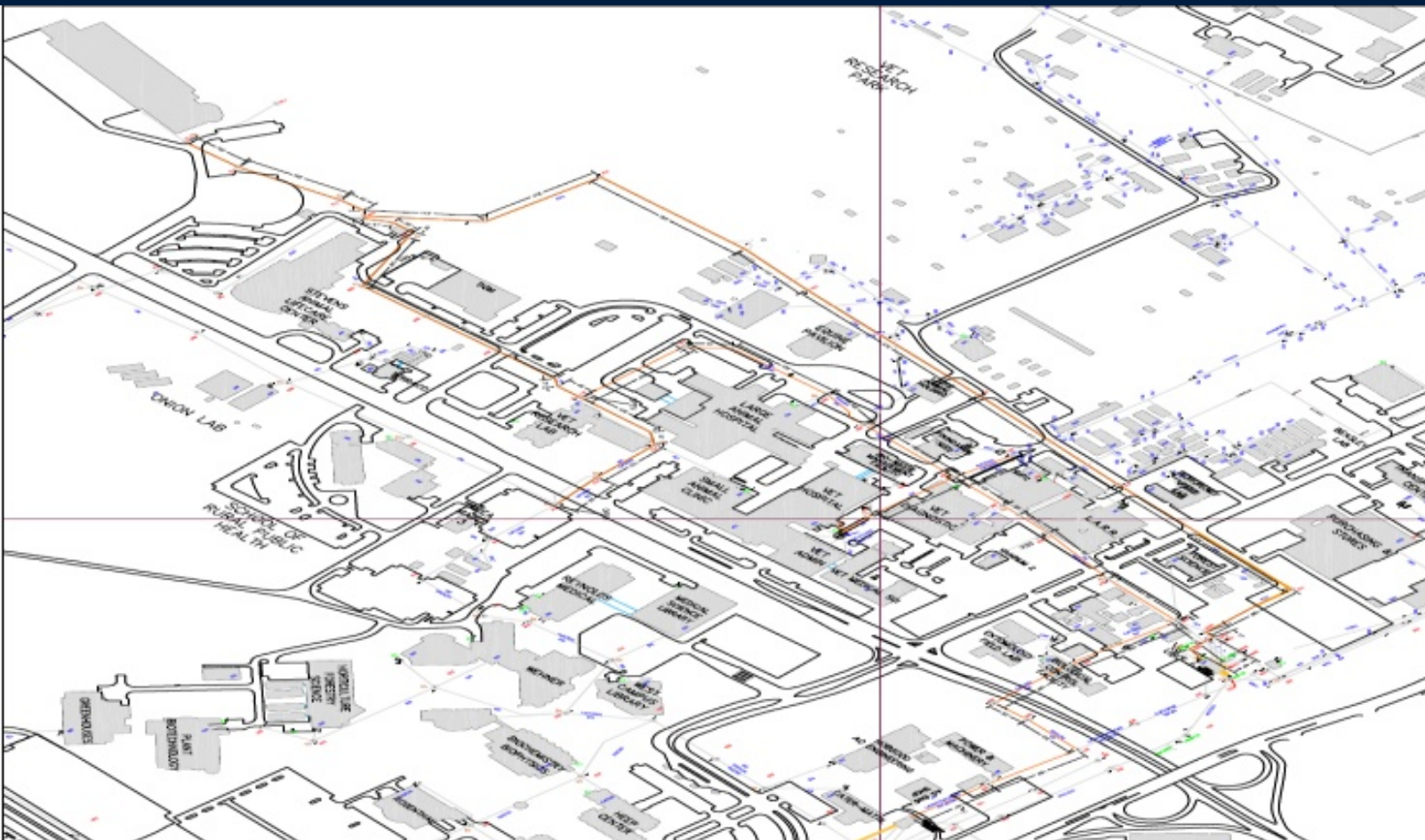
LEDs Generator



Transformer

Distribution Automation System

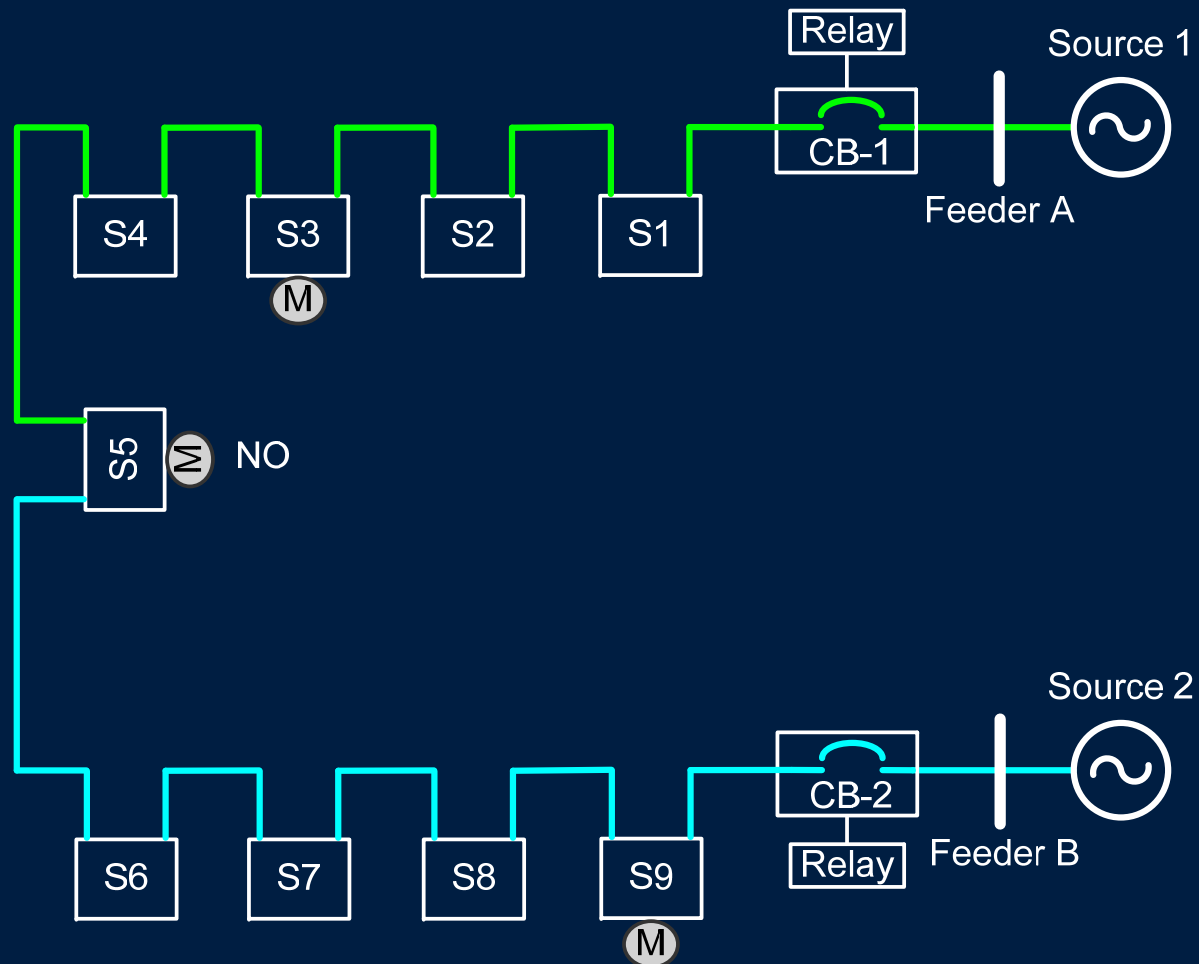
Feeders E and F



Legend

	Existing Operated Switch and Manholes
	Four-Way Switch With Cable Route
	Indicator (FCI) Four-Way Switch
	Manhole Ground
	Switchgear Above-Ground
	AGS Switchgear
	Generator
	Transformer

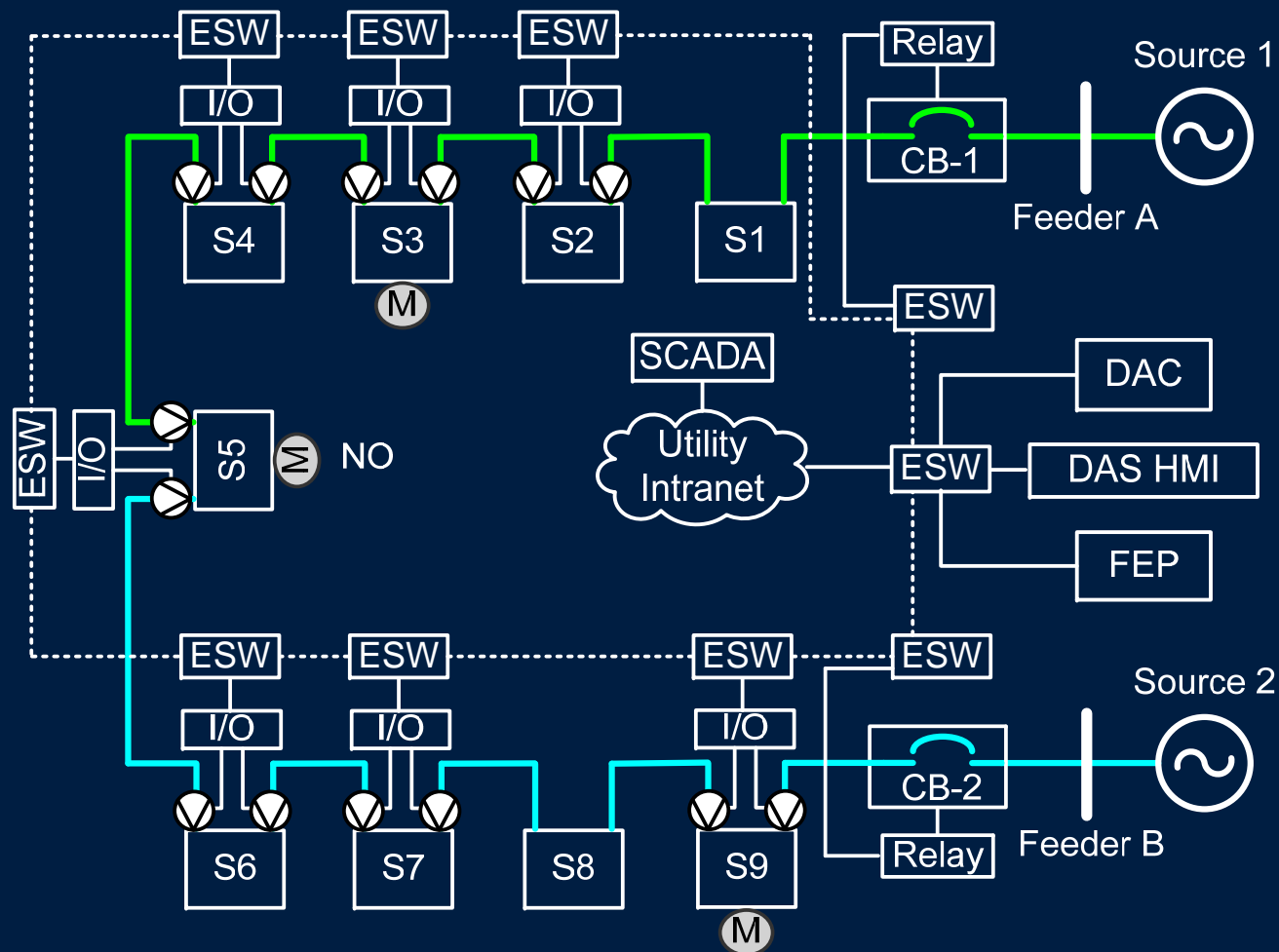
Simplified One-Line for Feeders A and B



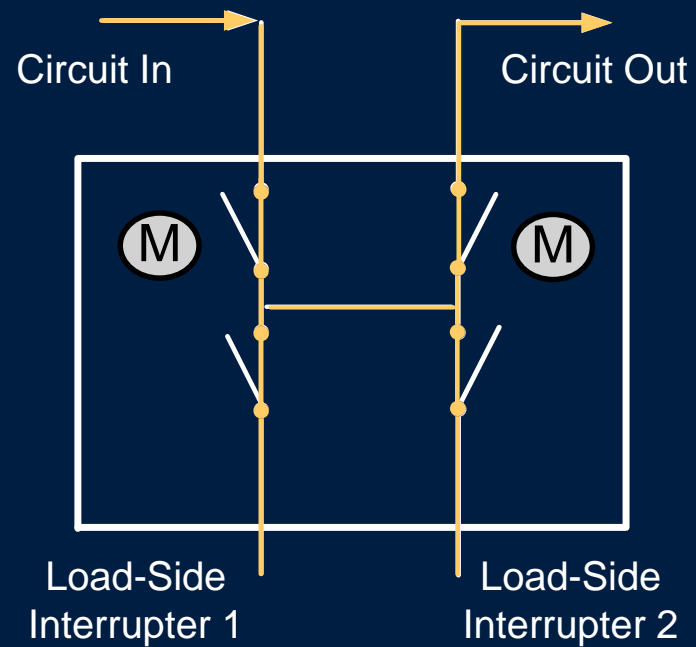
Conventional Method of Fault Detection and Power Restoration

- Time-consuming
- Labor-intensive
- Expensive
- Detrimental to equipment

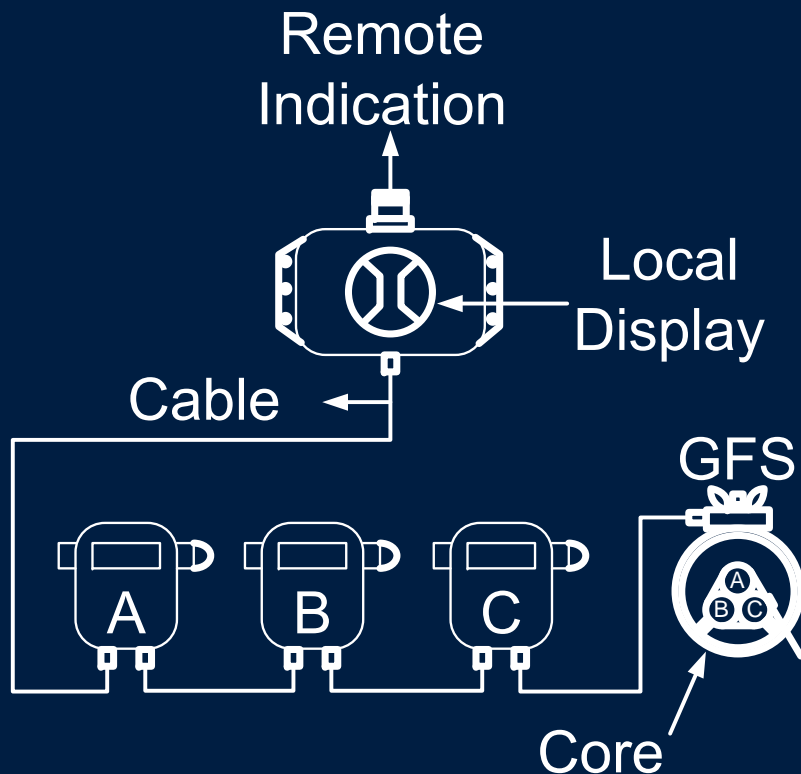
Automated Dual Feeder-Looped Circuit



Four-Way Load Break Electric Switch

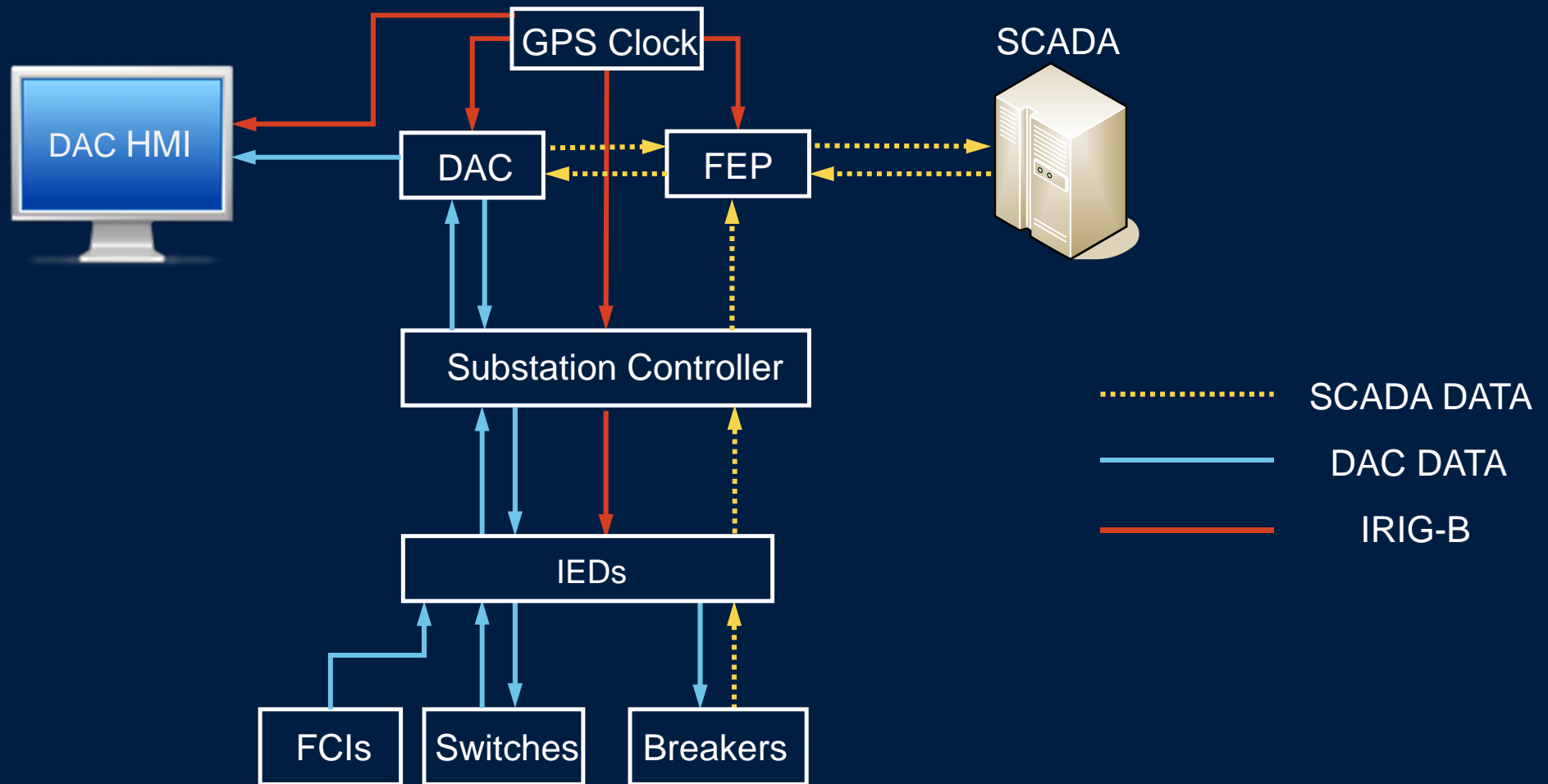


Fault Circuit Indicator



- Trips based on phase and trip timing of fault sensor
- Features delayed FCI response time
- Junction box with Real display ring inrush
- Resets automatically remote status

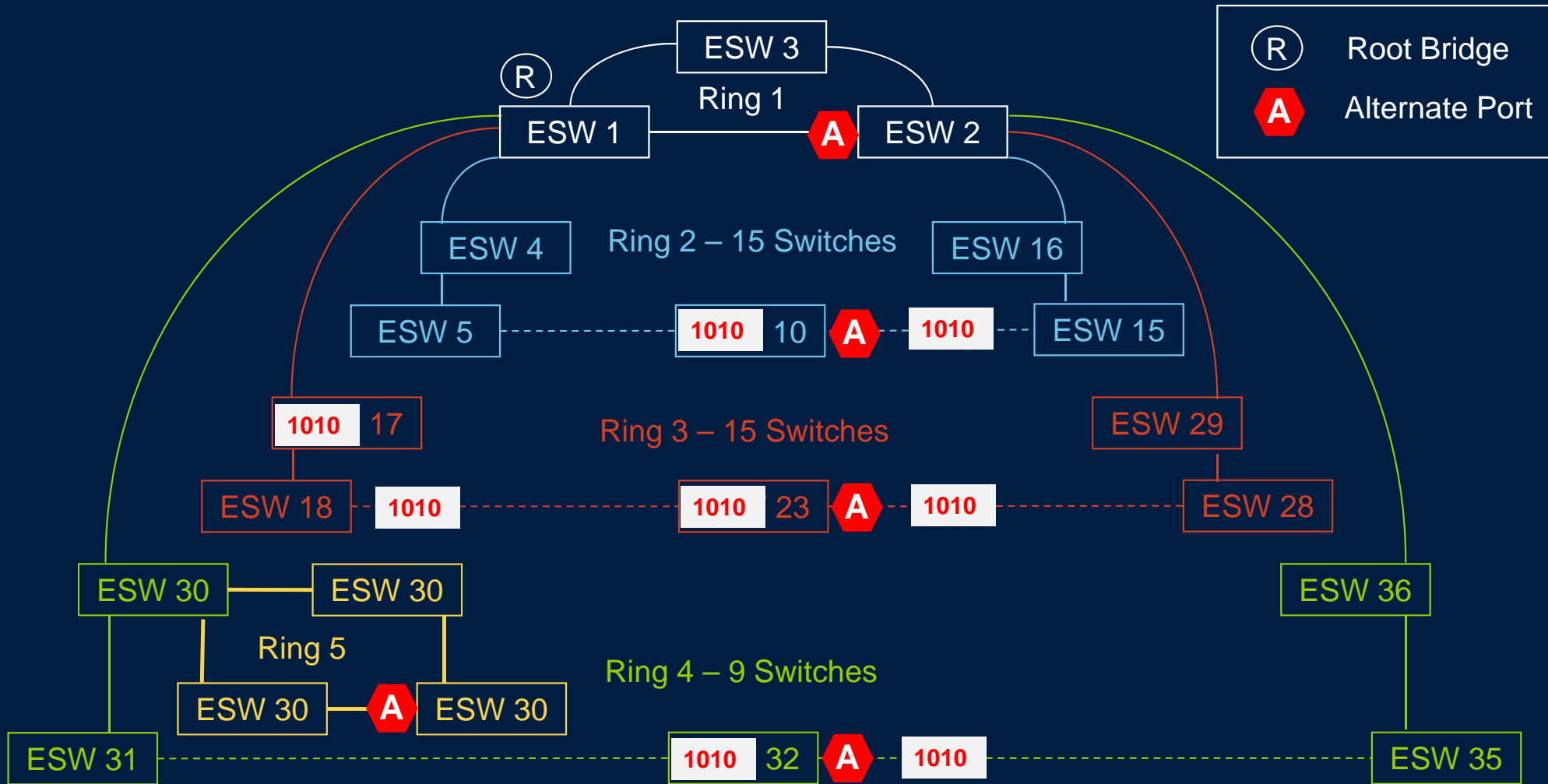
Data Acquisition and Controls



Ethernet Network Design Considerations

- Fiber-optic communications backbone
- High-speed communications
- Self-healing capability using RSTP
- Network security

Ethernet Network Topology



Ethernet Network Communication

- Each ring serves a different distribution-looped circuit
- Devices on each feeder have unique IP address range
- Devices on each feeder have unique VLAN assigned
- Network management prevents data congestion

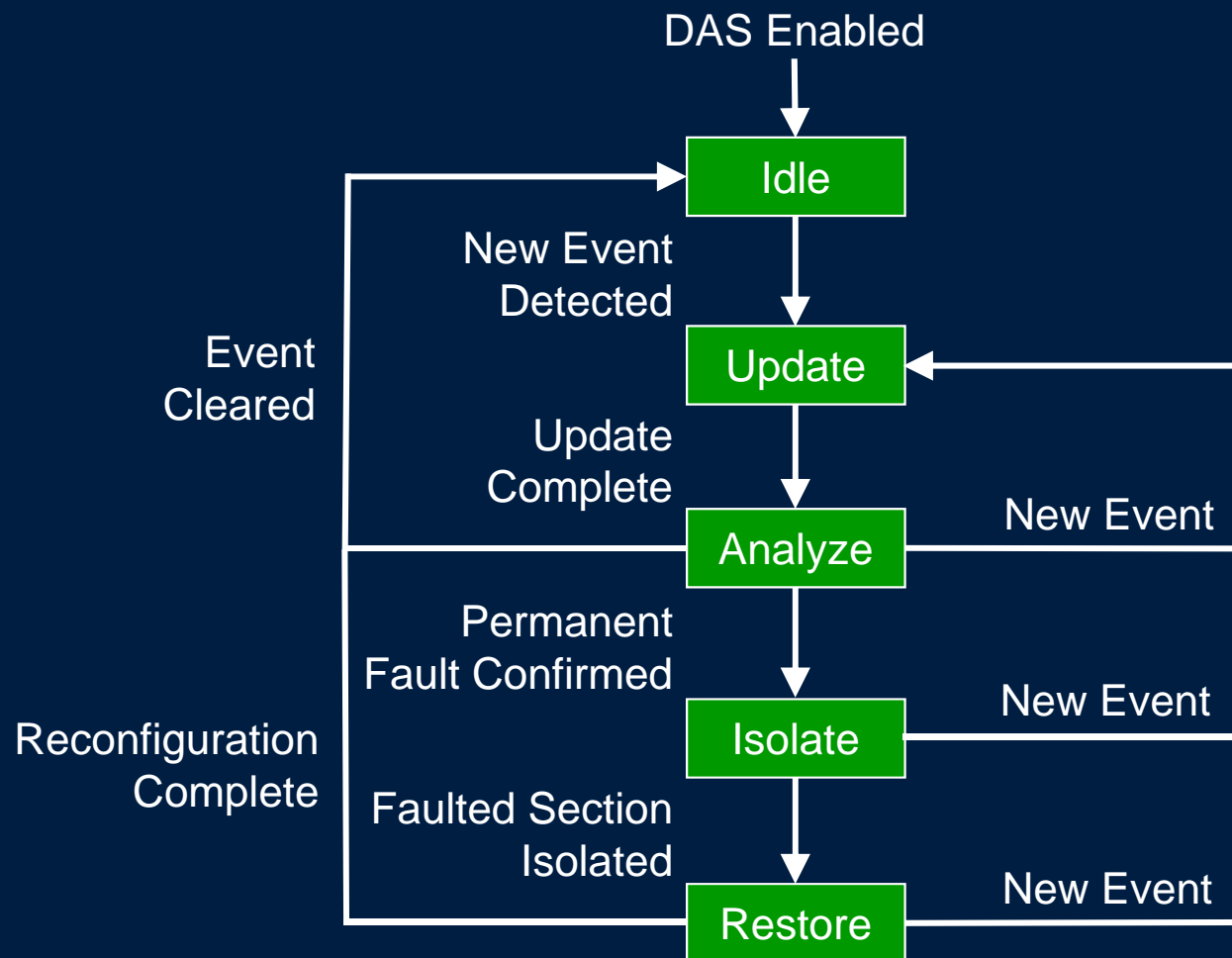
Network Security Using Security Gateways

- VPN provides authentication and integrity of transmitted data
- IPsec supports strong cryptographic encryption
- Multilevel passwords and role-based user access prevent unauthorized access
- VLAN / VPN combination provides tiered security

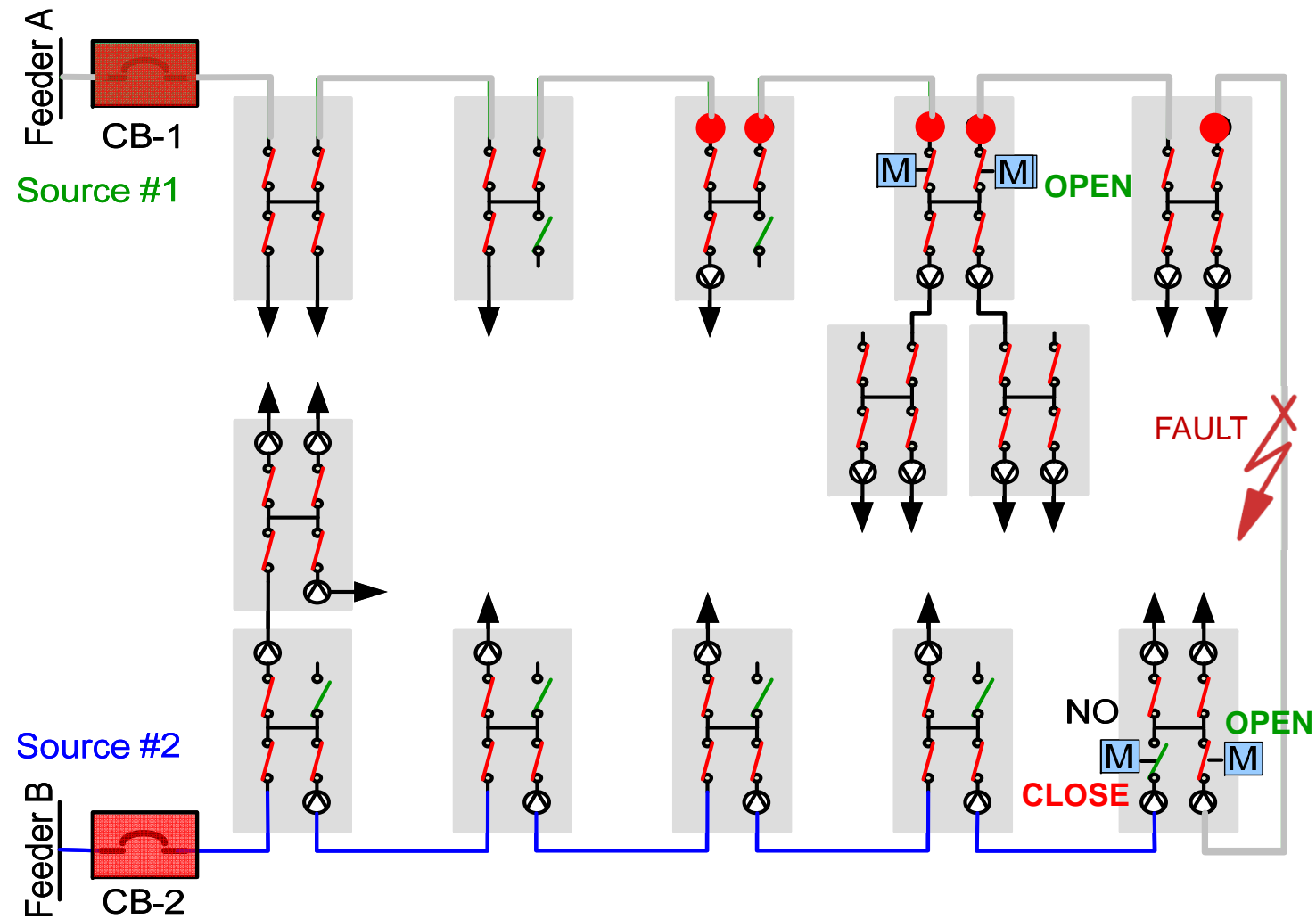
Distribution Automation System (DAS)

- Fault detection and isolation
- Automatic service restoration
- Automatic source transfer on loss of substation source
- System abnormal condition monitoring
- Response to multiple simultaneous faults
- Automated return-to-normal sequence

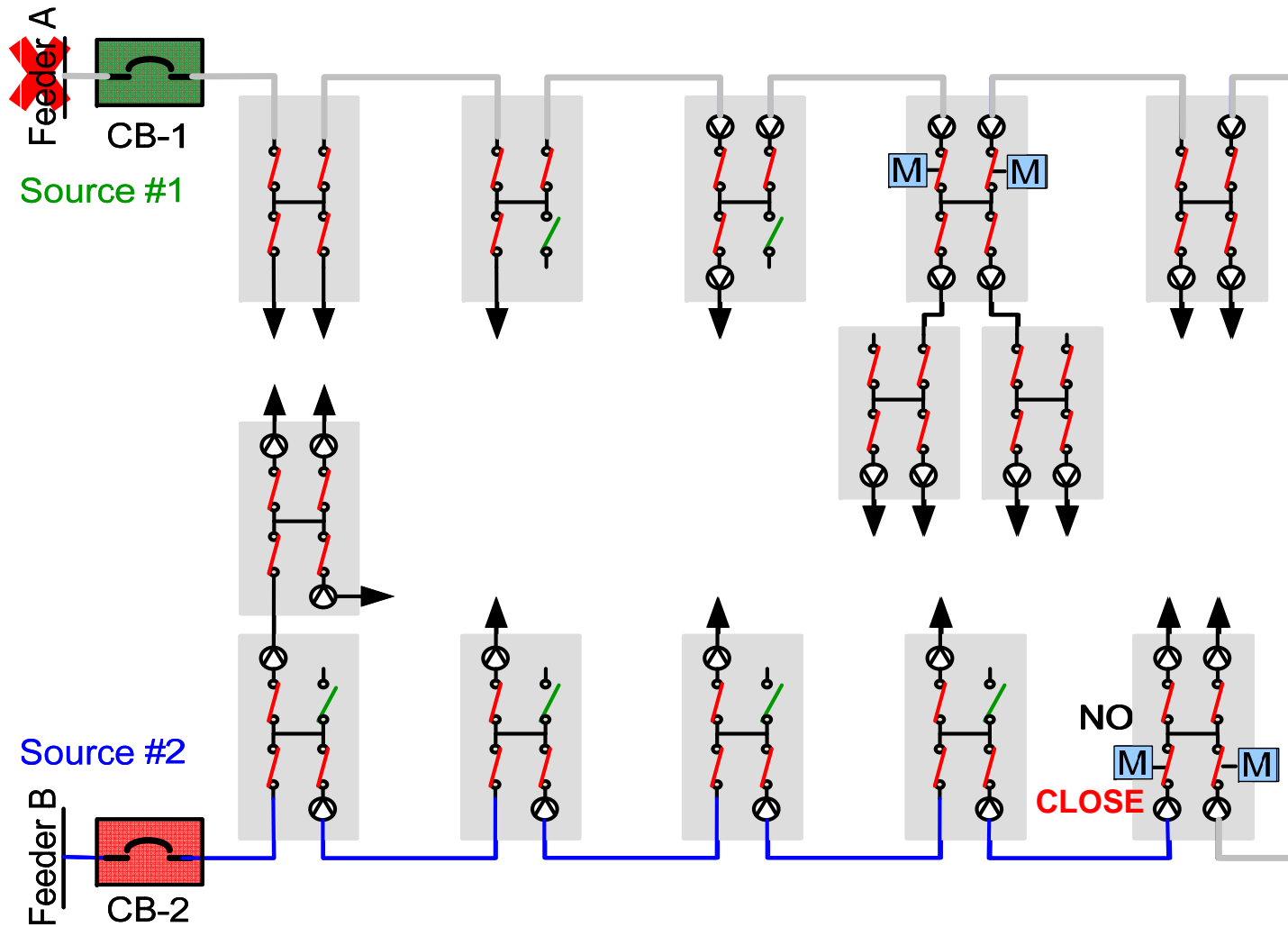
Automatic Reconfiguration Sequence



DAS Action on Dual Feeder-Looped Circuit



Automatic Source Transfer



Benefits of DAS

- Determines fault location
- Executes automatic network reconfiguration
- Improves system reliability with reduced outage time
- Increases system operational efficiency
- Reduces operating cost
- Allows easy system expansion with modular and scalable design

Questions?

