GE
Digital Energy

MDS Orbit LN Series

High Speed, Long Range, Exceptional Performance for Narrowband Licensed Networks

The MDS™ Orbit Licensed Narrowband (LN) Series radios implement the advanced networking and security features of the MDS Orbit platform to bring new levels of performance and versatility to networks utilizing narrowband licensed spectrum in the 400 and 900 MHz frequency bands. In addition to the core feature suite derived from the Orbit platform, the LN Series radios implement high speed QAM modulation options for a 6 times speed improvement over other narrowband solutions operating in 6.25, 12.5 and 25 KHz channel sizes.

The MDS Orbit LN Series radios are available in both the MCR (Multiservice-Connect Router) and ECR (Edge-Connect Router) models. Both the MCR and ECR share the same networking and security functionality with the MCR being a dual radio router while the ECR supports a single LN radio with optional WiFi in a more compact form factor. The MCR-LN and ECR-LN support IP/Ethernet and serial communication for data acquisition applications to remote PLC, control and metering devices.

Users can simultaneously operate multiple host systems, remote device types and protocols to support SCADA and M2M applications on a common infrastructure.

Key Benefits

- Improved performance for data acquisition and control networks implementing IP/Ethernet communication to remote devices
- Repurpose narrowband networks for new applications through a 6X increase in communication speed
- Secure your network and assets by implementing best-in-class cyber security
- Support converged network applications and hybrid wireless solutions through advanced wireless routing and quality of service
- Implement push communication and report by exception from remote devices

Applications

Oil & Gas

- Remote data collection from meters and flow devices
- Monitor and transmit wellhead performance and status data

Energy

- Remote control of IEDs and controllers at distribution substations
- Condition monitoring for reclosers and capacitor banks

Water & Wastewater

- Monitor lift stations across multiple sites from the control room
- Remote PLC communication for controlling level and flow

Heavy Industrial

- Monitor and control remote pumps and compressors
- Transmit video and remote site security information

imagination at work

Industrially Hardened

- Operating temperature range -40°C to 70°C
- CSA Class 1, Div 2 for hazardous locations
- IEEE® 1613, IEC® 61850-3 for electric substation environments
- 5-year warranty

Advanced Networking

- 10 Watt peak power with coverage up to 50 miles
- Concurrent routing and bridging enables flexibility for a variety of network designs
- Flexible quality of service (QoS) to prioritize network applications and device connectivity
- Hybrid wireless routing to support two wireless media in a single device

Exceptional Performance

- QAM Modulation providing 120 kbps in 25 KHz and 60 kbps in 12.5 KHz channel
- Real-time adaptive modulation automatically adjusts speed to signal characteristics
- Dynamic FEC extends range in difficult conditions
- IP Header and Payload compression to improve throughput over 30%

Enterprise Security

- Enterprise-class device and network cyber security functionality for advanced protection of network assets
- AES 128/256 encryption
- Public Key, EAP TLS, Pre-shared, Ike 1-2
- Radius Authentication

Exceptional Network Performance

Improved productivity, optimization, preventive maintenance, quality control, regulatory compliance, safety and security are just a few of the requirements that drive the need for high performance networks to support multiple applications and deliver actionable data collected from remote, geographically dispersed assets.

The MDS Orbit MCR-LN and ECR-LN radios bring new levels of networking performance to users operating narrowband licensed networks in 6.26, 12.5 and 25 KHz channel sizes.

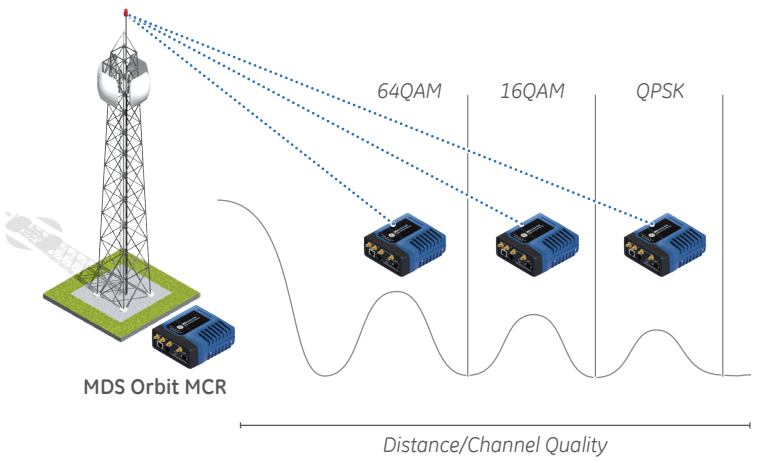
QAM Modulation

The LN Series radios implement QAM modulation to achieve raw data rates up to 6 times faster than traditional FSK modulation variants typically utilized in legacy narrowband networks. Through QAM modulation, speeds up to 120 kbps in a 25 KHz channel and 60 Kbps in 12.5 KHz are achieved.

CHANNEL SIZE	LEGACY SPEED	ORBIT LN SERIES SPEED		
		QPSK	16QAM	64QAM
6.25 KHz	4.8 kbps	9.6 kbps	19.2 kbps	28.8 kbps
12.5 KHz	9.6 kbps	20.0 kbps	40.0 kbp	60.0 kbps
25.0 KHz	19.2 kbps	40.0 kbps	80.0 kbps	120.0 kbps

Real Time Adaptive Modulation

Real time adaptive modulation automatically selects the optimum modulation type per remote radio to achieve the best speed. Adaptive modulation is implemented for both upstream and downstream communication. The Access Point continually monitors signal quality and adapts the modulation type accordingly.



Dynamic Forward Error Correction

Users can activate GE's MDS proprietary dynamic Forward Error Correction (FEC) to improve the radio receive sensitivity for networks operating in high interference environments or when operation at or near sensitivity limits is necessary. Dynamic FEC improves sensitivity between 3 to 7 dBm. The LN radio automatically optimizes the FEC coding block to the data packet size to minimize network overhead and maintain the best network throughput.

CHANNEL SIZE	SENSITIVITY USING QPSK MODULATION	
	Typical	With FEC Max Coding
6.25 KHz	117 dBm	124 dBm
12.5 KHz	112 dBm	119 dBm
25.0 KHz	107 dBm	114 dBm

IP Header and Payload Compression

For networks operating TCP and UDP protocols, the LN series implements IP Header and Payload compression to improve network throughput. TCP sessions in particular involve a significant amount of handshaking between host systems and remote devices. Virtual over-the-air throughput increases the raw data rates of 30% or more depending upon the compressibility of data packets being transmitted.

Media Access Control

Media Access Control (MAC) is a critically important function particularly in narrowband networks as it is responsible for maintaining optimal network throughput even as more devices and applications are added. The LN series radios implement a proprietary contention MAC designed specifically to consume very little overhead. The LN Series MAC guarantees that user data never collides and that data packets reach the intended destination, preventing throughput drops in congested networks.

Advanced Networking

The Orbit platform endows the LN Series with an advanced array of networking capabilities including simultaneous Layer 2 bridging and Layer 3 routing. Tunneling, integrated terminal server functionality and protocol conversion are also supported.

Quality of Service

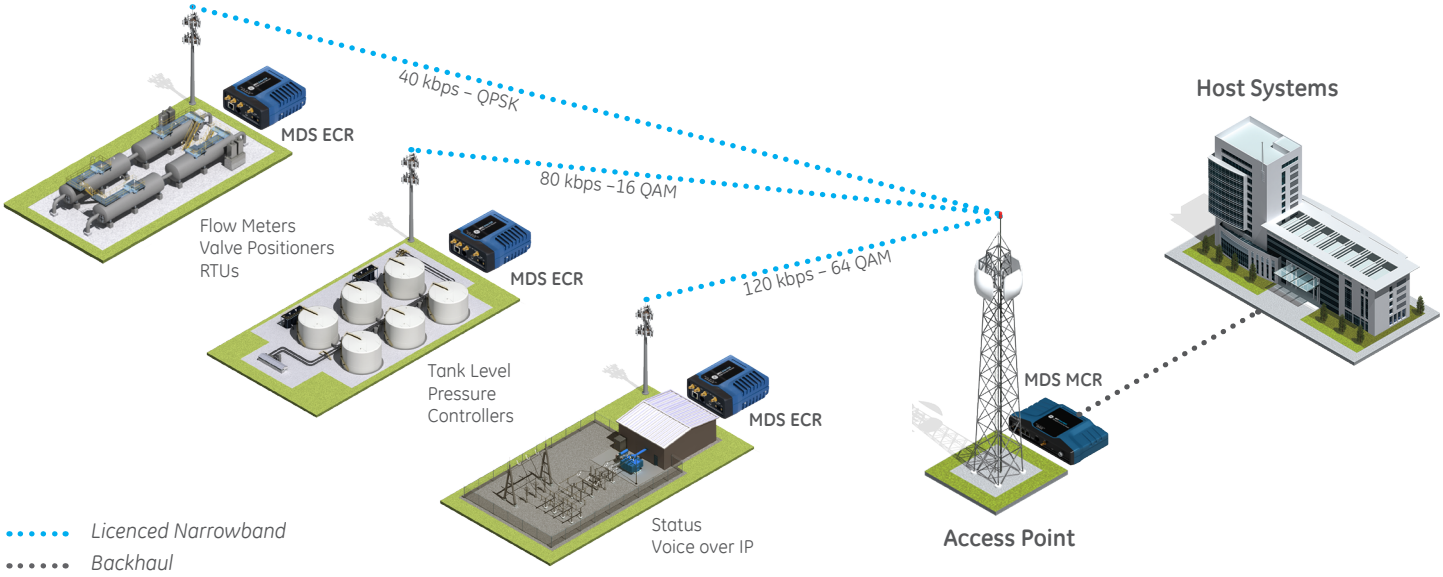
Quality of Service (QoS) allows the user to prioritize the flow of information over the network by application and interface using up to 16 QoS priorities. Layer 2, 3 and 4 classification enables the detailed identification of all types of applications for maximum flexibility in addition to standard 802.1p and DSCP based classifications. Traffic Shaping allows users to allocate a percentage of the uplink bandwidth on a per-application basis in order to ensure more deterministic data transmission during network congestion.

Hybrid Wireless

The Orbit LN Series brings added levels of network versatility by supporting seamless bridging and routing through multiple wireless options. This allows users to create separate field subnetworks, extend communications, or support integrated backhaul alternatives.

Both the MCR-LNx and ECR-LNx models support an optional, secure WiFi option. The MCR-LNx will support a second wireless option from other Orbit radio options including unlicensed 900 MHz or 4G LTE, and 3G cellular.

Orbit LN Series Application Advantages



Connectivity

- Connect multiple RTU and Controller types to a single remote radio
- Interface multivariable transmitters via serial or WiFi
- Use Ethernet for PLC or Voice over IP

Performance

- Use advanced QoS to prioritize critical SCADA over lower priority traffic
- Activate compression for >30% throughput improvement
- Adaptive modulation automatically adjusts optimum speed per remote

Communication

- Concurrently operate multiple host systems, applications and protocols
- Network security with robust encryption and authentication
- Use routing and bridging capabilities for more advanced deployments

Enterprise Security

The Orbit LN Series provides a best-in-class cyber security suite designed to meet stringent security requirements such as NERC-CIP and FIPS. It offers a versatile range of options allowing the user to scale security levels to their unique network conditions.

Orbit LN Series secures the network by supporting AES 128/256 encryption, IPSec VPN encryption (server and client), certificate management, firewalling and stateful packet inspection to insure that the data is protected, and only valid/legitimate data is permitted to flow. The user is secured through central and local authentications and authorization to insure access only with proper privileges. The radio itself is secure through digitally signed firmware, hardware and manufacturing implementations to insure hardware/firmware integrity.

Intuitive User Interface

An easy-to-use Graphical User Interface (GUI) allows for the quick provisioning and maintenance from a web browser. Orbit LN Series radios support HTTP, HTTPS, and SSH. MDS Orbit's wizards accelerate the configuration of complex network functionality by breaking down processes into simple, concise and automated steps.

Network Management

The Orbit platform supports management using SNMPv1/v2/v3, MIN-II and Enterprise MIB. NETCONF is also supported. Manage Orbit LN Series networks using PulseNET NMS. PulseNET is purpose built for industrial communications and includes sophisticated and meaningful pre-built workflows along with intuitive graphical representations of the network at your fingertips.

Orbit ECR and MCR Model Comparison

MODEL	PRIMARY WIRELESS	SECOND WIRELESS OPTION	COMMUNICATION PORTS	MOUNTING
MCR 	LN4: 400 MHz LN9: 900 MHz**	WiFi 4G LTE/3G ** Unlicensed 900 MHz**	Option A: 2 Ethernet, 1 Serial, 1 USB Option B: 1 Ethernet, 2 Serial, 1 USB	Surface Mount DIN Mount Option
ECR 	LN4: 400 MHz LN9: 900 MHz**	WiFi	1 Ethernet, 1 Serial, 1 USB	Surface Mount DIN Mount Option

Specifications

GENERAL	
Frequency	Configurable
Operation Modes	Simplex, half-duplex
	Access Point, Remote, Store & Forward**
Modulation	QPSK, 16QAM, 64QAM Per-Remote Adaptive Modulation
FEC	Dynamic Forward Error Correction
Compression	Header and Payload Compression
Range	Up to 50 Miles

CHANNEL SIZE	MODULATION & SPEED		
	QPSK	16QAM	64QAM
6.25 KHz	9.6 kbps	19.2 kbps	28.8 kbps
12.5 KHz	20.0 kbps	40.0 kbps	60.0 kbps
25.0 KHz	40.0 kbps	80.0 kbps	120.0 kbps

FREQUENCY BANDS	
LN4	L4E: 406 – 470 MHz
LN9	L9C: 928 – 960 MHz **

TRANSMITTER	
Frequency Stability	+/- 0.5 ppm
Peak Carrier Power	10 W/40 dBm
Average Power (Programmable)	QPSK: 0.1 – 5 W/10-37 dBm
	16QAM: 0.1 - 3.2 W/10-35 dBm
	64QAM: 0.1 – 2.5 W/10 – 34 dBm
Carrier Power Accuracy	+/- 1.5 dB typical
Output Impedance	50 Ohms
Adjacent Channel Power	< -60 dBc

RECEIVER			
Type	Direct Conversion		
Adjacent Channel Rejection	60 dB nominal		
Sensitivity	Typical @ 1x10-6 BER		
	QPSK	16QAM	64QAM
6.25 KHz	-117 dBm	-104 dBm	-96 dBm
12.5 KHz	-112 dBm	-104 dBm	-94 dBm
25.0 KHz	-107 dBm	-99 dBm	-91 dBm
Sensitivity w/ FEC	Dynamic FEC Max Coding		
	QPSK	16QAM	64QAM
6.25 KHz	-124 dBm	-111 dBm	-103 dBm
12.5 KHz	-119 dBm	-111 dBm	-101 dBm
25.0 KHz	-114 dBm	-106 dBm	-98 dBm

NETWORKING	
Routing	IPv4 Routing with Failover, OSPF, RIPv2
	Concurrent bridging and routing
Ethernet	IEEE 802.3, 802.1Q/VLANs, IGMP, STP, 64 VLANs
Tunneling	Layer 2 (Ethernet) and Layer 3 GRE
Quality of Service	Quality of Service 16 egress queues, Priority Queuing, Fair Queuing, Classification based on DSCP, 802.1p and Layer 2-4 classifiers
IP Protocols	TCP, UDP, ARP, DHCP, ICMP, NTP, FTP, SFTP, TFTP, DNS, configurable HTTP and HTTPS, SSH
Compression	TCP/UDP ROHC, LZ0
Dynamic FEC	Convolutional, Reed Solomon
Serial	TCP server, Modbus/TCP/RTU/ASCII conversion, TCP client, UDP Unicast and Multicast, BSAP, and DNP3

INTERFACES	
MCR Option A	(2) 10/100 Ethernet, RJ45
	(1) RS232/485 Serial, RJ45
	(1) mini USB 2.0
MCR Option B	(1) 10/100 Ethernet, RJ45
	(2) RS232/485 Serial, RJ45
	(1) mini USB 2.0
ECR	(1) 10/100 Ethernet, RJ45
	(1) RS232/485 Serial, RJ45
	(1) mini USB 2.0
Antenna MCR/ECR	TNC Female (RP-SMA for WiFi)

SECURITY	
IPSec VPN	Server (responder) & Client (initiator)
Authentication	Public Key, EAP TLS, Pre-shared, Ike 1-2
User Authentication	Local RBAC, AAA/Radius
Encryption	3DES, AES 128/192/256, CBC, CTR, CCM, GCM, SHA 256/384/512 HMAC
Firewall	Stateful L3-4 Access Control List, Layer 2 MAC Filtering, NAT, Source NAT (Masquerading), Static NAT, Port Forwarding
Device Security	Secure Boot, Secure Firmware, Digitally Signed Hardware and Software, Magnetometer Tamper Detection
Certificate Mgt.	X.509, SCEP, PEM, DER, RSA

ENVIRONMENTAL	
Temperature	-40º to +70º C (-40º 158º F)
Humidity	95% at 60º C (140º F) non-condensing

MECHANICAL	
Case	Rugged die-cast aluminum
Dimensions MCR	1.75 H x 8.0 W x 4.8 D in. 4.45 H x 20.32 W x 12.19 D cm
Weight MCR	2 lbs., .91 kg
Dimensions ECR	2.1 H x 4.3 W x 4.6 D in. 5.33 H x 10.92 W x 11.68 D cm
Weight ECR	1.45 lbs., .65 kg

ELECTRICAL	CURRENT REFERENCE – 13.8V
Primary Power	10 to 60 VDC
50% Duty Cycle	AP: 950 mA, Remote: 780 mA
Idle	AP: 910 mA, Remote: 350 mA

APPROVALS
CSA Class 1 Div 2 for hazardous locations
IEEE 1613, IEC 61850-3
Industry Canada & ENTELA
FCC Part 90: LN4FCC Part 101: LN9** (See note below)
ETSI/CE: LN4

WIFI OPTION
Frequency 2.4GHz
Standard IEEE 802.11 b/g/n
Maximum Data Rate: 54Mbps
Operating Modes: Access Point, Station
2 SSIDs, SSID hiding
VLAN mapping
Security: WPA/WPA2 PSK, Enterprise
Carrier Power: 20dBm adjustable

WARRANTY
5-year standard warranty

Ordering

MXNX	***	N	***	NNS	*	F	5	*	UNN	Description
Band	L4E									406 -470 MHz
	L9C									928-960 MHz **
			NNN							No second wireless
			W51							WiFi – 802.11b/g/n
					1					2-Ethernet ports, 1-Serial port
					2					1-Ethernet port, 2-Serial ports
								S		Surface mounting bracket
								D		DIN mounting bracket

MCR Order Code Example
MXNXL4ENNNNNNS1F5SUNN

- MCR-L4E
- 406-470 MHz
- 2 Ethernet and 1 Serial port
- Standard surface mounting bracket

ECR	***	N	***	NS1	*	USUNNN	Description
Band	L4E						406 -470 MHz
	L9C						928-960 MHz **
			NNN				No second wireless
			W51				WiFi – 802.11b/g/n
					S		Surface mounting bracket
					D		DIN mounting bracket

ECR Order Code Example
ECRL4ENW51NS1SUSUNNN

- ECR-L4E
- 406-470 M
- 1 Ethernet and 1 Serial port
- WiFi option enabled
- Standard surface mounting bracket

*** Check with factory for availability of this option. Scheduled for future release.*

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GEA-12931(E)
English
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