Installation and Safety Manual

Evolution 8000 Series Satellite Router™

Router Products

Models e8350 & iCONNEX e800

February 11, 2009

RoHS • WEEE • COMPLIANT

iDIRECT

Document Name: ISM_Evolution8000InstallationSafetyManual_RevE_021109.pdf

Document Part Number: E0000453-0001

Contents

About This Manual

1. Introduction

2. Safety Information

3. Evolution 8000 Series Specifications

List of Figures

List of Tables

Revision History

The following table shows all revisions for this document. Refer to this information to verify that you have the latest version. If you do not have the latest version or you are unsure, you can access the TAC web page at: http://tac.idirect.net and click the **Network Operator Documentation** link. You can then click the **Remote Modem** link and scroll down to select and download the latest version of this document.

Revision	Date Released	Reason for Change(s)	Who Updated?
A	March 26, 2008	First release of this document.	TTheus
B	May 14, 2008	Incorporated both e8350 and e800 models into one manual.	TVingelis
C	September 19, 2008	Changed RS-232 port description from DB-15 to HD-15, and general edits.	TTheus
D	December 15, 2008	Updated e800 power connector descriptions.	TTheus
E	February 11, 2009	Updated mobile remote hardware connections and description	TTheus

About This Manual

Thank you for purchasing an Evolution 8000 Series Satellite Router. This manual provides important safety and compliance information, and explains how to install and maintain an Evolution 8000 Series Satellite Router. This manual covers both the e8350 Satellite Router and iCONNEX e800 models.

This chapter contains:

Intended Audience

This manual is intended for use by the VSAT (Very Small Aperture Terminal) equipment installer, system engineer, or network operator responsible for maintaining the iDirect Network. Only qualified service personnel should install and operate the Evolution 8000 Series Satellite Router. Familiarity with cabling and wiring practices is beneficial.

Manual Contents

In addition to the information in this chapter, this manual also includes:

- *Chapter 1, Introduction* provides an overview and description of the e8350 and e800 models included in the Evolution 8000 Series Satellite Router product line.
- *Chapter 2, Safety Information* describes general cautions for the Evolution 8000 Series Satellite Router.
- *Chapter 3, Evolution 8000 Series Specifications* covers the mechanical, environmental and connector interface requirements for the Evolution 8000 Series Satellite Router.

- *Chapter 4, Installing Your e8350 Satellite Router* details procedures for installing the e8350 Satellite Router.
- *Chapter 5, iCONNEX e800 Physical Interfaces* describes in detail the physical interfaces for the iCONNEX e800.
- *Chapter 6, Configuring the iCONNEX e800 as a Mobile Remote* describes how to configure the iCONNEX e800 for mobile operation.
- *Appendix A, Warnings for the e8350 Satellite Router* describes warnings to be heeded to prevent personal injury or equipment damage for the e8350 Satellite Router. *This information does not apply to the iCONNEX e800.*
- *Appendix B, Compliance for the e8350 Satellite Router* provides compliance information for the e8350 Satellite Router. *This information does not apply to the iCONNEX e800.*

Document Conventions

This manual is crafted with the reader in mind, providing notes, helpful tips and reminders that assist you in the successful and safe operation of iDirect system hardware. Notes also provide suggestions or references to material not contained in this manual.

Note: Notes such as this indicate important information that is of interest to you. Make sure you review this information before you proceed.

Safety Definitions

Table 1 illustrates and defines the symbols that are used throughout this manual to alert you to possible danger or when to use caution.

Table 1. Safety Definitions

Symbol	Warning type	Definition
	**WARNING/CAUTION**	When you see this alert symbol and the WARNING or CAUTION heading, strictly follow the warning instructions to avoid personal injury, equipment damage, or loss of data.
	**DANGER**	Electric shock hazard: When you see this symbol and the DANGER heading, strictly follow the warning instructions to avoid electric shock injury.

Disclaimer

It is the responsibility of the system integrator/end user to comply with all necessary regulatory specifications at their own risk, time and cost. However, iDirect can provide a certain level of support up to full support of regulatory certification as negotiated and mutually agreed per contract basis.

The specifications and information regarding the products in this manual are subject to change without notice. All statements, information, and recommendations in this manual are believed to be accurate but are presented without warranty of any kind, express, or implied. Users must take full responsibility for their application of any products.

Notwithstanding any other warranty herein, all document files and software are provided "as is" with all faults. iDirect disclaims all warranties expressed or implied, including, without limitation, those of merchantability, fitness for a particular purpose and noninfringement arising from a course of usage or trade practice.

In no event shall iDirect or its supplier be liable for any indirect, special, consequential, or incidental damages, including, without limitation, lost profits, or loss or damage to data arising out of the use or inability to use this manual, even if iDirect or its suppliers have been advised of the possibility of such damages.

Trademarks, brand names and products mentioned in this manual are the property of their respective owners. All such references are used strictly in an editorial fashion with no intent to convey any affiliation with the name or the product's rightful owner.

iCONNEX e800 Warranty, Restrictions and Disclaimer

iDirect does not warrant any express or implied conditions, representations, and warranties including, without limitation, any implied warranty or condition of merchantability, fitness for a particular purpose for any iDirect Product that has been tampered, altered, modified electrically and/or mechanically. Such tampering, alteration, modification of iDirect products shall void all warranties.

Restrictions

The warranty for the iCONNEX e800 is *void* if any one of the following conditions exists:

- Has not been certified by iDirect with the customer system.
- Has had subsequent design changes from certified test sample without re-certification by iDirect.
- Has been altered in any way, except directed/authorized in writing by iDirect.
- Has not been installed, operated, repaired, or maintained in accordance with instructions supplied by the manufacturer and iDirect.
- Has been subjected to abnormal environmental, physical or electrical stress, misuse, negligence, or accident.
- Has been subjected to invasive input and output connections to the circuit board other than physical connectors (as defined in section "Physical Interface Specification" of this specification).

- Has been damaged by inappropriate input levels or output loads on the interface connections.
- Has been damaged through mishandling in customer production without taking precautionary steps to prevent Electro-Static Discharge (ESD) with normal electronics production process.
- Has been exposed to acts of God such as lightning, flood, or other means outside iDirect's control.

Disclaimer of Warranty

Except as specified in this warranty, all express or implied conditions, representations, and warranties including, without limitation, any implied warranty or condition of merchantability, fitness for a particular purpose, noninfringement, law, usage, or trade practice, are hereby excluded to the extent allowed by applicable law. To the extent an implied warranty cannot be excluded, such warranty is limited in duration to the warranty period. This disclaimer and exclusion shall apply even if the express warranty set forth above fails of its essential purpose.

Getting Help

The iDirect Technical Assistance Center (TAC) is available to help you 24x7x365. iDS Software user guides, installation procedures, an FAQ page, and other documentation that supports our products are available on the TAC webpage. Please access our TAC webpage at: http://tac.idirect.net.

If you are unable to find the answers or information that you need, you can contact the TAC at (703) 648-8151.

1 Introduction

The Evolution 8000 Series Satellite Router is the highest performance remote networking solution available today, offering tremendous flexibility, security, and network capacity. Developed to meet the most demanding user requirements, Evolution 8000 Series Satellite Routers are ideal for military, network carriers, or high-end enterprise customers requiring reliable, fast, secure, and encrypted data communications.

The Evolution 8000 Series Satellite Routers deliver all of the benefits of broadband IP networking while providing the highest TCP/IP throughput in the industry, including:

- Built-in flexibility
  - Mesh option
  - SCPC option
- Secure communications
  - FIPS 140-2 Certified (Pending)
  - Embedded 3DES/AES encryption
  - Direct interconnection for redundant failover
- Bandwidth optimization
  - Reservation MF-TDMA return channel that is four times more bandwidth efficient than Slotted Aloha
  - Turbo Codes on the forward and return channel providing a 1.5 dB power advantage over Reed-Solomon Viterbi codes
  - 1.2 Spacing — delivers 14% savings in bandwidth
  - Proprietary IP encapsulation that is 15% more efficient than MPE (Multi-Protocol Encapsulation)
  - Networks configuration in 1kbps increments to get exactly the bandwidth required

A front view of the e8350 Satellite Router is shown in Figure 1.

Figure 1. Front View of the e8350 Satellite Router

2 Safety Information

Follow the safety guidelines in this chapter carefully during installation of your Evolution 8000 Series Satellite Router. These guidelines help protect the satellite router from potential damage and help ensure your own personal safety. These safety measures are translated into multiple languages (see *Appendix A, Warnings for the e8350 Satellite Router*). Keep this safety information handy where you can easily refer to it.

Read this entire chapter before you attempt to install or use your Evolution 8000 Series Satellite Router. Adhere to all warnings listed on the product's warning labels and in the operating instructions, and follow all operating and usage instructions carefully.

Note: See "Safety Definitions" on page xii for a description of the warning icons that are used in this manual.

This chapter contains:

2.1 Installation Guidelines

When installing the Evolution 8000 Series Satellite Router, observe all caution and warning statements. Follow the general warnings and cautions to help ensure your safety and protect the equipment. However, these guidelines may not cover all of the potentially hazardous situations you may encounter during installation.

The installation of the Evolution 8000 Series Satellite Router must comply with the national and local electrical codes, as follows:

- In the United States, the National Fire Protection Association (NFPA) 70, United States National Electric Code
- In Canada, the Canadian Electric Code, Part 1, CC22.1
- In other countries, the International Electromechanical Commission (IEC) Recommendation 364, part 1 through part 7

Review the following safety instructions:

- Read the safety warnings and compliances in *Appendix A, Warnings for the e8350 Satellite Router* of this manual, before installing, configuring, or performing maintenance on the system.
- Always remove or disconnect all power connections before installing or moving an Evolution 8000 Series Satellite Router.
- Keep the staging area clear and free of dust during and after installation.
- Keep tools, equipment components, and shipping boxes away from walkway areas.
- Use the Evolution 8000 Series Satellite Router only in accordance with its marked electrical ratings and product usage instructions.

Only trained and qualified personnel should be allowed to install or replace this equipment.

This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.4 Service Personnel.

Before working on the equipment, unplug the power cord from the AC power source (if applicable).

Do not remove e8350 Satellite Router enclosure. Do not touch internal circuitry when the power cord is connected.

2.2 Electrical Safety

Follow all warnings and cautions to ensure your safety and protect the equipment from electrical hazards.

	**WARNING/CAUTION**	The BUC power requirement must match the proper Evolution 8000 Series Satellite Router voltage. The BUC may sustain damage if used with the incorrect power supply.
	**DANGER**	Do not work on the system, or connect or disconnect cables, during periods of lightning activity.

Follow these guidelines when you are working with any electrical equipment:

- Disconnect all power and external cables before installing or moving the equipment.
- Do not work alone when potentially hazardous conditions exist.
- Never assume that power has been disconnected; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe. Never install equipment that has signs of damage or mishandling.
- Carefully examine your work area for possible hazards, such as a wet floor, ungrounded power extension cables, and missing safety grounds.

2.3 Physical and Environmental Considerations

To protect the equipment and to avoid personal injury, observe the following physical and environmental considerations when installing an Evolution 8000 Series Satellite Router:

- **Ventilation** *(applies to e8350 Satellite Router only)*

  Slots and openings on the e8350 Satellite Router provide ventilation and ensure reliable operation of the product. To protect the e8350 Satellite Router from overheating, these openings must not be blocked or covered at any time. Do not place this product in a built-in installation, such as a bookcase or enclosed rack, unless proper ventilation is provided or the manufacturer instructions have been followed. If there is any dust build-up on the vent openings of the e8350 Satellite Router, vacuuming is recommended to remove these particles to ensure proper airflow.

- **AC Polarization** *(applies to e8350 Satellite Router only)*

  This product is equipped with a cord plug that fits into the power outlet only one way. Do not modify the plug by defeating this feature. If the plug does not fit, contact your electrician to replace your outlet or get the proper power cord. To prevent electric shock or impaired performance, do not use this plug with an extension cord or outlet unless you can fully insert the blades without blade exposure.

- **Power Sources** *(applies to e8350 Satellite Router only)*

  Operate this product only from the type of power source indicated on the bottom of approved power supplies (100 VAC to 240VAC, 50/60Hz). If you are not sure of the type of power supply at your site, consult your teleport operator or local power company.

- **Power Cord Protection** *(applies to e8350 Satellite Router only)*

  Power supply cords must be routed such that the cords can not be walked on or pinched by items placed upon or against them; pay particular attention to cords at plugs, convenience receptacles, and at the point where they exit the product.

- **Overloading** *(applies to e8350 Satellite Router only)*

  Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electrical shock.

- **Electrical Safety**

  For electrical safety, power line operated equipment accessories connected to this product should bear the UL, NRTL, or CE listing mark and should not be modified so as to defeat the safety features. This helps to avoid any potential hazard from electrical shock or fire. If in doubt, contact qualified service personnel.

- **Water and Moisture**

  To reduce the risk of fire or electrical shock, do not expose this product to rain or moisture.

- **Lightning**

  For added protection, unplug this product from the wall outlet (and disconnect the antenna and cable system) during a lightning storm or when it is left unattended and unused for long periods. Doing so prevents damage to the product from lightning and power-line surges.

- **Heat**

  Do not place the Evolution 8000 Series Satellite Router near heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

- **Accessories**

  To avoid personal injury or damage to the Evolution 8000 Series Satellite Router, do not place the satellite router on any unstable rack, cart, stand, table, or bracket.

- **Attachments**

  Do not use attachments unless recommended by the manufacturer as they may cause hazards or damage to equipment.

- **Restricted Access**

  This product is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key or other means of security, and is controlled by the authority responsible for the location.

- **Grounding**

  Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

2.4 Operational and Maintenance Safety

As you use your Evolution 8000 Series Satellite Router, observe the following safety guidelines:

- Cabling: Never use any RF cable other than what is supplied or recommended by iDirect.
- Cleaning: Do not use liquid cleaners or aerosol cleaners. Use a cloth for wiping up dust or use a vacuum cleaner to remove dust.

2.5 Safety Guidelines to Observe During Servicing

When your Evolution 8000 Series Satellite Router requires service, observe the safety guidelines in this section.

2.5.1 Servicing

Do not attempt to service the Evolution 8000 Series Satellite Router internal assemblies, as opening and removing covers may expose you to dangerous voltages or other hazards. There are no user serviceable parts inside. Opening the enclosures voids the warranty. Refer all servicing to qualified service personnel.

2.5.2 Conditions Requiring Service

Unplug the Evolution 8000 Series Satellite Router from the AC power outlet and refer servicing to qualified service personnel under the following conditions:

- The power supply cord or plug is damaged
- Liquid has been spilled on, or objects have fallen into the Evolution 8000 Series Satellite Router, or there has been exposure to water
- The Evolution 8000 Series Satellite Routerdoes not operate normally when following the operating instructions
- The Evolution 8000 Series Satellite Router is dropped or if the chassis is damaged
- The Evolution 8000 Series Satellite Router exhibits a distinct change in performance

3 Evolution 8000 Series Specifications

The specifications in this chapter describe the mechanical, environmental and connector interfaces for the Evolution e8000 Series Satellite Router. This chapter contains:

- *e8350 Satellite Router Specifications*
- *iCONNEX e800 Satellite Router Specifications*

3.1 e8350 Satellite Router Specifications

This section contains mechanical and environmental specifications, power specifications, and RF specifications for the e8350 Satellite Router.

3.1.1 Mechanical and Environmental Specifications

Ensure that the installation site can accommodate the mechanical and environmental specifications for the e8350 Series Satellite Router as defined in Table 2.

Table 2. e8350 Satellite Router Mechanical and Environmental Specifications

Category	Description
Dimensions	1.75 (H) x 17.5 (W) x 13.00 (D) inches
Weight	10 lbs (5.53 Kg)
Heat Dissipation	80W (273 BTU/hour)
Airflow	Forced air cooling
Ambient Temperature	
Operational:	14°F to 131°F (-10°C to 55°C) at 10,000 feet
	14°F to 140°F (-10°C to 60°C) at sea level
Storage:	-30°F to 176°F (-34°C to 80°C)
Temperature Gradient	1.0°C/min
Relative Humidity	
Operational:	0 to 90% noncondensing
Storage:	5 to 93% noncondensing

Table 2. e8350 Satellite Router Mechanical and Environmental Specifications *(continued)*

<table>
<tr><th>Category</th><th>Description</th></tr>
<tr><td>Altitude
Operating:
Storage:</td><td>
≤ 10,000 feet (3048m)
≤ 30,000 feet (9144m)</td></tr>
<tr><td>Operational Vibration
(10 minutes per axis)</td><td>The e8350 Satellite Router remains operational when exposed to 0.21 grms with the following profile:
<table>
<tr><th>Frequency</th><th>Slope</th><th>PSD</th></tr>
<tr><td>5 to 350 Hz</td><td>0</td><td>0.0001 g2/Hz</td></tr>
<tr><td>350 to 500 Hz</td><td>-6 dB/octave</td><td></td></tr>
<tr><td>500 Hz</td><td>0</td><td>0.00005 g2/Hz</td></tr>
</table></td></tr>
<tr><td>Operational Shock</td><td>The e8350 Satellite Router shall remain operational when exposed to 10g, 10ms half sine on x, y, z axis.</td></tr>
</table>

3.1.2 Power Specifications

Ensure that the installation site can accommodate the power specifications for the e8350 Satellite Router as defined in Table 3.

Table 3. e8350 Satellite Router Power Specifications

<table>
<tr><th>Category</th><th>Description</th></tr>
<tr><td>Input Voltage Range</td><td>100 - 240 VAC universal input</td></tr>
<tr><td>Frequency</td><td>50 Hz – 60 Hz</td></tr>
<tr><td>AC Power Consumption</td><td>≤ 4.0A maximum
<table>
<tr><th>BUC Type (with LNB)</th><th>Power at 90 VAC</th><th>Power at 254 VAC</th></tr>
<tr><td>2W Ku-Band</td><td>1.0A</td><td>0.47A</td></tr>
<tr><td>4W Ku-Band</td><td>1.17A</td><td>0.52A</td></tr>
<tr><td>16W Ku-Band</td><td>2.27A</td><td>0.87A</td></tr>
<tr><td>2W C-Band</td><td>1.05A</td><td>0.48A</td></tr>
<tr><td>5W C-Band</td><td>1.44A</td><td>0.6A</td></tr>
<tr><td>10W C-Band</td><td>1.72A</td><td>0.69A</td></tr>
</table></td></tr>
<tr><td>DC Power F-Connector</td><td>TX Out, +24 VDC, 3.5A maximum power supply to BUC or,
TX Out, +48 VDC, 3A maximum power supply to BUC</td></tr>
</table>

Table 3. e8350 Satellite Router Power Specifications *(continued)*

Category	Description
Protection	Internal, primary current fuse, inside power supply Over current protection Short protection
Power Factor Correction	Complies with EN61000-3-2 and EN61000-3-3
Efficiency	86% typical
Input Transient Response	0.5 msec for 50% load change typical
AC Input Connector	IEC-320-C14
AC Power Cord	18 AWG, country dependent

3.1.3 RF Specifications

Ensure that installation site can accommodate the RF specifications for the e8350 Satellite Router as defined in Table 4.

Table 4. e8350 Satellite Router RF Specifications

Category	Description
Frequency Range	
Transmit:	950-2000 MHz
Receive:	950-2000 MHz
Frequency Tuning Step Size	
Transmit:	38 Hz
Receive:	Sub-Hertz with demodulator
RF Power Range	
Transmit:	-35 dBm to +5 dBm
Receive:	-65 dBm to +0 dBm composite
RF Power Adjustability	
Transmit:	0.5 dB nominal step size
Receive:	Under AGC for all valid Rx input power range
Typical Transmit and Receive Phase Noise (dBc/Hz) at:	**Frequency** / **Phase Noise** 1 KHz / -83 10 KHz / -83 100 KHz / -96 1 MHz / -112
Typical Phase Jitter at 14 KHz to 1 MHz:	≤ 1.8° rms

Table 4. e8350 Satellite Router RF Specifications *(continued)*

Category	Description
Transmit Carrier Suppression	≥ 30 dBc
Discrete Spurs, Harmonics and Nonharmonics	≥ 50 dBc, with output ≥ -15 dBm
Modulator Spectral Shaping	Intelsat: IESS-309, MIL-STD-188-165A Section 5.1.6.4.1 Spectral Confinement
Transmitter On/Off Ratio	≥ 50 dBc, with output power ≥ -15 dBm

3.2 iCONNEX e800 Satellite Router Specifications

This section contains mechanical and environmental specifications, power specifications, and RF specifications for the iCONNEX e800 Satellite Router.

3.2.1 Mechanical and Environmental Specifications

Ensure that the installation site can accommodate the mechanical and environmental specifications for the iCONNEX e800 Satellite Router as defined in Table 5.

Table 5. e800 iCONNEX Satellite Router Mechanical and Environmental Specifications

Category	Description
Weight	1.4 lbs (0.63 Kg)
Heat Dissipation	35W (120 BTU/hour)
Ambient Temperature	
Operational:	14°F to 131°F (-10°C to 55°C) at 10,000 feet
Storage:	-30°F to 176° F (-34°C to 80°C)
Temperature Gradient	Shall never exceed 1.0°C/min
Relative Humidity	
Operational:	0 to 90% noncondensing
Storage:	5 to 93% noncondensing
Altitude	
Operating:	≤ 10,000 feet (3048m)
Storage:	≤ 30,000 feet (9144m)

Table 5. e800 iCONNEX Satellite Router Mechanical and Environmental Specifications *(continued)*

Category	Description
Operational Vibration (10 minutes per axis)	The iCONNEX e800 remains operational when exposed to 0.21 grms with the following profile:

Frequency	Slope	PSD
5 to 350 Hz	0	0.0001 g2/Hz
350 to 500 Hz	-6 dB/octave	
500 Hz	0	0.00005 g2/Hz

Operational Shock	The iCONNEX e800 shall remain operational when exposed to 10g, 10ms half sine on x, y, z axis.
Conformal Coating	HUM/SEAL 1B73

3.2.2 Power Specifications

Ensure that the installation site can accommodate the power specifications for the iCONNEX e800 Satellite Router as defined in Table 6.

Table 6. e800 iCONNEX Satellite Router Power Specifications

Category	Description
Input Voltage Range	+24 VDC or +48 VDC
DC Power F-Connector	TX Out, +24 VDC, 3.5A maximum power supply to BUC or, TX Out, +48 VDC, 3A maximum power supply to BUC
Protection	Internal, primary current fuse, inside power supply Over current protection Short protection
Power Factor Correction	Complies with EN61000-3-2 and EN61000-3-3
Efficiency	86% typical
Input Transient Response	0.5 msec for 50% load change typical

3.2.3 RF Specifications

Ensure that the installation site can accommodate the RF specifications for the iCONNEX e800 Satellite Router as defined in Table 7.

Table 7. e800 iCONNEX Satellite Router RF Specifications

Category	Description
Frequency Range	
Transmit:	950-2000 MHz
Receive:	950-2000 MHz
Frequency Tuning Step Size	
Transmit:	38 Hz
Receive:	333 KHz (coarse) with demodulator CRL tracking
RF Power Range	
Transmit:	-35 dBm to +5 dBm (recommend ≥ -10 dBm)
Receive:	-65 dBm to +0 dBm composite
RF Power Adjustability	
Transmit:	0.1 dB Step Size nominal in SCPC mode 0.5 dB Step Size nominal ins Star/Mesh mode
Receive:	Under AGC for all valid Rx input power range
RF Power Output Stability	+/- 1 dB
Typical Transmit and Receive Phase Noise (dBc/Hz) at:	**Frequency** / **Phase Noise** 1 KHz / -83 10 KHz / -83 100 KHz / -96 1 MHz / -112
Typical Phase Jitter at 14 KHz to 1 MHz:	≤ 1.8° rms
10 MHz BUC/LNB Reference Level	+1dBm, +/- 3 dB
Transmit Frequency Stability (after Downstream Carrier Lock)	Track with hub frequency stability
Remote to Remote (w/OCXO):	+/- 0.3 ppm
Hub with RCM and External GPS:	Equivalent to external GPS reference
Hub with RCM Only:	+/- 0.03 ppm
Hub without RCM:	+/- 0.002 ppm
Transmit Carrier Suppression	≥ 30 dBc
Discrete Spurs, Harmonics and Nonharmonics	≥ 50 dBc, with output ≥ -15 dBm

Table 7. e800 iCONNEX Satellite Router RF Specifications *(continued)*

Category	Description
Modulator Spectral Shaping	Intelsat: IESS-309 (See Figure 9-1), MIL-STD-188-165A, Section 5.1.6.4.1 Spectral Confinement
Transmit Discrete Spurs within Modulation Bandwidth	≥ 30 dBc
Transmit Discrete Spurs, Harmonics, and Nonharmonics	≥ 50 dBc, with Tx output power ≥ -10 dBm
Transmitter On/Off Ratio	≥ 50 dBc, with Tx output power ≥ -10 dBm

4 Installing Your e8350 Satellite Router

This chapter describes the guidelines and procedures for installing the e8350 Satellite Router at your VSAT location.

This chapter contains:

Note: Thoroughly review all the information in Chapter 2, Safety Information, before attempting any of the procedures in the chapter.

4.1 Tools and Supplies Required for Installation

Table 8 specifies recommended tools and supplies used when installing the e8350 Satellite Router, and the tools are shown in *Figure 2* and *Figure 3, on page 18*.

Table 8. Recommended Tools

Quantity	Tool
1	Number 2 Phillips screwdriver (for rack mounting)
1	F-Connector crimping tool
1	RG-6 coax stripper
1	Coax wire cutter
1	DB-9 to RJ-45 adapter
1	Straight-through LAN cable

Figure 2. Installation Tools

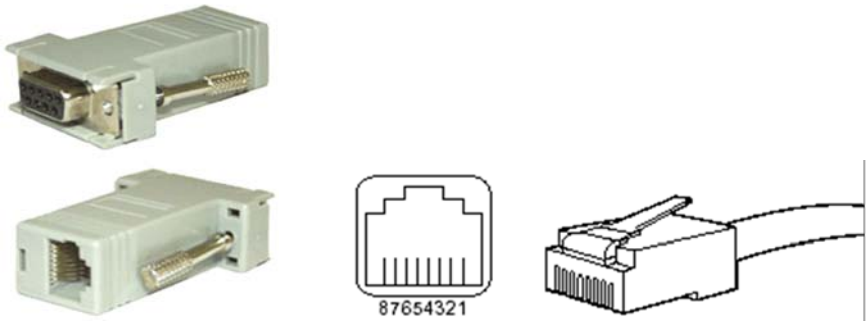


Figure 3. DB-9 to RJ-45 Adapter and Connector

You may need additional tools and equipment to install related equipment and cables. You may also require test equipment to check signal, power levels, and communication links. See *"Console Port Cable Specifications and Pinout" on page 31.* for cable specifications and RJ-45 pinouts.

4.2 Unpacking Your e8350 Satellite Router

The e8350 Satellite Router may be shipped in one or more shipping containers, depending on the type of bundle purchased. Once you have received all of the boxes, perform the following tasks:

- Ensure the boxes are facing upward (refer to the box orientation arrows on the shipping container).
- Inspect all shipping containers. If any damage or other signs of mishandling are evident, inform the carrier, iDirect, or the reseller.
- Remove the tape and any exterior covering from the box lid.

Note: Save the e8350 Satellite Router shipping boxes after you have unpacked the system. You will need these boxes to move or ship the system in the future.

Remove items from the box only as needed. Verify that you have received all of the proper e8350 Satellite Router components and accessory items listed in your order, including the optional equipment you ordered.

4.2.1 Components Normally Included in an Order

Prior to installation, ensure that you have received all of the necessary components for a complete e8350 Satellite Router installation. If any items are missing or damaged, contact your network operator/distributor for replacement.

A typical installation includes:

- An e8350 Satellite Router
- Two mounting ears for rack installation, shown in Figure 4.

Figure 4. Mounting Ears for the Evolution e8350 Satellite Router

- Four self-adhesive rubber feet for desktop installation
- AC power cord appropriate for the country of installation
- Two high-speed Ethernet LAN cables
- An IFL cable
- A Block Up Converter (BUC); 1W, 2W or 4W for Ku-Band and 2W or 5W for C-Band
- Optional Ku-Band power booster: 8W or 16W
- Optional C-Band power booster: 10W or 20W

- Low Noise Block converter (LNB)
- An antenna ranging in size from 0.96m, 1.2m, 1.8m, or 2.4m for Ku-Band; and 1.8m, 2.4m, and 3.8m for C-Band
- An appropriate feed assembly for the antenna (OMT)

Note: Installation instructions for your antenna and feed assembly are not included in this manual. Refer to the antenna manufacturer's installation guide.

4.2.2 Additional Components Normally Required

Additional components normally required for an installation include:

- An iDirect specified L-Band cable, consisting of a RG-6 or RG-11 dual-coax cable and connectors (for connecting the e8350 Satellite Router to the outdoor equipment), plus F-type connectors and sealant tape (See *"Console Port Cable Specifications and Pinout" on page 31*.)
- Non-Pen (Non-Penetrating) roof mount
- Ballast (anchor weight)

A picture of a typical antenna with BUC and LNB is shown in Figure 5.

Figure 5. Typical Antenna with BUC and LNB

4.3 Mounting the e8350 Satellite Router

The e8350 Satellite Router can be placed on a tabletop or flush mounted on a 19-inch rack with a one rack unit opening. This section provides details on how to properly mount the e8350 Satellite Router.

Note: The e8350 Satellite Router is designed for indoor use only.

4.3.1 General Guidelines for Mounting Configurations

When installing the e8350 Satellite Router, follow these guidelines:

- When selecting the site, consider accessibility, availability of power, signal, network cable connections, and the possibility of future expansion.
- Install the e8350 Satellite Router in a location where access is unobstructed. Plan for front and rear access.
- Ambient air temperature may not cool the e8350 Satellite Router to acceptable operating temperatures without adequate ventilation. The ambient temperatures and other environmental specifications are listed in *Chapter 3, Evolution 8000 Series Specifications*.
- Select a suitable installation location away from any area that tends to collect dust.
- Do not install the e8350 Satellite Router on the floor.

4.3.2 Guidelines for Desktop or Shelf Mounting

If the e8350 Satellite Router is mounted in an enclosed shelf, ensure that the shelf has adequate ventilation. An enclosed shelf should have openings on the sides and top to provide air circulation. *Before mounting onto a desktop or shelf*, attach the rubber feet provided with the e8350 Satellite Router to ensure this equipment remains firmly in place on the desktop or shelf.

To attach the rubber feet:

1. Turn over the e8350 Satellite Router.
2. Using the four circles on the bottom of the satellite router as a guide, affix the four adhesive rubber feet.

4.3.3 Guidelines for Rack Mounting

The e8350 Satellite Router requires a minimum of one rack unit (1.75 inches) of vertical rack space. Measure the proposed rack location before mounting. If the e8350 Satellite Router is mounted in an enclosed rack, ensure that the rack has adequate ventilation. An enclosed rack

should have louvered sides and top with fans to provide cooling air. Before using a particular rack, check for obstructions, such as a power strip, that could impair rack-mount installation.

To prevent bodily injury when mounting or servicing the e8350 Satellite Router in a rack, you must take special precautions to ensure that the rack remains mechanically stable. iDirect recommends that the equipment rack be firmly secured to the foundation/floor and secured to the adjacent rack.

Install the e8350 Satellite Router in the rack where access to the connectors is unobstructed. Do not block the vents.

To mount your e8350 Satellite Router in a 19-inch rack:

1. Using a Number 2 Phillips head screwdriver, attach the mounting ears on the right and left sides of the e8350 Satellite Router. Make sure that the notches on the mounting ears point downward.
2. Mount the e8350 Satellite Router into the 19" rack.
3. Connect the AC power cord.

4.4 Defining the e8350 Satellite Router Rear Panel

This section describes and illustrates the rear panel connectors and LED indicators for the e8350 Satellite Router. The connectors and LEDs are shown in Figure 6.

Note: For LED definitions shown, refer to Table 17 on page 39.

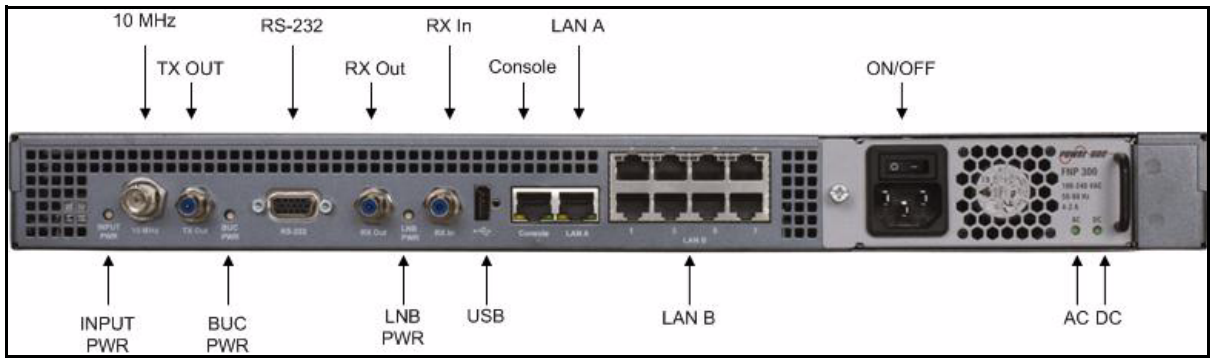


Figure 6. e8350 Satellite Router Rear Interface Connectors

A description of each connector and indicator is shown in Table 9.

Table 9. e8350 Satellite Router Connectors

Label	Connector Type	Interface and Purpose
10 MHz	75 ohm, BNC	External 10 MHz clock
TX Out	75 ohm, F-Type	L-band transmit signal to Block Up Converter (BUC) capable of 10 MHz reference and +24 VDC, 3.5A (or +48 VDC, 3A) maximum power supply to BUC
RS-232	HD-15 Female	Serial interface connection used for antenna pointing
RX Out	75 ohm, F-Type with DC Blocked Termination	Monitoring of the receive signal from LNB output, -10 dB nominal composite, buffered
RX In	75 ohm, F-Type	L-band receive signal, capable of 10 MHz reference and DC power to LNB
USB	USB	Universal Serial Bus interface connection
CONSOLE	RJ-45	RS-232 servicing serial connection console to PC or laptop
LAN A	RJ-45	Category-5 STP or UTP cable, 10/100 Base-T Ethernet LAN port connects the e8350 and e800 iCONNEX Satellite Router models to the customer LAN hub/switch
LAN B	RJ-45	Category-5 STP or UTP cable, 10/100 Base-T Ethernet LAN port connects the e8350 and e800 iCONNEX Satellite Router models to the customer LAN hub/switch
100-240 V~ 4A/2A 50/60 Hz	IEC-320-C14	AC input

The RJ-45 **Console** port pin assignments are listed in Table 10.

Table 10. RJ-45 Pin Assignments

PIN	SIGNAL NAME	DESCRIPTION
1	Not Connected	Do not connect
2	Reserved (Tx)	Do not connect
3	Transmit Data (TxD)	RS-232 voltage level compliant transmit data signal for debug use only
4	Ground (GND)	Ground
5	Ground (GND)	Ground

Table 10. RJ-45 Pin Assignments *(continued)*

PIN	SIGNAL NAME	DESCRIPTION
6	Receive Data (RxD)	RS-232 voltage level compliant receive data signal for debug use only
7	Reserved (Rx)	Do not connect
8	Not Connected	Do not connect

A diagram of the pin numbering scheme for the **Console**, **LAN A**, and **LAN B** RJ-45 ports is shown in Figure 7. In this diagram, two RJ-45 ports are shown together (see **Console** and **LAN A** in *Figure 6 on page 22*.

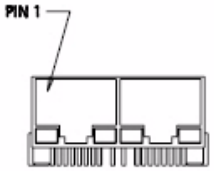


Figure 7. Console Port Pin Numbering

The pin assignments for the RS-232 serial connector are defined in Table 11.

Table 11. RS-232 Serial Connector Pin Assignments

PIN	SIGNAL NAME	DESCRIPTION
1	+3.3 VDC	200 mA maximum
2	Receive Lock	RS-232 voltage level compliant transmit output signal for antenna control devices. Receive lock indicates a successful downstream lock state. In SCPC mode, this signal means TDM Lock. In DVB-S2 mode, this signal means NCR Lock.
3	Reserved	Future Transmit Data (TxD)
4	Receive Data (RxD)	RS-232 voltage level compliant receive data input signal for connection to a GPS receiver in mobile applications
5	Transmit Mute	RS-232 voltage level compliant receive signal for use with antenna control devices
6	Reserved	Do not connect
7	Not Connected	Do not connect
8	Not Connected	Do not connect
9	Reserved	Do not connect
10	Reserved	Do not connect
11	Reserved	Do not connect
12	Reserved	Do not connect
13	Receive Signal Strength Indicator (RSSI)	DC voltage level output (0-4.6 VDC) used in antenna pointing applications to provide receive composite power measurement or receive C/N measurement
14	Reserved Output	Do not connect
15	Ground (GND)	Ground

A diagram of the pin numbering scheme is shown in Figure 8.

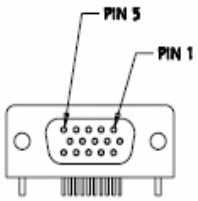


Figure 8. GPIO/RS-232 Port Pin Numbering

4.5 Preparing the Coax Cables

Use high quality coaxial cable to connect the e8350 Satellite Router to the outdoor equipment. iDirect recommends that you use a solid copper center conductor, quadruple shield, coaxial cable with a minimum of 60% + 40% braid and double foil shield to connect the e8350 Satellite Router to the outdoor equipment, such as:

- RG-6: 0.04 inch (1 mm), solid bare copper center conductor (CommScope 5782)
- RG-11: 0.064 inch (1.6 mm), solid bare copper center conductor (5902)

The center conductor must be straight and extend 1/8 inch (3.2 mm) beyond the end of the F-connector, and the connector should be securely crimped to the cable.

Note: iDirect does not recommend using RG-59 with solid bare copper center conductor unless the IFL length is less than 120 feet (37 m). If lower RF insertion loss is required due to the distance between the e8350 Satellite Router and the outdoor equipment, then RG-11 or other 75-ohm types of coax can be used.

If you use different types of coaxial cable other than the recommended quadruple shield RG-6 or RG-11, the following problems can occur:

- **Co-channel Interference.** If signals at the same frequency are carried on long, parallel runs of coaxial cable (for example, in cable trays, or riser), interference can occur between the signals. Higher quality cable helps to prevent this with better shielding. Co-channel interference causes degradation in higher packet rate loss.
- **Damage to the e8350 Satellite Router connectors**. The F-Type connectors are designed for RG-6 or RG-11 cable and connectors. Larger cables can damage the connectors.
- **Excessive DC Resistance**. Results in excessive voltage drop across the IFL cable. Excessive voltage drop can cause the voltage level at the BUC to be too low to operate properly.

Figure 9 shows all of the recommended tools.

Paladin Tools: LC-CST-CATV-"F" 1257

Coax Cutter: Benner-Nawman UP-B76

Cable Prep: RG-6 HCT-775 Hex Crimper, Size 0.384 inch
RG-11 HCT-116 Hex Crimper, Size 0.472 inch

Figure 9. Recommended Tools for Terminating Coaxial Cable

Before you can connect the cables, you must terminate connectors on each end.

To terminate the cables with F-Type connectors:

1. Cut off each end of the coax cable squarely, using the proper cable cutter as shown in Figure 10.

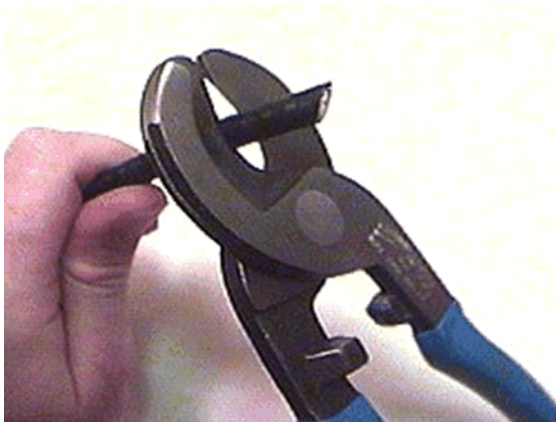


Figure 10. Coax Cable Cutting Technique

Wear protective eye wear while cutting cables and terminating connectors. Ensure that the center conductor is straight and cylindrical without any burrs. Failure to do so can damage the e8350 Satellite Router, BUC, and/or LNB input connector.

2. Remove the jacket material and foam insulation according to the length defined in **Length A** in Table 12. For RG-6, use a two-step coax stripper such as the LC-CST 1257 from Paladin Tools.

Table 12. Coax Trim Dimensions

	Length A (inch (mm))	Length B (inch (mm))	Length C (inch (mm))
RG-6	5/8 (15.9)	1/4 (6.4)	3/8 (9.5)
RG-11	13/32 (10.3)	3/32 (2.4)	13/32 (10.3)

3. Remove any foil in the braid as shown in *Figure 11 on page 29*.

Figure 11. Cutting Technique for Removing Foil in the Braid

4. Fold the braid back over the jacket and trim the braid to the length as defined in **Length C** in Table 12 and shown in Figure 12.

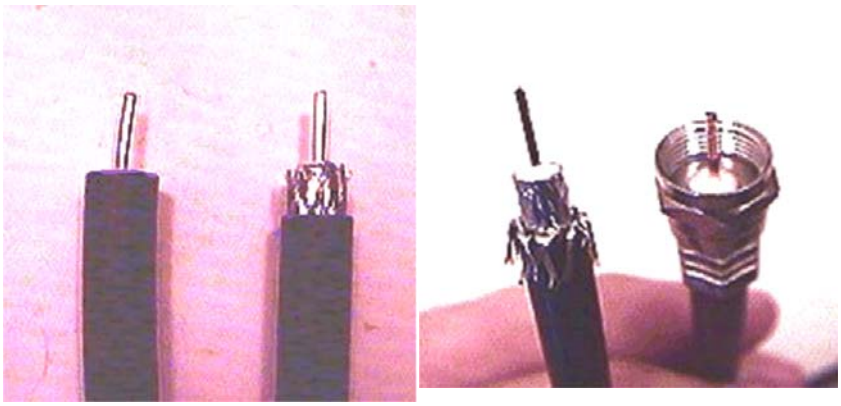


Figure 12. Folding the Braid

5. Flare the inner, outer braids and the outer foil shield only. Do not flare the inner foil shield (last foil around dielectric).

6. (If using a coax stripper, skip this step.) Being careful not to cut into the copper of the center conductor, remove the foil and cut the white color inner dielectric insulation to the length shown under **Length B** in Table 12. Remove any residue (as shown in *Figure 13 on page 30*).

7. If the conductive foil is burred, then smooth out the burr so that the edge (area where the dielectric material was removed) is smooth and provides a lead-in for the connector mandrel.

8. Install connector barrel over the foil and underneath the braid.

Note: The white color inner dielectric insulation should be flush with the inner rear surface of the connector. Refer to the picture on the right in Figure 13 on page 30 for an RG-11 termination.

9. Since the RG-11 connector has a built-in center pin, ensure that the coax center pin makes contact to the internal seizing pin of the connector, as shown in Figure 13.

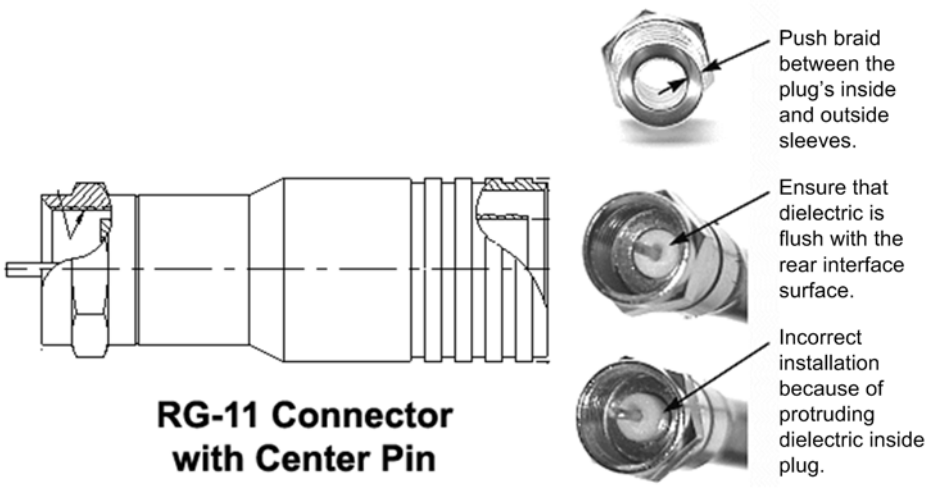
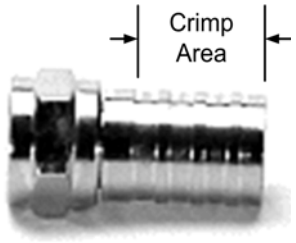


Figure 13. Attaching the RG-11 Connector

10. Crimp the connector with the proper crimp tool such as CablePrep HCT-775 for RG-6 or HCT-116 for RG-11, as shown in Figure 14.



F-Type Plug with Attached 3/8" Crimp Sleeve

Figure 14. Crimp Area for F-Type Plugs

11. Inspect and ensure that the copper center conductor only protrudes 1/8 inch (3.2 mm) nominally beyond the rim of the F-connector. Trim if necessary. A properly crimped and trimmed cable is shown in Figure 15.

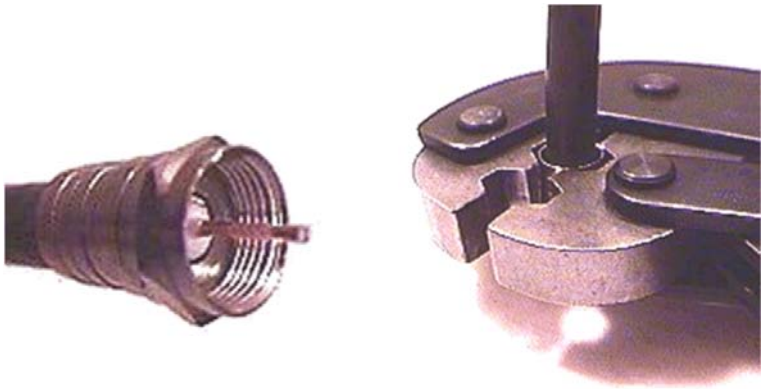


Figure 15. Proper Center Connector Length and Crimping Technique

The center conductor length must be a minimum of 1/16 inch (1.6 mm) to a maximum of 1/8 inch (3.2 mm) protrusion beyond the rim of the F-type connector (see Figure 15). It must be straight and cylindrical without any burrs at the end. Failure to follow this technique could result in damage to the e8350 Satellite Router, BUC, LNB connector and/or possible intermittent service.

4.5.1 Console Port Cable Specifications and Pinout

Use the RJ-45 to RJ-45 straight cable and RJ-45 to DB-9 female DTE adapter to connect the console port to the PC that is running terminal emulation software. You can identify whether a cable is straight-through or cross-over by comparing the two RJ-45 connectors at the ends of the Ethernet cable.

Holding the RJ-45 cable connectors side by side with the tab at the back, examine the sequence of the colored wires to determine the type of RJ-45 cable as shown in *Figure 16 on page 32*.

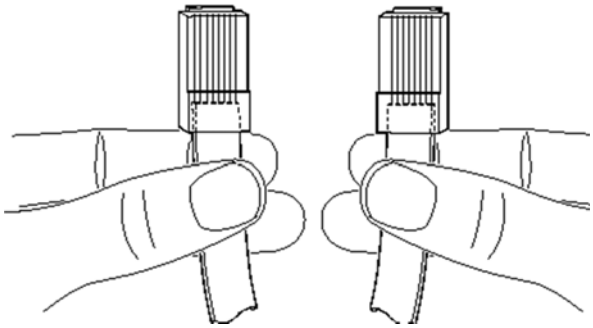


Figure 16. Holding the RJ-45 Cable Connectors

- Straight through: The colored wires are in the same sequence at both ends of the cable.
- Crossover: The first (far left) colored wire at one end of the cable is the third colored wire at the other end of the cable.

The signal and pinouts for the asynchronous serial console port of the e8350 Satellite Router and the RJ-45 to DB-9 female DTE adapter are listed in Table 13.

Table 13. RJ-45 to DB-9 Pinouts

Console Port (DTE)	RJ-45 Pin	Color Code	RJ-45 to DB-9 Terminal Adapter	Console Device
RTS	1	Blue	8	CTS
DTR	2	Orange	6	DSR
TxD	3	Black	2	RxD
GND	4	Red	NC	GND
GND	5	Green	5	GND
RxD	6	Yellow	3	TxD
DSR	7	Brown	4	DTR
Rx-RF-Power	8	White/Grey	9	Not Connected

A picture of the RJ-45 to DB-9 Female DTE adapter is shown in Figure 17.

Figure 17. RJ-45 to DB-9 Female DTE Adapter

Note: For use with external GPS and NMEA 0183 protocol standard, use pins 5 and 6 of RJ-45 or pins 5 and 3 on DB-9 terminal adapter to interface with the serial port of the GPS to obtain various GPS information.

4.5.2 Ethernet Port Cable Specifications and Pinouts

The 10 Base-T/100 Base-T Fast Ethernet ports support IEEE 802.3 and IEEE 802.3u specifications for the 10-Mbps and 100-Mbps transmission over Unshielded Twisted-Pair (UTP) cables. Use Category-3 or Category-5 UTP cable with RJ-45 connectors to connect the 10/100 Base-T Ethernet LAN A port on the e8350 Satellite Router to the customer-provided LAN hub or switch.

Note: iDirect supplies one 7-foot Category 5 UTP cable to connect the e8350 Satellite Router to the LAN hub or switch. If additional cables or different lengths are needed, they may be bought commercially.

To determine the type of RJ-45 cable, examine the sequence of the colored wires as follows:

- Straight through: The colored wires are in the same sequence at both ends of the cable.
- Crossover: The first (far left) colored wire at one end of the cable is the third colored wire at the other end of the cable, and the second colored wire at one end of the cable is the sixth colored wire at the end of the cable.

The pin assignments for the RJ-45 connector are listed in Table 14. Pin numbering is shown in Figure 18.

Table 14. RJ-45 Connector Pin Assignments

RJ-45 Pin	Description
1	Tx+
2	Tx-
3	Rx+
6	Rx-

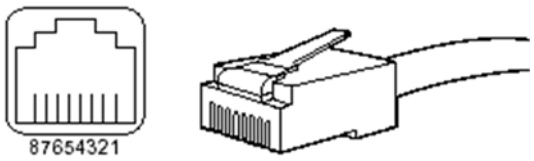


Figure 18. RJ-45 Cable Connectors, Plug and Receptacle

4.6 Connecting AC Power

The e8350 Satellite Router can be powered directly from the facility AC power source from 100 VAC to 240 VAC. iDirect recommends that the power is supplied by a low noise, low transient AC power source.

WARNING/CAUTION Improper AC power source rating, excessive noise or transients, or undersized circuit breaker will result in service interruption.

WARNING/CAUTION If you must remove power from the e8350 Satellite Router, disconnect power using the AC power cord.

4.6.1 Preparing Your PC/Laptop

See *"Defining the e8350 Satellite Router Rear Panel" on page 22.* for more information about the interface connectors.

Ensure that your PC/laptop:

- Is loaded with iDirect's iSite software
- Contains a Network Interface Card (NIC) connected with a crossover cable to the 10/100 LAN port of the e8350 Satellite Router
- Is running console terminal software, such as HyperTerminal

4.6.2 Checking Conditions before Powering Up the System

Check for the following conditions before you power up the e8350 Satellite Router:

- Verify that no RF coax cables are connected to the TX and RX ports on the rear of the e8350 Satellite Router.
- Verify that a DB-9 to RJ-45 adapter connects the COM Port of the PC/laptop to the Console port of the e8350 Satellite Router (typical terminal settings are COM1, 9600 baud, 8 data bits, no parity, one stop bit, and no flow control).

Do not connect or disconnect the Tx or Rx IFL cable while the e8350 Satellite Router is powered; this action may result in damage to the BUC, LNB, and/or satellite router.

4.6.3 Powering Up the System

After checking the setup as outlined above, power up the e8350 Satellite Router as follows:

- Connect the AC cord to the e8350 Satellite Router.

- Plug the AC power cord into the AC outlet.
- Move the AC power switch to the **ON** position.

Upon boot up, the POWER LED illuminates green, and within several seconds the STATUS LED flashes green as the e8350 Satellite Router performs a self-diagnostic test. If this test is successful, the STATUS LED illuminates green. If the test fails, the STATUS LED illuminates red.

After the initial hardware diagnostic test completes, the system takes approximately one minute to complete the boot up cycle, during which the STATUS LED flashes green. If the application successfully loads, the STATUS LED illuminates solid green. If the application cannot start due to configuration or other errors, the STATUS LED illuminates solid red. Once the e8350 Satellite Router is initialized, a factory default option file is loaded. A description of the LED states upon initialization is listed in Table 15.

Table 15. LED Status

LED Label	LED Color
POWER	Solid Green
STATUS	Solid Green
NET	Off
TX	Off
RX	Off
CRYPTO	Solid Green
FAN	Solid Green
TEMP	Solid Green

Note: The STATUS LED is normally green. A red STATUS LED indicates a malfunction.

Do not connect or disconnect the Tx or Rx IFL cable while the e8350 Satellite Router is powered on; this action may result in damage to the BUC, LNB, and/or e8350 Satellite Router.

4.7 Monitoring LED Status Indicators

Once the e8350 Satellite Router is powered on, check the LEDs to ensure the e8350 Satellite Router is functioning properly. The front panel indicators are shown in Figure 19.

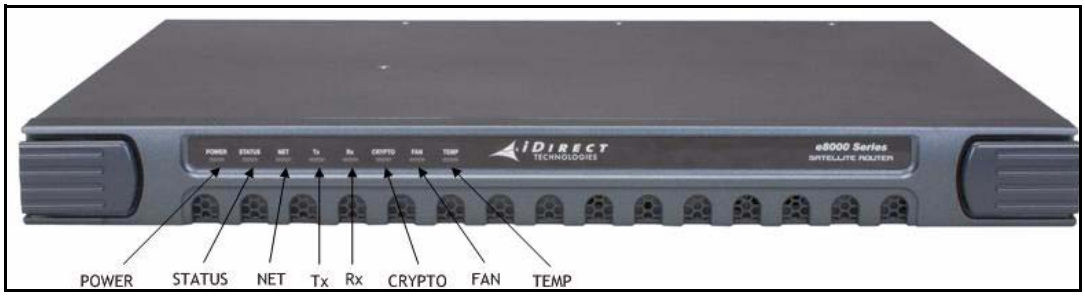


Figure 19. Front Panel Indicators

4.7.1 Front Panel Power and Network LED Status Indicators

For diagnostic purposes, the e8350 Satellite Router has eight LED indicators located on the front panel.

- The **POWER** LED indicates whether the e8350 Satellite Router is powered on or off.
- The **STATUS** LED indicates the overall status.
- The **NET** LED indicates the network acquisition status.
- The **Tx** LED indicates the transmitter status.
- The **Rx** LED indicates the receiver status.
- The **CRYPOTO** LED indicates when FIPS is enabled.
- The **FAN** LED indicates fan status.
- The **TEMP** LED indicates operating temperature status.

4.7.2 Front and Rear Panel LED Status Definitions

The e8350 Satellite Router rear panel status LEDs are defined in Table 16.

Table 16. Front Panel LED Indicators

LED Label	LED Color	Status
POWER	Off	Indicates that AC powered is off or that there is a power supply problem.
	Green	Indicates that power is on. The bootloader has started.
NET	Green	Indicates that the remotes have been acquired into the network.
	Flashing Green	Indicates that the elements are in network acquisition.
	Yellow	Indicates that the downstream SCPC is locked.
	Flashing Yellow	Indicates that the downstream SCPC is not locked.
STATUS	Green	Indicates normal operation. The DRAM test is successful.
	Flashing Green	Indicates that the unit is booting. The DRAM test is in progress.
	Red	Indicates a serious fault or failure in software, hardware, or configuration. May indicate that the DRAM test failed.
TX	Green	Indicates that the transmitter is enabled.
	Yellow	Indicates that the transmitter is disabled.
RX	Green	Indicates that the receiver is successfully locked to the downstream.
	Yellow	Indicates that the demodulator is not locked to the downstream carrier.
CRYPTO	Green	FIPS mode is enabled.
	Off	FIPS mode is not enabled.
FAN	Off	No fan alarm detected.
	Red	Fan alarm detected.
TEMP	Yellow	Operating temperature is nearing over temperature threshold.
	Red	Operating temperature threshold has been exceeded.

There are five LEDs on the rear of the e8350 Satellite Router that indicate whether certain components are powered on or off. These LEDs are described in Table 17.

Table 17. Rear Panel LED Indicators

LED Label	LED Color	Status
INPUT PWR	Off	Indicates that power is absent.
	Green	Indicates that power is present.
BUC PWR	Off	Indicates that the BUC power is not being supplied.
	Green	Indicates that the BUC power (+24 VDC or +48 VDC) is being supplied.
	Red	Indicates a BUC problem or an IFL disturbance.
LNB PWR	Off	Indicates that the LNB power is not being supplied.
	Green	Indicates that the LNB power (+19 VDC nominal) is being supplied.
	Red	Indicates an LNB problem or an IFL disturbance.
AC	Green	AC input is nominal.
	Off	AC input not detected.
DC	Green	DC output is nominal.
	Off	DC output not detected.

4.8 Maintaining the Remote

The e8350 Satellite Router requires basic maintenance to keep it running efficiently and to prolong its life. However, the only maintenance you need to perform, without explicit directions from iDirect, is to maintain the temperature and keep the external areas free from dust or dirt.

Note: There are no user-serviceable parts within the e8350 Satellite Router. Do not attempt to repair/replace a malfunctioning or defective component/module. Doing so may void the warranty.

4.8.1 Temperature Control

The e8350 Satellite Router has a built-in temperature sensor that measures the circuit board temperature. If the temperature exceeds a defined threshold, the e8350 Satellite Router alerts the NMS to the high temperature condition. See *Chapter 3, Evolution 8000 Series Specifications*, for the proper temperature range.

Various conditions can cause the e8350 Satellite Router to have an elevated internal temperature, such as:

- Objects blocking the enclosure vents
- Dust accumulated on the enclosure or the vents
- Ambient temperature elevated beyond the specified limits

4.8.2 Dust Removal

A dusty environment requires frequent maintenance. With the powered removed, use a slightly damp cloth with the excess moisture wrung out (not a saturated, dripping-wet cloth) to wipe away the dust that collects on the outside of the enclosure.

Vacuum the dust off the enclosure vents. Vacuum the circuit board through the enclosure vents, if possible.

4.9 Repacking the e8350 Satellite Router

If your system is damaged, or if you need to move the e8350 Satellite Router to another location, repack it in the original shipping boxes.

To repack your system:

1. Disconnect all cables.
2. Place the e8350 Satellite Router inside the original foam cutout in the shipping box.
3. Properly seal the box with packing tape.

For warranty service, obtain a Return Material Authorization (RMA) number from your reseller or iDirect prior to shipping. If you are a direct customer of iDirect, you may contact the iDirect TAC directly to obtain an RMA number and shipping instructions. Follow the shipping instructions, complete the RMA form, and attach the form to the outside of the shipping box.

5 iCONNEX e800 Physical Interfaces

This chapter defines the iCONNEX e800 Satellite Router physical interfaces and contains:

5.1 iCONNEX e800 Satellite Router Interface Specifications

This section contains a detailed diagram of the iCONNEX e800 Satellite Router circuit board and connector geometry (Figure 20, “Circuit Board and Connector Geometry”). Following this diagram is *Table 18 on page 45*, which defines the specifications for the ports shown in *Figure 20 on page 44*.

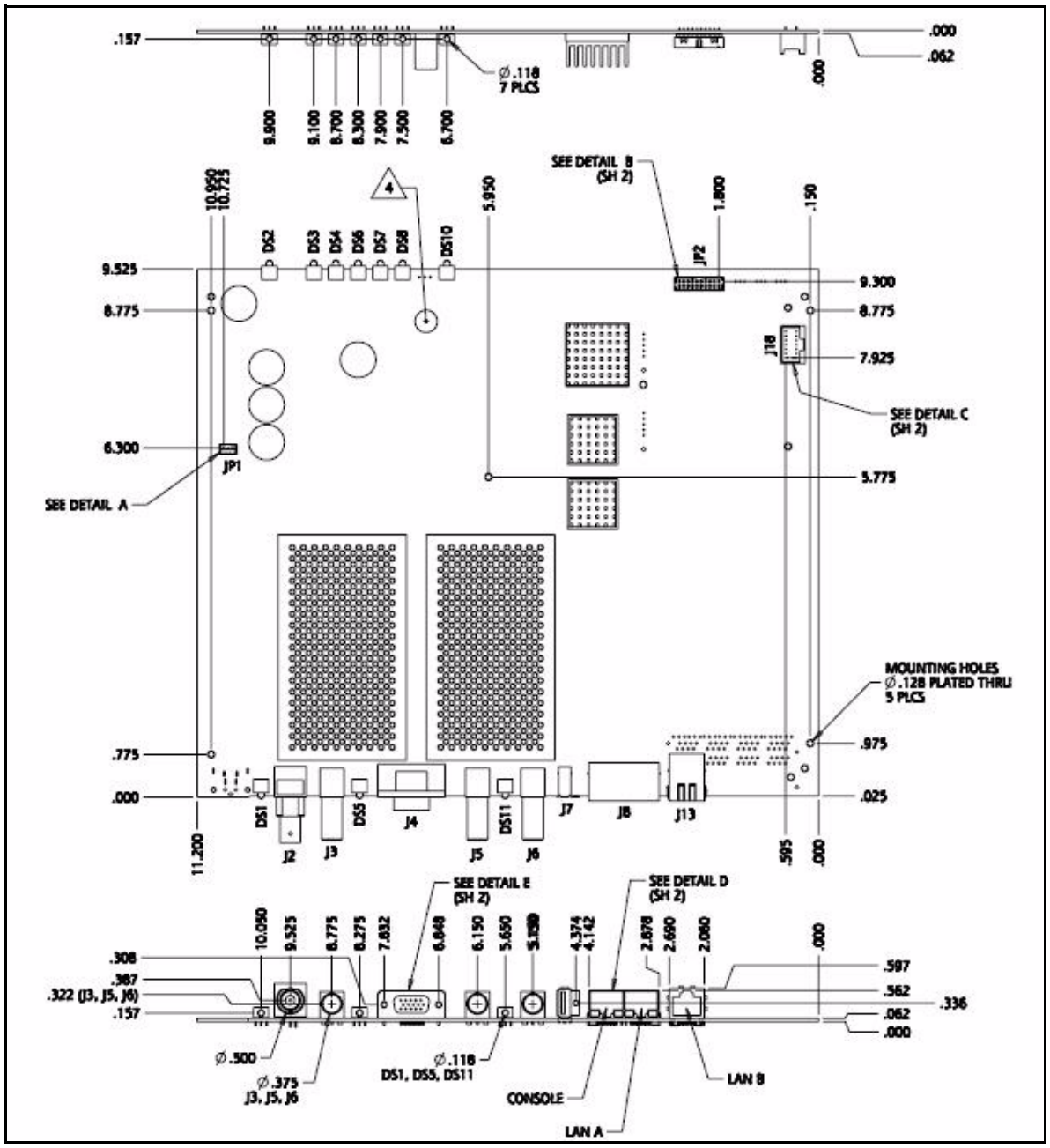


Figure 20. Circuit Board and Connector Geometry

Port specifications for the iCONNEX e800 Satellite Router are listed in Table 18.

Table 18. e800 iCONNEX Satellite Router Port Specifications

Port Designator	Port Name	DESCRIPTION
J18	Power Connector	MOLEX P/N 501844-1410 (mates with MOLEX P/N 51353-1400)
J2	10 MHz	BNC external 10 MHz connector (future use)
J3	TX Out	• F-Connector, female, 3/8", 32 thread • 75 ohm nominal • BUC Voltage: +24V or +48V (depending on input voltage) *Note: The BUC voltage on the Tx connector is approximately equal to the input voltage. For example, if the input voltage is +48V, approximately +48V is present at the TX connector.*
J5	RX Out	• F-Connector, female, 3/8", 32 thread • 75 ohm nominal • DC blocked port with terminator
J6	Rx in	• F-Connector, female, 3/8", 32 thread • 75 ohm nominal • LNB Voltage: +18.8 VDC nominal at 500 mA maximum
J7	USB	Future use
J8 (left)	Console	RJ-45, serial, RS-232
J8 (right)	Lan A	RJ-45, 10/100 Base-T
J13	Lan B	RJ-45, 10/100 Base-T
J4	RS232/GPIO	HD-15, General Purpose Input/Output, serial
JP1	Remote ON/OFF Switch	MOLEX P/N 89400-0320 (mates with MOLEX part number 87369-0300)
JP2	Remote LED Display	MOLEX P/N 87831-2020 (mates with MOLEX part number 87568-2063)

5.2 Power Connectors

This section describes the details of the iCONNEX e800 Satellite Router power connectors. The connectors include:

- *iCONNEX e800 Satellite Router Remote ON/OFF Switch Connector*
- *iCONNEX e800 Satellite Router Remote LED Connector*
- *iCONNEX e800 Satellite Router DC Power Connector*

5.2.1 iCONNEX e800 Satellite Router Remote ON/OFF Switch Connector

The iCONNEX e800 Satellite Router JP1 ON/OFF switch connector and pin assignments are shown in Figure 21 and Table 19.

Figure 21. JP1 Pin Numbering

Table 19. JP1 Pin Assignments

Pin	Signal
1	Open Pin = Power On Grounded Pin = Power Off
2	Not Connected
3	Ground

5.2.2 iCONNEX e800 Satellite Router Remote LED Connector

The iCONNEX e800 Satellite Router JP2 Remote LED connector and pin assignments are shown in Figure 22 and Table 20:

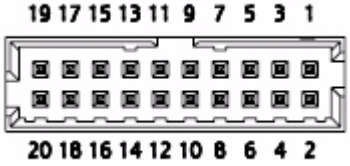


Figure 22. JP2 Pin Numbering

Table 20. JP2 Connector Pin Assignments

Pin	Signal Name
1	INPUT PWR
2	GROUND
3	RMT STAT LED RED
4	RMT STAT LED GRN
5	RMT NET LED YEL
6	RMT NET LED GRN
7	RMT TX LED YEL

Table 20. JP2 Connector Pin Assignments *(continued)*

Pin	Signal Name
8	RMT TX LED GRN
9	RMT RX LED YEL
10	RMT RX LED GRN
11	RMT ENCRYPT LED YEL
12	REMT ENCRYPT LED GRN
13	RESERVED (Do not use)
14	RESERVED (Do not use)
15	RMT OVERTEMP STAT LED RED
16	RMT OVERTEMP LED YEL
17	N/C
18	N/C
19	GROUND
20	+3.3V

5.2.3 iCONNEX e800 Satellite Router DC Power Connector

The iCONNEX e800 Satellite Router JP18 power connector and pin assignments are shown in Figure 23 and Table 21:

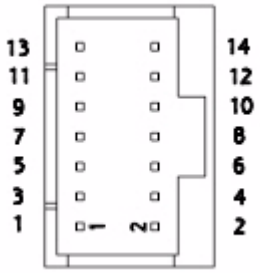


Figure 23. JP18 Pin Numbering

Table 21. JP18 Pin Assignments

Pin	Signal Name
1	INPUT PWR
2	INPUT PWR
3	INPUT PWR
4	INPUT PWR
5	INPUT PWR

Table 21. JP18 Pin Assignments *(continued)*

Pin	Signal Name
6	INPUT PWR
7	GROUND
8	GROUND
9	GROUND
10	GROUND
11	GROUND
12	GROUND
13	GROUND
14	PWR FAN STATUS

5.3 Console Port Cables

Use the RJ-45 to RJ-45 straight cable and RJ-45 to DB-9(F) female DTE adapter to connect the iCONNEX e800 Console Port to the PC DB-9(F) serial port running terminal emulation software.

You can distinguish a straight cable from a crossover cable by comparing the two modular connector ends of the RJ-45 cable. Holding the RJ-45 cable connectors side by side with the tab at the back, examine the sequence of the colored wires to determine the type of RJ-45 cable as shown in Figure 24.

- Straight through: The colored wires are in the same sequence at both ends of the cable.
- Crossover: The first (far left) colored wire at one end of the cable is the third colored wire at the other end of the cable.

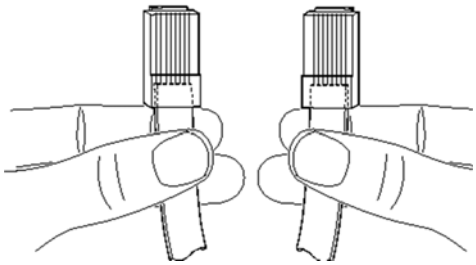


Figure 24. Examining RJ-45 Connectors

The RJ-45 to DB-9 DTE adapter and pin numbers is shown in Figure 25.

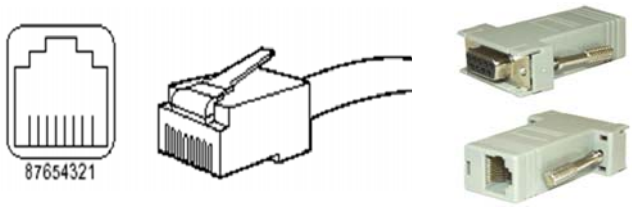


Figure 25. RJ-45 to DTE Adapter Pin Identification

5.4 Console Port Pin Assignments

This section describes the iCONNEX e800 Satellite Router console port pin assignments and illustrates the pin numbering scheme.

The RJ-45 console pin numbering is shown in Figure 26 and described in Table 22.

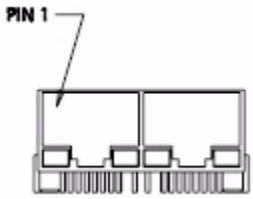


Figure 26. Console Pin Numbers

Table 22. e800 iCONNEX Satellite Router Console Pin Assignments

PIN	RJ-45 to DB-9(F) Terminal Adapter	SIGNAL NAME	DESCRIPTION
1	8	Not Connected	Do not connect
2	6	Reserved (Tx)	Do not connect
3	2	Transmit Data (TxD)	RS-232 voltage level compliant transmit data signal for debug use only
4	NC	Ground (GND)	Ground
5	5	Ground (GND)	Ground
6	3	Receive Data (RxD)	RS-232 voltage level compliant receive data signal for debug use only
7	4	Reserved (Rx)	Do not connect
8	9	Not Connected	Do not connect

5.5 LED Status and Definitions

The iCONNEX e800 Satellite Router has ten LEDs to indicate status. There are three LEDs on the rear edge (the edge with the RJ-45 and F-connectors) and seven LEDs on the front edge (the edge with LEDs only). Refer to *Figure 20 on page 44* for both front and rear edge LED designations.

5.5.1 Front Edge Status LEDs

There are seven front panel LEDs to indicate the status of the iCONNEX e800 Satellite Router. A description of each front panel LED is listed in Table 23.

Table 23. Front Panel LEDs

LED	INDICATOR	COLOR	DESCRIPTION
DS2	POWER	Off	DC power is absent or there is an on-board power regulator problem.
		Solid Green	The internal power regulator is powered on; boot loader has started.
DS3	STATUS	Flashing Green	Indicates initial bootup sequence; DRAM test is in progress.
		Solid Green	The DRAM test passes and operation is normal.
		Red	Indicates a serious fault or failure within the software, hardware, or configuration. May indicate that the DRAM test has failed.
DS4	NET	Flashing Yellow	Indicates that the hub downstream carrier has not been acquired.
		Solid Yellow	Indicates that the hub downstream carrier has been acquired.
		Flashing Green	Downstream carrier is acquired and the TDMA upstream has been acquired by the hub.
		Solid Green	Network has been acquired.
DS6	Tx	Solid Yellow	Transmitter is disabled.
		Solid Green	Transmitter is enabled.
DS7	Rx	Solid Yellow	Receiver is not locked to the downstream carrier.
		Solid Green	Receiver is locked to the downstream carrier.
DS8	CRYPTO	Off	FIPS is not enabled.
		Solid Green	FIPS is enabled.
DS10	TEMP	Off	Indicates normal operating temperature.
		Solid Yellow	Operating temperature is nearing the over temperature threshold.
		Red	Operating temperature threshold has been exceeded.

5.5.2 Rear Panel Status LEDs

The iCONNEX e800 Satellite Router has three LED indicators on the rear edge of the circuit board, and two on the power supply module. Monitor the iCONNEX e800 operational status by viewing the color and illumination pattern of the LEDs. A description of each rear panel LED is listed in Table 24.

Table 24. Rear Panel LEDs

LED	INDICATOR	COLOR	DESCRIPTION
DS1	INPUT PWR	Off	DC input from the external power source is absent.
		Solid Green	DC input from the external power source is present.
DS5	BUC	Off	Power to the BUC is absent.
		Solid Green	Power to the BUC is present.
		Solid Red	Indicates a BUC problem, IFL short, or a transient disturbance on the IFL.
DS11	LNB PWR	Off	Power to the LNB is absent.
		Solid Green	Power to the LNB is present.
		Solid Red	Indicates an LNB problem, IFL short, or a transient disturbance on the IFL.

5.6 Circuit Board Temperature Monitor

The iCONNEX e800 Satellite Router has a built-in temperature sensor located on the circuit board assembly. The temperature sensor measures the circuit board temperature. If the board temperature exceeds a defined threshold, the iCONNEX e800 alerts the NMS to the high temperature condition. Various conditions can cause the iCONNEX e800 to have elevated internal temperature such as:

- Inadequate airflow
- High dust accumulation on the circuit board surface
- Elevated ambient temperature

6 Configuring the iCONNEX e800 as a Mobile Remote

This chapter describes how the iCONNEX e800 can be configured as a mobile remote. It contains:

6.1 What is a Mobile Remote?

The iCONNEX e800 can be configured as mobile remote. In satellite TDMA systems, because of the long distance variation between different remotes and the satellite, it is important that the data sent by different remotes do not collide over the air. This is accomplished by adding a delay to the packets at the remote, so that the packets arriving at the hub are received synchronized to the frame marker. The delay that is added to each remote is known as Frame Start Delay (FSD), and it is calculated by the NMS based on the geographical locations of the remote, the hub, and the satellite.

As the geographical location of a mobile remote changes, the FSD also changes. The remote calculates the FSD provided its own geographical location is known. When the remote is configured as mobile remote, it receives for GPS data on the serial console port which provides latitude and longitude information in the form of an NMEA string. The remote uses this information to calculate the FSD and join the network. The remote needs to calculate the FSD only during network acquisition. Once the remote is in the network, the symbol delay corrections are made by the uplink control process.

The mobile remote also provides an input and output signal to the stabilizing antenna through the serial console port. The output signal called **lock** indicates the frame lock status of the receiver on the remote. The input signal called **TxMute** can be used to mute the transmitter until the antenna pointing is complete. This signalling is activated when modem handshaking is enabled in the NMS.

6.2 Hardware Connections for a Mobile Remote

A diagram depicting the iCONNEX e800 hardware connections is shown in Figure 27.

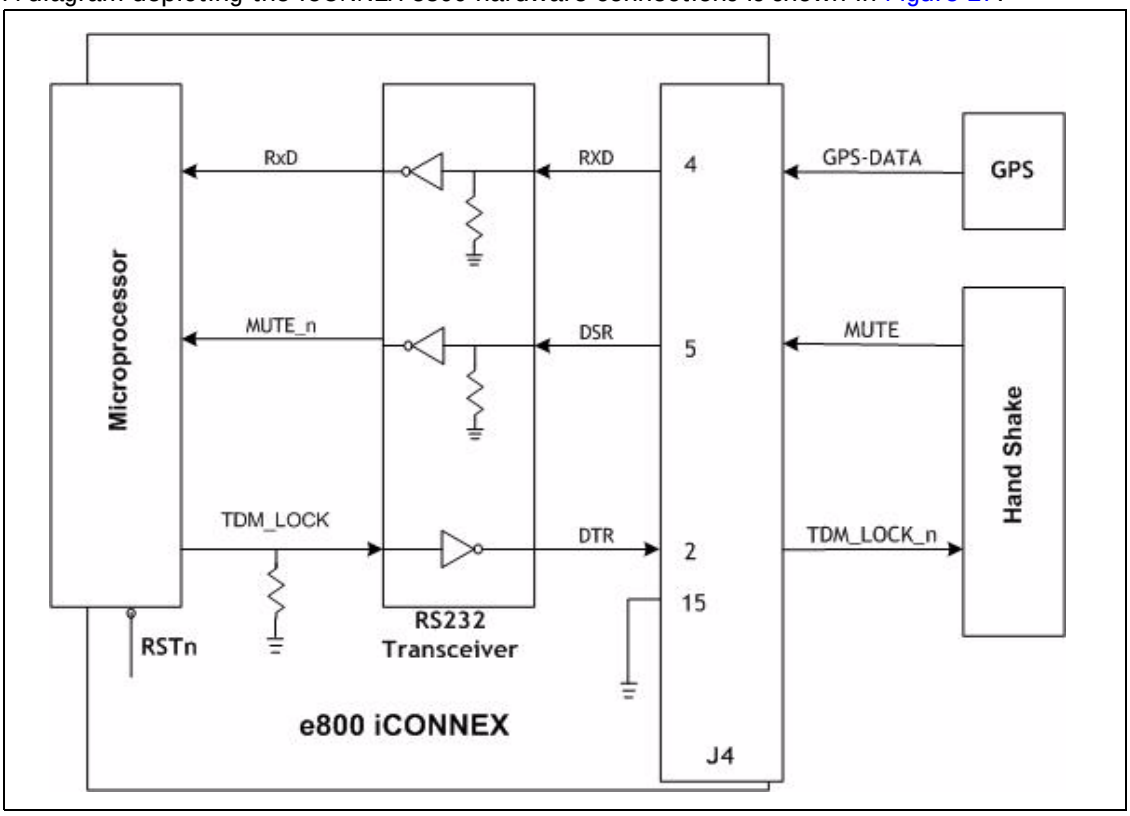


Figure 27. iCONNEX e800 Hardware Connections Diagram

The diagram illustrates the connections needed from GPS receiver and the Handshake device to the e800 iCONNEX HD-15 GPIO port. The signals shown in the figure have the following meaning:

- MUTE = 1 the transmitter is muted
  = 0 the transmitter is enabled
- TDM_LOCK_n = 0 when the receiver is locked
  = 1 when the reciver is unlocked
- GPS-DATA is the data from the GPS receiver

The RJ-45 console port does not support GPS data input or antenna control handshaking signals. These signals are supported by the HD-15 GPIO port.

6.2.1 GPS Receiver Specification

The iCONNEX e800 supports a subset of NMEA 0183 protocol. In particular, it supports location information provided by the GPS receiver in the form of a GPRMC string.

6.2.2 iCONNEX e800 GPS Port Pin Assignments

A description of the iCONNEX e800 General Purpose Input/Output HD-15(F) (labeled RS-232) serial port pin assignments is shown in Figure 28 and Table 25.

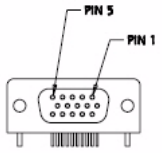


Figure 28. HD-15 Pin Numbers

Table 25. HD-15(F) RS-232 Serial Port Pin Assignments

Pin	Signal Name	Description
1	+3.3 VDC	200 mA maximum
2	Receive Lock	RS-232 voltage level compliant transmit output signal for antenna control devices. Rx Lock indicates a successful downstream lock state. In SCPC mode, this signal means *TDM Lock*. In DVB-S2 mode, this signal means *NCR Lock*.
3	Reserved	Future Transmit Data (TxD)
4	Receive Data (RxD)	RS-232 voltage level compliant receive data input signal for connection to a GPS receiver in mobile applications
5	Transmit Mute	RS-232 voltage level compliant receive signal for use with antenna control devices
6	Reserved	Do not connect
7	Not Connected	Do not connect
8	Not Connected	Do not connect
9	Reserved	Do not connect
10	Reserved	Do not connect
11	Reserved	Do not connect
12	Reserved	Do not connect

Table 25. HD-15(F) RS-232 Serial Port Pin Assignments *(continued)*

Pin	Signal Name	Description
13	Receive Signal Strength Indicator (RSSI)	DC voltage level output (0.0 to 4.6 VDC) used in antenna pointing applications to provide either receive composite power measurement or receive C/N measurement
14	Reserved Output	Do not connect
15	Ground (GND)	Ground

6.2.3 Handshake Signals

The remote sends an RS-232 active signal on the console port output on pin 2 while the modem is trying to acquire the downstream carrier. Once the downstream gets TDM frame lock, the receive lock signal becomes inactive. This signal indicates to the auto-point antenna equipment when to switch from coarse-tune mode to fine-tune mode.

Pin 5 input on the GPIO port can be used as a “mute” function and allows the auto-point antenna equipment to delay acquisition transmit until the antenna has finished pointing. Without this, the modem may transmit as soon as detecting TDM frame lock, before the antenna is pointed and polarized properly. Sending an RS-232 active level to pin 5 of the GPIO port enables the mute function.

6.2.4 GPS Information

GPS information is entered into the remote either automatically by a GPS receiver or manually by using the **latlong** command. This information sets the latitude and longitude of the remote for acquisition purposes. Because the remote is mobile, this information is considered to be temporary. Two minutes after entering this command, the latitude/longitude information is considered outdated and it is not used again until it is re-entered. This prevents a remote that has moved to a different location from transmitting before the new information is entered.

The location information is needed only during acquisition of the remote into the network. Once the remote is in the network, the uplink control process tracks the symbol offset variations due to the mobility of the remote. If the remote loses acquisition after two minutes and needs to reacquire the network, the latitude/longitude information must be entered again.

In the absence of a GPS receiver interface to the modem, the latitude/longitude information can be manually input to the modem through a telnet console interface or serial console interface. The GPS receiver interface operates at 4800 baud; however, the console interface (RJ-45) always operates at 9600 baud.

6.3 Configuring a Mobile Remote

The iCONNEX e800 is configured as a mobile remote by using iBuilder. Refer to the *iBuilder User Guide* for information on configuring a mobile remote.

6.4 Monitoring a Mobile Remote

The current location of an iCONNEX e800 mobile remote can be monitored in iMonitor in the **Event Window** for the remote. The remote periodically updates the NMS with its current location. If the location data is not current, the remote informs the NMS that the location is not available.

A.Warnings for the e8350 Satellite Router

This appendix repeats the e8350 Satellite Router safety warnings contained in this manual in multiple languages.

A.1 Danger/Warning Symbol

DANGER: This symbol means danger! You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

Waarschuwing	Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.
Varoitus	Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.
Attention	Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.
Warnung	Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.
Avvertenza	Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.

Advarsel	Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.
Aviso	Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.
¡Advertencia!	Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.
Varning!	Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.

A.2 Installation Warning

WARNING: Read the installation instructions before you connect the system to the power source.

Waarschuwing	Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.
Varoitus	Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.
Attention	Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.
Warnung	Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.
Avvertenza	Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.
Advarsel	Les installasjonsinstruksjonene før systemet kobles til strømkilden.
Aviso	Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.
¡Advertencia!	Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.
Varning!	Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

A.3 Restricted Area Warning

	WARNING: This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key or other means of security, and is controlled by the authority responsible for the location.
Waarschuwing	Dit toestel is bedoeld voor installatie op plaatsen met beperkte toegang. Een plaats met beperkte toegang is een plaats waar toegang slechts door servicepersoneel verkregen kan worden door middel van een speciaal instrument, een slot en sleutel, of een ander veiligheidsmiddel, en welke beheerd wordt door de overheidsinstantie die verantwoordelijk is voor de locatie.
Varoitus	Tämä laite on tarkoitettu asennettavaksi paikkaan, johon pääsy on rajoitettua. Paikka, johon pääsy on rajoitettua, tarkoittaa paikkaa, johon vain huoltohenkilöstö pääsee jonkin erikoistyökalun, lukkoon sopivan avaimen tai jonkin muun turvalaitteen avulla ja joka on paikasta vastuussa olevien toimivaltaisten henkilöiden valvoma.
Attention	Cet appareil est à installer dans des zones d'accès réservé. Ces dernières sont des zones auxquelles seul le personnel de service peut accéder en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité. L'accès aux zones de sécurité est sous le contrôle de l'autorité responsable de l'emplacement.
Warnung	Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Ein Bereich mit beschränktem Zutritt ist ein Bereich, zu dem nur Wartungspersonal mit einem Spezialwerkzeugs, Schloß und Schlüssel oder anderer Sicherheitsvorkehrungen Zugang hat, und der von dem für die Anlage zuständigen Gremium kontrolliert wird.
Avvertenza	Questa unità deve essere installata in un'area ad accesso limitato. Un'area ad accesso limitato è un'area accessibile solo a personale di assistenza tramite un'attrezzo speciale, lucchetto, o altri dispositivi di sicurezza, ed è controllata dall'autorità responsabile della zona.
Advarsel	Denne enheten er laget for installasjon i områder med begrenset adgang. Et område med begrenset adgang gir kun adgang til servicepersonale som bruker et spesielt verktøy, lås og nøkkel, eller en annen sikkerhetsanordning, og det kontrolleres av den autoriteten som er ansvarlig for området.
Aviso	Esta unidade foi concebida para instalação em áreas de acesso restrito. Uma área de acesso restrito é uma área à qual apenas tem acesso o pessoal de serviço autorizado, que possua uma ferramenta, chave e fechadura especial, ou qualquer outra forma de segurança. Esta área é controlada pela autoridade responsável pelo local.

¡Advertencia!	Esta unidad ha sido diseñada para instalarse en áreas de acceso restringido. Área de acceso restringido significa un área a la que solamente tiene acceso el personal de servicio mediante la utilización de una herramienta especial, cerradura con llave, o algún otro medio de seguridad, y que está bajo el control de la autoridad responsable del local.
Varning!	Denna enhet är avsedd för installation i områden med begränsat tillträde. Ett område med begränsat tillträde får endast tillträdas av servicepersonal med ett speciellt verktyg, lås och nyckel, eller annan säkerhetsanordning, och kontrolleras av den auktoritet som ansvarar för området.

A.4 Service Personnel Warning

WARNING: This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel.

Waarschuwing	Deze apparatuur mag slechts geïnstalleerd en onderhouden worden door servicepersoneel conform de definitie van AS/NZS 3260 Clausule 1.2.14.3 Service Personnel.
Varoitus	Tämän laitteen saa asentaa tai huoltaa ainoastaan Australiassa ja Uudessa Seelannissa sovellettavan AS/NZS 3260 -standardin kohdan 1.2.14.3 Service Personnel määrittelemä huoltohenkilöstö.
Attention	Cet équipement ne doit être installé et entretenu que par du personnel d'entretien comme défini par la réglementation AS/NZS 3260 Clause 1.2.14.3 Service Personnel.
Warnung	Dieses Gerät darf nur von Wartungspersonal gemäß AS/NZS-Definition 3260, Paragraph 1.2.14.3, "Service Personnel", installiert und gewartet werden.
Avvertenza	Questo apparecchio deve essere installato e mantenuto in efficienza esclusivamente da personale tecnico che soddisfi i requisiti specificati nella sezione 1.2.14.3 sul `Service Personnel' contenuta nelle norme AS/NZS 3260.
Advarsel	Installasjon og vedlikehold av dette utstyret skal kun foretas av vedlikeholdspersonell som definert i AS/NZS 3260, klausul 1.2.14.3 Service Personnel.
Aviso	Este equipamento deverá ser instalado e reparado apenas por pessoal de manutenção qualificado, conforme estipulado em AS/NZS 3260 Cláusula 1.2.14.3 Service Personnel.
¡Advertencia!	Este equipo se debe instalar y mantener solamente por personal de servicio, según definido por AS/NZS 3260 Cláusula 1.2.14.3 Service Personnel.

Varning!	Installation och underhåll av denna utrustning får endast utföras av servicepersonal enligt definition i AS/NZS 3260 klausul 1.2.14.3 Service Personnel.

A.5 Qualified Personnel Warning

WARNING: Only trained and qualified personnel should be allowed to install or replace this equipment.

Waarschuwing	Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.
Varoitus	Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.
Attention	Cet équipement ne doit être installé et entretenu que par du personnel d'entretien comme défini par la réglementation AS/NZS 3260 Clause 1.2.14.3 Service Personnel.
Avertissement	Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.
Achtung	Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.
Avvertenza	Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.
Advarsel	Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.
Aviso	Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.
¡Atención!	Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.
Varning!	Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.

A.6 Operating Temperature and Airflow Warning

WARNING: To prevent IDU from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 113°F (45°C). To prevent airflow restriction, allow at least 6 inches (15.2 cm) of clearance around the ventilation openings.

Waarschuwing	Om te voorkomen dat de IDU oververhit raakt, dient u deze niet in een gebied te bedienen waar de maximaal aanbevolen omgevingstemperatuur van 45° C wordt overschreden. Om luchtstroombeperkingen te voorkomen, dient u minstens 15 cm speling rond de ventilatieopeningen te laten.
Varoitus	Jotta IDU ei kuumentuisi liikaa, sitä ei saa käyttää alueella, jonka lämpötila ylittää suositellun maksimiympäristölämpötilan 45° C. Ilmanvaihdon säilyttämiseksi on tuuletusaukkojen ympärille jätettävä ainakin 15,2 cm:n tila.
Attention	Pour éviter toute surchauffe du IDU, il est recommandé de maintenir une température ambiante inférieure à 45° C. Pour assurer une parfaite circulation de l'air autour du routeur, prévoyez un espace minimum de 15 cm autour des ouvertures de ventilation.
Warnung	Um den IDU vor Überhitzung zu schützen, vermeiden Sie Benutzung des Geräts in einer Gegend, in denen die Umgebungstemperatur das empfohlene Maximum von 45° C überschreitet. Um eine Behinderung der Luftzirkulation zu vermeiden, stellen Sie sicher, daß um die Kühlungsöffnungen herum ein Raum von mindestens 15,2 cm frei bleibt.
Avvertenza	Per evitare che il IDU si surriscalda, non utilizzatelo in una zona dove la temperatura ambiente eccede le massime raccomandate di 113° F (45° C). Per evitare di bloccare il passaggio dell'aria, lasciate almeno 6 pollici (15.2 cm) di spazio libero attorno alle aperture per la ventilazione.
Advarsel	Forhindre at IDU blir overopphetet ved å ikke bruke den på et sted der den anbefalte omgivelsestemperaturen overstiger 45° C. Unngå at luftsirkulasjonen reduseres ved å ha en klaring på minst 15,2 cm rundt ventilasjonsåpningene.
Aviso	Para impedir o sobreaquecimento do IDU, não o utilize numa área que exceda a temperatura ambiente máxima recomendada de 45° C (113° F). Para não restringir o fluxo de ar, deixe um espaço de pelo menos 15,2 cm (6 polegadas) em volta dos orificios de ventilação.
¡Advertencia!	Para impedir que el IDU se caliente, no lo use en un área que exceda la temperatura ambiente máxima recomendada de 113° F (45° C). Con el fin de no restringir el flujo de aire, deje un espacio de un mínimo de 6 pulgadas (15,2 cm) alrededor de los orificios de ventilación.
Varning!	Förhindra att IDU chassis blir överhettad genom att inte använda den på en plats där den rekommenderade omgivningstemperaturen överstiger 45° C. Undvik att luftcirkulationen reduceras genom att ha ett fritt utrymme på minst 15,2 cm runt ventilationsöppningarna.

A.7 Lightning Activity Warning

WARNING: Do not work on the system or connect or disconnect cables during periods of lightning activity.

Waarschuwing	Tijdens onweer dat gepaard gaat met bliksem, dient u niet aan het systeem te werken of kabels aan te sluiten of te ontkoppelen.
Varoitus	Älä työskentele järjestelmän parissa äläkä yhdistä tai irrota kaapeleita ukkosilmalla.
Attention	Ne pas travailler sur le système ni brancher ou débrancher les câbles pendant un orage.
Warnung	Arbeiten Sie nicht am System und schließen Sie keine Kabel an bzw. trennen Sie keine ab, wenn es gewittert.
Avvertenza	Non lavorare sul sistema o collegare oppure scollegare i cavi durante un temporale con fulmini.
Advarsel	Utfør aldri arbeid på systemet, eller koble kabler til eller fra systemet når det tordner eller lyner.
Aviso	Não trabalhe no sistema ou ligue e desligue cabos durante períodos de mau tempo (trovoada).
¡Advertencia!	No operar el sistema ni conectar o desconectar cables durante el transcurso de descargas eléctricas en la atmósfera.
Varning!	Vid åska skall du aldrig utföra arbete på systemet eller ansluta eller koppla loss kablar.

A.8 Safety Extra-Low Voltage Port Warning

WARNING: The ports labeled "TX Out", "LAN A", "LAN B", “Console”, “RX Out” and "RX In" are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Avoid connecting these circuits to telephone network voltage (TNV) circuits.

Waarschuwing	De poorten die gelabeld zijn met "TX Out", "LAN A", "LAN B", “Console”, “RX Out” en "RX In" zijn veiligheidscircuits met extra-laag voltage (SELV). SELV-circuits mogen alleen maar op andere SELV-circuits worden aangesloten. Sluit deze circuits niet op telefoonnetwerkvoltage-circuits (TNV) aan.
Varoitus	Varoitus Portit, joissa on merkintä "TX Out", "LAN A", "LAN B", “Console”, “RX Out” ja "RX In", ovat suojattuja erittäisen alhaisen jännitteen (SELV) piirejä. SELV-piirit tulisi liittää ainoastaan toisiin SELV-piireihin. Vältä kytkemästä näitä piirejä puhelinverkkojännitteen (TNV) piireihin.
Attention	Les ports "TX Out", "LAN A ", "LAN B", “Console”, “RX Out” et « RX In » sont des circuits SELV (« Safety Extra-Low Voltage » :très basse tension de sécurité). Les circuits SELV ne devant être connectés qu'à d'autres circuits du même type, il est recommandé de ne pas les raccorder à des circuits TNV (« Telephone Network Voltage » :tension de réseau téléphonique).

Warnung	Die Ports mit der Bezeichnung "TX Out", "LAN A", "LAN B", “Console”, “RX Out” und "RX In" sind SELV-Schaltkreise (safety extra-low voltage circuits - Sicherheits-Niedrigspannungskreise). SELV-Schaltkreise sollten nur an andere SELV-Schaltkreise angeschlossen werden. Achten Sie darauf, diese Schaltkreise nicht an TNV-Schaltkreise (telphone network voltage - Telefonnetzspannung) anzuschließen.
Avvertenza	Le porte etichettate "TX Out", "LAN A", "LAN B", “Console”, “RX Out” e "RX In" sono circuiti di sicurezza a basso voltaggio (Safety Extra-Low Voltage SELV). Evitate di collegare questi circuiti con circuiti a voltaggio rete telefonica (Telephone Network Voltage - TNV).
Advarsel	Utgangene merket "TX Out", "LAN A", "LAN B", “Console”, “RX Out”og "RX In" er sikkerhetskretser (SELV) med ekstra lav spenning. SELV-kretser skal bare kobles til andre SELV-kretser. Unngå å koble disse kretsene til kretser for telefonnettspenning(TNV).
Aviso	As portas assinaladas com "TX Out", "LAN A", "LAN B", “Console”, “RX Out” e "RX In" são circuitos de segurança de baixa tensão (SELV). Os circuitos de segurança de baixa tensão só deverão ser conectados a outros circuitos de segurança de baixa tensão. Evite conectar estes circuitos a circuitos de tensão de rede telefónica (TNV).
¡Advertencia!	Los puertos "TX Out", "LAN A", "LAN B", “Console”, “RX Out” y "RX In" son circuitos de seguridad de voltaje extra bajo (SELV). Estos circuitos SELV deben conectarse solamente a otros circuitos SELV. Evite conectar este tipo de circuitos a circuitos de la red de voltaje del teléfono (TNV).
Varning!	Portarna med beteckningen "TX Out", "LAN A", "LAN B", “Console”, “RX Out” och "RX In" är SELV-kretsar (skyddskretsar för mycket låg spänning). SELV-kretsar får endast kopplas till andra SELV-kretsar. Undvik att koppla dessa kretsar till TNV-kretsar (kretsar med telefonnätspänning).

A.9 Ground Conductor Warning

WARNING: Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Waarschuwing	De aardingsleiding mag nooit buiten werking gesteld worden en de apparatuur mag nooit bediend worden zonder dat er een op de juiste wijze geïnstalleerde aardingsleiding aanwezig is. Neem contact op met de bevoegde instantie voor elektrische inspecties of met een elektricien als u er niet zeker van bent dat er voor passende aarding gezorgd is.
Varoitus	Älä koskaan ohita maajohdinta tai käytä laitteita ilman oikein asennettua maajohdinta. Ota yhteyttä asianmukaiseen sähkötarkastusviranomaiseen tai sähköasentajaan, jos olet epävarma maadoituksen sopivuudesta.

Attention	Ne jamais rendre inopérant le conducteur de masse ni utiliser l'équipement sans un conducteur de masse adéquatement installé. En cas de doute sur la mise à la masse appropriée disponible, s'adresser à l'organisme responsable de la sécurité électrique ou à un électricien.
Warnung	Auf keinen Fall den Erdungsleiter unwirksam machen oder das Gerät ohne einen sachgerecht installierten Erdungsleiter verwenden. Wenn Sie sich nicht sicher sind, ob eine sachgerechte Erdung vorhanden ist, wenden Sie sich an den zuständigen elektrischen Fachmann oder einen Elektriker.
Avvertenza	Non escludere mai il conduttore di protezione né usare l'apparecchiatura in assenza di un conduttore di protezione installato in modo corretto. Se non si sa con certezza che è disponibile un collegamento di messa a terra adeguato, esaminare le Norme CEI pertinenti o rivolgersi a un elettricista qualificato.
Advarsel	Omgå aldri jordingslederen og bruk aldri utstyret uten riktig montert jordingsleder. Ta kontakt med det riktige organet for elektrisk inspeksjon eller en elektriker hvis du er usikker på om det finnes velegnet jording.
Aviso	Nunca anule o condutor à terra nem opere o equipamento sem ter um condutor à terra adequadamente instalado. Em caso de dúvida em relação ao sistema de ligação à terra, contacte os serviços locais de inspecção eléctrica ou um electricista qualificado.
¡Advertencia!	No inhabilitar nunca el conductor de tierra ni hacer funcionar el equipo si no existe un conductor de tierra instalado correctamente. Póngase en contacto con una autoridad apropiada de inspección eléctrica o con un electricista competente si no está seguro de que hay una conexión a tierra adecuada.
Varning!	Koppla aldrig från jordledningen och använd aldrig utrustningen utan en på lämpligt sätt installerad jordledning. Om det föreligger osäkerhet huruvida lämplig jordning finns skall elektrisk besiktningsauktoritet eller elektriker kontaktas.

A.10 AC Power Supply Circuit Warning

WARNING: Care must be given to connecting units to the supply circuit, so that wiring is not overloaded.

Waarschuwing	Let erop dat de toestellen op voedingscircuits worden aangesloten zonder het vermogen van de bedrading te overschrijden.
Varoitus	Laiteyksiköt on yhdistettävä huolellisesti syöttöpiiriin niin, että johdot eivät ole ylikuormitettuja.
Avertissement	Veillez à bien connecter les unités au circuit d'alimentation afin de ne pas surcharger les connections.
Achtung	Beim Anschließen der Geräte an das Stromnetz ist darauf zu achten, daß die Schaltverbindungen nicht überlastet werden.
Avvertenza	Fare attenzione quando si collegano le unità al circuito di alimentazione, per non sovraccaricare i cablaggi.
Advarsel	Vær nøye med å koble enheter til strømforsyningskretsen slik at ledningene ikke overbelastes.
Aviso	Deverá ter precaução ao ligar unidades ao circuito de fornecimento de energia, para não sobrecarregar a instalação.
¡Atención!	Poner mucho cuidado al conectar los equipos al circuito de alimentación a fin de no sobrecargar el cableado.
Varning!	Var noga vid anslutning av enheter till matarströmkretsen så att ledningarna inte överbelastas.

B.Compliance for the e8350 Satellite Router

This appendix provides international agency compliance, safety, and statutory information for the Evolution e8350 Satellite Router. Please also refer to the EC-Declaration of Conformity at the end of this section.

Note: Triple DES Encryption is eligible for export from the U.S. to all customers worldwide, except to U.S. embargoed destinations. Other countries may exercise separate jurisdiction over the import, export, or use of encryption products. Users who use this product should observe any local regulations that may apply to the distribution or use of encryption products.

The Evolution 8000 Series Satellite Router product label is shown in Figure 29.

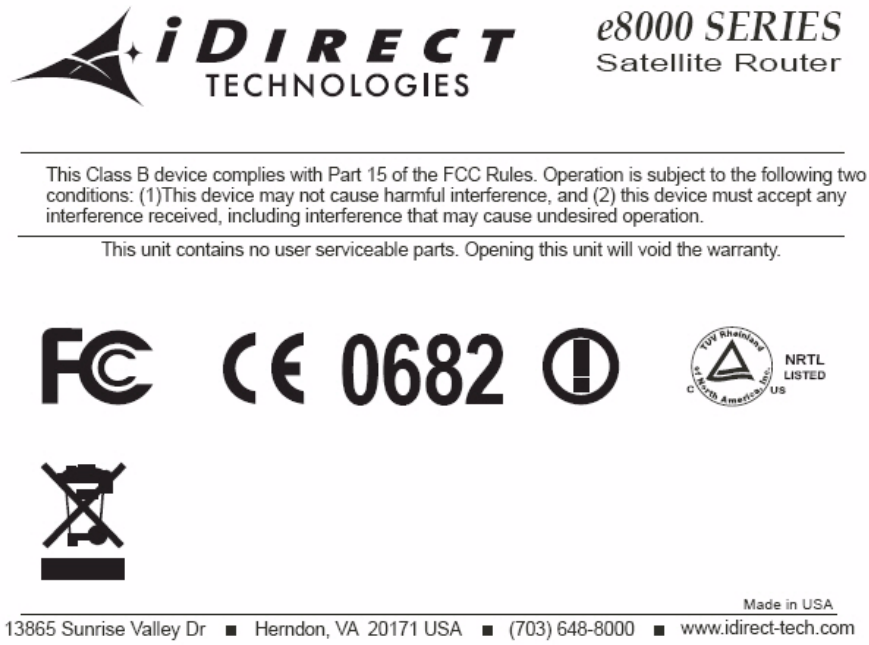


Figure 29. Evolution 8000 Series Satellite Router Product Label

B.1 FCC Compliance

The Evolution 8000 Series Satellite Routers comply with Class B of Part 15 of the FCC (Federal Communications Commission) rules as is identified by use of the FCC logo.

Radiated and Conducted Emission	47CFR15 Class B, CISPR-22 Class B, EN55022 Class B.

B.2 Part 15 Compliance

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. The equipment uses, generates, and radiates frequency energy. If the equipment is not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. There is also no guarantee that interference will not occur in a particular installation. You can determine if the equipment is interfering with radio or television reception by removing or applying power to the equipment and seeing if the interference goes away, or returns, when the unit is off or on.

To meet FCC requirements, only peripherals, such as computer input/output devices, terminals, and printers certified to comply with the Class B limits, may be attached to this device. Operation with non-certified peripherals is likely to result in interference to radio and TV reception.

To meet FCC requirements, shielded cables are required to connect the device to a personal computer, peripheral, or other Class B certified device.

Modification of this equipment without written authorization from iDirect may result in this equipment no longer complying with FCC requirements for Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

B.3 Canadian Labeling Requirements

Evolution 8000 Series Satellite Routers meet Canadian labeling requirements.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada.

B.4 CE Compliance (European Union)

Marking by this symbol indicates the Evolution 8000 Series Satellite Routers are in compliance with the following standards:

EMC Emission	EN55022, EN61000-3-2, EN61000-3-3 Class B
EMC Immunity	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11
Safety	IEC/EN60950-1

B.5 Safety

TUV Rheinland of North America is a Nationally Recognized Testing Laboratory (NRTL) in the United States and is accredited by the Standards Council of Canada to test and certify products to Canadian National Standards. The Evolution 8000 Series Satellite Router is in compliance to both U.S. and Canadian National Standards on Safety.

In addition, the IECEE CB Scheme Test Report and CB Test Certificate for the Evolution 8000 Series Satellite Router is done with TUV Rheinland of North America. This CB Scheme is recognized by the multilateral agreement among participating countries and certification organizations. Since iDirect is utilizing this CB test report issued by TUV, the Evolution 8000 Series Satellite Router is in compliance with all other member countries of the CB Scheme.

Safety	UL60950-1 / CAN/CSA-C22.2 NO. 60950-1 -03, IEC/EN 60950-1

B.6 RoHS and WEEE Compliance

This section briefly describes the European Union RoHS and WEEE Directives. It also presents an overview of iDirect for compliance to these directives.

B.6.1 Compliance with RoHS Directive (2002/95/EC)

The European Union passed the Restriction of Hazardous Substances (RoHS) Directive into law. It affects manufactures, sellers, distributors, and recyclers of electrical and electronic equipment containing lead, cadmium, mercury, hexavalent chrome, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE). As of July 1, 2006, the use of these materials is banned in new products sold in Europe. The RoHS Directive complements the WEEE Directive. iDirect is committed to protecting people and the environment and we are identifying any materials used in our processes that could pose a potential hazard to our employees, customers, or the environment.

All iDirect products shipped to the European Union after July 1, 2006 comply with the 2002/95/EC directive.

B.6.2 Compliance with WEEE Directive (2002/96/EC)

The Waste Electrical and Electronic Equipment directive (WEEE) applies to companies that manufacture, sell, distribute, or treat electrical and electronic equipment in the European Union. WEEE covers all large and small household appliances, IT equipment, radio and audio equipment, electrical tools, and telecommunication equipment.

The directive aims to reduce the waste arising from electrical and electronic equipment and to improve the environmental performance of all those involved in the lifecycle of these products.

According to this directive producers have a certain responsibility regarding their products in the waste phase. iDirect is offering its clients a take-back solution for iDirect waste products all over Europe. Details can be found on the iDirect website located at: http://www.idirect.net/page.ww?section=Company&name=Environmental+Responsibility. You can also contact us via email at weeepickup@idirect.net or call (888) 362-5475, extension 8026.

B.7 Declaration of Conformity

EC - Declaration of Conformity

Manufacturer/Responsible Person:	iDirect Technologies Inc. Logi Balasingam / Hai Tang
Address:	13865 Sunrise Valley Drive Herndon, VA 20171 USA
Declares that the Product:	
Type:	VSAT System
Model:	iDirect e8000 Series Satellite Router Model e8350
Intended Use:	Very Small Aperture Terminal (VSAT) System

Complies with the essential requirements of Article 3 of the R&TTE 1999/5/EC Directive, if used for its intended use and that the following standards has been applied:

1. Health (Article 3.1a of the R&TTE Directive)

Applied Standard(s):	DIN, VDE 0848 Part 1 (2000-08), 1999/519/EC (1999-07) which refers to ICNIRP Guidelines, FCC OET Bullet No. 65, Edition 97-01, August 1997
Issue:	August 2, 2001

2. Safety (Article 3.1a of the R&TTE Directive)

Applied Standard(s):	IEC/EN 60950-1: 2001
Issue:	Aug., 2001, July 2002, Nov 2003, Feb 2005

3. Electro Magnetic Compatibility (Article 3.1b of the R&TTE Directive)

Applied Standard(s):	**Emissions:**	EN55022:1998+A1:2000+A2:2003; Class A FCC Part 15.107(b), 15.109(g), Class A EN61000-3-2:2000, EN61000-3-3:1995 +A1:2001
	Immunity:	EN55024:2001
	Immunity:	EN61000-4-2:1995 +A1:1998+A2:2001, EN61000-4-3:2002, EN61000-4-4:1995, EN61000-4-5:1995 +A1:1996, EN61000-4-6:1996 +A1:2001, EN61000-4-8:1995, EN61000-4-11:2001
	VSAT System: ETSI EN 301-489-1 v1.2.1, ETSI EN 301-489-12 v1.1.1	

4. Efficient use of the Radio Frequency Spectrum (Article 3.2 of the R&TTE Directive)

Applied Standard(s):	ETSI EN 301-428 v1.3.1 – Ku Band VSAT System Level ETSI EN 301-443 v1.3.1 – C Band VSAT System Level
Issue:	Feb 2006
Place Of Issue :	Herndon, VA USA
Date Of Issue :	February 20, 2008

Logi Balasingam,
Principal Engineer
Homologation/ Certification

Hai Tang,
Vice President
Hardware Development

iDirect

13865 Sunrise Valley Drive
Herndon, VA 20171
+1 703.648.8000
+1 866.345.0983

www.idirect.net

Advancing a Connected World