

GE
Digital Energy

Industrial Communication Solutions for the Oil & Gas Industry



imagination at work

Industrial Communications

For over twenty-five years, GE has provided rugged communication networks for leading Oil and Gas, Industrial and Energy companies around the world.

As an industry leader in deploying communication networks with exceptional reliability, GE's reputation for delivering the highest quality products is unsurpassed. With extensive domain expertise in networking applications in harsh, industrial environments, GE provides Oil and Gas companies best-in-class solutions from the industry experts.

From hardened wireless devices to industrial-grade fiber multiplexers and Ethernet switches, GE provides a broad range of industrial products delivering end-to-end communication networks that scale to meet our customer's unique requirements.

GE's capabilities extend to purpose-built network management providing IT departments with the tools specifically designed to proactively monitor and manage their communication assets.

With an installed base exceeding one and a half million devices worldwide, Oil and Gas companies rely on GE's communication networks every day to attain operational targets and meet efficiency goals.



Industry Challenges

Oil and Gas operations around the world may vary in scale or scope but common to all is the need to collect and deliver actionable information to meet critical production, operational, safety and environmental requirements.

The Oil and Gas industry faces a variety of challenges to meet enterprise objectives, including:

- Improving efficiency and return on investment in the face of increasing global competition and a scarcity of natural resources and raw materials.
- Increasing productivity, reducing outages, and effectively managing assets while utilizing and maintaining an aging or evolving infrastructure.
- Reducing the cost and complexity of meeting regulatory compliance and reporting requirements.
- Maintaining safe, reliable operations often with reduced resources.
- Meeting mandated and changing safety and security requirements.

Industry Goals

Major objectives for Oil and Gas companies are to maintain production and ensure continuous operation. This requires a broader awareness of field assets, the ability to access increasing amounts of data from multiple locations and deliver actionable information to numerous stakeholders in order to meet the following industry goals:

- **Maintain Reliable and Safe Production** - to meet enterprise performance targets, achieve operations and safety metrics and protect investments in equipment and assets.
- **Maximize Resources and Reduce Waste** - by automating the collection and distribution of data eliminating manual monitoring and minimizing the duplication of efforts and resources.
- **Improve Efficiencies and Minimize Environmental Impact** - by monitoring increased amounts of data for leak detection, emissions, pollution run-off and control and general asset integrity.

GE delivers a comprehensive communications portfolio to deliver the broadest range of network solutions for Production, Operations, Maintenance and Safety.

GE's Solutions

Harsh environments demand communication solutions that have been designed to perform reliably in extreme operating conditions. From production to processing to transportation, GE provides Oil and Gas companies with the communication products and services to meet their demanding and diverse network requirements.

GE delivers customers industry-leading solutions by relying on its core competencies:

GE's Exceptional Performance and Reliability

GE's products have been rated and tested to harsh industrial specifications. This includes operating over wide temperature ranges (-40°C to +70°C), in environments that experience continuous vibration, require hazardous area approvals, such as Class 1/Div 2, with designs that withstand a variety of extreme outdoor environments.

Industry and Application Expertise

GE has provided industrial communication solutions to the Oil and Gas industry for over 25 years. Our deep domain knowledge in a variety of applications and environments around the world allow us to develop the innovative products that our customers have come to expect.

Product Functionality and Ease-of-Use

From set-up and configuration to security and network management, GE stresses the importance of a common user experience to minimize the time and expense of retraining and protracted installation and deployment.

Portfolio Breadth and Scalability

GE's broad product portfolio provides flexible network solutions that align with current needs and scale to meet evolving requirements. From wireless devices to fiber multiplexers and Ethernet switches, our products span public and private infrastructures, unlicensed and licensed spectrum and support IP/Ethernet, serial and I/O communications.

Network Management and Diagnostics

GE's purpose-built network management solution (NMS) provides an intuitive and user-friendly interface to monitor and manage communication networks. GE's NMS is a critical tool for consistently monitoring assets, proactively preventing downtime and rapidly responding to equipment problems in order to reduce maintenance cost.

End-to-End Industrial Communication Overview

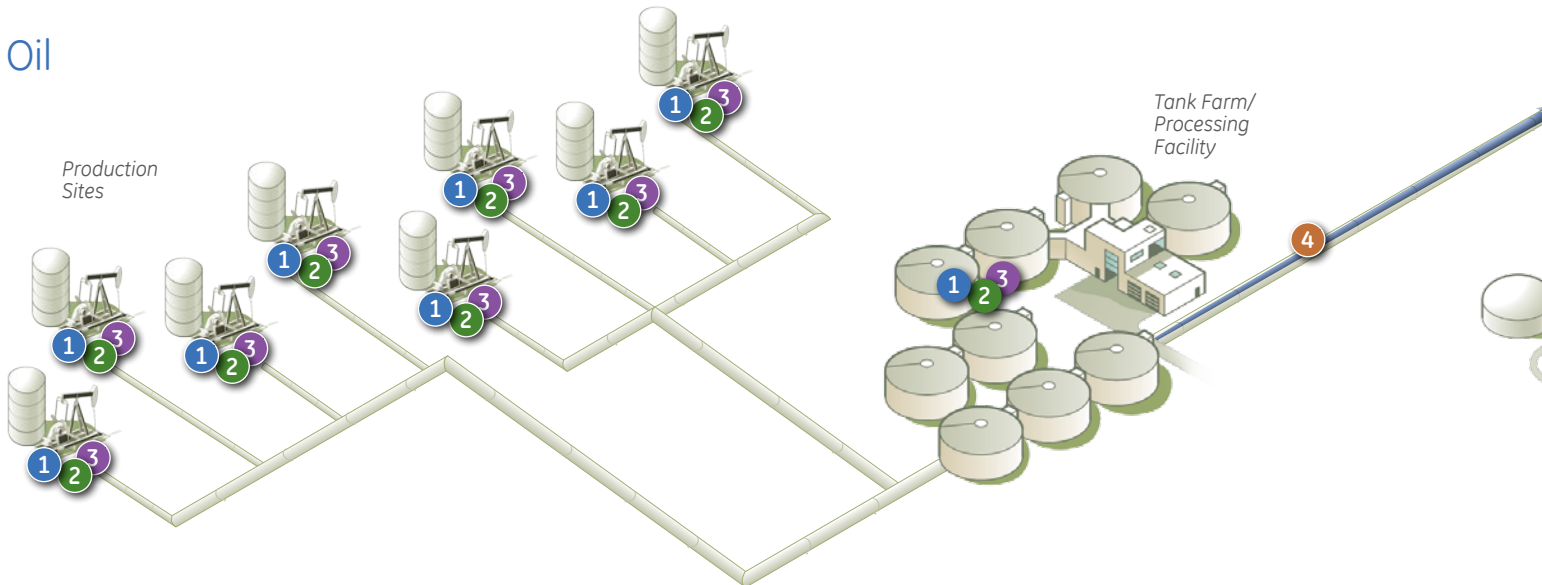
Upstream Production

- Transmit tubing and casing pressure from gas wellheads to RTUs and flow meters
- Data acquisition for dynamometer data, pump-off controllers and RTUs
- Data collection for production pad tank levels and compressor pressures and status
- Deliver actionable wellhead and production pad data to enterprise control centers
- Support multiple wireless options on a common infrastructure for local WiFi and high-speed Ethernet connectivity

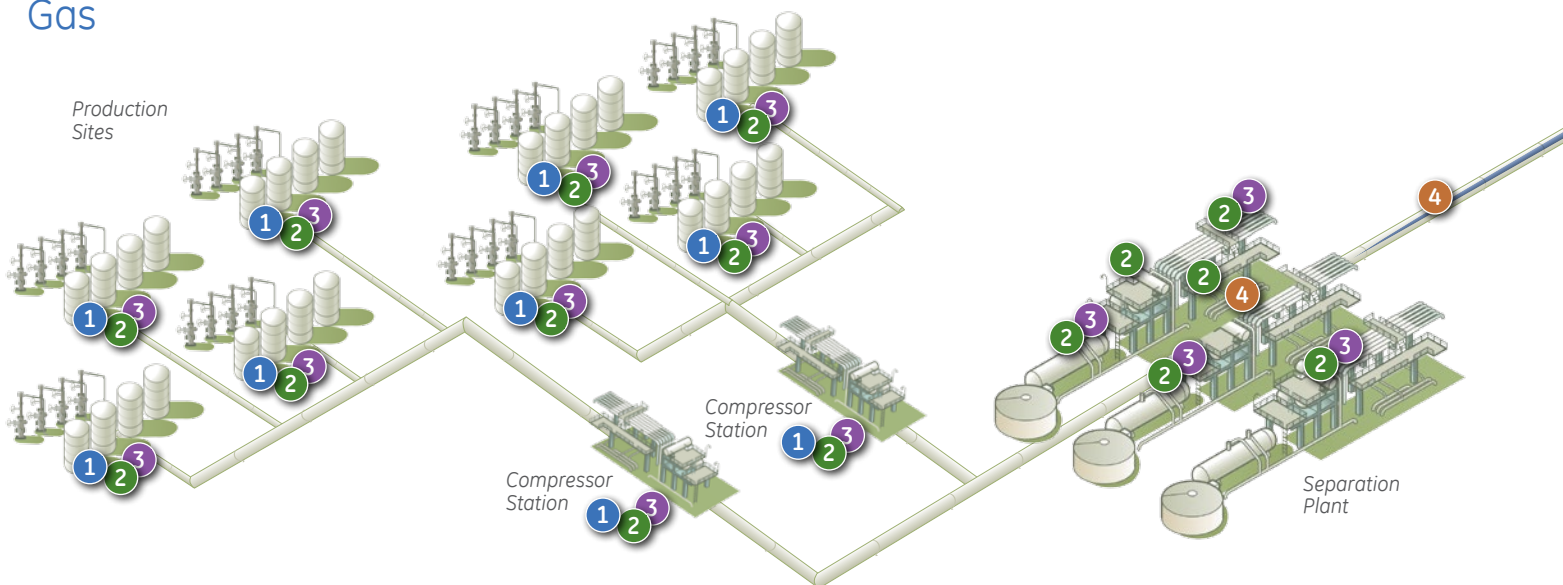
Midstream / Transportation

- Long-range connectivity to production pads, pump and compressor stations, block valve sites for real-time monitoring and control
- Collect compressor inlet, discharge pressure, and status values
- Remote data collection from meters and flow devices for intrusion and leak detection over remote pipelines
- SCADA communication to flow meters and RTUs for custody transfer, intrusion and leak detection
- Aggregate SCADA, voice and security data on a common fiber network

Oil



Gas

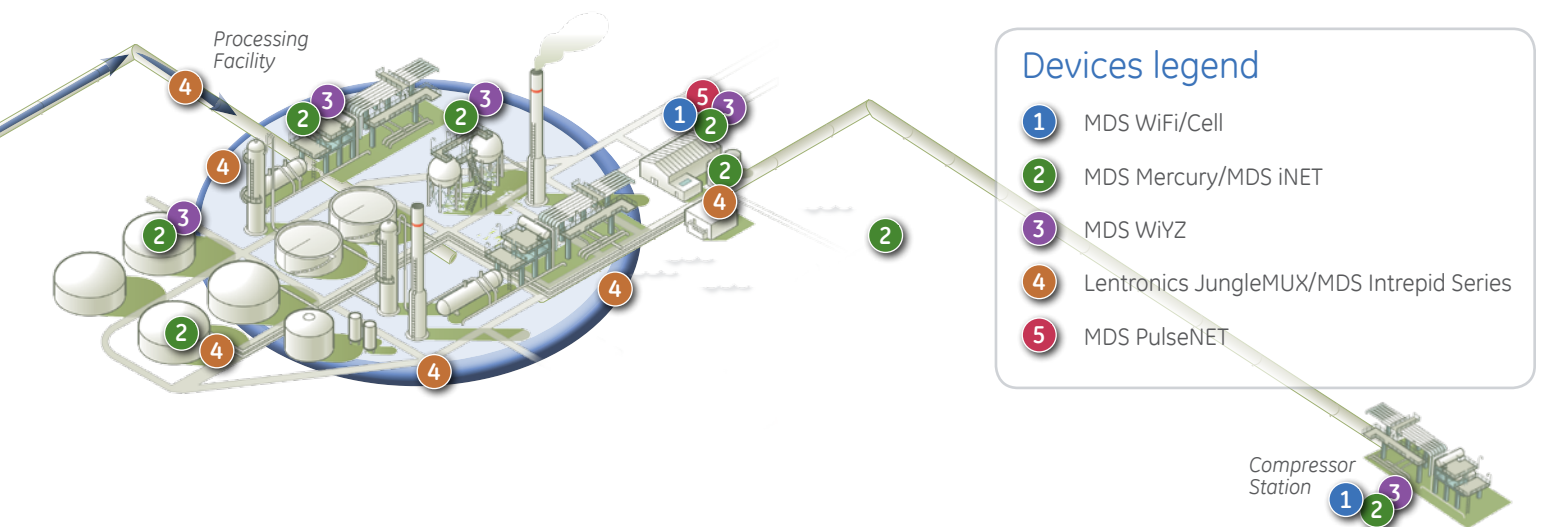
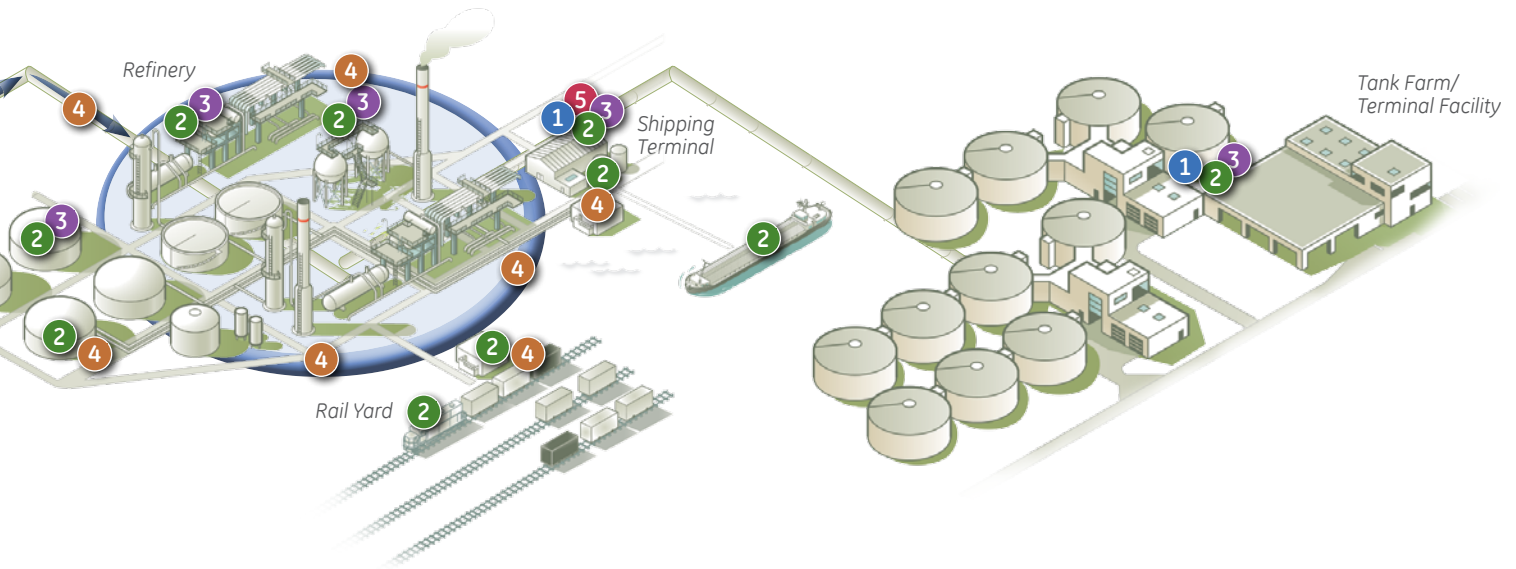


Processing

- High-capacity wireless backhaul infrastructure supporting data, voice and video communications
- Remotely monitor pressure, temperature and level data from facility perimeter
- Provide wireless LAN communications for facility control, operations and maintenance requirements
- Fiber communication for operation, maintenance, for protection and control of facility power grids

Transportation

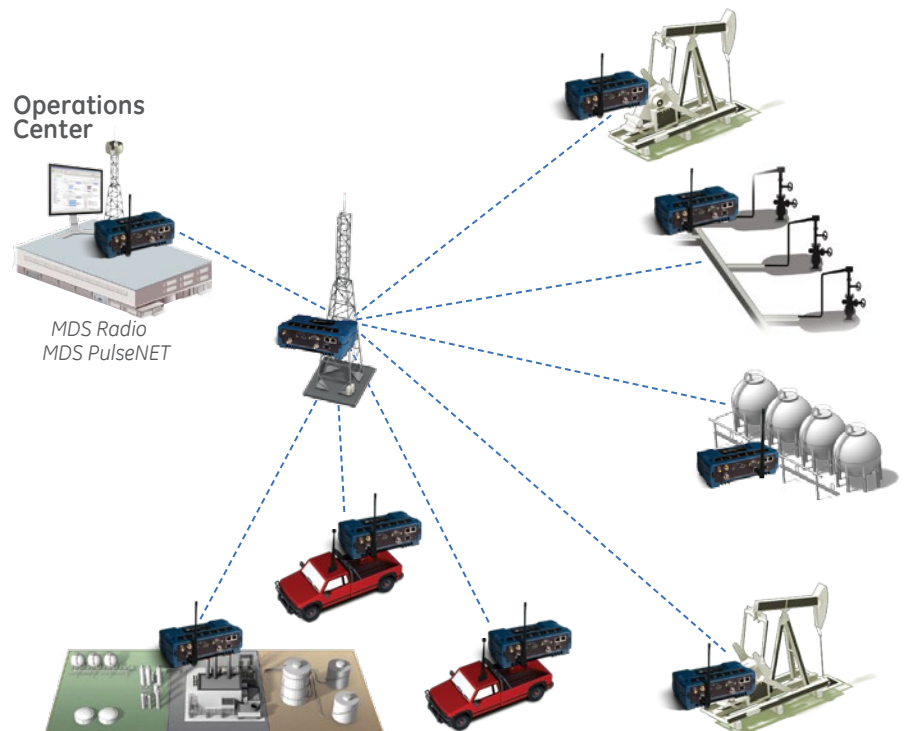
- Remote monitoring of pipeline flow and status signals
- Voice, data, CCTV, IP/Ethernet telecom services for hydraulic control, leak detection, pipeline SCADA, security and safety sub-systems
- Provide SCADA communication for flow meters, RTUs and controllers for custody transfer, storage, cathodic and leak detection
- Communication to terminal facilities and marine centers for spill recovery and coast-guard
- Long-range wireless communication between off-shore production to transportation terminals



Application Examples

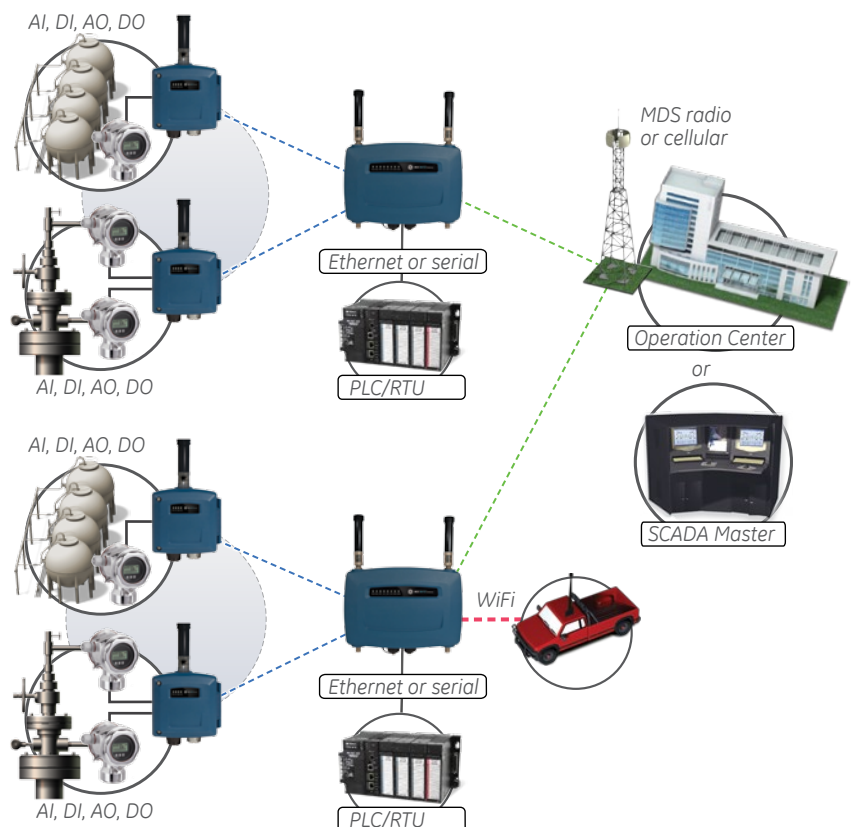
SCADA and Long-Range Networking

- Deploy a wireless SCADA infrastructure supporting communication to Pump Controllers and Electronic Flow Meters used for production monitoring, control and metering
- Provide wireless IP/Ethernet and serial communication to status measurement, leak detection and control devices at compressor stations, pump sites and terminal facilities
- Implement SCADA communication to revenue metering devices and cathodic protection locations
- Provide wireless LAN connectivity to remote RTUs, meters and controllers
- Bridge IP/Ethernet and serial between remote field networks and SCADA host systems
- Support SCADA, video, voice and mobile data for field force automation on a common wireless infrastructure featuring private MDS radios, WiFi and Cellular options



Remote Data Collection and Asset Monitoring

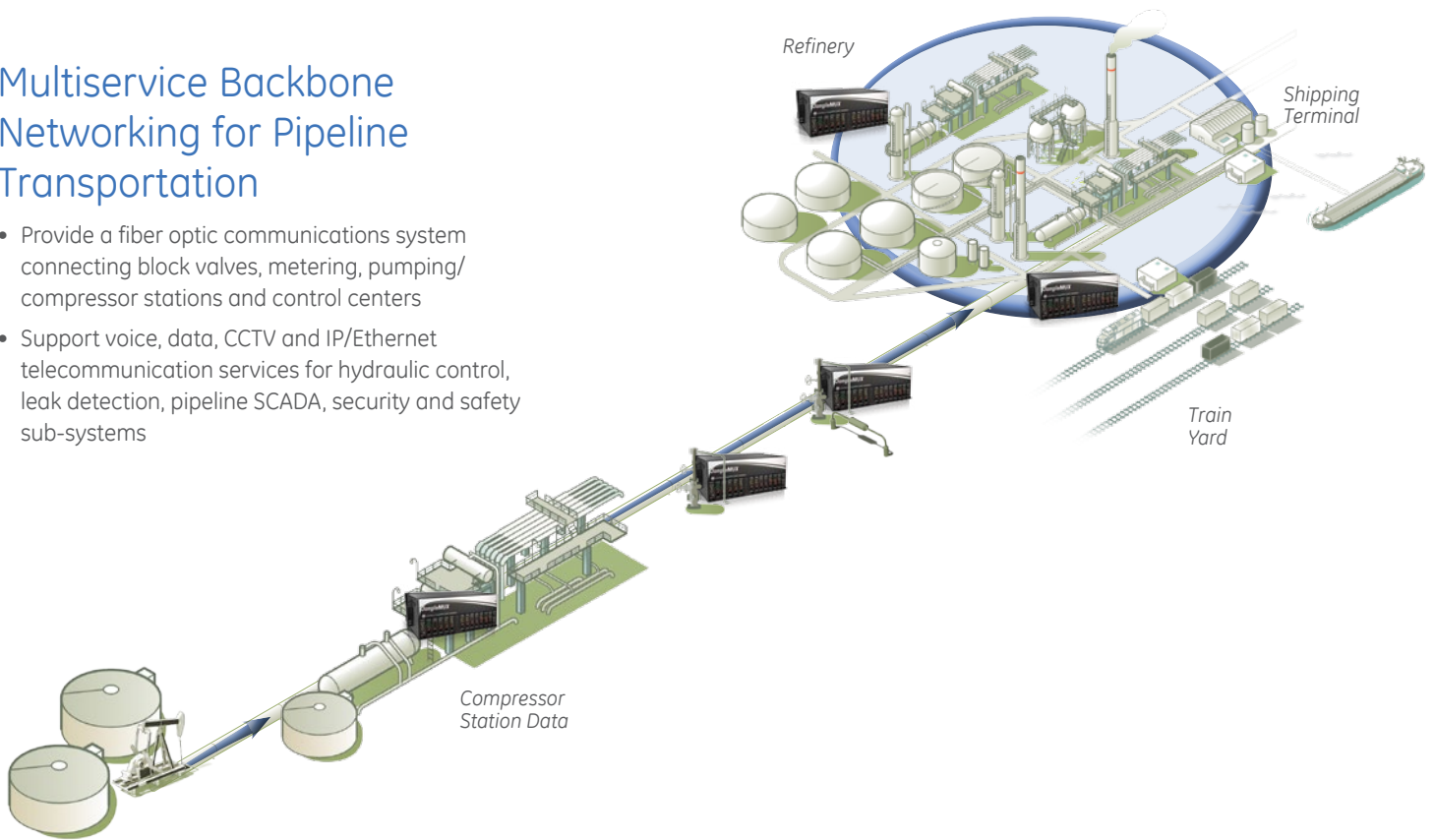
- Provide wireless connectivity between remote transducers and sensors at wellheads, tanks and compressors to field measurement and control devices
- Monitor wellhead tubing and casing pressure and tanks levels using battery powered remotes
- Use Modbus and Modbus TCP to poll remote sites for local data and status
- Use local WiFi for drive-up access at remote sites to view production pad data and status
- Transfer data from remote Gateways via SFTP to Enterprise data centers via CDMA or GPRS cellular options
- Implement local mesh networking or long range point-to-multipoint networks for optimal connectivity to remote sensors, transducers and I/O signals



End-to-End Industrial Communication Overview

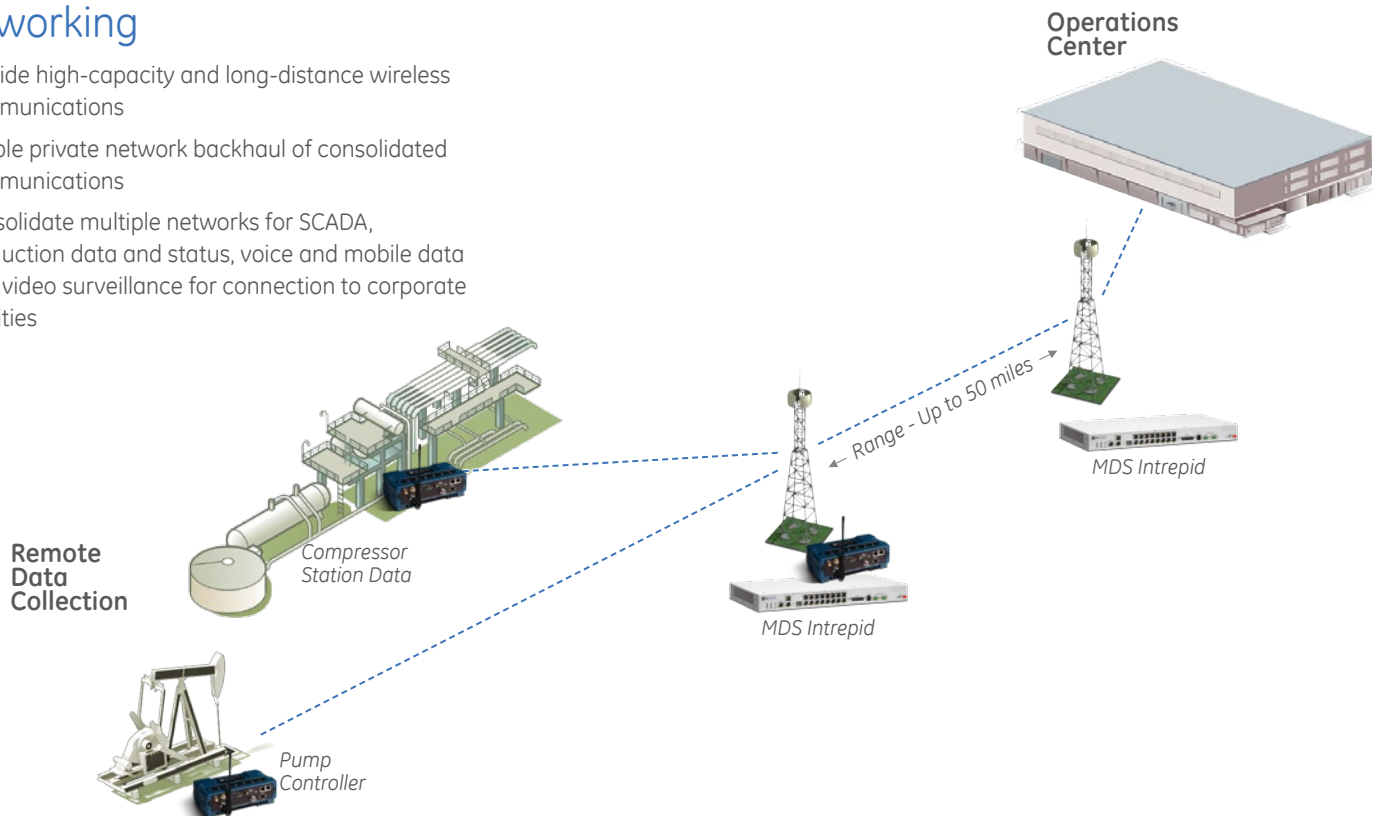
Multiservice Backbone Networking for Pipeline Transportation

- Provide a fiber optic communications system connecting block valves, metering, pumping/compressor stations and control centers
- Support voice, data, CCTV and IP/Ethernet telecommunication services for hydraulic control, leak detection, pipeline SCADA, security and safety sub-systems



Backhaul Communication Networking

- Provide high-capacity and long-distance wireless communications
- Enable private network backhaul of consolidated communications
- Consolidate multiple networks for SCADA, production data and status, voice and mobile data plus video surveillance for connection to corporate facilities





GE's Industrial Communication Portfolio Overview

Critical processes demand secure and reliable networks

Rugged Wireless | MDS

- World's leading industrial end-to-end wireless solutions provider
- IP/Ethernet and serial traffic, plus analog and digital process I/O signals

Secure & Dependable Multiplexers | Lentrionics

- Hardened, multi-service telecommunications platforms
- Secure application performance from the network edge to the core

Ethernet Switches & Protocol Converters | MultiLink

- Family of industrial hardened Ethernet switches
- Secure, reliable communications for critical infrastructure devices

Network Management

- Comprehensive network management software for asset monitoring
- Purpose-built for managing communication networks

Professional Services

- Network planning, systems design, implementation and commissioning services
- Project and program management services



MDS Data Acquisition

MDS' data acquisition products provide long-range, IP/Ethernet, serial, and I/O communication to monitor transducers and remote assets or provide SCADA connectivity to meters, RTUs and controllers. Models support features such as low power/sleep modes, battery power and repeater modes.

- IP/Ethernet and serial requirements at speeds up to 65 kbps using licensed spectrum between 100 to 900 MHz for distances up to 30 miles/48 km
- Unlicensed 900 MHz and 2.4 GHz communication at speeds up to 115 kbps for serial or IP/Ethernet for distances up to 25 miles for 900 MHz or 15 miles/24 km for 2.4 GHz
- Outdoor products with battery/solar powered options for transducers and I/O signals using mesh or point-to-multipoint communication with WiFi, Cellular or MDS connectivity to host systems or enterprise data centers



MDS LAN Extension

MDS' LAN Extension products provide high-speed, IP/Ethernet and serial point-to-multipoint connectivity for field devices supporting both fixed and mobile networking. Solutions include interoperable WiMAX and WiFi technology and cellular devices for connectivity to public carriers.

- WiMAX solutions supporting unlicensed and licensed options from 900 MHz to 5.8 GHz
- Cellular solutions for public carriers featuring 3G/4G LTE and operation in both CDMA and GPRS
- WiFi communications for high-speed local area networking featuring Access Point, Remote and Ad Hoc modes
- Models that bridge between multiple wireless media in a single device
- Portfolio options providing speeds up to 30 Mbps and range up to 20 miles/32 km



MDS Backhaul

The MDS Intrepid family of industrial high capacity wireless Point-to-Point and Point-to-Multipoint backhaul products offers a variety of protected and non-protected configurations supporting licensed and unlicensed frequency options with speeds up to 1 Gbps.

- Licensed and unlicensed frequencies from 2.4 to 38 GHz
- Available with E1/T1, Ethernet 10/100/1000Base-T, and OC3 interfaces
- Carries both TDM and IP traffic allowing for an easy and self-paced migration for legacy TDM to IP equipment
- Configurable for (1+0) non-redundant, (1+1) redundant, space diversity, or ring deployments



Lentronics Fiber Multiplexers

The Lentronics multiplexer family offers industrial hardened T1/E1, SONET/SDH standards based communication solutions for critical infrastructure applications over optical fiber and other media.

- High-speed, long-range connectivity for voice, data, CCTV and Ethernet traffic
- IP/Ethernet and serial communication to meters and RTUs
- Network aggregation for field communications
- Real-time network management and full-duplex connectivity
- Input collection from discrete sensors and output control to devices
- Secure and dependable providing 99.999% availability



MultiLink Hardened Ethernet Switches

GE's MultiLink family of switches are built and designed with industrial and utility use in mind. From physical hardening and network resilience, to support for industrial protocols and legacy device types, to compliance with regulatory standards and support for the latest in network management and security functions.

- Flexible options for Ethernet port and media types
- Enables cyber protection and network integration with advanced security features
- Support of high-speed recovery of redundant LANs for mission-critical applications
- Simple, powerful and easy configuration using web management software



Network Management

Our MDS and Lentronics Network Management Solutions provide a complete set of software tools to help manage, diagnose and enhance your network performance.

- Comprehensive network management software purpose-built for managing industrial communication networks
- Sophisticated and meaningful pre-built workflows along with intuitive graphical representations of your network
- Provisioned as a stand-alone tool or a client server solution, permitting centralized or distributed network management

For more information about
GE Industrial Communications products visit
GEDigitalEnergy.com/Communications



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