

# Grid IQ™ Network Communications Platform

## Enabling Utilities to Efficiently Build & Deploy Grid Modernization Systems

GE has been leading the way from the beginning. Our history, knowledge and contributions to the electric industry have been unsurpassed in the last 125 years. Our legacy continues to strengthen with solutions that automate the 21<sup>st</sup> century Electric Grid and deliver efficiencies for energy generation, transmission, distribution, control and utilization.

To successfully automate and implement a next generation communications network, a major objective for Utilities is to build a secure, future-proof and scalable infrastructure. Based on broad domain industry expertise, GE has designed the Grid IQ™ Network Communications Platform to assist Utilities in achieving this critical objective.

The Grid IQ Network Communications Platform provides an end-to-end infrastructure that creates a common, multi-use network solution across an entire service territory. With real-time connectivity, monitoring and control applications, GE provides Utilities a secure and flexible network with abundant system capacity that efficiently scales to support future applications.

Components of the Grid IQ Network Communications Platform include industrially hardened fiber and wireless communications that stretch from the network edge to the back office, a network management solution that provides advanced management of the entire network, and standards based cyber security surrounding the entire system.

### Key Benefits

- Extend and maximize legacy investments by facilitating the migration to next generation, multi-use, all IP technologies
- Increase automation, management and control with an all IP-based network
- Improve the operational efficiency and reliability of grid applications
- Simplify management and reduce costs in a large-scale communications network
- Enable end-to-end security with NERC/CIP compliance

### Applications

- Connectivity for Advanced Metering Infrastructures (AMI), Energy Management Systems (EMS), Distribution Management Systems (DMS) and Outage Management Systems (OMS)
- Distribution and substation automation
- Real-time protection and control for Distributed Energy Resources (DER)
- Connectivity for transmission, distribution and SCADA automation applications
- Mobile work force connectivity



## Multi-Use Communications

- Minimize CapEx/OpEx by consolidating multiple networks
- Embedded gateways provide easy integration of legacy devices
- Capable of covering large areas within urban, suburban and rural settings
- Secure gateways support Utility protocols

## End-to-End Security

- Complies with NISTIR 7628 cyber security guidelines
- Standards based FIPS 140-2 compliant devices
- Role-based access control and event logging

## Scalable & Reliable

- Quality of Service (QoS) enables low latency and high availability
- Automated network and configuration management
- Long range, low power battery options

## Industrially Hardened Equipment

- All devices IEEE 1613 certified for use in electric power substations
- Extended temperature ranges -30°C to +70°C

## Standards Based

- Supports Utility protocols including DNP3, IEC61850, IEC60870 and Modbus
- End-to-end standards based IPv4 Infrastructure

## Automating the 21<sup>st</sup> Century Grid

Automation meets Information Technology (IT) with the current electrical infrastructure, helping Utilities support the energy needs of our 21st century society by optimizing supply and demand.

Power automation technologies, combined with real-time communications, provide knowledge and decision-making tools that save energy, resources, money and the environment. More specifically, the systems enable existing devices to be combined with next generation hardware and software that together, works to:

1. Enable the integration and optimization of more renewable energy, such as wind and solar, and plug-in electric vehicles.
2. Drive significant increases in grid efficiency through Volt/VAR control and peak reduction through demand response.
3. Reduce down time and increase reliability through monitoring.
4. Empower consumers to manage their energy usage and save money without compromising their lifestyle.

These system improvements will be obtained using next-generation grid applications connected on a secure, all IP infrastructure.

## The Challenge of Legacy Systems

Legacy power grid networks were constructed using polled, narrowband radio networks that support a single monitoring and control application without the capacity to scale. Limitations of legacy networks include:

- Lack of security
- Limited element management
- Limited system capacity
- Inability of multiple applications to share a common set of end points

## The Future of Automated Power Systems

Future systems must leverage legacy systems because they cannot be cost-effectively upgraded or replaced to take advantage of emerging standards. The mechanisms that bridge legacy systems must maximize the benefits of interoperable standards and minimize the delays and expense involved with implementing new standards.

Future systems require open and interoperable networks that enable multi-use, all IP networks. These systems need to provide secure connectivity with sufficient bandwidth, low latency and Quality of Service (QoS) to enable multiple, simultaneous users and grid applications. Although a single IP network is required, a hybrid set of communication technologies needs to be seamlessly integrated to create an end-to-end multi-use communications solution.

## The Grid IQ Network Communications Platform

GE's Network Communications Platform enables the mission critical applications required to meet power automation needs. The solution enables Utilities to build a single network infrastructure for connectivity to existing and emerging applications.

A solution capable of connecting the grid requires blending communications technology in a way that meets the varying needs for bandwidth and latency while at the same time providing uniform network management in a secure, end-to-end system.

## Network Communication Devices

GE's industrial strength network communication devices are extremely scalable, utilize a common SNMP based network management system, and provide FIPS 140-2 compliant security standards to authenticate and network users. The communication is built using a portfolio of IP-based networking devices, including:

- Fiber and wireless high capacity backhaul products
- Hardened Ethernet switches and serial extension
- Narrowband licensed and unlicensed wireless access technology for non-real-time monitoring and battery powered applications



Furthermore, the solution is integrated on a common management and security platform that enables NERC/CIP compliance across the network.

## Network Management Software

New, unified network and element management systems are required to manage larger and more complex multi-use networks that span a Utility's entire service territory. These systems use a policy-based approach to configuring devices and managing QoS and security. These systems also have a rich set of tools to perform fault, configuration, performance and security management, as well as facilitating network planning and risk mitigation.



## Consulting, Design & Engineering Services

GE's broad industry knowledge and technical expertise can provide Utilities with the services required to deploy a multi-use communications network.

GE can manage the process from start to finish, generate system specifications, build network infrastructure and work with key strategic partners to help ensure interoperability and adherence to common standards.