SIEMENS

A&N Electric Cooperative

Smart Grid distribution feeder automation system improves service reliability

Smart Grid

Project summary
Siemens Smart Grid Division, together with A&N Electric Cooperative (A&N) and RuggedCom, Inc., successfully deployed an ultra high-speed distribution feeder automation (DFA) system that improves service reliability for the only hospital serving the eastern shore of Virginia: Riverside Shore Memorial Hospital in Nassawadox, Virginia.

The combined Smart Grid DFA solution allows for optimized fault detection, isolation and restoration (FDIR), minimizing the extent of power outages by quickly isolating affected areas.

Feeder automation reduces the impact of outages
Riverside Shore Memorial Hospital is critical to the surrounding community – they needed a way to reduce the impact of outages caused by numerous automobile collisions.

The Siemens distribution feeder automation-decentralized system (SDFA-DC) meets the needs of the community by detecting faults, isolating problems and transferring to alternative power sources in less than half a second.

Scalable approach
A&N plans to use Siemens technology to expand automation to other distribution feeders as time and finances permit. In addition to its high operating speed, A&N chose the Siemens approach because of its scalability. A&N can purchase a minimum amount of equipment to target critical needs and maximize their investment.

Customers can focus on what they do best
Mike Canales, director of facilities at Riverside Shore Memorial Hospital says, "We expect most service disruptions to be so short that they won't be visible to our patients. Our staff will be able to focus on caring for patients without the distraction of checking on equipment or implementing downtime procedures. This is just one of several examples of A&N's efforts to make a difference here on the eastern shore of Virginia."

Achieving high-speed operation by detecting faults
The SDFA-DC system achieves high-speed operation by detecting faults using Siemens SIPROTEC™ protective relays located at each feeder section point – continuously comparing upstream- and downstream-line current conditions.

When a comparison reveals a differential exceeding predefined parameters, the affected relay issues a fault notification to all other relays in the system. The relays then direct switching devices to reconfigure the feeder, isolating the fault and transferring viable line sections to another substation power source when necessary.

System communications are handled by standard WiMAX wireless links consisting of RuggedCom's RuggedMAX™ base stations and subscriber units.

Before commissioning, Siemens and RuggedCom engineers determined that WiMAX's wide bandwidth and near-line-of-sight propagation characteristics would provide an ideal communication platform for critical, high-speed feeder automation applications.

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Distribution feeder automation helps maintain critical service for Virginia hospital

High-speed, uninterrupted service
The effective, seamless nature of the Siemens SIPROTEC protective relays and high operating speed assists in allowing for uninterrupted service during the reconfiguration.

SDFA feeder automation system
The Siemens type SDFA feeder automation system acts as an extension to a substation. The system performs the functions of fault detection, isolation and restoration (FDIR).

The type SDFA-DC system uses an open standard for communications among all the intelligent devices within the loop. Through high-speed, peer-to-peer communications over Ethernet, the system is capable of providing extensive decentralized automation.

SDFA features
- Intelligent-loop topology
- Ethernet backbone with peer-to-peer communications over a variety of platforms (fiber, IP-based radio, etc.)
- Open standard and not a proprietary system (IEC 61850)
- Automatic FDIR to normal
- Multiple management locations
- Real-time SCADA information
- Graphical display via human-machine interface (HMI)
- Programmable restoration logic

- Intelligent high-speed fault detection
- Monitor ANSI class A violations
- Load data trending reports available
- Integration into remote terminal unit (RTU) and substation automation (SSA) systems
- Remote setting changes to allow grid flexibility
- Complete loop fault recording for class A violations
- Flexible system allows for expansion via "cut-and-paste" system
- Faster fault detection, clearing and isolation
- Immediate automatic restoration
- Single communication standard for operational and non-operational data transfer
- Easily integrated into SCADA systems
- Advanced monitoring features
- Secure fail-safe functionality

The Siemens Smart Grid division supplies products and solutions for intelligent and flexible electrical network infrastructures. To meet growing energy needs, the networks of today and tomorrow must integrate all forms of power generation and ensure bi-directional energy and communication flows. Intelligent networks help make it possible to generate and use power efficiently and on demand. They contribute to the electrification of railroads and also supply industrial enterprises, infrastructure elements and entire cities with electricity.

A&N Electric Cooperative (www.anec.com) is based in Tasley, Virginia and serves Accomack and Northampton counties on Virginia's Eastern Shore, and Smith Island in Somerset County, Maryland.

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