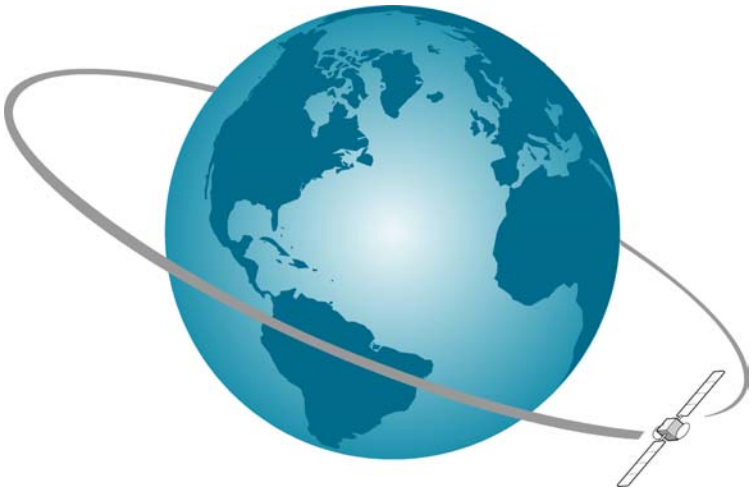
IPSat GW1000

Satellite Terminal

Installation and Operation Guide



RADYNE COMSTREAM

Radyne ComStream, Inc. • 6340 Sequence Drive • San Diego, CA 92121 • (858) 458-1800 • Fax: (858) 657-5400 • www.radn.com

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING! Electric Shock Hazard
Do Not Open The Equipment!

Service Only by Radyne ComStream, Inc.
Gefährliche Spannung!
Öffuen des Gerätes und Service nur dur Radyne ComStream, Inc.
The IPSat GW1000 contains no user-serviceable parts. Do not attempt to service this product yourself. Any attempt to do so will invalidate any and all warranties.

Table of Contents:

Preface

Using This Guide:

This guide is your sourcebook for using the IPSat GW1000 Satellite Terminal and describes the installation, operation, and configuration for this product. An overview of system and product level requirements, technical specifications, and troubleshooting procedures are also provided.
This guide is designed to help you find information quickly and easily. To take full advantage of this design, please take a moment to review the specific formats.

Throughout this guide you will find icons designed to help you identify important information. These icons are:

This hazard icon identifies the possibility of electric shock when you perform an operation with the IPSat GW1000 or if you do not use the IPSat GW1000 according to instructions.

The caution icon identifies information that requires careful attention in order to prevent equipment damage and/or injury to the operator.

The note icon identifies information for the proper operation of your equipment, including helpful hints, shortcuts, or important reminders.

Some illustrations contained in this guide may differ slightly from those shown on your front panel display, rear panel, or remote terminal due to variations in your setup, configuration, or customization.
Figures depicting equipment may differ from those at your site: therefore, refer to the labeling on your Radyne ComStream equipment to identify the components. An effort has been made to use illustrations that reflect basic equipment and configurations of the majority of customers.

Revision History

This guide is periodically updated and revised. For documentation updates, call Customer Service.

Revision	Date	Type of Revision
A	Aug 04	Initial release

Customer Service

We hope this guide provides all the information and instructions you need to operate the IPSat GW1000. However, if you need assistance, contact Radyne ComStream Customer Service at our corporate office located in the United States, through any of the following:

Phone (858) 458-1800 Monday-Friday
7:30 a.m. – 6:00 p.m. pacific standard time (GMT – 08:00)
Fax (858) 657-5455
comstream-custservice@radn.com
After-hours *emergency* Customer Service Paging (858) 458-1800 option 5. Leave a detailed voice message and your call will be returned.

Worldwide Customer Support:
Radyne ComStream – UK
+44-1420-540233

Radyne ComStream – Singapore
+656-325-1951

Radyne ComStream – Jakarta
+62-21-521-3733

Radyne ComStream – China
+86-10-658-31975

Product Shipments

Please verify that your company name and address are correct on the packing slip that is included with your equipment. Notify Radyne ComStream Customer Service if any of the information is incorrect.
Ensure that you write down the following numbers and include them in any correspondence with Radyne ComStream concerning your order:

Purchase order
Model
Reference line
Sales order

Errors
If any part of your shipment is missing or incorrect, call Radyne ComStream Customer Service.

Cartons and Packing Materials
The factory shipping carton and packing materials are designed to protect the equipment from excessive shock and vibration that can occur during shipping.
Use the original shipping carton and packing materials to repack the unit for shipment to another location or to return the unit to ComStream for repair.
For additional information on equipment repacking, refer to the Warranty booklet that accompanied the product shipment.

Warranty Statement

Radyne ComStream warrants that its products are free from defects in material and workmanship at the time of shipment and that they conform to applicable specifications. In no event will Radyne ComStream be liable for consequential misuse or damages.

The Radyne ComStream IPSat GW1000 is warranted against any above-mentioned defects that may occur within two years of the shipping date.

Should it be necessary to make a claim against this warranty, the buyer shall first notify Radyne ComStream Customer Service to define the nature of the problem. When returning products, please be aware of the following:

- Products returned to Radyne ComStream, whether for upgrade, warranted or out-of-warranty repair work, or maintenance, must comply with the ComStream Return Procedure.
- Products shall be forwarded to Radyne ComStream, transportation prepaid.
- Products returned to ComStream freight collect or without a return material authorization number will not be accepted.
- Radyne ComStream shall not accept any responsibility for returned products that are improperly packaged and/or damaged in shipment. If possible, please use original shipping and packaging materials.
- Original product identification markings and labels must not have been removed, defaced, or altered. Further, to preserve the warranty the product should not be subjected to abuse, improper installation or application, alteration, accident, or negligence in use, storage, transportation, or handling.

Any returned product shall be completely evaluated in an attempt to duplicate the problem so that appropriate corrective action and repair may be completed. Following repair, the product shall be thoroughly tested for compliance with appropriate specifications. This process will be handled promptly but may be subject to available labor and material resources.

The Radyne ComStream warranty, as stated herein, is in lieu of all other warranties, expressed, implied, or statutory.

Return Procedure

If it is necessary to return a product for out-of-warranty repair, upgrade, or any modification, the following procedures must be followed:

Contact ComStream Customer Service, located in the United States, by phone, fax or email at:
Phone (858) 458-1800
Fax (858) 657-5455
Comstream-custservice@radn.com

Speak to a ComStream Customer Service representative about any questions, issues, or problems. Quite often equipment problems can be corrected over the phone, which keeps your equipment in service and avoids unnecessary and costly downtime.
Should it be necessary to return a product to ComStream for any reason, the ComStream Customer Service representative will issue you a return material authorization (RMA) number. To issue an RMA number, the ComStream representative will need the product serial number and model number.

You may be returning a product for either: repair, upgrade, or modification. If you are returning the product for:
Repair – Include a complete description of the problem, the operating conditions that caused the problem, and any circumstances that may have led to the problem. This information is essential for ComStream repair technicians to reproduce, diagnose, and correct the problem.
Upgrade or modification – Include a complete description of the current configuration and the desired change(s). This information will allow a ComStream Customer Service representative to provide a formal quote for the upgrade.

Include a purchase order (PO) for any upgrade or out-of-warranty repair work being performed. ComStream will begin repair work after a PO is received.

Reference the RMA number on all paperwork that accompanies the equipment, and write the RMA number clearly on the outside of the shipping container.

Ship your module in the original shipping carton and packaging (or its equivalent), prepaid to:

Radyne ComStream, Inc.
6340 Sequence Drive
San Diego, CA 92121 USA

RMA Number

Do not include product accessories such as manuals, other printed material, or rack-mount brackets.

When handling or shipping static-sensitive equipment, observe antistatic procedures, and always use antistatic bags for shipment.

All equipment upgrade and repair requests will be completely evaluated and the required work performed promptly. The equipment will then be thoroughly tested for compliance with appropriate specifications.

Other Radyne ComStream Products

The ComStream Web site, found at www.radynecomstream.com, provides information about the entire line of ComStream products and systems, including internet over satellite systems, broadcast receivers, earth stations, high-speed and DVB modems, cable and microwave products, and frequency converters.

Safety Precautions

Carefully read and follow all safety, use, and operating instructions before operating the IPSat GW1000. Heed all warnings and cautions contained in this guide. Retain these instructions for future reference.

Follow Startup Procedure
Do not plug in the IPSat GW1000 until you have connected the unit and read the chapter on installation.

Provide a Safe Location
Place the IPSat GW1000 in a rack or on a stable surface of sufficient size and strength, where it will not be jarred, hit, or pushed off its surface. Ensure that all cables and cords are out of the way and will not be tripped over, as this could cause personal injury or serious damage to the equipment.

Avoid Water and Moisture
If the equipment is exposed to any liquid, contact ComStream, as serious damage could occur to the IPSat GW1000 or its components.

Avoid Heat, Humidity, and Dust
To avoid internal damage, the IPSat GW1000 should be placed away from all heat sources, including radiators, heater ducts, and so on, out of direct sunlight and away from high humidity, excessive dust, or mechanical vibrations that can cause damage to internal parts.

Provide Adequate Ventilation
Slots and openings on the IPSat GW1000 are provided for ventilation that is needed to ensure reliable operation. To avoid overheating and ensure that the ventilation slots are not blocked, place the IPSat GW1000 on a smooth, hard surface that has at least two inches of clearance around the unit and adequate air circulation. If the equipment is placed in a closed area, such as a rack, ensure that proper ventilation is provided and that the internal rack operating temperature does not exceed the maximum rated temperature at the position of the IPSat GW1000.
Never place the IPSat GW1000 on a soft surface that would obstruct the required airflow into the ventilation slots.

Use Correct Power Source
For units equipped with a North American power cord, the cord has an IEC-compatible female plug on one end, and a male plug on the other end. This cord is UL and CSA approved up to 125 VAC at 10 A and is ready to use with no user wiring required.
For units equipped with an International power cord, the cord has an IEC-compatible female plug on one end, and three stripped and tinned bare wires on the other end. This cord is approved up to 250 VAC at 6 A and complies with the international color codes of green/yellow (ground), blue (neutral), and brown (line).
If these color codes do not correspond to the colored markings on the terminals in the plug, use the following standards:

- The green/yellow wire must be connected to the plug terminal marked by the letter E or by the earth symbol (⏚) or color-coded green and yellow.
- The blue wire must be connected to the plug terminal marked with the letter N or color-coded black.
- The brown wire must be connected to the plug terminal marked with the letter L or color-coded red.

An AC plug must be attached to the International power cord in accordance with government standards and codes in effect at the installation site. If an un-terminated power cord is supplied with the unit, the appropriate certified termination plug must be installed. The following is a list of the required certifying agencies for various countries.

Country	Agency	Country	Agency
Australia	SAA	Italy	IMQ
Austria	OVE	Japan	MITI
Belgium	CEBEC	Netherlands	KEMA
Canada	CSA	New Zealand	SECV, SECQ, SECWA, EANSW, ETSA, HECT
Denmark	DEMKO	Norway	NEMKO
Finland	FEI	Rep. S. Africa	SABS
France	UTE	Spain	AEE
Germany	VDE	Sweden	SEMKO
India	ISI	Switzerland	SEV
Ireland	IIRS	United Kingdom	ASTA, BSI

Route Power Cords Safely
Route power cords so they are not walked on or pinched. Pay particular attention to cords and connections at the plugs, receptacles (such as power strips), and the point where they exit from the IPSat GW1000 and attach to other equipment. Do not place any items on or against power cords.

No Stacking
Do not place or stack any objects on top of the IPSat GW1000. Other equipment may be placed in a rack or on a shelf above or below the IPSat GW1000, but never stacked directly on top of it.

Protect Against Lightning and Power Surges
When the IPSat GW1000 is installed, have the professional installer ground the unit to protect against voltage surges and built-up static charges. For information on grounding standards for electrical and radio equipment, refer to the electrical code in the country of installation.
Protect the IPSat GW1000 from lightning and power-line surges during a storm by unplugging it from the wall outlet and disconnecting the coaxial cable.

Turn the IPSat GW1000 Off When Changing Circuit Boards
Turn the IPSat GW1000 off before installing or removing any circuit boards from chassis slots. Possible damage may occur to modem, boards, or related equipment if power is left on during this procedure.

Provide Antistatic Protection
Wear a properly grounded antistatic wrist strap to prevent electrostatic damage to components when handling circuit boards or other electronic modules.

Keep Objects Outside
Touching internal IPSat GW1000 parts is dangerous to both you and the unit. Never put any object, including your fingers, through slots or openings, as this could result in touching dangerous voltage points, short-circuiting parts, electric shock, or fire.
There are no user-serviceable parts inside the IPSat GW1000. If an object falls into the equipment, unplug the unit and contact ComStream Customer Service, as serious damage could occur to the IPSat GW1000 or its components.

Use Approved Attachments Only
Use only ComStream-approved equipment with the IPSat GW1000.

Clean the IPSat GW1000
Before cleaning the IPSat GW1000, unplug it from the wall outlet. Do not use any type of abrasive pads, scouring powders, aerosol cleaners, or solvents such as alcohol or benzene.
Use only a clean, soft cloth lightly moistened with a mild detergent solution. Wipe all equipment with a clean, soft cloth lightly moistened with water to remove the detergent solution.

Service the IPSat GW1000
Do not attempt to service the IPSat GW1000 yourself, as there are no user-serviceable parts. Opening or removing covers may expose you to dangerous voltages or other hazards as well as void your warranty. Contact ComStream Customer Service to obtain qualified service personnel.
The following conditions indicate that the equipment needs servicing:

- The power cord or plug has been damaged.
- An object has fallen into the IPSat GW1000.
- Liquid has been spilled into the IPSat GW1000, or it has been exposed to rain or water.
- The unit has been dropped or the cover has been damaged.
- The IPSat GW1000 does not operate normally, or it shows a marked change in performance.

Perform Safety Checks
Upon completion of any service or repairs to the IPSat GW1000, ask the service technician to perform safety checks to verify that the unit is in safe operating condition.

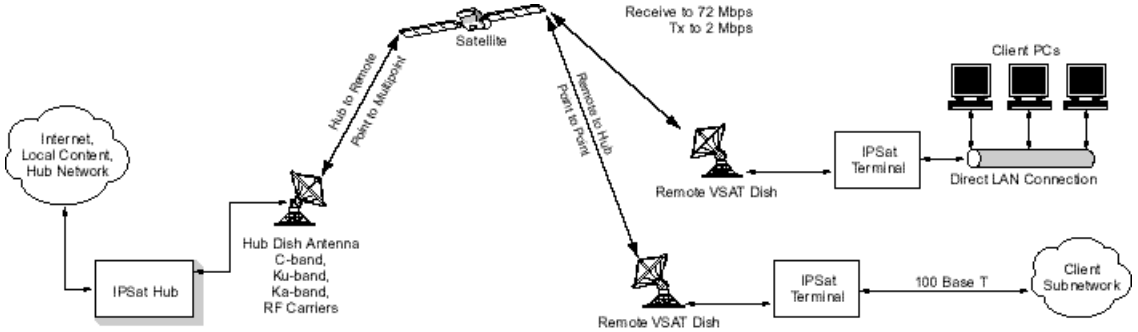
Overview

System Overview

The typical IP over-satellite system consists of a network hub with a single, very high-speed uplink broadcasting to numerous remote stations, each of which includes an IPSat GW1000 terminal.

The IPSat GW1000 Terminal is part of a satellite-based IP network that allows remote sites high-speed communications access to and from LAN/WAN links. The IPSat GW1000 provides full two-way connectivity to the hub over a satellite channel and to a local Ethernet network through a standard 10/100Base-T interface. The hub receives inbound SCPC satellite carriers from IPSat GW1000 remote terminals through a Multiple Receive Terminal (MRT), offering up to 12 demodulators in only nine rack units of space.

The hub system is scalable from 1 to 72 Mbps outbound and can support virtually any number of satellite return channels. Any combination of Internet protocol data streams, both TCP and UDP, unicast and multicast, may be carried between the hub and remote stations. Radyne ComStream can also integrate additional networking equipment and applications based on your system requirements.

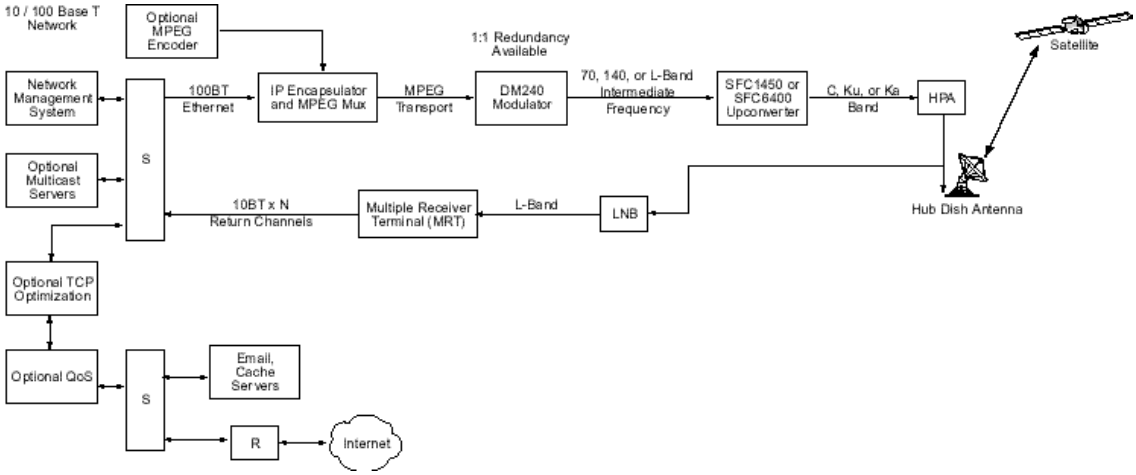


Basic Network Topology Diagram

Hub Equipment

While the networking equipment used in the hub will vary greatly with the particular application of the network, the basic core of the system remains the same and includes the following:

- Internet Protocol Encapsulator (IP Encapsulator)
- Satellite Modulator, DM-240
- Multiple Receiver Terminal (MRT)



- Optional Equipment

Hub Network Functional Block Diagram

Internet Protocol Encapsulator (IPE)
The IPE receives data from the hub IP network and encapsulates the data into a MPEG transport stream according to DVB data broadcast specification EN 301 192.

Satellite Modulator DM-240
The DM-240 is ComStream's standard DVB-compliant satellite modulator. Connecting to the IPE, the input interfaces include DVB SPI, ASI, M2P, and RS-422. The modulator accepts the input MPEG transport stream and provides scrambling, FEC encoding, and modulation of the satellite carrier channel in accordance with DVB specification EN 300 421.

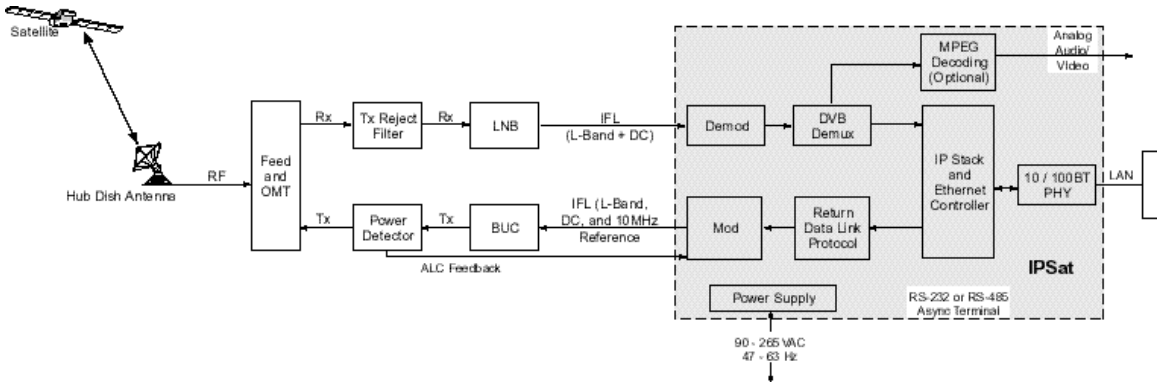
Multiple Receiver Terminal (MRT)
The MRT is a 9 rack-unit chassis housing redundant, hot-swappable AC power supplies, L-band amplifiers and distribution, and up to 12 SCPC demodulators.
The chassis includes integrated cooling fans and front panel LEDs showing status of all installed demodulators. The demodulator cards are hot swappable and operate between 19.2 kbps to 8.448 Mbps, meeting the same performance specifications as ComStream's standard DBR2000 receiver. Each demodulator is connected to a Cisco router, which provides a standard Ethernet interface to the hub Ethernet network for return channel traffic from remote stations.

Optional Equipment
Based on the system application, a network may require additional equipment including:

- MPEG video and audio encoders
- TCP optimization hardware
- Quality of service (QoS) or traffic-shaping hardware
- Basic network equipment
- Application servers

IPSat GW1000 Overview

The IPSat GW1000 Terminal is an integrated two-way SCPC satellite modem with combined IP router/bridge functionality designed specifically to carry high-speed broadband internet traffic.



IPSat GW1000 Remote System Block Diagram

The IPSat GW1000 Terminal is a two rack-unit chassis including a DVB-compliant demodulator, MPEG transport demux, IP stack processor, and Ethernet controller functions. Innovative design of the receive path allows use of up to the full satellite channel bandwidth to output to the Ethernet port.
IP data passed to the IPSat GW1000 Ethernet port is accepted and processed based on internal static routing tables, framed in HDLC packets, and passed to the satellite modulator. The modulator scrambles, FEC encodes, and modulates the data on an L-band IF carrier for transmission to the satellite. Up to 64 static routes may be defined in the IPSat GW1000.

Connecting multiple client computers through an Ethernet Hub may cause data collisions and subsequent loss of data. To resolve this potential issue, Radyne ComStream strongly recommends the use of an Ethernet Switch on the IPSat GW1000 Ethernet interface.

Installation

This chapter provides step-by-step procedures for installing and cabling the IPSat GW1000 and a description of all IPSat GW1000 rear panel connections and required cables.
Do not remove the IPSat GW1000 top cover! The IPSat GW1000 is powered by an exposed, switching AC power supply which presents an electric shock hazard when the top cover is removed. Personal injury or damage to the equipment can occur when the top cover is removed. None of the procedures in this manual require the removal of the IPSat GW1000 top cover.

Before beginning your installation, read the *Safety Precautions* as they contain important safety information and other instructions required to install the IPSat GW1000.

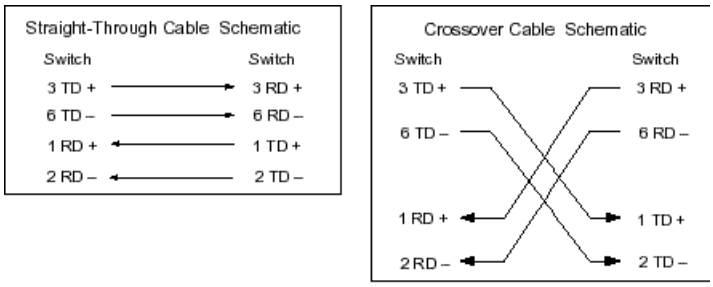
When installing the IPSat GW1000, always position the equipment to allow easy access to the rear panel and provide adequate ventilation.
To properly install the IPSat GW1000, follow the instructions provided in the shipping kit.

Ventilation
It is important that all installations allow adequate ventilation to the IPSat GW1000 at all times. To keep the system cool and running smoothly, the power supply-cooling fan exhausts air through grillwork openings on the rear panel and pulls external air through the slots at the sides of the unit.
The minimum airflow clearance space is three inches at the sides of the IPSat GW1000 and six inches at the rear.

Required Cables
For detailed information on cable specifications, including cable pinouts, connector drawings, and cable lengths, refer to the appendix on cable specifications.

The following cables are used to connect the IPSat GW1000 Terminal:

- RJ45 Cat 5 10/100 BaseT Ethernet cable, either straight through or crossover. This cable connects the 10/100 BaseT port to a standard Ethernet interface.



- RS-232 serial cable. This cable connects the console port to a console.

Coaxial cables:

- IFL TX Cable: TX Out Cable, part number 05-0954-001 (supplied). This cable connects the Tx out port to either the optional attenuator or to the LMR 400 cable.
- IFL TX Cable: LMR 400, 50 ohm coax terminated with N-type connectors. This cable connects either the optional attenuator to the upconverter, or the TX Out cable, 05-0954-001, to the upconverter.

Three signals are on the IFL coaxial cable to the ODU:

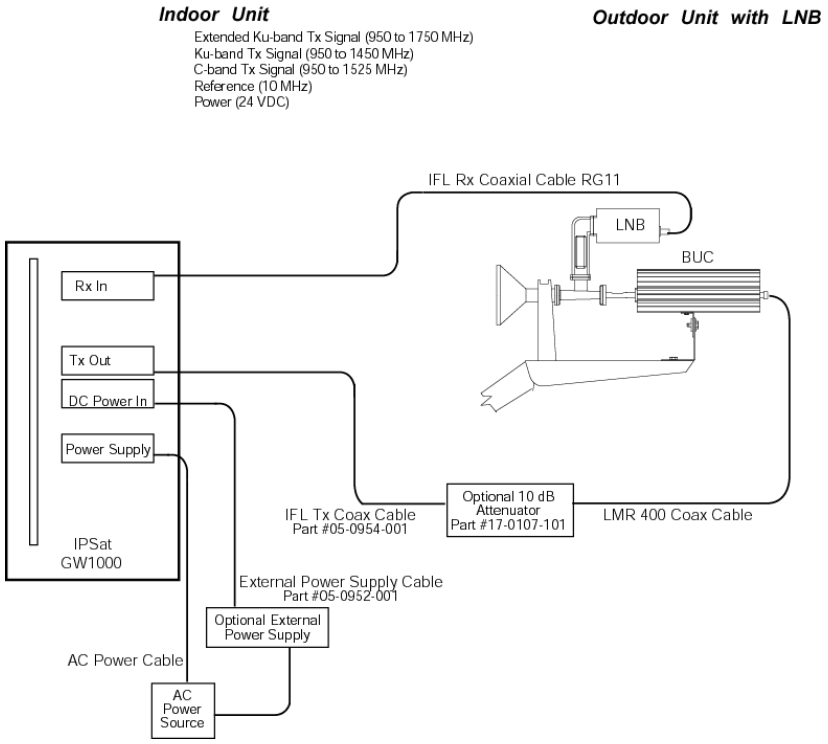
- 10 MHz reference which is a reference oscillator for ODU synthesizer
- DC power (24V @ 3 amp) for the ODU.
- TX carrier signal (L-band)
- Rx Cable: Quad shielded RG-11 coax terminated with F-type connectors. This cable connects the Tx/Rx port to the LNB.
- Video interface (Video port)
- Audio Left Port and Audio Right Port
- AC Power Cords: The IPSat GW1000 shipping kit includes two AC power cords, one for North American applications, specifically the United States and Canada, and the other for international applications.

North American Applications: the North American cord has an IEC-compatible female plug on one end and a North American male plug on the other. This cord is UL and CSA approved up to 125VAC at 10A. This cord is ready to use with no user wiring required.
International Applications: The international cord has an IEC-compatible female plug on one end and three stripped and tinned bare wires on the other end. This cord is approved by many international safety agencies, including VDE, up to 250VAC at 6A.

AC wiring must be done in accordance with governmental standards and codes in effect at the IPSat GW1000 installation site. Refer to the *Safety Precautions* for additional information.

Cabling the IPSat GW1000

Refer to the following diagram when cabling the IPSat GW1000. For a more detailed description of the IPSat GW1000 interconnections, refer to the Rear Panel Connections Section later in this chapter.



IPSat GW1000 Cabling

To connect the cables to the IPSat GW1000 terminal, follow these steps:

1 Place the IPSat GW1000 AC switch in the Off position.

2 Connect the IPSat GW1000 ground stud, located to the lower right of the fan on the rear panel, to the rack ground, or to another solid connection to earth ground with heavy gauge wire.

3 Connect the IPSat GW1000 to the upconverter. If an optional attenuator is required, follow step 3b.

a. Connect the IFL TX coaxial cable, part number 05-0954-001, from the IPSat GW1000 TX Out Port to the LMR 400 coaxial cable. Then connect the LMR 400 coaxial cable to the upconverter input.

b. If an optional Attenuator is required, connect the IFL TX coaxial cable, part number 05-0954-001, from the IPSat GW1000 TX Out Port to the Attenuator. Then connect the Attenuator to the upconverter input using the LMR 400 coaxial cable.

4 Connect the IPSat GW1000 to the LNB. Connect the RG-11 IFL Rx coaxial cable from the IPSat GW1000 Rx In Port to the LNB output. The LNB is a standard DRO or PLL type used to convert the received C, Ku, or Ka-band carrier to L-band. Two signals are present on the IFL coaxial cable:

- RF carrier signal (L-band)
- DC power

5 Connect the IPSat GW1000 to a remote terminal. Connect the RS-232 cable from the IPSat GW1000 console port to a terminal or PC with Terminal emulation software, such as HyperTerminal, installed.

6 Connect the IPSat GW1000 to an Ethernet interface by doing one of the following:

- Connect the CAT 5 **straight-through cable** from the IPSat GW1000 Ethernet 10/100 BaseT port to a 10/100 port on a switch.
- Connect the CAT 5 crossover cable to a 10/100 port on a server, PC, or TCP Optimizer.

7 Connect an external power supply to the IPSat GW1000, if required.

- Ensure that the external power supply equipment is turned Off.
- Connect the external power supply cable, part number 05-0952-001, from the DC Power In connector to the external power supply equipment. Then connect the external power supply equipment to an AC outlet according to that manufacturer's instructions.

8 Connect the IPSat GW1000 to an AC power source.

- Ensure the IPSat GW1000 power switch is in the Off, or 0, position.
- Select an AC power cord. If an international power cord is selected, attach a connector in accordance with local regulations and laws.
- Connect the female plug of the AC power cord to the AC power receptacle on the IPSat GW1000 rear panel.
- Connect the male plug of the AC power cord to an external AC power conditioning surge suppressor.
    - Connect the AC power conditioning surge suppressor to an AC outlet.

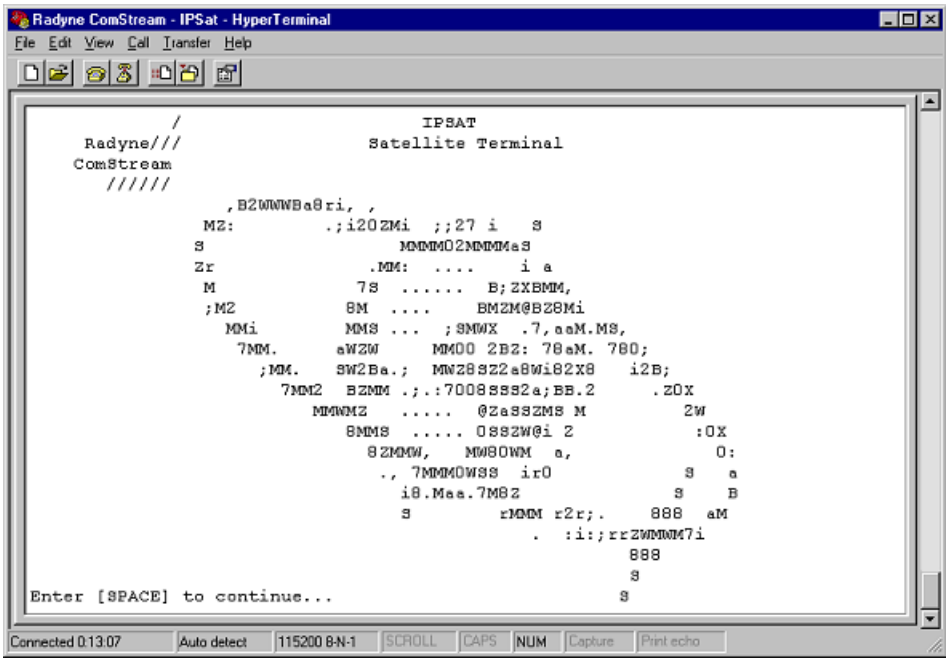
Corrupted AC input power can interrupt IPSat GW1000 operations and cause permanent damage to the unit. You should purchase and install a commercially available, external AC power conditioning surge suppressor to protect the IPSat GW1000 against power spikes and line transients.

Powering On The IPSat GW1000

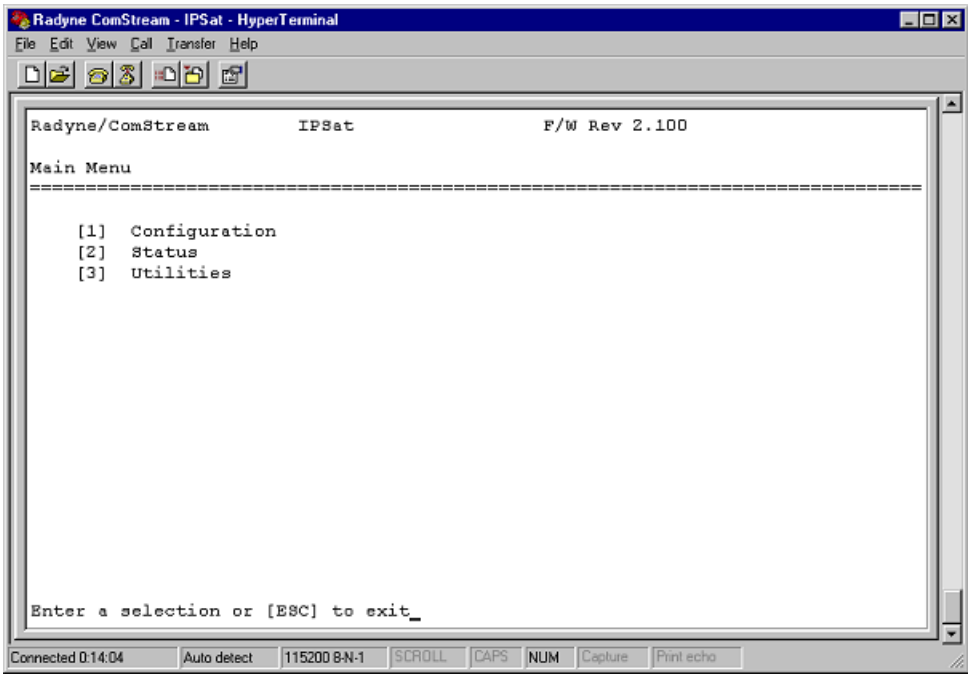
Once the cabling and interconnections for the IPSat GW1000 are completed, you may power-up the unit. The IPSat GW1000 power switch is a rocker switch located on the rear panel.
The power switch is labeled with a — and an 0. The — represents the On position, while the 0 represents the Off position.
To power up the IPSat GW1000, press the power switch to the ON, or — position. The power-on cycle takes approximately three to four minutes to complete, as the unit performs extensive self-diagnostics in this time period.

Basic Configuration
Before proceeding with the configuration, obtain the basic installation information at the end of this chapter.
Set the console terminal emulation program (HyperTerminal) to the factory default of 19200 bps, 8 bits, no parity, 1 stop bit and no flow control.

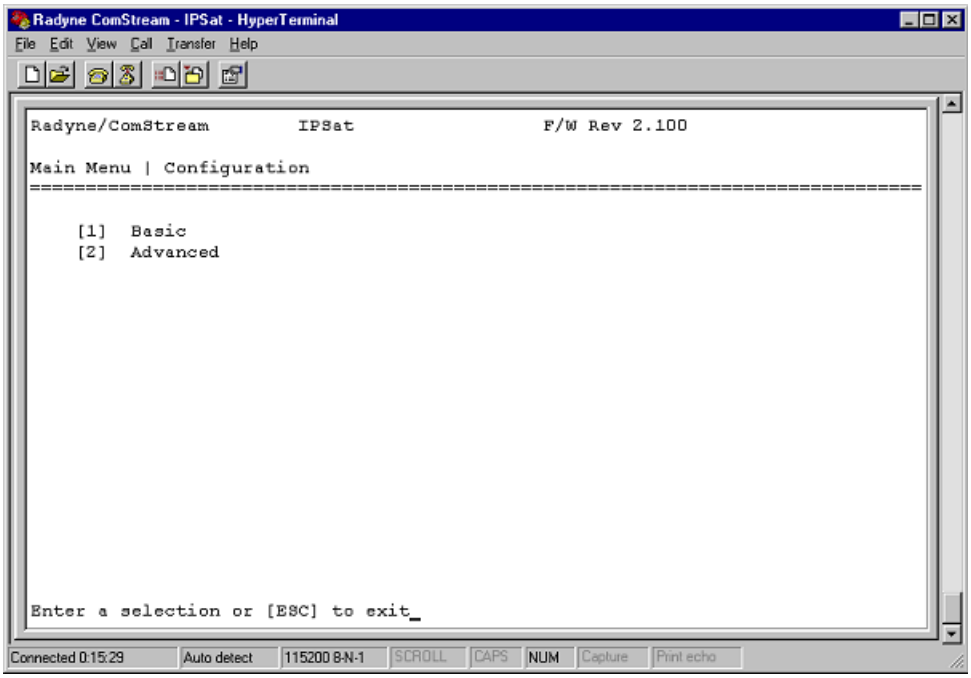
Press the Esc key. The following screen should appear:



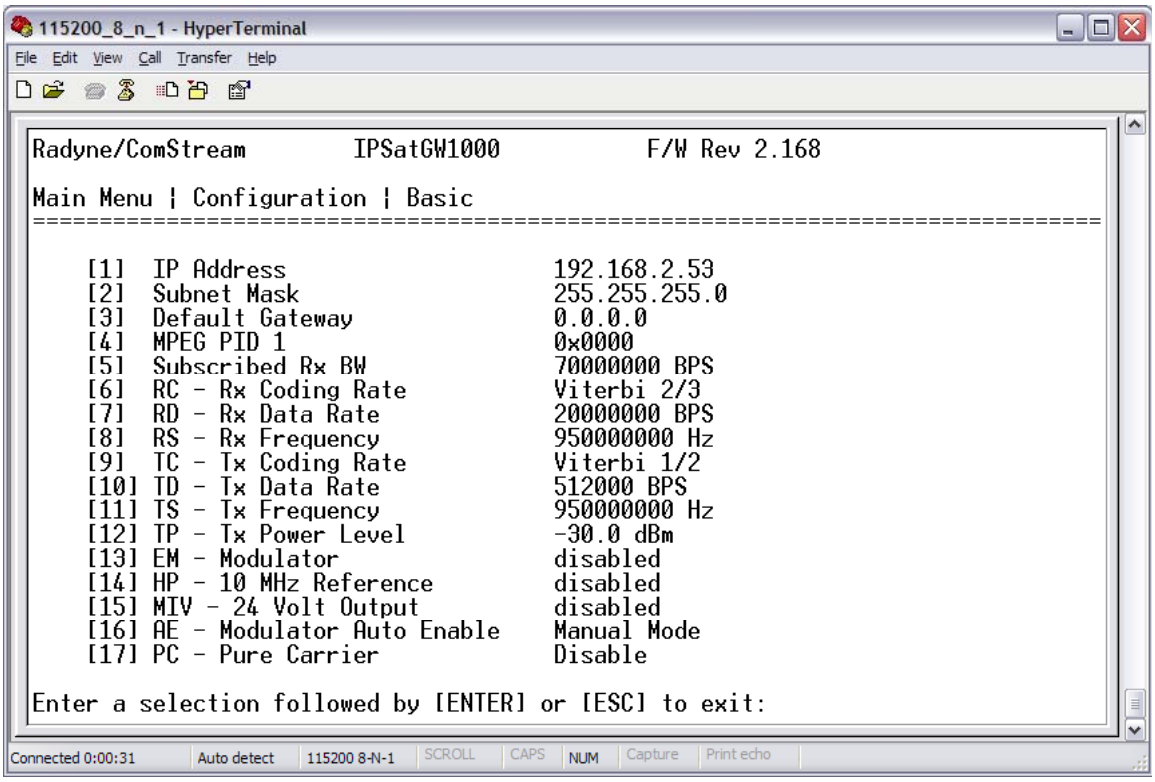
Navigate to the Main Menu by pressing the space bar. The following screen should appear:



Navigate to the Configuration Menu by pressing 1. The following screen should appear:



Navigate to the Basic Configuration Menu by pressing 1. The following screen should appear:

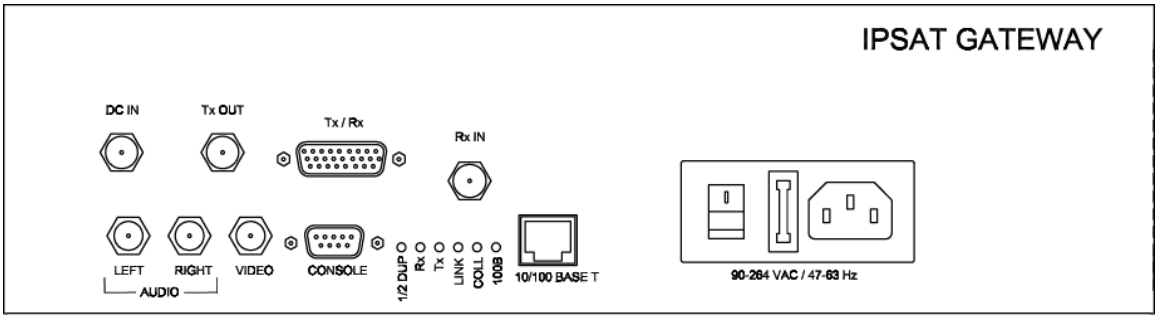


Most of the IPSat GW1000 configuration can be performed with the Basic Configuration Menu. The parameters are defined as follows:
IP Address: Used to identify the IPSat GW1000 on the network and is usually defined by your service provider
Subnet Mask: Used by the IPSat GW1000 in conjunction with its IP address to make forwarding decisions and is usually defined by your service provider.
Default Gateway: Used in situations where one or more routers exist on the IPSat GW1000's subnet accessible through the Ethernet interface. When a packet is received from the DVB channel and the IPSat GW1000 determines that the packet contains a destination IP address that is not on its own subnet, the IPSat GW1000 forwards the packet to a gateway. The gateway is chosen by searching the static routes that have been defined; if no static route exists to handle the destination network, the packet is forwarded to the default gateway. Note: The default gateway (and static route) configuration only applies to forwarding decisions made on packets received by the DVB port (demodulator or receive port), not packets received by the Ethernet port. Packet received by the Ethernet port that contains an unknown destination network will be forwarded out the HDLC port (modulator or transmit port).
MPEG PID 1: When a PID (Program Identifier) value is entered, the IPSat GW1000 will accept and process all traffic received by the DVB port (demodulator or receive port) that contains the PID value. At least one PID must be entered to receive DVB traffic and is usually defined by your service provider.
Subscribed Rx BW: Enter the amount of bandwidth that the IPSat GW1000 is subscribed to receive from the service provider. The IPSat GW1000 uses this parameter to accurately reflect the network activity on the front panel display.
RC-Rx coding rate: Sets the type and rate of the FEC (Forward Error Correction) decoding performed by the demodulator. Defined by service provider. Default is Vit 2/3.
RD-Rx Data Rate: Sets the data rate in bps (bits per second) that the demodulator receives at and is usually defined by your service provider. The Rx Symbol Rate is automatically determined by the Rx Coding Rate and the Rx Data Rate.
RS-Rx Frequency: Sets the L-band frequency in Hz (hertz) that the demodulator receives at and is usually defined by your service provider.
TC-TX Coding Rate: Sets the type and rate of the FEC (Forward Error Correction) coding performed by the modulator. Defined by service provider. Default is Vit 1/2. Note: When the service provider is using Radyne ComStream's MRT (Multiple Receiver Terminal), the TX Coding Rate must use the DVB symbol-mapped Viterbi types (DVB 1/2, DVB 3/4, DVB 7/8) or the sequential types.
TD-TX Data Rate: Sets the data rate in bps (bits per second) that the modulator transmits at and is usually defined by your service provider. The TX Symbol Rate is automatically determined by the TX Coding Rate and the TX Data Rate.
TS-TX Frequency: Sets the L-band frequency in Hz (hertz) that the modulator transmits at and is usually defined by your service provider.
TP-TX Power Level: Determines the power level in dBm (decibel-meter) that the modulator transmits at. Default is 0.0dbm.
EM-Modulator: Enables or disables the modulator. It performs the same function as pressing TX Enable on the front panel. Default is disabled.
HP-10 MHz Reference: Enables or disables 10 MHz BUC (Block UpConverter) reference frequency. Default is disabled.
MIV-24 Volt Output: Selects the source for the power to the BUC (Block UpConverter). Choices are disabled, enabled internal and enabled external. Default is disabled. Note: Enabled internal has a maximum of 24vdc at 3 AMPS.
AE-Modulator Auto Enable: Used to automatically return the modulator, 10 MHz and 24vdc to previous state upon power-up or reset when set to Auto; otherwise, when set to manual, the modulator must be manually enabled upon power-up or reset. Default is Manual.
PC-Pure Carrier: Enables or disables the transmission of an unmodulated carrier (continuous wave) out of the modulator. The pure carrier signal is used for diagnostic and installation procedures. Default is disabled.

Once all of the parameters have been configured, press the Esc key. A reset may be required for some of the settings to take effect. If this is the case, the IPSat GW1000 will reset itself after displaying a user prompt.
Refer to the Console chapter for more information about configuration and monitoring tasks and utilities that are available.

Rear Panel Connections

All IPSat GW1000 external connections are located on the rear panel.



IPSat GW1000 Rear Panel

External Input Power Supply Port

The DC Power In port supplies up to 48 VDC at 6 amps to the IFL cable for external (UPA).
Connector: Mini-UHF connector

Transmit Out Port

The TX Out port provides the transmit IF output, reference, and DC power to the ODU transmitter. The IPSat GW1000 modulator has electronically adjustable output power. For normal IPSat GW1000 operations, the output power of the L-band modulator is set between –35 and 8 dBm, in 0.1 dB steps. The output frequency is programmable in the range of 950 to 1750 MHz.
The output impedance is 50 ohms, with a return loss of 8 dB or better.
Connector: Mini-UHF connector

Optional Power Detector Port

The Tx/Rx port uses a Y-cable to interface with optional power detector and/or user data equipment. This port provides DC and receives a 4 to 400 KHz signal for the optional BUC power detector for closed loop power control.
Connector: DB26 HD

Receive Input Port

The Rx In port receives the L-Band IF signal for the ODU and provides DC power to the ODU LNB. The power of the input signal must be in the range of –30 to –65 dBm. The IF frequency must be in the range of 950 to 1750 MHz.
The input impedance is 75 ohms, with a return loss of 8dB or better.
Connector: F connector

Audio Output Ports Left and Right

The Audio Left and Audio Right Output ports supply the analog audio outputs for audio channels 1 and 2. The peak output level is approximately –3 dBu and the output are matched for 600-ohm impedance.
Connectors: stereo pair on RCA jacks, +18 dBU maximum, 0 dB throughput gain nominal.

Video Output Port

The Video Output port supplies the composite analog (NTSC or PAL) video output signal to the user monitor. The output impedance is 75 ohms. Connector: RCA jack.

Console Port

The Console port provides an RS-232 interface between the IPSat GW1000 and a console.
Connector: DB 9 connector

Ethernet Port 10/100 BaseT Port

The Ethernet 10/100 BaseT port supports auto-negotiation by default. Optionally, speed and duplex can be manually set.
Connector: 10/100BaseTX per IEEE 802.3u on an RJ-45 connector.

Power Supply

The rear panel AC power supply interface includes an On/Off (I/0) power switch, a cooling fan vent, and an IEC 320 power cord receptacle.
The IPSat GW1000 is powered by an auto-sensing, auto-ranging AC switching power supply. The power supply accepts 85 to 240VAC nominal input voltage levels cycling at 47 to 63 Hz.

Basic Installation Information Sheet

Basic Installation Information

General Information

Date_____Installer_____
Site location_____

Customer

Name _____ P.O.C. and phone # _____

Satellite

Name _____Longitude (degrees) _____

■ Operating band
- C-band ❒
- Ku-band ❒

■ Polarization
- Linear Co-Pol ❒
- Circular RHCP ❒
- Cross-Pol ❒
- LHCP ❒

Earth Station

■ Altitude (feet) _____ ■ Magnetic deviation degrees/minutes)_____
■ Longitude (degrees/minutes) _____ ■ Latitude (degrees/minutes)_____

Antenna

Size_____-___Manufacturer_____

■ Offset angle (deg) _____(for offset antennas nominally 22.5°)
■ Elevation angle (deg) _____ ■ Azimuth angle (deg) _____
■ Polarization angle (deg) _____

ODU Information

■ Radio transmitter gain _____ ■ LNB Type _____
■ IFL cable length _____ ■ IFL cable Type _____

IDU Configuration Parameters

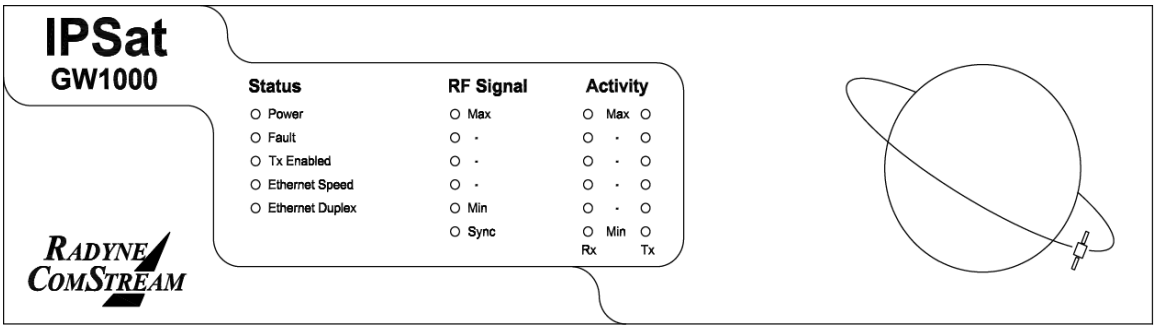
	■ *Transmit*	■ *Receive*
■ Data rate (bps)	_____	_____
■ Frequency (hz)	_____	_____
■ Coding Rate	_____	_____

Network Parameters

■ IPSat IP Address _____ ■ Subnet Mask _____
■ Default Gateway _____
■ Mpeg PID 1 _____ ■ Mpeg PID 2 _____

Front Panel Operation

This section describes the feedback system of the IPSat GW1000 front panel:



Front Panel Components

The front panel is broken into the following sections:

Status

- **Power:** Illuminates green when powered on
- **Fault:** Illuminates red when a fault is active
- **Tx Enabled:** Illuminates green when the modulator is enabled
- **Ethernet Speed:** Illuminates green when speed is 100mbps. Illuminates orange when speed is 10mbps.
- **Ethernet Duplex:** Illuminates green when duplex is full. Illuminates orange when duplex is half.

RF Signal (Eb/No)

- **Max:** Illuminates green if Eb/No is 11 or above
- **. :** Illuminates green if Eb/No is 10 or above
- **. :** Illuminates green if Eb/No is 9 or above
- **. :** Illuminates green if Eb/No is 8 or above
- **Min:** Illuminates green if Eb/No is 5 or above
- **Sync:** Illuminates green if demodulator has achieved synchronization

Activity (Rx)

- **Max:** Illuminates yellow if 90% of Rx Subscribed BW is above or is being utilized
- **. :** Illuminates green if 80% of Rx Subscribed BW or above is being utilized
- **. :** Illuminates green if 70% of RX Subscribed BW or above is being utilized
- **. :** Illuminates green if 60% of Rx Subscribed BW or above is being utilized
- **. :** Illuminates green if 50% of Rx Subscribed BW or above is being utilized
- **Min:** Illuminates green if 1% of RX Subscribed BW or above is being utilized

Activity (Tx)

- **Max:** Illuminates yellow if 90% of Tx Data Rate or above is being utilized
- **. :** Illuminates green if 80% of Tx Data Rate or above is being utilized
- **. :** Illuminates green if 70% of Tx Data Rate or above is being utilized
- **. :** Illuminates green if 60% of Tx Data Rate or above is being utilized
- **. :** Illuminates green if 50% of Tx Data Rate or above is being utilized
- **Min:** Illuminates green if 1% of Tx Data Rate or above is being utilized

IPSat GW1000 Console Design

IPSat GW1000 Menu Tree

The IPSat GW1000 console provides a menu-driven interface in a tree structure as detailed below. Notice that there are three main categories of functions: Configuration, Status, and Utilities. A description of each function can be found in the chart 5.1.

1. Main Menu
    - 1.1 Configuration
        - 1.1.1 Basic
        - 1.1.2 Advanced
            - 1.1.2.1 Network
                - 1.1.2.1.1 Ethernet
                - 1.1.2.1.2 IP
                    - 1.1.2.1.2.1. Static Routes
                    - 1.1.2.1.2.2. Multicast Control
            - 1.1.2.1.3 ARP
            - 1.1.2.1.4 HDLC
            - 1.1.2.1.5 NMS Control Address
        - 1.1.2.2 MODEM
            - 1.1.2.2.1 Modulator
            - 1.1.2.2.2 Demodulator
        - 1.1.2.3 DVB/MPEG
            - 1.1.2.3.1 PID Table
            - 1.1.2.3.2 MAC Filtering
            - 1.1.2.3.3 Audio/Video
        - 1.1.2.4 Console
        - 1.1.2.5 Security
            - 1.1.2.5.1 Telnet Control
            - 1.1.2.5.2 Telnet/Console Password
            - 1.1.2.5.3 Telnet Timeout
            - 1.1.2.5.4 Local Ping Control
            - 1.1.2.5.5 Console Password Control
        - 1.1.2.6 Faults
            - 1.1.2.6.1 Realtime Fault Mask
            - 1.1.2.6.2 Fault Log Mask
    - 1.2 Status
        - 1.2.1 Network
            - 1.2.1.1 Ethernet Port Status
            - 1.2.1.2 IP
                - 1.2.1.2.1 Forwarding Table

IPSat GW1000 Console Parameters

The following chart provides a description of all of the parameters that can be configured and monitored on the IPSat GW1000.

Main Menu → Configuration → **Basic**	**[1] IP Address**: Used to identify the IPSat GW1000 on the network and is usually defined by your service provider. **[2] Subnet Mask**: Used by the IPSat GW1000 in conjunction with its IP address to make forwarding decisions and is usually defined by your service provider. **[3] Default Gateway**: Used in situations where one or more routers exist on the IPSat GW1000's subnet accessible through the Ethernet interface. When a packet is received from the DVB channel and the IPSat GW1000 determines that the packet contains a destination IP address that is not on its own subnet, the IPSat GW1000 forwards the packet to a gateway. The gateway is chosen by searching the static routes that have been defined; if no static route exists to handle the destination network, the packet is forwarded to the default gateway. Note: The default gateway (and static route) configuration only applies to forwarding decisions made on packets received by the DVB port (demodulator or receive port), not packets received by the Ethernet port. Packets received by the Ethernet port that contain an unknown destination network will be forwarded out the HDLC port (modulator or transmit port). **[4] MPEG PID 1**: When a PID (Program Identifier) value is entered, the IPSat GW1000 will accept and process all traffic received by the DVB port (demodulator or receive port) that contains the PID value. At least one PID must be entered to receive DVB traffic and is usually defined by your service provider. **[5] Subscribed Rx BW**: Enter the amount of bandwidth that the IPSat GW1000 is subscribed to receive from the service provider. The IPSat GW1000 uses this parameter to accurately reflect the network activity on the front panel display. **[6] RD - Rx Data Rate**: Sets the data rate in bps (bits per second) that the demodulator receives at and is usually defined by your service provider. The Rx Symbol Rate is automatically determined by the Rx Coding Rate and the Rx Data Rate. **[7] RS - Rx Frequency**: Sets the

	frequency in Hz (hertz) that the demodulator receives at and is usually defined by your service provider. **[8] TC - TX Coding Rate:** Sets the coding rate that the modulator will use and is usually defined by your service provider. **[9] TD - TX Data Rate**: Sets the data rate in bps (bits per second) that the modulator transmits at and is defined by your service provider. The TX Symbol Rate is automatically determined by the TX Coding Rate and the TX Data Rate. **[10] TS - TX Frequency:** Sets the frequency in Hz (hertz) that the modulator transmits at and is usually defined by your service provider. **[11] TP - TX Power Level:** Determines the power level in dBm (decibel-meter) that the modulator transmits at. **[12] EM - Modulator:** Enables or disables the modulator. It performs the same function as pressing TX Enable on the front panel. **[13] HP - 10 MHz Reference**: Enables or disables the 10 MHZ reference from the IPSat GW1000 to the BUC (Block Up Converter) **[14] MIV - 24 Volt Output**: Enables or disables the 24v output from the IPSat GW1000 power supply to power a BUC (Block UpConverter). The output supplies a maximum of 3 Amps. **[15] AE - Modulator Auto Enable:** Used to automatically enable the modulator upon power-up or reset when set to Auto; otherwise, when set to manual, the modulator must be manually enabled upon power-up or reset. **[16] PC - Pure Carrier:** Enables or disables the transmission of an unmodulated carrier (continuous wave) out of the modulator. The pure carrier signal is used for diagnostic and installation procedures.

Main Menu → Configuration → Advanced → Network → **Ethernet**	**[1] MAC Address:** The Media Access Control address (physical address) of the Ethernet port. While it is possible to change the address, this is not recommended since there is no guarantee that it will be unique. The MAC address is also used by your service provider to identify your IPSat GW1000. **[2] Port Setting:** In Auto-negotiation Mode, the IPSat GW1000's Ethernet port will automatically negotiate its speed and duplex with the Ethernet port of the device the IPSat GW1000 is plugged into. In Manual Mode, the console will allow the user to specify the port speed and duplex. Note 1: When connecting two Ethernet devices together, both devices should be set to use the same port settings. For example, if the IPSat GW1000 is set to use auto-negotiation, the Ethernet device it is connected to should also use auto-negotiation. If this advice is not heeded, your network performance could be reduced due to excessive collisions. Note 2: The Port Speed and Port Duplex Mode options only appear when Manual Mode is selected for the Ethernet port. **[3] Port Speed:** The manually configured speed of the Ethernet port. **[4] Port Duplex Mode:** The manually configured duplex mode of the Ethernet port.

Main Menu → Configuration → Advanced → Network → IP → **Static Routes**	When the IPSat GW1000 must forward traffic to multiple networks that are accessible through different routers on the IPSat GW1000's subnet, static routes must be used. To add a static route, press "a". You will be prompted to enter the following: Destination: The destination network IP address. Mask: The destination network subnet mask. Gateway: The IP address of the gateway (router) that will forward the packet to its final destination or the next hop. Port: The port that the incoming packet will be forwarded out. This should always be the Ethernet port unless a Multicast static route is entered, in which case, the HDLC port should be chosen. Note: The default gateway and static route configuration only apply to forwarding decisions made on packets received by the DVB port (demodulator or receive port), not packets received by the Ethernet port. Packets received by the Ethernet port that contain an unknown destination network will be forwarded out the HDLC port (modulator or transmit port). Configuration Example: Consider the network diagram below for the following discussion. Assume that Router A can forward packets to ten different networks, Router B can forward packets to network 192.168.34.240 with subnet mask 255.255.255.248, and Router C can forward packets to network 192.168.34.232 with subnet mask 255.255.255.248. [IPSat GW1000]-------[Switch]---------[Router A] 10.0.0.1 | 10.0.0.30 | |----------[Router B] | 10.0.0.35 | |----------[Router C] 10.0.0.40

	The easiest way to configure the IPSat GW1000 for this network is to perform the following three steps: 1. Configure a default gateway of 10.0.0.30 on the Basic Configuration page. Using the default gat gateway in this instance saves the user from entering ten static routes. 2. Configure a static route as follows: Destination: 192.168.34.240 Mask: 255.255.255.248 Gateway: 10.0.0.35 Port: Ethernet 3. Configure a static route as follows: Destination: 192.168.34.232 Mask: 255.255.255.248 Gateway: 10.0.0.40 Port: Ethernet
Main Menu → Configuration → Advanced → Network → **ARP**	Determines how long an unused ARP (Address Resolution Protocol) entry will remain in the ARP table.
Main Menu → Configuration → Advanced → Network → **HDLC**	This value depends on the type of equipment your service provider is using to process the IPSat GW1000's HDLC (transmitted) traffic. 16-bit address mode is used for Cisco equipment and 0-bit address mode is used for RAD equipment. Your service provider should provide you with this setting.
Main Menu → Configuration → Advanced → Network → **NMS Control Address**	The IP address that is used by your service provider's NMS (Network Management System). The NMS allows your service provider to configure your IPSat GW1000 and gather statistics from your IPSat GW1000.
Main Menu → Configuration → Advanced → MODEM → **Modulator**	[**1] MI - TX Spectral Inversion**: Enables or disables transmit spectral inversion. Default is Disable **[2] TM - TX Modulation Type**: Modulation type can be set to QPSK or BPSK. This should be provided by your service provider. Default is QPSK. **[3] TO - TX Offset:** A frequency that is added (or subtracted) to the TX frequency. Default is 0hz. **[4] ROE - Radio Output Enable**: The amount of time that the IPSat GW1000 will wait upon power-up or reset to automatically enable the modulator. The BUC requires a warm-up period in order for accurate transmission characteristics. Default is 180 seconds. **[5] TR - TX Symbol Rate:** The symbol rate at which the modulator transmits at.

	It can be entered in sps (symbols per second). When changing the symbol rate, the data rate in the Basic Configuration will also change. Symbol rate is related to data rate using the following equation: Symbol Rate = (Data Rate / (Code Rate x Modulation Index)) For example, the symbol rate of a 2 Mbps, Viterbi-DVB 3/4, QPSK transmission is Symbol Rate = (2000000 / ((3/4) x 2)) = 1333333 sps **[6] DM - Differential Encoding on modulator:** Enables or disables differential encoding. Used to protect from the possibility of phase ambiguity errors. Default is on. **[7] SM - Scrambling Type on modulator:** selects type of scrambling algorithm applied to transmit data stream. Default is ComStream. **[8] PD - Power Detect:** Enables or disables optional power detector. Default is disabled. **[9] MFS - Modulator Filter Select**: Selects the spectral shape of the modulated transmit signal. Used to optimize filter shapes between modulator and demodulator Default is ComStream.

Main Menu → Configuration → Advanced → MODEM → **Demodulator**	**[1] EBT - Eb/No Threshold:** When the Eb/No falls below the Eb/No threshold, the IPSat GW1000 will report a fault. Default is 0db. **[2] AO - Acquisition Offset:** When the demodulator begins its acquisition process, it will begin its search at the Rx frequency plus or minus the acquisition offset. For example, if the Rx Frequency is 1200000000 Hz and the acquisition offset is 1000 Hz, the demodulator will begin its acquisition at 1200001000 Hz. Default is 0hz. **[3] DD - Differential Decoding:** Enables or disables differential decoding. Used to protect from the possibility of phase ambiguity errors. Default is on. **[4] RM - Rx Modulation Type:** Modulation type can be set to QPSK or BPSK. This should be provided by your service provider. Default is QPSK. **[5] RR - Rx Symbol Rate:** The symbol rate at which the demodulator receives at. It can be entered in sps (symbols per second). When changing the symbol rate, the data rate in the Basic Configuration will also change. Symbol rate is related to data rate using the following equation: Symbol Rate = (Data Rate / (Code Rate x Modulation Index)) x Reed-Solomon Overhead For example, the symbol rate of a 70 Mbps, Viterbi 7/8, QPSK transmission is Symbol Rate = (70000000 / ((7/8) x 2)) x (204/188) = 43404256 sps [**6] SD - Descrambling Type:** enables or disables DVB descrambling algorithm applied to receive data stream. Default is DVB descrambling. **[7] DFS - Demod Filter Select:** Selects the spectral shape for the digital filter. Used to optimize filter shapes between modulator and demodulator. Default is ComStream.

Main Menu → Configuration → Advanced → DVB/MPEG → **PID Table**	When a PID (Program Identifier) value is entered, the IPSat GW1000 will accept and process all traffic received by the DVB port (demodulator or receive port) that contains the PID value. At least one PID must be entered to receive DVB traffic and is defined by your service provider.
Main Menu → Configuration → Advanced → DVB/MPEG → **MAC Filtering**	Enables or disables MAC Filtering. When MAC Filtering is enabled, only DVB packets containing the IPSat GW1000's MAC address will be accepted and processed by the IPSat GW1000. This value is usually defined by your service provider.
Main Menu → Configuration → Advanced → DVB/MPEG → **Audio/Video**	**[1] Video PID**: When a Video PID (Program Identifier) value is entered, the IPSat GW1000 will accept and process all traffic received by the DVB port (demodulator or receive port) that contains the PID value. The MPEG-2 video traffic that is received on this PID will be output on the RCA Video output (J82). **[2] Audio PID:** When an Audio PID (Program Identifier) value is entered, the IPSat GW1000 will accept and process all traffic received by the DVB port (demodulator or receive port) that contains the PID value. The MPEG-2 audio traffic that is received on this PID will be output on the RCA Audio Left and Right outputs (J80 and J81). **[3] PCR PID**: When a PCR (Programmable Clock Reference) PID (Program Identifier) value is entered, the IPSat GW1000 will accept and process all traffic received by the DVB port (demodulator or receive port) that contains the PID value. In most cases, the PCR PID must match the video PID so that the MPEG-2 video stream can be properly decoded.
Main Menu → Configuration → Advanced → **Console**	The console port speed Default is 19200,8,N,1 Note: baud rate is in bps (bits per second).
Main Menu → Configuration → Advanced → Security → **Telnet Control**	Enables or disables the IPSat GW1000's Telnet server. Default is Disable. Only six Telnet sessions can be active at any given time.
Main Menu → Configuration → Advanced → Security → **Telnet/Console Password**	The Telnet password can be entered here. Default is IPSat GW1000. Should be changed to a unique password for security reasons.

Main Menu → Configuration → Advanced →Security → **Console Password Control**	If enabled, the user must enter a password to gain access through the console. The user may log out of the console session by pressing Esc at the welcome screen. If the unit is reset, the console password will also be required to gain access.
Main Menu → Configuration → Advanced → Security → **Telnet Timeout**	The amount of time that a Telnet session can remain idle before it is terminated. Default is 5 min.
Main Menu → Configuration → Advanced → Security → **Local Ping Control**	Enables or disables the IPSat GW1000's response to ping requests received on its Ethernet port. Default is enable.
Main Menu → Configuration → Advanced → Faults → **Realtime Fault Mask**	When a fault on this page is masked, the fault will not appear in the list of current faults if the fault occurs. On the GW1000, the Fault indicator on the front panel also will not light.
Main Menu → Configuration → Advanced →Faults → **Fault Log Mask**	When a fault on this page is masked, the fault will not appear in the Fault Log if the fault occurs.
Main Menu → Status → Network → **Ethernet Port Status**	**Link Status**: Up when Ethernet port is connected to a working Ethernet device and Down when Ethernet port is not connected to a working Ethernet device. **Port Operation Mode**: Ethernet port can be in auto-negotiation mode or manual mode. **Speed**: Can be 100 Mbps or 10 Mbps. **Duplex Mode**: Can be full-duplex or half-duplex. **Loopback Mode**: Ethernet port is either in normal mode or loopback mode.
Main Menu → Status → Network → IP → **Forwarding Table**	Lists the IPSat GW1000's routing table which includes the destination network, destination network prefix (mask), gateway IP address of the destination network, and the interface that leads to the destination network. Interface 1 is Ethernet, 2 is HDLC, and 3 is Local.
Main Menu → Status → Network → IP → **Routed Packet List**	Before the IPSat GW1000 can forward a packet, it must decide which port the packet should be forwarded out of based on the source and destination IP addresses contained in the packet. After the IPSat GW1000 has made this decision, it stores the information in the Routed Packet List. Entries time out of the list based upon the ARP Table Timeout setting.

Main Menu → Status → Network → **ARP Table**	Before the IPSat GW1000 can send data to a host on its Ethernet subnet, it must know the host's physical address or MAC (Media Access Control) address. The ARP (Address Resolution Protocol) table contains a list of MAC address and IP address mappings. Entries will be removed from the table according to the ARP Table Timeout value.
Main Menu → Status → **Modem**	**Demodulator Status**: Reports whether the demodulator is synchronized or not synchronized to a carrier signal. **Modulator Status**: Reports whether the modulator is enabled or disabled. **AGC value**: The AGC (Automatic Gain Control) of the demodulator is a gauge of how powerful the received signal is. As the signal strength increases, so does the AGC value. **Eb/No**: The Eb/No value is the energy-per-bit with respect to noise (or signal-to-noise ratio) of the signal received by the demodulator. **Receive Offset**: The frequency difference between the signal acquired by the demodulator and the configured Rx frequency.
Main Menu → Status → **DVB/MPEG**	Displays the number of packets received on each configured PID in the DVB stream.
Main Menu → Status → **Packet Statistics**	**[DVB] Received Packets**: Number of packets received on the DVB port. **[DVB] Dropped Packets**: Number of packets received at the DVB port that could not be forwarded due to an unresolvable destination IP address or some other error condition. **[DVB] Local Packets**: Number of packets received on the DVB port that are destined for the IPSat GW1000. **[Ethernet] Transmitted Packets**: Number of packets that are transmitted out of the Ethernet port. **[Ethernet] Received Packets**: Number of packets that are received by the Ethernet port. **[Ethernet] Receive Errors**: Number of errors that occur on received packets on the Ethernet port. For example, if the IPSat GW1000 receives a frame that is too short due to an Ethernet collision, an error will be logged. Another example would be when the IPSat GW1000 receives traffic at a faster rate than it can transmit.

	[HDLC] Transmitted Packets: Number of packets that are transmitted out of the HDLC port. **[HDLC] Transmission Errors**: Number of errors that occur when attempting to transmit packets out of the HDLC port. **Mpeg Packet Total**: Number of packets received in the MPEG/DVB stream. **Mpeg Packet Errors**: Number of errors received in the MPEG/DVB stream. It is normal for a few errors to appear upon startup or reset.
Main Menu → Status → **Firmware Versions**	Displays the versions of firmware that are used by the IPSat GW1000.

Main Menu → Status → Faults → **Current Faults**	Any active faults will appear on this screen. For a description of faults, please refer to the Faults and Maintenance chapter.
Main Menu → Status → Faults → **Fault Log**	The last 100 faults will appear on this screen along with the time the fault occurred, since the last reset. For a description of faults, please refer to the Faults and Maintenance chapter.
Main Menu → Utilities → **Ping**	**[1] Destination IP Address:** The IP address of the host that is to be pinged. **[2] Packet size**: The size of the payload contained in the ping. **[3] Number of packets:** The number of packets to send to the host. **[4] Send Ping(s):** Initiates the ping process. Pressing the ESC key will abort the ping task.
Main Menu → Utilities → Loopback → **Test**	**[1] Loopback IP Address**: The IP address that the IPSat GW1000 will send back through its HDLC port. [**2] Loopback Test (Hardware):** Starts or stops the loopback mode.

Main Menu → Utilities → Loopback → **Test Statistics**	**DVB Receive Packets**: The number of packets received at the DVB port during loopback testing. **HDLC Transmit Packets**: The number of packets transmitted out of the HDLC port during loopback testing.
Main Menu → Utilities → **Initialize Configuration**	Answering Yes will return all of configured settings to their factory default values.
Main Menu → Utilities → **Firmware Upgrade**	When new features are added or "bugs" are fixed, a firmware upgrade is required. The firmware can be downloaded to the IPSat GW1000 using the console interface or your provider may choose to download it through the DVB stream. For the fastest console download, the console port speed should be set to 115200 bps and 1K X-MODEM should be used as the transfer protocol. Note: While a firmware upgrade is being downloaded, the IPSat GW1000 will not forward any network traffic.
Main Menu → Utilities → Debug Commands → **Forward Channel Processor Commands**	This is a debugging tool and should only be used under the direction of Radyne ComStream customer support.
Main Menu → Utilities → Debug Commands → Packet Capture Commands → **Packet Capture Control**	Enables or disables the capturing of the last XXX packets the IPSat GW1000 received on its Ethernet port.
Main Menu → Utilities → Debug Commands → Packet Capture Commands → **View Packet Capture**	Decodes the packets captured by the IPSat GW1000.
Main Menu → Utilities → Debug Commands → Packet Capture Commands → **Erase Packet Capture**	Answering "Y" erases from non-volatile memory the packets captured by the IPSat GW1000.
Main Menu → Utilities → Debug Commands → Packet Capture Commands → **Save Packet Capture**	Answering "Y" saves the packets captured by the IPSat GW1000 to non-volatile memory.
Main Menu → Utilities → **Reset**	Answering "Y" will cause IPSat GW1000 to reset.

Faults and Maintenance

Fault Description	
Rx Sync Fault	Forward channel demodulator is not synchronized to the satellite signal.
Low Eb/No Fault	Receive Eb/No is below its defined threshold.
Short Circuit Fault	Tx IFL cable has been short-circuited.
Tx Fault	Modulator transmit fault.
Tx Power Control Fault	Modulator Tx power control circuit has exceeded its dynamic range.
Modem NvRam Fault	A corruption of the modems non-volatile memory was detected.
MPC860 NvRam Fault	A corruption of the TCP/IP stack processor non-volatile memory was detected.
Mpeg NvRam Fault	A corruption of the MPEG processor non-volatile memory was detected.
Mpeg_Sync_Fault	The MPEG processor is not synchronized to a valid MPEG transport stream.
IPC Com Fault processor	A communication fault occurred between the MPEG and the TCP/IP stack processor.
Buffer Allocation Fault	No buffers available for the TCP/IP stack processor.
Tx Queue Fault	No buffers available for the transmitter.
Ethernet Link Fault	Ethernet cable not detected.

Troubleshooting Tips

The troubleshooting tips in the following table were designed to help you diagnose and correct minor operational problems in the unlikely event that you experience difficulties with your IPSat GW1000 Remote Terminal.

For the problems listed, solutions are provided to help you troubleshoot IPSat GW1000 difficulties. If you try all the suggested solutions and the unit still fails, call Radyne ComStream Customer Service.

Trouble Shooting Common IPSat GW1000 Problems		
Problem	**Possible Causes**	**Solutions**
No main menu at terminal	IPSat GW1000 is not receiving power.	Check that power is being supplied to the unit—some front panel LEDs should be lit.
	The RS232 cable is not properly connected.	Check that the RS232 cable is connected using the serial cable provided.
	Parity and baud rate parameters are not properly configured.	Check that the selected parity, 8/none, default 19200, 8, none, 1 and baud rate match that of the terminal.
Carrier is not being transmitted	IPSat GW1000 is set for external timing.	Set to internal.
	10 MHz Ref is not enabled.	Enable 10 MHz Ref in console.
	24 VDC for BUC not enabled.	Select 24 Internal for External from console. External requires external power supply.
	The Eb/N0 level is too low.	Check the cabling to the satellite dish. Check that the modem is configured properly. Check antenna alignment.
IPSat GW1000 will not acquire the incoming carrier	Cables are not connected properly.	Check that all cables are connected correctly.
	Modulator output is not enabled at the far end.	Check that the modulator output is enabled at the far end.
	Modulator and demodulator parameters are not compatible.	Check that the modulator and demodulator configuration parameters are compatible.
	Signal-to-noise ratio is not correct.	Check that the signal-to-noise ratio is sufficient.
	If operating in QPSK mode, there may be a spectral inversion problem introduced in the up conversion or down conversion process.	Use DI command to compensate for this.

	Signal is not present on the Rx IF connector.	Check the AG parameter to ensure that a signal is present on the Rx IF connector. A value of 255 indicates no signal; a value of 80 to 135 indicates a good signal level.
IPSat GW1000 experiences occasional decoder synchronization loss, but no loss of carrier tracking or bit time lock.	Rain fades or other loss of signal power will cause decoder faults before carrier tracking or bit timing faults.	Make sure that the Eb/N0 level is sufficient.

The IPSat GW1000 requires no periodic or preventive maintenance and is designed to deliver years of maintenance-free service. The only task you need to perform is keeping the air intake grill free of debris, blockage, or excessive dust to ensure that the IPSat GW1000 receives adequate airflow.
If you do clean the IPSat GW1000, first remove power from the unit. Then clean the cabinet, panel, and controls with a soft cloth ***lightly*** moistened with water.

Do not use any type of abrasive pads, scouring powders, liquid cleaners, aerosol cleaners, or solvents such as alcohol or benzene.

Appendix A

Technical Specifications

General Specifications	
Chassis	2RU rack-mountable in standard 19" rack. Approximately 15" deep and 13" wide.
Power	90 to 265 VAC, 47 to 63 Hz Integrated line filter Internal supply will source up to 5W BUCs; external power supply for larger BUCs available
Cooling	Forced air; air inlet on side panels, exhaust on rear panel At least 2 inches free air space on back and sides for air flow required
Environmental	0 to 50 degrees C ambient, 5 to 95% RH, non-condensing Vibration as normally encountered in stationary hub facility
Regulatory	CE Mark approval pending, others upon request
Monitor & Control	Available through, RS-232 console, TELNET, or optional Network Management System

Demodulator Specifications	
RF Input	50 to 2150 MHz –20 to –65 dBm carrier power –10 dBm maximum aggregate power
Symbol Rates	1.0 to 45.0 Msps
Data Rates	1.0 to 72.5 Mbps
Demodulation	QPSK
DVB Forward Error Correction	Viterbi rate 1/2, 2/3, 3/4, 5/6, and 7/8 inner decoder DVB-compliant deinterleaver DVB Reed-Solomon rate 188/204 outer block decoder DVB synchronous descrambler Compliant with DVB-S standard, EN 300 421
DVB Mode BER Performance	per EN 300 421
BERT	RS-422 electrical Synchronous clock and data 1/8th aggregate data rate (less RS sync byte)

Modulator Specifications	
RF Output	950 to 1750 MHz
RF Output Power	+8 to –35 dBm carrier power adjustable in 0.1 dB steps
RF Step Size	1 kHz
Symbol Rates	19.2 Ksps to 2.048 Msps
Data Rates	9.6 Kbps to 2.048 Mbps
Modulation	BPSK or QPSK
FEC Modes	Intelsat mapped symbols per IESS 308; 1/2, 3/4, and 7/8 rate DVB mapped symbols per EN300 421; 1/2, 3/4, and 7/8 rate Radyne ComStream Sequential 1/2 and 3/4 rate
Scrambler	V.35 asynchronous scrambler in Viterbi only
Differential Encoding	Included in Viterbi and Sequential
Phase Noise	Compatible with IESS 308
Spurious	Compatible with IESS 308
BERT	RS-422 electrical Synchronous clock and data 1/8th aggregate data rate (less RS sync byte)

Ethernet Specifications	
Ethernet Data Interface	10/100Base-T twisted pair interface per IEEE 802.3u RJ-45 female connector, pinout per IEEE 802.3u
Ethernet Mode	Auto detect
LED Indicators	On rear panel: 10/100B Mode, TX Data, Rx Data, collision, and Link
MPEG Transport Processing	32 PIDs and MPE section filters per EN 301192 and IEC 13818-1
Aggregate Transport Data Rate	72.5 Mbps maximum
Filtered Transport Data Rate	Up to full channel rate
Ethernet Throughput Rate	Greater than 10000 packets / sec
Routing Functions	Supports 64 static routes (gateway devices, ARP)

MPEG-2 Video Decoder Output Specifications	
Output	RCA jack, female
Impedance	75 Ohms
Input Data Format	MPEG-2 video stream per IEC 13818-2
Demultiplexing	Up to 32 user-defined MPEG PIDs available
Video Decoding	MPEG-2 compliant per IEC 13818-2
Analog Video Output	Composite video: NTSC (default) or PAL, standard definition

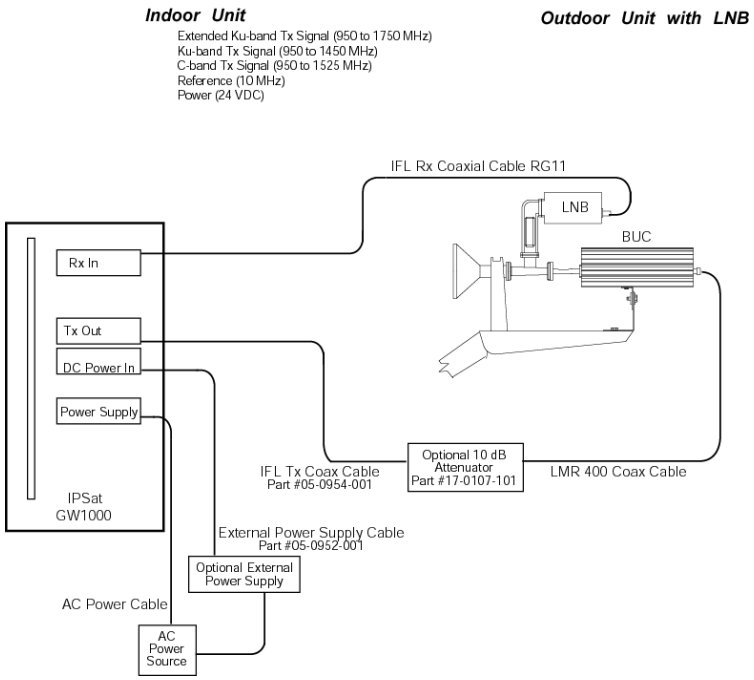
MPEG-2 Audio Decoder Output Specifications	
Output	RCA jack, female
Impedance	600 Ohms unbalanced
Audio Decoding	MPEG-1 and MPEG-2 compliant
Analog Audio Output	Left and right dual mono or joint stereo
Analog Audio Bandwidth	13 KHz ± 1 dB, based on 64 kbps audio data rate per channel
Analog Audio Level	0 dBm +1/-3 dB fixed for a 0 dBm input signal at program encoder

Appendix B

Cable Specifications

This appendix provides installation procedures and defines the required performance parameters for the following cables and connectors:

- IFL TX and Rx cables
- Y-cable
- Optional Power Detector Cable
- IFL F- and N- connectors



IPSat GW1000 Cabling

IFL Cables

IFL cables must conform to the specifications provided in this manual to ensure that ComStream equipment operates properly.

Quad-shielded coax must be used for IFL cables. Without quad shielding, the system may be subject to outside RF interference, which can degrade performance.

IFL cables must be properly installed for the system to operate at the specified performance levels. Radyne ComStream **strongly recommends** purchasing the following IPSat GW1000 IFL cables from the following vendors:

- LMR-400 quad-shielded coaxial cable, Times Microwave Communications, 800-867-2629
- RG-11 quad-shielded coaxial cable, type 2282, Times Fiber Communications, 800-677-2288

It is assumed that the TX and Rx IFL cables are the same length. A record of the length of these cables should be kept for reference. Radyne ComStream can provide complete IFL Kits including all required connectors and cables pre-wired...

IFL F- and N Connectors

Radyne ComStream supplies the necessary F- and N-connectors for use with the IPSat GW1000 IFL coax cables. These connectors are designed for the recommended Times Microwave LMR-400 and Times Fiber RG-11 coaxial cable. If another IFL coaxial cable is used, different F and N-connectors will be required and must be matched to the coaxial cable selected.

IFL F-Connector

The F-connectors supplied with the IPSat GW1000 are designed to be used with the recommended Times Fiber RG-11 coaxial cable. One F-connector must be installed on both the indoor and outdoor ends of the Rx coaxial cable. A crimping tool must be used to securely fasten the F-connector collar. Although this crimping tool is available from different vendors, ComStream recommends the following vendor for additional F-connectors or crimping tools:

- CABLE Prep, 203-526-4337
- Crimp tool part number HCT-211

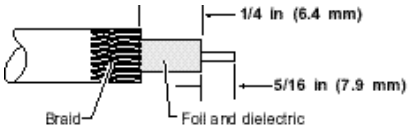
For up-to-date information on vendors, contact your Radyne ComStream representative.

RG-11 Cable Assembly with F-Connector

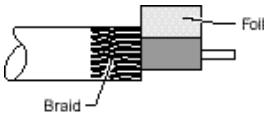
To prepare the RG-11 cable and attach an F-connector, follow these steps.

1 Expose 5/16 inch (7.9 mm) of the center conductor. Ensure that the center conductor is not scored.

2 Remove 1/4 inch (6.4 mm) of jacket. Ensure that the braid is not cut. Fold exposed braid back over the cable jacket.



1 Remove first foil. Ensure that the braid is not cut. Fold the second braid back over the cable jacket.



1 Guide the center conductor into the connector. Push the connector onto the cable until a reasonable stop is felt.

2 Crimp the connector using the recommended crimping tool (.475 inch [12.1 mm] hexagon tool.)

IFL N-Connector

The N-connectors supplied with the IPSat GW1000 are designed for the recommended Times Microwave Quad-shielded LMR-400 coaxial cable. One N-connector must be installed at both the indoor and outdoor ends of the TX coaxial cable. By using the quad-shielded LMR-400 cable from Times Microwave, cable runs of up to 100 m (328 ft.) can be used for data rates above 19.2 kbps. For lower data rates, the maximum cable lengths are shown in the following table.

Data Rate (kbps)	Maximum Cable Length (m)
9.6	86
19.2	100

The maximum length assumes a receive E_b/N_0 of 5 dB. With higher E_b/N_0 values, maximum cable runs can be increased to a maximum of 100 m. This cable attenuates the received signals by 6 dB per 30.5 m (100 ft.). For longer cable runs, the receive signal E_b/N_0 must be increased by an amount equal to the increased signal attenuation caused by the additional cable length. For example, increase the far end transmit power by 6 dB for each additional 30.5 m of IFL coax cable length.

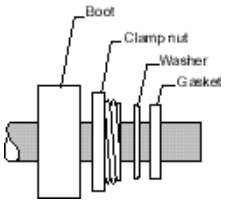
Cable Loss

For all data rates, the degradation of system NF due to the IFL coaxial cable is negligible for cable lengths up to 100 m (328 ft.).

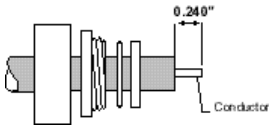
LMR-400 Cable Assembly with N-Connector

To prepare the LMR-400 cable and attach an N-connector, follow these steps.

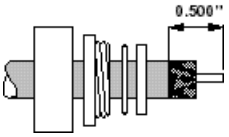
1 Flush cut end of cable using a fine saw blade. Cut cable so that the end remains round and the face of the cable is perpendicular to its length. Slide on shrink boot, clamp nut, washer, and gasket.



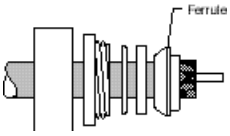
2 Expose the 0.240 inches of the conductor. Cut through the cable jacket, braids, and dielectric core. Do ***not*** nick the cable conductor.



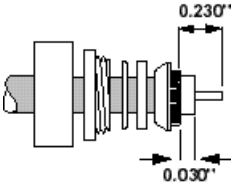
3 Expose 0.500 inches of the outer braid. Do ***not*** to nick the braids when removing the cable jacket.



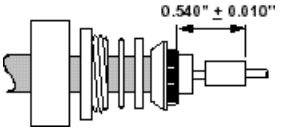
4 Slide on the ferrule. Ensure that all braids come up through the ferrule



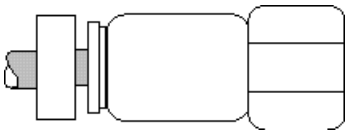
5 Flare out the braids and fold them back onto the ferrule. Trim braids to shoulder. Trim core back to 0.030 inches maximum. Trim the conductor back to 0.230 inches.



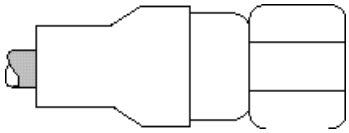
6 Install the contact. Solder on the contact using 60/40 solder. Feed solder through solder hole while heating the contact.



7 Install the connector body onto the cable. Check for proper pin height. Apply Locktite 242 to the clamp nut threads. Thread the clamp nut into the connector body. Torque to 50 in-lbs. Check pin height.



8 Install strain relief boot. Position the boot onto the connector body. Apply hot air until boot is smoothly seated onto both the cable and connector. Use only an adhesive lined shrink boot.



Appendix C

Outdoor Unit Recommendations

For TX IFL cable lengths less than those listed in the following table, an **in-line attenuator** should be inserted into the cable. ComStream recommends the use of a Radyne ComStream attenuator, part number 17-0107-101. The attenuator ensures a minimum dynamic range of 15 dB in the output power.
The minimum cable length should be used as a guide by the system integrators and installers as an approximation only.
The maximum cable length is 100 meters in all installations.
Radyne ComStream **strongly recommends** the use of Times Microwave LMR-400 TX IFL cable and Times Fiber RG11 quad-shielded Rx cable. For information on ordering LMR-400 or RG-11 cable, refer to the appendix on cable specifications.
The following table provides the recommended Outdoor Unit:

Output Power		**Frequency Band**	**ODU Part Number**	**Minimum IFL Cable Length (meters)**
Watt	**dBm**			
2	33	Ku	30-0120-510	20
4	36	Ku	30-0120-560	20
5	37	C	30-0120-479	45
8	39	Ku	30-0120-584	20
10	40	C	30-0120-583	20

For additional information and updates regarding outdoor units, contact your Radyne ComStream sales representative.

Glossary

G

A	
AC	Alternating Current
AGC	Automatic Gain Control
ANSI	American National Standards Institute
AO	Acquisition Offset
ARP	Address Resolution Protocol
ASCII	American Standard Code for Information Interchange
ASIC	Application Specific Integrated Circuit
ATE	Automatic Test Equipment
B	
BER	Bit Error Rate
BERT	Bit Error Rate Test
Bit/BIT	Binary Digit or Built-In Test
bps	Bits Per Second
BPSK	Binary Phase Shift Keying
Bridge	Interconnects LAN segments at the network interface layer level
BUC	Block Upconverter
Byte	8 Binary Digits

C	
C	Celsius
CA/xxxx	Cable Assembly
CD-ROM	Compact Disk – Read Only Memory
CLK	Clock
cm	Centimeter
COM	Common
CPU	Central Processing Unit
D	
DD	Differential Decoding
Default Gateway	Used where one or more routers exist
DFS	Demod Filter Select
DC	Direct Current
Demod	Demodulator or Demodulated
DVB	Digital Video Broadcast
E	
E_b/N_0	Ratio of Energy per bit to Noise Power Density in a 1 Hz Bandwidth.
EBT	Eb/No Threshold
EIA	Electronic Industries Association

F	
FEC	Forward Error Correction
FW	Firmware
G	
GHz	Gigahertz
GND	Ground
H	
HDLC	High-level Data Link Control
HW	Hardware
Hz	Hertz (Unit of Frequency)
I	
IEEE	International Electrical and Electronic Engineers
IF	Intermediate Frequency
IP	Internet Protocol
ISO	International Standards Organization
J	

K	
Kbps	Kilobits per Second
Kbps	Kilobytes per Second
kg	Kilogram
kHz	Kilohertz
Ksps	Kilosymbols per Second
L	
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LNB	Low Noise Block Amplifier
M	
MAC	Message Authentication Code
Mbps	Megabits per Second
MHz	Megahertz
Mod	Modulator or Modulated
MPEG	Moving Pictures Experts Group
Multicast	If an IP datagram is broadcast to a subnet, it is received by every host on the subnet.
M&C	Monitor and Control
N	
NMS	Network Management System
O	
ODU	Outdoor Unit
P	
PC	Pure Carrier
PCR	Programmable Clock Reference
PID	Program Identifier
P/N	Part Number
Q	
QPSK	Quadrature Phase Shift Keying
R	
RAD	What does this mean?
RF	Radio Frequency
RM	Receive Modulation

Router	Interconnects networks at the inter-network layer level and routes packets between them.
RR	Receive Symbol Rate
RU	Rack Unit. 1 RU = 1.75”/4.45 cm
Rx	Receive (Receiver)
RxD	Receive Data
S	
SCPC	Single Channel Per Carrier
Static Route	Manual routing performed by the network administrator
Subnet Mask	Identifier used in conjunction with an IP address for forwarding purposes
SYNC	Synchronize
T	
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol / Internet Protocol
Tx	Transmit (Transmitter)
TxD	Transmit Data
U	
UDP	User Datagram Protocol
V	
V	Volts
VAC	Volts, Alternating Current
VCO	Voltage Controlled Oscillator
VDC	Volts, Direct Current

W X Y Z	
W	Watt
Misc.	
16QAM	16 Quadrature Amplitude Modulation
8PSK	8 Phase Shift Keying