

**Byron Flynn**  
**Automation Subject Matter Expert**  
**GE Energy**

Byron Flynn currently serves as an Automation and Intelligent Grid Subject Matter Expert with GE Energy. In this role, Mr. Flynn is responsible for supporting electric utilities with Substation and Distribution Automation, Monitoring and Diagnostics Systems and Intelligent Grid applications. Mr. Flynn joined GE in 1999 with the acquisition of Stellar Dynamics, a company specializing in automation systems and services, formerly part of Idaho Power Company. His service to Idaho Power began in 1981 and includes working in the Communications, Substation Design, and System Operations Departments.

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## The Power of Knowledge - Distribution Automation

Byron Flynn



imagination at work

## Agenda

**Industry Perspective**  
**Approach to DA**  
**Case Studies**



# Agenda

## Industry Perspective

### Approach to DA

### Case Studies

## Evolving Objectives



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## Focus Is Now On . . .

### **Intelligent Grid Communications –**

Open communications systems supporting standard devices throughout the electrical grid

### **Integration of Applications –**

SCADA, Distribution Management Systems, Outage Management and Advanced Metering are becoming tightly integrated, supporting open interconnect standards

### **Integration of Intelligent Electrical Devices –**

New smart devices including the meter, field switches, reclosers, fault detectors, capacitors, demand response devices and distributed generation

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## Industry Focus On . . .

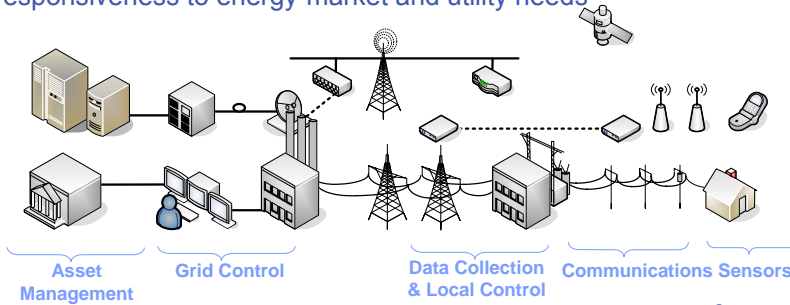
- **Intelligent Grid Communications**
- **Integration of Applications**
- **Integration of Intelligent Electrical Devices**



## The Intelligent Grid Vision

A power system -

- ✓ consisting of automated T&D systems, all operating in a coordinated, productive and reliable manner
- ✓ meeting customer demands with an intelligent communications infrastructure - enabling timely, secure and adaptable information flow to meet the needs of the evolving digital economy
- ✓ handling emergency conditions with 'self-healing' actions and responsiveness to energy-market and utility needs



Source: EPRI® Intelligrid

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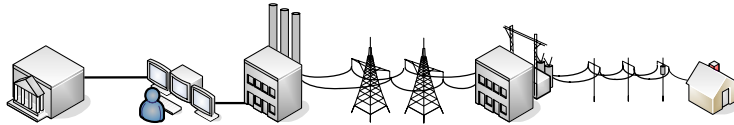
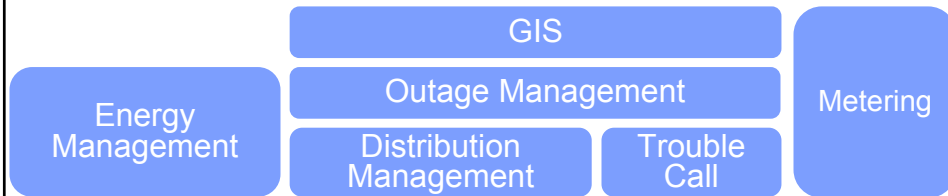
## Industry Focus On . . .

- Intelligent Grid Communications
- Integration of Applications
- Integration of Intelligent Electrical Devices



## Operations Today: Custom System Interfaces

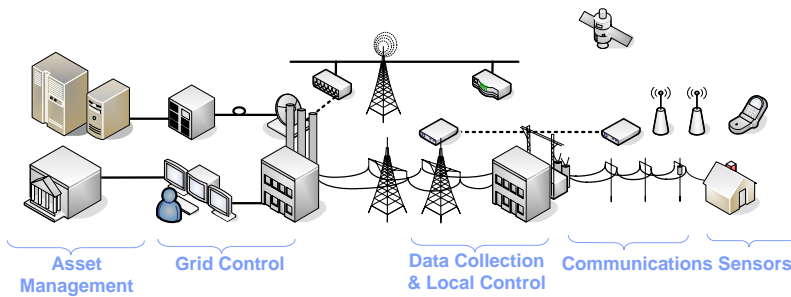
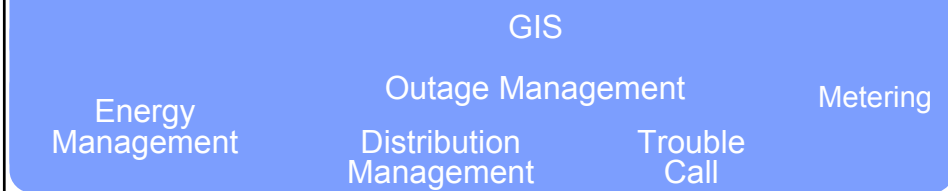
Back Office – Design, Planning, Visualization, Billing, Etc.



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## Operations Tomorrow: Merging Data, Applications

Back Office – Design, Planning, Visualization, Billing, Etc.



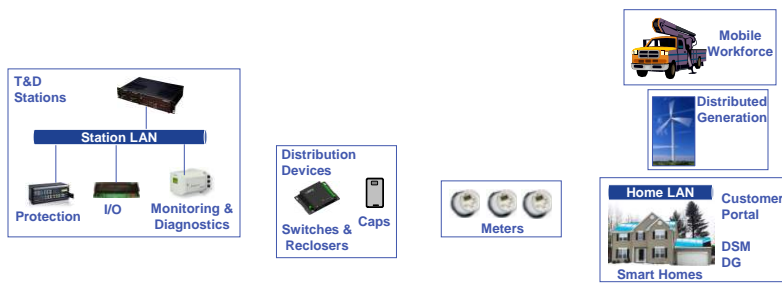
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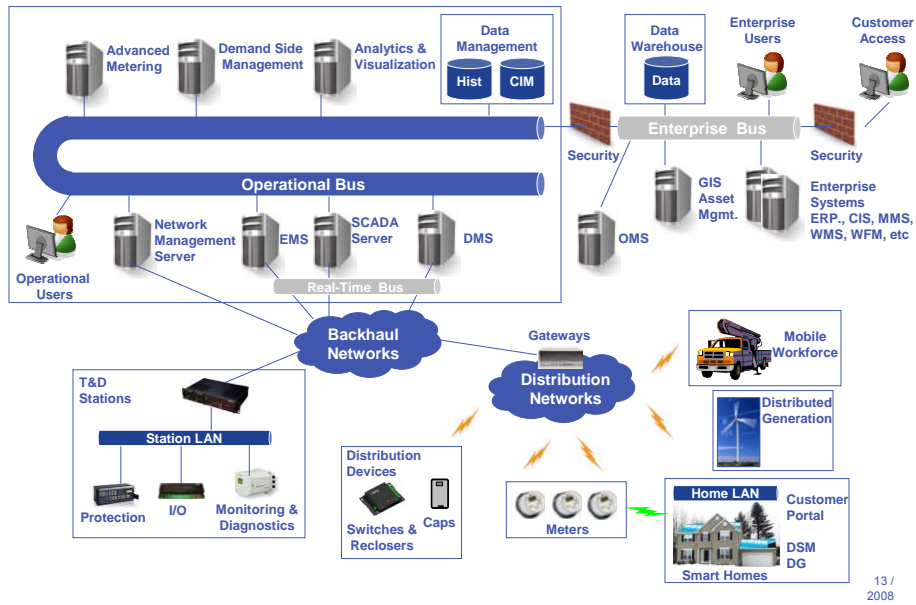
## Industry Focus On . . .

- Intelligent Grid Communications
- Integration of Applications
- Integration of Intelligent Electrical Devices

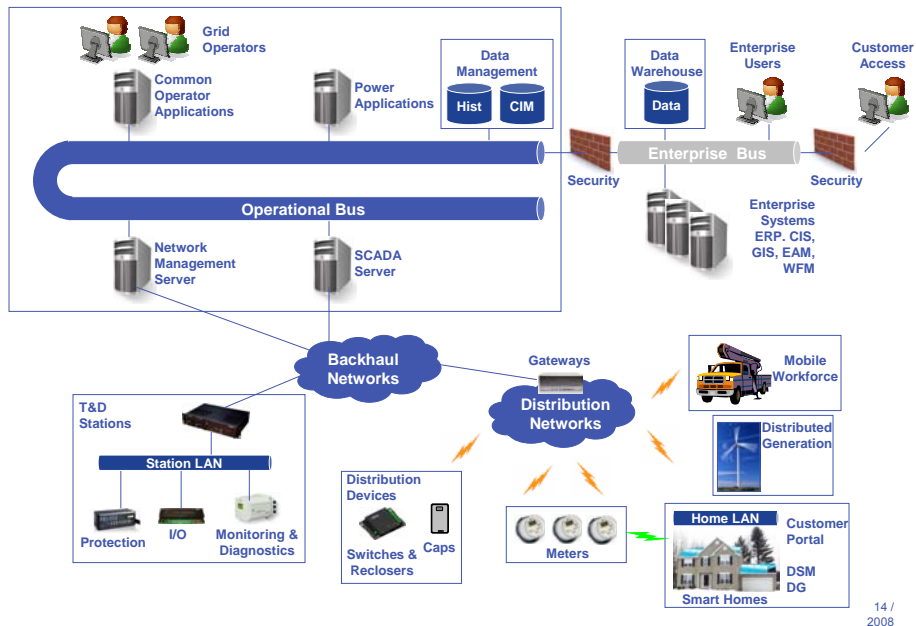
## Intelligent Devices Across The Grid



# Intelligent Grid Architecture



# Intelligent Grid Architecture - Future



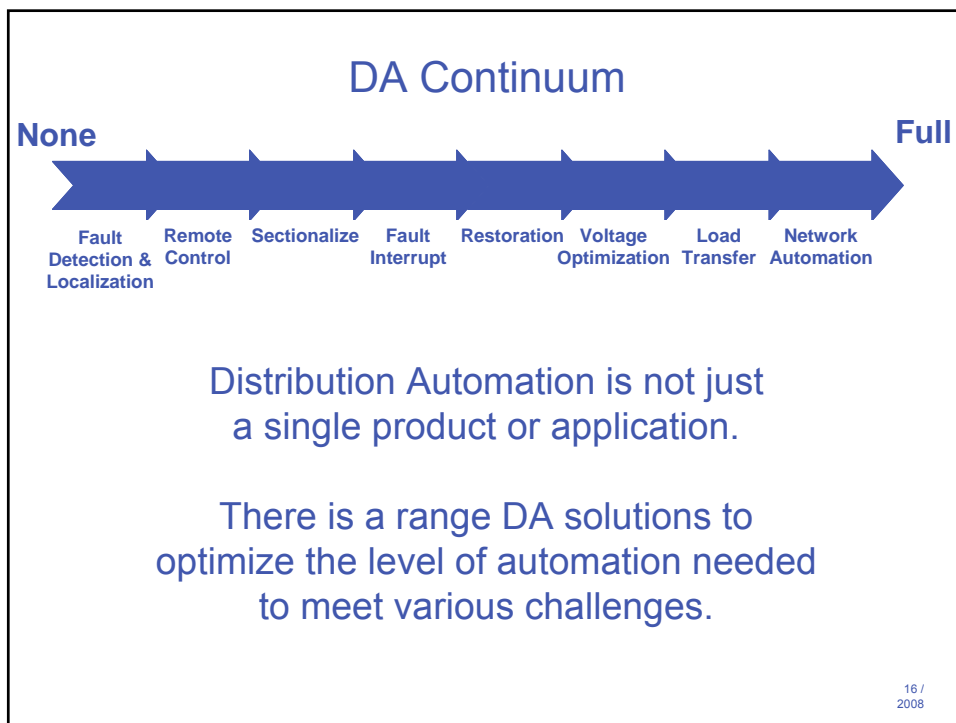


# Agenda

## Industry Perspective

## Approach to DA

## Case Studies



## Approach to DA

Start with an understanding of:

- > Priorities of Objectives
- > Scope of Work
  - Previously installed equipment
  - Previous discussions and work
- > Critical Factors of Project
  - Safety
  - Operations
  - Current level of automation
  - Communications options
  - Costs
  - Existing infrastructure
- > Other Factors?



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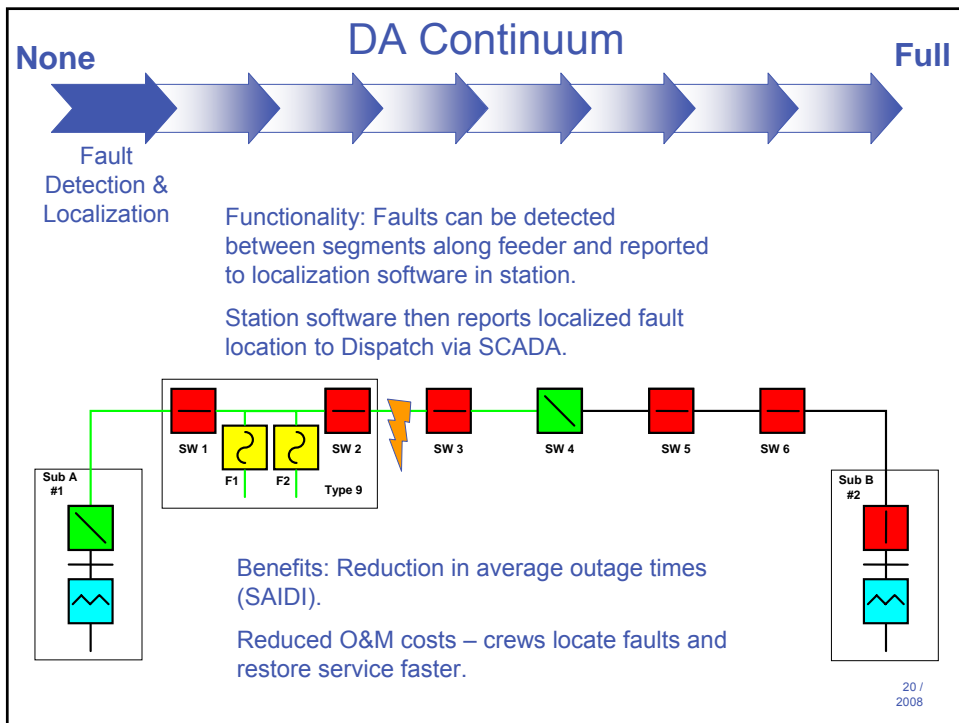
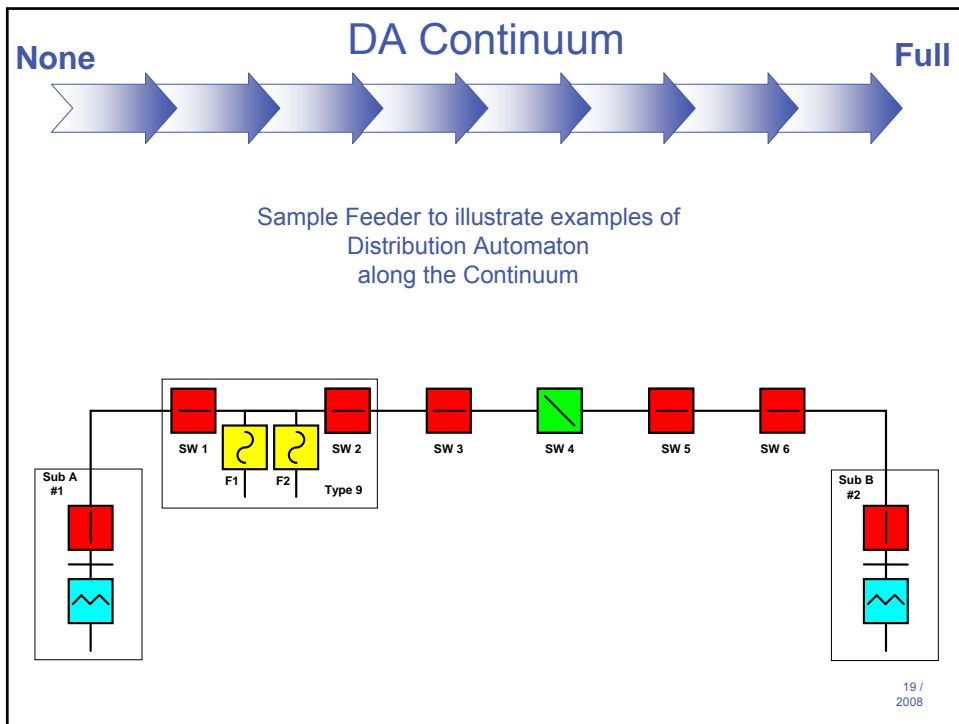
## Agenda

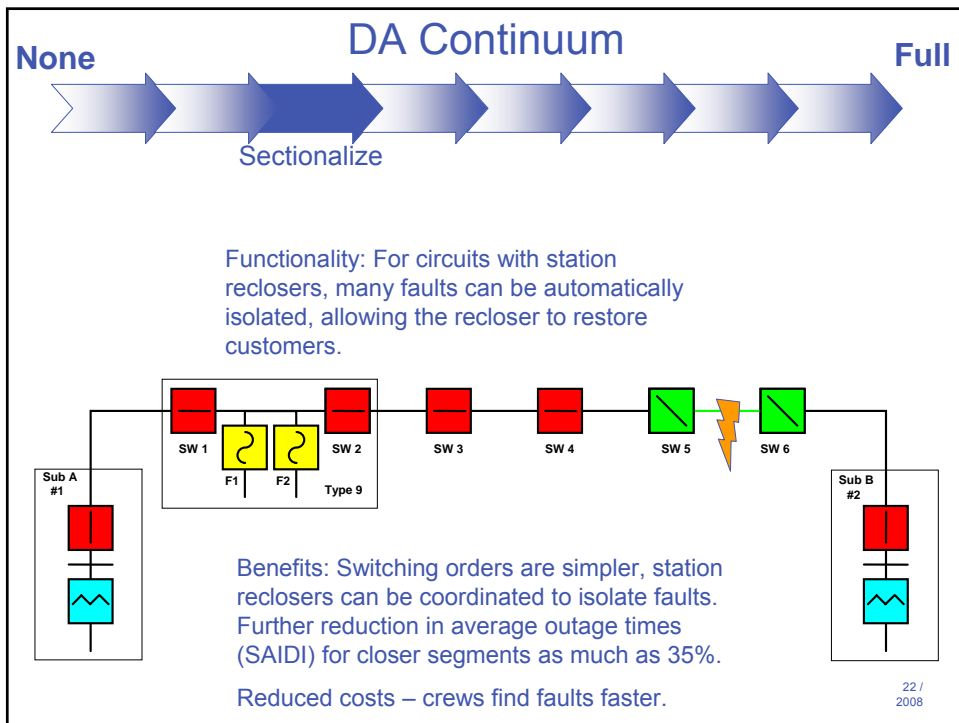
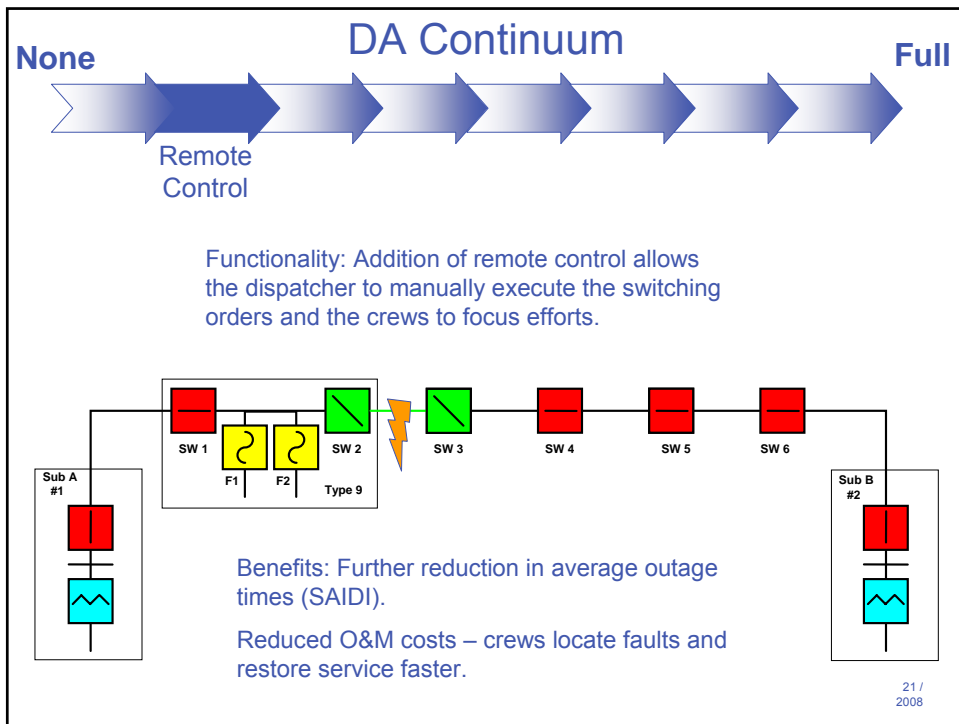
Industry Perspective

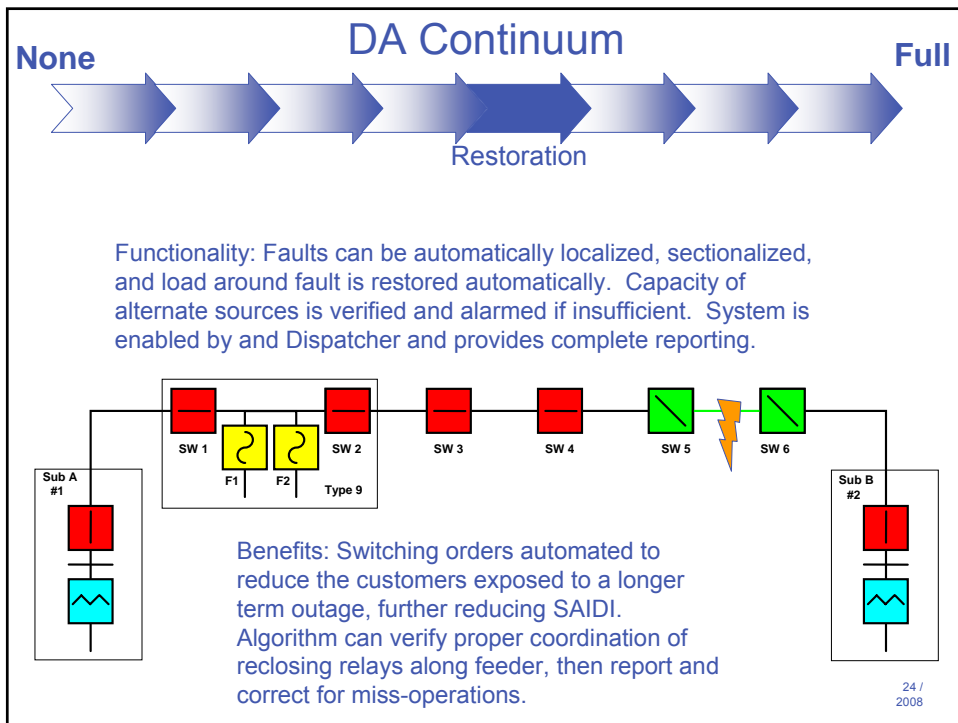
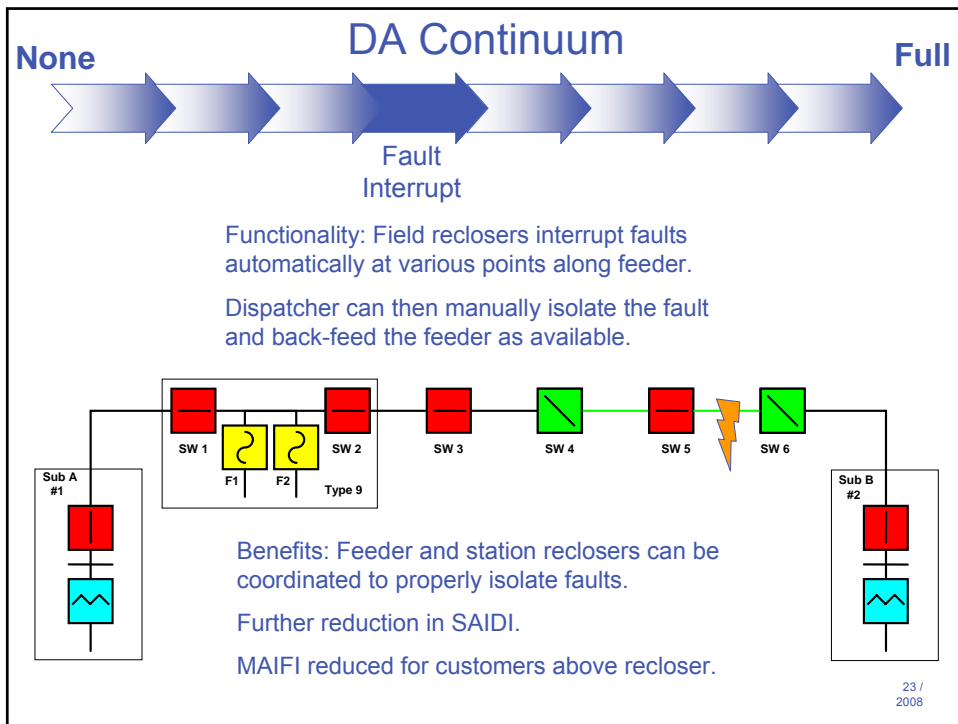
Approach to DA

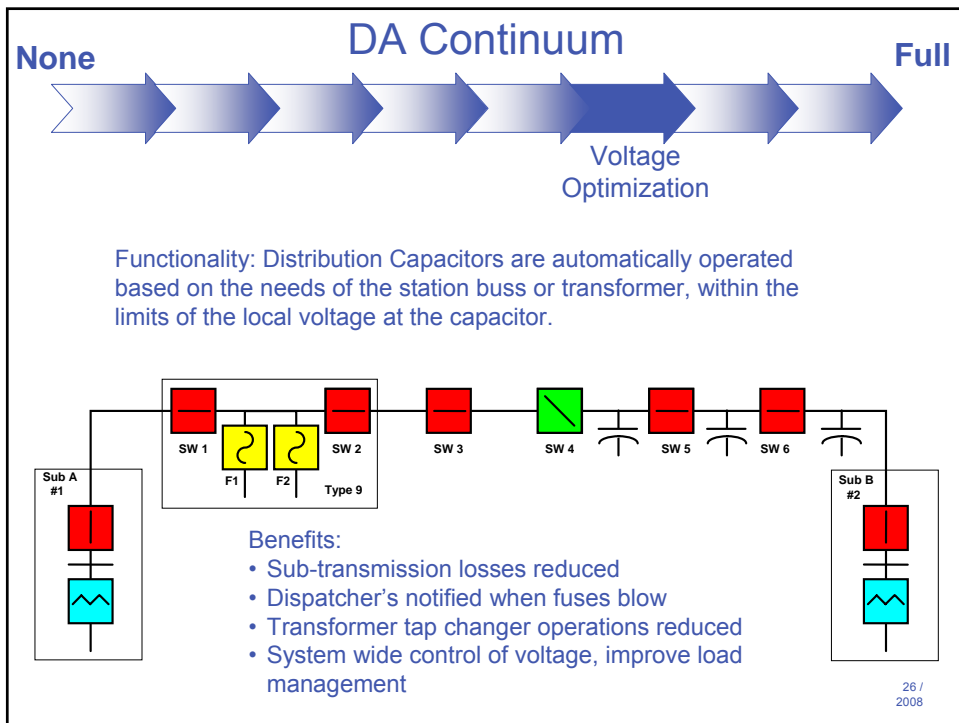
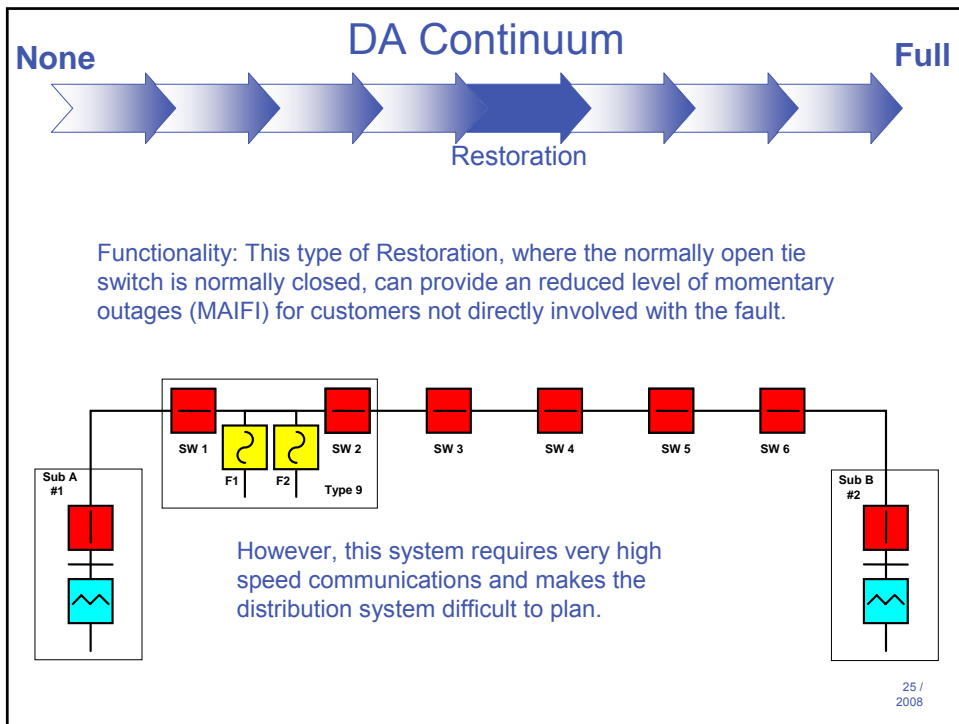
Case Studies  
(Along the Continuum)

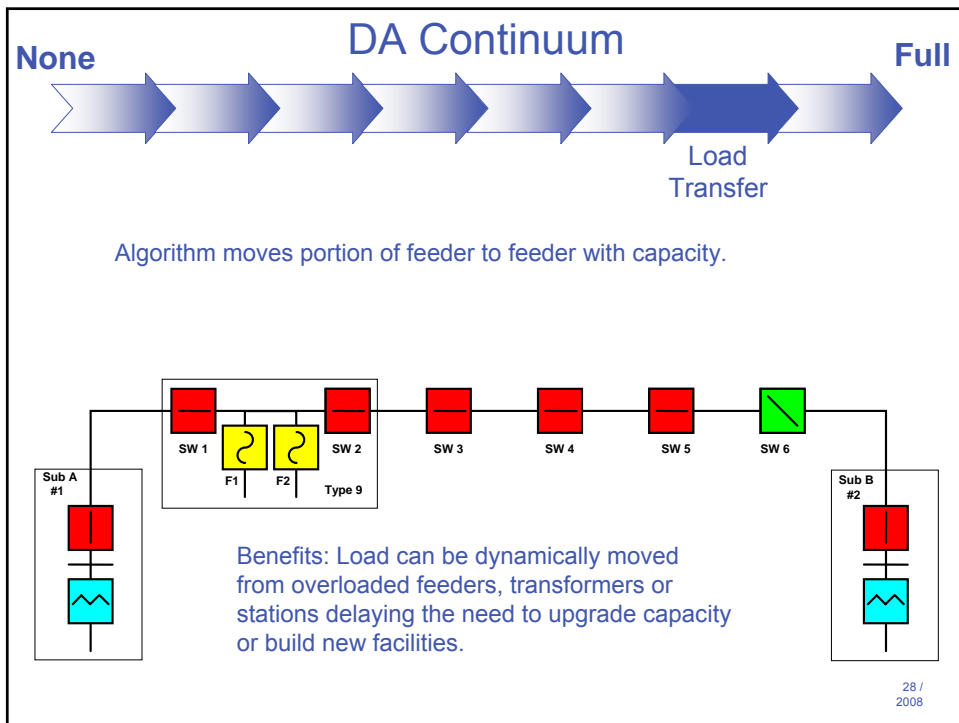
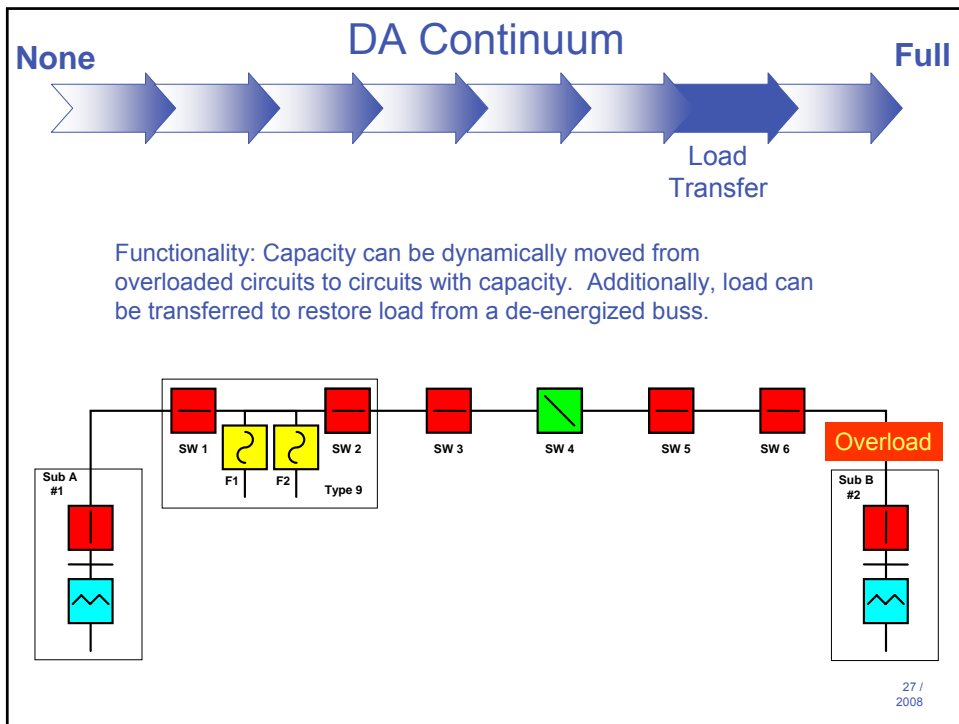


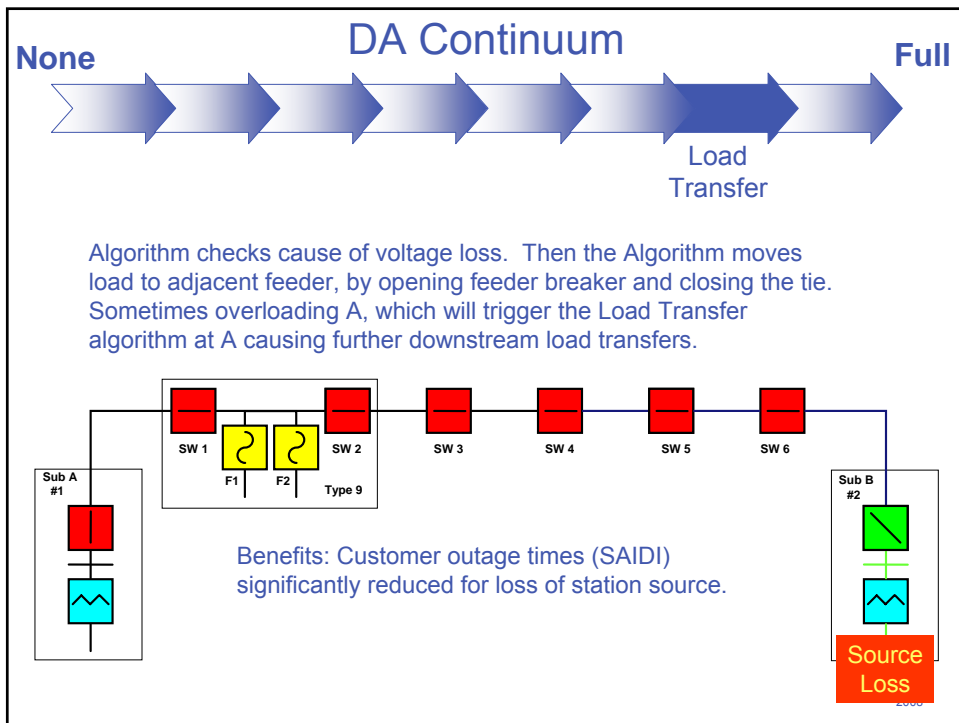
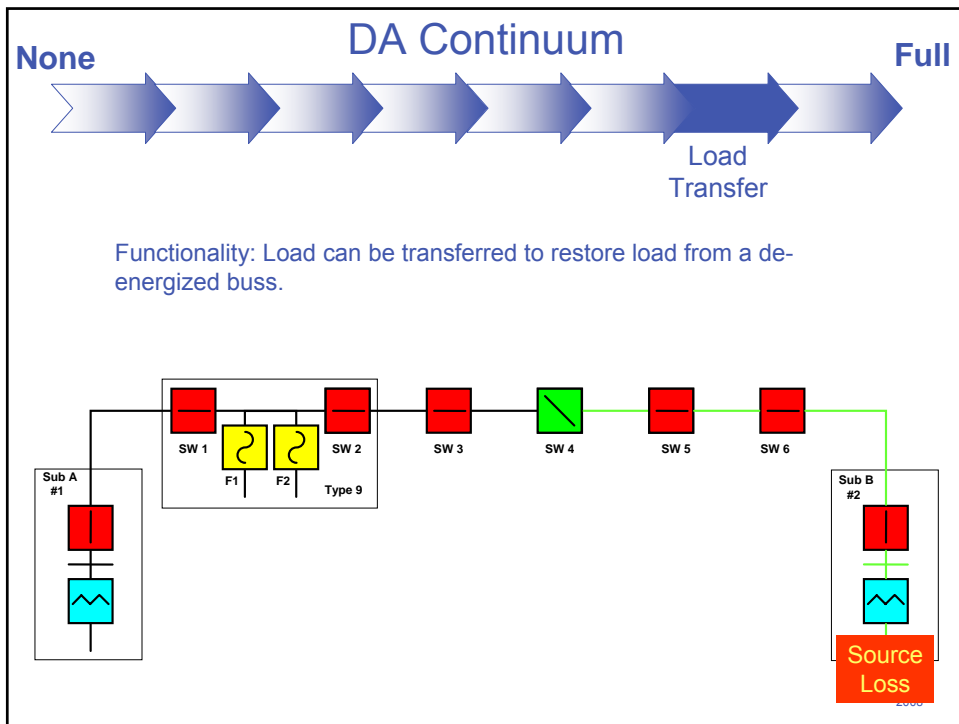




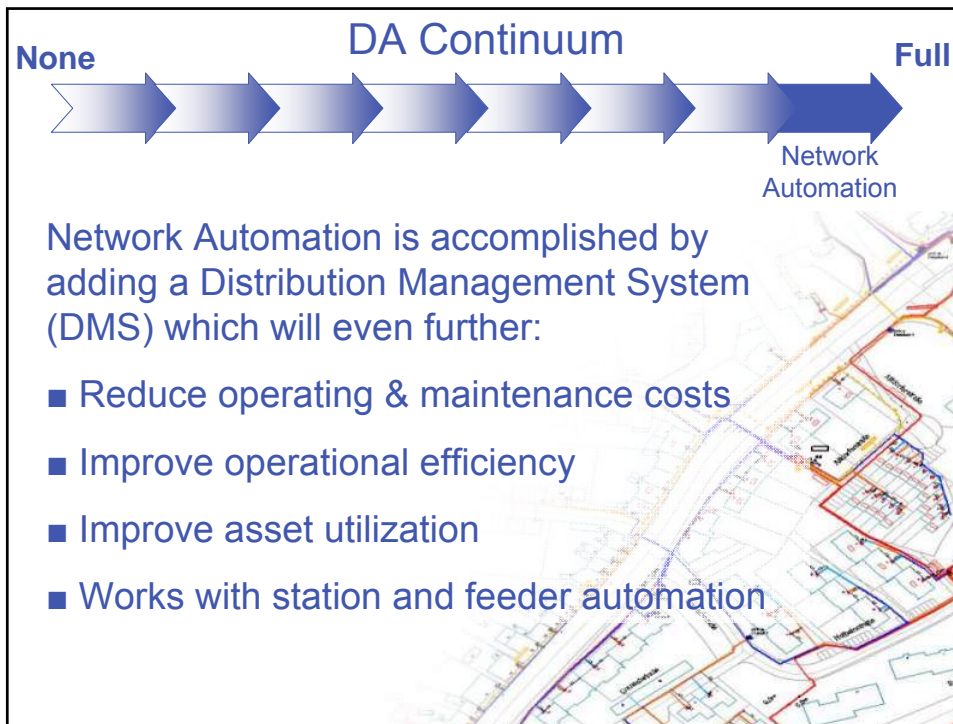












**None** **DA Continuum** **Full**

Network Automation

**Large European Utility**  
*Full DMS Suite of Applications*

- > Over 4 million real time points
- > Modeling over 40 million network components
- > 650 Primary RTUs, 1700 Circuits
- > 6000 Distribution Automation RTUs
- > Serving over 5.5 million customers
- > Commissioned in 18 months

**Impact of Distribution Automation**

**CUSTOMER MINUTES LOST**

Year	SAIDI (Customer Minutes Lost)
2002	85.0
2003	85.0
2004	85.0
2005	85.0

**CUSTOMER INTERRUPTIONS**

Year	SAIFI (Customer Interruptions)
2002	95.0
2003	95.0
2004	95.0
2005	95.0

Performance Data publicly available from Website

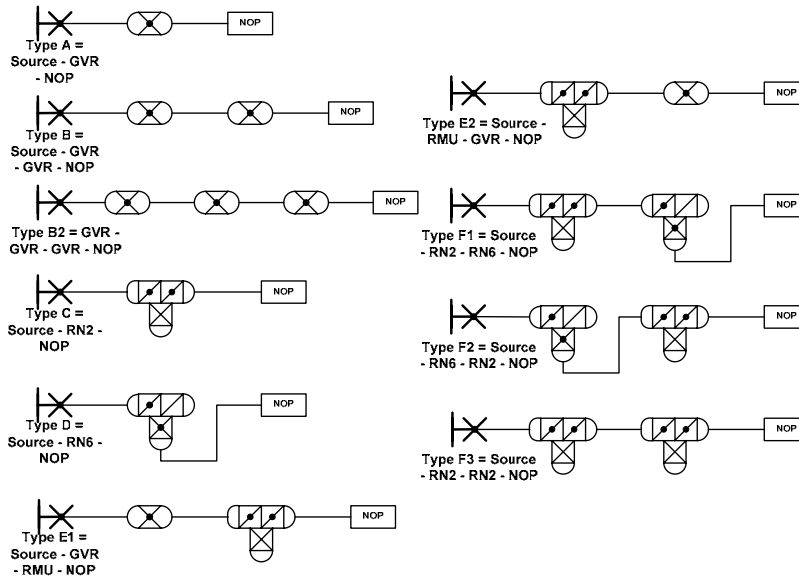
**In first 18 months:**

- 18 Customer Interruptions (SAIFI) saved since automation installed.
- Consistent fast response to restoration of healthy network.
- Improved performance from control engineers.
- Savings in excess of \$3 million.

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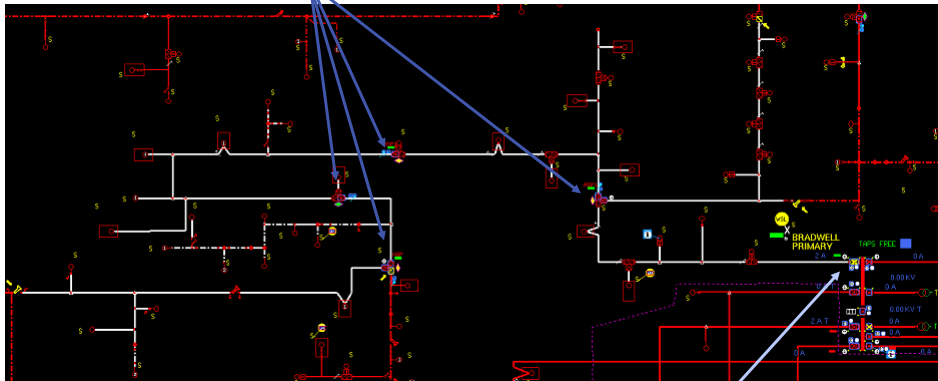
## Standardized Network Models



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## Example Trip and Auto-Sectionalize

Distribution Automation RTUs on this feeder – 3 sectionalize points and one tie point

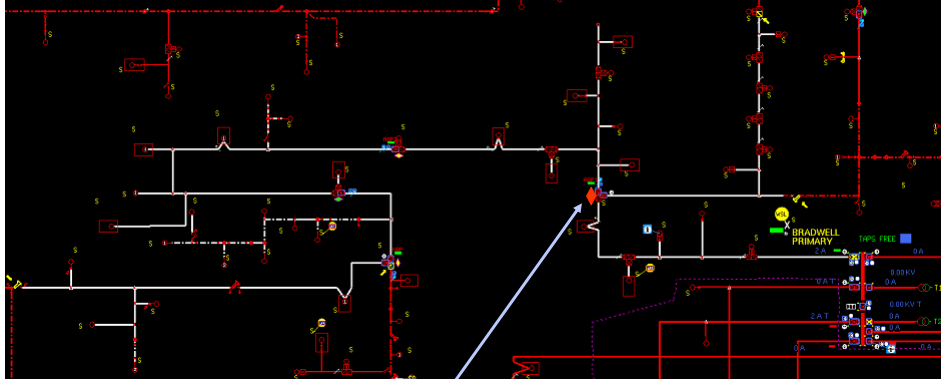


### Feeder Trip detected in 11kv Primary Substation

- Yellow cross indicates Open circuit breaker
- White cable indicates dead section



## Example Trip and Auto-Sectionalize

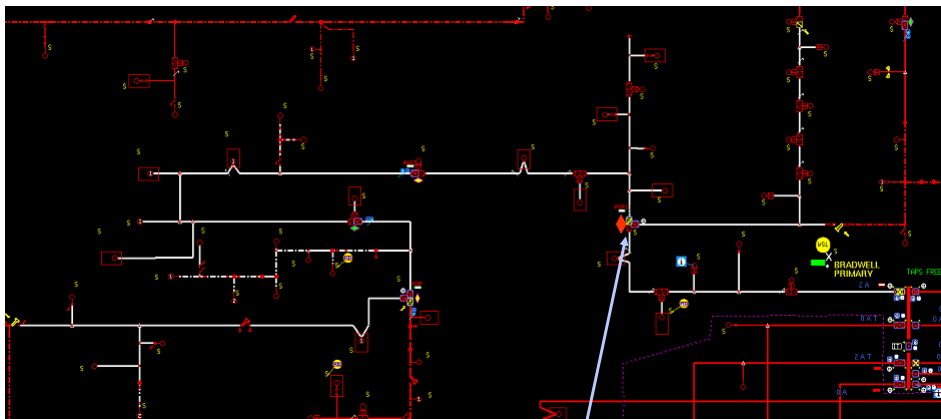


Earth Fault Passage Indicators on each DA RTU are polled via radio

- FCI indicates faulted section



## Example Trip and Auto-Sectionalize

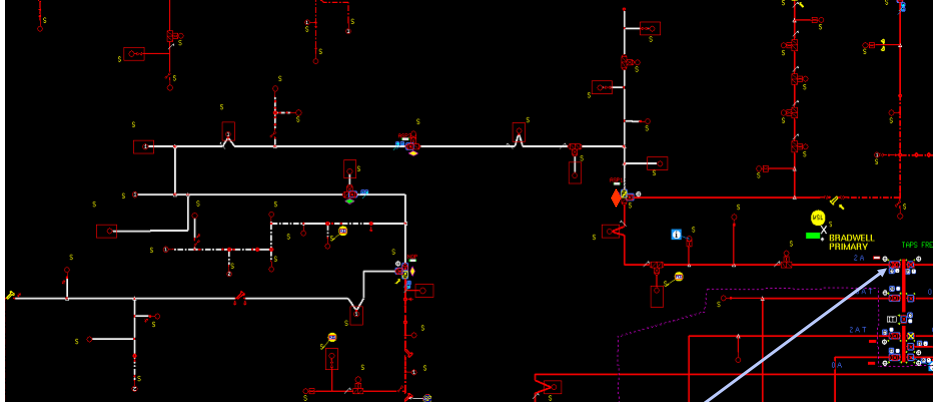


Switch at first sectionalize point opened via radio comms to RTU

- Yellow line indicates open status



## Example Trip and Auto-Sectionalize

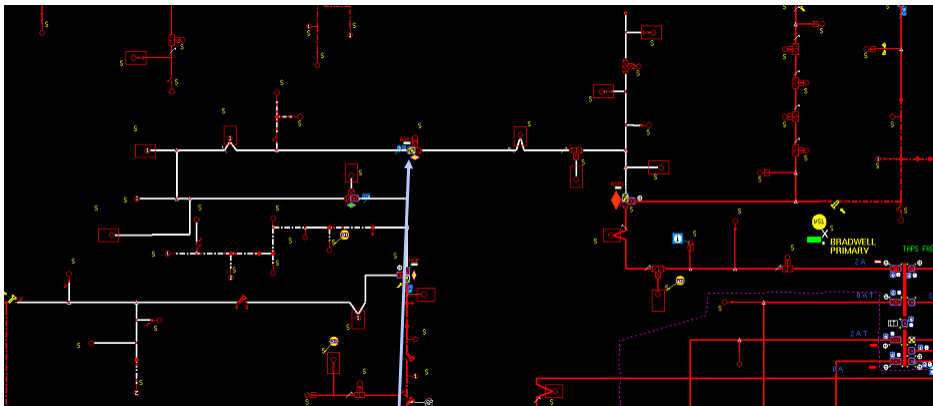


Primary CB Closed via primary SCADA comms

- Red cross indicates closed status
- Red cable indicates live section



## Example Trip and Auto-Sectionalize

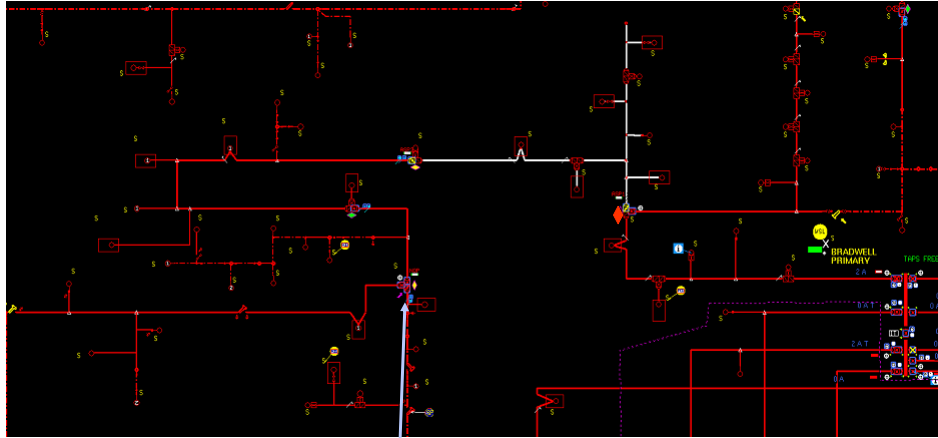


Switch at second sectionalize point opened via radio comms to RTU

- Yellow line indicates open status



## Example Trip and Auto-Sectionalize

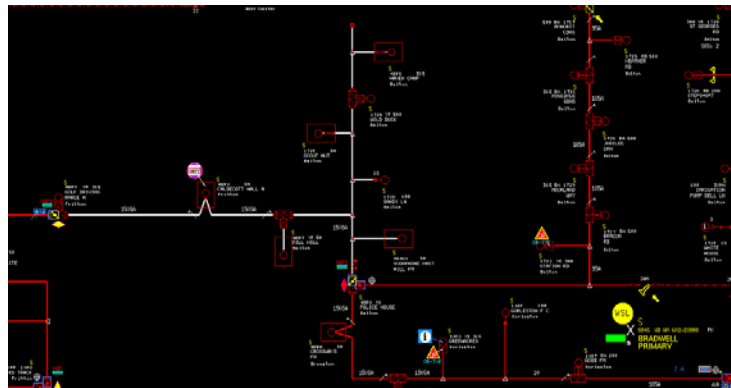


Tie Point closed via radio comms to RTU

- Red line indicates closed status
- Red cable indicates live section



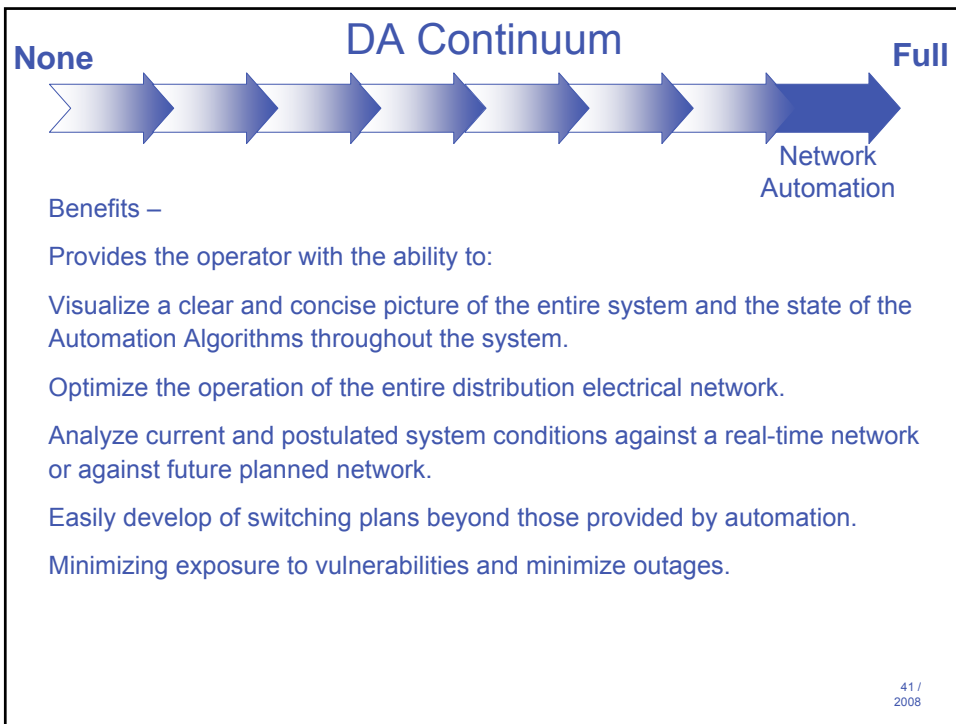
## Example Trip and Auto-Sectionalize



Faulted Section Isolated in 90 seconds

- Time dependant on communications medium. In this example dial-up RTUs are used.
- Crew can be dispatched direct to isolated fault section.
- Outage time under typical "Short Duration" threshold – does not impact SAIFI/SAIDI






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# Thank You

**The Power of Knowledge -  
Distribution Automation**

 **imagination at work**

