GE

Grid Solutions

GridNode

High-Speed Falling Conductor Protection

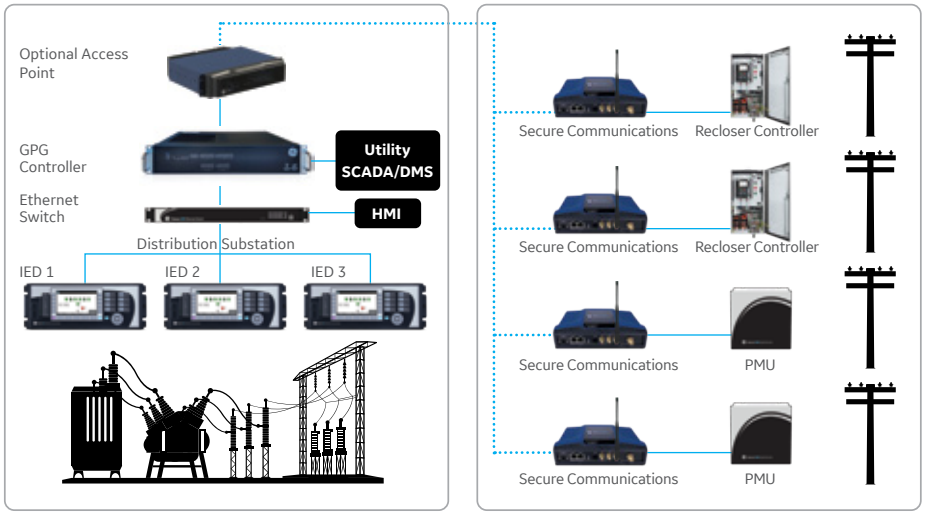
GE's GridNode High-Speed Falling Conductor Protection provides a reliable solution to detect and isolate broken overhead line conductors using secure wide-area measurements.

When an overhead power line breaks, the energized conductor falls to the ground or surrounding objects causing a high-impedance fault and/or arcing. For over 20 years, the industry has relied on negative-sequence current (I2/I1) principles to detect a broken conductor. However, with the increasing penetration of Distributed Energy Resources (DERs) and depending on the number of loads and/or presence of single-phase loads connected to a line, this solution is no longer an efficient method of protection.

GE's GridNode High-Speed Falling Conductor Protection offers an evolution to falling conductor monitoring and protection by delivering enhanced reliability, speed, and performance needed for today's distribution networks.

Key Benefits

- Reliably identify broken overhead lines and trip corresponding breakers or block a recloser under 500ms prior to the conductor touching the ground
- Easy deployment with no coordination required with existing protection
- Minimize customer impact with coordinated operation to isolate the broken line
- Increased flexibility through the ability to accommodate high DER penetration
- Prolong asset life by preventing potential damage caused by unnecessary reclosing
- Increased reliability with the capability to detect broken conductors in low load branches as well as feeder end
- Enhanced reliability through real-time adaptive settings
- Low implementation costs by leveraging existing digital protective relays



GridNode HFCP architecture

Advanced Protection & Communications

- A reliable and tested protection algorithm using wide-area measurements
- Utilizing secure and standard communication protocols
- Secure method to short-circuit faults
- Deployed over industry standard communication media (fiber optic, radio (licensed or unlicensed) or cellular

Simplified Deployment

- No coordination with existing protection devices required
- Scalable solution based on system requirements
- Supports up to 10 feeders per GPG unit

Ease of Use

- Simplified configuration with graphical-based software
- Advanced visualization providing downed conductor location on geographical map
- Alarm, events, trending and file archiving

Associated Hardware and Software

- GridNode High-Speed Falling Conductor Protection function block and configurator
- GPG Controller
- Optional/Enabling Hardware
  - Reason S20 Switch
  - Reason RT430/434 Precision Time Clock
  - MDS Orbit Radio
  - Multilin F60 Feeder Protection System with Phasor Measurement Units (PMUs)

GridNode High-Speed Falling Conductor Protection Services

GE's GridNode High-Speed Falling Conductor Protection solution is a scalable system that provides reliable and fast detection of broken falling conductors in distribution system. GE's Advanced Applications Services team provides the following engineering and consulting services as part of the solution.

CONSULTING	PMU placement assessment and support Deployment strategy
COMMUNICATIONS	Network and communications system design Hardware specification
ENGINEERING	System configuration; Settings development Cybersecurity
FACTORY TESTING	Factory acceptance testing including Hardware-in-the-Loop (HIL) testing and validation
INSTALLATION & SITE INTEGRATION	Field services; Site integration services Communications, network, and I/O testing
TESTING & COMMISSIONING	Site acceptance testing and performance validation
TRAINING & SUPPORT	Master service agreement to help maintain the accuracy of the operation following network topology changes

GridNode High-Speed Falling Conductor Protection Solution - Hardware specifications

- Certification: IEC 61850-3, IEEE 1613, CE, FCC Class A, UL, CCC
- Mounting: 2U/19" Rack mount
- System Design: Fanless, with no internal cabling
- OS Support: Windows and Embedded RTOS VxWorks for critical real time
- Power Consumption: 19W/220VAC or VDC (Typical)
- Power Supply: Redundant 100 ~ 240 VAC (47 ~ 63 Hz)
  DC: 100 ~ 240 VDC DC: 48VDC with isolation protection
- PRP & HSR Ethernet redundancy
- Two expansion slots to increase serial and Ethernet port types and quantity

GridNode High-Speed Falling Conductor Protection Solution - Additional Components

Multilin F60 Feeder Protection System with Phasor Measurement Units

Reason S20 Managed Ethernet Switch

Reason RT430/434 Precision-Time Clock

MDS Orbit Radio

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