GE VERNOVA

CELLULAR WAN + NARROWBAND IoT SOLUTIONS FOR CRITICAL COMMUNICATIONS

JIMMIE FINISTER
SALES MANAGER, INDUSTRIAL COMMUNICATIONS
GE VERNOVA

future TECHNOLOGIES

TECHNOLOGY SUMMIT 2024

GE VERNOVA
Our portfolio of energy businesses

GE Company Update

GE Corporate Structure and Formation of 3 Independent Companies

GE VERNOVA
Our portfolio of energy businesses

GE HealthCare

GE HealthCare will be the name of GE's healthcare business. Given the global prominence and established reputation of the current GE Healthcare business unit name, in addition to its trusted familiarity with billions of patients around the world, it made the most sense from both a customer and business standpoint to keep the name as-is.

GE VERNOVA
Our portfolio of energy businesses

GEVernova will be the name of GE's energy portfolio of renewable energy, power, and digital businesses. With "ver" conveying green and "nova" signaling a new era of reliable, affordable, and sustainable energy, this name was selected as a unifying banner under which these businesses will set out to lead the world's energy transition.

CIC part of Grid Automation which is part of GE

Renewable Energy, part of GE Vernova

GE Aerospace

GE Aerospacewill be the name of GE's aviation business. This new name opens the aperture, expanding upon our established expertise, extensive partnerships, and commitment to customers in the aviation sector, while setting forth a confident new vision to propel a new era of possibility in aerospace.

WE ARE

GE VERNOVA

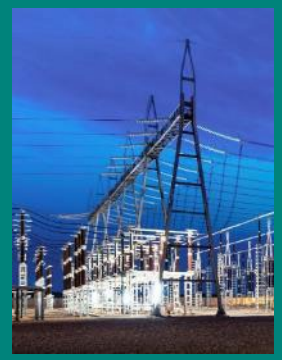
Our portfolio of energy businesses

GE VERNOVA

Our portfolio of energy businesses









GE Vernova Portfolio of Businesses:

GE VERNOVA
Our portfolio of energy businesses

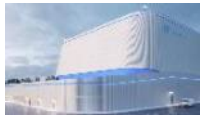
ONE OF A KIND

POWER

Gas Power
- Heavy Duty Gas Turbines
- Aeroderivative Gas Turbines
- Steam Turbines/Generators

Steam Power
- US Nuclear, Global Coal
- Steam, Generators, Boilers

Hydro
- Hydro Turbines/Generators
- Pumped Storage



Nuclear
- Boiling Water Reactors
- Fuel
- Small Modular Reactors

WIND

Onshore Wind
- 2 - 3.5 MW platform
- 5 – 6 MW platform
- Services & repowering

Offshore Wind
- Haliade-150 (6 MW)
- Haliade-X (14 MW)

Wind Power
- ONW blades
- Haliade X blades

ELECTRIFICATION

Grid Solutions
- Transmission
- Transformers
- *Grid Automation*

Power Conversion
- O&G Electrification
- Naval Electrification
- Microgrids

Solar & Storage Solutions
- Inverters
- Energy storage

DIGITAL

- Grid Software
  - Opus One Plat.
- Manufacturing
- Power and O&G

FINANCIAL SERVICES

Financial Services
- 3rd Party Financing Support
- Direct Financing though Equity

ACCELERATORS

Advanced Research
- Differentiated Technologies
- External Partnerships

Consulting Services
- Power Market Assessments
- Investment Decision Analysis

~80K EMPLOYEES IN 140 COUNTRIES

GRID AUTOMATION

GE VERNOVA

TWO PRODUCT AND TECHNOLOGY GROUPS

Protection, Automation & Control (PAC)

AAA & Services

Advanced Automation Applications for REN integration, industries & microgrids

Substation Automation

Digital & conventional control systems, multi-functional RTUs, time synch, fault recorders, PMUs

Protection & Control

Advanced technologies for transmission, distribution, rail and industrial applications

Asset Monitoring & Communications (AMC)

Asset Performance Management

Comprehensive solution for company wide asset performance and life cycle management

Monitoring & Diagnostics

Wide range of asset monitoring devices and fleet level condition monitoring system

Critical Infrastructure Communication

Communication systems using switches, power line carrier, optical networks and wireless solutions

MONITOR – PROTECT – CONTROL - COMMUNICATE

Markets Served

GE VERNOVA

Energy

Transmission Solutions
Distribution Automation
AMI Gateway Backhaul
Protection and Control
Maintenance Workforce Mobility
RTU Serial/IP SCADA and IEC 61850

Oil & Gas

Gas Production
Oil Production
Midstream
Wellhead Completion & Construction

Transportation

Positive Train Control
Remote Control Locomotive (CAI-220 RCL)
Switching Yard Automation
Signalling and Switching, Fiber and Wireless Backhaul, Distributed Power

Water & Wastewater

Production & Distribution
Wastewater / Storm Water
AMI Gateway Networks

Mining & Industrials

Extraction & Processing Applications
Factory Automation

Industrial Communications Portfolio

GE VERNOVA
Our portfolio of energy businesses

Wireless Networks

IoT Platform

SD

TransNEXT

Orbit MCR

Orbit ECR

Master Station

OCR

NEW

Cellular Base & Core

- Orbit Routers and Gateways for licensed / unlicensed spectrum and cellular operation
- Customized radios for Rail

Optical Solutions

JPAX MPLS-TP
Purpose built Routers

JMUX/ TN1U SONET/ SDH
Hardened Multiplexers

T1/E1 Multiplexers (Upgradable)

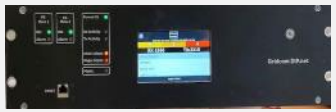
JPAX-H

High Capacity Backhaul

Unlicensed
Sub 6GHz PtMP

Licensed
6-86 GHz PtP

DIP.net Teleprotection



Power Line Carrier solutions

Industrial Grade Ethernet Switches

Switches & GPS Sync

Enclosures & Custom Designs

Management Tools

PulseNET advanced network management software

Critical Infrastructure Communications Global Sites

GE VERNOVA
Our portfolio of energy businesses

GE VERNOVA
Our portfolio of energy businesses

MDS Orbit

Graham Hall
Technical Applications Engineer

Orbit & Master Station models

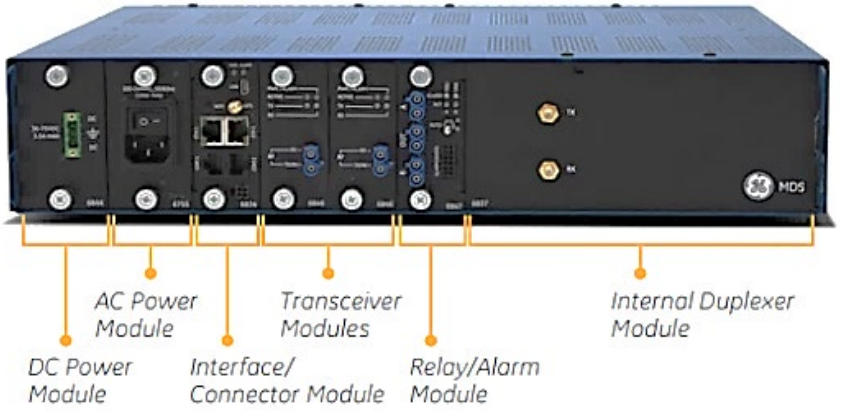
GE VERNOVA
Our portfolio of energy businesses

ECR

EdgeConnect Router
Single WAN Channel

Master Station

Radio and Power Supply Redundancy
Internal duplexer and split tx/rx available*



OCR

Cellular Outdoor Router

MCR

MultiserviceConnect Router
Dual WAN Channels

Made in the USA!

*Options dependent on configuration

SUPERIOR RELIABILITY

Built to withstand a wide range of harsh environments and operational conditions.

- Mean Time Between Failure (MTBF) > 68 years
- Field proven hardware reliability
- No electrolytic capacitors improve uptime
- No fans or moving parts
- Conforms to IEEE1613 and CSA Class 1, Div. 2
- Built for industrial temperature range of -40 to 70 °C (-40 to 158 °F)
- Active/active and active/standby backup and redundancy with auto-failover between public cellular and private networks for increased communication reliability and application availability

NETWORK SECURITY

Firewall & MAC filtering
Access control list, Stateful Packet Inspection (SPI) firewall & MAC filtering ensures only valid traffic is permitted.

Certificate management for enabling only trusted devices on the network
X.509 in DER and PEM format with the SCEP Protocol

IEEE 802.1x
Enables only approved devices to be admitted on the Ethernet or Wi-Fi after a username/password or certificate-based challenge.

IPsec VPN encryption
- Encrypted end-to-end tunnels to a VPN concentrator
- OSPF/RIPv2

FIPS 140-2 (Level 2)

VLAN support
IEEE 802.1Q VLAN trunk and access port modes for traffic separation

Wi-Fi security
WPA, WPA2-PSK and Enterprise mode

Over the air (OTA) data encryption
- AES-CCM 128/256bits
- Automatic key rotation

Wurldtech ACC L1 certified

USER ACCESS

User Accounts

Username / password based access with automatic lockout.

Audit and Logging

On-board event logging and alarm tracking for user login/logout, configuration changes, and network connections. Events can be forwarded to central system or NMS through multiple supported protocols.

Role Based Access Control (RBAC)

Three user levels (operator, technician, admin) are available with increasing levels of read, write, and execute privileges.

Secure Interface Protocols

HTTPS, SSH, SNMPv3, and NETCONF provide secure access to device configuration and management.

AAA / Centralized User Authentication

Configurable RADIUS and TACACS+ based authentication.

Configuration Files and Restore Points

Device config can be captured on-device as restore points or off-device as config files. These files can be used to “clone” devices or quickly restore service in emergency situations.

DEVICE SECURITY

EMP protection
Military-Standard-461G, RS105 grade Electro Magnetic Pulse compliance.

Physical Port Disable
Each physical port or wireless interface can be individually enabled and disabled.

Logical Port Disable
Each logical port, such as HTTPS, SSH, SNMP and NETCONF, or a virtual interface can be individually enabled and disabled.

Tamper Detect Magnetometer
Movement in any axis or rotation is detected by continuously measuring the electromagnetic field around the Orbit device securing against theft and tampering.

Digitally Signed Firmware
Firmware is cryptographically signed by GE and offers an additional customer signature option to ensure authenticity.

Secure Firmware Upgrade
Firmware upgrades are loaded on the Orbit device through SFTP or HTTPS to ensure secure transfer.

Secure Boot
Orbit runs secure checks upon booting and prevents itself from fully booting if it discovers that the hardware has been tampered with.

MULTIPLE INTERFACE OPTIONS

MCR supports multiple port configuration including an optional SFP port. This design provides flexibility to match specific application needs and equipment requirements.

SFP

Ethernet

RS-232/485

One SFP, Two Ethernet, Two Serial, One USB

- Licensed or Unlicensed band antenna port
- LTE or WiFi connections
- Dual-SIM (GSMA eSIM compatible)
- RS-232/485 Serial Port
  Alarm input on serial pin interface*
- USB 2.0
- 2-RJ45 10/100 Ethernet Ports
- DC Power 10-60 VDC

*With optional alarm sensor kit

Two 10/100 Ethernet & One RS-232/485

One 10/100 Ethernet, One RS-232 & One RS-232/485

Four 10/100 Ethernet & Two RS-232/485

The MDS Orbit Platform

GE VERNOVA
Our portfolio of energy businesses

Multiple Wireless Technologies

100/200/400/700/900MHz **Licensed**

Unlicensed 900MHz ISM

Cellular 4G LTE, Public and Private, CBRS, Anterix, FIRSTNET

Wi-Fi 2.4 GHz, 7 clients

WiFi 2.4/5.8 GHz MIMO, 32+ clients

Multiple Data Interfaces

- 10/100 Ethernet
- RS232 Serial
- RS485 Serial 2W & 4W
- USB 2.0
- SFP / 1Gbps Ethernet

Advanced Networking

Layer 2 Bridging

Layer 3 Routing

OSPF, RIPV2 EBGP, VRF

VLANs and GRE

Quality of Service (QoS)

DHCP, DNS, NTP

User Features

Graphical User Interface

Configuration Wizards

Command Line Interface

Built –in Spectrum Analyzer

Built-in RTU Simulator

Physical

DIN Rail Mount

Flat Mount / Wall

10-60 VDC input

Spectrum Analyzer

5 Year Warranty

MODULAR PLATFORM
Ease of installation and simple serviceability

SUPERIOR RELIABILITY
1+1 redundancy and built for harsh physical & electrical environments

FLEXIBLE INTERFACE
Multiple options to match each application

BACKWARDS COMPATIBLE
Drop in compatibility with x710 networks and evolution to Orbit LN networks

SUPERIOR RELIABILITY

Full 1+1 Redundancy with warm standby transceiver to maximize network availability and reliability.

- Automatic failover to standby transceiver
- Redundant power supplies or mix of AC and DC supplies
- Optional battery back up
- Standby transceiver status visible to network management systems

GE VERNOVA
Our portfolio of energy businesses

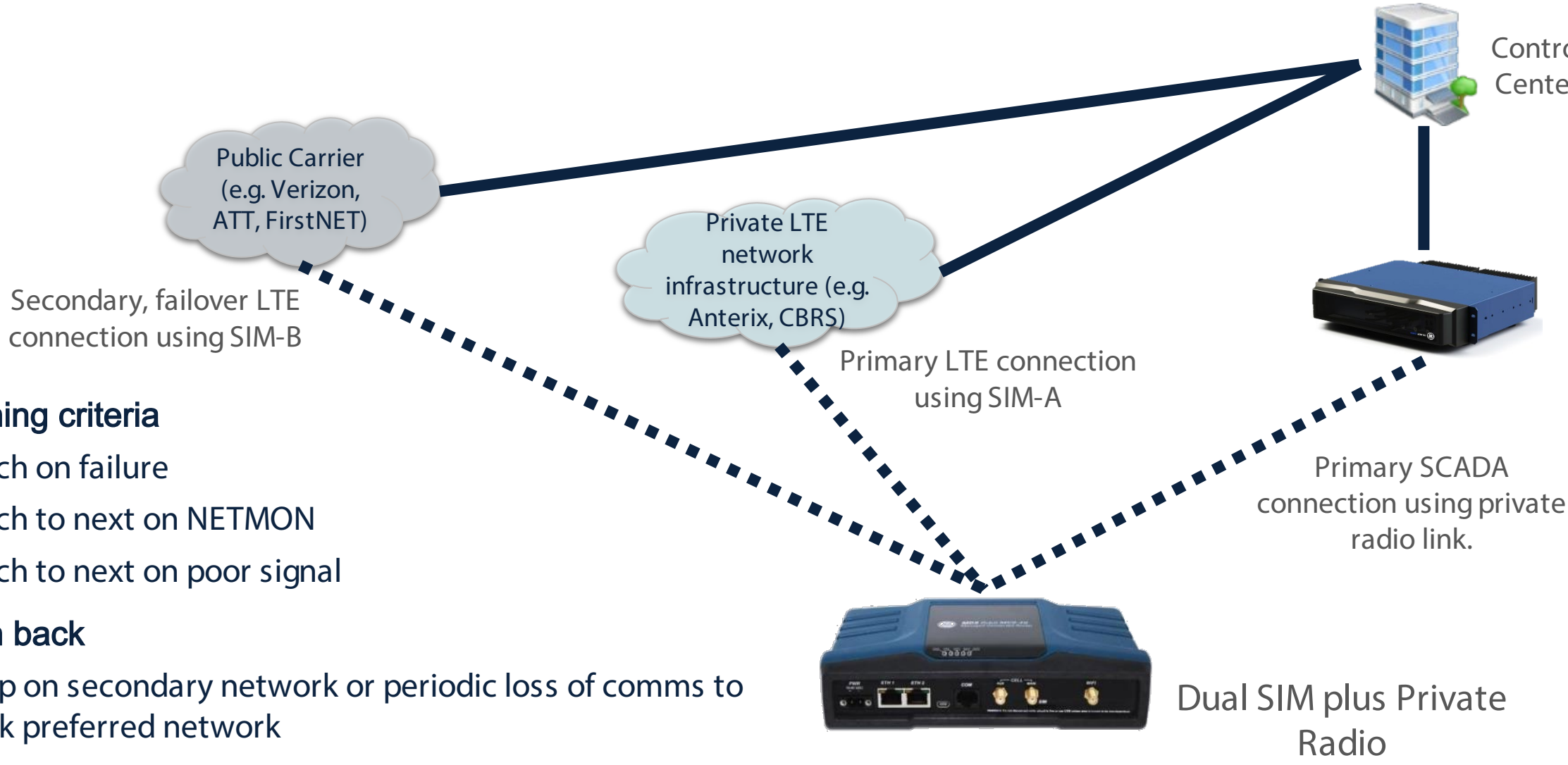
Failover/Failback

GE Renewable Energy

Dual SIM Redundancy and Failover

MDS Orbit Wireless Router Family

GE VERNOVA
Our portfolio of energy businesses



Switching criteria

- Switch on failure
- Switch to next on NETMON
- Switch to next on poor signal

Switch back

- Camp on secondary network or periodic loss of comms to check preferred network

Dual Active Modem
MDS Orbit Wireless Router Family

GE VERNOVA
Our portfolio of energy businesses

- Two active connections to separate private or public cellular networks
- Triple SIM for maximum flexibility/redundancy for mission critical networks
- Fast Failover between modems in seconds—not minutes

Left slot is 4Gb
SIM–A & SIM–B
AT&T, Verizon, CBRS UE,
Anterix Active™

Right slot is 4Gy
SIM-C
AT&T, Verizon

Simultaneous Connectivity :
Modem #1 SIM-A *or* SIM-B, ***and*** Modem #2 SIM-C

Failover Example
#1 Priority: Modem #1 SIM-A
#2 Priority: Modem #2 SIM-C
If both have connectivity, "instant" failover (once condition detected)
#3 Priority: Modem #1 SIM-B
When neither primary network is available, Modem #1 fails over to SIM-B

Fail back
- Both modems try to connect. Fail back to primary modem once connectivity restored.

Modem #1 Primary LTE connection using **SIM-A**

CBRS Private LTE network infrastructure

Modem #1 Backup LTE connection using **SIM-B**

Failover to Public Carrier

Modem #2 LTE connection using **SIM-C**

Anterix Private LTE network or Public Carrier

Dual Active LTE

GE VERNOVA
Our portfolio of energy businesses

MDS TransNEXT

Features & Benefits

MDS TransNEXT

GE VERNOVA

FLEXIBLE:

- Up to 30 miles across 900 MHz unlicensed
- Low power consumption/sleep mode for solar/battery
- Always on e-ink display for information / diagnostics
- Repeater, multiple hop store-and-forward
- Over the air reprogramming
- 100% Backward compatible with legacy MDS TransNET

RELIABLE:

- Industry leading performance in interference
- CSA C1/D2 for hazardous locations

SECURE & RESILIENT:

- Unique passwords, signed FW, and secure boot
- Proprietary hopping algorithm (128 channels, auto-correct, exclusions list for jammed frequencies)

MDSTransNEXT Hardware at a Glance

GE VERNOVA
Our portfolio of energy businesses

Power:

- 6-36 VDC
- Transmit Draw*: 510mA
- Receive Draw*: 100mA
- Sleep Draw**: 4mA

Environmental:

- -40° C to +70° C
  - Models w/ Display have tighter range
- < 95% RH (Non-Condensing)

Physical

DIN Rail Mount

Flat Mount / Wall

10-60 VDC input

5 Year Warranty

*@ 13.8VDC **2024 Release

Building a world that works