



Intuicom®

**Navigator IIE™
Multifunction Wireless Data Transceiver
Ethernet Interface**

User Guide

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1 Product Overview

The Intuicom Navigator IIE Ethernet Master Transceiver (IIE) is designed to operate in conjunction with Intuicom Navigator II and Communicator II wireless data transceivers in a Point-to-Multipoint network.

The Intuicom Navigator IIE provides a convenient Ethernet interface to nodes on an Intuicom wireless network by hosting IP sockets mapped to remote serial ports, and in many cases, eliminating the need for a PC combined with Nav-Link Software as a wireless gateway host.

This User Guide assumes familiarity with the Navigator II, Communicator II and Nav-Link Server software in addition to basic TCP/IP knowledge. If necessary, please review Navigator I, Communicator II and Nav-Link User Guides to become familiar with general concepts and network architectures as well as transceiver roles and configuration.

1.1 General Description

The IIE operates exclusively in the role of the Master Transceiver in a Point-to-Multipoint wireless network. The IIE acts as a gateway between third-party TCP/IP applications and remote nodes on the wireless network. Additionally the IIE can host special TCP sockets for diagnostics and control functions.



Figure 1-1: Navigator IIE Front Panel

The Military/Waterproof version of the IIE provides the same functionality and adds a rugged housing with waterproof connectors. The Military/Waterproof version supports additional RF module options.

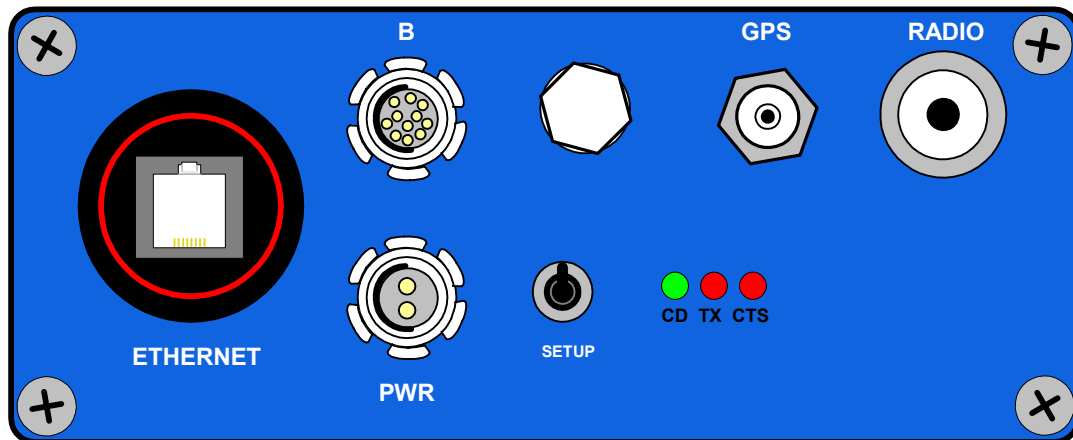


Figure 1-2: Military/Waterproof Navigator IIE Front Panel

1.2 Features and Benefits

Intuicom Navigator IIE key features include:

- **Direct Ethernet TCP/IP network connectivity** providing simple, clean, low power integration.
- TCP **“Tracking Port”** providing a single read only port combining all slaves’ GPS messages. When used with optional embedded GPS, the IIE can include its GPS message with those of the slaves allowing for moving networks or as a status indicator for the Master transceiver.
- TCP **“Static Mapped Ports”** providing user-configured one-to-one mappings between TCP ports and remote serial ports - allowing third party applications to connect to remote serial devices.
- **“Raw Port”** allowing direct read and write access to the raw stream of Navigator II packets – allowing access for PC-Based full-features Intuicom Nav-Link software – or third party direct integration.
- **“Diagnostics Port”** – Connectivity for Intuicom’s Multipoint Diagnostics application providing diagnostics status parameters such as RF signal, noise, decode success, current network RF path, and remote configuration (available only with 900 Mhz and 2.4 Ghz RF Modules).
- **“Control Port”** – Connectivity for Intuicom’s RemoteCommander application providing remote command and control for slave Navigator II’s.

- **“Broadcast Ports”** – dedicated write only ports for transmitting data network wide to configured serial ports. Could be used, for example, to broadcast data to all slaves’ Port Bs.
- **Ability to operate as a traditional RS232 based serial master** – bypassing Ethernet. When Ethernet is not called for, this feature provides the core functionality of a basic Intuicom Communicator II.

1.3 Common Applications

1.3.1 Tracking

One common application is receiving tracking data from the slaves' integrated GPS receivers via a single TCP port for easy integration with third party tracking and moving map applications. The Navigator IIE supports this application without the need for a PC to host the stream of tracking data.

Figure 1-3 shows a Navigator IIE hosting a "Tracking Port" providing tracking to a third-party application from a wireless network of Intuicom Navigator IIs with onboard GPS receivers. A typical deployment might include dozens of Navigator II slaves and any number of Communicator IIs as wireless repeaters.

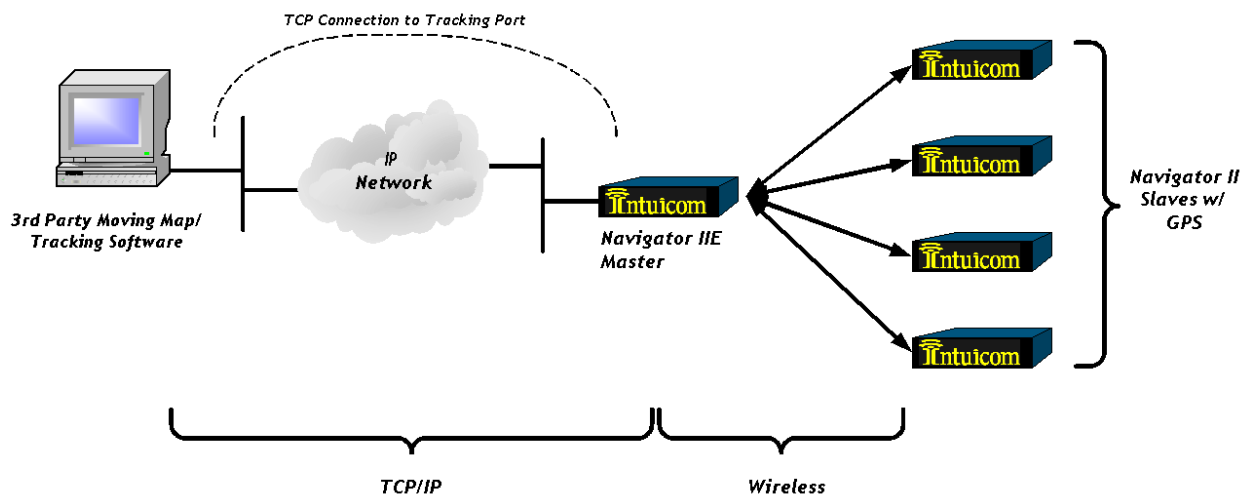


Figure 1-3: Basic Tracking Application using Navigator IIE

1.3.2 Remote Serial Devices

In this example, separate, un-coordinated third-party applications are accessing their respective serial devices across an Intuicom wireless network using TCP/IP socket connections to the Navigator IIE Master transceiver. The IIE is configured to host a TCP port for each of the remote serial devices. This application is utilizing two RS232 ports on each Navigator II operating as a Slave transceiver.

While operating in the configuration depicted in **Figure 1-4**, a network manager may connect to the “Diagnostics” port on the IIE to check signal and noise statistics of the wireless network. A typical deployment might employ Communicator II transceiver(s) as repeaters where necessary.

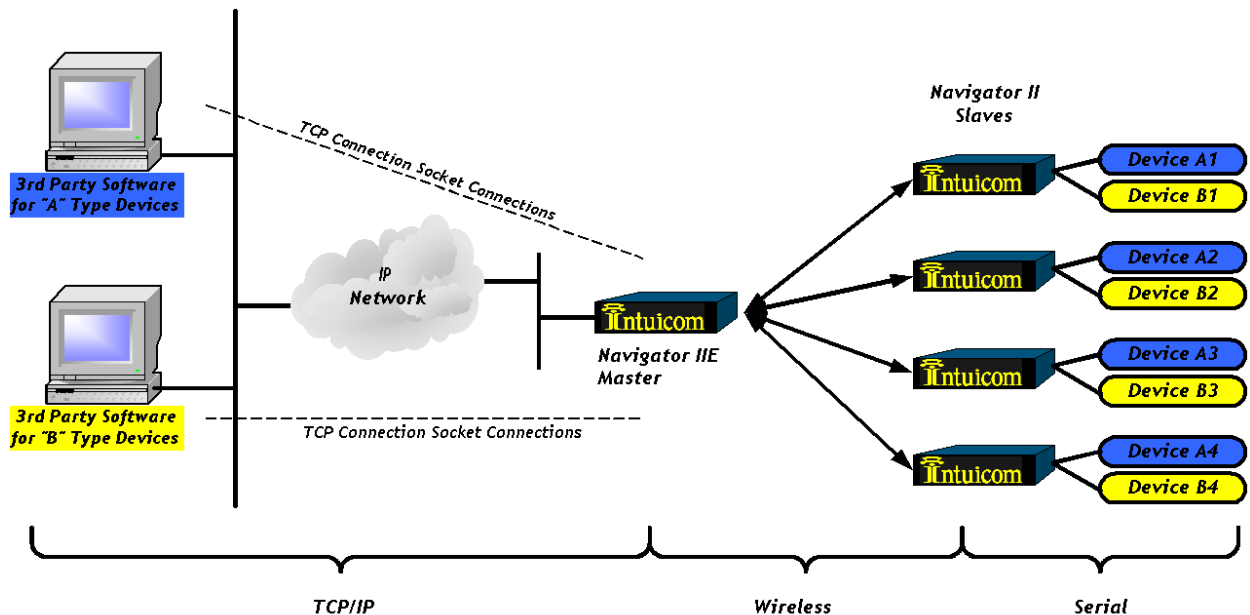


Figure 1-4: Navigator IIE providing access to remote serial devices

1.3.3 Distributing GPS RTK Corrections – Survey

The Navigator IIE can be used to distribute one or more streams of RTK Corrections to Survey GPS Rovers in the field. In this example two different GPS base stations send RTK corrections via TCP/IP to “Broadcast” Ports configured on the IIE. GPS rovers in the field can choose which stream to use by connecting to the appropriate serial port.

Actual deployments may include Communicator II transceivers operating as wireless repeaters to extend the coverage area of the RTK correction broadcast.

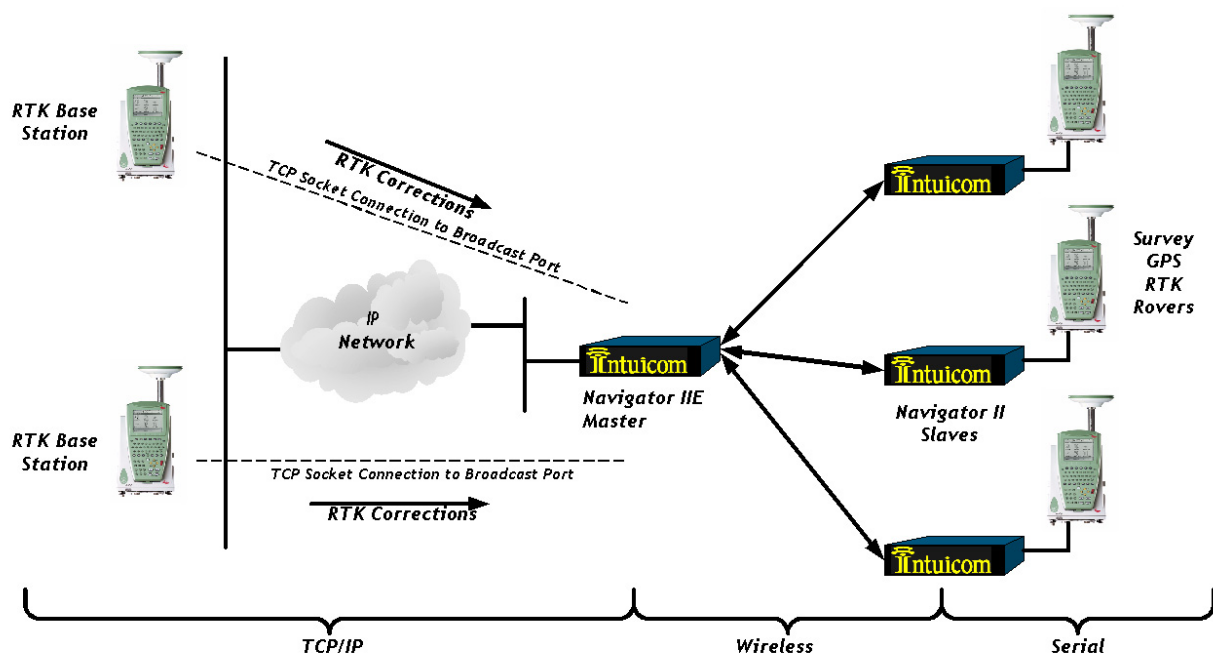


Figure 1-5: Using the IIE to distribute GPS RTK Correction Messages

1.3.4 Combining the IIE with Nav-Link for Advanced Functionality

Certain applications benefit from the added functionality and flexibility of running Intuicom Nav-Link Gateway Server software to provide the TCP socket interface for third-party applications. Figure x-x shows the IIE configured to host a “Raw” port where Nav-Link can connect and provide the expanded functionality such as multiple tracking port connections, a larger number of static mapped ports, logging, etc.

Again, a typical network might easily include Communicator II Wireless Data Transceivers operating as repeaters, greatly expanding the range of the wireless network.

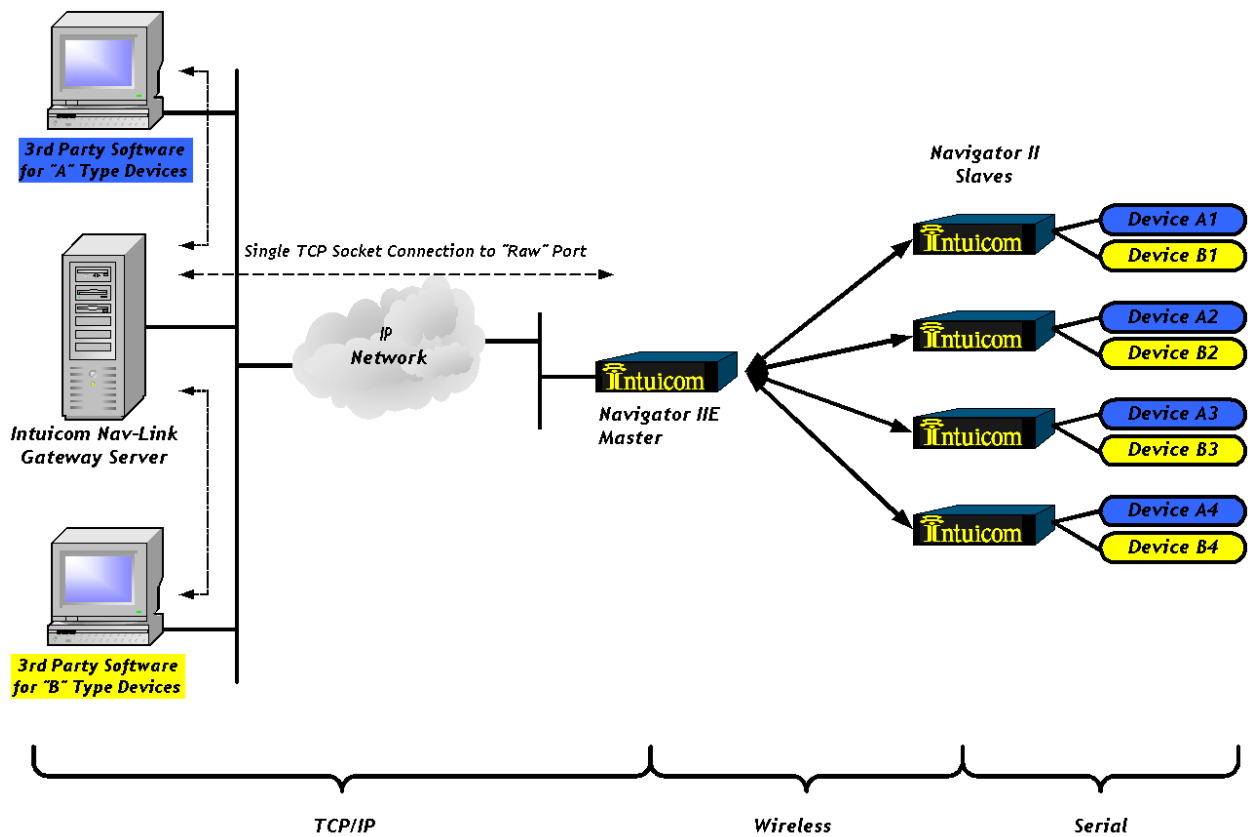


Figure 1-6: Navigator IIE and Intuicom Nav-Link

2 Configuration

2.1 Accessing the Main Setup Menu

The IIE's interactive menu is accessed using a terminal application and connecting to Port B on the front of the unit with a serial cable.

Connect to Port B on the front of the unit with a straight through serial cable (not null modem) using any terminal application such as HyperTerminal or Procomm configured at 19200 baud N81 with no flow control. Once connected, push and hold the setup button (or toggle and hold setup switch) for approximately 3 seconds until the IIE Main Setup Menu appears as shown in **Figure 2-1**.

```
Intuicom Navigator IIE
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Unit ID: 2251844
Firmware Version: 6000 b06      Feb 22, 2004
Configuration Version: 110
Unit Option: Ethernet Master

Main Configuration Menu:

1 Serial/IP Port Configuration
2 GPS Configuration
3 RF Configuration
4 Navigator Configuration

Enter Choice (ESC to exit):
```

Figure 2-1: IIE Main Setup Menu

2.2 Configuration Process

A suggested approach to configuring a Navigator IIE consists of the following steps:

1. Configure the RF module to operate as the network Master with a serial baud rate of 115,200bps with hardware flow control.
2. Confirm the Navigator IIE internal microprocessor's RF serial interface matches that of the RF module – in this case 115,200bps with hardware flow control.
3. Configure the Navigator IIE's IP Address, Netmask and Default Gateway for the IP network where it will reside.
4. Configure and activate desired features such as the Tracking Port or a Static Mapped Port, by selecting a unique TCP port for each feature.

5. Configure the internal GPS if installed and activate its data stream to the Tracking port (optional).
6. Attach the IIE to an IP network and test configured features for correct operation.

2.3 RF Port Speed and RF Configuration

For the IIE to operate as the Master Transceiver in a Point-to-Multipoint wireless network, the internal RF module must be correctly configured. Additionally, its internal serial interface configuration must match that of the Navigator IIE's internal microprocessor. This interface should always operate at 115,200 baud with hardware flow control – any other configuration will result in sub-optimal performance. Configure the RF module by selecting **Option 3** from the Navigator IIE Main Setup Menu.



Figure 2-2: RF Configuration Main Menu

In general, the RF module should be configured to operate as a Point-to-Multipoint Master. Refer to the Intuicom Communicator II and Navigator II user guides for more information about configuring the RF Module in the role of Master Transceiver. For JBREWS Military band RF Modules, refer to the JBREWS Addendum to the Communicator II user guide.

```
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Serial Port Configuration Menu:

1 Serial Port B (19200 NONE)
2 Serial Port C (19200 NONE)
3 GPS Internal Interface *
4 RF Internal Interface *
5 IP Configuration

(*)Consult Manual before changing these interfaces !

Enter Choice (ESC to exit):
```

Figure 2-3: Serial/IP Configuration Menu

After configuring the RF Module, confirm the baud rate and flow control of the Navigator RF Internal Interface by choosing **Option 1** from the Main Setup Menu, then choosing **Option 4** from the Serial/IP Configuration Menu.

```
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Set up for RF Internal Interface:
115200 baud, NONE flowcontrol

1 1200
2 2400
3 4800
4 9600
5 19200
6 38400
7 57600
8 115200
9 Flowcontrol (NONE)

Enter Choice (ESC to exit): █
```

Figure 2-4: RF Internal Interface Baud Rate Menu

2.4 General IP Configuration Parameters

For the IIE to be able to communicate on an Ethernet IP network, it will need to be configured with an appropriate IP address, NETMASK and gateway address. Choose **Option 1** from the **Main Setup Menu** to enter the **Serial/IP Configuration Menu**, and then choose **Option 1, Configure Master IP Parameters** to configure the IP address, NETMASK, and Gateway IP address.



Figure 2-5: IP Configuration Parameters



Figure 2-6: IIE IP Address Configuration

2.5 Raw Port Configuration

The RAW port provides a bi-directional interface to which Intuicom Nav-Link or third-party applications can connect and directly parse or transmit Intuicom Navigator Packets. This feature is useful for expanding the interface capability of the IIE, including accessing discrete IO data or to transmit discrete IO state changes to remote Navigator II transceivers. For more information regarding the Navigator II protocol, contact Intuicom.

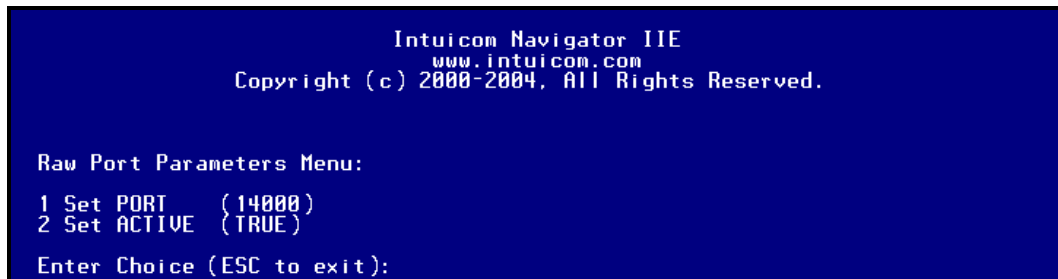


Figure 2-7: RAW Port Configuration Menu

Configure the RAW port by selecting **Option 2** from the **Configure Master IP Parameters** choose and set a TCP port number for the RAW port, and make it active

2.6 Tracking Port Configuration

The Tracking Port is a read only port that combines the GPS data from all connected Slave transceivers. Each message output from the Tracking port is tagged with the ID of the Slave transceiver where the data was generated. Unlike Nav-Link, the Tracking port on the IIE supports only one connection at a time.

```
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Tracking Port Parameters Menu:
1 Set PORT    (11000)
2 Set ACTIVE  (TRUE)
Enter Choice (ESC to exit): █
```

Figure 2-8: Tracking Port Configuration Menu

Configure the Tracking port by selecting Option 3 from the **Configure Master IP Parameters** Menu. Select a TCP port number and set the feature active.

2.7 Diagnostics Port Configuration

The Diagnostics Port allows a connection from the Intuicom Multipoint Diagnostics application to monitor statistics such as signal and noise levels for each slave and repeater in the Multipoint network. For Diagnostics to be active, the Diagnostics Menu item in Menu 5 of the RF Configuration menu, must be set to a value from 1 to 64. Additionally diagnostics are only possible in a wireless network configured to operate with one or more repeaters.

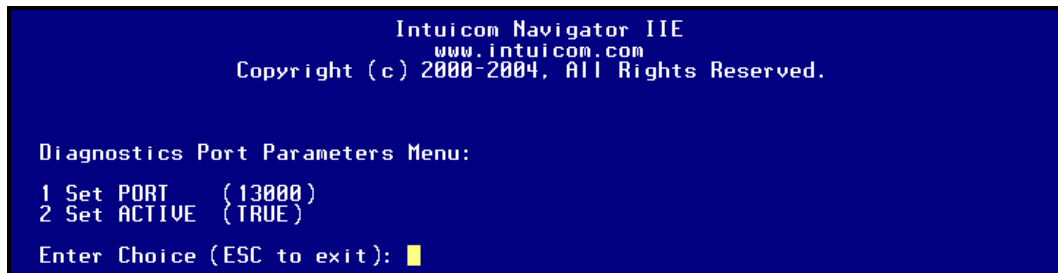


Figure 2-9: Diagnostics Port Configuration

2.8 Control Port Configuration

The Control Port allows the Intuicom Remote Commander application to connect to and communicate with Navigator Slaves providing a means of remote monitoring and control of Navigator II Slave configuration parameters.



Figure 2-10: Control Port Configuration Menu

2.9 Static Mapped Port(s)/Broadcast Ports

A Static Mapped port creates a one to one mapping between a TCP port/Socket and a serial port on a remote Navigator II slave. To configure a Static Mapped Port, one needs the ID of the remote Navigator II and the desired serial port (A, B, C, or GPS).

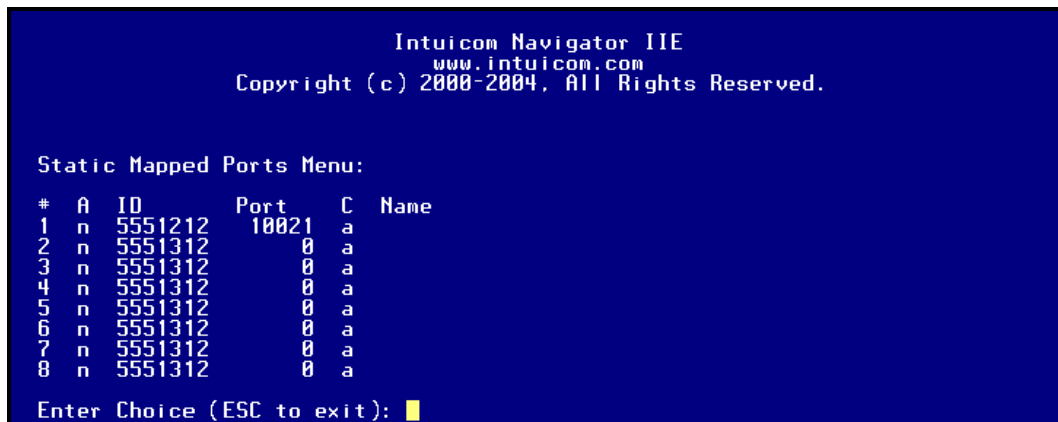


Figure 2-11: Static Mapped Port/Broadcast Port Configuration Menu

Up to eight Static Mapped Ports can be configured on a Navigator IIE. To configure a **Static Mapped Port**:

- Select the line number (1-8) of the port you wish to configure or change.
- Select Y to activate or N to disable.
- Enter the seven-digit ID of the remote Navigator II
- Enter the TCP port you wish to map to this unit
- Enter the remote Navigator II serial port to complete the mapping (A, B, C, or GPS).

```

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Static Mapped Ports Menu:

#  A  ID      Port    C  Name
1  n  5551212  10021  a
2  n  5551312    0      a
3  n  5551312    0      a
4  n  5551312    0      a
5  n  5551312    0      a
6  n  5551312    0      a
7  n  5551312    0      a
8  n  5551312    0      a

Enter Choice (ESC to exit): 1
Activate [n]:
Enter Enter remote ID (1000000 - 9999999)[5551212]: 9142344
Enter Enter remote port (10 - 90000)[10021]: 10021
Enter channel [a]:

```

Figure 2-12: Configuring a Static Mapped Port

```

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Static Mapped Ports Menu:

#  A  ID      Port    C  Name
1  y  9142344  10021  a
2  n  5551312    0      a
3  n  5551312    0      a
4  n  5551312    0      a
5  n  5551312    0      a
6  n  5551312    0      a
7  n  5551312    0      a
8  n  5551312    0      a

Enter Choice (ESC to exit):

```

Figure 2-13: A completed Static Mapped Port Configuration (Line 1)

In addition to a one-to-one mapping, a configuration can be created to broadcast data to remote serial ports. To configure a **Broadcast Port**:

- Activate the configuration line as you would with a static mapped port
- Enter the ID '5551212' – this indicated to broadcast rather than to direct data to a specific Navigator II
- Enter the TCP port for this broadcast function
- Enter the remote serial port to broadcast to. – For example: if "A" is entered as the broadcast serial port, data sent to the configured TCP port will be sent to all Slave Navigator II's Port A.

Note: The Broadcast Port function is operates in one direction, i.e. data transmitted on a remote serial port configured to receive broadcast data will not be available for reading on the broadcast TCP port. This function is however compatible with a Static Mapped Port to the same remote serial port and can operate simultaneously.

2.10 RS232 Master Mode Configuration

The IIE can be used as a basic serial Master Transceiver if necessary (operate as a Communicator II in the role of Master). To configure this function, selection **Option 4** from the **Main Setup Menu** to enter the **Navigator Configuration Menu**, then select **Option 4** to toggle from Ethernet to Serial operating mode.

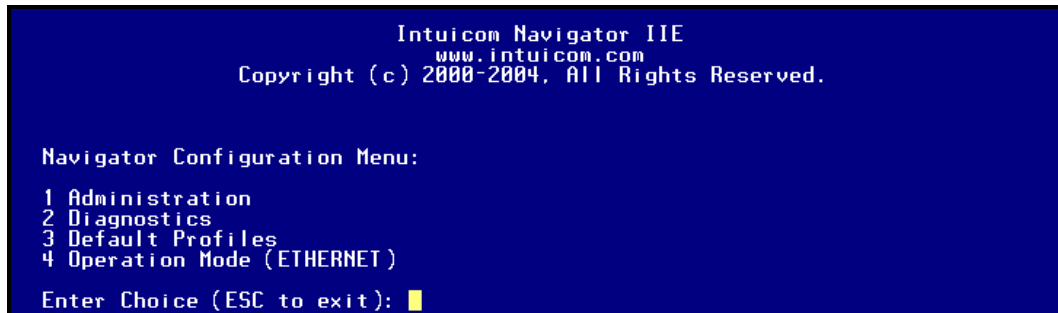


Figure 2-14: Toggling the Operating Mode - Ethernet

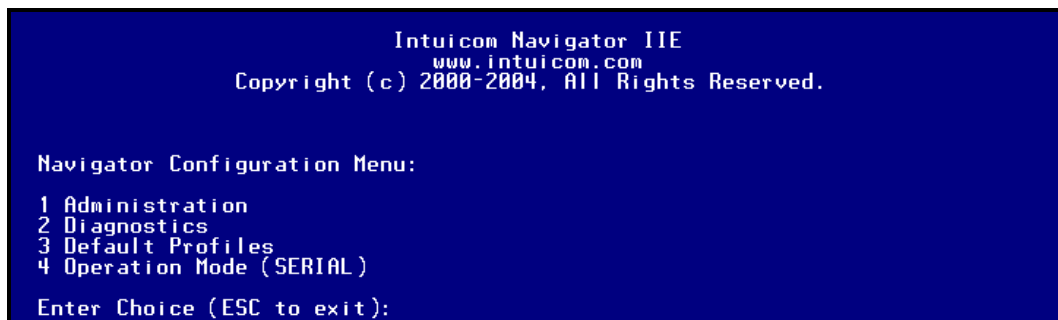


Figure 2-15: Toggling the Operating Mode - Serial

This function will utilize Port B on the front of the unit – be sure to configure the appropriate baud rate and flow control for this port. Intuicom recommends using 115,200 baud with hardware flow control at all times when operating a serial Master Transceiver.

2.11 Configuring the Local GPS (if applicable)

If an optional embedded GPS receiver is installed in the IIE, it can be configured by choosing **Option 2** from the **Main Setup Menu** to enter the **GPS Configuration Menu**.

Configuration the same as GPS configuration for a Navigator II. Be sure to confirm that the baud rate of the Navigator GPS interface matches that of the GPS receiver.

To change the baud rate of the GPS interface, choose **Option 1** from the **Main Setup Menu** and then choose **Option 3** from the **Serial/IP Configuration Menu**. Select the baud rate for the internal GPS interface. Note that the A12 receiver option only allows 4800, 9600 and 19200 baud.

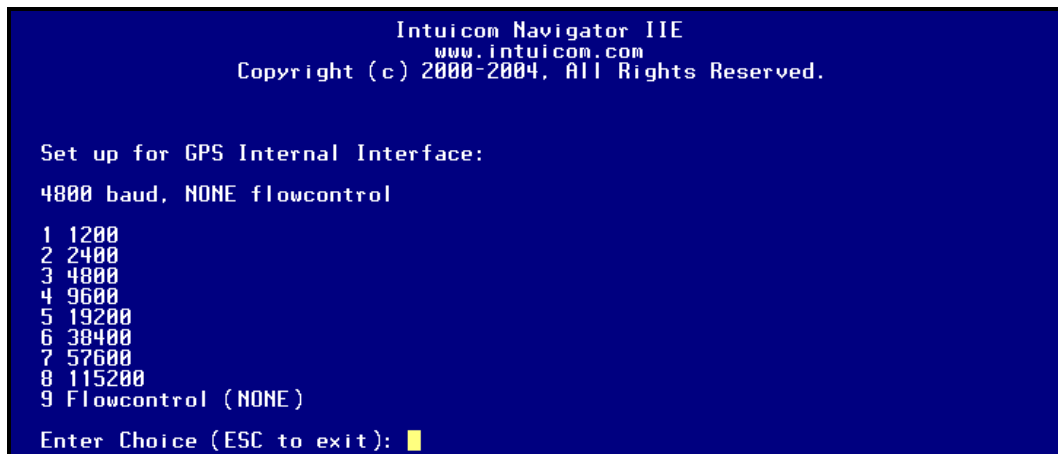


Figure 2-16: Configuring the GPS Interface Baud Rate

After setting the baud rate for the Navigator GPS Interface, return to the GPS Configuration menu and selection Option 3 to command the GPS receiver to match the configured baud rate. After completing the baud rate configuration, the GPS receiver output can be setup.

```
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GPS Configuration Menu:
Installed GPS (A12)
1 Connect to GPS
2 Set GPS to current baud rate (4800), Binary
3 Set GPS to current baud rate (4800), NMEA
4 Configure NMEA output
5 Enable/Disable RTCM
6 Enable/Disable WAAS
7 Configure GPS Parsing/Compression
Enter Choice (ESC to exit):
```

Figure 2-17: GPS Configuration Menu

The Navigator IIE provides a feature to add its GPS output to the tracking port. This feature is toggled on and off by selecting **Option 7** from the **GPS Configuration Menu** and then toggling **Option 4**, **NMEA Data Parsing on Internal GPS Interface**.

```
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GPS Parsing and Compression Menu:
Installed GPS (A12)
1 NMEA Parsing on Serial Port A (OFF)
2 NMEA Parsing on Serial Port B (OFF)
3 NMEA Parsing on Serial Port C (OFF)
4 NMEA Parsing on Internal GPS Interface (ON)
5 NMEA Data Compression on Serial Port A (DISABLED)
6 NMEA Data Compression on Serial Port B (DISABLED)
7 NMEA Data Compression on Serial Port C (DISABLED)
8 NMEA Data Compression on Internal GPS Interface (OFF)
Enter Choice (ESC to exit): █
```

Figure 2-18: Configuring IIE GPS Data Stream Option

2.12 Exiting the Setup Menu

To exit the **Main Setup Menu**, press “ESC”. After exiting, the Navigator IIE will reboot and go directly into RUN mode. The front panel LEDs will cycle from all green to the LED combination appropriate for its configuration. See **Section 3.2** for more information about the front panel LEDs.

2.13 Confirming Operation

Perform a simple test to confirm correct configuration by connecting the unit to a network and connect to each configured TCP port by using Telnet.

After Slave units are configured, test the flow of data by connecting to a given TCP port on the IIE Master and using a terminal program such as HyperTerminal to connect to the corresponding Slave serial port.

3 Deployment and Operation

3.1 Physical Setup

Each unit installed in the field requires the following for operation:

Power - Connect power (+6-30 VDC for 900 Mhz units and +9.5-30 VDC for 2.4 Ghz units) to the connector (2.1 x 5.5mm center pin positive). Be sure to use a regulated, clean power source, and confirm the power source is capable of delivering enough current to run the unit.

IMPORTANT!

NOTE: For the Waterproof/Military Version, do NOT connect power to the interface cable (11-pin) or to the power only cable (2-pin) before connecting cable to unit. ...AGAIN – CONNECT THE INTERFACE OR POWER CABLE TO UNIT BEFORE APPLYING POWER TO CABLE AND REMOVE POWER TO CABLE BEFORE UNPLUGGING CABLE FROM UNIT. Failure to follow this procedure could result in damage to unit.

NOTE: For the Waterproof/Military Version, only supply power to unit through one cable. Do NOT supply power to the unit via the 11-pin interface cable and the 2-pin power only cable at the same time.

RF Data Transceiver Antenna – Connect an appropriate antenna cable and antenna. The connector on the Navigator is **N-type female**. The antenna cable length should be as short as possible to avoid power loss. Be sure to use tested, high quality, low-loss antenna cables in good condition. Poor cables can be difficult to troubleshoot.

GPS Receiver Connection – If utilizing an internal GPS receiver, connect a GPS antenna cable and antenna. The connector on the Navigator IIE is **TNC female**. The antenna cable length should be as short as possible to avoid loss. Be sure to use tested, high quality, low-loss antenna cable in good condition. Poor cables can be difficult to troubleshoot. The GPS antenna connector is biased with +5VDC (+3.3VDC for Thales A12 GPS receiver) for active GPS antennas.

Note that placing the GPS antenna near some other antenna with high power RF radiation may affect the GPS receiver's ability to correctly produce position data.

3.2 Front Panel LEDs

The LEDs located on the Navigator IIE front panel provide important information on the operation of the integrated wireless data transceiver. Compare the status of the unit's LEDs with the table below to aid you in the troubleshooting process.

Condition	Master			Slave			Repeater		
	CD	TR	CTS	CD	TR	CTS	CD	TR	CTS
Powered, disconnected	SR	SR	SR	SR	O	BR	SR	O	BR
Connected, no repeater, sending sparse data	SG	IF	IF	SG	IF	IF			
Master calling slave through repeater	SR	SD	SR	SR	O	BR	SR	O	BR
Master connected to repeater, not to slave	FO	SD	SR	SR	O	BR	SR	SD	SR
Repeater connected to slave	SG	IF	IF	SG	IF	IF	SG	IF	IF
Mode 6, disconnected	SR	O	BR	SR	O	BR			
Setup Mode	SG	SG	SG	SG	SG	SG	SG	SG	SG

Table 3-1: LED Status in Point-to-Point Mode

Condition	Master			Slave			Repeater		
	CD	TR	CTS	CD	TR	CTS	CD	TR	CTS
Powered, disconnected	SR	SD	O	SR	O	BR	SR	O	BR
Repeater and slave connected to master, no data	SR	SD	O	SG	O	SR*	SG	SD	SR*
Repeater & slave connected to master, master sending data to slave	SR	SD	O	SG	O	SR*	SG	SD	SR*
Repeater & slave connected to master, slave sending data to master	SG-SR	SD	IF	SG	IF	SR*	SG	SR	SR*

Table 3-2: LED Status in Point-to-Multipoint Mode

LEDs	
CD	Carrier Detect
TR	Transmit
CTS	Clear to Send

LED Status	
BR	Blinking Red
FO	Flashing Orange
IF	Intermittent Flashing Red
O	Off
SD	Solid Red, Dim
SG	Solid Green, Bright
SR	Solid Red, Bright

Table 3-3: LED Status Legend

4 Troubleshooting

Issue	Possible Cause	Possible Fix(s)
No LEDs	Power is disconnected Remote LED on the RF module is disabled	Confirm power Enable Remote LED functionality in the RF Module
Unit powers up but cannot connect to Port B using serial cable – or garble seen when toggling the setup switch	Not using straight-through serial cable Not configured at 19200 N81 without flow control	Confirm using straight through serial cable Confirm terminal application configured to 19200 N81 with no flow control and that the terminal program has “connected”
Unit is configured but cannot be connected to via TCP/IP	The units TCP/IP configuration is incorrect The specific TCP port to which connection is being attempted is not enabled or configured correctly.	Verify TCP/IP configuration including IP address, NETMASK, default gateway, and feature specific TCP ports.
The unit is correctly configured but slave transceiver cannot connect to it	Antenna not connected Power level set too low	Confirm that an antenna is connected, that the transmission line is in good shape with good connectors, and that the antenna is for the correct band. Confirm transmit power in the RF module is set at a high enough level for the application
Internal GPS not tracking	Antenna cable not connected or antenna does not have needed sky view.	Confirm appropriate GPS antenna attached (3.3v) and that it is placed to have full view of the sky.

Figure 4-1: Troubleshooting Matrix

5 Specifications

5.1 General (non-waterproof/Military)

Specification	Value	
Enclosure	Extruded aluminum with rubber bumpers	
Size	53mm x 167mm x 143 mm - H x W x L	
Weight	795 grams	
Temperature Operating Environment	-30 to +80 C non-condensing	
Connectors/Signals		
Wireless Data Transceiver	N-Type Female	
GPS	TNC Female	
Ethernet	RJ45 (10BaseT)	
RS232 Data	3 - DB9 5-wire serial	
Discrete	4 - Inputs, 3 - Outputs available on DB9 (3 rd serial port not available when using all discretes)	
GPS PPS	Available on pin 1 of each DB9	
Input Voltage	6-30 VDC 900 Mhz 9.5-30 VDC 2.4 Ghz 10.5 – 24 VDC 225-400 Mhz	
Average Power Consumption (900 Mhz) @ 12VDC – Full RF Transmit Power	GPS	No GPS
Transmit	~300 mA	~285 mA
Receive	~160 mA	~140 mA
Idle	~145 mA	~ 115 mA

5.2 Wireless Data Transceiver

Specification	Wireless Transceiver Option		
	900 Mhz	2.4 Ghz	225-400 Mhz ⁽¹⁾
FCC ID	KNY-6231812519 Canada: IC:2329B-DGR09RAS	KNY209228624168 Canada: 2329391130A	N/A
Frequency Range	902-928 Mhz	2400-24835 Mhz	225-400 Mhz
Operating Modes	Adaptive Multipoint, TDMA, Point-to-Point, Store-and-forward repeater		
Transmitter			
Output Power	1 Watt	500 mW	4 Watt
Range, Line of Sight	60 Miles	20 Miles	60+ Miles
Modulation	Spread Spectrum GFSK, 120 kBs – 170 kBs		
Occupied Bandwidth	230 kHz		
Receiver			
Sensitivity	-108 dBm at 10 ⁻⁶ raw BER		
Selectivity	40 dB at fc± 230 kHz, 60 dB at fc ± 460 kHz		
Data Transmission			
Error Detection	32 Bit CRC, resend on error		
Data Encryption	Substitution, dynamic key		
Link Throughput ⁽²⁾	115 Kbps		

5.3 GPS Receiver (Optional)

Specification	GPS Receiver Option	
	CMC Superstar II	Thales A12 (WAAS)
Channels		10+2 SBAS Config
Frequency		L1 C/A code
Update Rate		1 Hz
PPS		Yes
Speed		1000 Knots (514 m/s)
Altitude		60,000 Ft. (18,288 m)
Position Accuracy ⁽¹⁾		
Autonomous Horiz. CEP		3 m
DGPS Horiz. CEP		< 1 m
WAAS/EGNOS Horiz. CEP		1 m
Acquisition Time		
Hot Start		< 10 sec
Warm Start		< 45 sec
Cold Start		< 150 sec
Reacquisition Time		
Total SV blockage <20 sec		1-2 sec
Communications		
Standard NMEA Output		Yes
DGPS Input		RTCM-104 v2.2 Messages 1,3,9

⁽¹⁾ Accuracies based on tests in low multipath environment with clear sky conditions; accuracies may degrade in high multipath environments

Technical drawing of a rectangular metal enclosure. The drawing includes three views: front, top, and side. The front view shows a rectangular box with a width of 6.017 and a height of 6.686. The top view shows a rectangular box with a width of 6.017 and a depth of 2.003. The side view shows a rectangular box with a width of 6.017 and a height of 6.686. The drawing includes dimensions for the enclosure and a note indicating the material is 6061-TB AL.

5.5 Pinouts

Pin Number	Signal Name/Alternate	Direction
1	No Connection / GPS PPS	Output
2	TXD	Output
3	RXD	Input
4	No Connection	
5	Signal Ground	
6	No Connection (or power input)	
7	CTS	Input
8	RTS	Output
9	No Connection/+5V/+Vin	Output

Table 5-1: Serial Port B Pinout

6 Antennas and Accessories

Part Number	Description
Data Antennas	
EAN0900NH	Whip Stub Antenna - 900 MHz, Half Wave, with N type male connector
EAN0900WB	12 inch omnidirectional antenna - 890-940 MHz 3 dB open coil with bracket mount with radials. No cable included.
EAN0905WB	33 inch omnidirectional antenna - 890-940 MHz 5 dB elevated feed gain with female N type connector. Includes bracket mount. No ground plane required. No cable included
MFB-9385	48 inch omnidirectional antenna in fiberglass housing: 896-940 MHz, 5 dB, N-type connector, no cable
MFB-9387	96 inch omnidirectional antenna in fiberglass housing: 896-940 MHz, 5 dB, N-type connector, no cable
GPS Antennas	
MP 1330FW	1575 MHz marine grade antenna, 26.5 dB gain, 5-26 VDC
MP 1372FW	Lightweight Survey Antenna. L1 frequency band, 13 dB amplification, TNC female connector. No cable included.
Dual Mode Antennas	
MM-MAG3-925/1575	Dual Mode Antenna - Mobile Mark high gain magnetic mount dual band 900 MHz/GPS antenna w/ 10 ft. cable with male N type RF connector and male TNC GPS connector
MM-SM3-925/1575	Dual Mode Antenna - Mobile Mark high gain surface mount dual band 900 MHz/GPS antenna w/ 10 ft. cable with male N type RF connector and male TNC GPS connector.
RF Filters	
EBF900	Cavity Band Pass Filter 902-928 MHz. Provides 20dB interference rejection at frequencies above 932 MHz and below 897 MHz, with less than 1.5dB insertion loss.
Mounting Bracket	
FIP1-MNTPLT	Navigator II flush mounting plate kit with set of bolt/washer kit.

Table 6-1: Navigator II, IIE Antennas and Accessories

7 FCC Notification

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.

This device must be operated as supplied by Intuicom, Inc. Any changes or modifications made to the device without the express written approval of Intuicom, Inc. may void the user's authority to operate the device.

CAUTION: Intuicom Navigator II/IIE Models with 902-928 Mhz wireless transceivers have a maximum transmitted output power of 955 mW, models with 2400-2485 Mhz wireless transceivers have a maximum transmitted output power of 500 mW. It is recommended that the transmit antenna be kept at least 23 cm away from nearby persons to satisfy FCC RF exposure requirements.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

8 Warranty

LIMITED WARRANTY TO END-USERS

Intuicom, Inc.
1880 South Flatiron Ct., Suite R
BOULDER, CO 80301

- A. Standard Limited Warranty for Software Products. For Products that include a software license, INTUICOM makes a limited warranty to the End User that the software will perform substantially in accordance with the accompanying written materials and that the transfer media on which the Product is provided will be free from defects in materials or workmanship under normal use and service for a period of ninety (90) days from the date of delivery (the "Limited Warranty") pursuant to the software license included with the Product. The software license specifically disclaims all other warranties relating to the Products, including any and all other warranties with respect to the performance of the Products.
- B. Hardware and Other Equipment Manufactured By Intuicom. Hardware products manufactured by INTUICOM include a limited warranty for defects in materials or workmanship under normal use and service for a period of one (1) year from the date of delivery. Intuicom, at its sole discretion, will repair or replace hardware covered under this limited warranty. Cables, antennas or other accessories manufactured by INTUICOM include a limited warranty for defects in materials or workmanship under normal use and service for a period of ninety (90) days from the date of delivery. Repairs not covered under this limited warranty will be billed as set forth in INTUICOM's current Hardware Service Policy and Instructions.
- C. Hardware Manufactured By Others. INTUICOM makes no warranties whatsoever with respect to Hardware manufactured by third parties. Customers shall look only to the original manufacturer of the Hardware, pursuant to the terms of any manufacturer warranty for any alleged defects and indemnifies and holds INTUICOM harmless from and against any claims by any party related directly or indirectly to any defects in the Hardware, and functional failure, improper operation, failure to operate according to specifications or any other matter related to the Hardware. INTUICOM shall not be liable or responsible for the failure of the Manufacturer to perform under or honor any warranty with respect to the Hardware. Customer acknowledges and agrees that Customer shall have the risk of any loss, damage or functional failure related to the HARDWARE and shall have the responsibility for maintaining the proper operation of the HARDWARE and complying with all maintenance guidelines and specifications from the Manufacturer and all other conditions to receiving warranty coverage from the Manufacturer.
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