

Multilin 8 Series – Application Note



GE's Multilin™ 850 Feeder Protection System is part of the Multilin 8 Series platform of protection relays that share common hardware, firmware and PC Setup Software. Other relays in this platform include the Multilin 869 Motor Protection System, Multilin 845 Transformer Protection System, Multilin 889 Generator Protection System, and will include other protection devices in the future.

Advanced, Fast and Redundant Communication Architecture & Cyber Security for NERC/CIP Compliance

The Multilin 850 relay is well equipped with advanced communications options which meet and exceed the needs of industrial and distribution utility applications. The base CPU supports Modbus protocol through a RJ-45 Ethernet port, USB and serial, as well as over a secure Wi-Fi connection. Once the communications module option is specified and added to the base unit, the single RJ-45 Ethernet port becomes disabled and replaced with two Ethernet ports on the communications module. This enhanced communications provided advanced communication capabilities including support for IEC61850, IEC62439 Parallel Redundancy Protocol (PRP), and IEEE 1588 Precision Time Protocol. The Multilin 850 is also equipped with one serial port. The rear COM1 port type is selected when ordering: either the RJ-45 Ethernet or RS485 Serial port. Modbus, DNP3, IEC 61850, IEC 60870-5-104, IEC 60870-5-103 are all supported by the Multilin 850 protection relay.

1. WIFI

The Multilin 8 Series platform features a secure Wi-Fi connection, which can be used to configure devices from the EnerVista™ Multilin™ 8 Series Setup Software PC application on the laptop, if the laptop is capable of Wi-Fi communications. By using Wi-Fi, instead of wired LANs for setup purpose, several advantages, both technical and commercial, may be noted:

- The operation of the devices is nonintrusive. Operators may connect their laptop to the wireless LAN without the need to be in the physical proximity to the Multilin 850 relays.
- There is also increased safety for operators, as they don't need to work in close proximity to high voltage equipment, while operating the Multilin 850 devices.

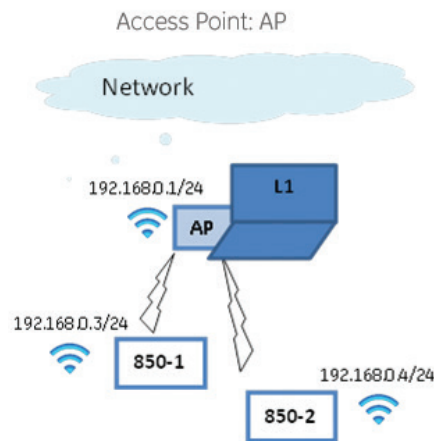


Figure 1.
Example of Wi-Fi Deployment for Multilin 850 devices.

2. Cybersecurity

The Multilin 8 Series offers two levels of security: standard security available in the base offering and advanced security (CyberSentry™) options, available as a selectable option.

With the standard security features, the system supports a strong authentication type, based on the concept of Role Based Authentication Control (RBAC). RBAC allows for different access levels, as appropriate for the user function(s) at hand, such as segmenting administrative functions away from common operator functions. Another feature common to both security types is the enforcement of password complexity, as outlined by security best practices. This feature may be enabled on Multilin 850 devices as required by each application.

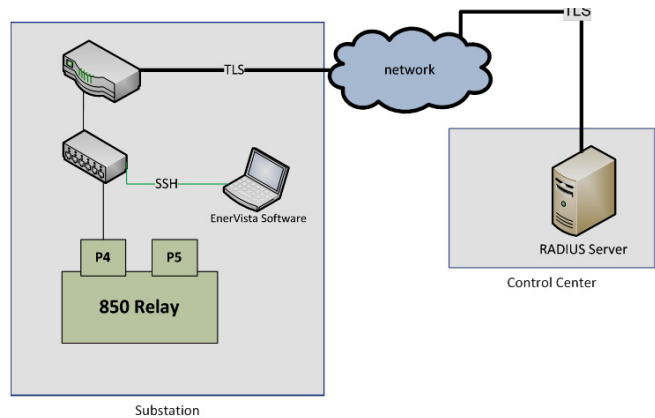


Figure 2.
Example of CyberSentry deployment within Multilin 850 devices.

CyberSentry introduces additional features based on NERC CIP and NIST NISTIR 7628 cyber security requirements, which are important both for providing very strong protection against cyber-attacks, as well as for compliancy purpose.

3. Time Synchronization

The Multilin 850 is capable of receiving a time reference from several time sources in addition to its own internal clock, for the purpose of time stamping events, transient recorders and other event occurrences within the relay.

The Multilin 850 provides an internal clock, SNTP, IRIGB and IEEE 1588 (precision time protocol-PTP) as potential time references. SNTP delivers times in the order of milliseconds, IRIG-B in microseconds and PTP nanoseconds. If two or more time sources are setup, the time source with the higher priority, as shown in Table 1, is used, where 1 is considered to be the highest priority.

Time source	Accuracy	Priority
PTP		1*
IRIGB		2*
SNTP		3
Internal Clock		4

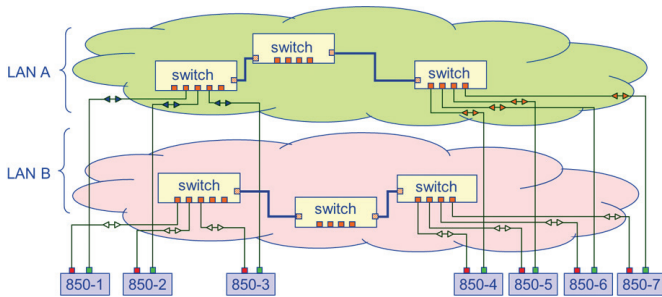
Table 1.

Time synchronization sources available in Multilin 850.

New Precision Time Protocol (PTP) defines a method for precise synchronization of clocks in distributed network systems. The 850 relay supports IEEE 1588 version 2. The relay meets the time accuracy requirements of IEC 61850 5 Ed2 clause 11.1.3.3 time synchronization class T5 ($\pm 1 \mu\text{s}$) given an error-free timing input and stable temperature.

4. Parallel Redundancy Protocol (PRP)

PRP is a type of active redundancy that uses devices with two ports connected on two independent networks and sends the same data through both ports. This is known as parallel redundancy and it offers zero time recovery, which is a must for real time protection & control applications. The two protocols in this category are defined in IEC 62439-3 and they are the Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR). The current version of the standard is edition 2.0 released in 2012. The 850 relay supports PRP across the two Ethernet ports the advanced communications module is equipped with.



5. IEC 61850

The optional advanced communications processor supports both the IEC61850 protocol GOOSE messaging and server service as per edition 2 of the standard. The GOOSE messaging service allows the 850 relay to exchange digital and analog information with other relays supporting the same service while the server support allows IEC61850 SCADA and HMI devices access to the relay for monitoring and control. The 850's IEC61850 GOOSE implementation supports the IEC61850 GOOSE service. The configuration of IEC61850 services is accomplished using the EnerVista Multilin 8 Series Setup Software.

The 850 relay supports 3 GOOSE transmissions, with up to 64 digital/analog items per GOOSE. Any digital/analog value existing in the 61850 logical nodes can be assigned to a transmission item. The 850 relay supports 8 GOOSE receptions, with up to 64 digital items per GOOSE that can be mapped into any of the 96 remote inputs.