

Installation and Safety Manual

Evolution X1 Satellite Router

Router Products

March 27, 2012



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Document Name: ISM_EvolutionX1InstallationSafetyManual_RevA_032712.pdf

Document Part Number: E0001680-0001

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 site at <http://tac.idirect.net> and click on the **Satellite Routers** link. You can then scroll down to the iDX release that is applicable to you and download the latest version of this document.

Revision	Date Released	Reason for Change(s)	Who Updated?
A	March 27, 2012	Initial release of this document	TTheus



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About This Manual

Thank you for purchasing an iDirect Evolution X1 Satellite Router. This manual provides important safety and compliance information, and explains how to install and maintain the iDirect Evolution X1 Satellite Router.

This chapter contains the following sections:

- [Intended Audience](#)
- [Manual Contents](#)
- [Document Conventions](#)
- [Safety Definitions](#)
- [Getting Help](#)

Intended Audience

This manual is intended for use by the VSAT (Very Small Aperture Terminal) equipment installer, System Engineer, and Network Operator responsible for maintaining the iDirect Network. Only qualified service personnel should install and operate the iDirect Evolution X1 Satellite Router solutions. Familiarity with cabling and wiring practices is beneficial.

In this document, the iDirect Evolution X1 Satellite Routers are often referred to as IDUs (Indoor Units) while radios and LNBs are collectively referred to as ODUs (Outdoor Units).

Manual Contents

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

- [Chapter 1, Introduction](#) provides an overview and description of the iDirect Evolution X1 Satellite Router.
- [Chapter 2, Safety Information](#) describes general cautions.
- [Chapter 3, Specifications](#) covers the mechanical, environmental and connector interface requirements.
- [Chapter 4, Installation](#) details procedures for installing the iDirect Evolution X1 Satellite Router.

The following appendixes are also provided:

- [Appendix A, Warnings](#) describes warnings to be heeded to prevent personal injury or equipment damage.
- [Appendix B, Compliance](#) provides compliance information.

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

The symbols that are used throughout this manual to alert you to possible danger or when to use caution are shown here:

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 or WARNING heading, strictly follow the warning instructions to avoid electric shock injury.

Getting Help

The iDirect Technical Assistance Center (TAC) is available to help you 24x7x365. iDX Software user's guides, installation procedures, an FAQ page, and other documentation that supports our products are available on the TAC Web site. Please access our TAC Web site 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.

iDirect strives to produce documentation that is technically accurate, easy to use, and helpful to our customers. Your feedback is welcomed! Send comments to techpubs@idirect.net.

1 Introduction

iDirect is introducing a cost-effective satellite router bundle optimized for large, narrowband networks with small inbound channels and single client sites. The bundle features the new Evolution X1 Satellite Router, a low power, compact remote that comes with a highly efficient BUC and LNB. The Evolution X1 Satellite Router leverages the bandwidth efficiencies of the DVB-S2/ACM standard and incorporates basic routing and VLAN functionality. Developed specifically to support large-scale broadband access networks, the low-cost Evolution X1 Satellite Router is ideal for demanding broadband applications such as SCADA, point-of-sale and ATM.

This manual explains how to safely install and maintain the Evolution X1 Satellite Router, and it includes important safety information.

The iDirect Evolution X1 Satellite Router is shown in [Figure 1](#).



Figure 1. Front View of the iDirect Evolution X1 Satellite Router

The front panel LEDs and rear panel connectors are described in [Chapter 4, Installation](#).



2 Safety Information

Follow the safety guidelines in this chapter carefully during installation of your iDirect Evolution X1 Satellite Router. These guidelines help to protect the Evolution X1 router from potential damage and help to ensure your own personal safety. These safety measures have been translated into multiple languages (see [Appendix A, "Warnings"](#)). 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 X1 router. Adhere to all warnings listed on the product's warning labels and in the operating instructions. Follow all operating and usage instructions carefully.

Note: See [Safety Definitions](#) for a description of the Warning icons that are used in this manual.

This chapter contains the following sections:

- [Installation Guidelines](#)
- [Electrical Safety](#)
- [Physical and Environmental Considerations](#)
- [Safety Guidelines to Observe During Servicing](#)

2.1 Installation Guidelines

When installing the Evolution X1 router, observe all caution and warning statements. Follow the general warnings and cautions in [Table 1](#) 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 IDU 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.
- All cables (IFL or other types) that run from the outdoor equipment to the indoor equipment must be connected to a surge protector at the point of entry to the building.
- Equipment connected to the protective grounding of the building installation through the mains connection or through other equipment with a connection to protective grounding, and to a cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system must be made through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).

Review the safety instructions in this chapter, and the safety warnings and compliances beginning in [Appendix A, "Warnings"](#), of this manual before installing, configuring, or performing maintenance on the system.

- Always remove or disconnect ALL power connections before installing or removing a chassis.
- Keep the staging area clear and free of dust during and after installation.
- Keep tools, IDU components, and shipping boxes away from walkway area.
- The IDU operates safely when it is used in accordance with its marked electrical ratings and product usage instructions.
- In Norway, due to regulation for installations of cable distribution systems, and in Sweden, a galvanic isolator shall provide electrical insulation below 5 MHz. The insulation shall withstand a dielectric strength of 1.5 KV rms, 50 Hz or 60 Hz, for 1 minute.
 - Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr - og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet.
 - Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.

Table 1. General Safety Warnings and Cautions

Symbol	Warning type	Definition
	WARNING/CAUTION	Only Trained and qualified personnel should be allowed to install or replace this equipment.
	WARNING/CAUTION	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.
	DANGER	Before working on the ODU equipment, unplug the power cord from the AC power source.
	WARNING/CAUTION	Do not remove IDU chassis enclosure. Do not touch internal circuitry when the power cord is connected.
	WARNING/CAUTION	The BUC power requirement must match the proper IDU voltage (+24 VDC). The BUC may sustain damage if used with the incorrect power supply.

2.2 Electrical Safety

Follow the warnings and cautions in [Table 2](#) to ensure your safety and protect the equipment from electrical hazards.

Table 2. Electrical Safety Warnings and Cautions

Symbol	Warning type	Definition
	WARNING/CAUTION	The BUC power requirement must match the proper IDU 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 the basic guidelines when you are working with any electrical equipment:

- Disconnect all power and external cables before installing or removing the chassis.
- 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 appears damaged.
- Carefully examine your work area for possible hazards, such as 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 physical and environmental considerations below when installing an Evolution X1 router:

- **Ventilation**

Slots and openings on the chassis provide ventilation and ensure reliable operation of the product. To protect the chassis 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 Evolution X1 router chassis, vacuuming is recommended to remove these particulate to ensure proper airflow.

- **AC Polarization**

This product is equipped with a cord plug that will fit 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 impair performance, do not use this plug with an extension cord or outlet unless you can fully insert the blades without blade exposure.

- **Power Sources**

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

- **Power Cord Protection**

Route power supply cords so they are not likely to 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**

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 unit should bear the UL, NRTL, 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 IDU 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 iDirect Evolution X1 Satellite Router, do not place the chassis on any unstable rack, cart, stand, table, or bracket. Any mounting of the product should follow the manufacturer's instructions.

- **Attachments**

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

- **Restricted Access**

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.

- **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.

- **Operational and Maintenance Safety**

As you use your iDirect Evolution X1 Satellite Router, observe the following safety guidelines:

- Cables — Never use any other RF cable than what is supplied or recommended by iDirect.
- Cleaning — Do not use liquid cleaners or aerosol cleaners. Use a cloth for wiping up dust.

2.4 Safety Guidelines to Observe During Servicing

When your iDirect Evolution X1 Satellite Router requires service, observe the safety guidelines in this section.

2.4.1 Servicing

Do not attempt to service the Evolution X1 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 units will void the warranty. Refer all servicing to qualified service personnel.

2.4.2 Conditions Requiring Service

Unplug the Evolution X1 router from the AC Power outlet and refer servicing to qualified service personnel under the following conditions:

- When the power supply cord or plug is damaged.
- If liquid has been spilled on, or objects have fallen into, the Evolution X1 router, or it has been exposed to water.
- If the Evolution X1 router does not operate normally when following the operating instructions. Adjust only those controls that are covered by the operating instructions. Other adjustments may result in damage and will often require extensive work by a qualified technician to restore the Evolution X1 router to its normal operation.
- If the Evolution X1 router has been dropped or if the chassis has been damaged.
- When the Evolution X1 router exhibits a distinct change in performance.

3 Specifications

The specifications in this chapter describe the mechanical, environmental and connector interfaces for the iDirect Evolution X1 Satellite Router.

This chapter contains the following sections:

- *Mechanical and Environmental Specifications*
- *Power Specifications*
- *RF Specifications*

3.1 Mechanical and Environmental Specifications

Ensure that the installation site can accommodate the mechanical and environmental specifications of the IDU. The iDirect Evolution X1 Satellite Router mechanical and environmental specifications are presented in [Table 3](#).

Table 3. Mechanical and Environmental Specifications

Category	Description
Dimensions	W 9 in (22.86 cm) x D 6.8 in (17.3 cm) x H 1.8 in (4.6 cm)
Weight	1.8 lbs (0.82 Kg)
Heat Dissipation	10 W (34.2 BTU/Hour)
Airflow	Natural Convection Cooling
Ambient Temperature	
Operational:	-40° F to 140° F (-40° C to 60° C) at Sea Level 32° F to 113 ° F (0° C to 45° C) at 10,000 Feet
Storage:	-22° F to 176° F (-30° C to 80° C)
Temperature Gradient	1.0° C per 1min
Relative Humidity	
Operational:	10 to 90% non-condensing
Altitude	
Operating:	≤ 10,000 feet (3048m)
Storage:	≤ 35,000 feet (9144m)

3.2 Power Specifications

This section provides the AC power specifications and the typical BUC/LNB for the iDirect Evolution X1 Satellite Router.

The iDirect Evolution X1 Satellite Router AC power specifications are defined in [Table 4](#).

Table 4. Power Specifications

Category	Description
Input Voltage Range	100 – 240 V (VAC) Single Phase to 24 VDC
Frequency	47 - 63 Hz
AC Power Consumption	≤ 1.4 Amps maximum

Table 4. Power Specifications (continued)

Category	Description
DC Power F-Connector	BUC Power (IFL) +24 VDC, 20W max (up to 50° C), up to 3W BUCs 65W external PSU are supported LNB Power (IFL) +24 VDC 170mA (DiSEqC) 22 kHz DiSEqC tone NOTE: Only use the iDirect approved and provided power supply (Part number P0002253-0001).
Protection	- Internal, primary current fuse, inside power supply - Over current protection - Short circuit protection
Power Factor Correction	Complies with EN61000-3-2 and EN61000-3-3
Efficiency	87% minimum
Input Transient Response	0 msec for 0% to 100% load change typical
AC Input Connector	IEC-320-C6
AC Power Cord	18 AWG, country dependent

3.3 RF Specifications

The iDirect Evolution X1 Satellite Router RF specifications are presented in **Table 5**.

Table 5. RF Specifications

Category	Description
Frequency Range	Transmit: 950-1700 MHz Receive: 950-2150 MHz
Frequency Tuning Step Size	Transmit: 0.6 Hz Receive: Sub-Hertz with Demodulator
RF Power Range	Transmit: -30 dBm to 0 dBm Receive: Single Carrier Input Power: Minimum: $-130 + 10\log_{10}(\text{Symbol Rate})$ dBm to -5 dBm Pmax = 0 dBm minimum, 30 dB attenuation adjustable in 1 dB steps Composite Wideband Input Power: -5 dBm (maximum)
RF Power Adjustability	Transmit: 1.0 dB Nominal Step Size Receive: Under AGC for all valid Rx input power range

Table 5. RF Specifications (continued)

Category	Description										
Typical Transmit and Receive											
Phase Noise (dBc/Hz) at:	<table> <tr> <th>Frequency</th><th>Phase Noise</th></tr> <tr> <td>1 KHz</td><td>-75</td></tr> <tr> <td>10 KHz</td><td>-85</td></tr> <tr> <td>100 KHz</td><td>-95</td></tr> <tr> <td>1 MHz</td><td>-105</td></tr> </table>	Frequency	Phase Noise	1 KHz	-75	10 KHz	-85	100 KHz	-95	1 MHz	-105
Frequency	Phase Noise										
1 KHz	-75										
10 KHz	-85										
100 KHz	-95										
1 MHz	-105										
Typical Phase Jitter at 14 KHz to 1 MHz:	$\leq 1.8^\circ$ rms										
Transmit Carrier Suppression	- 40 dBc (max)										
Discrete Spurs, harmonics and non-harmonics	≥ 50 dBc, with output ≥ -15 dBm Inband 32 dBc										
Modulator Spectral Shaping	DVB-S2 (ETSI EN302307)										
Transmitter On/Off	≥ 50 dBc, with output power ≥ -15 dBm										

4 Installation

This chapter describes the guidelines and procedures for installing the iDirect Evolution X1 Satellite Router (IDU) at your VSAT location.

This chapter contains the following sections:

- *Tools and Supplies*
- *Unpacking iDirect Evolution X1 Satellite Router Equipment*
- *Components Typically Included in an Order*
- *Mounting the iDirect Evolution X1 Satellite Router*
- *Guidelines for Rack Mounting*
- *iDirect Evolution X1 Satellite Router Rear Panel*
- *Preparing the Coax Cables*
- *Connecting AC Power to the IDU*
- *Front Panel LED Status Indicators*
- *Maintaining the Evolution X1 Satellite Router*
- *Repacking iDirect Evolution X1 Satellite Routers*

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

Table 6 specifies recommended tools and supplies for a typical IDU installation (see **Table 6** and **Figure 2**).

Table 6. 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 LAN Cable



Figure 2. Installation Tools

4.2 Unpacking iDirect Evolution X1 Satellite Router Equipment

The Evolution X1 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 and either iDirect or the reseller.
- Remove the tape and any exterior covering from the box lid.

Note: *Save the iDirect Evolution X1 Satellite Router shipping boxes after you have unpacked the system. You will need these boxes if you want 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 Evolution X1 Satellite Router components and accessory items listed in your order, including the optional equipment you ordered.

4.3 Components Typically Included in an Order

Prior to installation, ensure that you have received all of the necessary components for a complete VSAT installation. If any items are missing or damaged, please contact your Network Operator/Distributor for replacement.

A typical installation includes:

- An iDirect Evolution X1 Satellite Router
- +24 VDC power supply
- One high speed Ethernet LAN cable
- An antenna ranging in size from 0.75m, 0.96m, 1.2m, 1.8m, or 2.4m for Ku-Band; and 1.8m, 2.4m, and 3.8m for C-Band
- An IFL cable
- An appropriate feed assembly for the antenna (OMT)
- A Block Up Converter (BUC); 1.5W or 3W for Ku-Band and C-Band
- Low Noise Block converter (LNB)

4.3.1 Additional Components Normally Required

- An iDirect Specified L-Band cable — Consists of a RG-6 or RG-11 dual-coax cable and connectors (to connect the IDU and ODU), plus type F connectors and sealant tape. (See [Chapter 4, Installation](#).)
- Non-Pen (Non-Penetrating) Roof Mount
- Ballast (anchor weight)

A picture of a typical antenna with BUC and LNB is shown in [Figure 3](#).



Figure 3. Typical Antenna with BUC and LNB

Note: For instructions on installing your antenna, refer to its manufacturer's Installation Guide.

4.4 Mounting the iDirect Evolution X1 Satellite Router

The iDirect Evolution X1 Satellite Router can be placed on a tabletop or modem shelf that is mounted on a 19-inch rack with a two rack unit opening. This section provides details on how to accomplish the installation.

Note: The Evolution X1 Satellite Router is designed for indoor use only.

4.4.1 General Guidelines for Mounting Configurations

When installing the Evolution X1 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 Evolution X1 Satellite Router in a location where access is unobstructed. Plan for access to both the front and rear panels.
- Ensure that the room where the Evolution X1 Satellite Router operates has adequate ventilation.
- Ambient air temperature may not cool the Evolution X1 Satellite Router to acceptable operating temperatures without adequate ventilation. The ambient temperatures and other environmental specifications are listed in [Chapter 3, Specifications](#).
- Select a suitable installation location away from any area that tends to collect dust.

- Do not install the Evolution X1 Satellite Router on the floor.

4.4.2 Guidelines for Desktop or Shelf Mounting

If the Evolution X1 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.

4.5 Guidelines for Rack Mounting

The Evolution X1 Satellite Router requires a minimum of two rack units (3.5 inches) of vertical rack space. You should measure the proposed rack location before mounting the chassis. 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 IDU chassis 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 chassis in the rack where access to the connectors is unobstructed. Do not block the vents.

4.6 iDirect Evolution X1 Satellite Router Rear Panel

This section describes and illustrates the rear panel connectors and LED indicators. They are shown in [Figure 4](#). See [Table 7](#) for a description of each connector and indicator.

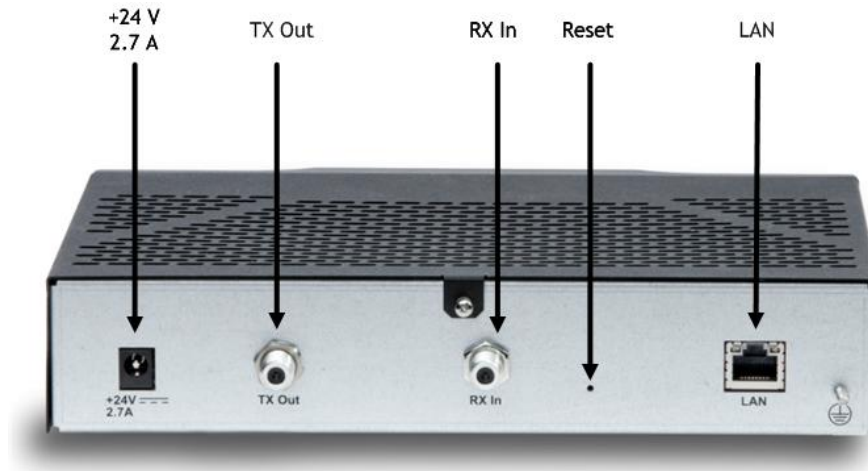


Figure 4. iDirect Evolution X1 Satellite Router Rear Interface Connectors

Table 7. iDirect Evolution X1 Satellite Router Connectors

Label	Connector Type	Interface and Purpose
+24V 2.7A	CUI 2.5mm	External +24VDC power supply
TX Out	75 ohm, F-Type	L-Band Transmit signal to Block UpConverter (BUC) capable of 10 MHz Reference and +24 VDC @ 1.5 Amps maximum over operating temperature
RX In	75 ohm, F-Type	Monitor of the actual receive signal from LNB Output
Reset	Recessed push button	Factory default reset
LAN A	RJ-45	Category-5 STP or UTP cable, 10/100 Base-T Ethernet LAN port connects the Evolution X1 Satellite Router to the customer LAN Hub/switch
Ground	4-40 mounting stud	chassis ground

The RJ-45 and LAN pin assignments are listed in [Table 8](#).

Table 8. RJ-45 Pin Assignments

PIN	DESCRIPTION
1	Tx +
2	Tx -
3	Rx +
6	Rx -

A diagram of the pin numbering scheme is shown in [Figure 5](#).

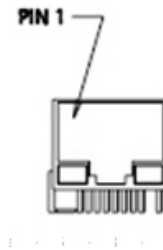


Figure 5. Port Pin Numbering

The LAN port is normally assigned to the WAN (towards the VPN). Its IP address is the next hop for the VPN.

4.7 Preparing the Coax Cables

Use high quality coaxial cable to connect the iDirect Evolution X1 Satellite Router to the ODU equipment. iDirect recommends that you use a solid copper center conductor, quad shield, coaxial cable with a minimum of 60% + 40% braid and double foil shield to connect the IDU to the ODU 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 IDU chassis and the ODU 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 quad 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 and higher packet loss rate.
- Damage to the Evolution X1 Satellite Router connectors — The chassis connectors are designed for RG-6 or RG-11 cable and connectors. Larger cables can damage the connectors.
- Good return loss — High quality cable and correct connectors help ensure an optimal return loss of 10 dB or more.

Excessive DC Resistance — Will result in excessive voltage drop across the IFL cable. Hence, the voltage at the BUC may be too low to operate properly.

Figure 6 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 6. Recommended Tools for Terminating Coaxial Cable

Before you can connect the cables, you must install 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 7](#).



Figure 7. 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 IDU, BUC, and/or LNB input connector.

- 2 Remove the jacket material and foam insulation according to the length defined under **Length A** in [Table 9](#). For RG-6, use a two-step Coax Stripper such as the LC-CST 1257 from Paladin Tools.

Table 9. 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 8 on page 22](#).



Figure 8. 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 under **Length C** in [Table 9 on page 21](#) and shown in [Figure 9](#).

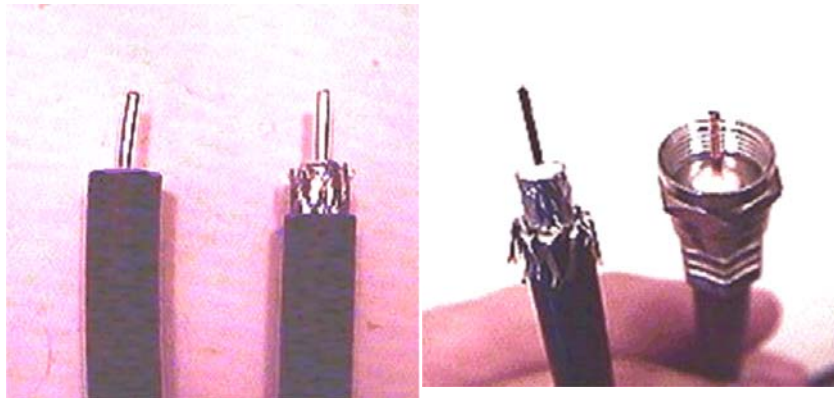


Figure 9. Folding the Braid

- 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 dielectric to the length shown under **Length B** in [Table 9 on page 21](#). Remove any dielectric residue.
- 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 mandrel over 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 10](#) for an RG-11 termination.*

- 9 Since 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. Refer to [Figure 10 on page 23](#).

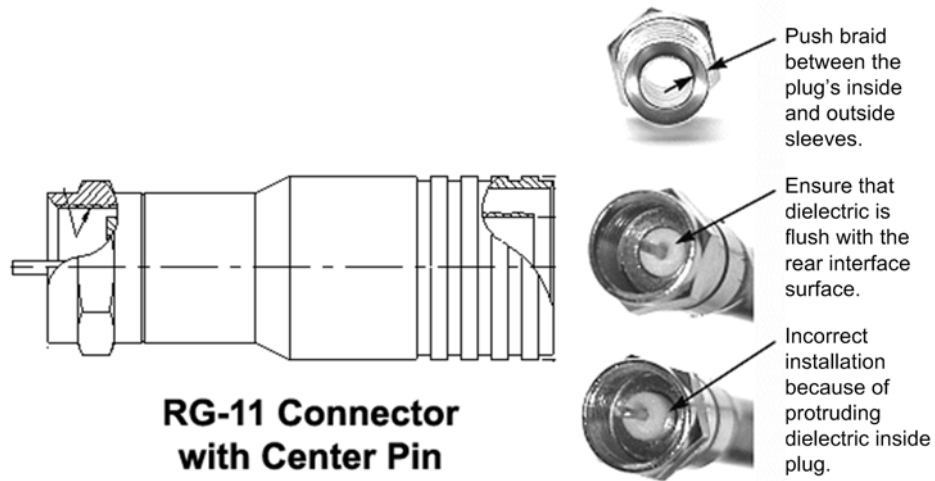


Figure 10. Attaching the RG-11 Connector

- 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 11](#).

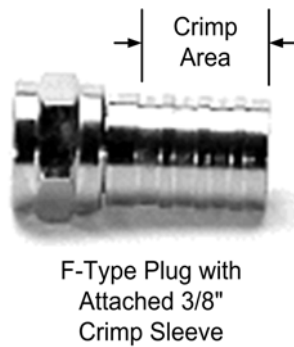


Figure 11. Crimp Area for F-Type Plugs

- 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 as shown in [Figure 12](#). Trim if necessary.

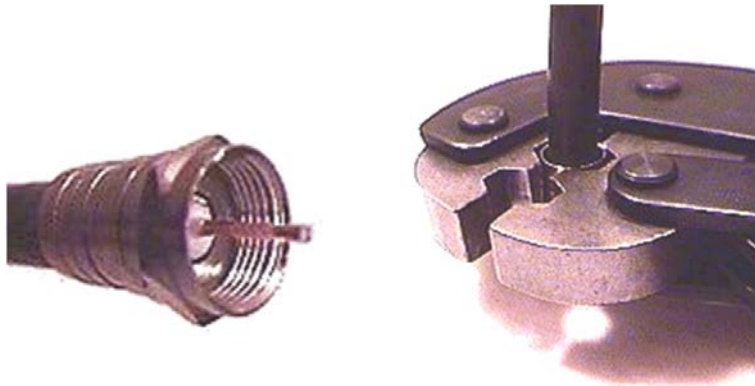


Figure 12. Proper Center Connector Length and Crimping Technique



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 12](#)). It must be straight and cylindrical without any burrs at the end. Failure to follow this technique could result in damage to the IDU, BUC, LNB connector and/or possible intermittent service.

4.7.1 LAN A 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 attach the 10/100 Base-T Ethernet LAN A port on the iDirect Evolution X1 Satellite Router chassis to the customer provided LAN Hub or switch.

Note: *iDirect supplies one 7-foot Category 5 UTP cable to connect the Evolution X1 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.

Table 10 lists the pinouts for the Ethernet ports of the IDU chassis and shown in [Figure 13](#) on page 25.

Table 10. Ethernet Port Pinouts

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

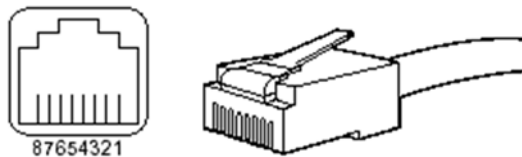


Figure 13. RJ-45 Cable Connectors, Plug and Receptacle

4.8 Connecting AC Power to the IDU

The IDU can be powered directly from the facility AC power source from 100 VAC to 240 VAC. iDirect recommends that the chassis be powered from a low noise, low transient AC power source.

Symbol	Warning type	Definition
	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 chassis, you should disconnect power using the AC power cord.

4.8.1 Preparing Your PC/Laptop for Connection to the IDU

See [Section 4.6, iDirect Evolution X1 Satellite Router Rear Panel](#) for more information about the interface connectors.

Ensure that your PC/laptop:

- has an IP address that is on the same subnet of the Evolution X1 Satellite Router.
- includes a Network Interface Card (NIC) connected with a CAT 5 cable to the 10/100 LAN port of the IDU
- has a Web browser installed

4.8.2 Checking Conditions before Powering Up the System

Before you power up the system, verify that no RF coax cables are connected to the TX and RX ports on the rear of the chassis.

Also verify that an Ethernet cable connects the LAN port of the PC/laptop to the LAN port of the Evolution X1 Satellite Router.



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

4.8.3 Powering Up the System

After checking the setup as outlined above, power up the IDU as follows:

- Connect the AC cord to the iDirect Evolution X1 Satellite Router.
- Plug the AC power cord into the AC outlet.

Upon boot up, the **POWER** LED illuminates green, and within several seconds the **STATUS** LED flashes green as the unit 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, 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 IDU chassis is initialized, a typical functional IDU chassis with the proper factory default option file is loaded.

Note: *The STATUS LED is normally green. A red STATUS LED indicates a malfunction of the IDU.*



Do not connect or disconnect the Tx or Rx IFL cable while the IDU is powered on; this action may result in damage to the BUC, LNB, and/or Evolution X1 Satellite Router.

4.9 Front Panel LED Status Indicators

Once the IDU is powered up with the appropriate Options file, check the LEDs to ensure the IDU is functioning properly. The front panel indicators are shown in [Figure 14](#).



Figure 14. Front Panel Indicators

4.9.1 Front Panel Power and Network LED Status Indicators

For diagnostic purposes, the Evolution X1 Satellite Router chassis has five LED indicators located on the front panel.

- The RX LED indicates the transmitter status.
- The TX LED indicates the receiver status.
- The NET LED indicates the network acquisition status.
- The POWER LED indicates whether the unit is powered on or off.

The colors of the LEDs indicate the state of the Evolution X1 Satellite Router as defined in [Table 11 on page 28](#).

Table 11. Front Panel LED Indicators

LED Label	LED Color	Indicated X1 Status
RX	Off	Receiver is disabled or not configured.
	Solid Yellow	Downstream carrier is configured, but the demodulator is not locked.
	Slow Flashing Yellow	Downstream carrier is configured and the demodulator is locked. NCR is not locked.
	Solid Green	Downstream carrier is configured, demodulator and NCR are locked.
	Solid Red	Together with TX and NET LEDs simultaneously red, indicates serious fault or failure.
TX	Solid Yellow	Transmitter is disabled.
	Solid Green	Transmitter is enabled.
	Solid Red	Together with RX and NET LEDs simultaneously red, indicates serious fault or failure.
NET	Flashing Yellow	Demodulator is not locked on the Downstream carrier.
	Solid Yellow	Demodulator is locked on the Downstream carrier.
	2 Second Flashing Green	Demodulator is locked on the Downstream carrier. Network acquisition is in progress.
	1 Second Flashing Green	Demodulator and NCR are locked on the Downstream carrier. Network acquisition is in progress.
	Solid Green	Network is acquired. Link Layer is up.
	Solid Red	Together with RX and NET LEDs simultaneously red, indicates serious fault or failure.
POWER	Off	No or low DC power input to the X1.
	Solid Green	Acceptable DC power level to the X1 is detected.
	Solid Yellow	BUC/LNB power fail.

4.10 Configuring the Evolution X1 Satellite Router

Now that you have installed the Evolution X1 Satellite Router, you are ready to install the firmware and configure the satellite routes. For instructions on how to do this, refer to the Satellite Router Commissioning Guide for your release. To download the guide, go to <http://tac.idirect.net> and click Satellite Routers.

4.11 Maintaining the Evolution X1 Satellite Router

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

Note: *There are no user-serviceable parts within the iDirect Evolution X1 Satellite Router. Do not attempt to repair/replace a malfunctioning or defective component/module. Doing so may void the warranty.*

4.11.1 Temperature Control

The IDU has a built-in temperature sensor. The temperature sensor measures the actual circuit board temperature. If the board temperature exceeds a defined threshold, the IDU alerts the NMS about the high temperature condition. See [Chapter 3, Specifications](#), for the proper temperature range.

Various conditions can cause the IDU chassis 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

4.11.2 Dust Removal

A dusty environment requires frequent maintenance. With the unit powered down, 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.

4.12 Repacking iDirect Evolution X1 Satellite Routers

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

To repack your system:

- 1 Remove all cabling connected to the IDU and ODU.
- 2 Place the IDU or ODU 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.

A Warnings

This appendix repeats the 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 være 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 virtälähteeseen.
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.
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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.
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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 overopphet 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 orifícios 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 chassi 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.
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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 lynet.
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 telefoonnetwerk-voltage-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 (telephone 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 monterte 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 inspeção 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

This appendix provides international agency compliance, safety, and statutory information for the iDirect Evolution X1 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.*

X1 SERIES
Satellite Router

This Class B device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This unit contains no user serviceable parts. Opening this unit will void the warranty.



13865 Sunrise Valley Dr ■ Herndon, VA 20171 USA ■ (703) 648-8000 ■ www.idirect-tech.com

Figure 15. iDirect Evolution X1 Satellite Router Product Label

B.1 FCC Compliance



The iDirect Evolution X1 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

iDirect Evolution X1 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 iDirect Evolution X1 Satellite Routers are in compliance with the following standards:

EMC Emission	EN 55022 Class B, FCC Part 15 Class B, CISPR 22 Class B, EN 61000-3-2, EN 61000-3-3
EMC Immunity	EN 55024, EN 301-489-1, EN 301-489-12, 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 60950, IEC/EN60950-1, UL 60950-1, CSA C22.2 No.60950-1-03
Radio (System Level)	EN 301-428-V1.3.1 - Ku-Band EN 301-443-V1.3.1 - C-Band

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 iDirect Evolution X1 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 iDirect Evolution X1 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 iDirect Evolution X1 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 iDirecWeb site located at:

<http://www.idirect.net/page.wv?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

Manufacture: iDirect Technologies Inc.
Responsible Person: Logi Balasingam
Address: 13865 Sunrise Valley Drive, Herndon, VA 20171, USA
Declares that the product:

Type: VSAT System
Model: eVolution X1 Series Satellite Router
Intended Use: Very Small Aperture Terminal (VSAT) System

Complies with the essential requirements of Article 3 of the R&TTE 1995/05/EC Directive, if used for its intended use and that the following standards have 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 Aug 2, 2001

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

Applied Standard(s): IEC/EN 60950-1: 2nd Edition 2005, UL 60950-1: 2007, CAN/CSA C22.2 No. 60950-1-07 Aug., 2001, July 2002, Nov 2003, Feb 2005, 2007

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

Applied standard(s): Emissions: EN55022: 2010, Class B
FCC Part 15.107(b), 15.109(g), 2011 Class B
EN61000-3-2: A1:2006, A2:2009
EN61000-3-3: 2008

Immunity: EN55024: 2010
EN61000-4-2: 2009, EN61000-4-3: 2011
EN61000-4-4: 2010, EN61000-4-5: 2006
EN610004-6: 2009
EN61000-4-8:1995, EN61000-4-11:1994+A1:2001

VSAT SYSTEM: ETSI EN 301-489-1 v1.9.2, ETSI EN 301-489-12 v2.2.2

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; issue Feb 2006
ETSI EN 301-443 v1.3.1 – C Band VSAT System Level; issue Feb 2006

Place of Issue: Herndon, VA
Date of Issue: March 14, 2012

A handwritten signature in black ink, appearing to read "Logi Balasingam", is written over a horizontal line.

Logi Balasingam, Senior Principal Engineer – Homologation & Certification

BROADBAND ACCESS ANYWHERE

13865 SUNRISE VALLEY DRIVE • HERNDON, VA 20171 USA • (703) 648-8000 • FAX (703) 648-8014 • WWW.IDIRECT-TECH.COM

Declaration of Conformity

iDirect

13865 Sunrise Valley Drive
Herndon, VA 20171

+1 703.648.8000

+1 866.345.0983

www.idirect.net

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