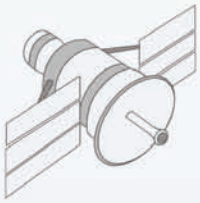
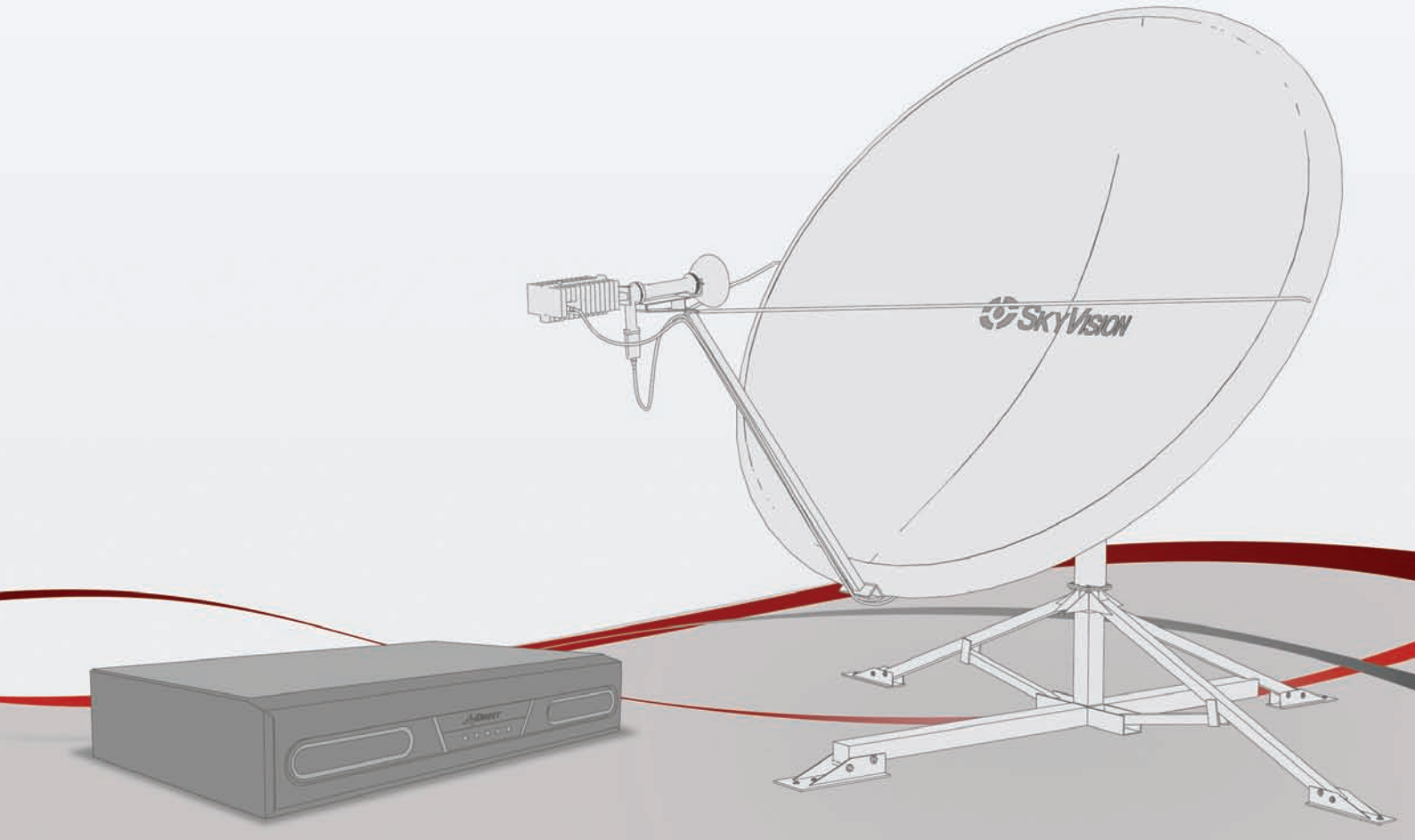
SkyVision
Global IP Connectivity





VSAT Installation Manual

Version 1.0

Disclaimer

Preface

The SkyVision VSAT Installation Manual has been prepared to complement the visual presentation of the installation and activation of a SkyVision VSAT. Also included are a Glossary and a Resource List for your convenience.

SkyVision will update this document as technology progresses and its services develop.

SKYVISION GLOBAL NETWORKS LLC

VSAT Installation Manual
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Table of Contents

Introduction

1. Introduction 7
1.1 Welcome to the SkyVision VSAT Installation Manual 7

VSAT Components

2.1 VSAT Components Introduction 9
2.2 VSAT Antenna 9
2.3 The LNB - Low Noise Block Down-Converter 10
2.4 The BUC - Block Up-Converter 11
2.5 The Feed 12
2.5.1.1 Linear Cross-polarization 13
2.5.1.2 Linear Co-polarization 13
2.5.1.3 Circular Cross-polarization 13
2.6 The iDirect Satellite Router 14
2.6.1 The iDirect iNFINITI 3100 Satellite Router 14
2.6.2 The iDirect iNFINITI 5100 Satellite Router 15
2.6.3 The iDirect Evolution X3 Satellite Router 16
2.7 Coaxial Cables 17
2.8 Length and Quality of Signal 17
2.9 Comparison of RG-6 and RG-11 Cable Types 17
2.10 Connectors 18
2.11 Splitter 18

Site Survey

3.1 Site Survey Introduction 20
3.2 Determine Who Will Perform the Site Survey 20
3.3 Azimuth and Elevation 20
3.4 Line-of-Sight 20
3.5 How to Check the Line-of-Sight 21
3.6 Terrestrial Site Selection Checklist 21
3.7 Roof Location Considerations 22
3.8 Antenna Installation - Roof Location 22
3.9 Equipment Room Power Requirements 22

Antenna Installation

4.1 Antenna Installation & Alignment Prerequisite Checklist 24
4.2 VSAT Terminal Field Installer 24
4.3 VSAT Installer Equipment Requirements 24
4.4 SkyVision Scheduling Kit and Option File 24
4.5 Verify List of On-site Equipment 25
4.6 Antenna Installation & Alignment 25
4.7 How to Calculate the Inclinometer Elevation Angle 26

Router Installation

5.1 Connecting and Installing the iDirect Satellite Router 28
5.2 Connecting with Putty 28
5.3 Connecting with Hyper Terminal 28
5.4 Configuring Your PC as a Host on Your Satellite Router LAN 29
5.5 Checking the Version of the iSite Application and the Satellite Router 29
5.6 How to Check Your Version of iSite 29
5.7 Checking Your Version of the Satellite Router 29
5.8 How to Download the Correct Version of iSite 30
5.9 Using iSite to Log in to the Satellite Router 30
5.10 Downloading the Correct Version of the Satellite Router Image 30
5.11 Loading the Option File 31
5.12 Changing the IP Configurations on Your PC to DHCP 31
5.13 Calculating the Azimuth and Elevation with the iSite Application 31
5.14 Finding the Correct Satellite 31
5.15 Using a Spectrum Analyzer 32
5.16 Using the iSite “Antenna Pointing” Tool 33
5.17 Information Check 33
5.18 Contacting SkyVision for the "Line-Up" Schedule 34

Troubleshooting and Support

6.1 Troubleshooting Introduction 36
6.1.1 Troubleshooting the iNFINITI 3100 and 5100 Receive Chain 36
6.1.2 Troubleshooting the Evolution X3 Receive Chain 36
6.2.1 Troubleshooting the iNFINITI 3100 and 5100 Transmit Chain 37
6.2.2 Troubleshooting the Evolution X3 Transmit Chain 37
6.3.1 iNFINITI 3100 and 5100 Troubleshooting Checklist 38
6.3.2 The Evolution X3 Troubleshooting Checklist 38
6.4 SkyVision Support Help Desk Procedure 39

Resources 40
Glossary 41

About SkyVision

SkyVision is a leading global IP telecommunication service provider to emerging markets, offering solutions over satellite and fiber optic systems. SkyVision's focus is on global connectivity services for emerging markets, with customers that include incumbent telecoms, ISPs, cellular operators, global and local enterprises, government entities and NGOs, in over 50 countries.

With an emphasis on its customers' local or regional requirements, SkyVision offers superior network connectivity solutions. Known for its innovative approach, the company offers an extensive suite of both customized solutions and industry-standard services for end-to-end IP connectivity, managed from its international gateways and selected local hubs. SkyVision's global-reaching network connects its customers to the Internet backbone with more than ten satellite platforms and a network of high-capacity fiber optic cables, via its gateways in Europe, North America and the Middle East, as well as multiple points of presence (POPs) in Africa.

SkyVision understands that reliable connectivity is an integral and critical element of every customer's business. For this reason, SkyVision's service concept relies on establishing a local presence with dedicated support in each of the countries to which it delivers its services. This strategy allows SkyVision to better understand its customers' unique needs in each region, tailoring its solutions to their specific requirements and backing those solutions with rapid, high-priority support. Service Operation and Maintenance is carried out by SkyVision's regional representatives, along with the company's professional Operations and Engineering teams. In addition, its presence in local markets allows SkyVision to deliver equipment both quickly and securely via its own storage facilities in strategic locations. The company's commercial and technical representation in its key target markets also allows SkyVision to assist its customers in regulatory matters.

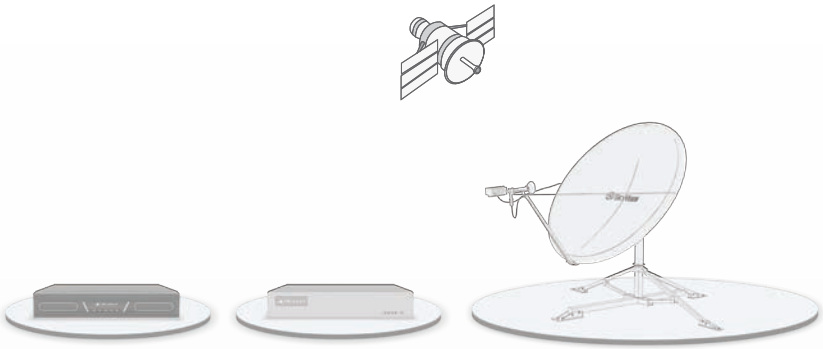
SkyVision currently commands a satellite and fibre IP connectivity network spanning 100 countries. The company's VSAT network solutions draw on SkyVision's extensive space segment inventory from leading satellite providers and its capacity is carefully tailored to customers' individual needs for optimal cost-effectiveness.

SkyVision Global Networks LLC, with headquarters in the UK, is a privately-held company founded in 2000.

Chapter 1

INTRODUCTION

1. Introduction



1.1 SkyVision VSAT Installation Manual

This handbook is designed to complement SkyVision's Visual VSAT Installation Manual Presentation which introduces you step-by-step to the technical requirements and practical applications of setting up an antenna and a VSAT-based satellite router to access the SkyVision satellite broadband service. Topics covered in this handbook will include the VSAT components, the process of site surveying, antenna installation and alignment, satellite router installation, troubleshooting, and the SkyVision Support Center Help Desk Procedures. The user-friendly chapters will allow you to either follow along with the visual presentation or reference topics at your leisure.

(We recommend that you view the presentation in sequence before traveling to the proposed VSAT location, as you will need to have access to the internet to follow some instructions. You will also need a complete understanding of the requirements and procedures before arriving at the proposed site.)

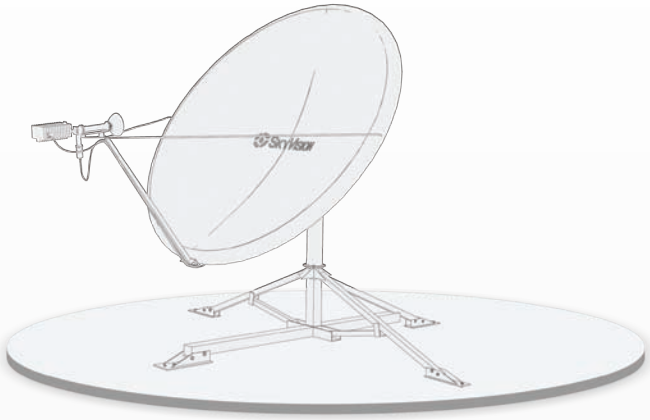
Chapter 2

VSAT COMPONENTS

2.1 VSAT Components Introduction

In this chapter we will examine the various components that make up a complete VSAT (Very Small Aperture Terminal): the VSAT Antenna, LNB, BUC, Feed, iDirect Satellite Router, and Coaxial Cables.

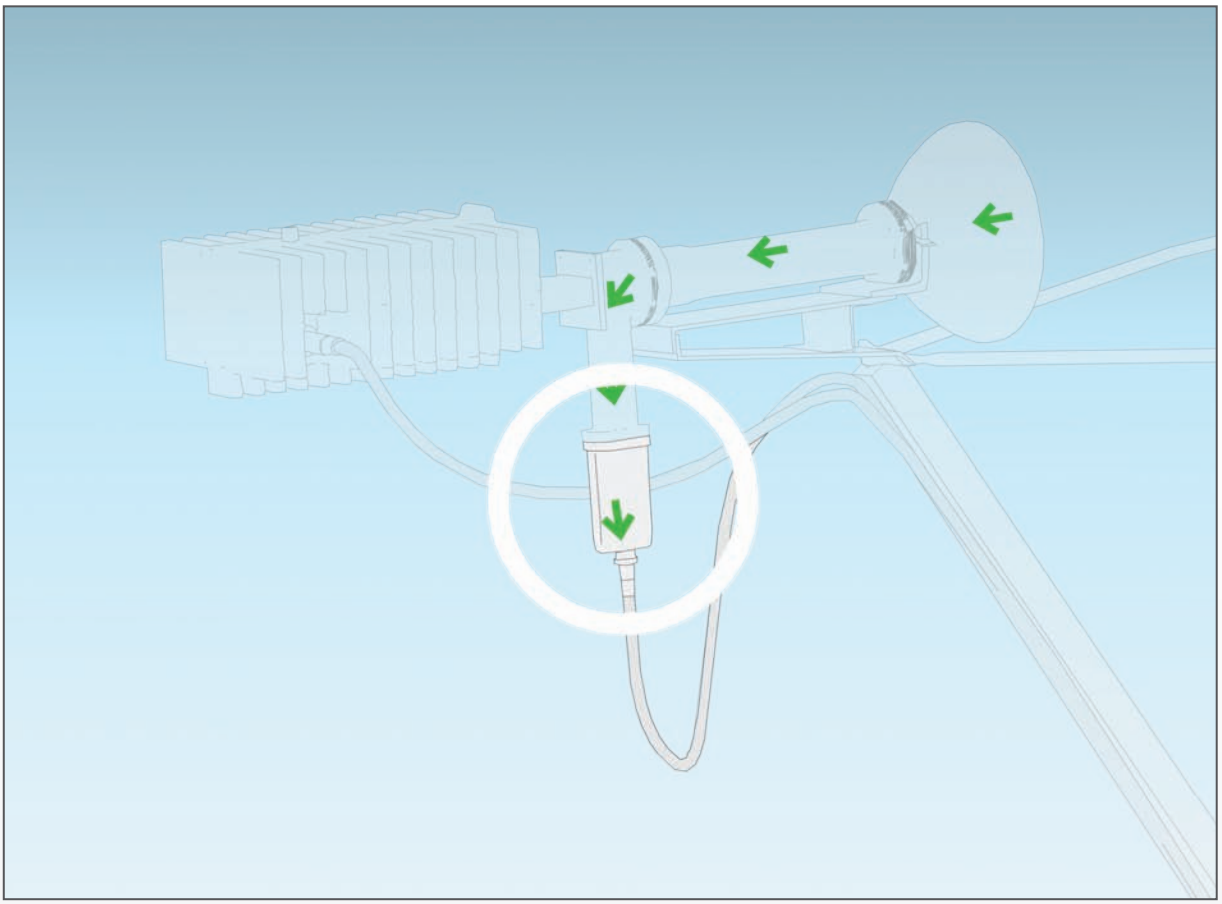
2.2 VSAT Antenna



The first component is the satellite antenna, which is required for the reception and transmission of signals to and from the satellite. The appropriate size of the antenna diameter is determined by your SkyVision Account Manager, taking your needs into account. The shape of the coverage pattern of a satellite varies from one satellite to another. As a result, certain geographical locations will require larger antennas for optimal performance. A larger antenna will also result in a higher gain and a narrower transmission beam, which will provide improved rejection of the "side lobes" of adjacent satellites and protection from terrestrial interference.

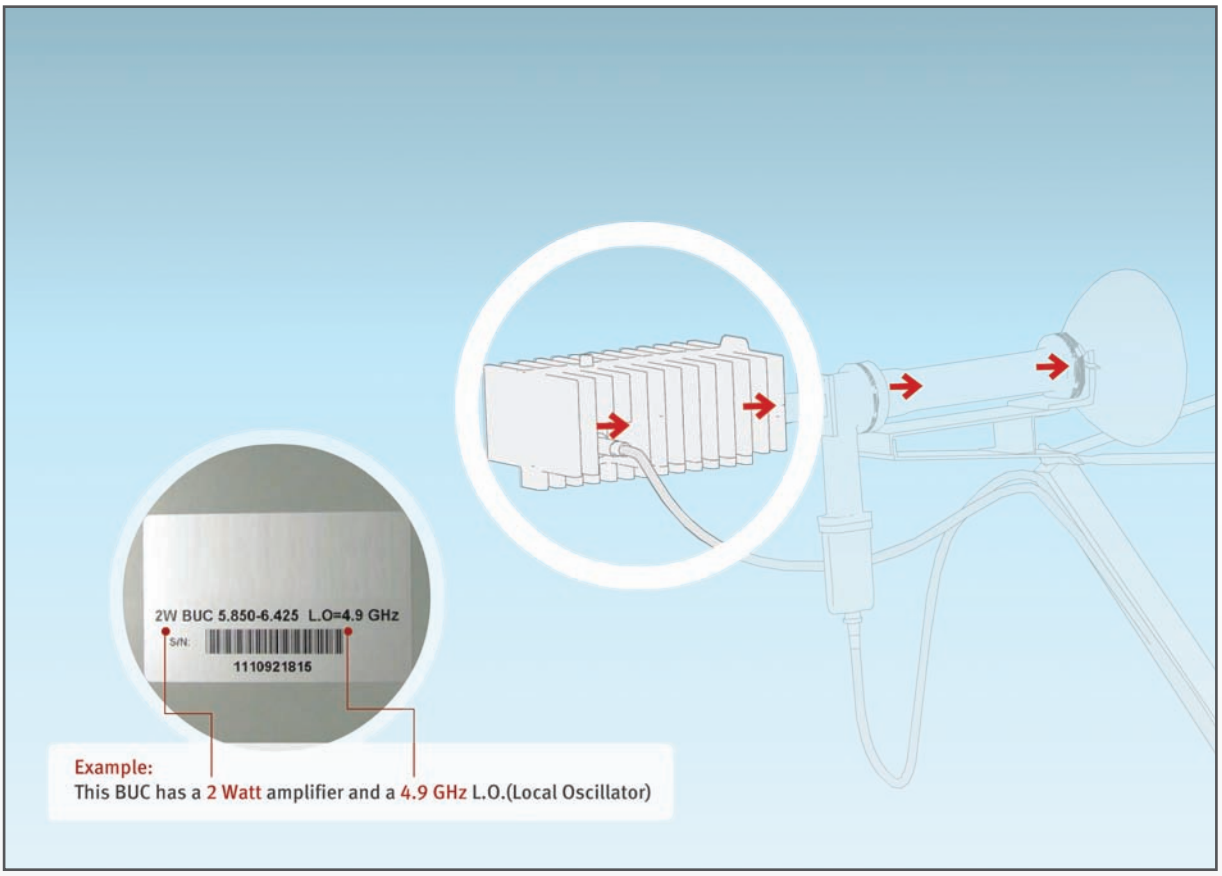
(Please note that the antenna usually has an elevation offset which you can find in your antenna manual. You will need to refer to this offset in section **3.3 Azimuth and Elevation.**)

2.3 The LNB - Low Noise Block Down-Converter



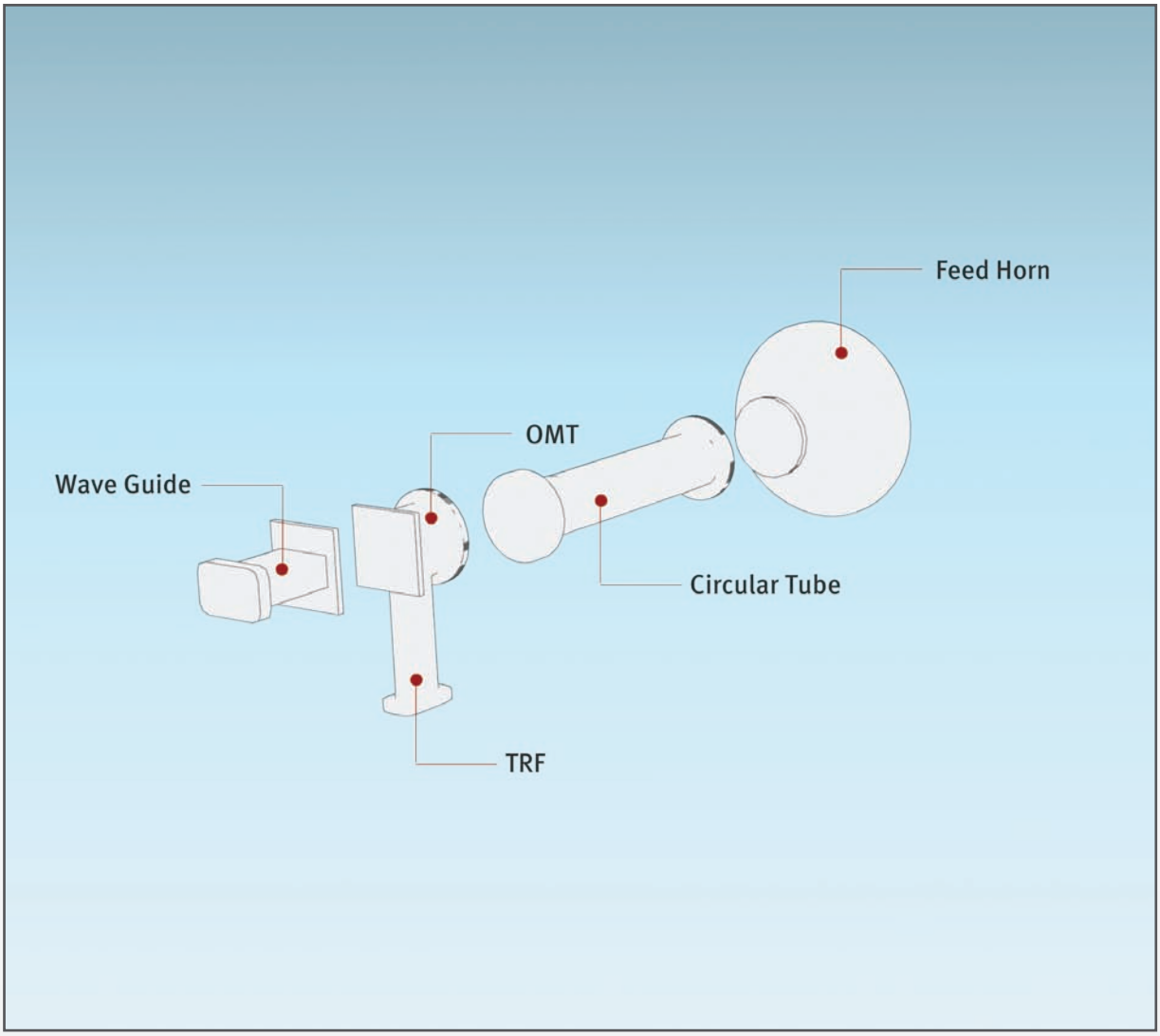
The LNB (Low Noise Block Down-Converter) is part of the receive chain of your VSAT. Located on the feed horn, the LNB converts the satellite signal that was reflected off of the satellite antenna's reflector from C-Band into an L-Band signal. The L-Band signal is in the frequency range of 950 to 1750 MHz and is considered more manageable. This is partially due to the fact that the transmission of the lower frequency signal can be more reliable when using a coaxial cable than is the case when higher frequency C-Band signals are transmitted of on this type of cable. Virtually all new satellite routers today use L-Band inputs. An LNB can be identified by its F-type output connector.

2.4 The BUC - Block Up-Converter



The BUC (Block Up-Converter) is part of the transmit chain of your VSAT. It is often located on the feed horn, but if it is a large BUC, it may be located at the base of the antenna and connected with RF conduits (waveguides).
The BUC converts the modem's L-Band transmit signal into higher frequency C-Band signals, then amplifies it before it is reflected off the satellite antenna towards the satellite. In order to perform both of its functions, the BUC is composed of two individual components: the Local Oscillator and the Power Amplifier. The Local Oscillator performs the frequency conversion between the L-Band and the satellite frequency, such as C-Band. The resulting satellite frequency is calculated by adding the L-Band frequency to a number known as the Local Oscillator Frequency that will be stamped onto the BUC. A Local Oscillator Frequency of 4900 MHz is used for a non inverted spectrum, and a Local Oscillator Frequency of 7375 MHz is used for an inverted spectrum. A typical system will require a 2-watt BUC or higher, depending on the application. Although BUCs are available with very powerful amplifiers, it is unlikely that a VSAT installation will require more than 10W, even in less than ideal circumstances. SkyVision will provide you with the specific power requirements for your service.

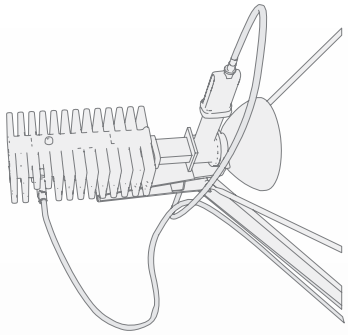
2.5 The Feed



The Feed is composed of the Feed Horn, OMT (Orthomode Transducer), the Transmit Reject Filter (which is either built-in or needs to be added on the receive end of the OMT), Waveguide and Circular Tube, for circular polarization requirements. There are three main polarization positions used for SkyVision Services.

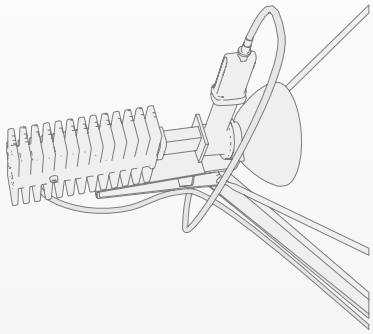
(Refer to your SkyVision Scheduling Kit for your polarization requirements.)

2.5.1.1 Linear Cross-polarization



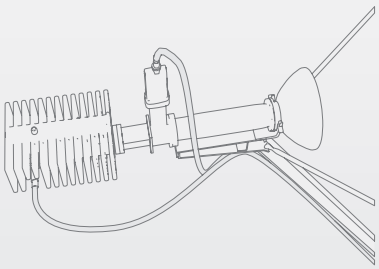
In order to transmit and receive in *opposite* polarities you will need to assemble the feed so that the receive part of the OMT (which the LNB is attached to) is perpendicular to the ground and the wide face of the waveguide is parallel to the ground.

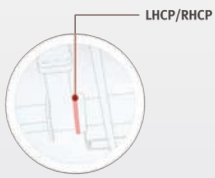
2.5.1.2 Linear Co-polarization



In order to transmit and receive in the *same* polarities you will need to assemble the feed so that the receive part of the OMT (which the LNB is attached to) is perpendicular to the ground and the narrow face of the waveguide is parallel to the ground.

2.5.1.3 Circular Cross-polarization





In order to transmit and receive in *opposite circular* polarities you will need to add the circular tube between the feed horn and the OMT. Assemble the feed so that the receive part of the OMT (which the LNB is attached to) is perpendicular to the ground and the wide face of the waveguide is parallel to the ground. Make sure that the receive part of the OMT is aligned to the desired reception polarity, either LHCP or RHCP which is displayed on the mouth of the circular tube.

2.6 The iDirect Satellite Router

SkyVision VSAT solutions include one of the following three iDirect Satellite Routers; the iNFINITI 3100, the iNFINITI 5100 or the Evolution X3.

2.6.1 The iDirect iNFINITI 3100 Satellite Router

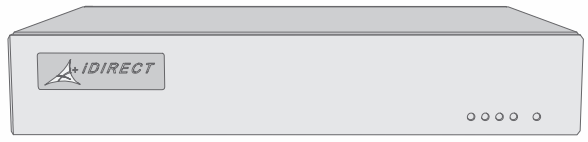
The iDirect iNFINITI 3100 Satellite Router has several important features:

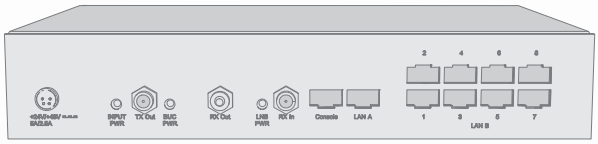
- Star Topology
- A built-in TCP and HTTP acceleration
- Advanced QoS and prioritization
- Automatic end-to-end Uplink Power Control for higher network availability
- 2 back panel indicators, one for the BUC and the other for the LNB
- An RX output for an auxiliary device

The iNFINITI Image Versions for SkyVision's Services are Versions 7.1.1 and 8.0.2.5.

(Please note that if your remote displays a constant message such as: "unknown broadcast message", and ignores the commands from the HUB it means that the iNFINITI version you are using is below the minimum 7.1.1 version requirement).

2.6.2 The iDirect iNFINITI 5100 Satellite Router





The iDirect iNFINITI 5100 Satellite Router has several important features:

- Star topology, Mesh and iSCPC
- Built-in TCP and HTTP acceleration
- Advanced QoS and prioritization
- Automatic end-to-end Uplink Power Control for higher network availability
- 2 back panel indicators, one for the BUC and the other for the LNB
- An RX output for an auxiliary device

The iNFINITI 5100 also has an 8 Port 10/100 Ethernet Switch.

The iNFINITI Image Versions for SkyVision's Services are Versions 7.1.1 and 8.0.2.5.

(Please note that if your remote displays a constant message such as: "unknown broadcast message", and ignores the commands from the HUB it means that the iNFINITI version you are using is below the minimum 7.1.1 version required.)

2.6.3 The iDirect Evolution X3 Satellite Router

The iDirect Evolution X3 Satellite Router has several important features:

- Star topology
- DVB-S2/ACM outbound for greater efficiency and enhanced network availability
- Automatic end-to-end Uplink Power Control for higher network availability
- Built-in TCP and HTTP acceleration
- Advanced QoS and traffic prioritization
- There is also a red button to restart at the default configuration in case of contact loss because of user error.

(The default IP address of the satellite router is 192.168.0.1.*)*

The X3 Evolution Image Version for SkyVision Services is Version 9.0.0.7.

(*Please note that the Evolution X3 has no telnet status notifications regarding incompatible image versions; however, if the remote is not locked it shows lock searching notifications.)*

2.7 Coaxial Cables

Coaxial cables are used to connect the iDirect Satellite Router to both the BUC and the LNB, carrying the RF signal for both the Receive and Transmit functions.

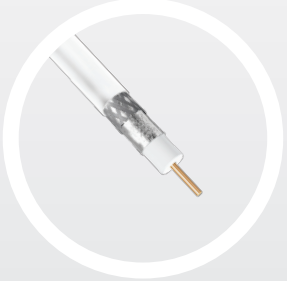
2.8 Length and Quality of Signal

Selecting suitable coaxial cables is an important decision. Both the type of cable and the distance from the VSAT antenna to the satellite router will directly affect the quality of the received and transmitted signals. SkyVision's standard maximum length of cable is 30 meters.

(SkyVision can assist you by providing advice on cable selection.)

2.9 Comparison of RG-6 and RG-11 Cable Types

The coaxial cable used to connect the LNB and the BUC should have a 75 (ohm) impedance and typically should be either an RG-6 or RG-11 cable. The decision made regarding which of these two types to use is one of cost vs. performance. The RG-6 cable is cheaper than the RG-11, but also suffers greater signal reduction. The RG-11 cable is usually more expensive, but provides a higher signal transmission performance. This performance difference should be considered when making any decision, along with any loss that may result from a larger distance between the iDirect Satellite Router and the antenna when making any decision.



RG-6

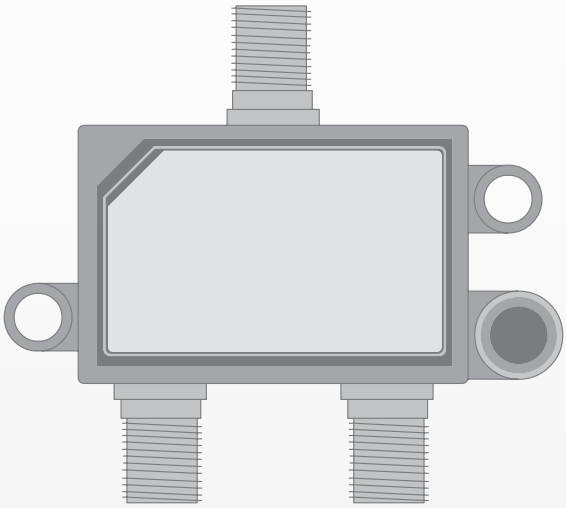
RG-11

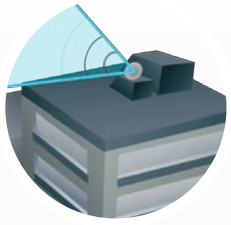
2.10 Connectors

Cable preparation and installation are of critical importance and careful attention must be paid to the work being done during these stages. Connectors that have not been crimped and properly weather-proofed will most likely create problems. If you choose to route the cables underground, a conduit must be used.

2.11 Splitter

In the event that a splitter is used, it must be of the correct type. A splitter from a hardware store will not work, as these "consumer" splitters are designed for TV frequencies and will not pass the higher frequencies of the satellite signal. Purchase a splitter designed specifically for cable and satellite communications that has two outputs, ensuring that one output is a DC pass-through output.





Chapter 3

SITE SURVEY

3.1 Site Survey Introduction

In this chapter, we will conduct a site survey to determine the optimal location for the VSAT. It is important to note that failure to properly conduct the site survey can lead to many challenges in the future.

3.2 Determine Who Will Perform the Site Survey

If you are not experienced in performing the site survey yourself, you should hire a Certified SkyVision Installer. Contact your SkyVision Sales Manager for assistance.

3.3 Azimuth and Elevation

Before the next step of measuring the line-of-sight, please calculate your Azimuth and True Elevation online at: www.dishpointer.com and follow these steps:

1) Type your location and press **Go**.
2) Choose your satellite from the drop down menu.
3) Scroll down to **Dish set up Data**, where you can view your Elevation and True Azimuth.

If you are using an offset antenna, subtract the offset from the true elevation angle to get the actual elevation.

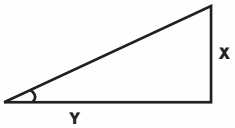
(Please note that you will be shown how to use the iSite application to confirm the Azimuth and Elevation angles later on in section **5.16 Using the iSite "Antenna Pointing" Tool.)**

3.4 Line-of-Sight

Communication satellites used in the satcom industry are typically in geostationary orbit, appearing to be in a fixed position in the sky directly above the equator, relative to an observation point on earth. The entire field of geostationary satellites can therefore be found in an arc across the sky. In order to communicate with the satellite you wish to downlink from or uplink to, the antenna must be able to "see" the location in the sky above the equator in which the satellite is located. The situation of an unobstructed view between the satellite and the antenna is known as "having a line-of-sight" to the satellite.

3.5 How to Check the Line-of-Sight

To calculate the line-of-sight you will need to do some basic mathematics. You will be shown how to use the Microsoft Windows Calculator to perform the necessary calculations.



Where **X** is the height of the obstruction in front of the antenna and **Y** is the distance between them.

For example, if the obstruction is 8 meters high and 32 meters away from the antenna, you will need to perform the following calculation: **arc tan (8/32) = ∝**

Use the Microsoft Windows Calculator to calculate your line-of-sight as follows:

1) Navigate to your windows calculator.
2) Choose **View** then **Scientific.**
3) Enter the height of the obstruction in meters and divide it by the distance in meters.
4) Choose the equals function.
5) Check the **Invert** box.
6) Choose the **Tan** function.
7) The result will be the minimum angle of your true elevation in degrees.
8) This angle should be lower than the true elevation angle of your antenna.

If you do not achieve a clear line-of-sight, relocate the antenna until this is achieved.

3.6 Terrestrial Site Selection Checklist

In addition to achieving the optimal line-of-sight to the satellite, there are some very important elements to consider when choosing the location for the physical placement of the antenna. The following should be verified when determining the antenna location:

- Check to see that the site is relatively flat and level (using a leveler), and that it will be possible to conveniently access the antenna once installed.
- Check the site for underground obstructions, such as buried cables or pipes.
- Check the site for interference from WiMAX, microwave transmissions, cellular telephone towers and even airport radar.
- The site should be free from construction. If construction work is planned in the area in which the antenna will be installed, the use of an alternate location should be considered as the construction can interfere with transmission or damage the antenna and its surrounding infrastructure.
- Confirm that installation at the site will follow all local building codes regarding grounding, foundation requirements, zoning rules, setbacks and any other requirements specific to your location.

3.7 Roof Location Considerations

Roof locations present unique concerns for an antenna installation, such as access to the antenna, the need to properly anchor the antenna mount, and terrestrial interference. Consider these factors before deciding to mount the antenna on a roof.

3.8 Antenna Installation - Roof Location

If you decide on a roof location, make sure that the location provides a clean, flat, secure, and construction-free environment with:

- A lightning arrestor that is properly grounded.
- An easily accessible point-of-entry for two coaxial cables, or a location where the installer can create a point-of-entry.
- Secure access to the antenna away from unauthorized personnel.
- An antenna surface capable of supporting the weight of the VSAT plus its wind load.
- One 230V AC or 110V AC outlet near the installation site for use during both the installation process and subsequent maintenance work.
- A clear path or empty conduit to run a two inch minimum diameter coaxial cable from the building's point-of-entry to the base of the antenna.
- Site security. The remote gateway antenna can create harmful non-ionizing radio frequency radiation to humans. To avoid this, the antenna must be placed in a controlled area with restricted human access to the physical air space between the antenna reflector and the output of the radio frequency amplifier.

3.9 Equipment Room Power Requirements

Room and building preparations are required to ensure that the ground segment equipment can function well.
The equipment room should meet the following minimum requirements:

- Ambient temperature range between 20 and 25 degrees Celsius.
- Maximum rate of air temperature change of less than 5 degrees Celsius per hour.
- Relative humidity between twenty percent (20%) and fifty percent (50%).
- Continuous air cycling with filtration for proper ventilation to ensure that equipment is kept free of contaminants and particle matter.
- Fibrous material and gaseous elements should not be present in the equipment room.
- Availability of an appropriate number of units of vertical rack space in standard 19" equipment racks, as well as sufficient 230V AC, 10AMP outlets in each rack.
- Measures implemented to prevent the build-up of electrostatic discharge (i.e appropriate straps and mats, and no carpeting)
- Power should be provided using an uninterrupted power supply according to your local electrical code and power requirements, with either rectified 230V AC or 110V AC outlets in each rack that will house equipment.

Chapter 4

ANTENNA INSTALLATION

4.1 Antenna Installation & Alignment Prerequisite Checklist

In this chapter we will learn about the requirements and procedures for installing and aligning your antenna.
The installation will not be successful if the equipment is not ready or the installer does not have the right set of tools or knowledge. If the proper preparations are not made, there is a risk that work may be interrupted. This could result in additional costs or even damage to the equipment. The following points should be reviewed prior to commencing the installation and alignment process.

4.2 VSAT Terminal Field Installer

First, the satellite terminal field installer must have solid knowledge and understanding in antenna installation, covering:

- Assembly, Alignment, Peak, and Pol.
- The TX and RX RF chain.
- The Windows operating system, IP configuration, and setup.

4.3 VSAT Installer Equipment Requirements

The installer is required to have the following equipment:

- Inclinometer
- Compass
- Laptop or desktop computer with Windows 98 and above, WinZip/ WinRar and a com port connection.
- Voltmeter
- Basic Tools that include flat, cross, and helen screwdrivers, a wrench, and a wire cutter
- Extra cables for RF that include an RG6 cable, straight and cross Ethernet cables and an RS232 serial cable for router initial configuration

Optional but highly recommended additional and spare equipment to have on site:

- Spectrum Analyzer
- BUC
- LNB
- Satellite Router

4.4 SkyVision Scheduling Kit and Option File

At this point you will need to be able to refer to the SkyVision Scheduling Kit that was emailed to you. Attached you will also find your iDirect Satellite Router Option File containing configuration parameters that include the following:

- Carrier transmit and receive frequencies
- Local Area Network (LAN) and Wide Area Network (WAN) IP addresses

4.5 Verify List of On-site Equipment

Confirm that all the necessary VSAT components are on-site according to the list of equipment provided by SkyVision. If any of the items in the checklist are not available, please contact your SkyVision representative.

4.6 Antenna Installation & Alignment

Once you have confirmed that you have made all of the necessary preparations, the antenna installation and alignment can commence.

Installation
Manufacturer's installation instructions should have been included with the antenna. If they cannot be found, or any part is unclear, please ask your installer to clarify or contact SkyVision's Installation Support. Proper alignment of the antenna is critical to receive a strong signal, and so as not to interfere with other satellites. This is a very precise process that must be followed carefully. An antenna that is not properly aligned can affect the quality of the service being received.

Alignment
Before starting, you will need to have on-hand the look angle and elevation coordinates that you calculated in sections **3.3** and 3.5 If you do not have these, refer to the information sent to you by SkyVision along with the "option file".

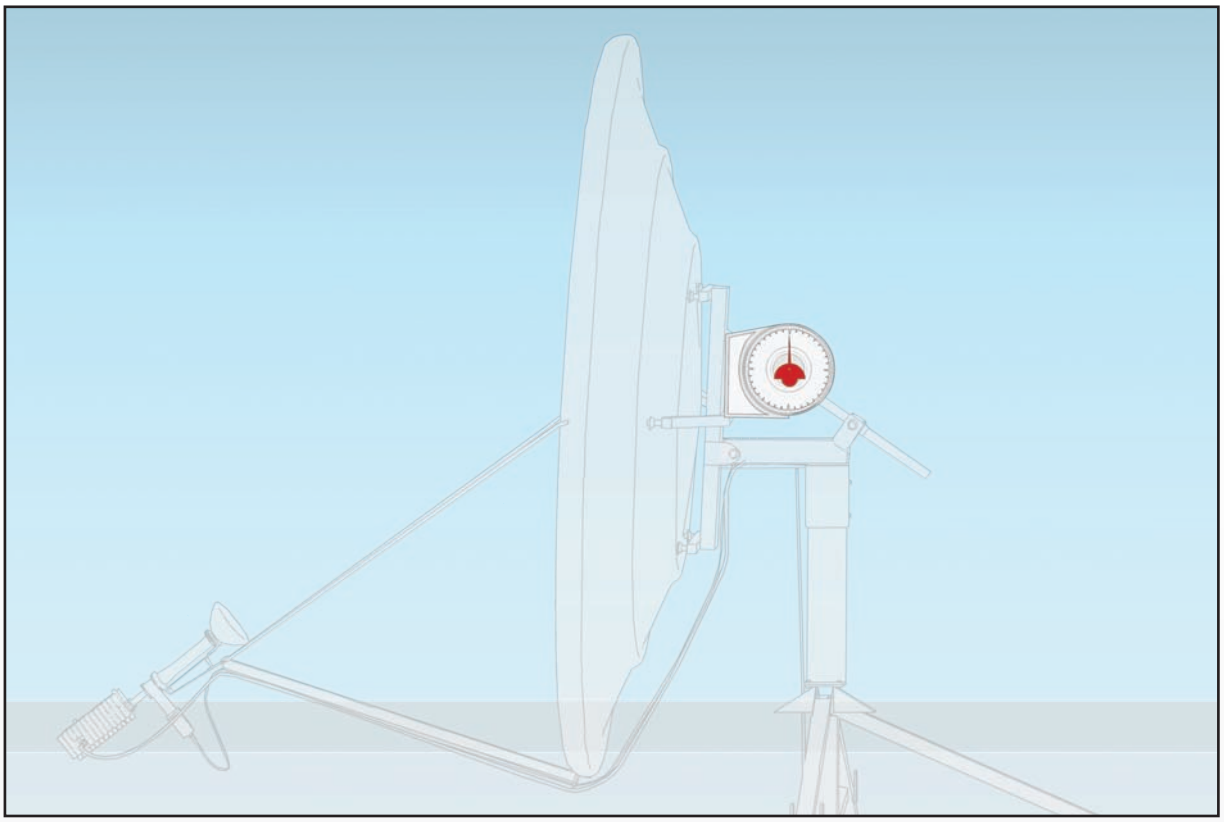
The antenna should now be aligned as follows:

1) Assemble and anchor the antenna according to the manufacturer's instructions.
2) Make sure your antenna is level by using a leveler.
3) Make sure you have assembled the feed in the correct polarization position.
4) Refer to the correct coordinates you calculated in the **Alignment and Elevation** step.
   Important: When aligning the azimuth, do not set the compass on a metal surface because of potential magnetic interference.
5) To set the antenna's azimuth, use a compass as reference and adjust the antenna left or right horizontally.
6) To set the antenna's elevation angle, use the inclinometer as reference and adjust the strut vertically.

(Please note that the elevation offset for offset antennas is determined by the antenna model. To find out your antenna's offset, please refer to the antenna user manual provided by the manufacturer.)

The fine-tuning of the alignment will be performed after the iDirect Satellite Router has been properly installed and configured.

4.7 How to Calculate the Inclinometer Elevation Angle



To calculate the inclinometer elevation angle, position the inclinometer on the metal surface that attaches the antenna to the mount. You will need to take into account that the inclinometer will be positioned vertically at 90 degrees to the ground. With this in mind, it is important to understand the following example:

If your true elevation is 50 degrees and your offset is 20 degrees, subtract your offset from your true elevation, which will give you the total value of 30 degrees. Now, subtract your new elevation value of 30 degrees from the inclinometer's starting value of 90 degrees. 60 degrees will be your desired inclinometer elevation angle.

Chapter 5

ROUTER INSTALLATION

5.1 Connecting and Installing the iDirect Satellite Router

In this chapter, we will complete the steps of your iDirect Satellite Router Installation.
To connect the iDirect Satellite Router:

1) Turn on the iDirect Satellite Router and wait for the status LED to **turn off** and for the RX and Net LED to **turn on**. Confirmation of this will mean that the satellite router has fully booted up.
2) Connect a console cable (RJ45 to DB9) from the console port of the satellite router to the DB9 PC port (Com1) of your computer.
3) Identify the satellite router's IP address by using the Putty application. Make sure to use either version 0.6 or above. You can also use the Hyper Terminal application to identify the satellite router's IP address.

5.2 Connecting with Putty

To identify the satellite router's IP address using the Putty application:

1) Open the Putty application.
2) Choose the **Serial connection**, and click **Open**.
3) After gaining access to the satellite router, enter the login details as follows:
   iDirect Login: root
   Password: iDirect
   Make sure to use a capital "D" and then press **enter**.
4) Type the command, "ifconfig". On the second line of the ixp card you will see "inet addr:", which is the LAN IP address of the iDirect Satellite Router and "Mask:", which is the subnet mask of your LAN.

5.3 Connecting with Hyper Terminal

To identify the satellite router's IP address using the Hyper Terminal application:

1) Open the Hyper Terminal application.
2) In the **Connection Description** window, type in a name of your choice and click **OK.**
3) In the **Connect To** window, select **COM1** (which is the port that is connected to the satellite router).
4) In the **COM1** Properties window, choose **Restore Defaults.**
5) Once you have gained access to the satellite router, enter the login details as follows:
   iDirect Login: root
   Password: iDirect
6) Type the command "ifconfig". On the second line of the ixp card you will see, "inet addr:", which is the LAN IP address of the iDirect Satellite Router and "Mask:" which is the subnet mask of your LAN.

5.4 Configuring Your PC as a Host on Your Satellite Router LAN

To configure your PC as a host on the satellite router LAN, you will need to identify your default gateway and subnet mask as follows:

Connect an Ethernet cable (RJ45) from the LAN port of the satellite router to the PC port (LAN) of your computer.

1) Navigate to the **Local Area Connection Properties.**
2) In the **General Tab**, navigate to Internet **Protocol (TCP/IP)** and click **Properties.**
3) Check the box **Use the following IP address.**
4) Note the satellite router's **IP address** appearing after "inet addr". In the IP address field, type in the same IP address as the satellite router's but change the last digit to one value higher than is stated. This will be the IP address of your computer.
5) Use exactly the same details from the **Mask**: in the Hyper Terminal window to fill in the subnet mask in the **Internet Protocol (TCP/IP) Properties** window.
6) Enter the default gateway IP address, which is identical to the satellite router's IP address.
7) Click **OK** in the **Internet Protocol (TCP/IP) Properties** window, and then click **Close** in the **Local Area Connection Properties** window.

(This will apply the changes.)

5.5 Checking the Version of the iSite Application and the Satellite Router

Now, confirm that the versions of the iSite application and the satellite router correspond to the SkyVision Option File you received.

5.6 How to Check Your Version of iSite

Please check your version of iSite by moving your cursor over the iSite file icon. Cross reference the version number with your SkyVision Option File. They should be the same.

5.7 Checking Your Version of the Satellite Router

Check the version of your satellite router as follows:

1) Open a Telnet Session in the Hyper Terminal application by typing the command "telnet 0.
2) Enter the username and password as follows:
   Username: admin
   Password: P@55w0rd!
3) Once you have logged in to the Telnet Session, type the command "version". Your satellite router version will appear on the second line, next to "Code Version:".
4) Cross-reference the satellite router version with the SkyVision Option File. They should be the same.

If the version of your satellite router is correct and your version of iSite is the same as stated in your SkyVision Option File, go to **step** 5.11 **Loading the Option File**. If not, continue to the next step **5.8 How to Download the Correct Version of iSite.**

5.8 How to Download the Correct Version of iSite

To access the appropriate version of iSite application or satellite router image, you will need to download the remote package from the following link:
ftp://cloud.sky-vision.net/pub/iDirect/software *(Make sure to capitalize the "D" in iDirect.)*
At this point, you will have to re-identify the satellite router's IP address and again configure your PC as a Host on your satellite router LAN before opening the iSite application. (5.4)

5.9 Using iSite to Log in to the Satellite Router

Before you log in to the satellite router make sure you have disabled your firewall, then follow these steps:

1) Open the iSite application.
2) Right-click **TDMA Remote** and select **Log in.**
3) Enter the password: **P@55w0rd!**, choose **Login as Admin** and click **OK**.

Troubleshoot: If iSite does not identify the remote automatically, follow these steps:

1) Right-click the **iDirect** icon in the left-hand menu, and then select **New.**
2) Right-click **Unknown** and select **Login.**
3) Enter the IP Address of the satellite router and the **password: P@55w0rd!**, then click **OK.**

The **Configuration TDMA Remote** window will appear. This confirms that you have successfully logged in to the satellite router.

5.10 Downloading the Correct Version of the Satellite Router Image

To download the correct version of the satellite router image to the "satellite router":

1) Open the iSite application. Right-click **TDMA Remote** and log in to the satellite router.
2) If the Telnet Session is not opened, right-click on the **TDMA Remote**. Select **Connect** and then **Telnet**. Enter the username: **admin** and use the same password as in the previous step. This will allow you to monitor the progress of the version change.
3) Right-click the **TDMA Remote**, then select **Download Package.**
4) Click **Open**, and then browse for the **cumulative update** located in the **remote package**.
5) Make sure that the checkboxes **Don't check version, Downloaded images only** and **Don't reset** are selected.
6) Click **Start** and then navigate to the Telnet window. *(Once this is completed, you will see the message "Flash completed" in the telnet window. Continue to the next step only when you have seen this message.)*
7) When downloading has finished, go to the **download package** window click **Open** and then browse for the **rmt file** located in the **remote package** folder.
8) Make sure that you select the checkboxes **Don't check version, Downloaded images only** and **Don't Reset**. *(Pay close attention to the last checkbox.)*
9) Click **Start**, and then navigate to the Telnet window. After a few minutes, you will see the message "Flash completed" in the telnet window. When downloading has finished, go to the **download package** window and click **Close.**
10) Now you will need to load the Option File. For that go to the next section to complete the version update.

5.11 Loading the Option File

To load the Option File:

1) Save the Option File that SkyVision sent you to your Desktop.
2) Open the HyperTerminal or Putty application to monitor the progress of the following steps.
3) If the iSite application is not open, open it now.
4) Right-click the **TDMA Remote** submenu, then select **Download Option from Disk.**
5) Browse for the Option File and click **Open** to load it to the satellite router from your desktop.
6) Choose **Yes** to approve the downloading of the Option File.
7) In order to complete the loading of the Option File, iSite will request to reset your satellite router. Choose **Reset Now.**
8) Monitor the Hyper Terminal or Putty application and wait to see the iDirect login. Login as usual to confirm that the satellite router has finished rebooting.
9) Repeat step 5.7 **Checking Your Version of the Satellite Router** to confirm that the satellite router version has been updated.
10) Make sure that the satellite router operates with the new Option File, by checking that the IP address of the satellite router is the same as the ETH0_1 address in the Option File.

5.12 Changing the IP Configurations on Your PC to DHCP

Once you have loaded the Option File, you will need to change the IP configurations on your PC to DHCP. To do this, navigate to the **Local Area Connection Properties,** and follow these steps:

1) In the **General Tab**, navigate to the **Internet Protocol (TCP/IP)** and click **Properties**.
2) Select both **obtain an IP address automatically** and **obtain DNS server address automatically.**
3) Click **OK** and close both the **Internet Protocol (TCP/IP)** and the **Local Area Connection Properties** windows.

You have now changed the IP configurations on your PC to DHCP.

5.13 Calculating the Azimuth and Elevation with the iSite Application

In order to confirm the Azimuth and Elevation calculations using the "iSite application":

1) Log in as **Admin** to the satellite router with iSite as previously explained.
2) Right click on the **TDMA Remote** icon.
3) Go to **Align Antenna,** and then choose **Antenna Pointing.**
4) If you have already loaded the Option File the next 3 steps have already been configured and you just need to confirm that they are correct.
5) Under **Remote Location** enter the latitude and longitude of your VSAT location.
6) Under **Spacecraft Position** enter the satellite longitude.
7) Under **Elevation Information** enter your antenna's **Offset** according to your antenna manual.
8) Under **Gross Antenna Pointing Information** you will find the **Elevation Actual** and the **Azimuth True** final calculations.

5.14 Finding the Correct Satellite

Now, you will need to fine-tune the alignment of your antenna to the correct satellite. To do this, you can either use a spectrum analyzer or the iSite application.

5.15 Using a Spectrum Analyzer

To align your antenna to the correct satellite using a spectrum analyzer, follow these steps:

1) Find the downlink carrier details as stated in the Option File sent to you by SkyVision for reference.
2) Open the Option File.
3) Scroll down to the [Modem Parameters] paragraph.
4) The downlink frequency carrier in hertz will be located next to the RX_Freq. This value needs to be converted to an L-Band range. To do this, divide the value by 1 million.
5) Next to the RX_bitrate you will find a value in bits that you can convert to the span required on the spectrum analyzer. The conversion needs to be from bps to Mbps. To do this, divide the value by 1 million. (This is the SkyVision downlink carrier.)
6) Connect the LNB to the splitter input using a 75 ohm RG6 coaxial cable.
7) Connect the splitter DC pass-through output to the satellite router.
8) Connect the other splitter output to the spectrum analyzer.

WARNING: Make sure that you are using a DC Block on your spectrum analyzer input.

Troubleshoot: *In the event of a bad connection, check the cables to see if they are damaged.*

9) Adjust the spectrum analyzer to the beacon frequency of the satellite or to the SkyVision downlink carrier, where the Center frequency will be the calculated **RX_Freq** and the span will be the calculated **RX_bitrate** just in units of Mhz instead of Mbps.
10) Adjust the elevation to the correct value, according to the site location and antenna offset.
11) Sweep the sky in the expected azimuth area until you acquire the satellite signal. If the signal is not acquired, decrease or increase the elevation angle by slightly adjusting the strut, and repeat the azimuth sweep until the signal is acquired.

Troubleshoot 1: *Rotate the Feed component until you achieve the correct polarity confirmed by optimal signal representation.*
Troubleshoot 2: *If you cannot confirm reception of the satellite signal, do the following*:

a. Point the antenna towards another familiar satellite.
b. Check to see if you can receive a signal. Reception of a signal will verify that the receive chain is operational.
c. Once the familiar satellite signal is acquired, record the inclinometer and compass measurements to confirm the offset.
d. Now that you have confirmed signal reception from a familiar satellite and that your VSAT is operational, repeat steps 10 and 11 until the correct satellite signal is acquired, or contact SkyVision for further assistance.

12) Adjust the feed horn slightly and monitor the size of the carrier on the spectrum to complete the maximization of the gain. To determine the best polarization setting, rotate the feed element until you acquire the strongest signal level which will have the least amount of interference from the opposing polarization.

(For more information on polarization, consult a satellite reference document.)

5.16 Using the iSite "Antenna Pointing" Tool

Before aligning your antenna to the correct satellite using the iSite application, it is important to note that you must **always** power down the satellite router when connecting and/or disconnecting the coaxial cables. You must also disable any firewall application, as this will interfere with the procedure.

To find SkyVision's downlink carrier using iSite:

1) Open iSite, and right-click the **TDMA Remote** submenu.
2) Select **Align Antenna.**
3) Select **Antenna Pointing**, and then select the **Antenna Pointing Tab.**
4) Select **Start**, to initiate the process.
5) Now remove the TX cable from the BUC, then press **OK.**
6) Monitor the **Current Signal Strength** values, the graph and the audio cues, for reference during the next two steps.
7) Adjust the elevation to the correct value, according to the site location and antenna offset.
8) Sweep the sky in the expected azimuth area until you acquire the satellite signal. If the signal is not acquired, decrease or increase the elevation angle by slightly adjusting the strut, and repeat the azimuth sweep until the signal is acquired.

   Troubleshoot: Rotate the Feed component until you achieve the correct polarity confirmed by optimal signal representation.

9) As you adjust the axes to the appropriate coordinates, the signal in the graph will progress from red, no signal detected, to green, signal detected. You can also hear this progression audibly in broken sound bites that increase in pitch and volume as your alignment becomes more accurate. The signal represented in green on the graph has the highest audio pitch. **A Current Signal Strength** value of 14 or more volts of direct current will confirm that SkyVision's downlink carrier has been detected.
10) Adjust the feed horn slightly and monitor the **Current Signal Strength** to complete the maximization of the gain. To determine the best polarization setting, rotate the feed element until you acquire the strongest signal level which will have the least amount of interference from the opposing polarization. (For more information on polarization, consult a satellite reference document.)

5.17 Information Check

Once the antenna is aligned correctly and the satellite signal gain is maximized, open a Telnet Session and type the following commands to complete an information check:

1) **"version"**, this determines if the version of the satellite router is correct. The "Code version:" should be as described by the Option file, in order to be able to work with the SkyVision service.
2) **"rlock"**, this command is for the iNFINITI model, type **"rmtlock status"** for the X3 Evolution, this command determines if the satellite router is locked on a previous provider. If the satellite router was previously used with another provider it might have been locked, in which case the word **LOCKED** will be displayed. If your satellite router is locked, you will need to unlock it. To do this, you must contact the previous provider and request that they unlock it. After receiving confirmation that your satellite router has been unlocked, proceed to the next step.
3) **"rx snr"**, this determines the signal-to-noise ratio. You will need to achieve a value of higher than 9db by readjusting the alignment of your antenna.
4) In capital letters, **"DID"**, this displays the identification parameters of the satellite router, regardless of the Option File.
   Make sure that the satellite router's model and serial number matches the ones displayed in the Option File.
5) **"rmtstat"**, this displays the RX parameters after getting a lock. During the activation process, when you receive your line-up schedule, you might be asked to type this command in order to check if there are SCPC errors and TDM loss.

5.18 Contacting SkyVision for the "Line-up" Schedule

Once all the approvals for the new link are received, the SkyVision Installation Department will send the first suggested time slot for the activation of the SkyVision Service. When activation has been completed in the suggested time slot, please send confirmation of the schedule to SkyVision Installation with the name and contact information of the technician.

If the activation must be completed at a later or earlier stage than the suggested scheduled time, please contact the SkyVision Installation Department with a convenient time for the activation schedule. You will receive either a confirmation mail or an alternative time slot mail from SkyVision.

The contact details for the SkyVision Installation Department are as follows:
Tel: + 44 208 387 1770(1)
Email: installation@sky-vision.net

Chapter 6

TROUBLESHOOTING AND SUPPORT

6.1 Troubleshooting Introduction

In this chapter, we will go over solutions for challenges you might encounter. Make sure you refer to the troubleshooting information that matches your iDirect Satellite Router Model.

6.1.1 Troubleshooting the iNFINITI 3100 and 5100 Receive Chain

To troubleshoot the Receive Chain:

1) Check to see that the LNB and feed horn match the service ordered.
2) In case of interference, it is recommended to use a narrow frequency range LNB.
3) Is the coaxial connection correct and tight?
4) If you do not know, or are uncertain of any of these parameters, we recommend that you consult the receiver documentation or call SkyVision support.
5) Check to see that the coaxial connector is clean and free from any corrosion. If there are signs of corrosion, it is recommended that the LNB be replaced.
6) Check to see that the feed is secured to the LNB using the screws provided with the LNB.
7) Check to see that the "O" ring is installed between the LNB and the feed horn flange to prevent water from entering the input waveguide of the LNB.
8) Check for the presence of water or moisture in the input waveguide of the LNB. If there are signs of corrosion it is recommended that the LNB be replaced.
9) Ensure that the condition of the outside cover of the coaxial cable is without breaks or cracks. Also make sure that there are no sharp bends, pinch points or flattened sections of the cable.
10) Check that there is between +13 and +18 volts coming from the receiver to power the LNB.
11) Ensure that the LNB PWR LED is green. If it is off, try to reset the satellite router. If the LED is red, the IFL cable which connects the LNB to the satellite router has short-circuited.
12) If there is a signal from the LNB but no signal at the router, check the signal at the end of the cable before the router with a spectrum analyzer.
13) In the Option File, under the **MODEM PARAMETERS** section, increase the rx acq_range to be 2 million.
14) Change the LNB to one with a narrow frequency range which is preferable.

6.1.2 Troubleshooting the Evolution X3 Receive Chain

To troubleshoot the Receive Chain:

1) Check to see that the LNB and feed horn match the Service ordered.
2) In case of interference, it is recommended to use a narrow frequency range LNB.
3) Is the coaxial connection correct and tight?
4) If you do not know, or are uncertain of any of these parameters, we recommend that you consult the receiver documentation or call SkyVision support.
5) Check to see that the coaxial connector is clean and free from any corrosion. If there are signs of corrosion, it is recommended that the LNB be replaced.
6) Check to see that the feed is secured to the LNB using the screws provided with the LNB.
7) Check to see that the "O" ring is installed between the LNB and the feed horn flange to prevent water from entering the input waveguide of the LNB.
8) Check for the presence of water or moisture in the input waveguide of the LNB. If there are signs of corrosion it is recommended that the LNB be replaced.
9) Ensure that the condition of the outside cover of the coaxial cable is without breaks or cracks. Also make sure that there are no sharp bends, pinch points or flattened sections of the cable.

10) Check that there are between +13 and +18 volts coming from the receiver to power the LNB.
11) If there is a signal from the LNB but no signal at the router, check the signal at the end of the cable before the router with a spectrum analyzer.
12) In the Option File, under the **MODEM PARAMETERS** section, increase the rx acq_range to 2 million.
13) Change the LNB to one with a narrow frequency range which is preferable.

6.2.1 Troubleshooting the iNFINITI 3100 and 5100 Transmit Chain

To troubleshoot the Transmit Chain:

1) Make sure that the BUC matches the antenna and the satellite router being used.
2) Are the input and output frequency ranges correct?
3) Is the 10 MHz reference signal present?
4) Is the DC power level around +24 volts at the router output and at the cable end on the roof? (If you do not know or are uncertain of any of these parameters, we recommend that you call SkyVision Support.)
5) Ensure that the coaxial connection is tight and that the connector is sealed against water. Connectors that incorporate a separate center pin that is soldered in place are recommended for the best operation of the BUC.
6) Ensure that the directions of the feed waveguide and OMT are oriented correctly. Failure to do so will result in improper operation of the BUC.
7) Ensure that the BUC is secured to the feed using the screws provided with the BUC.
8) Ensure that the "O" ring is installed between the BUC and the feed flange to prevent water from entering the input waveguide of the BUC.
9) Ensure that all external BUC assemblies are properly grounded in accordance with grounding instructions supplied by your antenna and receiver manufacturer's manual. Grounding provides protection to the BUC against lightning and ESD damage.
10) For proper system operation consult your iDirect Satellite Router manual.
11) Ensure that the BUC PWR LED is green. If it is off, try to reset the satellite router. If the LED is red, the IFL cable which connects the BUC to the satellite router has short-circuited. Check the Option File under the ODU section to make sure that the tx iflDC equals 1.
12) Ensure that the condition of the outside cover of the coaxial cable is without breaks or cracks. Also make sure that there are no sharp bends, pinch points or flattened sections in the cable.
13) Change the BUC, make sure the Local Oscillator frequency is the same. If not change the Option File under FREQUENCY TRANSLATION to the new L.O .Frequency.

WARNING: There are no user-serviceable parts inside the BUC. Failed BUCs must be returned to the factory for testing. Opening the BUC or any attempt to repair the BUC will void the BUC warranty.

6.2.2 Troubleshooting the Evolution X3 Transmit Chain

To troubleshoot the Transmit Chain:

1) Make sure that the BUC matches the antenna and the satellite router being used.
2) Are the input and output frequency ranges correct?
3) Is the 10 MHz reference signal present?
4) Is the DC power level around +24 volts at the router output and at the cable end on the roof? (If you do not know or are uncertain of any of these parameters, we recommend that you call SkyVision Support.)
5) Ensure that the coaxial connection is tight and that the connector is sealed against water. Connectors that incorporate a separate center pin that is soldered in place are recommended for the best operation of the BUC.
6) Ensure that the directions of the feed waveguide and OMT are oriented correctly. Failure to do so will result in improper operation of the BUC.

7) Ensure that the BUC is secured to the feed using the screws provided with the BUC.
8) Ensure that the "O" ring is installed between the BUC and the feed flange to prevent water from entering the input waveguide of the BUC.
9) Ensure that all external BUC assemblies are properly grounded in accordance with grounding instructions supplied by your antenna and receiver manufacturer's manual. Grounding provides protection to the BUC against lightning and ESD damage.
10) For proper system operation consult your iDirect satellite router manual.
11) Ensure that the condition of the outside cover of the coaxial cable is without breaks or cracks. Also make sure that there are no sharp bends, pinch points or flattened sections in the cable.
12) Change the BUC, make sure the Local Oscillator frequency is the same. If not, change the Option File under FREQUENCY TRANSLATION to the new L.O. frequency.

WARNING: There are no user-serviceable parts inside the BUC. Failed BUCs must be returned to the factory for testing. Opening the BUC or any attempt to repair the BUC will void the BUC warranty.

6.3.1 iNFINITI 3100 and 5100 Troubleshooting Checklist

In the event of service quality degradation or service interruption, please carry out the following troubleshooting checklist before contacting the SkyVision Support Center so that we may better assist you:

1) Was there a change or failure of equipment? (Please be detailed in your account.)
2) Are the TX, RX and LAN cables connected to the satellite router?
3) Is the RX LED on?
4) Is your satellite router TX LED on?
5) Is the Network LED on?
6) Is the BUC PWR LED on?
7) Is the LNB PWR LED on?

6.3.2 The Evolution X3 Troubleshooting Checklist

In the event of service quality degradation or service interruption, please carry out the following troubleshooting checklist before contacting the SkyVision Support Center so that we may better assist you:

1) Were there any changes made in the system prior to the problematic occurrence? (Please be detailed in your account.)
2) Are the TX, RX and LAN cables connected to the satellite router?
3) Is the RX LED on?
4) Is your satellite router TX LED on?
5) Is the Network LED on?

6.4 SkyVision Support Help Desk Procedure

Thank you for choosing SkyVision as your internet connectivity service provider. We are making the utmost effort to provide you with the most professional and prompt service.

For further information or assistance, please do not hesitate to contact us.

Call the 24/7 SkyVision Support Center at: + 44 20 8387 1770.
Email: support@sky-vision.net
Text us via MSN Messenger at: support@sky-vision.net

Please have the information you have gathered while analyzing and troubleshooting the problem on hand for reference.

RESOURCES

Azimuth and Elevation

Refer to the azimuth and elevation chart in the following link to find out how to position your antenna so that it can "look" at the satellite to which you wish to downlink and uplink to: www.dishpointer.com

Downloading the Correct Version of iSite

If you do not have the correct version of iSite, you will need to download the remote package which contains the correct version of the iSite application and image from the following link: ftp://cloud.sky-vision.net/pub/iDirect/software

SkyVision Help Desk Procedure

If you require further assistance, please follow the SkyVision Help Desk Procedure:

Have the information on hand that you gathered while analyzing and troubleshooting the problem and Identify yourself using your iDirect remote serial number.
Call the 24/7 SkyVision Support Center at: + 44 20 8387 1770.
Email at: support@sky-vision.net
MSN Messenger at: support@sky-vision.net

Sun Outage Calculator

Calculate your sun outage schedule at the following link: http://www.satellite-calculations.com/SUNcalc/SUNcalc.htm

Checking the Connection Speed

You have two options for checking your connection speed:

a) Download a test file from SkyVision's server at: ftp://83.229.88.22/test.zip and follow the instructions.
b) Contact the SkyVision Support Center to perform more accurate measurements for you using the iPerf software program.

Routing Information and Running Ping and Trace Route Commands

To view routing information for your prefixes as seen from the world and run ping and trace route commands to your site from Level 3 routers around the world go to this link and click on the relevant title: http://level3.com/LookingGlass/

Viewing Propagation of Prefixes throughout the World

To see the propagation of prefixes throughout the world, go to this link and click Start BGPlay: http://www.ris.ripe.net/bgplay/.

GLOSSARY

Az
See Azimuth.

Azimuth
The Azimuth (Az) is the VSAT antenna beam's pointing angle found by clockwise movement around the vertical plane from True North.

Arc
See Orbital Arc.

Bit Rate
The bit rate is the rate of the transmission of data in bits per second (bps).

Bps
See Bit Rate.
Terrestrial Interference
Terrestrial interference is caused when an object on the ground interferes with the line-of-sight between the earth station and the satellite.

BUC
See Block Up-Converter.

Block Up-Converter
The Block Up-Converter (BUC) receives L-Band signals from the satellite router, translates them into the desired band of operation, provides the power for amplification, and applies the translated amplified transmit signals to the VSAT Terminal antenna for uplink to the satellite.

Carrier Wave
The carrier wave (cw) is an electromagnetic wave which is modulated by the baseband signal.

C-Band
C-Band is the portion of the RF Spectrum that is typically 3.625 to 4.2 GHz on the satellite's downlink and 5.85 to 6.425 GHz on the satellite's uplink.

Circular Polarization
In a circularly polarized wave, the polarization rotates one full turn for every cycle of the RF carrier. The propagating RF wave therefore has no fixed orientation for its electric and magnetic fields as the wave propagates, so the orientation of the antenna's transmit and receive feed have no effect on the signal level received over the link.

Clarke Belt
The Clarke Belt is the circle in space above the equator of the earth that contains all the slots for geostationary orbit satellites. It is named after Arthur C. Clarke who was the first to propose the idea of placing active repeaters in space along this circle.

Clearance Angle
The clearance angle is the angle between the antennas' pointing direction and the terrestrial interference.

CP
See Circular Polarization.

CW
See Carrier Wave.

dB
See Decibel.

dBW
See Decibel-Watt.

Decibel
A decibel (db) is a term of measurement to express the relative difference in power or intensity between electric signals. Db equals 10 times the logarithm of the ratio of two powers. For example, 20 watts is bigger than 1 watt by 13 dB. Decibels do not indicate an absolute value; they are used only to compare two power values.

Decibel-Watt
The dB-Watt is an absolute value of RF power level compared to one Watt. For example, 4 watts equals 6 dBW.

Digital Video Broadcast – Satellite.
Digital Video Broadcast – Satellite (DVB-S) defines the encoding format for multiple video channels on a single QPSK satellite carrier. DVB-S2 is a next-generation advanced version of DVB-S that offers more capacity and stronger forward error correction at low signal levels.

DVB-S
See Digital Video Broadcast – Satellite.

DVB-S2
See Digital Video Broadcast – Satellite.

El
See Elevation.

Elevation
Elevation (El) is the second antenna pointing angle considered for locating the satellite target above the horizon during the VSAT ground station antenna alignment.

Elliptical Orbit
The elliptical orbit is an orbit path that follows the shape of an ellipse. This orbit path is used to place satellites into a geostationary orbit.

Enterprise VSAT
An Enterprise VSAT terminal is used for business or enterprise purposes.

Feed
The feed component in a reflector antenna is itself an antenna that radiates the signal towards the reflector component of the antenna.

Feed Horn
A feed horn is the antenna feed component completed by a waveguide horn. Feed horns typically have a beam width of 30-90 degrees, and are used to illuminate the main reflector, which then funnels the energy into a narrow beam. Feed horn apertures come in various shapes such as rectangular, circular, or even elliptical. The horn usually has a feed window, which is a non-conducting film stretched over the opening to keep moisture out.

Footprint
See Satellite Footprint.

Frequency
A frequency is the characteristic of an electromagnetic wave and/or an RF signal. It is the number of cycles the voltage and/or the fields complete in one full reversal cycle per second. Operational Bands, like C-Band, Ku-Band, and Ka-Band, are determined by the frequency.

GEO Orbit
See Geostationary Orbit.

Geostationary Orbit
The geostationary orbit is an orbit approximately 22,000 (36,000 km) miles above the earth's surface in the plane of the equator that has an orbital period equal to one sidereal day. Satellites positioned in a GEO orbit appear to an observer on the surface of the earth as stationary objects in the sky.

Hub
A Hub is an earth station that acts as the central role of a star or "hub and spoke" network. The Hub station is composed of a large antenna and high-powered amplifiers. One advantage of this is to minimize the remote VSAT terminal antenna and amplifier size requirements. In a Hub station scenario, all surrounding VSAT traffic must pass through the station resulting in the inability for VSAT terminals to communicate directly with each other, even if their electronics allow for this.

IDU
See Indoor Unit.

Indoor Unit
The Indoor Unit (IDU) is the component of the VSAT terminal that is located indoors. It is usually the satellite router. The IDU is connected to the Outdoor Unit (ODU) via an IFL link.

IF
See Intermediate Frequency.

Intermediate Frequency
The Intermediate Frequency (IF) is the resulting frequency of the combination of the carrier signal with the Local Oscillator. In a satellite receiver, the RF signals are down-converted to a lower frequency band. The outgoing signal is delivered over the IFL to the outdoor equipment, where it is up-converted to the transmitting RF band. Transmission over the IFL and demodulation is less complex and expensive.

IFL
See Inter-Facility Link.

Inter-Facility Link
An Inter-Facility Link (IFL) is the set of co-axial cables that connect the indoor equipment to the outdoor equipment of a satellite earth station. In a VSAT terminal, the IFL is usually one or two coaxial cables carrying IF signals, control signals, and DC power.
Information Bit Rate
Information Bit Rate is the rate that the original bit information is transmitted over the RF channel, in bits per second.

Information Bit Rate
Information Bit Rate is the rate that the original bit information is transmitted over the RF channel, in bits per second.

Ka-Band
The Ka-band is typically in the downlink frequencies of 18 to 22 GHz and uplink frequencies of 27 to 31 GHz.

Ku-Band
The Ku-band is typically in the downlink frequencies of 10.7 to 12.75 GHz and uplink frequencies of 13.75 to 14.5 GHz.

LAN
See Local Area Network.

Local Area Network
A Local Area Network (LAN) is a group of local user nodes that share local resources such as printers, servers, and Internet gateways.

Latency
Latency is the measured time it takes for data traffic to travel from a start point, through a network path and finally arrive at its destination. Satellite circuits have characteristically higher latency due to the physical limitations of the earth-to-satellite-to-earth propagation path, which currently is almost 250 milliseconds.

Latitude
Latitude is the angular distance north or south of the earth's equator, measured in degrees along the meridian of the earth. Lines of Latitude are parallel lines around the earth that represent the angle of line from the surface of the earth through the center of the earth with respect to the earth's axis of rotation. The equator is the Zero Latitude line.

L-Band
L-Band is a standard IF (Intermediate Frequency) used in VSAT ground stations for signals passing between the antenna and the indoor equipment.

LEO
See Low Earth Orbit.

Low Earth Orbit
A Low Earth Orbit is an orbit that can be as low as 150 miles above the earth's surface. LEO full-cycle time periods can be as short as a few hours.

Link
A Link is the signal path from one earth station to another distant earth station's demodulator.

Link Margin
A link margin is the amount that a signal's power may be reduced before it reaches an unacceptable level of bit error rate performance.

LNB
See Low-Noise Block Converter.

Low-Noise Block Converter
The Low-noise Block Converter (LNB) provides a fixed, block frequency translation of the downlink spectrum to L-Band.

Longitude
Longitude is the angular distance on the surface of the earth, measured in degree values, positive or negative, and east or west from the Prime Meridian at Greenwich, England.

MEO Orbit
See Medium Earth Orbit.

Medium Earth Orbit
The Medium Earth Orbit (MEO) can be an orbit a few hundred miles high to several thousand miles high. MEO full-cycle time periods can range from 12 hours to several hours.

Microwave
Microwave signals are RF signals in the 3 to 30 GHz Frequency Bands.

NOC
See Network Operations Center.

Network Operations Center
The Network Operations Center (NOC) is a satellite operator center manned by trained technicians who monitor all the signals on the satellite fleet's transponder, and in turn are responsible for troubleshooting and assisting field technicians with signal levels and the correct alignment of VSAT ground station antennas.

ODU
See Out Door Unit.

Out Door Unit
The Out Door Unit (ODU) is the outdoor equipment of a VSAT terminal. The ODU is typically comprised of the antenna, feed system, LNB, and BUC or transceiver.

Off-Axis
The off-axis angle is any angle of radiation away from the actual angle of an antenna's main beam.

Offset Antenna
An offset antenna is an antenna designed with its feed positioned away from the reflector aperture which eliminates blockage and the scattering of the main beam due to the support struts and the feed. Offset antennas come in prime focus or dual reflecting optic designs. Both typically have good gain and low side lobe performance.

OMT
See Orthomode Transducer.

Orthomode Transducer
The Orthomode Transducer (OMT) combines two opposite polarized signals in a very low-loss way and serves as the junction element of the ODU to protect the LNB from burn-out by the power of the output signal generated by the BUC.

Orbital Arc
The orbital arc is the imaginary arc in the sky formed by connecting the pointing angles of all the geostationary satellites visible at any given location on the surface of the earth.

Outbound Carrier
The outbound carrier in a star VSAT Network is the broadcast signal transmitted by the hub and received by the remote VSAT Terminals.

Packet
A packet is a unit of information transmitted from one node on a network to another over Ethernet and IP. This transmission unit is of a fixed maximum length containing a header, an address, a data payload, and error detection information. Ethernet packets usually contain IP packets as well.

Pointing Error
A pointing error is the difference between the direction of an antenna's main beam and the direction to the intended satellite target. Pointing errors can result in a reduction of the signal strength and an increase in signal interference.

Pol
See Polarization.

Polarization
Polarization (Pol) is the orientation of the electromagnetic field of a propagating wave with reference to the antenna's vertical or horizontal axis.

Propagation
Propagation is the phenomenon of electromagnetic waves traveling through space or other medium. The term, propagation loss, is typically used to refer to the adverse effects caused to a signal passing through the atmosphere and water.

Rain Fade
Rain fade is a propagation loss factor caused by the absorption and scattering of the microwave signal to or from a satellite due to water droplets in the atmosphere.

RF
See Radio Frequency.

Radio Frequency
Radio Frequency (RF) is a signal at its operating frequency in a communications link. In the case of satellite links, RF is a term used to describe the signal at its C-, Ku-, or Ka-band operating frequency.

SATCOM
SATCOM is a generic term for satellite communications of all kinds.

Satellite Footprint
A satellite footprint is a set of contour lines used to map out on the earth's surface points of equal signal strength received from a satellite. The footprint is determined by the design of the satellite antenna and the direction that it is pointed.

Satellite Router
A satellite router is an IDU that contains a modulator and a demodulator and thus is one of the essential components of a VSAT Terminal.

SCPC
See Single Channel Per Carrier.

Single Channel Per Carrier
Single Channel Per Carrier (SCPC) is a term describing any single carrier used in a point-to-point dedicated satellite circuit that does not utilize the methods of burst or TDMA.

Single Hop
A single hop is a signal transmission passing through a satellite circuit which originates at one earth station and terminates at the second earth station.

Slot
A slot is a geostationary orbit assigned to a specific longitude where a satellite is 'parked' and maintained.

Spectrum Analyzer
A spectrum analyzer is a device used to test the power of a signal as a function of frequency.

TCP/IP
See Transmission Control Protocol/Internet Protocol.

Transmission Control Protocol/Internet Protocol
Transmission Control Protocol/Internet Protocol (TCP/IP) is the basic communication language of the Internet. It is designed to be a two-layer programming word structure. The higher layer, TCP, reduces the file into small packets that are transmitted over the Internet and received by a TCP layer that unpacks the packets into the original message size. The lower layer, IP, is responsible for the address part of each packet ensuring that it gets to the right destination. Each gateway computer on a network checks this address to see where to forward the message. Even though some packets from the same message are routed differently than others, they are unpacked at the same destination.

Teleport
A teleport is a communications complex typically consisting of multiple earth stations pointed to a variety of different satellites and providing interconnection to terrestrial fiber optic transmission systems.

TDM
See Time Division Multiplexing.

Time Division Multiplexing
Time Division Multiplexing (TDM) is a technique of transmitting two or more signals on the same path, but at different times allowing a user to use the same RF spectrum to communicate multiple channels of information to one or more nodes.

TDMA
See Time Division Multiple Access.

Time Division Multiple Access
Time Division Multiple Access (TDMA) is the technique used by multiple terminals that are geographically dispersed to share the same frequency channel by transmitting at different times.

Topology
A network topology is the pattern of links connecting pairs of nodes of a network. A given node has one or more links to others, and the links can appear in a variety of different shapes. The simplest connection is a one-way link between two devices.

Transceiver
A transceiver is an outdoor antenna-mounted electronic module that provides frequency translation and amplification for both the uplink and downlink signal paths.

Transmission Bit Rate

Transmission bit rate is the rate that all data is transmitted over the RF channel in bits per second. The data can include the original information as well as forward error correction (FEC), signaling, and overhead data. The RF transmission bit rate and RF Symbol rate are directly proportional to the bit rate.

Transponder

A transponder is a frequency-selective signal processing path functioning as both a receiver and a transmitter on a communications satellite. It receives a microwave uplink signal from earth, amplifies it and retransmits it back to earth at a different downlink frequency. A communications satellite typically has several transponders.

VSAT

See Very Small Aperture Terminal.

Very Small Aperture Terminal

Very Small Aperture Terminal (VSAT) is a small earth station used for broadcast, reception and interactive communications via geosynchronous satellites. Typical VSAT antenna diameter sizes are between 1.8 to 2.4 meters and utilize the Ku-band and C-Band for satellite transmission that handles up to 56 Kbits/sec of digital transmission.

Waveguide

A Waveguide is a hollow pipe designed to be a low-loss way to transport microwave signals between components in the RF signal path, carrying the high power RF Transmit Signal from the transmitter to the antenna's feed. They are much more efficient than coaxial cables; however, they are physically larger and much more expensive.

Wavelength

Wavelength is the distance between peaks of an oscillation over time. It is also defined as the distance the wave travels (in meters) between one complete cycle of E/M field variation.

WiFi

See Wireless Fidelity.

Wireless Fidelity

Wireless Fidelity (WiFi) refers to any type of IEEE 802.11 network that uses high RF signals to transmit and receive data over distances of a few hundred feet using Ethernet protocol.

WiMax

See Worldwide Interoperability for Microwave Access.

Worldwide Interoperability for Microwave Access

Worldwide Interoperability for Microwave Access is a standards-based wireless telecommunications technology that provides high-throughput broadband connections over long distances. WiMax can be used for a number of applications, including "last mile" broadband connections, hotspots, cellular backhaul, and high-speed enterprise connectivity for business.