GE
Grid Solutions

# PowerNode Fast Load Shedding

PowerNode Fast Load Shedding (FLS) is a remedial action system for industrial facilities that prevents the electrical system from collapsing when there is a sudden loss of generators, utility infeed, or batteries.

## Facility Challenges

Industrial facilities often have multiple sources of power to support their operational needs which can include on site generation as well as power being supplied by the utility. When a plant experiences a loss of one of these power sources, the remaining power generation may not be able to support the existing plant loading and result in an unplanned shutdown. These unplanned shutdowns can have a very significant impact in the plant's productivity and availability, causing significant losses in revenue when they occur.

## GE's Fast Load Shedding Solution

GE's PowerNode Fast Load Shedding (FLS) system has proven to maintain electrical system stability after a plant experiences a loss of one or more of its generation or utility sources. Pulling real-time information from the plant loads and generation sources, GE's dynamic fast loadshed system can detect a generation contingency and trigger actions that will shed the minimal amount of load needed to compensate for the lost generation. Using IEC 61850 GOOSE messages, GE's FLS can initiate loadshed actions within 15 ms in both islanded and non-islanded situation.

## Key Benefits

- **Reduces unplanned downtime impact:** With operating times of less than 15 ms, GE's FLS significantly reduces unplanned downtime and all associated loss of material & production, potential equipment damage and environmental impact.
- **Scalable:** Can expand from very small systems to facilities consisting of thousands of different loads. Utilizing up to 128 different groups of loads, GE's FLS system can support changing the loadshed priority of these groups depending on current plant conditions.
- **Flexible:** Utilizing the embedded HMI, plant operations can easily be monitored by local operators allowing to change the priority of any load group in real time.
- **Vendor Agnostic & Integrates with P&C IEDs:** GE's FLS solution uses IEC 61850 GOOSE messages and other standard protocols in existing P&C relays to minimize installation time and cost of the overall solution.
- **Easy Future Expansions:** New load can be easily added to the load shedding scheme to accommodate future system expansions.

## Fast Load Shedding

- Trigger load shedding in less than 15 ms
- Shed minimal amount load to compensate for lost generation (Dynamic)
- Supports up to 128 loadshed groups
- System Scalable to 1000's individual loads
- Utilizing IEC 61850 GOOSE for achieving high-speed operation

## Fast Operating Modes

- Dynamic Load Shedding
- Static Load Shedding
- Secondary load shedding functions can be included such as undervoltage, and underfrequency overpower

## Solutions and Services

- System study of plant load characteristics
- Development of load shedding system
- System validation and hardware-in-the-loop (HIL) testing
- Site integration and commissioning
- Customize operator HMI
- Cyber security evaluation & deployment
- Long term maintenance and support

## Supports most Industry Protocols

- IEC 61850, DNP3, IEC 101/104

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## PowerNode Fast Load Shedding Solution Architecture

- P&C relays send load/infeed power measurements and their availability to the GPG FLS controller using IEC 61850 GOOSE messages or other legacy protocols .
- GE's FLS controller receives notification of a loss of an infeed from the P&C relays using IEC 61850 GOOSE messages.
- Based on the priorities set by the operator, the FLS algorithms will dynamically shed only the loads groups needed to match the amount of generation lost.
- GE's algorithms have been verified and validated to operate in under 15 ms from the time the loss of infeed has been

detected.

- For additional reliability, GE's FLS system can be designed to use redundant Fast Loadshed controllers.

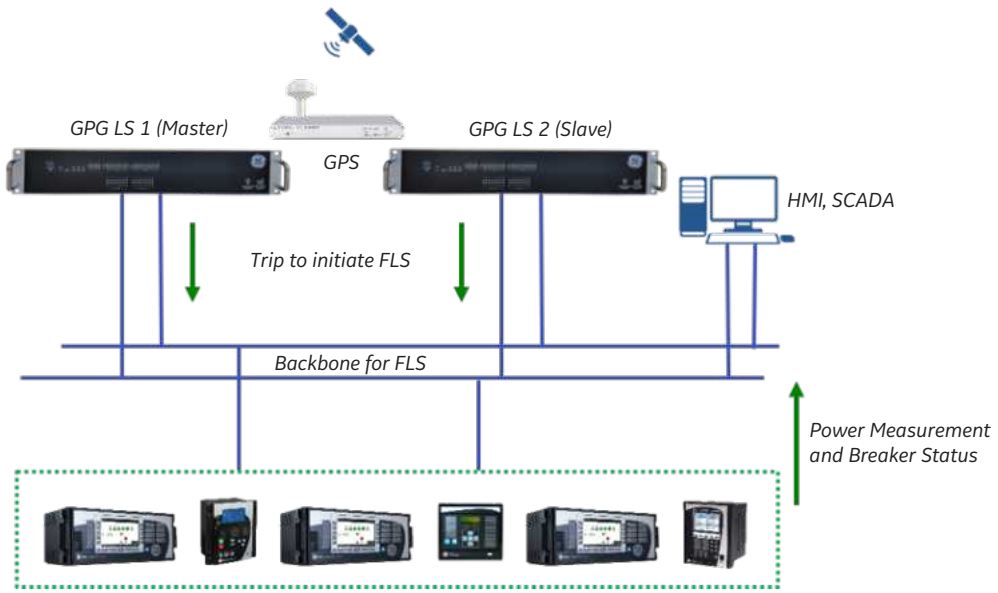
In addition to its dynamic loadshed algorithms, the GPG FLS controller can also be configured to operate in more traditional loadshed schemes. The GPG FLS controller also supports static loadshedding based on pre-defined scenarios as well as secondary load shedding that can include undervoltage, underfrequency and overpower triggering to react to changing power conditions.

## Hardware Specifications

- Certification: IEC 61850-3, IEEE 1613, CE, FCC Class A, UL, CCC
- -20 °C to 70 °C operating temperature
- Mounting: 2U/19" rack mount
- System design: Fanless, with no internal cabling
- OS Support: RTOS VxWorks and Windows Embedded.
- Power Supply: Redundant 100 ~ 240 VAC (47 ~ 63 Hz) DC: 100 ~ 240 VDC DC: 48VDC
- PRP & HSR Ethernet redundancy.
- Two expansion slots to increase serial and Ethernet port types and quantity.

## Communication Protocols Supported

- IEC 61850 Server/Client Ed.1 and Ed.2 (MMS and GOOSE)
- C37.118 and IEC 61850-90-5 Synchrophasor Protocol.
- IEC 60870-5-101/104 Server/Client.
- DNP3 Master/Slave RTU and TCP
- IEEE 1588, Irig-B and NTP client time synchronization
- Modbus RTU/TCP Master/Slave.
- IEC 6070-5-103 Master.
- OPC DA & AE Server/Client.
- OPC UA Server
- EGD Producer

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