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USER MANUAL R400NX SERIES

R400NX - Network AIS Receiver with Ethernet & USB – SKU: 001-1142
R400NXG - Network AIS Receiver with GPS, Ethernet & USB – SKU: 001-1143

R400NX-Series-MA-v06r07
2022-06-22
ENGLISH

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1 R400NX SERIES AIS RECEIVER MODELS

R400NX
Network AIS Receiver
With USB & Ethernet

R400NXG
Network AIS/GPS Receiver
With USB, Ethernet & GPS

2 DOCUMENT

2.1 About This Manual

This Manual provides installation, operating Instructions and fault-finding procedures for the equipment to which it relates.

After installation, this manual should remain with the vessel to which it relates.

This manual may also be made available in electronic Portable Document Format (PDF). In PDF format, the following categories are all enabled as active hyperlink references: (1) The titles of each section; (2) document cross-references; (3) the table of contents.

This document may therefore be navigated quickly and effectively by using a mouse or other pointing device to activate each of these hyperlinks. This is a printer friendly document, designed to be printed 2-sided as a booklet with A5 pages on A4 stock paper.

Document name:	Date:	Details:	Author:
R400NX-Series-MA-v06r07	2021-06-21	First Issue – Configuration for Lantronix Xport Module	TSI / JGV

3 NOTICE

3.1 Copyright

COMAR SYSTEMS
Vittlefields Technology Centre
Forest Road
NEWPORT
Isle of Wight
PO30 4LY
UNITED KINGDOM

tel: +44 (0)1983 828900

email: sales@comarsystems.com
web: www.comarsystems.com

4 GENERAL NOTICES

SAFETY: Make sure the power supply is switched off before you make any electrical connections to the unit.

INSTALLATION: This equipment must be installed in accordance with the instructions provided in this manual. Failure to do so could result in poor performance, personal injury and/or damage to your vessel and/or connected equipment.

CABLES: The supplied cables should only be cut, shortened or lengthened by an appropriate supplier.

COMPASS: The compass safe distance of this unit is 0.5 m or greater for 0.3° deviation.

In accordance with a policy of continual development and product improvement, hardware and software may be upgraded from time to time, and future versions of equipment may therefore not correspond exactly with this manual.

When necessary, upgrades to the product will be accompanied by updates or addenda to this manual. Information contained in this manual is liable to change without notice.

Comar Systems Ltd. disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

This device complies with part 15 of the 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.

5 INTRODUCTION

5.1 Background to AIS

AIS is an Automatic Identification System. For improved safety and specifically for collision avoidance reasons, vessels need to know the position, details and navigational intentions of other vessels within VHF range.

IMO regulations covering most commercial vessels worldwide have been passed requiring that AIS transponders are fitted to all commercial vessels over 300 grt on international voyages.

The transponders use VHF frequencies to:

Transmit details of their own vessel

Receive details from other vessels or navigation aids within VHF range

5.2 The R400NX Series

The R400NX Series AIS receivers, come in 2 different models with different connections, including USB port & Ethernet interface (Both Models), and GPS receiver (R400NXG). The R400NX Series is designed specifically for coastal monitoring of AIS equipped vessels.

The R400NX units can be connected to an Ethernet Network directly, or via a router / PC running compatible software, AIS data transmitted from ships within range can be displayed on the screen giving a visual interpretation of the traffic within VHF range. The unit can also be mounted at a remote location and AIS data sent over the Internet to a fixed IP address for use on a dedicated server.

> **Note: The main difference between the R400N series and the R400NX series is the type of network module which is installed within the product. The R400N series use a Digi module, whereas the R400NX series uses a Lantronix XPort module. Functionally the receivers are the same, but follow a different setup process / configuration interface.**

Information transmitted from vessels fitted with AIS transponders includes:

- Name of Vessel
- Speed (SOG)
- Position
- MMSI Number
- Rate of Turn
- Destination
- Call Sign
- Course (COG)
- Navigational Status
- IMO Number
- Size of Vessel
- ETA
- Type of Vessel
- Heading
- Vessel Dimensions
- Draft
- Status
- Cargo

> **Note: Not all the above information is necessarily transmitted by each vessel.**

6 PARTS LIST

Before proceeding with the installation of any R400NX Series model, check the contents of the box which should include:

- The R400NX, or R400NXG AIS Receiver Unit
- Universal 100-250VAC/12VDC Power Supply
- Antenna Connector Adaptor
- USB Cable
- Network Cable

7 INSTALLATION

7.1 Mounting

The R400NX units are not waterproof and should be installed in a dry location, ideally in a location suitable for connection to power and a VHF antenna, observing a compass safe distance of 0.5m and away from excessive heat sources and high levels of vibration and shock.

7.2 Power Connection

Fit the universal power supply with the correct adaptor for your local power. Plug the 2.1 mm jack into the rear of the R400NX Unit and switch on the power

Hint: Alternatively the unit will accept 9-30 V dc from an alternative source capable of supplying 1 Amp. The centre pin is Positive.

7.3 Antenna Installation

A VHF antenna is not supplied as the type of antenna and cable requirements differ for each installation. An antenna can be acquired from a local marine electronics outlet.

Shore based reception is governed by local terrain, however an open view to the sea with an antenna mounted in the clear at a height of approximately 20 metres will achieve 25 miles plus.

Hint: The antenna connector type is BNC, 50Ω

Hint: The higher the antenna is located, the greater the range

Hint: Mount the antenna with a relatively clear view of the horizon. Large obstructions that might shade the antenna should be avoided.

Hint: A higher gain antenna will increase reception range.

Hint: Normally an omni-directional antenna is recommended; however a directional antenna such as a 3 element Yagi can be used to increase range in one particular direction.

8 CONFIGURATION

8.1 Connection to a Network or PC

These models can be connected to a standard PC via USB or Network Router / Switch via Ethernet. Note if connecting directly to a PC you will need a crossover cable.

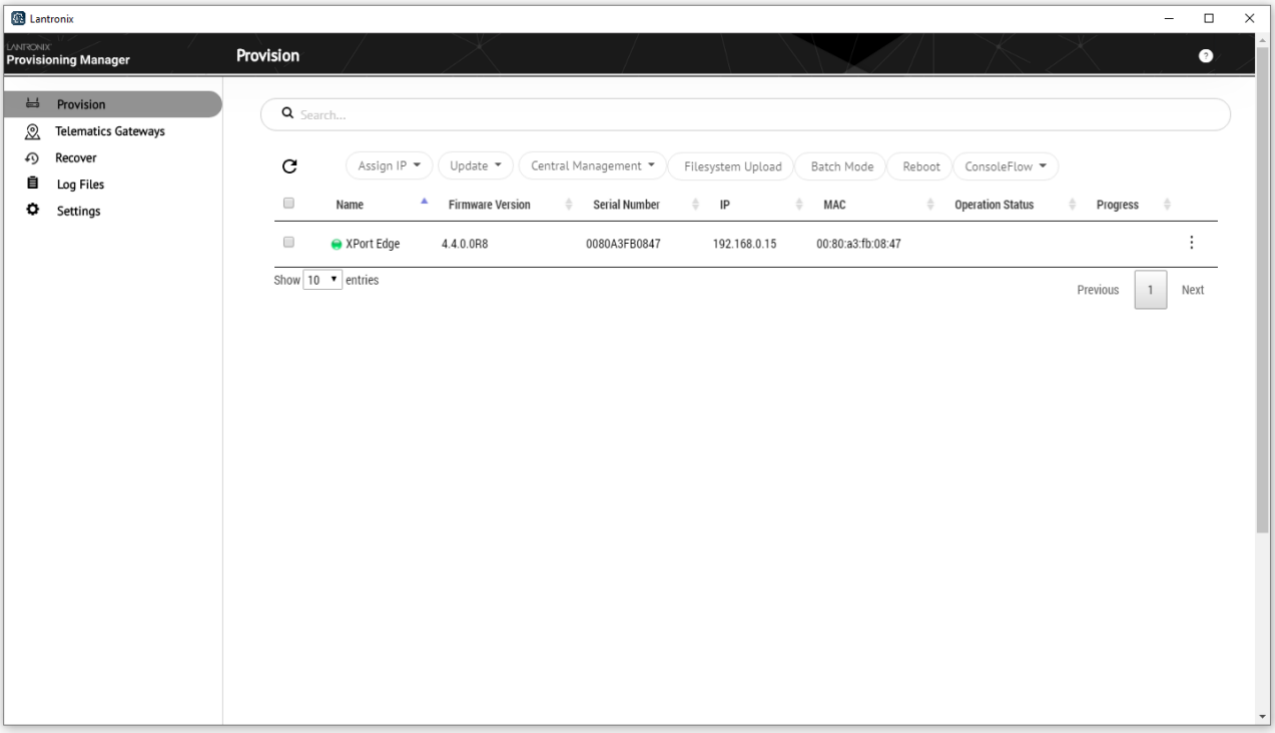
When connected to a network the yellow LED on the socket should be illuminated, if not, the unit has not detected a link. The green LED will blink when data is transmitted or received.

8.2 Configuring the Network

Start by downloading the R400NX software from our website at: comarsystems.com/software-downloads, and copy the *Lantronix Provisioning Manager* executable program to your PC.

Open the Lantronix Provisioning Manager from the location on your PC.

If you have connected the R400NX to your local network, the device will be displayed in the device list as shown in the example below:



8.3 Discovery Troubleshooting Tips

8.3.1 Firewalls

Check to make sure that any software firewalls (common examples are Windows Firewall and most popular Anti-Virus software) are disabled. These can block the discovery process, also any physical firewall will almost certainly block the discovery process as well.

8.3.2 Routers or Switches

Is there a router between the computer running the *Provisioning Manager* utility and the XPort device itself? Normally, routers will block the discovery process. If possible remove them and use a hub instead. If there is a switch in between this may or may not be a problem. Occasionally they are configured to block the discovery traffic. If unsure use a hub or a direct Ethernet cable connection. In case the port on your Router/Switch/Hub is at fault, try an alternative port as well.

8.3.3 Cabling

If nothing else works try using a direct crossover Ethernet cable directly between the computer and the XPort device. Another option is to try another Ethernet cable.

8.3.4 Ethernet LED

Check the Ethernet Link LED on the XPort device. Is it lit solid? If not, there is not a valid network connection and it will not be possible to discover the device.

8.3.5 Network Adapters

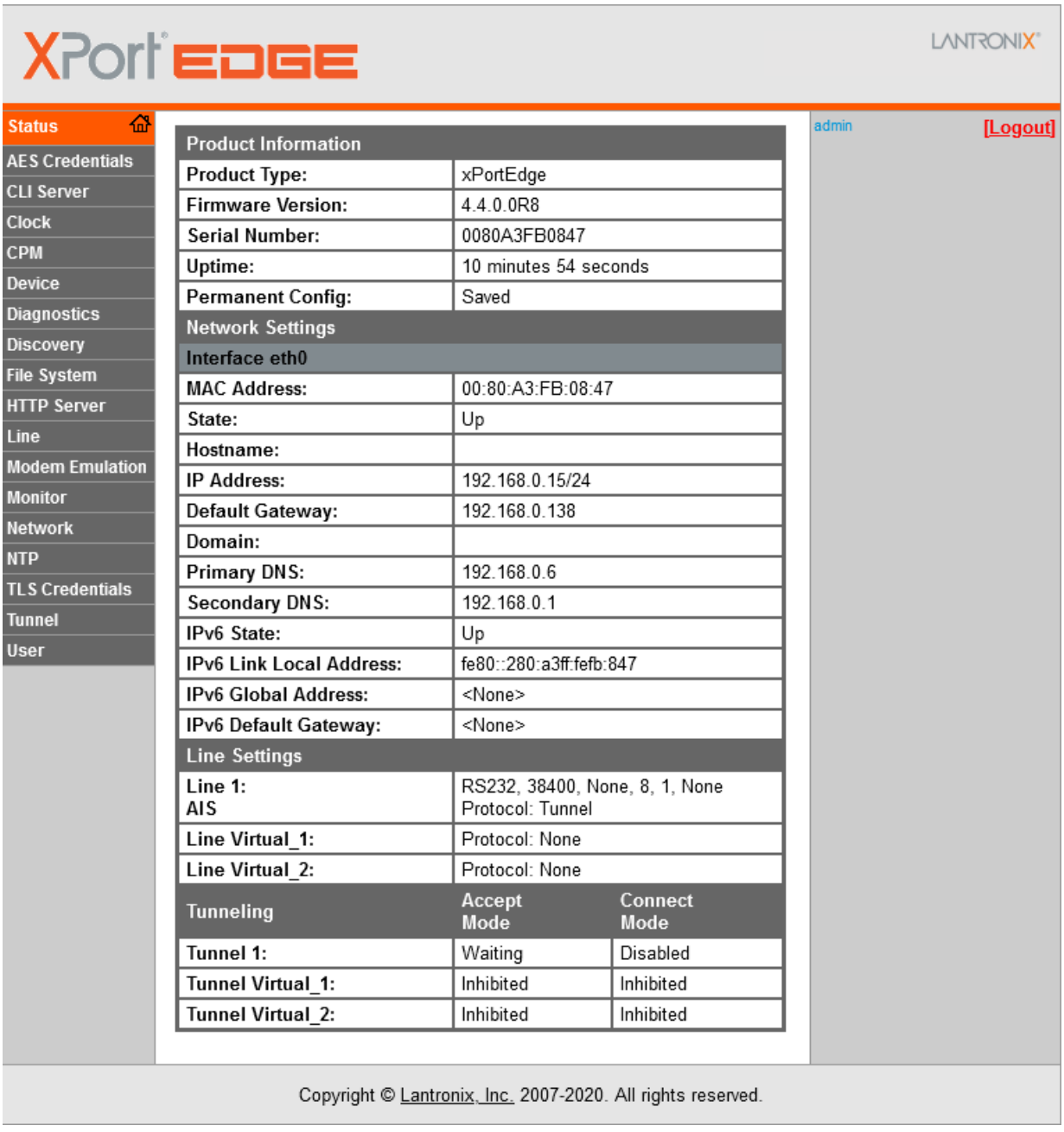
Make sure the proper network adapter is enabled, also ensure all other network adapters are disabled. If more than one network adapter is enabled, this can cause the discovery process to fail.

8.4 Configuring the Network Settings

To configure the XPort Edge Ethernet module used in your R400NX, type the discovered IP address from the *Provisioning Manager* into your browser to login to the *Lantronix Edge* web interface. The default login details are:

Username: **root**
Password: **dbps**

Once entered it will connect you directly to the internal web browser, and open it on its home page as below and configure the device to your requirements:



9 GPS / GNSS RECEIVER (R400NXG ONLY)

The R400NXG contains an integral GPS / GNSS receiver allowing positional data and AIS data to be output together from the receiver.

By default the GPS / GNSS receiver will output the following NMEA messages:

GPGGA, GPGSA, GPGSV, GPRMC

9.1 GPS / GNSS Receiver Technical Specification

- A standard active 3.3 volts dc GPS antenna with a gain between 10 and 30 dB needs to be connected to the TNC connector on the rear of the R400NXG for the GPS / GNSS receiver to work.
- Channels: 52
- GNSS Constellations Supported: GPS, GLONASS, Galileo, BeiDou
- Frequency: 1560 - 1620 MHz
- Message Update Rate: 1 sec
- Cold Start: 28 s
- Hot Start: 1 s

10 OPERATION

Operation of R400NX units is fully automatic and only requires Power, VHF and (GPS R400NXG) connection.

On powering up the unit:

The green LED marked ON should illuminate

The Channel LEDs should come on briefly then go off

The Channel A and B LEDs should flash momentarily when information from nearby transceivers is received

Data is then output for visual or textual viewing on compatible electronic charting systems or other systems or devices.

10.1 Range of AIS

The AIS reception range is similar to that normally associated with Marine VHF Radiotelephone. Range is dependent on height of antenna and also type of antenna, the higher and better antenna installed the greater the reception range.

Typically an antenna mounted on the rail of a yacht will achieve 15 miles, mounted on the masthead will increase this to 20 miles. Shore based reception is governed by local terrain, however an open view to the sea with an antenna mounted in the clear at a height of approximately 20 metres will achieve 25 miles plus, higher gain antenna can be used on shore to further increase the range.

11 TROUBLESHOOTING

11.1 No power LED is displayed

Check the power supply and that the unit is connected correctly to a 12 or 24V dc supply

Check the polarity of the supply is correct. The center pin of the 2.1mm jack is positive

11.2 Channel 1 and Channel 2 LEDs do not flash

Check that a VHF antenna is fitted and correctly connected

Check that the antenna is correctly positioned, i.e. at a suitable location to visibly 'see' vessels

11.3 Channel 1 and Channel 2 lights flash, but no data is received

If the red channel lights flash then data is being received from nearby vessels.

Check that the correct data cable is connected to the PC or NMEA device

Check on the PC application or device that the correct port is assigned and the correct baud rate is setup. The correct baud rate is 38,400

11.4 I can receive ships on my display, but no names are shown

Remember that the names of ships as well as other static information are only sent every 6 minutes or when requested by another station

12 SPECIFICATION

The R400NX units are compact dual channel synthesized VHF Receivers designed to receive and decode all transmissions from vessels fitted with Class A or B AIS transceivers, Aids to Navigation, and SARTS.

12.1 Electrical	
Power Supply Range:	9 - 30 Volts dc
Power Consumption:	300mA @ 12 V dc
Baud Rate:	38,400 Baud (38.4Kb)
Format:	ITU/ NMEA 0183
Output Message:	AIS: VDM GPS: GGA, GSA, GSV, RMC (R400NXG Only)
12.2 Receiver	
Frequency:	Channel A 161.975 MHz Channel B 162.025 MHz
Channel Spacing:	25 kHz
Sensitivity:	> -112 dBm @ 20% MER
Demodulation:	GMSK
Data Rate:	9600
Antenna Impedance:	50 Ω
12.3 Physical	
Dimensions:	L132 x W106 x H46 mm
Weight:	600 g
Mounting:	4 mounting holes in end plates
Connections:	AIS Antenna BNC GPS Antenna TNC – R400NXG Only
USB Port:	USB 2.0 Type B (Cable Supplied)
Ethernet Interface:	RJ-45
Power:	2.1 mm Phono plug
Indicators:	On (Green), Channel A (Red), Channel B (Red)
Construction:	Aluminium, ABS End Caps
Finish:	Black Fine-texture Powder Coat

13 TRANSMISSION SPECIFICATION

13.1 Class A Units

Static information Every 6 minutes, or when data has been amended, or on request.

Dynamic information This is dependent on speed and course alteration.

13.1.1 Table of Class A Shipborne Mobile Equipment Reporting Intervals

Ship's Dynamic Conditions	Reporting Interval
Ship at anchor or moored and not moving faster than 3 knots	3 Minutes
Ship at anchor or moored and moving faster than 3 knots	10 Seconds
Ship 0-14 knots	10 Seconds
Ship 0-14 knots and changing course	3 1/3 Seconds
Ship 14-23 knots	6 Seconds
Ship 14-23 knots and changing course	2 Seconds
Ship >23 knots	2 Seconds
Ship >23 knots and changing course	2 Seconds

13.2 Class B Units

Static information Every 6 minutes

Dynamic information Every 3 minutes if speed is less than 2 knots Every 30 seconds if speed is greater than 2 knots

14 COPYRIGHT

15 LIMITED WARRANTY

Comar Systems Ltd warrants this product to be free from defects in materials and manufacture for one year from the date of purchase. Comar Systems Ltd will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour. The customer is, however, responsible for any transportation costs incurred in returning the unit to Comar Systems Ltd.

This warranty does not cover failures due to abuse, misuse, accident or unauthorised alteration or repairs.

The above does not affect the statutory rights of the consumer.

Changes or modifications not made by Comar Systems or an authorised repairer will: (1) Void the warranty issued by Comar Systems (2) Void the user's authority to operate the equipment.

> **Note: Every effort has been made to ensure that all information contained in this manual is accurate at the time of going to press. We therefore cannot take any responsibility for the content of this manual and advise that you take normal steps to ensure that the information is at its most current when you are reading this manual.**

COMAR SYSTEMS
Vittlefields Technology Centre
Forest Road
NEWPORT
Isle of Wight
PO30 4LY
UNITED KINGDOM

tel: +44 (0)1983 828900

email: sales@comarsystems.com
web: www.comarsystems.com