Siemens Distribution Feeder Automation (SDFA)

Developed in the USA

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Siemens Distribution Feeder Automation (SDFA)
Defining a Smarter Grid

Feeder Automation
New type of Real-time FLISR System

Volt/VAR, CVR
New type of Real-time Volt/VAR System

NERC CIP Cyber Security

Interoperable Deploy in Greenfield and Brownfield Projects

Highly Adaptive Protection Systems New Protection methods

Comms. Friendly Small Bandwidth

U.S. DOE
Siemens Distribution Feeder Automation (SDFA)
An Entirely New Product Design & System Approach

AUTOMATICALLY LOCATE AND ISOLATE FAULTED LINE SECTIONS
AND RESTORE SERVICE TO HEALTHY LINE SECTIONS (FLISR)

Automatic Primary Switches
- Bridges Vector OH SW
- SDR Reclosers

Automation Controllers + SW
- SIPROTEC 7SJ80
- SIPROTEC 7SC80
- IEC 61850 Protocol
- SW: DIGSI and FASE

Communication
- RuggedCom WiMax
- WiFi
- Direct Fiber

HMI Options
- SICAM PAS CC
- DNP 3.0 Slave
- 7SJ64 HMI
- IEC 61850

Features and Applications
- Peer-to-peer logic and control (no centralized controller)
- Differential measurement technique over comm link
- Automatic Transfer Scheme (ATS) for critical loads
- Fault Location, Isolation and Service Restoration (FLISR)
- Load Management and Load Balancing
- Volt / VAR Control and Voltage Reduction

Benefits
- Keep the lights on! Reduce truck rolls and crew size
- ATS & FLISR at a lower cost than alternative solutions
- FLISR minimizes outage time (Address SAIDI, SAIFI)
- Scalable from small to large projects (ATS to FLISR)
- Compatible with existing SCADA, CBs, reclosers & SWs
- Siemens will supply as turnkey solution

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Typical Network Architecture

Connections Legend:
- IEC 61850
- Cat 5 Ethernet
- Coaxial RF Cable

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Typical Installation

- IP-based peer-to-peer Comm
- Works with any vendor switch or recloser
- Low-cost Automation Controllers
- Compatible with existing protection, Integrates with SCADA and SA
- Optional substation-hardened HMI

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Siemens Distribution Feeder Automation (SDFA)

Key Differentiators & Technological Advances

Industry Practice
- Point-to-Multipoint Communications
- DNP or Proprietary Protocol
- Slow Operation
- Complex Overcurrent Protection
- Rules Based
- Complex Programming (TDC)

SDFA Approach
- IP-based, Peer-to-Peer Communications
- IEC 61850 (with native Peer-to-Peer comm)
- High Speed Operation (suitable for ATS app.)
- Simple Differential Protection (OC backup)
- Distributed PLC Logic Sequences
- Drag-&-drop, point-&-click Programming UI
- Multiple DA Applications
- Common Hardware Platform
- Common Engineering Tool
- Common Communications System
- Adaptive and Storm Settings
- Fault Record Retrieval
- Asset Monitoring
Siemens Distribution Feeder Automation (SDFA)
What makes this a Compelling Solution?

Problem: Keeping the lights on!
- Reduce outage size and duration.
- Locate faults faster with less driving time.
- Reduce crew size to isolate and restore.
- Reduce windshield time, particularly with long distribution lines.

Solution: SDFA allows utilities to “do more with less”
- Fast transfer scheme for critical loads (e.g., hospital or industrial acct.)
- Perform isolation and restoration faster than standard recloser and sectionalizer technology, and sometimes at a lower CAPEX cost.
- Increase billing revenue through fewer and smaller outages.
- Improve customer service – Resolve outages before customer calls.
- Provide the ability to service a larger territory with fewer linemen.
- Make use of adaptive settings for storm conditions to reduce SCADA operator work load.
Siemens Distribution Feeder Automation (SDFA) Supports Multiple DA Applications

Open Transition Mode

Closed Transition Mode

SDFA-ATS

SDFA-FLISR

SDFA-VR

Transformer & Tap Changer
Siemens Distribution Feeder Automation (SDFA-ATS)

Ultra High-speed Source Transfer for Critical Loads

1. Detect Loss of Power Source
2. Disconnect Failed Preferred Source
3. Connect Alternative Source
4. Auto Return to Preferred Source
5. Down Stream Fault Disable Transfer
6. Power Cycles

- Simple and affordable
- Works with third-party reclosers
- Turn-key design and field support
Siemens Distribution Feeder Automation (SDFA-ATS)

Typical Installation

- Power Bus
- Recloser 1
- SDFA Automation Controller 1
- Fiber
- Recloser 2
- SDFA Automation Controller 2
Siemens Distribution Feeder Automation (SDFA-FLISR)
Case Study: A&N Electric Coop

Customer Challenge
- A&N Electric’s distribution network contained a critical hospital load that was manually controlled.
- A fault in connected feeder could lead to a long outage before the system could be reconfigured to supply power to the hospital from an alternate substation source.
- Other restoration solutions were considered too slow.

Siemens Solution
- SDFA is a new type of DA solution for protecting and automating distribution feeders using open standards.
- High-speed Fault Location, Isolation & Restoration.
- Uses conventional Siemens hardware & industry-standard IEC 61850 integration methods and software.
- Siemens developed high-speed restoration logic and new graphical feeder automation configuration wizard.
- First use of IEC 61850 over WiMax for DA application.

Customer Benefits
- Isolate and restore faster than alternative solutions.
- Minimize outage time and dispatch expenses.
- Eliminate hospital’s need to implement downtime procedures when no SDFA was available.
- Improve customer service – Resolve outages before customers call.

Distribution Network Reliability

Siemens Distribution Feeder Automation (SDFA)

Minimized Downtime & Faster Restoration

Customer Challenge

Siemens Solution

Customer Benefits

Fault Isolated & Power Restored Using SDFA
Hospital Downtime Procedures Implemented when no SDFA was Available
Field Crew on Site
Crew Travel Time
Crew Repair Time
Feeder Back to Normal Operation

Fault Occurs

16 – 30 Minutes
16 – 45 Minutes

SDFA Restores Power in 300 milliseconds
Siemens Distribution Feeder Automation (SDFA-VR)

**Typical Installation**

**Communication**

- (RuggedMax WiMax)
- (Siemens SCALANCE WiFi)

**Automatic Controllable Switchgear**
- Vector OH Switch
- Capacitor Bank

**Control Cabinets**
- Capacitor Control
- Tap Change & Feeder control

**Automation Controllers**
- 7SJ64 Tap Change 7SJ80 Line End, Cap, Feeder
- PLC Functionality
- IEC61850

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**Smart Grid Division**

Infrastructure & Cities Sector – Smart Grid Division

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Siemens Distribution Feeder Automation (SDFA-VR)

Typical Network Architecture
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Turnkey Design and Delivery

- Project Management
- Engineering
- Production
- IEC 61850 System Test
- Support
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Support Services

FAT Tests

Field Startup Support

Training

After Sales Technical Support
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Why SDFA?

- Performance Operational Speed
- Scalable Automate in Manageable Steps
- User Friendly Programming Tools Graphic Drag / Drop
- Optional HMI Real-time Operational & Non-Operational
- Smart Grid Ready Automation & Protection in Synch
- Interoperable Works with 3rd-party Vendor Equipment
Thank you for your attention!