



1.0 INTRODUCTION

The transceiver, shown in Figure 1, is a spread spectrum radio designed for license-free operation. These units employ Digital Signal Processing (DSP) technology to provide highly-reliable long-distance communications, even in the presence of weak signals or interference.

The transceiver is housed in a compact and rugged die-cast enclosure that need only be protected from direct exposure to the weather. It contains a single printed circuit board with all necessary components for radio operation. No jumper settings or manual adjustments are required to configure the radio for operation.



Figure 1. GE MDS TransNEXT Transceiver. Dual transceiver version (left) and single transceiver (right).

About This Guide

This guide covers the GE TransNext operating in **Transnet Compatible Mode**. All GE MDS manuals are available free of charge at www.gemds.com.

Transceiver Features

Listed below are several key features of the transceiver. These are designed to ease the installation and configuration of the radio, while retaining the ability to make changes in the future.

- 902–928 MHz operation using the TransNEXT 900
- User-selectable option to skip sub-bands with constant interference
- 65,000 available network addresses
- Network-wide configuration from the Master station eliminates most trips to Remote sites
- Data transparency ensures compatibility with virtually all asynchronous SCADA system RTUs
- Peak-hold RSSI averaged over eight hop cycles
- Operation at up to 115,200 bps continuous data flow
- Store-and-Forward repeater operation
- Data latency typically less than 10 ms
- Same hardware for Master or Remote configuration
- Supports RS/EIA-232 and RS/EIA-485 user interface

- Low current consumption; less than 3 mA in “sleep” mode

NOTE: Some radio features may not be available on all models. Features may be limited by the options purchased or the applicable regulatory constraints for the region in which the radio will operate.

Typical Applications

Multiple Address Systems (MAS)

This is the most common application of the transceiver. It consists of a central control station (Master) and two or more associated Remote units, as shown in Figure 2. An MAS network provides communications between a central host computer and remote terminal units (RTUs) or other data collection devices. The operation of the radio system is transparent to the computer equipment. When used in this application, the transceiver provides an excellent alternative to traditional (licensed) MAS radio systems.

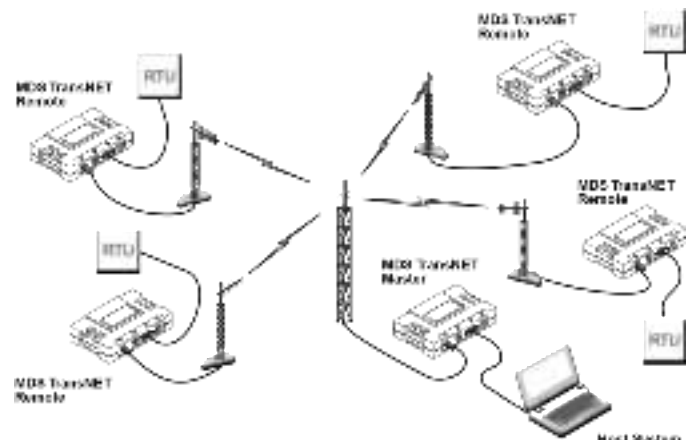


Figure 2. Typical MAS Network

Point-to-Point System

A point-to-point configuration (Figure 3) is a simple arrangement consisting of just two radios—a Master and a Remote. This provides a half-duplex communications link for the transfer of data between two locations.



Figure 3. Typical Point-to-Point Link

Adding a Tail-End Link to an Existing Network

A tail-end link can be used to extend the range of a traditional (licensed) MAS system. This might be required if an outlying site is blocked from the MAS Master station by a natural or man-made obstruction. In this arrangement, a TransNEXT



radio links the outlying Remote site into the rest of a licensed MAS system by sending data from that site to an associated TransNEXT installed at one of the licensed Remote sites (see Figure 4.)

As the data from the outlying site is received at the licensed Remote site, it is transferred to the licensed radio (via a local cable connection) and is then transmitted to the MAS Master station in the usual manner.

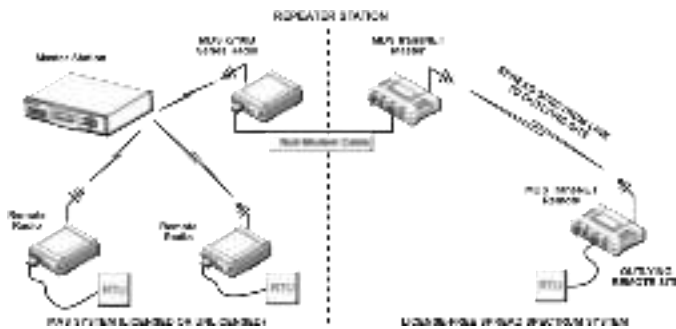


Figure 4. Typical Tail-End Link Arrangement

Extending a TransNEXT Network with a Network Repeater

Similar to a Tail-End Link, Store-and-Forward (SAF) offers a way to physically extend the network range, but in a simple and economical manner. SAF works by dividing a network into a vertical hierarchy of two or more sub-networks. Extension radios (designated as MODE X) serve as single-radio repeaters that link adjacent sub-networks, and move data from one sub-network to the next one.

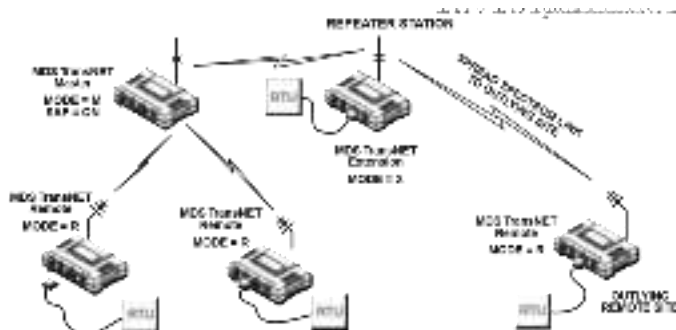


Figure 5. TransNEXT Repeater Network

Accessories

GE MDS offers an Accessories Selection Guide listing additional items that may be used with our products. Contact your factory representative or visit www.GEmds.com for the latest copy.

2.0 INSTALLATION

TransNEXT Installation

Figure 6 shows a typical Remote station arrangement. Master stations are similar, but an omni-directional antenna is normally

used instead of a directional type, and a host computer replaces the data terminal equipment.

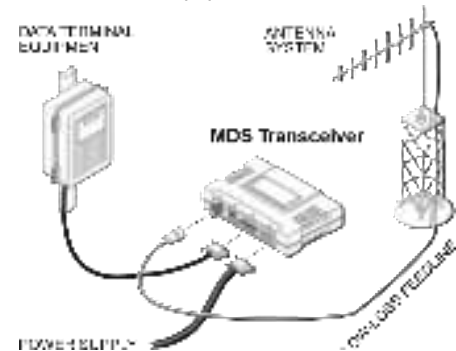


Figure 6. Typical Remote Station Arrangement

The following steps provide an overview of the installation procedure.

1. Select a site that provides stable power, protection from the weather, entrances for antenna and other cabling, and an antenna location with an unobstructed transmission path in the direction of the associated station(s).
2. Select and install an appropriate antenna and feedline for your system requirements. Professional Installation is required. Feedline losses and antenna gains must be properly accounted for. Please refer to Table 5.1 and Table 5.2 in section "5.0 Antennas" for more details on approved antennas and feedline requirements.
3. Mount the transceiver to a stable surface using the brackets supplied with the radio (fasteners/anchors are not supplied).
4. Connect the data equipment to the transceiver's DATA connector. Use only the required pins for the application. Refer to Figure 7.
5. Measure and install the primary power for the transceiver. It must be within 6–36 Vdc (including transients) and be capable of providing 12 watts over this voltage range. (Typical current draw is 860mA @13.8 Vdc; 2.0A at 6 Vdc.) A power connector with screw-terminals is provided with each unit.

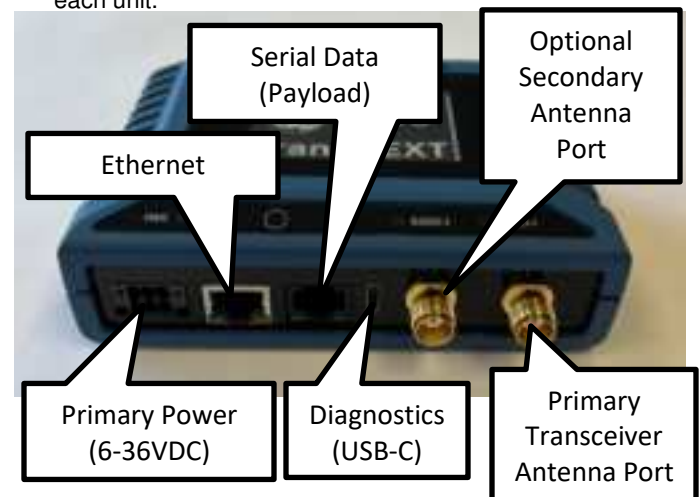


Figure 7: Interface Connector Functions



6. Set the radio's basic configuration with a PC terminal connected to the DIAGNOSTICS connector via a USB-C cable.
7. Four essential settings for the transceiver are:
 - a. **Mode:** AP/Remote (Mode M or Mode R)
 - b. **Network Address:** A unique number from 1 to 65000
 - c. **Data Interface Parameters:** bps, data bits, parity, stop bits
 - d. **Single/Dual Transceiver Operation**
8. Perform the initial start-up of the transceiver:
 - a. Apply primary power.
 - b. Observe top panel display for proper boot up.



Figure 8: Top Panel display of initialized unit

In a normally operating system, you will see the GE MDS and TransNEXT screen as shown in Figure 8, above.

9. Configure unit for single or dual transceiver operation (NET9S only)
 - a. Select Radio 2
TransNEXT>radio 2
 - b. To Enable Radio 2
TransNEXT>radio mode transnet
To Disable Radio 2
TransNEXT>radio mode test

Note: for NET9S applications with a single transceiver, terminate the unused secondary TNC antenna port (See Figure 7) of the radio, and the unused antenna port of the dual polarized antenna, with suitable 50-ohm terminations.

10. Optimize the installation:
 - a. Aim the antenna properly
 - b. Verify antenna system VSWR
 - c. Configure HopTime setting
 - d. Configure Payload baud rate setting
 - e. Perform radio interference checks

3.0 RADIO PROGRAMMING

The following is a list of commands available for configuring this unit

radio help	List available commands																
radio rx <on off>	Enable/Disable RX mode																
radio tx <on off> <mode>																	
<on off>	Enable/Disable TX mode																
<mode>	0-CW 1-PN9 2-10 3-CW_PN 4-RAMP 5-CW_SHIFT																
radio power <pwr>	Get/Set Power (integer)																
radio rssi	Get RSSI (dBm)																
radio channel <chnl>	Get/Set Channel #																
radio rssioffset <offset>	Get/Set Rssi Offset																
radio debugmode <mode>	Get/Set Debug Mode																
radio setfrequency <freq>	Set Frequency Hz																
radio hoptime <hoptime>	Set radio dwell time (7 or 28ms). Dwell time is total of TX and RX time per channel in the hop sequence.																
radio skip <1,2,3,4>	Set hopping channel zones to skip. Up to 4 zones can be skipped and are identified 1-8, use 0 for a zone that should not be skipped. The zones available for skipping are shown below																
<table><tr><th>ZONE 1</th><th>ZONE 2</th><th>ZONE 3</th><th>ZONE 4</th><th>ZONE 5</th><th>ZONE 6</th><th>ZONE 7</th><th>ZONE 8</th></tr><tr><td>902.2 to 905.2</td><td>905.4 to 908.4</td><td>908.6 to 911.6</td><td>911.8 to 914.8</td><td>915.0 to 918.0</td><td>918.2 to 921.2</td><td>921.4 to 924.4</td><td>924.6 to 927.6</td></tr></table>		ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8	902.2 to 905.2	905.4 to 908.4	908.6 to 911.6	911.8 to 914.8	915.0 to 918.0	918.2 to 921.2	921.4 to 924.4	924.6 to 927.6
ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5	ZONE 6	ZONE 7	ZONE 8										
902.2 to 905.2	905.4 to 908.4	908.6 to 911.6	911.8 to 914.8	915.0 to 918.0	918.2 to 921.2	921.4 to 924.4	924.6 to 927.6										
radio state	Get State																
radio getvswr	Sample VSWR																
radio update	Update radio firmware																
radio mode <mode>	Get/Set Radio Mode																
radio init	test transnet																
cfg set radio.mode	Restore defaults																
	Set the radio network mode to Master "M" or Remote "R"																



4.0 TROUBLESHOOTING

All radios in the network must meet the following requirements for proper operation. Check these items first when troubleshooting a communication problem:

- Adequate and stable primary power
- Secure cable connections (RF, data, and power)
- A clear transmission path between Master and each Remote
- An efficient and properly aligned antenna system providing adequate received signal strength.
- Proper programming of the transceiver's parameters
- The correct interface between the transceiver and the connected data equipment (correct cable wiring, proper data format, timing, etc.)

LEDs

The radio's power LED indicator panel provides useful information when troubleshooting a system problem.

PWR	Continuous—Power is applied to the radio; no problems detected
	Flashing (5 times-per-second)—Fault indication. Use PC or top panel screen for more information on fault condition
	Off—Radio is unpowered or in Sleep mode

Event Codes

When an alarm condition exists, the transceiver creates a message that can be read on a connected PC by using the **ALARM** command.

Types of Alarms

Minor Alarms—report conditions that, under most circumstances, will not prevent transceiver operation. These include out-of-tolerance conditions, baud rate mismatches, etc. The cause of these alarms should be investigated and corrected to prevent system failure.

Major Alarms—report serious conditions that generally indicate a hardware failure, or other abnormal condition that will prevent (or hamper) further operation of the transceiver. Major alarms may require factory repair. Contact your factory representative for assistance.

5.0 ANTENNAS

This product has been approved for use with only the antennas listed in Table 5.1, below

Manufacturer	Manufacturer's Part Number	Type	Gain (dBi)/per port	For use with (ESMDS- or 101D-)
Kathrein	OGB9-915N	Omni	11.0	NET9L
PCTEL	Z3336	Yagi	12.2	NET9L
Hana Wireless	HW-OD9-6D-NF	Dual-Polarized Omni	6.0	NET9S
PCTEL	BMVD890K-DP	Dual-Polarized Yagi	11.0	NET9S

Table 5.1: Approved Antennas for TransNEXT

Professional installation is required. The installation site must conform to 15.247/RSS-247 Conducted and Radiated Power limits. Proper feedline selection and/or radio power setpoints must be set accordingly for use with each antenna type as detailed in Table 5.2.

Radio Model	Antenna Model	Radio Power Setpoint (dBm)	Minimum Cable Loss required for this configuration (dB)	Conducted Power into antenna (dBm) Note 1	ERP (dBm) Note 2
NET9L	OGB9-915N	30	5.0	25	36
		25	0	25	36
NET9L	Z3336	30	6.2	23.8	36
		24	0.2	23.8	36
NET9S	HW-OD9-6D-NF	30	5.0	30	36
		27	0	30	36
NET9S	BMVD890K-DP	30	8.0	25	36
		22	0	25	36

Note 1: Conducted Power into antenna is the sum of the power of both transmitter feedline outputs for NET9S
Note 2: ERP is the sum of the radiated power of all polarizations for NET9S

Table 5.2: Feedline losses and radio power setpoints for ERP and Conducted Power compliance for TransNEXT installations.

6.0 REGULATORY INFORMATION

Product Labels



Figure 9: ESMDS-NET9L Label



Figure 10: ESMDS-NET9S Label



Figure 11: 101D-NET9L Label



Figure 12: 101D-NET9S Label

RF Exposure Notice

Professional Installation Required. The radio equipment described in this guide emits radio frequency energy. Although the power level is low, the concentrated energy from a directional antenna may pose a health hazard. Do not allow people to come closer than **34 centimeters** to the front of the antenna when the transmitter is operating with a 10dBd (12.15dBi) antenna and so configured for the maximum allowable EIRP of +36dBm. Use of higher gain antennas is prohibited. More information on RF exposure is available online at: www.fcc.gov/oet/info/documents/bulletins

Installation professionnelle requise. L'équipement radio décrit dans ce guide émet de l'énergie radiofréquence. Bien que le niveau de puissance soit faible, l'énergie concentrée d'une antenne directionnelle peut présenter un danger pour la santé. Ne laissez personne s'approcher à moins de 34 centimètres de l'avant de l'antenne lorsque l'émetteur fonctionne avec une antenne de 10 dBd (12,15 dBi) et qu'il est ainsi configuré pour l'EiRP maximum autorisé de +36 dBm. L'utilisation d'antennes à gain plus élevé est interdite. Plus d'informations sur l'exposition aux RF sont disponibles en ligne sur : www.fcc.gov/oet/info/documents/bulletins

FCC Part 15 and Industry Canada RSS Notices

Warning: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

a) Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

b) The radio transmitters described herein (IC ID: 101D-NET9L and 101D-NET9S) have been approved by Industry Canada to operate with the antenna types listed in Table 5.1 with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Cet appareil est conforme à la Partie 15 des règlements de la FCC et Industrie Canada exempts de licence standard RSS (s). Son utilisation est soumise à deux conditions:

(1) ce dispositif ne peut causer des interférences,
(2) cet appareil doit accepter toute interférence pouvant causer un mauvais fonctionnement du dispositif.

a) En vertu des règlements d'Industrie Canada, cet émetteur radio ne peut fonctionner avec une antenne d'un type et un maximum (ou moins) approuvés pour gagner de l'émetteur par Industrie Canada. Pour réduire le risque d'interférence aux autres utilisateurs, le type d'antenne et son gain doivent être choisis de façon que la puissance isotrope rayonnée équivalente (PIRE) ne dépasse pas ce qui est nécessaire pour une communication réussie.

b) Les émetteurs radio décrits ici (IC ID : 101D-NET9L et 101D-NET9S) ont été approuvés par Industrie Canada pour fonctionner avec les types d'antennes répertoriés dans le tableau 5.1 avec le gain maximum autorisé et l'impédance d'antenne requise pour chaque type d'antenne indiqué. Les types d'antennes non inclus dans cette liste, ayant un gain supérieur au gain maximum indiqué pour ce type, sont strictement interdits pour une utilisation avec cet appareil.

Technical Assistance

Factory technical assistance is available by contacting GE MDS during business hours (8:30 AM to 6:00 PM Eastern Time). Use one of the following means to contact the factory:

Telephone: (585) 241-5510

E-mail: GEmds.TechSupport@GE.com

Web: www.GEmds.com

FAX: (585) 242-8369



Supplier's Declaration of Conformity

GE MDS LLC
175 Science Parkway
Rochester, NY 14620 USA
Phone (585) 241-5510
www.gemds.com

declare under our sole responsibility that the
products

GE MDS TransNEXT
And
GE MDS TransNEXT Lite

comply with Part 15 of FCC Rules. Operation is
subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation