Installation, Support, and Maintenance Guide

Evolution X7 Satellite Router

Router Products

October 25, 2013

iDIRECT

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Revision History

The following table shows all revisions for this document. To determine if this is the latest revision, check the TAC Web site at http://tac.idirect.net.

Revision	Date	Updates
A	September 30, 2013	Initial release (JS)
B	October 25, 2013	Corrected RF transmit power specification (SKS)

Contents

Figures

Tables

About

This manual provides important safety information and explains how to install and maintain the iDirect Evolution X7 Satellite Router.

This chapter contains the following sections:

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 the X7 Router. Familiarity with cabling and wiring practices is beneficial.

Manual Contents

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

- Chapter 1, *Introduction* on page 1, provides an overview and description of the X7 Router
- Chapter 2, *Specifications* on page 3 describes the mechanical, environmental and RF specifications of the X7 Router
- Chapter 3, *Interfaces* on page 7 provides connector descriptions of the X7 Router
- Chapter 4, *X7 Router Installation* on page 13 describes procedures for installing the X7 Router
- Chapter 5, *Maintenance* on page 19 describes maintenance procedures for the X7 Router

NOTE: A basic list of acronyms and abbreviations can be found in Appendix A, *Acronyms and Abbreviations*.

Document Conventions

This section illustrates and describes the conventions used throughout this document.

Convention	Description	Example
`Command`	Used when the user is required to enter a command at a command line prompt or in a console.	Enter the command: `cd /etc/snmp/`

Terminal Output	Used when showing resulting output from a command that was entered at a command line or on a console.	`crc report all`
		`8350.3235 : DATA CRC [ 1]`
		`8350.3502 : DATA CRC [5818]`
		`8350.4382 : DATA CRC [ 20]`

Screen Reference	Used when referring to text that appears on the screen on a Graphical User Interface (GUI). Used when specifying names of commands, menus, folders, tabs, dialogs, list boxes, and options.	1. To add a remote to an inroute group, right-click the Inroute Group and select **Add Remote**. The Remote dialog box has a number of user-selectable tabs across the top. The **Information** tab is visible when the dialog box opens.
Hyperlink	Used to show all hyperlinked text within a document or external links such as web page URLs.	For instructions on adding a line card to the network tree, see *Adding a Line Card* on page 108.

WARNING: A ***Warning*** highlights an essential operating or maintenance procedure, practice, condition, or statement which, if not strictly observed, could result in injury, death, or long term health hazards.

CAUTION: A ***Caution*** highlights an essential operating or maintenance procedure, practice, condition, or statement which, if not strictly observed, could result in damage to, or destruction of, equipment or a condition that adversely affects system operation.

NOTE: A ***Note*** is a statement or other notification that adds, emphasizes, or clarifies essential information of special importance or interest.

Related Documents

The following documents are available at http://tac.idirect.net. Consult these documents for information about installing and using iDirect's satellite network software and equipment.

- *iDX iBuilder User Guide*
- *iDX iMonitor User Guide*
- *Web iSite User Guide*
- *iDX Satellite Router Installation and Commissioning Guide*

- *iDX Release Notes*
- *iDX Technical Reference Guide*
- *Quick Start Guide (QSG), included in package with router*

Related Training Services

iDirect offers scheduled classroom training at various global training centers, as well as eLearning, in the installation, operation, maintenance and management of iDirect satellite networks. For training course descriptions and available training dates visit the iDirect web site ***Training and Services*** at: http://www.idirect.net/Training-and-Services.aspx or call +1 (800) 648-8240 for class registration and information.

Getting Help

iDX Software users guides, installation procedures and guides, an FAQ page, and other documentation that supports iDirect products, are available on the TAC Web site located at: http://tac.idirect.net.

To find answers to questions or information, contact the iDirect Technical Assistance Center (TAC) at (703) 648-8151.

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

Warranty, RoHS, WEEE, Declaration of Conformity

Complete iDirect hardware product statements for the X7 Router are available at these Web sites:

- http://www.idirect.net/warranty, for the hardware warranty
- http://www.idirect.net/rohs, for the RoHS statement of compliance
- http://www.idirect.net/weee, for the WEEE statement of compliance
- http://www.idirect.net/doc, for the Declaration of Conformity

1 Introduction

The iDirect Evolution X7 Satellite Router (X7 Router) is a next-generation router supporting DVB-S2/ACM on the outbound and A-TDMA. It uses a compact, rack-mount design, embedded 8-port switch, and variant power supply configurations making it an ideal enterprise class solution. In addition to Web iSite support, the availability of a Downstream Configuration template and multi-image support on the X7 Router enables simple deployments and seamless upgrades.

This chapter contains the following sections:

This manual explains how to safely install and maintain the X7 Router, and it includes important safety information in Appendix B, *Safety*.

The Evolution X7 Satellite Router is shown in Figure 1-1.

Figure 1-1. X7 Router

1.1 Features

Highlights:

- Increased throughput capabilities
- 1 RU high router chassis fitting in standard telecom racks
- Variant power supply module configurations
- Dual image support and Web iSite for ease of deployment and upgrades
- Communications-on-the-Move (COTM) support
- AES Encryption

1.2 Power Supply Options

The X7 Router is available with these power supply configurations:

- Option 1: 100-240V AC +24V Power Supply (Standard)

  Option 1 power supply for the X7 Router is standard with a single +24V power support for the X7's BUC.

- Option 2: 100-240V AC +24 V, +48 V Power Supply

  Option 2 AC power module for the X7 Router comes with dual selectable +24V/+48V power support for either a +24V or +48V BUC.

- Option 3: 36-76V DC +24 V, +48 V Power Supply

  Option 3 DC power module for the X7 Router comes with dual selectable +24V/+48V power support for either a +24V or +48V BUC.

2 Specifications

This chapter describes the mechanical, environmental, power, and RF specifications for the X7 Router.

This chapter contains the following sections:

2.1 Mechanical and Environmental Specifications

The installation site must be able to accommodate the X7 Router mechanical and environmental specifications. The mechanical and environmental specifications are listed in Table 2-1.

Table 2-1. Mechanical and Environmental Specifications

Category	Description
Dimensions	17.5 in (44.5 cm) W x 12" in (30.5 cm) D x 1.75 in (4.45 cm) H 19-inch (48.26 cm) rack mountable, 1 RU (1.75 inches (44.45 mm))
Weight	10 lbs (4.55 kg)
Heat Dissipation	≤ 375 Watts
Airflow	Front Panel Fan Assist (2 fans), Power Supply (1 fan), Rear Exhaust, No Filter
Ambient Temperature	
Operational	32˚ to +122˚F (0˚ to +50˚C) @ Sea Level 32˚ to +113˚F (0˚ to +45˚C) @ 10,000 Feet
Storage	-40˚ to +176˚F (-40˚ to 80˚C)
Temperature Gradient	.5˚C per minute (but ≤ 20˚C per hour)
Relative Humidity	
Operational	90%, non-condensing
Storage	5 to 93%

Table 2-1. Mechanical and Environmental Specifications (continued)

Category		Description
Altitude		
	Operational	≤ 10,000 ft
	Survival	≤ 35,000 ft
Shock		
	Operational	≤ 20G
	Survival	≤ 40G (ISTA-1A)
Vibration		
	Operational	0.21 Grms @ 500 Hz
	Survival	2.09 Grms @ 500 Hz

2.2 Power Specifications

The X7 Router power specifications are listed in Table 2-2.

CAUTION: If negative voltages are used such as Telecom -48VDC, the negative most voltage is always connected to –ve terminal (in the Telecom case this would be -48V) and the positive most voltage is always connected to the +ve terminal (in the Telecom case this would be 0VR). Chassis can be referenced to +ve, -ve or left floating (i.e. not connected to either +ve or –ve) as required as the power module is fully isolated input to the chassis.

Table 2-2. Power Specifications

Category	Description
Input Voltage Range	Option 1: 100-240 VAC, Auto-Ranging Option 2: 100-240 VAC, Auto-Ranging Option 3: 36-76 VDC
Frequency	Options 1 & 2: 50-60 Hz, Auto-Ranging
AC Power Consumption	Option 1: 2.7 A , 270 W Option 2: 3.4 A , 340 W
DC Power Consumption	Option 3: 8.3 A , 310 W
BUC Voltage	Option 1: 24 VDC Option 2 & 3: Selectable, 24 or 48 VDC
DC Power @ TX Output	Option 1, 2, & 3: 24 VDC @ 4.9A (117 W MAX) Option 2 & 3: 48 VDC @ 3.3A (158 W MAX)
DC Power @ RX Inputs	13-18 VDC @ 500 mA, voltage is software configurable

Table 2-2. Power Specifications (continued)

Category	Description
Protection	Over-Voltage Protection for LNB and BUC DC Over-Current Limiting for LNB and BUC DC Options 1 & 2: Primary AC fuse within PS module (250 VAC, T6.3 A) Option 3: Primary DC fuse within PS module (250 V, 16 A)
AC Input Connector	IEC-60320-C14, 3-cond, Male
AC Power Cord	Supplied, per country of use
DC Input Connector	Self-capturing terminal block, 14-16 AWG
Efficiency	87% Min

2.3 RF Specifications

The Evolution X7 Satellite Router RF specifications are listed in Table 2-3.

Table 2-3. RF Specifications

Category	Description
IF Interface, Impedance	Type “F”, Zo = 75 ohms
Frequency Range	
Transmit	950 - 1950 MHz
Receive	950 - 2150 MHz
Tuning Step Size	
Transmit	10 Hz
Receive	55 KHz
RF Power	
Transmit	-35 to +3 dBm, 0.5 dB step
Receive, Minimum	-130 + 10Log(Sym rate) dBm (Single carrier)
Receive, Maximum	-5 dBm (Wideband Composite)
Tx SSB Phase Noise	**Frequency** / **Phase Noise** 1 KHz / -75 10 KHz / -85 100 KHz / -95 1 MHz / -105
LNB Support	Fsym $\geq$ 10 Msps: DRO LNB Fsym $\leq$ 10 Msps: PLL LNB (internal reference) Fsym $\geq$ 1 Msps: Universal LNB w/22 KHz tone
Receiver Noise Figure	15 dB

Table 2-3. RF Specifications (continued)

Category	Description
Transmit Carrier Suppression	≤ -40 dBc
Spurious & Harmonic Content	≤ -60 dBc, with output @ -20 dBm, (In-band ≤ -32 dBc)
Transmitter Muting	50 dB (min); residual carrier ≤ -90 dBm with baseband (BB) and RF muted

3 Interfaces

This chapter describes the X7 Router physical interfaces and LEDs, and contains the following sections:

3.1 X7 Router Front LEDs

The X7 Router front panel is shown in Figure 3-1 and defined in Figure 3-1.

Figure 3-1. X7 Router Front Panel LED Display

NOTE: The descriptions of the LEDs may vary between iDX Software Releases. Check the release specific *iDX Satellite Router Installation and Commissioning Guide, Web iSite User Guide, and iDX Release Notes* for details.

Table 3-1. X7 Router Front Panel Description

Callout - Label	Description
1 - POWER	Indicates power supply status and any power-related problems
2 - STATUS	Indicates basic operational state and problems with core hardware
3 - FAN	Provides fan status
4 - TEMP	Indicates any problems with the current operating temperature
5 and **6 - RX1** and **RX2 (future)**	Provides downstream receive status, see Table 3-3 on page 11, callouts 12 and 14, for rear power receive status LED information
7 - TX	Indicates the state of the transmitter, see Table 3-3 on page 11 , callout 9, for BUC power LED information
8 - NET	Modem Network Status: indicates the state of the satellite network connection

3.2 X7 Front Panel LED Status Descriptions

Descriptions for states of LEDs may vary between iDX Software Releases. Check the release specific *iDX Satellite Router Installation and Commissioning Guide, Web iSite User Guide, and*

iDX Release Notes for details. Figure 3-1 on page 8 shows the front panel and Table 3-2 describes the front panel LED color and status information:

Table 3-2. X7 Router iDX 3.2 LED Descriptions

Label	Signal Color/Type	Definition
POWER		Indicates power supply status and any power-related problems
	Off	No or low power input
	Green	Valid power input detected
	Yellow	Problem with BUC voltage selection
STATUS		Indicates basic operational state and problems with core hardware
	Off	Powered off or going through initial Power-on Self-test (POST)
	1 second flashing Green	Initial POST failed
	Green	HW operation is normal (all self-tests passed)
	Red	Fault: hardware, software, one or more self-test failures, or configuration error
FAN		Provides fan status
	Green	All fans working
	Red	Failure of one or more fans
TEMP		Indicates problems with the current operating temperature
	Off	Router OFF or booting if **STATUS** LED is not Green
	Green	Normal operating temperature
	Yellow	Operating temperature is nearing the over-temp or under-temp threshold
	Red	Operating temperature has exceeded the over-temp or under-temp threshold
RX1 and **RX2**		Provides downstream receive status, **RX2 is reserved for future use**
	Off	Receiver off or not configured
	Yellow	Downstream carrier configured, demodulator not yet locked
	1 second flashing Yellow	Downstream carrier configured, demodulator locked to downstream carrier, Network Clock Reference (NCR) not yet locked
	Green	Downstream carrier configured, demodulator and NCR locked to downstream carrier

Table 3-2. X7 Router iDX 3.2 LED Descriptions (continued)

Label	Signal Color/Type	Definition
TX		Indicates the state of the transmitter
	Off	Transmitter is off: if **STATUS** LED is green, then transmission disabled by configuration
	Yellow	Transmitter enabled, mute ON
	Green	Transmitter enabled, mute OFF
NET		Indicates the state of the satellite network connection
	Off	Router off or in sleep mode if **TX** LED is yellow (mute ON)
	Yellow	Demodulator is not locked on the primary downstream carrier
	1 second flashing Yellow	Demodulator locked on primary downstream carrier, NCR not yet locked
	2 second flashing Green	Demodulator locked on the primary downstream, NCR locked
	1 second flashing Green	Network acquisition and authentication in progress
	Green	Network acquired and authenticated; if **TX** LED is OFF, then router is in Rx (receive) only mode
	Red	Authentication failed

3.3 X7 Router Rear Panel Description

The X7 Router rear panel is shown in Figure 3-2 and defined in Table 3-3 on page 11.

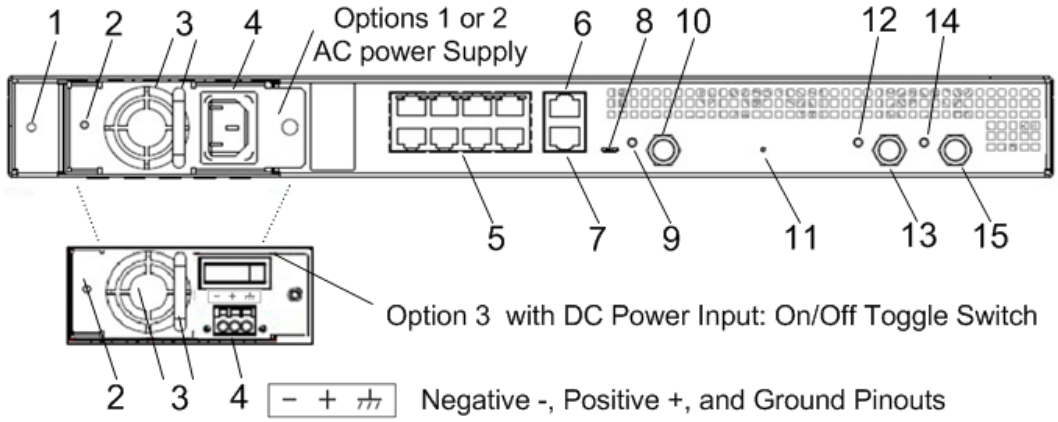


Figure 3-2. Rear Panel Description

Table 3-3. X7 Router Rear Panel Connector and LED Descriptions

Callout	Label	Interface Definition and Connector Type
1		Grounding stud, #6-32tpi
2	no label	Power Supply Module LED OFF - No valid output Green - Valid DC output
3	no label	Power supply extraction handle
4	no label	Terminal Block Header Option 1 & 2: AC input connector IEC-320-C13 Option 3: DC input terminals - Negative, Positive, and Ground; 14-16 AWG
5	**LAN 1-8**	Ethernet Communications Ports, RJ-45
6	**BUC I/O**	BUC Communications Port, RJ-45
7	**Console**	Console Communications Port, RS-232 Serial, RJ-45
8	**+24, +48**	BUC voltage selector switch
9	**BUC PWR**	BUC Power LED: if off, no power to BUC Green - No fault Red - Over-current protection has tripped
10	**TX OUT**	Transmitter Output (F)
11	none	Internal Reset Switch
12, 14	**LNB1, LNB2 PWR**	LNB Power LEDs: if off, no power to LNB Green - No fault Red - Over-current protection has tripped
13, 15 (future)	**RX1 IN, RX2 IN**	Receiver Inputs (F), **RX 2 IN** is reserved for future use

4 X7 Router Installation

This chapter describes the guidelines and procedures for installing the X7 Router and contains these sections:

NOTE: See *Document Conventions* on page xii for a description of the warning icons that are used in this manual.

NOTE: Thoroughly review all the information in Appendix B, *Safety*, before attempting any of the procedures in the chapter.

4.1 Installation Steps at a Glance

The following steps must be followed for successful installation of the X7 Router. Each step refers to other sections or appendices, as appropriate, with more detailed information.

4.1.1 Pre-Installation Guidelines

X7 Router installation guidelines:

- When selecting the site, consider accessibility, power availability, signal, network connections, and the possibility of future expansion
- Install the X7 Router in a location where access is unobstructed
- Ensure the X7 Router has adequate ventilation
- Do not install the X7 Router on the floor
- Select a suitable dust free location

4.1.2 Installation Checklist

NOTE: The X7 Satellite Router is designed to be installed in a sheltered environment per environmental specifications. See Section 2.1, on page 3.

NOTE: Where applicable, mating connectors must be prepared for installation. See Appendix D, *Cable Preparation* on page 33 and Appendix E, *DC Power Supply Installation* (for routers with DC power supply options, only).

1. Unpack the router according to the unpacking instructions in Section 4.3, *Unpacking iDirect Evolution X7 Router Equipment* on page 15.
2. Account for all components for the installation. A typical list is given in Section 4.4, *Components Typically Included in an Order* on page 15.
3. The recommended tools should be available for installation. See Section 4.2, *Tools and Supplies Required for Installation* on page 15.
4. Prepare the coax cables as directed in Section D.1, *Coax Cable Preparation* on page 33 to connect to **RX 1 IN** and **TX Out.**

   CAUTION: Do not connect or disconnect the Tx or Rx IFL cable while the satellite router is powered on; this action may result in damage to the BUC, LNB, and/or X7 Router.

5. Prepare the Ethernet cable(s) and connector(s) as described in Section D.2, *Ethernet Port Pinouts* on page 37. For connection to Web iSite, use **LAN 1** port with an RJ-45 cable as described in Section D.2.2, on page 38.
6. If using the **Console** port for servicing, prepare the console port cable and connector as described in Section D.3, *Console Port Connection* on page 38.
7. Mount the router as directed in Section 4.5, *X7 Router Mounting* on page 16.
8. Connect the power as directed for either AC or DC power supplies:
   - See Section 4.5.1, *Installing With an AC Power Supply (Option 1 or 2)* on page 16
   - See Section 4.5.2, *Installing With a 24-48 VDC Power Supply (Option 3)* on page 17
9. Monitor front and rear panels during startup. See Section 3.1, *X7 Router Front LEDs* on page 8 and Section 3.3, *X7 Router Rear Panel Description* on page 10.
10. Prepare PC for X7 Router connection as specified in Section 4.6, *Preparing the PC for Connection to the X7 Router* on page 18.
11. Login PC to Web iSite as specified in Section 4.7, *Web Interface LED Status Indicators* on page 18.
12. Install the firmware and configure the satellite router as specified in Section 4.8, *Configuring the X7 Router* on page 18.
13. If the router needs repacking or maintenance see Chapter 5 on page 19.
14. When the X7 Router is physically installed, the firmware and configuration of the satellite router need to be completed. Refer to the *iDX Satellite Router Installation and Commissioning Guide* for the release of software installed on the system and for instructions.

4.2 Tools and Supplies Required for Installation

Appendix C, *Tools Needed* on page 31 specifies recommended tools and supplies used when installing the X7 Router.

4.3 Unpacking iDirect Evolution X7 Router Equipment

The satellite router and related equipment may be shipped in one or more shipping containers. Once all of the boxes have been received, perform the following tasks:

- Confirm 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

Save the Evolution X7 Satellite Router shipping boxes after unpacking the system. These boxes will be needed in the event of moving or shipping the system in the future. See Section 5.5, *Repacking the X7 Router* on page 22 for repacking information.

Remove items from the box only as needed. Verify all of the proper X7 Router components and accessory items listed in the order have been received, including the optional equipment ordered. See Section 4.4, *Components Typically Included in an Order* on page 15.

4.4 Components Typically Included in an Order

Prior to installation, account for all necessary components for a complete VSAT installation. If any items are missing or damaged, contact the Network Operator/Distributor for replacement.

A typical installation includes the following items:

- 1 (one) Evolution X7 Satellite Router with installed AC or DC power supply
- 2 (two) hardware mounting ear kits
- 1 (one) LAN Ethernet cable
- 1 (one) Quick Start Guide (11 X 17 inch brochure)
- For DC (options 3 and 4), 1 (one) connector kit containing: one cable tie, one terminal block plug (P/N Phoenix 1779848), one cable strain relief, P/N 1803947
- Additional components normally required are available in several sizes and types. Consult the iDirect Account Manager for details. The components typically are:
  - One antenna
  - IFL (Inter Facility Link) or coaxial cable appropriate for the installation
  - One appropriate feed assembly for the antenna (OMT)
  - One BUC (Block Up Converter)
  - One LNB (Low Noise Block Converter)

4.5 X7 Router Mounting

This section describes the mounting of the X7 Router. Follow the pre-installation guidelines, Section 4.1.1, on page 13, before attempting installation.

The X7 Router requires a minimum of one rack unit (1.75 inches) of vertical rack space. Measure the proposed rack location before mounting. If the X7 Router is mounted in an enclosed the router must have 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 that could impede installation.

1. All mating connectors must be prepared correctly for installation. See Appendix D, *Cable Preparation* on page 33 (for all routers) and Appendix E, *DC Power Supply Installation* (for routers with DC power supply options, only).
2. Attach the rack ears (included) to the X7 Router with the hardware provided.
3. Mount the X7 Router in the rack.
4. Follow installation procedures for power supply options:
   - Option 1 or Option 2 (Section 4.5.1, on page 16) for AC power supply
   - Or, Option 3 (Section 4.5.2, on page 17) for DC power supply

4.5.1 Installing With an AC Power Supply (Option 1 or 2)

For an X7 Router with an AC power supply Option 1 and 2 follow these steps:

CAUTION: Direct connections to the power source should only be made by a properly licensed electrician. Installation must meet applicable electrical codes.

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

CAUTION: If power must be removed from the chassis, the power cord must be disconnected, first.

CAUTION: The BUC power requirement must match the proper voltage. The BUC may sustain damage if used with the incorrect power supply.

NOTE: Install an easily accessible socket-outlet near the equipment.

1. First, perform steps 1-6 of the Installation Checklist, Section 4.1, on page 13.
2. Select the appropriate BUC voltage (**+24** or **+48** VDC) by sliding the BUC voltage selector switch (Table 3-3, *X7 Router Rear Panel Connector and LED Descriptions* on page 11: Callout #8). 24 VDC BUC voltage selection is the factory setting.

3. Connect the TX and RX coax cables to the X7 Router and secure but do not over-tighten. See D.1, *Coax Cable Preparation* on page 33 for preparation details.

CAUTION: Do not connect or disconnect the Tx or Rx IFL cable while the satellite router is powered on; this action may result in damage to the BUC, LNB, and/or X7 Router.

4. Connect the AC power cord to the power source. This will power ON the X7 Router.
5. Monitor the front and rear panel lights during power on startup. See Section 3.1, *X7 Router Front LEDs* on page 8.
6. Prepare PC for X7 Router connection as specified in Section 4.6, *Preparing the PC for Connection to the X7 Router* on page 18.
7. Login PC to Web iSite as specified in Section 4.7, *Web Interface LED Status Indicators* on page 18.
8. Install the firmware and configure the satellite router as specified in Section 4.8, *Configuring the X7 Router* on page 18.

4.5.2 Installing With a 24-48 VDC Power Supply (Option 3)

CAUTION: If negative voltages are used such as Telecom -48VDC, the negative most voltage is always connected to –ve terminal (in the Telecom case this would be -48V) and the positive most voltage is always connected to the +ve terminal (in the Telecom case this would be 0VR). Chassis can be referenced to +ve, -ve or left floating (i.e. not connected to either +ve or –ve) as required as the power module is fully isolated input to chassis.

For an X7 Router using a 36-76 VDC power supply (Option 3):

1. First, perform steps 1-6 of the Installation Checklist, Section 4.1, on page 13.
2. Set the X7 Router power switch to the OFF position (0).
3. Prepare the power cables per the instructions in Appendix E, *DC Power Supply Installation* on page 41 and connect the power cables.

CAUTION: The BUC power requirement must match the proper voltage. The BUC may sustain damage if used with the incorrect power supply.

4. Select the appropriate BUC voltage (**+24** or **+48** V), by sliding the BUC voltage selector switch (Table 3-3, *X7 Router Rear Panel Connector and LED Descriptions* on page 11: Callout #8). 24 V BUC voltage selection is the factory setting.
5. Set the X7 Router power switch to the ON position (1).
6. Upon powering up, a Level 0 Reset occurs. Reset options are available in Appendix F, *X7 Reset* on page 45.

7. Monitor front and rear panel lights during startup. See Section 3.1, *X7 Router Front LEDs* on page 8.
8. Prepare PC for X7 Router connection as specified in Section 4.6, *Preparing the PC for Connection to the X7 Router* on page 18.
9. Login PC to Web iSite as specified in Section 4.7, *Web Interface LED Status Indicators* on page 18.
10. Install the firmware and configure the satellite router as specified in Section 4.8, *Configuring the X7 Router* on page 18.

4.6 Preparing the PC for Connection to the X7 Router

See Section 3.1, *X7 Router Front LEDs* on page 8 for more information about the LEDs, as well as either the *iDX Release Notes* and *iDX Satellite Router Installation and Commissioning Guide or Web iSite User Guide*.

Confirm the PC:

- Has a Web browser installed
- Has an IP address that is on the same subnet of the X7 Router
- Includes a Network Interface Card (NIC) connected with a CAT 5 Ethernet cable

4.7 Web Interface LED Status Indicators

The X7 Router has eight LEDs on the front panel, see Table 3-1 on page 8. For diagnostic purposes, the X7 Router displays eight LEDs in the Web Interface software (Web iSite). The eight software interpreted LEDs are:

- **POWER** - indicates power supply status and any power-related problems
- **STATUS** -indicates basic operational state and problems with core hardware
- **FAN** - provides fan status
- **TEMP** - indicates any problems with the current operating temperature
- **RX1** - indicates the transmitter status
- **RX2** - is for future use
- **TX** - indicates the receiver status
- **NET** - indicates the network acquisition status

The LED displayed colors (red, yellow, green) indicate the state of the X7 Router and are documented in the *iDX Release Notes*, *Web iSite User Guide* or the *iDX Satellite Router Installation and Commissioning Guide*. The definitions of the LED states may be software version dependent.

4.8 Configuring the X7 Router

When the X7 Router is physically installed, the downloading the firmware and configuration of the satellite router need to be completed. Refer to the *iDX Satellite Router Installation and Commissioning Guide* for the release of software installed on the system and for instructions. To download the guide, go to http:\\tac.idirect.net and click **Satellite Routers**.

5 Maintenance

This chapter describes the required maintenance procedures for the correct functioning of the X7 Router.

This chapter contains the following sections:

NOTE: Thoroughly review all the information in Appendix B, *Safety*, before attempting any of the procedures in the chapter.

5.1 Safety Guidelines to Observe During Servicing

When an X7 Router requires service, observe the safety guidelines in this section.

5.1.1 Servicing

Do not attempt to service the X7 Router internal assembly. Opening and removing covers exposes dangerous voltages and/or other hazards. There are no user serviceable parts inside. Opening the units will void the warranty. Refer all servicing to qualified service personnel.

5.1.2 Conditions Requiring Service

Disconnect the X7 Router from the power source and refer servicing to qualified service personnel if any of the following conditions occur:

- When the power supply cord or plug is damaged
- If the X7 Router does not operate normally when following the operating instructions (adjust only those controls that are covered by the operating instructions)
- If the X7 Router has been dropped or if the chassis has been damaged
- When the X7 Router exhibits a distinct change in performance

5.2 Maintaining the X7 Router

The X7 Router requires basic maintenance to keep it running efficiently and to prolong its life.

NOTE: There are no user-serviceable parts within the X7 Router. Do not attempt to repair a malfunctioning or defective X7 Router, doing so may void the warranty.

5.2.1 Temperature Control

The X7 Router has a built-in temperature sensor which measures the actual circuit board temperature. If the board temperature exceeds a defined threshold, the X7 Router alerts the NMS about the high temperature condition. See Table 2-1 on page 3, for the proper temperature range.

Elevated internal temperature may be caused by:

- Objects blocking the vent
- Dust accumulated on the enclosure or the vent
- Ambient temperature elevated over the specified limits 90 Day Regular Maintenance

5.2.2 90 day maintenance

Typically, the only maintenance needed to be performed on the unit, is to maintain the temperature of the X7 Router and keep its external areas free from moisture, dust or dirt, which are included in a 90-day maintenance cycle.

Perform the following procedures every 90 days:

- Make sure that no objects are blocking the vents
- If there are objects blocking the vents, remove them safely so there is at least 6 inches (12 cm) from the unit
- Make sure that no dust has accumulated on the enclosure or the vent. If dust has accumulated use a soft brush to remove dust
- Make sure that the ambient temperature remains within the specified limits

5.3 Troubleshooting the X7 Router

Table 5-1 describes the most common X7 Router troubleshooting events and actions to take. Consult with the iDirect TAC when considering a reset. Reset functions are described in Section F.1, *Level 0 Reset* on page 45.

Table 5-1. Troubleshooting Events and Actions to Take

Event	Action
Router not functioning	Check status LEDs. Compare LEDs to Table 3-1 on page 8

Table 5-1. Troubleshooting Events and Actions to Take (continued)

Event	Action
POWER LED OFF (No power)	• Verify power connection • Test power to determine if there is power to the power module • Reseat the Power Module by unscrewing the top chassis screw, gently and firmly grasping the pull tab to extract the Power Module, reseat Power Module, secure the screw (the Power Module could have become loose from transportation or movement)
POWER LED ON and not functioning	Test power Check other status LEDs. Compare LEDs to Table 3-1 on page 8.
48 V BUC not working	Is the installer expecting 48V BUC power? If so: • The correct BUC voltage (**+24** or **+48** VDC) must be selected by sliding the BUC voltage selector switch (Table 3-3, *X7 Router Rear Panel Connector and LED Descriptions* on page 11: Callout #8), 24 VDC BUC voltage selection is the factory setting • Check the model of power module: the model may not allow 48 V BUC power and check the barcodes for 48V BUC support These barcodes on for Option 2 and Option 3 power modules indicate SUPPORT for 48V BUC: Option 2  Option 3  The Option 1 Power Module **does not support** a 48V BUC, and has this barcode: Option 1 

5.4 Removing and Replacing the Power Module

In the event the Power Module must be removed and/or replaced, Table 5-1 describes the steps to take.

Table 5-2. Removing and/or Replacing the Power Module

Event	Steps to Take
Removing the Power Module	• Make sure power cord is unplugged • Unscrew chassis screw • Pull firmly but gently on the handle pull of the power supply to extract the power module from the slot
Replacing the Power Module	• Slide in power supply • Make sure the power supply is securely pushed in and flush • Tighten screw • Plug power cord into power supply input receptacle

5.5 Repacking the X7 Router

If the X7 Router system is damaged or if the chassis needs to be moved to another location, the unit needs to be repacked in the original shipping boxes.

To repack the system:

1. Disconnect all cables.
2. Place the X7 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 the reseller or iDirect prior to shipping. Direct customers of iDirect, 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.

Appendix A Acronyms and Abbreviations

The list in this appendix is meant to be generic and may contain acronyms and abbreviations not found in this manual and some terms may not be defined based on industry standards of knowledge.

0...9

16APSK	Sixteen Amplitude and Phase Shift Keying
8PSK	Eight Phase Shift Keying

A

A-TDMA	Adaptive Time Division Multiple Access
ABS	Automatic Beam Switching
AC	Alternating Current
ACM	Adaptive Coding and Modulation
ACS	Antenna Control System
AES	Advanced Encryption Standard
APSK	Amplitude and Phase-shift keying
AZ	Azimuth

B

BB	BaseBand
BIM	Below-Decks Interface Module
BIST	Built-In Self-Test
BITE	Built-In Test Equipment
BPN	BUC Part Number
BPSK	Binary Phase Shift Keying
BSN	BUC Serial Number
BTP	Burst Time Plan
BUC	Block Up Converter

C

C/N	Carrier to Noise ratio
CBIT	Continuous Built In Test
CDR	Critical Design Review
CIR	Committed Information Rate
CPE	Customer Premise Equipment
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CSA	Canadian Space Agency

D

DAC	Digital to Analog Converter
dB	deciBel
dBi	deciBel isotropic
dBm	deciBel milli-Watt
dBW	deciBel Watt
DC	Direct Current
DDR	Double Data Rate

DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Service
	DVB-S2
	Digital Video Broadcasting over Satellite, Second Generation

E

EIRP	Effective Isotropic Radiated Power
Eb/N0	Bit Energy to Noise Power Spectral Density ratio
EEPROM	Electrically Erasable Programmable Read-Only Memory
EL	Elevation
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
ETSI	European Telecommunications Standards Institute

F

FCC	Federal Communication Commission
FEC	Forward Error Correction
FID	Functional ID
FMECA	Failure Mode Effects Criticality Analysis
FPGA	Field Programmable Gate Array
FS	Functional Specification

G

G/T	Gain over Temperature
GHz	GigaHertz
GPIO	General-Purpose Input/Output
GPS	Global Positioning System

H

HCP	High-Capacity Payload

I

IBIT	Initiated Built In Test
ICD	Interface Control Document
ICMP	Internet Control Message Protocol
iDX	Evolution Software System
IEC	International Electrotechnical Commission
IFL	Inter-Facility Link
IF	Intermediate-frequency
IP	Ingress Protection
IP	Internet Protocol
IR	Information Rate

J

K

kbps	kilobit per second
kHz	kilohertz
KRFU	Ku/Ka-band Radio Frequency Unit
ksps	kilosymbol per second

L

LAN	Local Area Network
LDPC	Low-Density Parity Coding
LED	Light Emitting Diode
LNB	Low Noise Block Converter
LOS	Loss of Signal
LRU	Line-Replaceable Unit

M

Mbps	Megabits per second
Mcps	Megachips per second
MES	Mobile Earth Station
MF-TDMA	Multi-Frequency TDMA

MHz	Megahertz
MID	Manufacturer ID
MIL-STD	US Military Standard
MODCOD	Modulation and Coding
Msps	Mega Symbols per Second
MTBF	Mean Time Between Failures
MTBUR	Mean Time Between Unscheduled Removals

N

NAND	Not AND
NF	Noise Figure
NOR	Not OR
NMS	Network Management System

O

OAE	Outside Antenna Equipment
ODU	Outdoor Unit
OEM	Original Equipment Manufacturer
OMT	Orthogonal-Mode Transducer
OpenAMIP	Open Antenna-Modem Interface Protocol
OTA	Over The Air
OTP	One Time Programmable

P

PA	Power Amplifier
PAST	Person-Activated Self-Test
PCB	Printed Circuit Board
PC	Personal Computer
PDR	Preliminary Design Review
PLL	Phased Locked Loop
PSK	Phase Shift Keying
PSU	Power Supply Unit

Q

QEF	Quasi Error Free
QoS	Quality of Service
QPSK	Quadrature Phase Shift Keying

R

RF	Radio Frequency
RGMII	Reduced Gigabit Media Independent Interface
RMS	Root Mean Square
RoHS	Restriction of Hazardous Substances
ROM	Read-Only Memory
RSSI	Receive Signal Strength Indication
RTP	Real-Time Protocol
Rx or RX	Receive

S

SAS	Satellite Access Station
SCPC	Single Channel Per Carrier
SGMII	Serial Gigabit Media Independent Interface
SIM	Subscriber Identity Module
SNR	Signal to Noise Ratio
SRS	Systems Requirement Specification
SRU	Shop Replaceable Unit
SSB	Single Side Band

T

TBD	To Be Defined
TCP	Transmission Control Protocol
TDMA	Time Division Multiple Access
TFI	Terminal Functional ID
TMI	Terminal Manufacturer ID
TPCFEC	Turbo Product Code FEC
TPN	Terminal Part Number

TSN	Terminal Serial Number
TTC	Terminal Transmit Control
Tx or TX	Transmit

U

UDP	Universal Data Protocol
UL	Underwriters Laboratories

V

VAC	Volts Alternating Current
VDC	Volts Direct Current
VSAT	Very Small Aperture Terminal

W

WFQ	Weighted Fair Queuing
WGS	Wideband Global SATCOM

X

X

Z

Appendix B Safety

Follow the safety guidelines in this chapter during installation of the Evolution X7 Satellite Router. These guidelines help to protect the X7 Router from potential damage and help to ensure personal safety. Keep this safety information handy for reference.

Read this entire chapter before installing or using the X7 Router. Adhere to all warnings listed on the product warning labels and in the operating instructions.

This chapter contains the following sections:

B.1 Installation Guidelines

When installing the X7 Router, observe all caution and warning statements. Follow all the warnings and cautions in this section for personal safety and to protect the equipment. These guidelines are not intended to cover all of the hazardous situations that may be encountered during installation. Follow all facility and local safety guidelines.

The installation of the X7 Router must comply with the applicable national and local electrical codes for the United States and Canada, 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, LAN, and other cables) 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
- Lightning protection should be installed to protect the X7 Router unit as appropriate for local conditions and per local codes

- Equipment connected to the protective grounding of the building installation through the main 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 in the *Quick Start Guide*, 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, X7 Router components, and shipping boxes away from walkway area
- The X7 Router operates safely when it is used in accordance with its marked electrical ratings and product usage instructions

CAUTION: Only Trained and qualified personnel should be allowed to install or replace this equipment.

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.

CAUTION: Before working on the equipment, unplug the power cord from the AC power source.

CAUTION: Do not remove the enclosure. Do not touch internal circuitry when the power cord is connected.

CAUTION: The BUC power requirement must match the proper voltage (24 or 48 VDC). The BUC may sustain damage if used with the incorrect power supply.

B.2 Electrical Safety

Follow the warnings and cautions below for personal safety and to protect the equipment from electrical hazards.

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

CAUTION: The BUC power requirement must match the proper voltage (24 or 48 VDC). The BUC may sustain damage if used with the incorrect power supply.

Follow these basic guidelines when working with any electrical equipment:

- Disconnect all power and external cables before installing or removing the chassis
- Do not work alone
- Confirm power has been disconnected
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe
- Never install equipment that appears damaged
- Examine the work area for possible hazards, such as wet floor, ungrounded power extension cables, and missing safety grounds

B.3 Physical and Environmental Considerations

To protect the equipment and to avoid personal injury, observe the physical and environmental considerations below when installing an X7 Router:

- **Ventilation**

  A single-core protective vent on the back of the chassis provides pressure equalization and allows reliable operation of the product. To protect the chassis from overheating 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.

- **Power Sources**

  Operate this product only from an approved power source. If the power supply is unknown, consult the teleport operator or local power company.

- **Power Cord Protection**

  Route power supply cords so they will not be walked on or pinched; pay particular attention to cords at plugs, convenience receptacles, and at the exit points.

- **Overloading**

  Do not overload wall outlets, extension cords, or integral convenience receptacles.

- **Electrical Safety**

  Power line operated equipment accessories connected to this unit must bear the UL, NRTL, CE listing mark. Do not modify the safety features. If in doubt, contact qualified service personnel.

- **Heat**

  Do not place the X7 Router near heat sources, such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

- **Accessories**

  Do not place the chassis on any unstable rack, cart, stand, table, or bracket. Mounting of the product must follow the manufacturer's instructions.

- **Attachments**

  Do not use attachments unless recommended by the manufacturer.

- **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 without a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if it is uncertain that suitable grounding is available.

- **Operational and Maintenance Safety**

  Chapter 5 on page 19 provides detailed maintenance information. As the Evolution X7 Satellite Router is used, the following safety guidelines must be observed:

  - **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 dusting

Appendix C Tools Needed

Figure C-1 and Table C-1 specify recommended tools and supplies for a typical installation. Additional tools and equipment may be required to install related equipment and cables. Test equipment may be required to check signal, power levels, and communication links.

Figure C-1. Recommended Installation Tools

Table C-1. Recommended Installation Tools and Equipment

Quantity	Tool
1	Number 2 Phillips screwdriver
1	F-type Compression Tool
1	RG-6 Coax Stripper
1	Coax / Wire Cutter
Length as Needed	RG-6 or RG-11 solid copper conductor coax outdoor rated cable

Appendix D Cable Preparation

This appendix describes the cable preparation details and has these sections:

D.1 Coax Cable Preparation

NOTE: The procedures in this section, for preparing coaxial cables, are meant to be generic. Cables and connectors should be installed per manufacturer's requirements specific to the brands preferred. In general, specific and detailed instructions are for RG-6 cables and connectors, only.

Use high quality coaxial outdoor cable to connect the Evolution X7 Satellite Router to the Outdoor Unit (ODU) equipment. iDirect recommends that a solid copper center conductor, coaxial cable be used with a minimum of 60% + 40% braid and double foil shield to connect the equipment, such as:

- RG-6 — 0.04 inch (1 mm), outdoor rated, Quad Shielded, solid bare copper center conductor, for cable lengths less than or equal to 225 feet (68.5 meters)
- RG-11 — 0.064 inch (1.6 mm), outdoor rated, Quad Shielded, solid bare copper center conductor, for cable lengths less than or equal to 400 feet (121.9 meters)

Before connecting the cables, connectors on each end must be installed.

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. RG-6 or RG-11 Quad Shield or other outdoor quality, 75-ohm type of coax can be used.

If different types of coaxial cable are used other than the recommended quad shield RG-6, 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
- **Good return loss** – High quality cable and correct connectors help ensure an optimal return loss of 10 dB or more

NOTE: 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.

NOTE: Appendix C, *Tools Needed* on page 31 lists all of the recommended tools for terminating coax cables.

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 D-1.

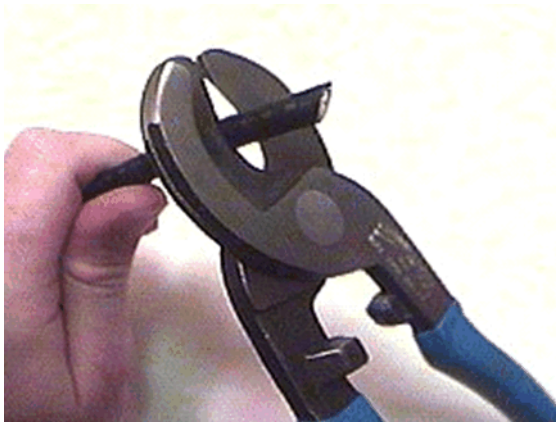


Figure D-1. Coax Cable Cutting Technique

WARNING: Wear protective eye wear while cutting cables and terminating connectors.

WARNING: The center conductor must be straight and cylindrical without any burrs. Failure to do so can damage the satellite router, BUC, and/or LNB input connector.

2. Remove the jacket material and foam insulation according to the length defined under **Length A** in Table D-1. For RG-6, use a two-step Coax Stripper such as the LC-CST 1257 from Paladin Tools.

Table D-1. 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)

Table D-1. Coax Trim Dimensions

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 D-2.

Figure D-2. 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 D-1 on page 34 and shown in Figure D-3.

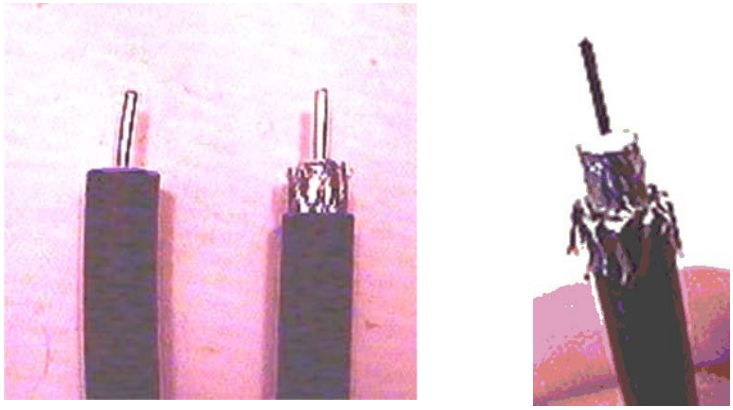


Figure D-3. Folding the Braid

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 D-1 on page 34. 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 the RG-6 connector compression sleeve, or mandrel, (top left (A) in Figure D-4) over foil and underneath the braid. A good, weatherproof outdoor connector mandrel should have a visible O-Ring (bottom right (B) Figure D-4).

NOTE: The white colored inner dielectric insulation should be flush with the inner rear surface of the connector. Refer to the picture on the right (C) in Figure D-4 for an RG-6/RG-11 termination.

NOTE: 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. Refer to Figure D-4.

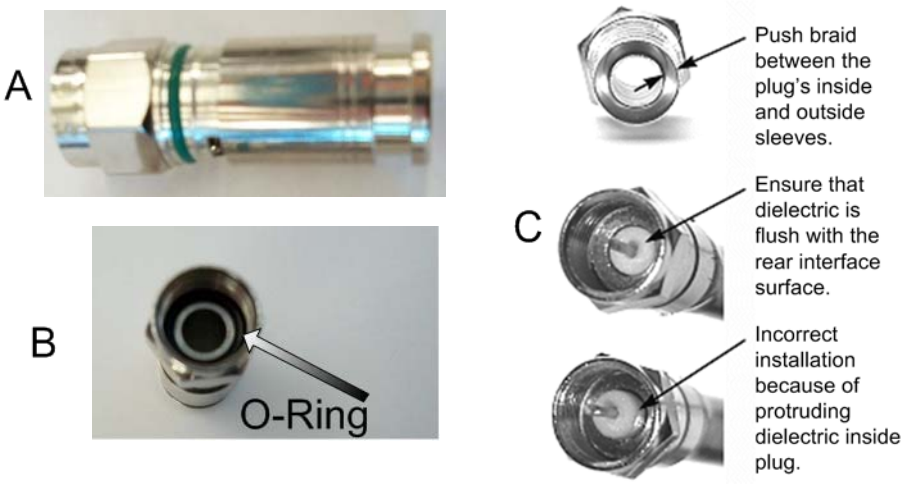


Figure D-4. Attaching the Compression fitting F-type Connector

9. Finish connecting the cable to the connector with the compression tool connector, such as Holland Compression Tool 1855 as shown in Figure D-5.

Figure D-5. Compression fitting F-Type Weatherproof Plug and Tool

10. 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.

CAUTION: 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. It must be straight and cylindrical without any burrs at the end. Failure to follow this technique could result in damage to the satellite router, BUC, LNB connector and/or possible intermittent service.

D.2 Ethernet Port Pinouts

The Ethernet cable included in the order is typically a straight through cable typically used for connection to a PC. The X7 Router is capable of Universal Cable Recognition or auto-MIDX (auto-sensing) and will connect to a PC with the straight through Ethernet cable for Web iSite use.

LAN 1 port is the recommended port to connect the Ethernet cable to the Ethernet port on the PCrunning Web iSite.

Either crossover or straight through cables may be used with the X7 Router. It is not necessary for the PCto auto-sense. Details of the X7 Router LAN/Ethernet port pinouts are described in Section D.2.1 and Section D.2.2 defines straight thru and crossover cables.

D.2.1 Ethernet Port Pinouts

Table D-2 lists the pinouts for the Ethernet ports (labeled **LAN 1-8)** of the X7 Router and the pinout order is shown in Figure D-6.

Table D-2. Ethernet Port Pinouts

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

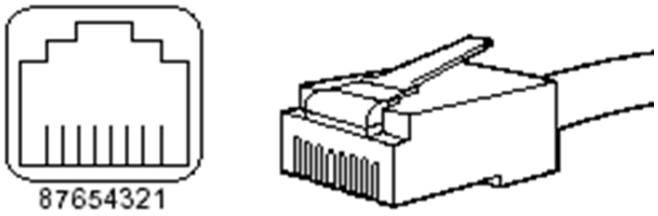


Figure D-6. RJ-45 Cable Connectors: Receptacle and Plug

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 ports on the Evolution X7 Satellite Router chassis to the customer provided LAN Hub or switch.

NOTE: iDirect supplies one 7-foot Category 5 UTP cable to connect the X7 Router to the LAN hub or switch. If additional cables or different lengths are needed, they may be bought commercially.

D.2.2 Straight Through and Crossover RJ-45 Cables

To confirm the RJ-45 cable type, hold the cable ends as depicted in Figure D-7. The sequence of the colored wires should be 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

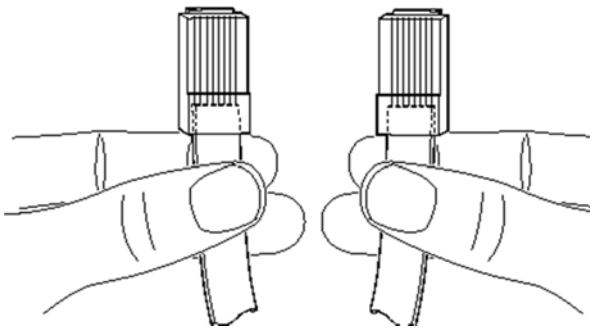


Figure D-7. Holding the RJ-45 Cable Connectors

D.3 Console Port Connection

The Console port is used for servicing the X7 Router.

Connect as follows:

1. Connect an RJ-45 to RJ-45 straight through cable, such as the Ethernet cable included, to **LAN 1** port on the X7 Router.
2. Connect the opposite end of the Ethernet cable to an RJ-45 to DB-9 female DTE adapter, or a USB dongle (such as a Trendnet TU-S9).
3. Connect to a PC running terminal emulation software.

PC serial port settings should be:

- asynchronous mode
- 9600 baud
- eight (8) data bits, no (N) parity bit, and one (1) stop bit, (9600/8-N-1)

The signal and pinouts for the asynchronous serial **Console** port (RS-232) of the X7 Router and an RJ-45 to DB-9 female DTE adapter are listed in Table D-3. A picture of the RJ-45 to DB-9 Female DTE adapter is shown in Figure D-8 on page 40.

Table D-3. 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

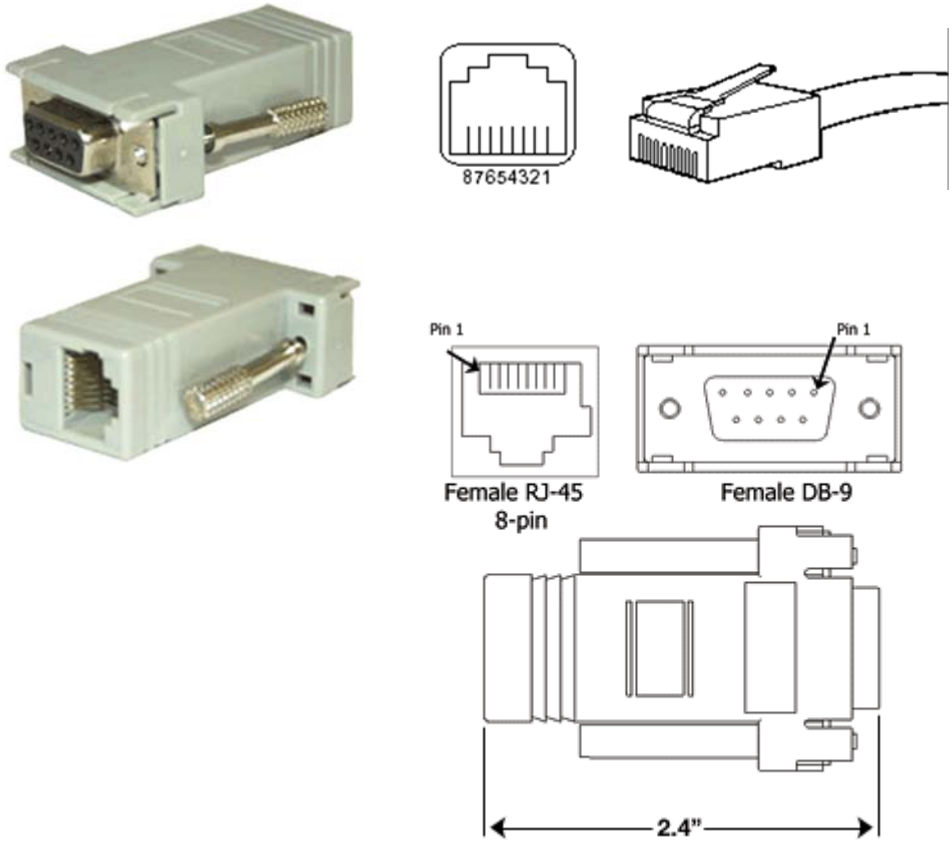


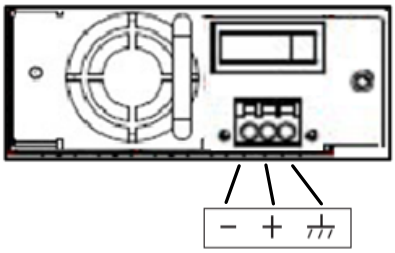
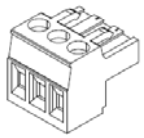
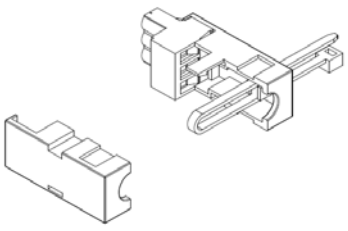
Figure D-8. RJ-45 to DB-9 Female DTE Adapter

Appendix E DC Power Supply Installation

This appendix describes the installation of the DC power supply wiring for Option 3.

Make sure all items are available to prepare the cable entry housing. Descriptions and diagrams of the items included with the router or necessary for the DC wiring are found in Table E-1. “At a Glance” instructions are in Figure E-1 on page 42 with corresponding detailed steps in Table E-2 on page 42.

Table E-1. X7 Router DC Power Module Connector Parts

Name	Description	Diagram or Reference
DC Terminal block	Rear panel, DC terminal block area	
3 DC input wires	Appropriately labeled wires, such as: • red = positive + • black = negative - • blue = ground - ⏚	14-18 AWG (American Wire Gauge) Reference: http://en.wikipedia.org/wiki/American_wire_gauge
Terminal block plug	Included in kit, P/N Phoenix 1779848	
Cable Entry Housing Strain Relief and Cable Tie	Cable Entry Housing Strain Relief and Cable Tie, included in kit, P/N 1803947, and cable tie	

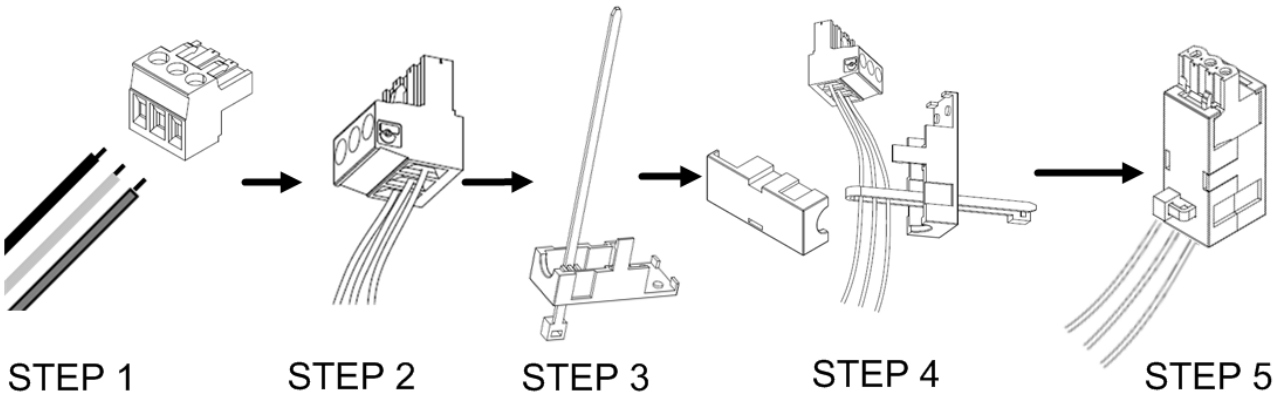


Figure E-1. DC-DC Power Supply Assembly at a Glance

DC-DC Power Supply Assembly at a Glance

Table E-2. Power Module Power Cable Installation Instructions Detail

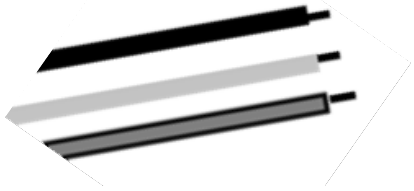
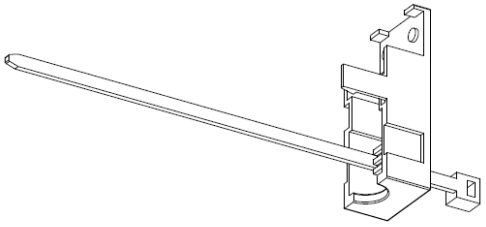
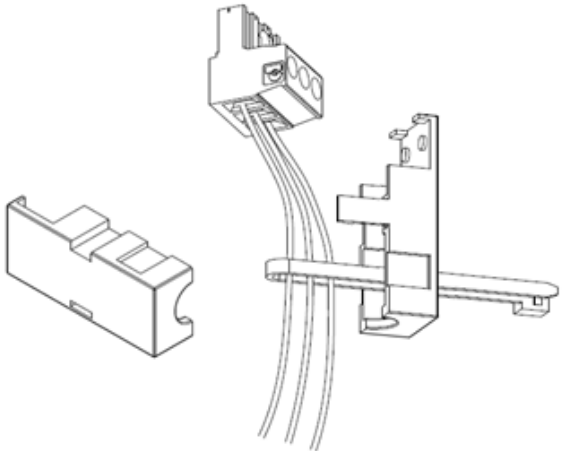
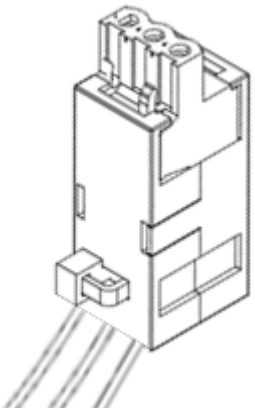
Step	Instructions	Diagram
1.	Strip approximately 1/4 inch of insulation from the ends of three appropriately sized (14-18 AWG) DC input wires.	
2.	Loosen the three screws on the terminal block plug . Insert DC (-), DC (+), and ground wires into the corresponding terminals of the DC terminal block plug. Fasten the three screws securely. Do not over-tighten.	
3.	Insert the cable tie through one of the holes in the right half of the strain relief clip.	

Table E-2. Power Module Power Cable Installation Instructions Detail

Step	Instructions	Diagram
4.	1. Wrap the cable tie around the wires, and tighten. 2. Insert the “three screw end” of the terminal block plug into the half of the strain relief clip. Be sure the two end screw holes fit securely into the two small protruding screw holders.	
5.	1. Clip the other half of the strain relief clip around the cable entry housing and tighten the cable tie. 2. Insert the finished terminal block plug, with the cable entry housing, into the terminal block header in the power supply.	

Appendix F X7 Reset

The X7 Router has three types of reset functions: Level 0, Level 1, and Level 2. Each type has a different effect on the router. Contact the iDirect TAC center for more information.

F.1 Level 0 Reset

Level 0 reset provides a basic reset function.

NOTE: Level 0 reset can be triggered in 3 ways: by powering up the X7 Router; briefly pressing the reset button; or, in Web iSite selecting File Management > Restart Device > Restart.

Level 0 reset features:

- Initiated by:
  - Router powering up
  - Briefly pressing the reset button and not keeping it pressed for more than 1 second, see Section 3.3, *X7 Router Rear Panel Description* on page 10 for the reset button location
  - In Web iSite, select the File Management menu > Restart Device > Restart
- Used to boot to a newly-loaded software image and configuration
- Recovery: initiate a Level 0 reset
- Router rear LEDs: **RX1 PWR** LED turns green; **RX2 PWR** LED and **BUC PWR** LED go off

F.2 Level 1 Reset

Level 1 reset is used to run hardware diagnostics and validate router hardware.

NOTE: Debug diagnostics are triggered by this reset. If router hardware requires diagnostics and validations call the iDirect TAC center. Exit and recover from a Level 1 reset by briefly pressing, for less than 1 second, the reset button.

- Recovery: initiate a Level 0 reset
- Router rear LED conditions when pressing reset for Level 1 reset, see Table 3-3 on page 11 for LED descriptions: **RX1 PWR** LED turns green when the reset button is initially pressed, then goes off; **RX2 PWR** and **BUC PWR** LED go off, initially; after pressing the reset button for 1 second, the **RX2 PWR** LED turns green, then goes off

F.3 Level 2 Reset

Level 2 reset provides a means of returning the router to factory default settings.

NOTE: This reset must not be used unless there is an intent to reconfigure or reload the software and options. There is no recovery once this reset occurs. New options file, software, and configuration must be loaded with Web iSite once this reset has been initiated.

Level 2 reset features:

- Initiated by: Pressing the reset button and keeping it pressed for more than 15 seconds, see Section 3.3, *X7 Router Rear Panel Description* on page 10 for the reset button location
- Intended for recovery of modem, only, and new options file, configuration, and software must be loaded
- Router boots with factory default image (default options file, software, and passwords), access to Web iSite is available at 192.168.0.1
- Recovery: none - reload software, options file, configuration
- Router rear LEDs: **BUC PWR** LED (see callout #9, Table 3-3 on page 11) will turn solid green when the reset button is held for greater than 15 seconds

iDirect

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

www.idirect.net

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