GoQAM Modulator RF Output and IF Output Hardware

Installation and Operation Guide

Please Read

Important

Please read this entire guide. If this guide provides installation or operation instructions, give particular attention to all safety statements included in this guide.

Notices

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Contents

Safety Precautions

Read, Retain, and Follow These Instructions

Carefully read all safety and operating instructions before operating this product. Follow all operating instructions that accompany this product. Retain the instructions for future use. Give particular attention to all safety precautions.

Warning and Caution Icons

WARNING:

Avoid personal injury and product damage! Do not proceed beyond any icon until you fully understand the indicated conditions.

The following icons alert you to important information about the safe operation of this product:

You will find this icon in the literature that accompanies this product. This icon indicates important operating or maintenance instructions.

You may find this icon affixed to this product and in this document to alert you of electrical safety hazards. On this product, this icon indicates a live terminal; the arrowhead points to the terminal device.

You may find this icon affixed to this product. This icon indicates a protective earth terminal.

You may find this icon affixed to this product. This icon indicates excessive or dangerous heat.

You may find this symbol affixed to this product and in this document. This symbol indicates an infrared laser that transmits intensity-modulated light and emits invisible laser radiation and an LED that transmits intensity-modulated light.

Heed All Warnings

Adhere to all warnings on the product and in the operating instructions.

Avoid Electric Shock

Follow the instructions in this warning.

WARNING:

To reduce risk of electric shock, perform only the instructions that are included in the operating instructions. Refer all servicing to qualified service personnel.

Servicing

WARNING:

Avoid electric shock! Opening or removing the cover may expose you to dangerous voltages.

Do not open the cover of this product and attempt service unless instructed to do so in the operating instructions. Refer all servicing to qualified personnel only.

Cleaning, Water, Moisture, Open Flame

To protect this product against damage from moisture and open flames, do the following:

- Before cleaning, unplug this product from the AC outlet. Do *not* use liquid or aerosol cleaners. Use a dry cloth for cleaning.
- Do not expose this product to moisture.
- Do not place this product on a wet surface or spill liquids on or near this product.
- Do not place or use candles or other open flames near or on this product.

Ventilation

To protect this product against damage from overheating, do the following:

- This product has openings for ventilation to protect it from overheating. To ensure product reliability, do not block or cover these openings.
- Do not open this product unless otherwise instructed to do so.
- Do not push objects through openings in the product or enclosure.

Placement

To protect this product against damage from breakage, do the following:

- Place this product close enough to a mains AC outlet to accommodate the length of the product power cord.
- Route all power supply cords so that people cannot walk on, or place objects on, or lean objects against them. This can pinch or damage the cords. Pay particular attention to cords at plugs, outlets, and the points where the cords exit the product.
- Make sure the mounting surface or rack is stable and can support the size and weight of this product.

WARNING:

Avoid personal injury and damage to this product! An unstable surface may cause this product to fall.

When moving a cart that contains this product, check for any of the following possible hazards:

- Move the cart slowly and carefully. If the cart does not move easily, this condition may indicate obstructions or cables that you may need to disconnect before moving this cart to another location.
- Avoid quick stops and starts when moving the cart.
- Check for uneven floor surfaces such as cracks or cables and cords.

WARNING:

Avoid personal injury and damage to this product! Move any appliance and cart combination with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart to overturn.

Fuse

When replacing a fuse, heed the following warnings.

WARNING:

Avoid electric shock! Always disconnect all power cables before you change a fuse.

WARNING:

Avoid product damage! Always use a fuse that has the correct type and rating. The correct type and rating are indicated on this product.

Grounding This Product (U.S.A. and Canada Only)

Safety Plugs

If this product is equipped with either a three-prong (grounding pin) safety plug or a two-prong (polarized) safety plug, do not defeat the safety purpose of the polarized or grounding-type plug. Follow these safety guidelines to properly ground this product:

- For a 3-prong plug (consists of two blades and a third grounding prong), insert the plug into a grounded mains, 3-prong outlet.

  Note: This plug fits only one way. The grounding prong is provided for your safety. If you are unable to insert this plug fully into the outlet, contact your electrician to replace your obsolete outlet.

- For a 2-prong plug (consists of one wide blade and one narrow blade), insert the plug into a polarized mains, 2-prong outlet in which one socket is wider than the other.

Note: If you are unable to insert this plug fully into the outlet, try reversing the plug. The wide blade is provided for your safety. If the plug still fails to fit, contact an electrician to replace your obsolete outlet.

Grounding Terminal

If this product is equipped with an external grounding terminal, attach one end of an 18-gauge wire (or larger) to the grounding terminal; then, attach the other end of the wire to an earth ground, such as an equipment rack that is grounded.

20050727 Headend/Rack

FCC Compliance

Where this equipment is subject to U.S.A. FCC and/or Industry Canada rules, the following statements apply.

United States FCC Compliance

This device 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 such interference when this 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 users will be required to correct the interference at their own expense.

Canada EMI Regulation

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

Cet appareil numérique de la class A est conforme à la norme NMB-003 du Canada.

20061110 FCC HE

About This Guide

Introduction

This guide describes both the intermediate frequency (IF) Gigabit Overlay Quadrature Amplitude Modulation (GoQAM) modulator and the radio frequency (RF) GoQAM.

Note: In this guide, the GoQAM modulator is referred to as the GoQAM.

The RF GoQAM is a software-modified Model D9479-1 Gigabit QAM (GQAM) Modulator. The Model D9479-3 IF GoQAM is similar to the RF GoQAM, but has IF outputs in lieu of RF outputs, as well as a different back panel. Both are integral components of Cisco Overlay solution. The Overlay solution uses Digital Broadband Delivery System (DBDS) technology to create a network in which different conditional access (CA) systems can coexist in a coherent manner. Overlay technology allows a PowerKEY® DBDS network to be "laid over" an existing cable network that uses a different CA system.

Important: The GoQAM requires System Release (SR) 2.5/SR 3.5 (or later) with the Overlay feature enabled.

Purpose

This guide provides detailed specifications and component descriptions for the GoQAM and how the GoQAM functions in Cisco's Overlay solution. This guide also includes all of the procedures that enable you to install, provision, and operate the GoQAM within your cable network. Call center personnel can use this guide to assist them with common troubleshooting procedures.

Scope

This guide includes the following topics:

- Descriptions of GoQAM functions
- Descriptions of GoQAM components
- Installation procedures
- Operation procedures
- Troubleshooting guidelines
- Customer information
- IF and RF GoQAM technical specifications

Audience

This guide is written for cable network system administrators and engineers, operators of the Overlay DNCS, call center personnel, and system operators who are responsible for installing, operating, maintaining, and troubleshooting the GoQAM.

Document Version

This is the fourth release of this document. In addition to minor text and graphic changes, the following table provides the technical changes to this document.

Description	See Topic
Removed references to locking the front panel	Throughout document
Updated compliance information	Throughout document

1

Introducing the GoQAM

Introduction

This chapter describes how the GoQAM functions within the Overlay environment, explains how the GoQAM processes and outputs data, and provides illustrations and descriptions of the front and back panel components for both the IF and the RF versions of the GoQAM.

Important! You must be operating SR 2.5/SR 3.5 (or later) to install and provision (configure) a GoQAM on your system.

In This Chapter

System Overview

Diagram of Cisco's Overlay Solution

The GoQAM is an integral component of the Overlay solution. The Overlay solution uses Digital Broadband Delivery System (DBDS) technology to create a network in which different conditional access (CA) systems can coexist in a coherent manner. Overlay technology assumes that a PowerKEY DBDS network will be "laid over" an existing but different cable network.

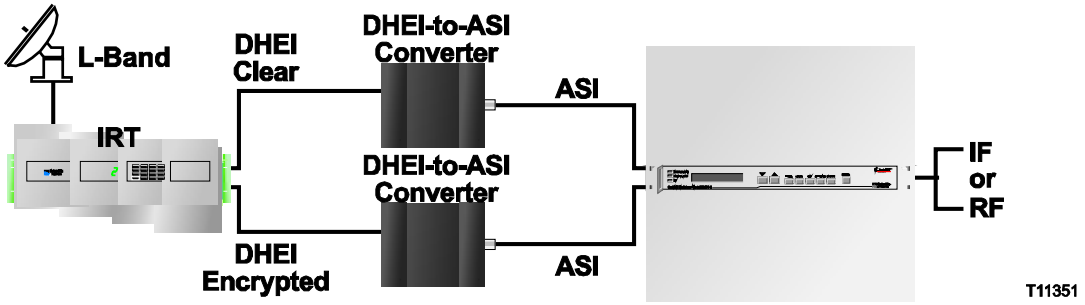
Important! The GoQAM is supported in SR 2.5/SR 3.5 (or later).

Depending on the system architecture, the GoQAM can be used in either headends or hubs. The following illustrations are examples of typical Overlay environment setups.

Overlay Environment Without a Multiplexer With an IRT

In an Overlay environment without a multiplexer (MUX), the Integrated Receiver Transcoder (IRT) does the encryption for the non-Cisco set-tops.

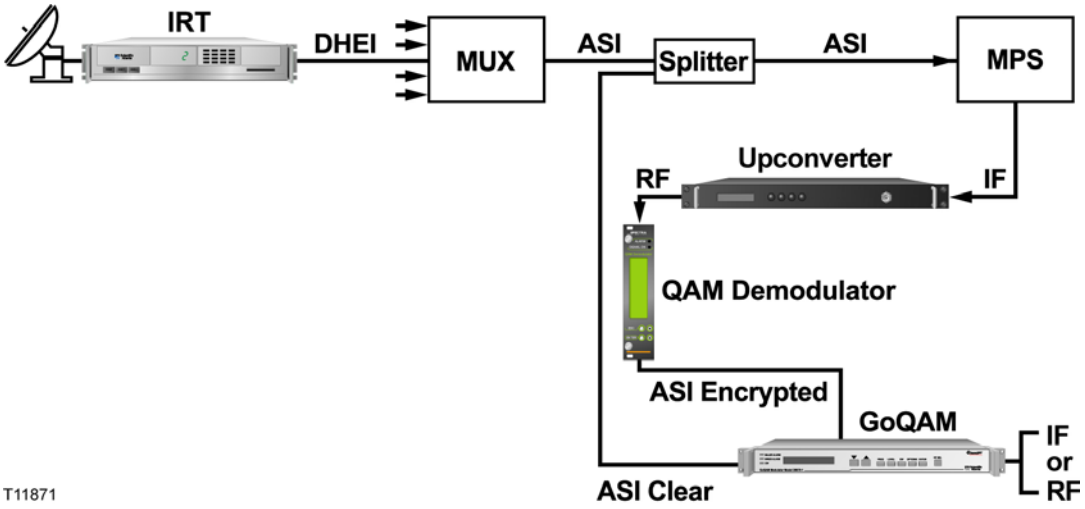
The following graphic illustrates how Overlay technology interfaces to a non-Cisco headend that uses a simple IRT. The IRT performs a number of functions including Mediacipher encryption. With an IRT, clear and encrypted signals are available through DHEI connectors on the IRT back panel.



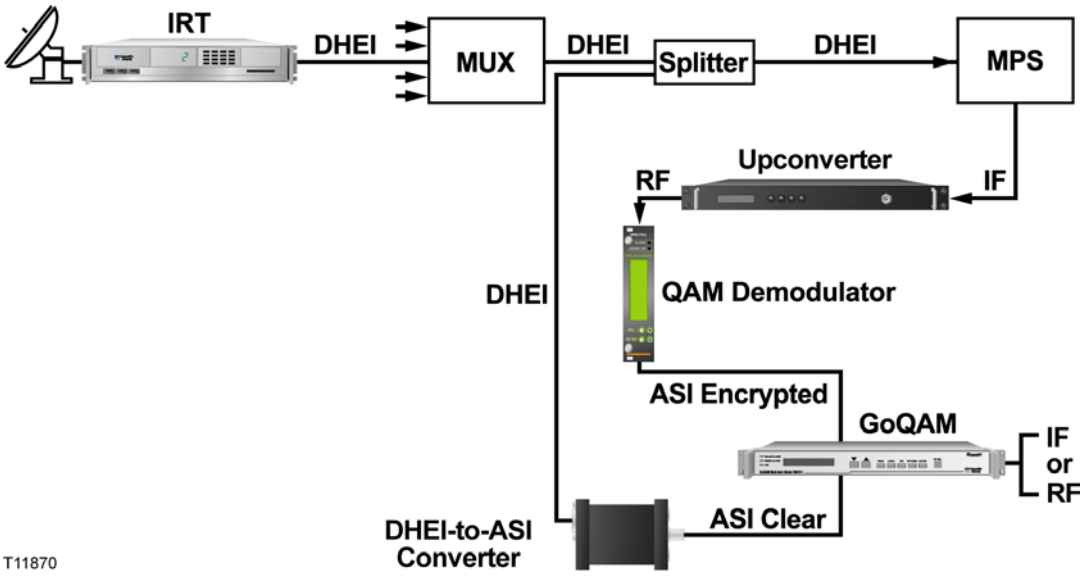
Overlay Environment With a MUX

In an Overlay environment with a MUX, the Modular Processing System (MPS) does the encryption for the non-Cisco set-tops. The following graphics illustrate how Overlay technology interfaces to a non-Cisco headend that uses a multiplexer followed by an MPS. The MPS performs Mediacipher Encryption and may perform QAM modulation, depending upon the specific device.

Example 1:



Example 2:



Note: The MPS is being replaced by the SmartStream Encryptor Modulator (SEM). As with the MPS, a number of different options are available for interfacing Overlay technology with the SEM. Specific details can be obtained by contacting Cisco Services.

Features

The GoQAM provides many new digital broadcast features and innovations for your system. The following table describes these features and innovations.

Feature	Function
DVB ASI Input pairs	■ Supports a maximum ASI data rate of 216 Mbps (MPEG packet rate) at all four inputs ■ Accepts two pairs of inputs. Each pair consists of an incumbent-encrypted stream and its corresponding clear stream. The GoQAM extracts critical packets—those without which video cannot be reconstructed—and encrypts them using Cisco PowerKEY encryption technologies. The GoQAM also extracts the corresponding critical packets from the incumbent-encrypted stream. Later, the PowerKEY packets and the incumbent-encrypted critical packets are multiplexed with the portion of clear stream that has not been encrypted.
10/100BaseT Ethernet Interface	Provides a control and management interface to the DNCS
Multiplexing Functionality	Provides program and packet identifier (PID) remapping and filtering
MPEG Stream Management	■ Provides program clock reference (PCR) timestamp correction ■ Provides program specific information (PSI) reconstruction ■ Provides transport stream monitoring ■ Allows adaptive insertion rate control
Stream Encryption, Conditional Access, and Management	■ PowerKEY Native stream encryption mode ■ Allows PowerKEY Book One ECM Handling ■ Provides MPEG packet insertion and entitlement control messages (ECMs) ■ Supports broadcast clear-to-air and interactive encrypted PowerKEY modes
IF Version: 64/256 QAM IF Output (2)	■ Provides a separate physical connector for each QAM output (up to 2) ■ Provides a 44 MHz fixed output ■ Supports International Telecommunications Union (ITU) J.83 Annex-A, and Annex-B, and Annex-C standards

Feature	Function
RF Version: 64/256 QAM RF Output (2)	■ Provides a separate physical connector for each QAM output (up to 2) ■ Allows independent level control for each QAM signal ■ Allows an adjustable output center frequency range of 91 MHz to 869 MHz ■ Provides a switched filter bank for superior broadband combined noise performance ■ Supports International Telecommunications Union (ITU) J.83 Annex-A, and Annex-B, and Annex-C standards
User Interface Features	Allows local setting of RF power levels and display of diagnostic and debug information through the front panel and user interface

GoQAM Input Pairs

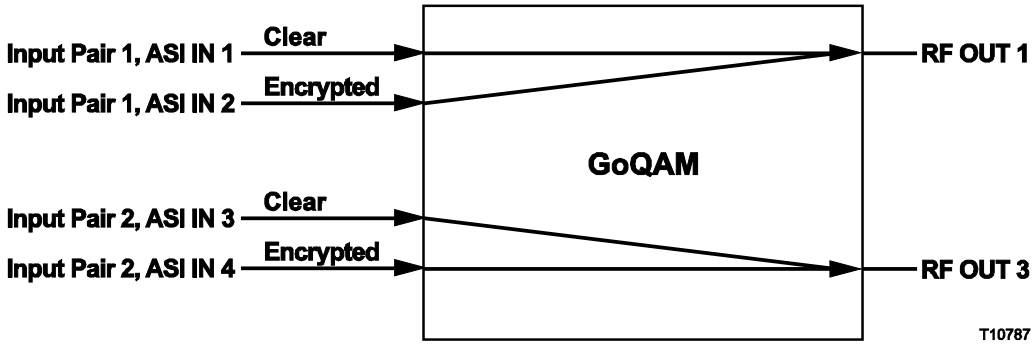
The GoQAM associates the DVB ASI inputs as pairs of clear and encrypted inputs for Overlay purposes. This means that each DVB ASI input constitutes a dedicated pair of clear and encrypted streams. Each pair carries a clear digital broadcast stream on one input and its encrypted form on the other input. For example, ASI IN 1 and ASI IN 2 carry the clear and encrypted forms of the same digital transport stream, respectively.

GoQAM Input Pairs Diagram

RF GoQAM Example

The following illustration depicts the fixed input and output combinations for an RF GoQAM.

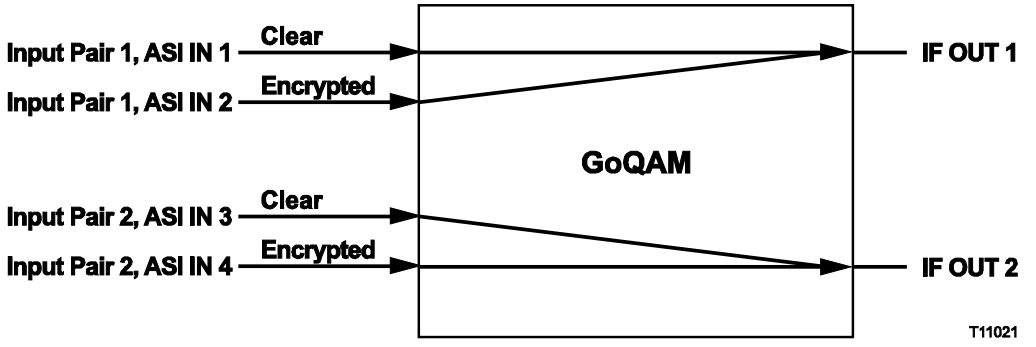
Note: For the RF GoQAM, input pair 1 can only be mapped to RF OUT 1, and input pair 2 can only be mapped to RF OUT 3.



IF GoQAM Example

The following illustration depicts the fixed input and output combinations for an IF GoQAM.

Note: For the IF GoQAM, input pair 1 can only be mapped to IF OUT 1, and input pair 2 can only be mapped to IF OUT 2.

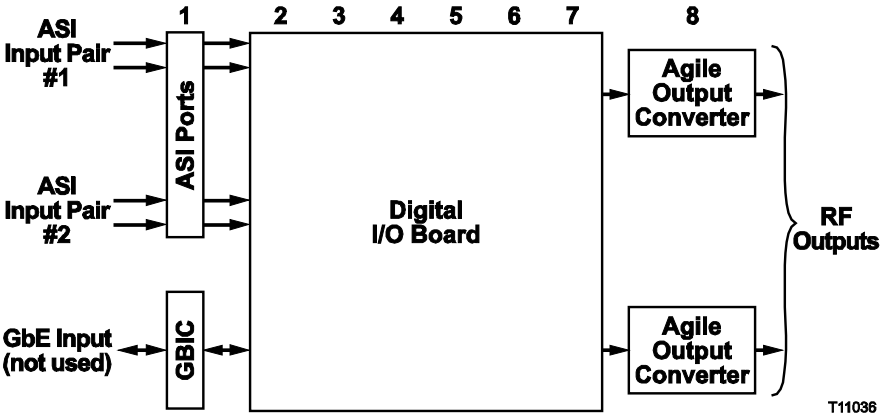


Input/Output Process

This section describes how the GoQAMs modulate, encrypt, and transmit the signals they receive from external sources.

Input/Output Diagram (RF Version)

The following diagram illustrates the stages of the input/output (I/O) process for the RF GoQAM.



Note: The stage numbers correspond with the following table.

Input/Output Stage/Description Table

The following table describes the stages of the I/O process of the RF GoQAM. The numbers correspond to the above I/O diagram.

Stage	Description
1	A pair of transport streams (a clear version and a third-party encrypted version of the same stream) are input to the modulator.
2	The digital I/O board timestamps the MPEG packets in each stream, then filters and routes them according to their PID values.
3	The digital I/O board selects the packets to pass from both the clear and third-party encrypted streams.
4	PowerKEY encryption is added to selected clear packets and PID values are remapped.
5	The clear and encrypted streams are synchronized.
6	An overlay output stream is created by muxing (multiplexing) the clear, S-A encrypted, and third-party encrypted packets.
7	The output stream is modulated at 64 QAM or 256 QAM.

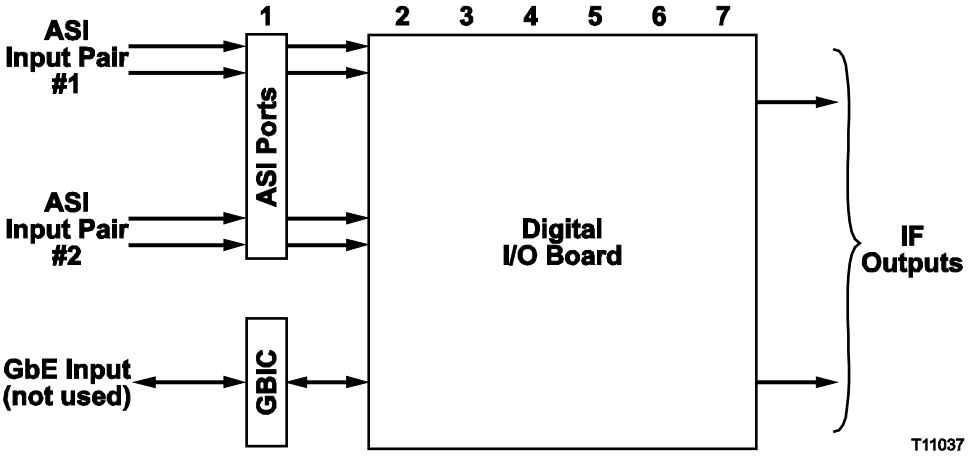
Stage	Description
8	The I/O board directs the transport stream to one of the two RF Agile output converters and sends the signal through the RF network to the DHCTs.

This section provides the installation process and lists the detailed procedures in this guide that correspond with each process step.

Important: To ensure proper installation, read this entire guide *before* starting installation and then follow these processes in the order shown.

Input/Output Diagram (IF Version)

The following diagram illustrates the stages of the input/output (I/O) process for the IF GoQAM.



Note: The stage numbers correspond with the following table.

Input/Output Stage/Description Table

The following table describes the stages of the I/O process of the IF GoQAM. The numbers correspond to the above I/O diagram.

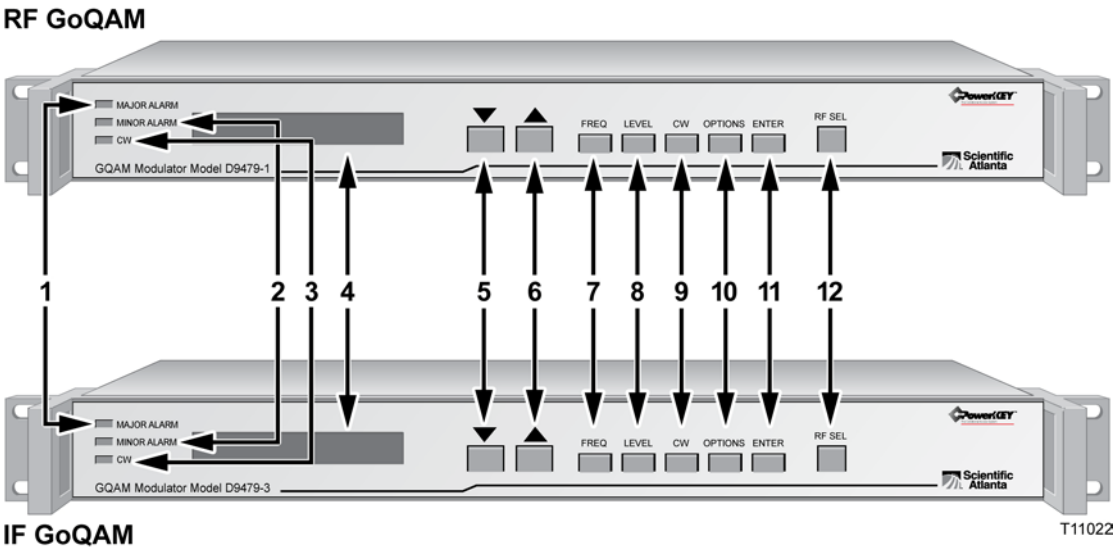
Stage	Description
1	A pair of transport streams (a clear version and a third-party encrypted version of the same stream) are input to the GoQAM.
2	The digital I/O board timestamps the MPEG packets in each stream, then filters and routes them according to their PID values.
3	The digital I/O board selects the packets to pass from both the clear and third-party encrypted streams.
4	PowerKEY encryption is added to selected clear packets and PID values are remapped.

Stage	Description
5	The clear and encrypted streams are synchronized.
6	An overlay output stream is created by muxing (multiplexing) the clear, S-A encrypted, and third-party encrypted packets.
7	The output stream is modulated at 64 QAM or 256 QAM and sent out one of the two IF ports.

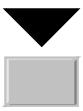
Front Panel Overview

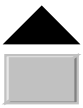
Front Panel Diagram

This illustration shows the front panel components of each type of GoQAM.



The following table describes the front panel components.

Item	Component	Description
1	MAJOR ALARM indicator	This LED is red and lights for a major alarm condition. Major alarms occur for hardware or software conditions that indicate a serious disruption of service or the malfunctioning or failure of important circuits. The LED goes off when all major alarms have cleared.
2	MINOR ALARM indicator	This LED is yellow and lights for a minor alarm condition. Minor alarms indicate a less critical error condition. The GoQAM may continue to operate with some loss of functionality. The LED goes off when all minor alarms have cleared.
3	CW indicator	This LED is yellow and lights when any one of the RF carriers is set to continuous wave (CW) mode.
4	LCD alphanumeric display screen	This screen displays status and operating screens controlled by the front panel keys.
5		The Down Arrow key decrements a displayed value or navigates through a set of displayed values. This key is only active when the display has a flashing value, which indicates that the value can be changed. This key is primarily used for decreasing a displayed value such as frequency or level.

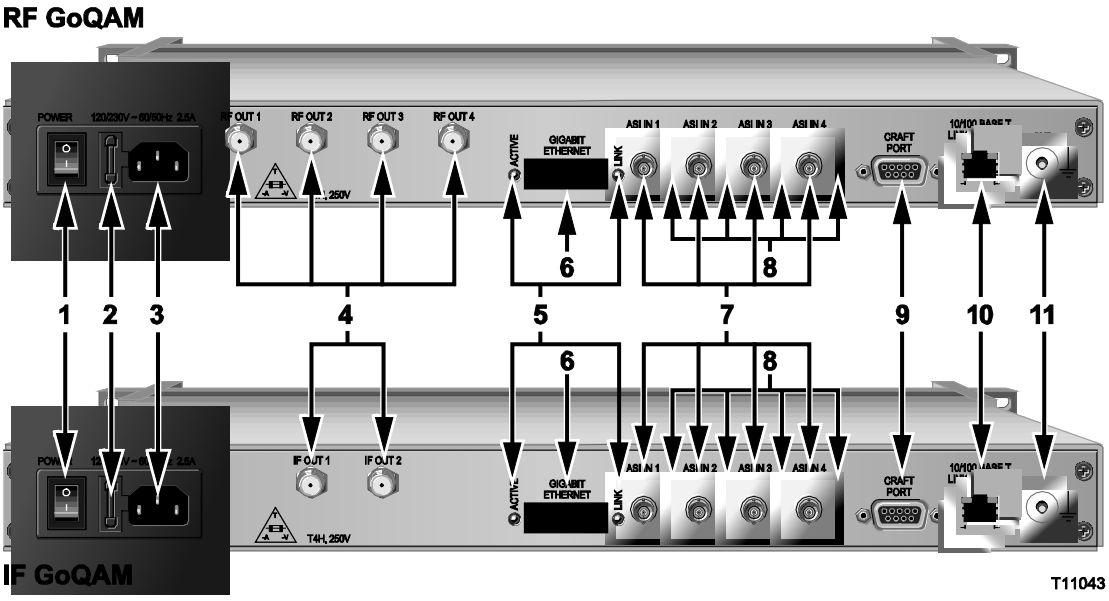
Item	Component	Description
6		The Up Arrow key increments a displayed value or navigates through a set of values. This key is only active when the display has a flashing value, which indicates that the value can be changed. This key is primarily used for incrementing a displayed value such as frequency or level.
7		■ **RF Version:** The Frequency key selects the frequency display screen on which you can adjust the RF output frequency for each of the RF carriers. ■ **IF Version:** The frequency is fixed at 44.00 MHz.
8		■ **RF Version:** The Level key selects the RF Output Level screen on which you can adjust the RF output power level and mute the RF output (42 dBmV to 56 dBmV). ■ **IF Version:** The Level key selects the IF Output Level screen on which you can adjust the IF output power level and mute the IF output (27 dBmV to 37 dBmV).
9		The Continuous Wave (CW) key selects the Continuous Wave Screen on which you can set the GoQAM modulator to output either a modulated carrier or a continuous carrier for each of the RF carriers. CW mode is used for testing and not for normal operation.
10		The Options key scrolls through status information and setup options.
11		The Enter key saves configuration changes to nonvolatile memory.
12		■ **RF Version**: The RF Port Selection (RF SEL) key selects one of the RF outputs. ■ **IF Version**: Selects one of the IF outputs.

Back Panel Overview

Back Panel Diagram

This illustration shows the back panel components for each type of GoQAM.

Back Panel Diagram



Back Panel Components

The following table describes the back panel components.

Back Panel Components

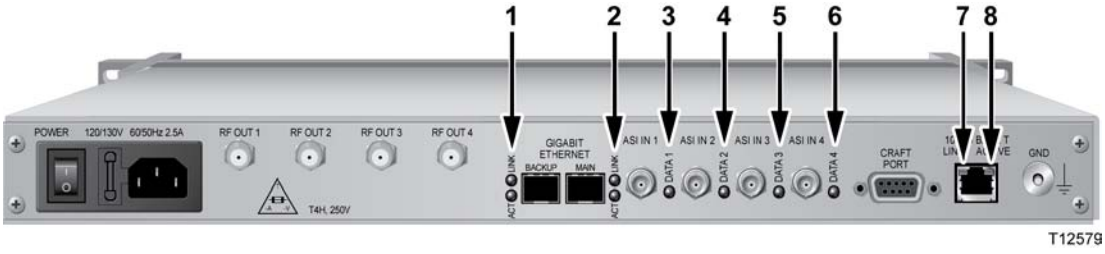
Important: The cooling fans for the GoQAM are mounted on the side panel.

Item	Component	Description
1	Power Switch	On/off rocker-type power switch
2	Fuse Holder	4.0 A SLO BLO 250 V fuse (Cisco part number 188106)
3	AC Power Inlet	IEC 320-conductor grounded outlet
4	RF OUT and IF OUT Ports	F-connectors for RF or IF output, 75 Ω **Note:** The RF GoQAM uses only RF OUT ports 1 and 3.
5	Gigabit Ethernet Port LEDs	Not used (disabled) in the Overlay solution

Item	Component	Description
6	Gigabit Ethernet port	Not used (disabled) in the Overlay solution
7	DVB ASI INPUTS 1-4	Female BNC, 75 Ω connector. Allows for the input of MPEG-2 transport stream data at a maximum rate of 216 Mbps
8	DVB ASI LEDs	Data LEDs 1 through 4 light when the DVB ASI Input ports are receiving valid MPEG-2 transport stream packets
9	CRAFT PORT	For Cisco diagnostic use only
10	10/100BaseT port	Ethernet port shares data with DNCS Ethernet hub
11	GND	Ground screw for grounding the GoQAM

Back Panel Indicator Lights

The following illustration and table show the back panel indicator lights.



Item	Indicator Light	Description
1	ACTIVE (green)	Not used (disabled) in the Overlay solution
2	LINK (green)	Not used (disabled) in the Overlay solution
3	DATA 1 (green)	Lights when the DVB ASI Input 1 port is receiving valid MPEG-2 transport stream (TS) packets
4	DATA 2 (green)	Lights when the DVB ASI Input 2 port is receiving valid MPEG-2 TS packets
5	DATA 3 (green)	Lights when the DVB ASI Input 3 port is receiving valid MPEG-2 TS packets
6	DATA 4 (green)	Lights when the DVB ASI Input 4 port is receiving valid MPEG-2 TS packets
7	LINK (yellow)	Lights when a valid 10/100BaseT Ethernet link connection exists
8	ACTIVE (green)	Lights when data traffic is on the 10/100BaseT Ethernet link

2

Installing the GoQAM

Introduction

This chapter describes how to install the GoQAM into a rack and where to connect the GoQAM to the other components within the Overlay environment. The connections used for the GoQAM vary according to its use in your system.

Note: Refer to ***Technical Specifications*** (on page 149) for additional technical specifications and requirements to help you install and configure the GoQAM in your system.

In This Chapter

Installation Process Summary

Before You Begin

This process assumes that you have already installed the GoQAM software on the DNCS. Refer to the release notes and installation instructions for your GoQAM release for detailed instructions. Also be sure that you have access to the *Digital Network Control System Online Help* for your system release before installing the GoQAM.

GoQAM Installation Processes

The following process summary provides the recommendations for a GoQAM installation.

Stage	Process	See Procedure
1	Review system requirements and technical specifications.	N/A
2	Consult your Bandwidth Management Plan and the GoQAM input and output specifications to allocate your bandwidth resources properly.	N/A
3	Unpack and inspect the GoQAM.	■ ***Unpack and Inspect the GoQAM*** (on page 18)
4	Record the MAC address from the label located on the underside of the GoQAM unit.	■ ***Record the MAC Address*** (on page 19)
5	Install the GoQAM into a rack.	■ ***Stacking Guidelines*** (on page 20) ■ ***Install the Modulator Into a Rack*** (on page 24)
6	Connect the GoQAM to an earth ground and then the power source. ■ For the 120/230 V AC GoQAM, connect the power cord. ■ For the 48V DC GoQAM, connect the power wires to the DC power inlet.	■ ***Connect Power Sources*** (on page 27)
7	Connect other network devices to the GoQAM, except the RF out ports.	■ ***Connect the DVB ASI Input Ports*** (on page 29) ■ ***Connect the 10/100BaseT Ethernet Port*** (on page 31)

Stage	Process	See Procedure
8	Define the MPEG sources and provision the GoQAM using DNCS Element Provisioning according to your network wiring diagram.	■ ***Provision the RF GoQAM*** (on page 37) ■ ***Provision the IF GoQAM*** (on page 53) ■ *Digital Network Control System Online Help*
9	Power on the GoQAM	N/A
10	Ensure that the GoQAM boots correctly and check for alarms from the front panel.	■ ***Understand the Boot Process*** (on page 78) ■ ***Troubleshooting Alarm Messages*** (on page 134) ■ ***Troubleshooting Boot Screen Error Messages*** (on page 143)
11	Connect the RF or IF output ports.	***Connect the RF OUT or IF OUT Ports*** (on page 33)
12	Set the power output level in accordance with your network wiring diagram and spectrum analyzer measurements.	■ ***Adjust the RF Output Level of a Selected Carrier*** (on page 87) ■ ***Adjust the IF Output Level of a Selected Carrier*** (on page 110)
13	If sessions have been defined for the GoQAM path, verify the correct session count by pressing the OPTIONS button.	■ RF: ***Viewing the Session Count*** (on page 91) ■ IF: ***Viewing the Session Count*** (on page 114)
14	If encrypted, check the program count.	■ RF: ***Viewing the Program Count*** (on page 91) ■ IF: ***Viewing the Program Count*** (on page 114)
15	Verify video and audio from a local DHCT.	See the post-upgrade procedures for your current System Release contained in the upgrade installation instructions.

Unpack and Inspect the GoQAM

Carrier's Responsibility

Cisco thoroughly inspects and carefully packs all products before shipment. The carrier is responsible for safe shipping and delivery.

- If there are any missing parts or if there is damage to the product contact Cisco Services.
- Retain all boxes for future equipment shipping needs. The boxes are specifically designed for shipping the GoQAM.

Unpacking and Inspecting Procedure

Complete the following steps to unpack and inspect the modulator.

1. Review the Safety Precautions.
2. Inspect the shipping carton for visible damage.
3. Open the shipping carton.
4. Remove all packing material.
5. Inspect the product for visible damage.
6. Inspect for loose items that may indicate concealed damage.
7. Inspect for missing parts using the packing slip as a guide.
8. Go to ***Record the MAC Address*** (on page 19).

Record the MAC Address

This section contains instructions for recording the MAC address as part of the installation process.

Recording the MAC Address

1. Unpack and inspect the modulator.
2. Locate the label containing the MAC addresses on the underside of the chassis.

   Important! The GbE MAC addresses are typically the MAC address of the modulator plus 1 (one).

   Examples:

   - **GQAM MAC Address:** 00:02:de:41:51:03
   - **GbE MAC Address (Main):** 00:02:de:41:51:04
   - **GbE MAC Address (Backup):** 00:02:de:41:51:05
3. Record the MAC addresses here:

   - **GQAM MAC Address:** _____
   - **GbE MAC Address (Main):** _____
   - **GbE MAC Address (Backup):** _____

   Important! You will need these MAC addresses for provisioning (configuring) the DNCS.
4. Go to ***Stacking Guidelines*** (on page 20).

Stacking Guidelines

The GoQAM is a high-density, high performance device for digital broadband data delivery. One GoQAM performs the services of two QAM modulators. This space-saving feature makes the GoQAM the device of choice for contemporary digital broadband delivery systems.

Providing proper ventilation and cooling for the modulator is mandatory. You can stack up to 32 GoQAM devices in a standard 40-rack unit (RU) equipment rack if you read and carefully follow the guidelines provided in this section and later in this chapter.

Each GoQAM contains three dual fan packs that provide forced air cooling. These fan packs, located on the side of the unit, pull air across the internal circuitry to remove heat.

Important! In order for the fans to operate correctly, you *must* install each GoQAM using the rack mount brackets included with the unit. These brackets contain notched cutout sections to allow for clearance so that air can enter and leave the unit without restriction.

When you install the GoQAM in the rack using the rack mounts provided, you can install them directly above and below each other with no requirements for vented spacers. Using these rack mounts also provides support for the modulator. The GoQAM is *not* intended to be suspended or "hung" in the rack by only mounting the front bezel support.

Controlling Operating Temperature

CAUTION:

Cisco headend equipment is designed to operate in a maximum 122°F (50°C) environment. Specifically, this means that the air temperature at the air inlet of any GoQAM must never exceed 122°F (50°C).

Each GoQAM draws up to 151 W of input power and a total of 515 BTU/hr. For a full rack with 32 units, the sum total is 4832 W per rack, or 16,480 BTU/hr. You should make your HVAC considerations based on these calculations.

Controlling Exhaust Air

Exhaust air management is the key to cooling multiple modulators in a custom rack configuration. Inlet air temperature should be as cool as possible and should never exceed 122°F (50°C). Exhaust air should have little or no restrictions. Obstructions such as cabling or other devices that block airflow to the side or top of the rack should be avoided.

Considerations When Using Side by Side Equipment Racks

Often, side-by-side equipment racks will not include an internal wall between them. You should take extreme care when installing modulators in these types of systems. There is approximately an 18°F (10°C) rise from inlet air temperature to exhaust air temperature on a GoQAM. This rise in temperature could have a cumulative effect on temperature from one rack to the adjacent one. You must take extreme care not to exceed the 122°F (50°C) maximum inlet air temperature requirement in these situations.

Considerations When Using Racks with a Wall on One Side

Rack installations that have the outer wall or side of the rack in place on the exhaust side of the GoQAM should note that without sufficient airflow through the rack, the heated exhaust air may re-circulate back to the input side of the GoQAM. Depending on the situation, this re-circulation air could eventually exceed the specified 122°F (50°C) maximum.

Measuring the Inlet Air Temperature

If you are concerned about inlet air temperature, you should measure the temperature of the inlet air in the actual rack as you plan to use it. You should have all cabling in place and all adjacent units installed and running.

Important! Opening the door on the back panel of the rack can have an *adverse* effect on the managed airflow. If access to the door on the back panel is not controlled, you should take the inlet air temperature with the back panel door open since, in most instances, opening the door will re-direct the airflow in an adverse manner.

Stacking Considerations

You have two main options for stacking GoQAMs in a rack. The option you choose depends on your system requirements. One option is to stack the GoQAMs in a rack containing a top-mounted exhaust fan with vented panels on the front and back. The second option is to place a top-vented rack over a floor plenum forced air vent. The requirements for these two stacking options are described next in this section.

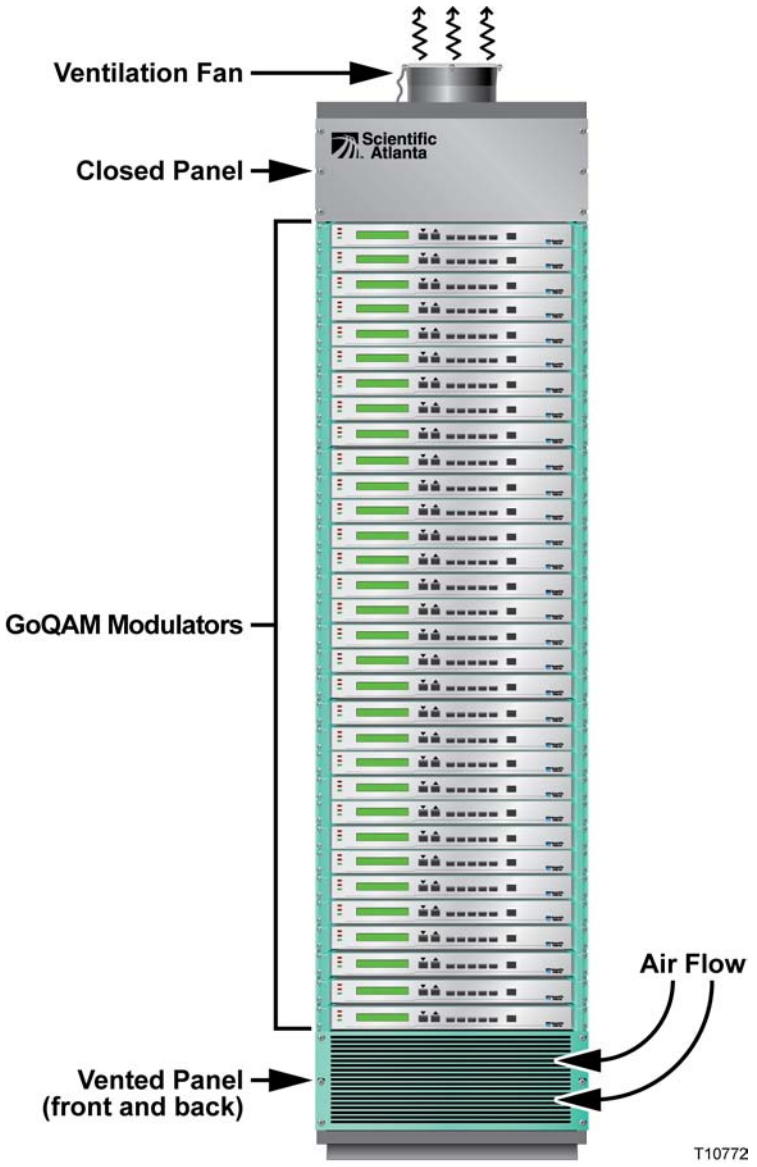
Option 1 – Using a Rack With a Top-Mounted Exhaust Fan

This stacking option uses a 40 RU configuration containing up to 32 GoQAMs. The remaining 8 RUs are configured with 4 RUs at the bottom and 4 RUs at the top.

The 4 RU space at the bottom is covered with a vented panel on both the front and the back. This panel allows air to freely enter the rack to cool the modulators.

The 4 RU space at the top is covered with a closed panel. This option uses an exhaust fan located on top of the rack to draw the heated air upward and out of the rack. The 4 RU space at the top allows the ventilation space needed for the exhaust fan to operate efficiently. The exhaust fan should be chosen so that a minimum of 600 cubic feet per minute (cfm) flows through the rack with 2000 cfm being the ideal amount.

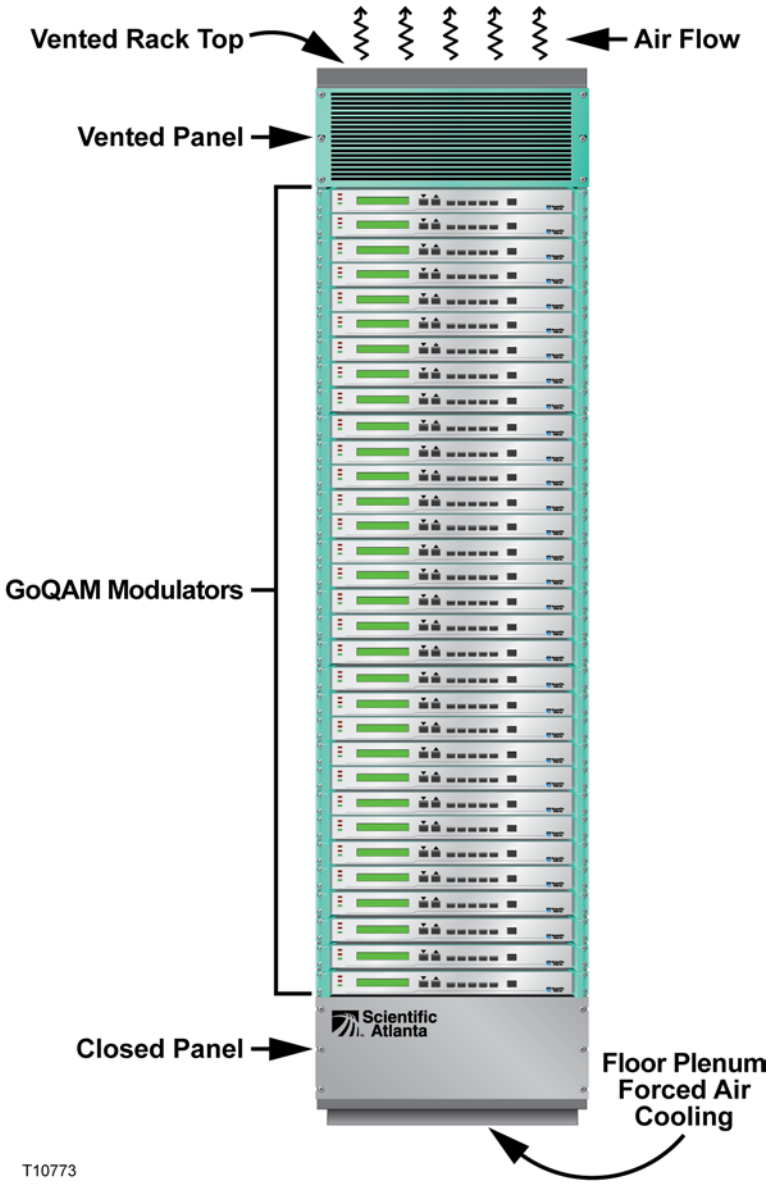
Example:



Option 2 – Using a Rack With Floor Plenum Forced Air Cooling

This stacking option also uses a 40 RU configuration containing up to 32 GoQAMs. In Option 2, however, the lower 4 RU space is covered with a solid panel instead of a vented one. The upper 4 RU space is vented along with the entire top of the rack. The floor plenum forced airflow must also be a minimum of 600 cfm with 2000 cfm being the ideal amount.

Example:



Install the Modulator Into a Rack

The front bezel of the GoQAM mounts to the front of the equipment rack. The GoQAM fits into an EIA RS-310 rack mount.

Important! You *must* read the preceding section, ***Stacking Guidelines*** (on page 20), before installing the modulators into the rack.

Installation Requirements

This section lists the power, rack, and environmental conditions necessary for installation.

Power Requirements Table

The following table describes the power specifications for the GoQAM.

Item	Specification
Supply Voltage	■ 90V to 130V AC @ 47 to 63 Hz (AC unit) ■ 180V to 264V AC @ 47 to 63 Hz (AC unit) ■ –42V to –57V DC (DC unit)
Fuses	■ 4.0 A SLO BLO 250V (AC unit) ■ 6.3 A SLO BLO 250V (DC unit)
Line Frequency	■ 47 Hz to 63 Hz (AC unit only)
Power Required	■ RF GoQAM: 155 VA (typical) ■ IF GoQAM: 85 VA (typical)
Power Dissipated	■ RF GoQAM: 151 Watts (typical) ■ IF GoQAM: 81 VA (typical)
In Rush Current	■ 35 amps maximum, Vin = 130V AC (AC unit) ■ 75 amps maximum, Vin = 264V AC (AC unit) ■ 15 amps maximum, Vin = -57V DC (DC unit)

Rack Requirements Table

Item	Specification
Rack Mount Type	EIA RS-310
Height	1.75 in./44.45 mm
Width	19 in./482.6 mm
Depth	22.5 in./571.5 mm
Weight	13.5 lb./5.4 kg

Environmental Requirements Table

Item	Specification
Operating Temperature	0° to 50°C (32° to 122°F) **CAUTION:** **Avoid damage to this product! Your warranty is void if you operate this product above the maximum specified operating temperature.** **Use caution when installing wiring and racks to avoid obstruction of air flow. The obstruction can occur at the side air vents of the GoQAM or the vent fans at the GoQAM side panel.** **Important!** You must use the supplied notched rack mounts (Cisco part numbers 734845 and 734846) to mount this modulator into the rack. These rack mounts allow correct air circulation through the unit.
Storage Temperature Range	-10° to 70°C (14° to 158°F)
Operating Humidity	5 to 95%, non-condensing
Vibration Susceptibility	No data errors with a chassis vibration of 0.5 Gs. No data errors with a vibration frequency of 10 Hz to 400 Hz
Electrostatic Shock Susceptibility	No damage sustained from five discharges of 15 KV IEC electrostatic discharge model (150pF + 150 Ω) to all exposed connections

Installing the Modulator into a Rack

CAUTION:

Do not tangle or strain interconnecting cables.

Use caution when installing wiring and racks to avoid obstruction of airflow into the side air vents of the GoQAM or out of the vent fans on the side of the GoQAM.

IMPORTANT: You must use the supplied notched rack mounts to provide additional support and to allow correct air circulation through the unit.

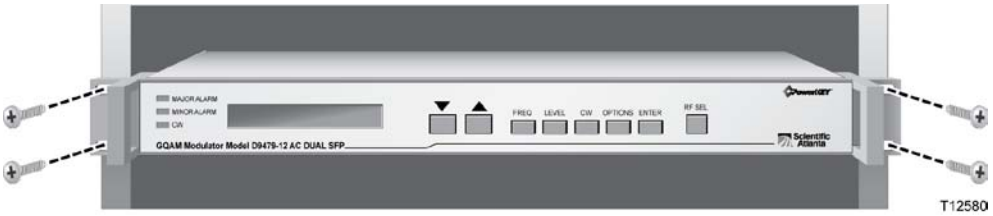
1 Install the rack mounts.

Important: The supplied rack mounts (Cisco part numbers 734845 and 734846) *must* be used. When you use the supplied rack mounts, you can install these modulators above or below each other in the rack with no space required. These rack mounts provide additional support along with the following features:

- Attaches directly to the rack
- Allows you to slide modulators partially out of the rack for service
- Allows appropriate air circulation throughout the unit

2 Place the modulator in the rack.

3 Insert a mounting screw through each of the four-bezel mounting holes on the front panel of the GoQAM and then into the rack.



4 Firmly tighten each mounting screw.

5 Go to ***Connect Power Sources*** (on page 27).

Connect Power Sources

This section contains instructions for connecting the DC and AC power sources to the modulator.

Connecting an Earth Ground

Complete the following steps to connect an earth ground to either the DC or AC versions of the GoQAM.

CAUTION:

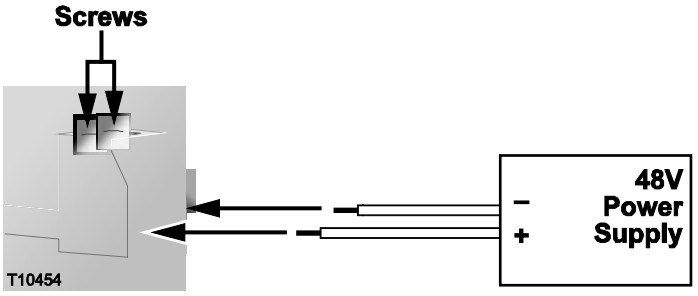
The 48 V DC GoQAM must be connected to an earth ground.

1. Place a ground wire onto the ground lug (marked **GND**) on back of the GoQAM; then, use your fingers to tighten the ground lug to secure the ground wire.
2. Connect the other end of the ground wire to the rack or earth ground.

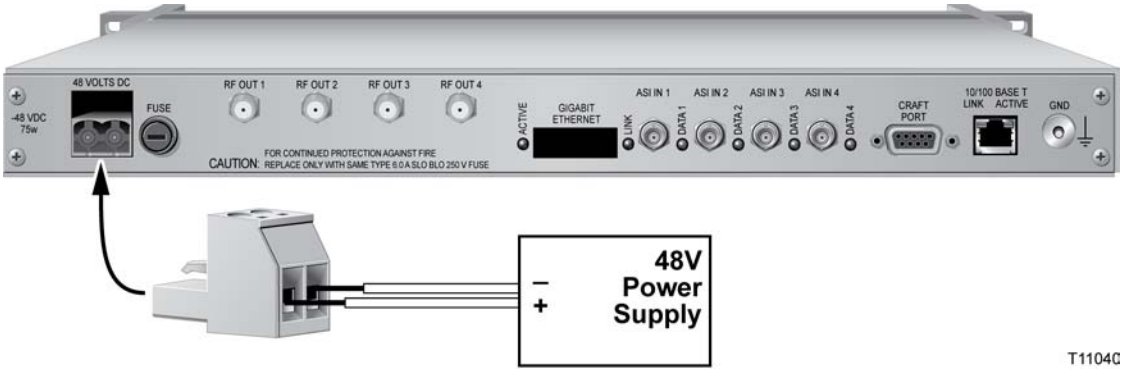
Connecting a DC Power Source

Complete the following steps to connect a DC power source to the 48 V DC Dual SFP GQAM.

1. Verify that the DC power source is set to the **Off** position.
2. Insert the wires from the DC power source into the terminal block connector. Use a small flat-blade screwdriver to tighten the screws at the top of the terminal block connector to secure the wires.



3 Insert the terminal block connector into the terminal block on the back panel of the 48 V DC GoQAM.



4 Keep the DC power source set to the **Off** position until you are ready to power on the modulator.

5 Go to ***Connect the DVB ASI Input Ports*** (on page 29).

Connecting an AC Power Source

Complete the following steps to connect an AC power source to the 120/230 V AC GoQAM.

1 Verify that the power switch on the back panel is placed in the **Off** position.

2 Connect the power cord to the AC power inlet on the back panel of the 120/230 V AC GoQAM.

3 Connect the other end of the power cord to an AC electrical outlet.

4 Keep the power switch in the **Off** position until you are ready to power on the device.

5 Go to ***Connect the DVB ASI Input Ports*** (on page 29).

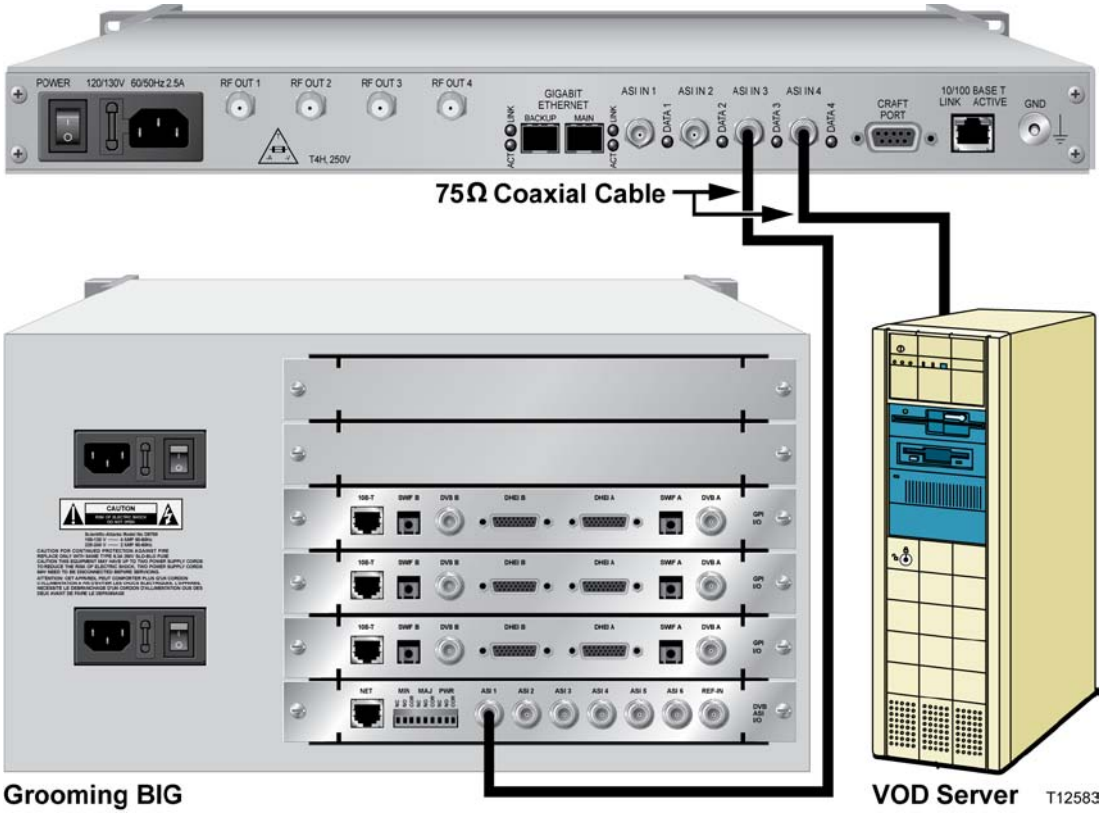
Connect the DVB ASI Input Ports

Description

The GoQAM uses ASI input pairs to receive data from ASI-compliant transmitting devices such as Integrated Receiver Transcoders (IRTs) and MPEG multiplexers. These ASI inputs conform to the DVB document A010. The DVB ASI Input ports are BNC-type connectors and connect to 75 Ω coaxial cables. Each DVB ASI Input port allows for the input of MPEG-2 transport stream (TS) data at a maximum rate of 216 Mbps.

Location of DVB ASI Input Ports

The following illustration shows an example of an IF GoQAM connected to DVB ASI sources.



Connecting the DVB ASI Ports

Refer to your network wiring diagram to cable the GoQAM in accordance with your bandwidth allocation plan.

Follow these steps to connect each of the DVB ASI Input ports.

1. Locate the output (DHEI or DVB ASI) on the back of an output device.

   Important: If you are connecting an IRT or other DHEI device, you must first connect a DHEI cable to a DHEI-to-ASI converter before connecting to the GoQAM.

2. To connect input pair 1, connect clear feed #1 to ASI input port 1 and encrypted feed #1 to ASI input port 2.

   Note: The maximum recommended length for the cable is 100 meters.

3. To connect input pair 2, connect clear feed #2 to ASI input port 3, and encrypted feed #2 to ASI input port 4.

   Note: The maximum recommended length for the cable is 100 meters.

4. Repeat steps 2 and 3 for all DVB ASI inputs according to your system's specifications and requirements.

5. Go to ***Connect the 10/100BaseT Ethernet Port*** (on page 31).

Connect the 10/100BaseT Ethernet Port

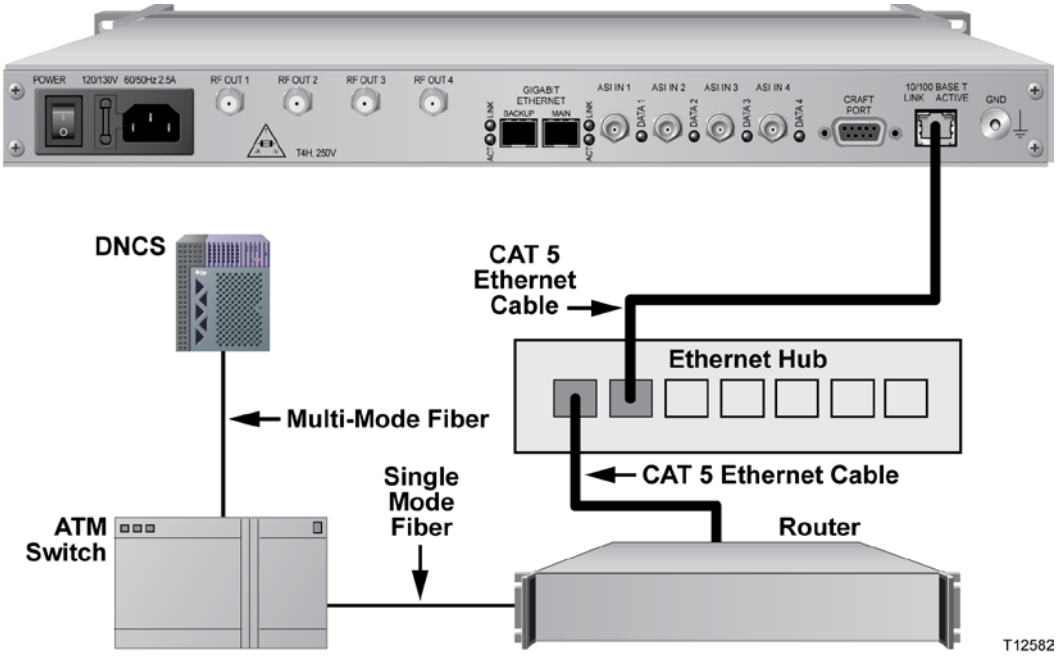
Description

The GoQAM shares data with the DNCS through an ATM switch, a router, an Ethernet hub, and an Ethernet port. An Ethernet connection enables the DNCS to perform software downloads, provision the GoQAM, set up broadcast sessions, monitor alarms, and check system performance.

Note: Connect the 10/100BaseT Ethernet port on the GoQAM to an Ethernet hub as part of an Ethernet connection. Do not connect it directly to a DNCS workstation or another PC.

Location of 10/100BaseT Ethernet Port

The following illustration shows an example of a 10/100BaseT Ethernet connection for the IF GoQAM.



Connecting the 10/100BaseT Ethernet Port

Follow these steps to connect the GoQAM to the Ethernet network.

1. Connect the DNCS to the ATM switch using multi-mode fiber.
2. Connect the ATM switch to the router using single mode fiber.
3. Connect the router to the 10/100BaseT Ethernet hub using CAT-5 Ethernet 10/100BaseT wiring with RJ-45 connectors.
4. Connect the 10/100BaseT port on the GoQAM to the 10/100BaseT Ethernet hub using CAT-5 Ethernet 10/100BaseT wiring with RJ-45 connectors.

   Note: Use a screened or shielded cable to connect the GoQAM to the 10/100BaseT Ethernet hub.
5. Your next step is to provision the GoQAM on the DNCS. See ***Provision the RF GoQAM*** (on page 37) or ***Provision the IF GoQAM*** (on page 53), for further details about provisioning the GoQAM on the DNCS. Then, go to step 6.
6. After your have provisioned the GoQAM on the DNCS, power on the GoQAM to ensure that the GoQAM boots correctly and check for alarms from the front panel.
7. Go to ***Connect the RF OUT or IF OUT Ports*** (on page 33).

Connect the RF OUT or IF OUT Ports

The back panel of the GoQAM contains ports that are labeled either **RF OUT** or **IF OUT** depending on the model of GoQAM you are using. The RF OUT or IF OUT ports of the GoQAM should be connected to a system of combiners, through the cable system, and eventually to subscribers' DHCTs. Each RF OUT or IF OUT port provides for the transport of MPEG-2 transport stream (TS) data. The RF OUT and IF OUT ports use F-connectors and 75 Ω coaxial cable interfaces.

Note: The Overlay solution uses only *two* of the RF OUT ports (RF OUT 1 and RF OUT 3) on the RF GoQAM modulator.

CAUTION:

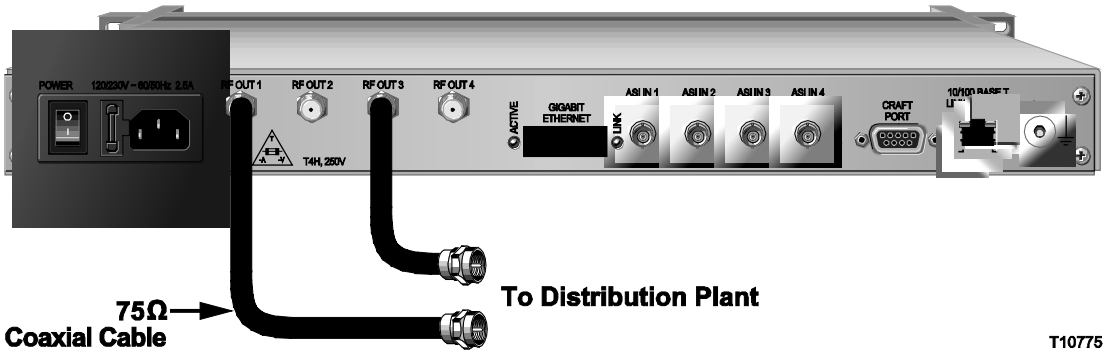
Turning on the GoQAM with default RF output level may cause RF interference with the services of other units connected to the network. Therefore, set the RF output frequency and RF output level before you connect any RF OUT ports to the network.

Important! We strongly recommend that you configure and adjust frequencies from the Set Up GoQAM window on the DNCS. See *Provision GoQAMs on the DNCS* (on page 46) or *Provision an IF GoQAM on the DNCS* (on page 71) for detailed instructions.

Location of RF OUT Ports

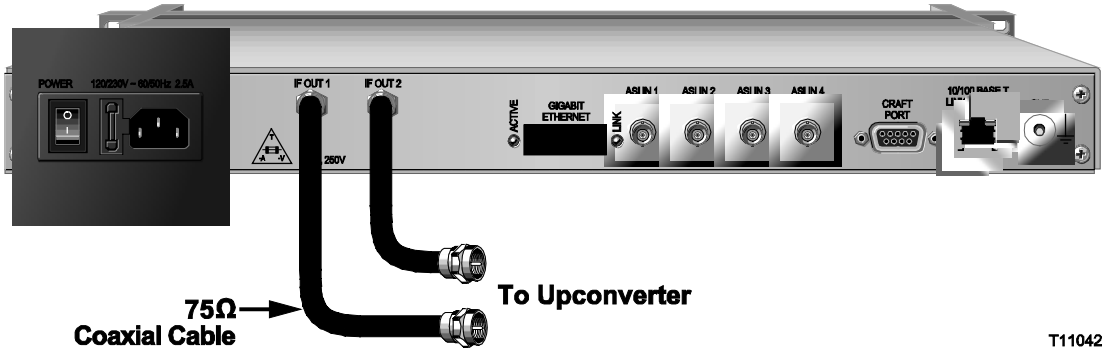
The following illustration shows an example of two of the four RF OUT ports connected to the distribution plant.

Note: The RF GoQAM uses only the RF OUT 1 and RF OUT 3 ports.



Location of IF OUT Ports

The following illustration shows an example of the two IF OUT ports on the IF GoQAM connected to the upconverter.



Connecting the RF Out or IF OUT Ports

Follow these steps to connect the RF OUT or IF OUT ports.

CAUTION:

Establish the RF output level and the IF output level before you connect the RF OUT or IF OUT ports to the distribution plant.

Important: We strongly recommend that you configure and adjust frequencies from the Set Up GoQAM window on the DNCS. See *Provision the RF GoQAM* (on page 37), or *Provision the IF GoQAM* (on page 53) for detailed instructions.

1. Refer to your network wiring diagram to connect the GoQAM properly.
2. Locate the RF OUT or IF OUT ports on the back panel of the GoQAM.
3. Connect one end of a 75 Ω coaxial cable to each port to be used for the GoQAM.
4. Verify that you have established the correct output level for the RF OUT or the IF OUT ports by completing the following steps:
   a. Connect the GoQAM to a spectrum analyzer to measure radio frequency levels.
   b. Set the RF or IF output levels from the front panel of the GoQAM.
   c. Provision the GoQAM from the DNCS.

Notes:

- For the RF GoQAM, see ***Adjust the RF Output Level of a Selected Carrier*** (on page 87) and ***Provision GoQAMs on the DNCS*** (on page 46) for more information.
- For the IF GoQAM, see ***Adjust the IF Output Level of a Selected Carrier*** (on page 110) and ***Provision an IF GoQAM on the DNCS*** (on page 71) for more information.

5 Choose one of the following options:

- For the RF GoQAM, connect the other end of each 75 Ω coaxial cable to the distribution plant.
- For the IF GoQAM, connect the other end of each 75 Ω coaxial cable to an upconverter.

3

Provision the RF GoQAM

Introduction

This chapter provides examples and descriptions of the DNCS graphical user interfaces (GUIs) used for provisioning (configuring) the RF GoQAM in an Overlay environment. Provisioning the GoQAM prepares the device so that the DNCS recognizes it and so that it operates properly.

Important! Your system must be operating SR 2.4/SR 3.4 (or later) to use a GoQAM on your system. You must also have the Overlay feature enabled.

Note: See ***Technical Specifications*** (on page 149) for the technical specifications of the RF GoQAM and consult your network wiring diagram when you provision the GoQAM to ensure a proper allocation of bandwidth.

For more information about the DNCS and operating the DNCS software, refer to the *Digital Network Control System Online Help* for your system release.

In This Chapter

Understand the RF GoQAM GUIs

This section provides examples and descriptions of the GUIs used for provisioning the RF GoQAM as a DBDS network element in an Overlay environment.

Important! Actual GUIs may differ slightly from the GUIs presented in this guide.

Understanding the RF GoQAM GUIs

Use the DNCS RF GoQAM GUIs to provision the RF GoQAM on the DNCS. The main GUI is the Set Up RF GoQAM window. The Set Up RF GoQAM window contains the following fields:

- Basic Parameters
- Advanced Parameters
- Connectivity

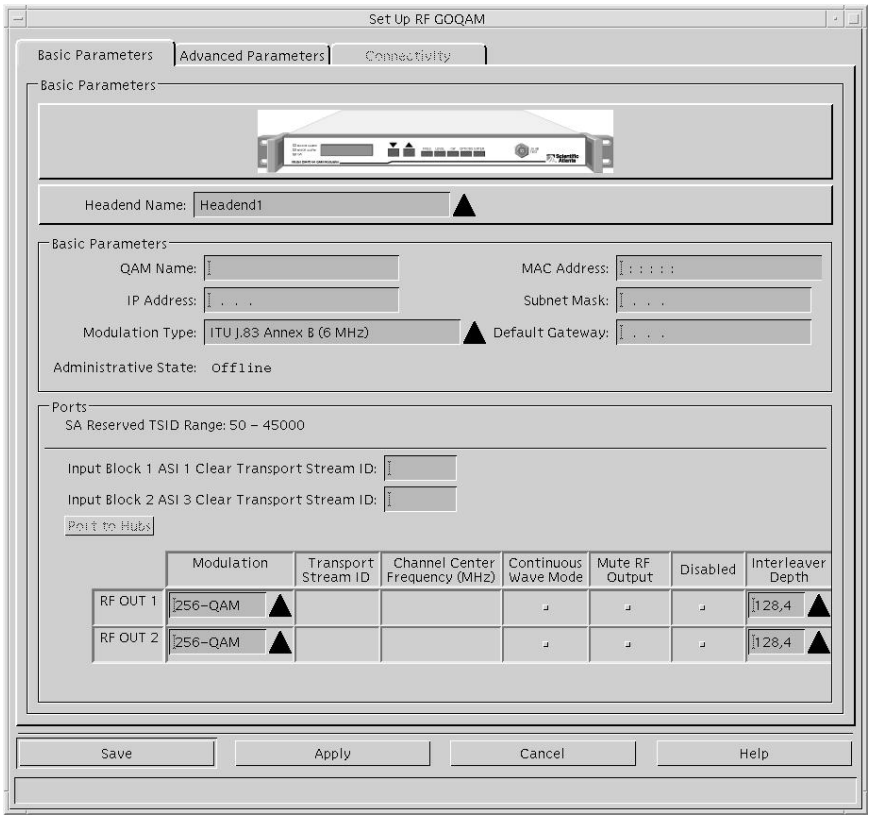
Note: This section includes examples and descriptions of all of the areas within these fields.

Understanding Basic Parameters

The Basic Parameters fields allow you to identify the GoQAM, assign it to a headend, and specify the modulation type for each of the RF Out ports. If you want to view the Basic Parameters fields while reading this section, follow these steps to examine the Set Up RF GoQAM window.

1 From the DNCS Administrative Console, select one of the following tabs:
   - For SR 2.7/3.7/4.2 and later, click the **Network Element Provisioning** tab.
   - For SR 2.5/3.5/4.0 and earlier, click the **Element Provisioning** tab.
2 Click **QAM**. The QAM List window opens.

3 Select **File > New > GOQAM > RF GOQAM**. The Set Up RF GoQAM window opens with the Basic Parameters tab to the forefront and displays the Basic Parameters fields as shown in the following example.



Basic Parameters

The following table lists the Basic Parameters fields and their descriptions.

Field	Description
Headend Name	Displays the name of the headend with which the modulator is associated
QAM Name	Displays the name used for the modulator
IP Address	Displays the IP address of the Ethernet interface through which the DNCS manages and controls the modulator
Modulation Type	Allows you to specify one of the following modulation types for each of the carriers: ■ ITU J.83 Annex B (6 MHz) ■ ITU J.83 Annex C DAVIC/DVB (6 MHz) **Note:** The default value is ITU J.83 Annex B (6 MHz).

Field	Description
Administrative State	Specifies whether the modulator is active within the system. The values are: ■ **Offline:** Default ■ **Online:** Active
MAC Address	Displays the MAC address of the GoQAM
Subnet Mask	Displays the IP subnet mask assigned by the system administrator
Default Gateway	Displays the network default gateway assigned by the system administrator

Ports

The following table lists the Ports field descriptions.

Field	Description
Reserved TSID Range	Identifies the available range of Transport Stream IDs (TSIDs)
Input Block 1 ASI 1 Clear Transport Stream ID	Identifies the Transport Stream ID for input block 1 at ASI 1
Input Block 2 ASI 3 Clear Transport Stream ID	Identifies the Transport Stream ID for input block 2 at ASI 3
Port to Hubs	Allows you to specify which hub is associated to any selected RF output port. The default is all hubs under the defined headend

RF Out Parameters

The following table lists the RF OUT port (1 – 2) field descriptions.

Note: Overlay technology uses only two of the RF OUT ports on the RF GoQAM.

Field	Description
Modulation	Displays the modulation format of the individual carriers The default is 64-QAM for ITU J.83 Annex B.
Transport Stream ID	Displays the identifier of the transport stream ID for each RF Out module

Field	Description
Channel Center Frequency (MHz)	Displays the frequency assigned to each carrier (range is 91 MHz to 869 MHz). Valid frequencies use the following format, with XXX representing a number from 91 to 869: ■ XXX.000 ■ XXX.25 ■ XXX.75
Continuous Wave Mode	Provides an unmodulated RF carrier **Note:** Continuous wave mode may be selected for each carrier.
Mute RF Output	Disables the RF output. May be selected for each carrier.
Disabled	Prevents the DNCS from setting up any additional sessions on this RF output if the DNCS is choosing QAM resources. Existing sessions are not affected and continue to function as expected. May be selected for each RF output.
Interleaver Depth	Allows you to select the Interleave setting based on the type of set-top you are using on your system. Interleaving is a technique to overcome correlated channel noise. Interleaving spreads out bursts of errors to remain within the error-correcting ability of a device.

Function Keys

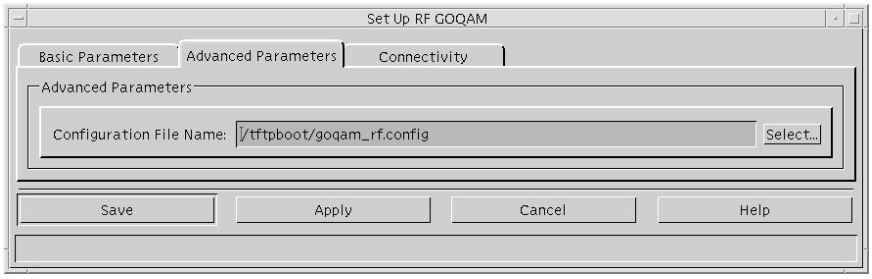
The following function keys appear on the Set Up GoQAM window.

Key	Function
Save	Saves changes to settings and closes the Set Up GoQAM window
Apply	Makes changes to settings without closing the Set Up GoQAM window
Cancel	Closes the Set Up GoQAM window without saving changes that have not been previously applied to settings
Help	Opens the DNCS Online Help

Understanding Advanced Parameters

The Advanced Parameters fields of the Set Up RF GOQAM window allow you to select the configuration file. To view the Advanced Parameters fields while reading this section, click the **Advanced Parameters** tab in the Set Up RF GOQAM window.

The following diagram shows an example of the Advanced Parameters fields of the Set Up RF GOQAM window.



Advanced Parameters

The following table lists Advanced Parameters field descriptions.

Field	Description
Configuration File Name	Displays the name of the configuration file used by the RF GoQAM to determine whether it is running the correct version of application code
Select	Opens the File Selection Dialog window so that you can specify the configuration file for the selected RF GoQAM.

Understanding the File Selection Dialog Screen

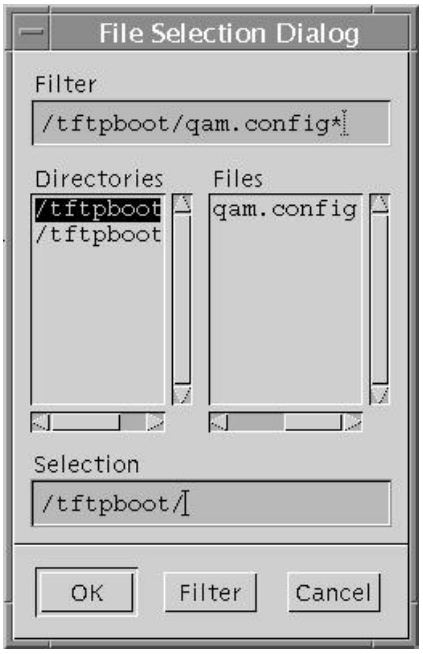
The File Selection Dialog screen allows you to specify the configuration file for the RF GoQAM. To view the File Selection Dialog screen while reading this section, click the **Select** button on the Advanced Parameters tab.

Understanding the BOOTP/TFTP Process

The BOOTP/TFTP process allows the GoQAM, after power on or reset, to request an IP address and receive configuration parameters, application downloads, and provisioning from the network BOOTP server. The DNCS, which is a BOOTP server, uses a BOOTP reply to assign an IP address to the GoQAM if the unit is provisioned in the DNCS database.

The configuration file selected in the File Selection Dialog window is included in the BOOTP reply. The GoQAM uses the information in the configuration file to determine whether it is running the correct version of application code. If the GoQAM is not running the correct version of application code, it requests the correct image file(s) from the DNCS.

The following diagram shows an example of the File Selection Dialog window.



Function Keys

The following function keys appear in the File Selection Dialog screen.

Key	Function
OK	Places the selected file name into the Configuration File Name field and closes the File Selection Dialog window
Filter	Enables the contents of the directory to display in the Directories and Files fields
Cancel	Closes the File Selection Dialog window without changing the original settings

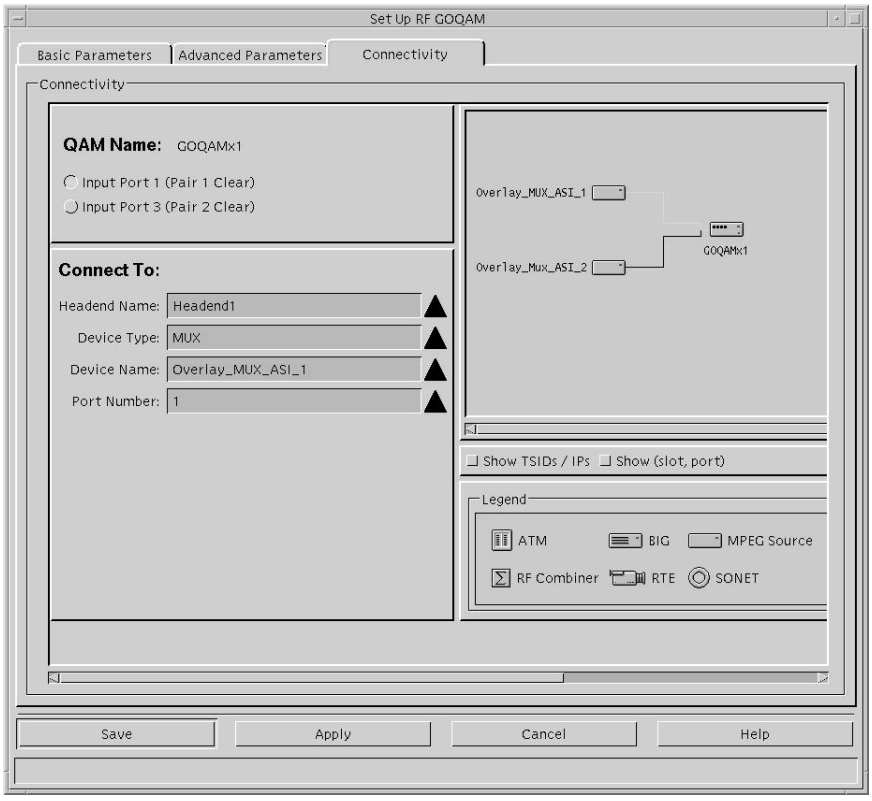
Understanding Connectivity

The Connectivity fields of the Set Up RF GoQAM window allow you to specify the input device connected to each of the Input ports on the GoQAM.

Note: When you first provision the RF GoQAM, the Connectivity fields are accessible only after you click **Apply** or **Save** from the Set Up RF GOQAM window. Thereafter, the Connectivity fields are accessible for viewing or modification.

To view the Connectivity fields while reading this section, click the **Connectivity** tab in the Set Up RF GOQAM window.

The following diagram shows an example of the Connectivity fields of the Set Up RF GOQAM window.



Connectivity

The following table lists the Connectivity field descriptions.

Field	Description
QAM Name	Identifies the name of the selected RF GoQAM and allows you to specify the Input (ASI) Port (1 or 3)
Headend Name	Identifies the headend in which the input device exists
Device Type	Identifies the type of input device, such as an Automux or IRT to which the RF GoQAM is connected
Device Name	Identifies the name of the input device to which the RF GoQAM is connected
Port Number	Identifies the port number of the device that is connected to the RF GoQAM. The server should be entered in the DNCS as a generic MPEG source. Create as many ports as are available for the server and connect to the RF GoQAM
Show TSIDs/IPs	Displays the Transport Stream (TS) IDs and Internet Protocol addresses (IPs)
Show (slot, port)	Displays the slot and port of the card connected to the RF GoQAM
Legend	Displays a group of icons that represent network elements that may be displayed in the graphical drawing area

Provision GoQAMs on the DNCS

In order for the RF GoQAM to operate properly as a network element within the DBDS, you must provision the RF GoQAM on the DNCS. This section provides procedures for provisioning an RF GoQAM on the DNCS.

Before You Begin

Before you begin to provision the GoQAM on the DNCS, you need the following information:

- IP address of the GoQAM
- Physical (MAC) address of the GoQAM
- Name you need to assign to the GoQAM
- Headend to which you need to assign the GoQAM
- RF frequencies for each output port
- Modulation type this GoQAM will use
- Transport Stream IDs for each port of the GoQAM
- Interleaver Depth for this GoQAM

Provisioning an RF GoQAM on the DNCS

Follow these steps to provision a new RF GoQAM or to adjust the settings for an existing RF GoQAM on the DNCS.

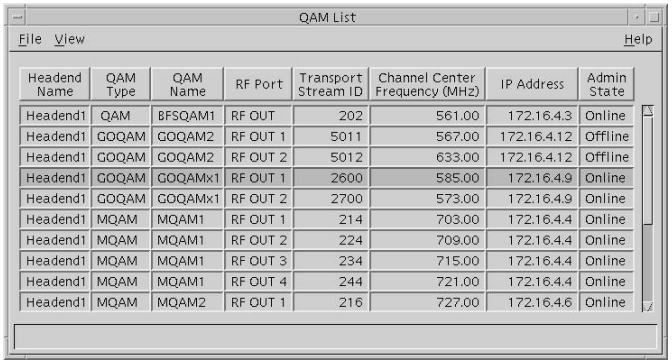
1 Verify that you have provisioned the RF GoQAM in accordance with your network wiring diagram and the input/output specifications for the RF GoQAM (see ***Technical Specifications*** (on page 149)) and other network devices.

Note: Refer to the *Digital Network Control System Online Help* for more information about provisioning network elements.

2 From the DNCS Administrative Console, select one of the following tabs:

- For SR 2.7/3.7/4.2 and later, click the **Network Element Provisioning** tab.
- For SR 2.5/3.5/4.0 and earlier, click the **Element Provisioning** tab.

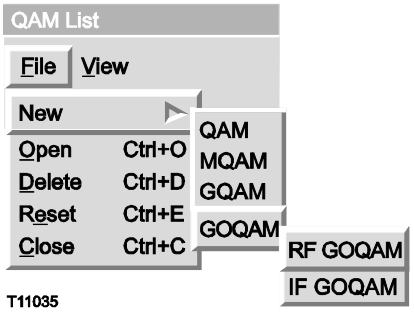
3 Click **QAM**. The QAM List window opens.



4 Choose one of the following options:

- To provision a *new* RF GoQAM, go to step 5.
- To change the settings for an *existing* RF GoQAM, go to step 7.

5 From the QAM List select **File >New > GOQAM > RF GOQAM.** The Set Up RF GOQAM window opens.



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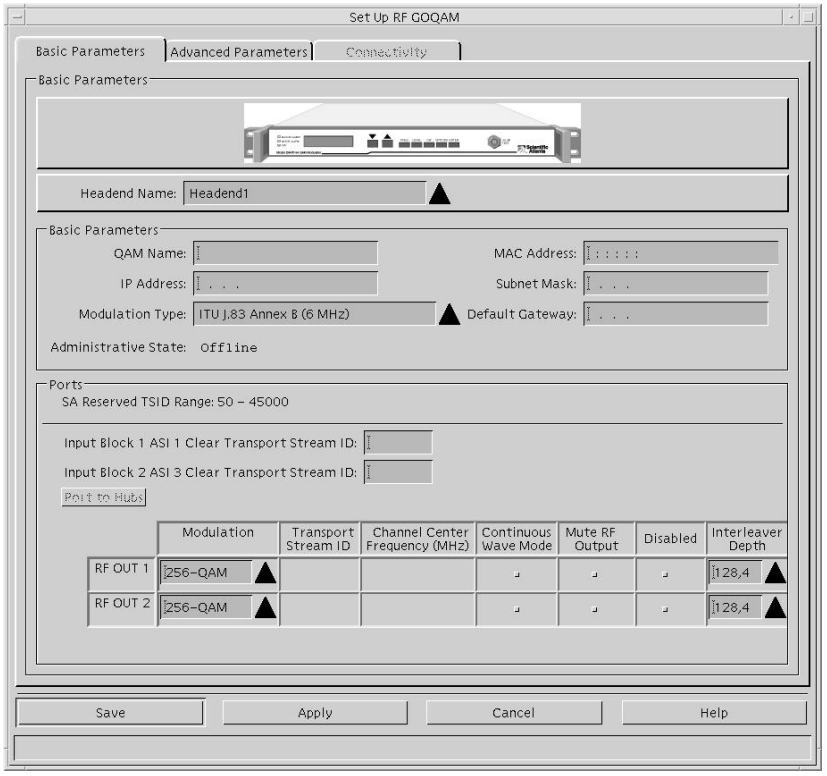
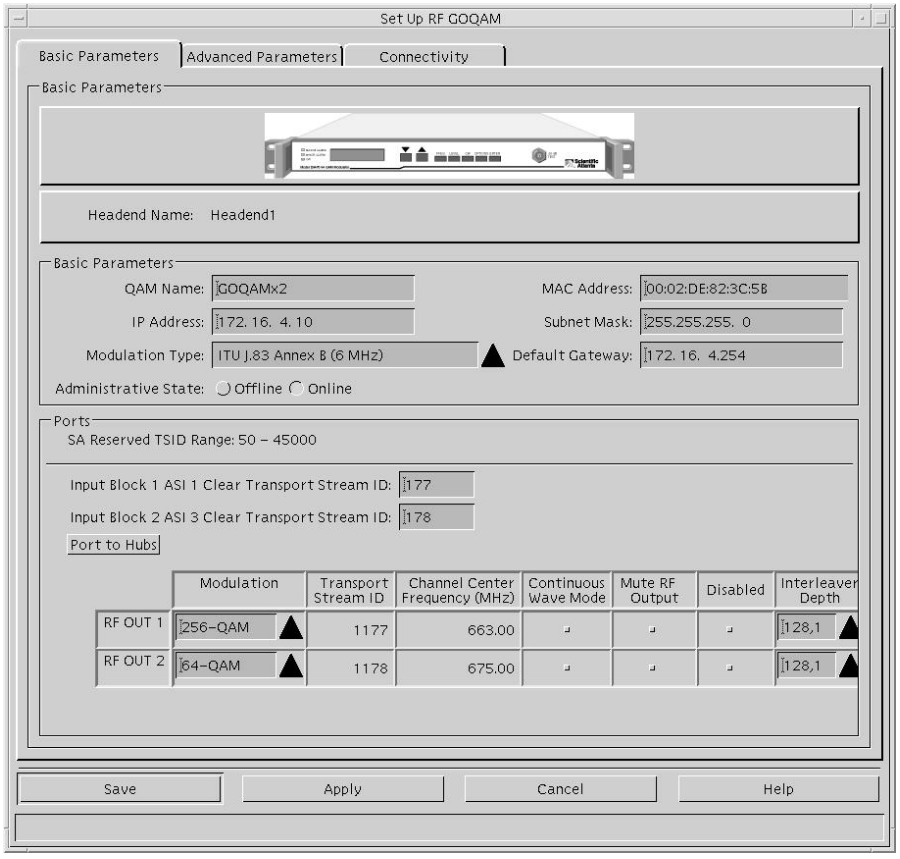


6 Enter the required configuration information into the blank fields on the Basic Parameters tab in the Set Up RF GOQAM window, then go to step 9.

Important: Be sure to associate the port with a hub by clicking the **Port to Hubs** button to open the RF Output Port window.

7 From the QAM List, highlight an RF GoQAM in the list, select **File > Open**. The Set Up RF GOQAM window opens with the Basic Parameters tab to the forefront displaying the Basic Parameters configuration fields.



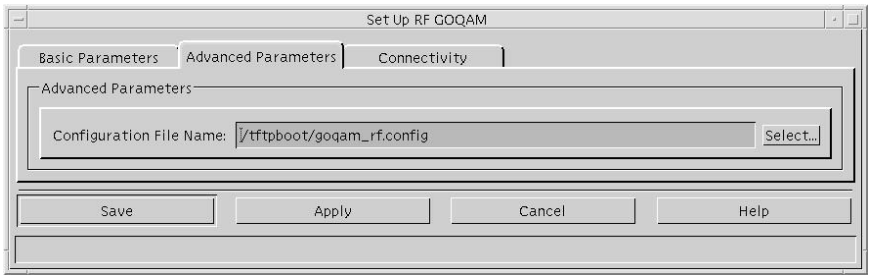
8 Enter or change the desired information in the Basic Parameters fields.

Important: Be sure to associate the port with a hub by clicking the **Port to Hubs** button to open the RF Output Port window.

Notes:

- See the Basic Parameters field descriptions, earlier in this section, for descriptions of each field.
- Refer to the *Digital Network Control System Online Help* for your system release for more details about required DNCS procedures.

9 Click the **Advanced Parameters** tab. The Set Up RF GOQAM window opens with the Advanced Parameters tab to the forefront displaying the Advanced Parameters configuration fields.

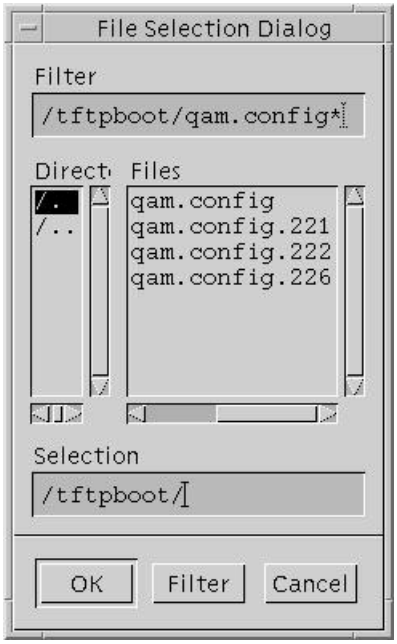


10 Enter or change the desired information in the Advanced Parameters fields.

Notes:

- See the Advanced Parameters field descriptions, earlier in this section, for more details.
- Refer to the *Digital Network Control System Online Help* for your system release for more details about required DNCS procedures.

11 To define the Configuration File Name, click **Select**. The File Selection Dialog window opens.



12 Enter the configuration file in the Selection field; then, click **OK**. The File Selection Dialog window closes.

Note: See the **File Selection Dialog** tab description, earlier in this section for more information.

13 Choose one of the following options:

- To provision the connectivity settings for a *new* RF GoQAM, go to step 14.
- To adjust the connectivity settings for an *existing* RF GoQAM, go to step 15.

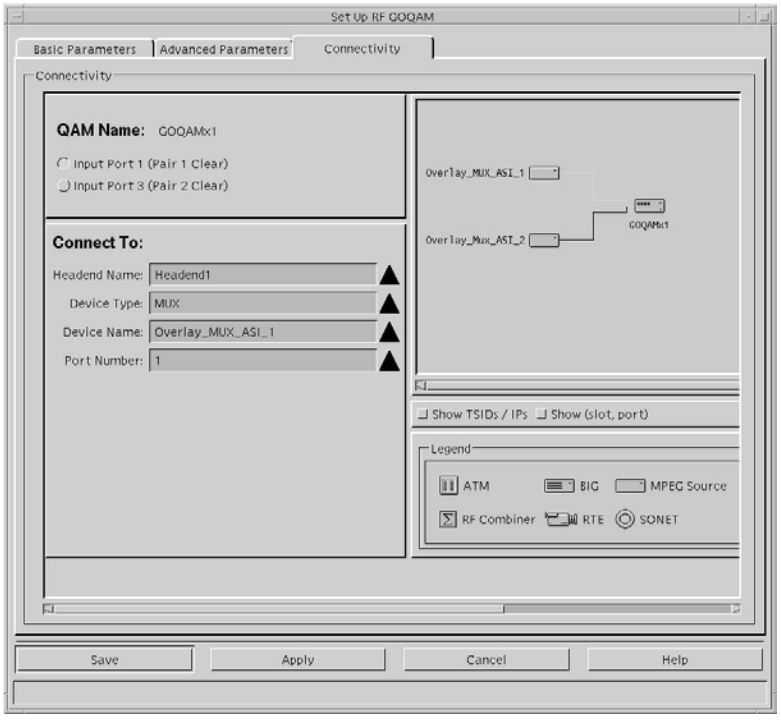
14 On the Set Up GOQAM window, click **Apply**.

Results:

- The system saves the settings for the new RF GoQAM.
- The Connectivity tab becomes sensitized.

Note: When you first provision the RF GoQAM, the Connectivity tab is accessible only after you click **Apply** or **Save** from the Set Up GOQAM window. Thereafter, the Connectivity tab is accessible for viewing or modification.

15 Click the **Connectivity** tab. The Set Up RF GOQAM window opens with the Connectivity tab to the forefront displaying the Connectivity configuration fields.



16 Select the RF GoQAM input port you want to connect to the network.

17 Select the device you want to connect to the RF GoQAM in the **Connect To** fields of the Connectivity tab; then, click **Save**. The QAM List updates to include the RF GoQAM.

Notes:

- The fields available in the Connect To panel of the Connectivity tab vary according to which device is selected.
- See the Connectivity field descriptions, earlier in this section, for descriptions of each field.
- Refer to the *Digital Network Control System Online Help* for your system release for more details about required DNCS procedures.

18 When you have completed provisioning the RF GoQAM, go to ***Operating the RF Modulator*** (on page 77).

4

Provision the IF GoQAM

Introduction

This chapter provides examples and descriptions of the DNCS graphical user interfaces (GUIs) used for provisioning (configuring) the IF GoQAM in an Overlay environment. Provisioning the GoQAM prepares the device so that the DNCS recognizes it and so that it operates properly.

Important: Your system must be operating SR 2.4/SR 3.4 (or later) to use a GoQAM on your system. You must also have the Overlay feature enabled.

Note: See ***Technical Specifications*** (on page 149) for the technical specifications of the IF GoQAM and consult your network wiring diagram when you provision the GoQAM to ensure a proper allocation of bandwidth.

For more information about the DNCS and operating the DNCS software, refer to the *Digital Network Control System Online Help* for your system release.

In This Chapter

Understand the IF GoQAM GUIs

This section provides examples and descriptions of the GUIs used for provisioning the IF GoQAM as a DBDS network element an Overlay environment.

Important! Actual GUIs may differ slightly from the GUIs presented in this guide.

File Selection Dialog Screen

The following table lists field descriptions on the File Selection Dialog screen.

Field	Description
Filter	Displays the path and filename wildcard used by the system to search for files. Enter the UNIX path, ending with /*. This field displays the contents of the directory in the Directories and Files fields of this window when you click **Filter**.
Directories	Displays a list of available directories at the current path specified in the **Filter** field
Files	Displays a list of files within the current path specified in the **Filter** field
Selection	Displays the selected file

Understanding the IF GoQAM GUIs

Use the DNCS IF GoQAM GUIs to provision the IF GoQAM on the DNCS. The main GUIs are the Set Up IF GOQAM window, the UpConverter List window, and the Set Up UpConverter window. The following list provides descriptions of the IF GoQAM GUIs:

- The Set Up IF GOQAM window contains the following fields:
  - Basic Parameters
  - Advanced Parameters
  - Connectivity
- The UpConverter List window contains the UpConverter Name fields
- The Set Up UpConverter window contains the following fields:
  - Basic Parameters
  - Connectivity

Note: The sections within this chapter include examples and descriptions of all of the fields within these windows.

Understand the Set Up IF GoQAM GUI

This section provides descriptions of the fields in the Set Up IF GoQAM GUI.

Understanding Basic Parameters

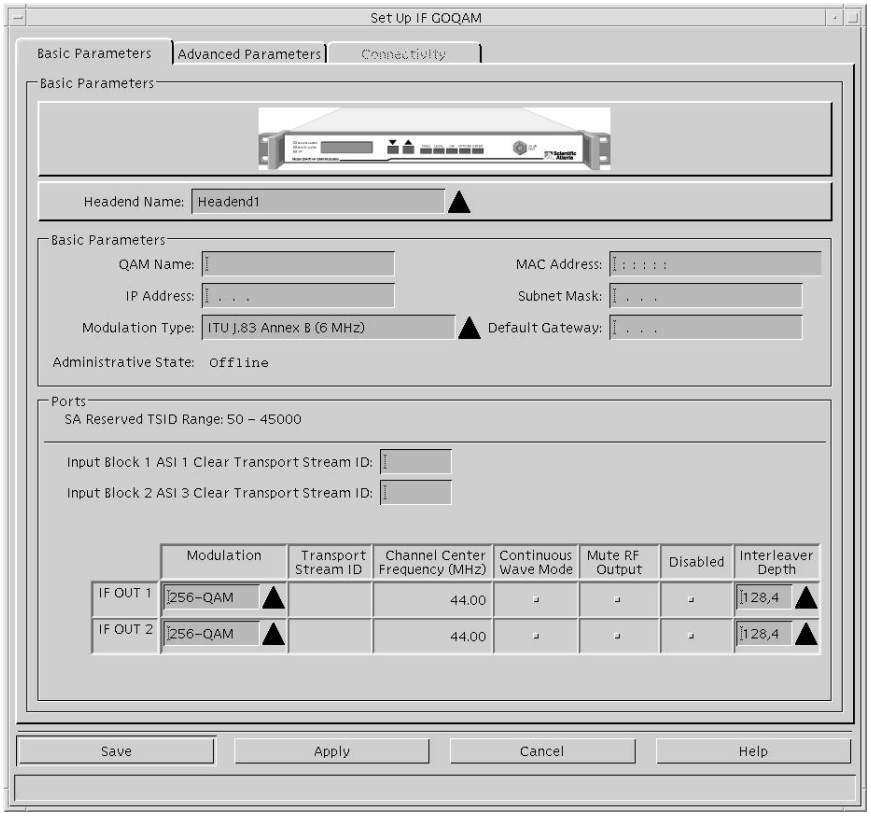
The Basic Parameters fields allow you to identify the IF GoQAM, assign it to a headend, and specify the QAM modulation type. If you want to view the Basic Parameters fields while reading this section, follow these steps to examine the Set Up IF GOQAM window.

1 From the DNCS Administrative Console, select one of the following tabs:

- For SR 2.7/3.7/4.2 and later, click the **Network Element Provisioning** tab.
- For SR 2.5/3.5/4.0 and earlier, click the **Element Provisioning** tab.

2 Click **QAM**. The QAM List window opens.

3 Select **File > New >GOQAM > IF GOQAM**. The Set Up IF GOQAM window opens with the Basic Parameters tab to the forefront and displays the Basic Parameters fields as shown in the following example.



Basic Parameters

The following table lists the Basic Parameters field descriptions.

Field	Description
Headend Name	Displays the name of the headend with which the GoQAM is associated.
QAM Name	Displays the name used for the GoQAM.
IP Address	Displays the IP address of the Ethernet interface through which the DNCS manages and controls the GoQAM.
Modulation Type	Allows you to specify one of the following modulation types for each of the carriers: ■ ITU J.83 Annex B (6 MHz) ■ ITU J.83 Annex C DAVIC/DVB (6 MHz) **Note:** The default value is ITU J.83 Annex B (6 MHz).
Administrative State	Specifies whether the GoQAM is active within the system. The values are: ■ Offline – Default ■ Online – Active
MAC Address	Displays the MAC address of the GoQAM
Subnet Mask	Displays the IP Subnet mask assigned by the system administrator.
Default Gateway	Displays the network default gateway assigned by the system administrator.

Ports

The following table lists the Ports field descriptions.

Field	Description
Reserved TSID Range	Identifies the available range of Transport Stream IDs (TSIDs)
Input Block 1 ASI 1 Clear Transport Stream ID	Identifies the Transport Stream ID for input block 1 at ASI 1
Input Block 2 ASI 3 Clear Transport Stream ID	Identifies the Transport Stream ID for input block 2 at ASI 3

IF OUT Parameters

The following table lists the IF OUT port (1 – 2) field descriptions.

Note: Overlay technology uses only two of the IF OUT ports on the IF GoQAM.

Field	Description
Modulation	Displays the modulation format of the individual carriers **Note:** The default is 64-QAM for ITU J.83 Annex B.
Transport Stream ID	Displays the identifier of the transport stream ID for each IF Out port
Channel Center Frequency (MHz)	Displays the frequency assigned to each carrier The frequency is fixed at 44.00 MHz on the IF GoQAM
Continuous Wave Mode	Provides an unmodulated carrier **Note:** Continuous wave mode may be selected for each carrier.
Mute RF Output	Disables the RF output. May be selected for each output. **Note:** The RF Output should be provisioned from the front panel of the GoQAM with the Mute RF option enabled before you connect the IF GoQAM to the distribution plant.
Disabled	Prevents the DNCS from creating new sessions on this output port. Existing sessions are not affected. May be selected for each output.
Interleaver Depth	Allows you to select the Interleave setting based on the type of set-top you are using on your system. Interleaving is a technique to overcome correlated channel noise. Interleaving spreads out bursts of errors to remain within the error-correcting ability of a device.

Function Keys

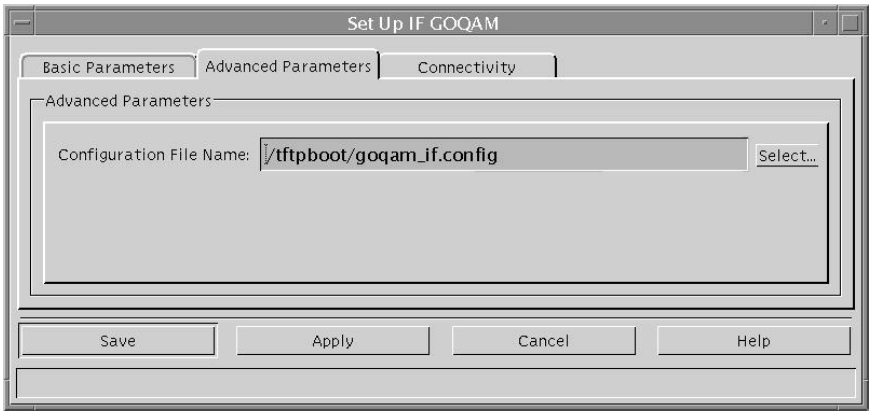
The following function keys appear on the Set Up GoQAM window.

Key	Function
Save	Saves changes to GoQAM settings and closes the Set Up IF GoQAM window
Apply	Makes changes to GoQAM settings without closing the Set Up IF GoQAM window
Cancel	Closes the Set Up IF GOQAM window without saving changes that have not been previously applied to GoQAM settings
Help	Opens the DNCS Online Help

Understanding Advanced Parameters

The Advanced Parameters fields of the Set Up IF GOQAM window allow you to select the configuration file. To view the Advanced Parameters fields while reading this section, click the **Advanced Parameters** tab in the Set Up IF GOQAM window.

The following diagram shows an example of the Advanced Parameters fields of the Set Up IF GOQAM window.



Advanced Parameters

The following table lists Advanced Parameters field descriptions.

Field	Description
Configuration File Name	Displays the name of the configuration file used by the GoQAM to determine whether it is running the correct version of application code
Select	Opens the File Selection Dialog window so that you can specify the configuration file for the selected GoQAM. See **File Selection Dialog Screen**, next in this section, for more information

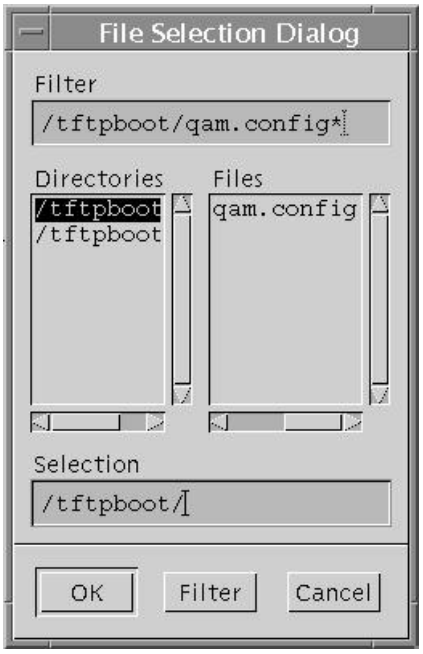
Understanding the File Selection Dialog Screen

The File Selection Dialog screen allows you to specify the configuration file for the GoQAM. To view the File Selection Dialog screen while reading this section, click the **Select** button on the Advanced Parameters tab.

Understanding the BOOTP/TFTP Process

The BOOTP/TFTP process allows the GoQAM, after power on or reset, to request an IP address and receive configuration parameters, application downloads, and provisioning from the network BOOTP server. The DNCS, which is a BOOTP server, uses a BOOTP reply to assign an IP address to the GoQAM if the unit is provisioned in the DNCS database. The configuration file selected in the File Selection Dialog window is included in the BOOTP reply. The GoQAM uses the information in the configuration file to determine whether it is running the correct version of application code. If the GoQAM is not running the correct version of application code, it requests the correct image file from the DNCS.

The following diagram shows an example of the File Selection Dialog window.



File Selection Dialog Screen

The following table lists field descriptions on the File Selection Dialog screen.

Field	Description
Filter	Displays the path and filename wildcard used by the system to search for files. Enter the UNIX path, ending with /*. This field displays the contents of the directory in the Directories and Files fields of this window when you click **Filter**
Directories	Displays a list of available directories at the current path specified in the **Filter** field
Files	Displays a list of files within the current path specified in the **Filter** field
Selection	Displays the selected file

Function Keys

The following function keys appear in the File Selection Dialog screen.

Key	Function
OK	Places the selected file name into the Configuration File Name field and closes the File Selection Dialog window
Filter	Enables the contents of the directory to display in the Directories and Files fields
Cancel	Closes the File Selection Dialog window without changing the original settings

Understanding Connectivity

The Connectivity fields of the Set Up GoQAM window allow you to specify the input device connected to each of the input ports on the GoQAM.

Note: When you first provision the GoQAM, the Connectivity fields are accessible only after you click **Apply** or **Save** from the Set Up GoQAM window.

To view the Connectivity fields while reading this section, click the **Connectivity** tab in the Set Up GoQAM window.

The following diagram shows an example of the Connectivity fields within the window.

Connectivity

The following table lists the Connectivity field descriptions.

Field	Description
QAM Name	Identifies the name of the selected GoQAM and allows you to specify the Input Port (1 or 3)
Port Number	Identifies the port number of the device that is connected to the GoQAM. The server should be entered in the DNCS as a generic MPEG source. Create as many ports as are available for the server and connect to the GoQAM
Headend Name	Identifies the headend in which the input device exists
Device Type	Identifies the type of input device, such as an IRT to which the GoQAM is connected
Device Name	Identifies the name of the input device to which the GoQAM is connected
Port	Identifies the port number of the device that is connected to the IF GoQAM. The server should be entered as the DNCS as a generic MPEG source. Create as many ports as are available for the server and connect to the IF GoQAM.

Field	Description
Show TSIDs/IPs	Displays the Transport Stream (TS) IDs and Internet Protocol addresses (IPs)
Show (slot, port)	Displays the slot and port of the card connected to the GoQAM
Legend	Displays a group of icons that represent network elements that may be displayed in the graphical drawing area

Understand the Set Up UpConverter GUI

The Set Up UpConverter GUI allows you to add, provision, monitor, delete, or edit an upconverter, assign it to a headend, and specify RF output and connectivity parameters for the upconverter.

Important! You must connect an upconverter to the GoQAM in order to use the procedures in this section.

Understanding the Set Up UpConverter GUI

Follow these steps to open the UpConverter List window.

1 From the DNCS Administrative Console, select one of the following tabs:

- For SR 2.7/3.7/4.2 and later, click the **Network Element Provisioning** tab.
- For SR 2.5/3.5/4.0 and earlier, click the **Element Provisioning** tab.

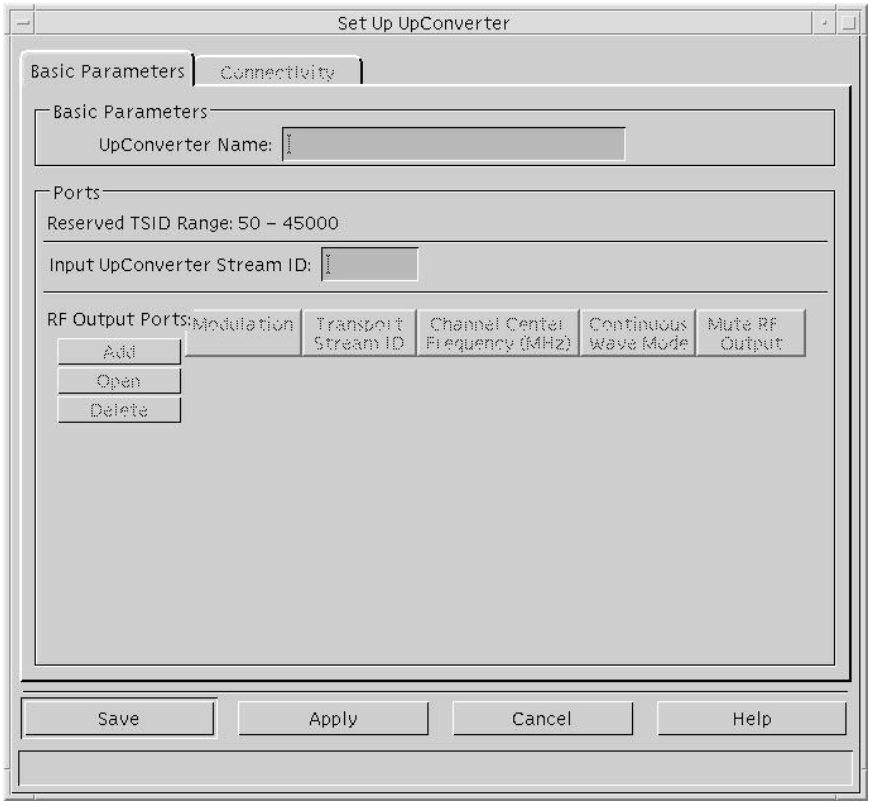
2 Click **UpConverter**. The UpConverter List window opens.

3 Choose one of the following options:

- To create a new upconverter, to go step 4.
- To edit an existing upconverter, go to step 6.

4 From the UpConverter List window, select **File > New**. The Set Up UpConverter window opens with Basic Parameters tab to the forefront.

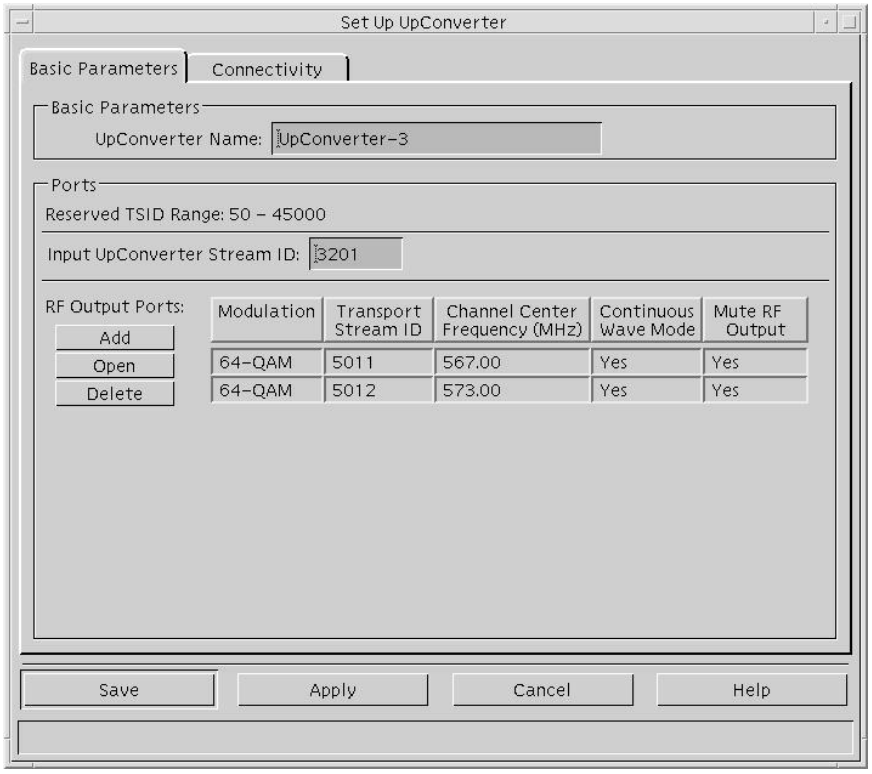
Important! For a description of the fields in the Set Up UpConverter window, go to **Set Up UpConverter Basic Parameters**, later in this section.



5 Enter the required configuration information into the blank fields of the Set Up UpConverter window, then go to step 7.

6 Double-click one of the upconverters listed in the UpConverter Name column. The Set Up UpConverter window opens with Basic Parameters tab to the forefront.

Note: The IF GoQAM transmits a 44.00 MHz IF stream to an upconverter. The upconverter converts the 44.00 MHZ IF stream to RF output at a specific RF output port for transmission on the network. Use the Set Up UpConverter window to add, edit, or delete these RF output ports.

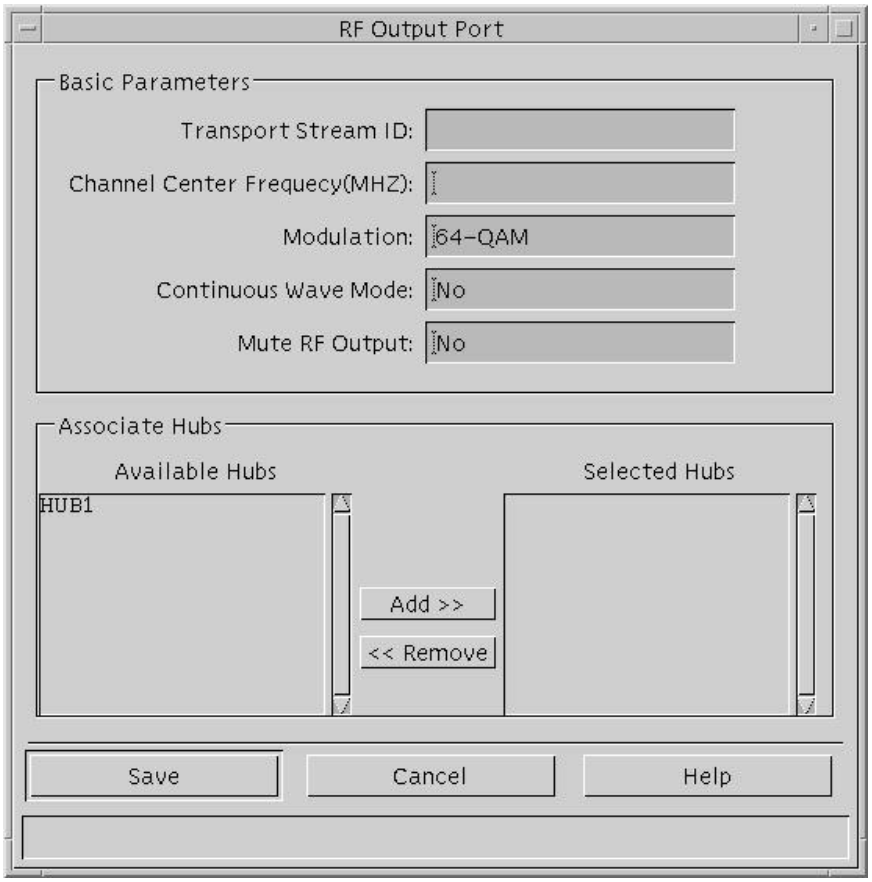


7 Do you want to add an RF Output Port?

- If **yes**, go to step 8.
- If **no**, go to step 10.

8 To add an RF Out Port, click **Add**. An RF Output Port window similar to the following opens.

Important! For a description of the fields in the RF Output Port window, go to the **RF Output Ports** section in ***Set Up UpConverter Basic Parameters*** (on page 68).



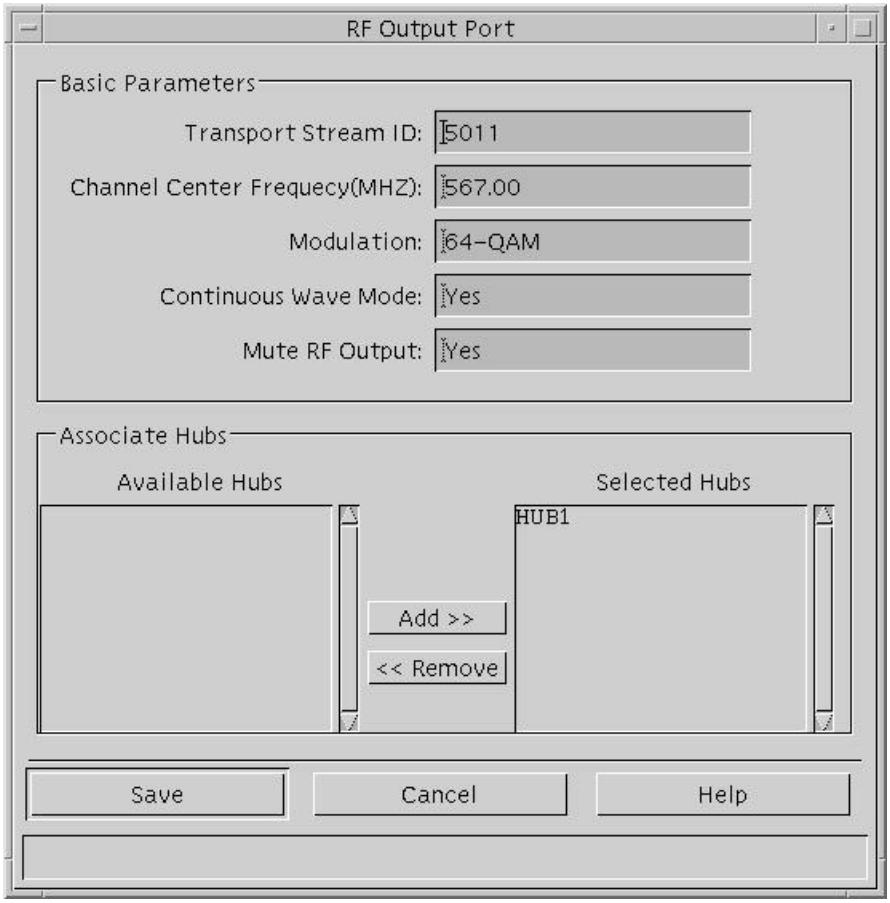
9 Enter correct information in the RF Output Port window and move an Available Hub to the Selected Hubs field.

10 Do you want to view or edit an RF Output port?

- If **yes**, go to step 11.
- If **no**, go to step 13.

11 To view or edit an RF Output Port, highlight a row and click **Open**. An RF Output port similar to the following opens.

Note: For a description of the fields in the RF Output Port window, go to the **RF Output Ports** section in ***Set Up UpConverter Basic Parameters*** (on page 68).



12 Did you make changes in the RF Output Port window?

- If **yes**, click **Save**.
- If **no**, click **Cancel**.

13 On the Set Up UpConverter window, click **Apply**. The system applies the settings.

Set Up UpConverter Basic Parameters

The UpConverter Name is the name assigned to the upconverter.

Ports

The following table lists the Set Up UpConverter Ports field descriptions.

Field	Description
Reserved TSID Range	Displays the available range of transport stream IDs ■ 50 – 45000 for Overlay systems ■ 11 – 50999 for Regional Control System (RCS)
Input UpConverter Stream ID	Displays the transport stream ID of the currently selected upconverter

RF Output Ports

The following table lists the Set Up UpConverter RF Output Ports field descriptions.

Field	Description
Modulation	Displays the frequency modulation for the RF Output ports **Note:** The default is 64-QAM for ITU J.83 Annex B.
Transport Stream ID	Displays the identifier of the transport stream ID for each RF Output ports
Channel Center Frequency (MHz)	Displays the frequency assigned to the upconverter
Continuous Wave Mode	This option is not operational at this time.
Mute RF Output	This option is not operational at this time.

Function Keys

The following table describes the function keys on the Set Up UpConverter window.

Field	Description
Add	Allows you to add a new RF Output port
Open	Allows you to edit an RF Output port
Delete	Allows you to delete an RF Output port
Save	Saves changes and closes the window
Apply	Makes changes without closing the window

Field	Description
Cancel	Closes the window without saving changes that have not been previously applied
Help	Opens the DNCS Online Help

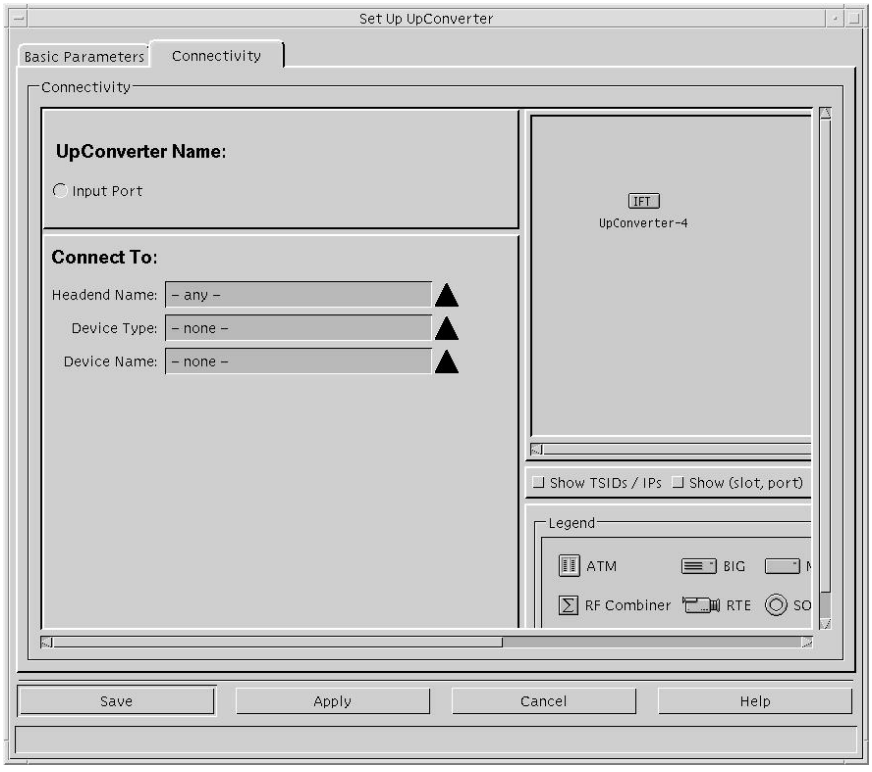
Understanding Set Up UpConverter Connectivity

The Connectivity fields of the Set Up UpConverter window allow you to specify the IF GoQAM connected to each of the Input ports on the upconverter.

Note: When you first provision the upconverter, the Connectivity fields only appear after you click Apply or Save from the Set Up UpConverter window. Thereafter, the Connectivity fields are accessible for viewing or modifying.

To view the Connectivity fields while reading this section, click the **Connectivity** tab in the Set Up UpConverter window.

The following diagram shows an example of the Connectivity fields of the Set Up UpConverter window.



Set Up UpConverter Connectivity

The following table lists the Set Up UpConverter Connectivity field descriptions.

Field	Description
UpConverter Name	Identifies the name of the selected UpConverter and allows you to select the Input Port
Headend Name	Identifies the headend in which the input device exists
Device Type	Identifies the type of input device to which the IF GoQAM is connected
Device Name	Identifies the name of the input device to which the IF GoQAM is connected
Show TSIDs/IPs	Displays the Transport Stream (TS) IDs and Internet Protocol addresses (IPs)
Show (slot, port)	Displays the slot and port of the card connected to the RF GoQAM
Legend	Displays a group of icons that represent network elements that may be displayed in the graphical drawing area

Provision an IF GoQAM on the DNCS

In order for the IF GoQAM to operate properly as a network element within the DBDS, you must provision the IF GoQAM on the DNCS. This section provides procedures for provisioning an IF GoQAM on the DNCS.

Before You Begin

Before you begin to provision the GoQAM on the DNCS, you need the following information:

- IP address of the GoQAM
- Physical (MAC) address of the GoQAM
- Name you need to assign to the GoQAM
- Headend to which you need to assign the GoQAM
- RF frequencies for each output port
- Modulation type this GoQAM will use
- Transport Stream IDs for each port of the GoQAM
- Interleaver Depth for this GoQAM

Provisioning an IF GoQAM on the DNCS

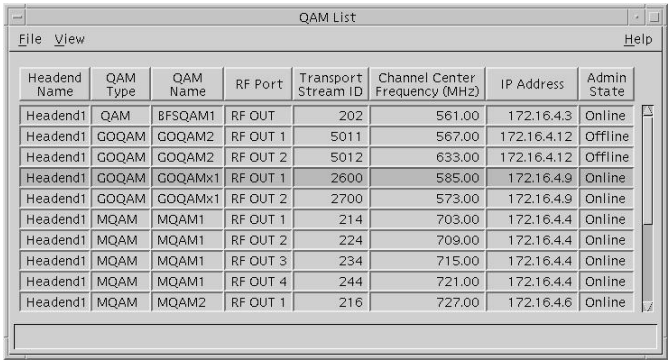
Follow these steps to provision a new IF GoQAM or to adjust the settings for an existing IF GoQAM on the DNCS.

1. Verify that you have provisioned the IF GoQAM in accordance with your network wiring diagram and the input/output specifications for the IF GoQAM (Appendix A) and other network devices.

   Note: Refer to the *Digital Network Control System Online Help* for your system release for more information about provisioning network elements.

2. From the DNCS Administrative Console, select one of the following tabs:
   - For SR 2.7/3.7/4.2 and later, click the **Network Element Provisioning** tab.
   - For SR 2.5/3.5/4.0 and earlier, click the **Element Provisioning** tab.

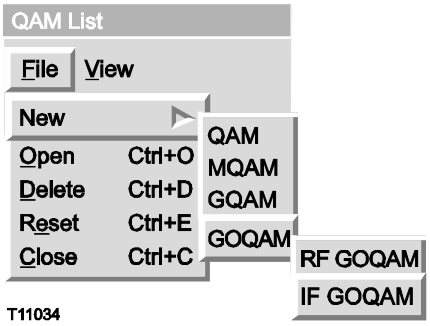
3 Click **QAM**. The QAM List window opens.



4 Choose one of the following options:

- To provision a *new* IF GoQAM, go to step 5.
- To change the settings for an *existing* IF GoQAM, go to step 7.

5 Select **File > New > GOQAM > IF GOQAM**. The Set UP IF GOQAM window opens.



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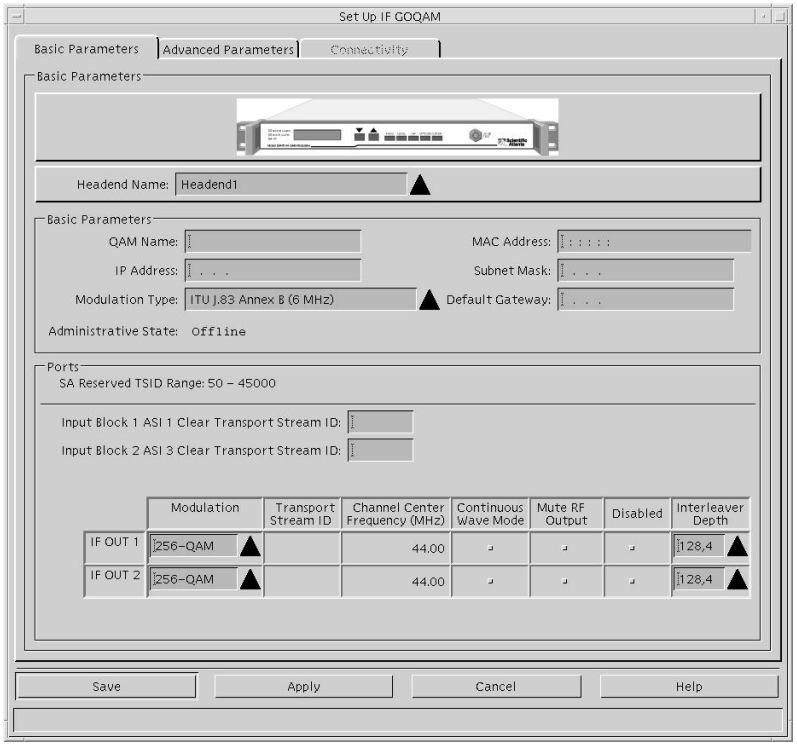
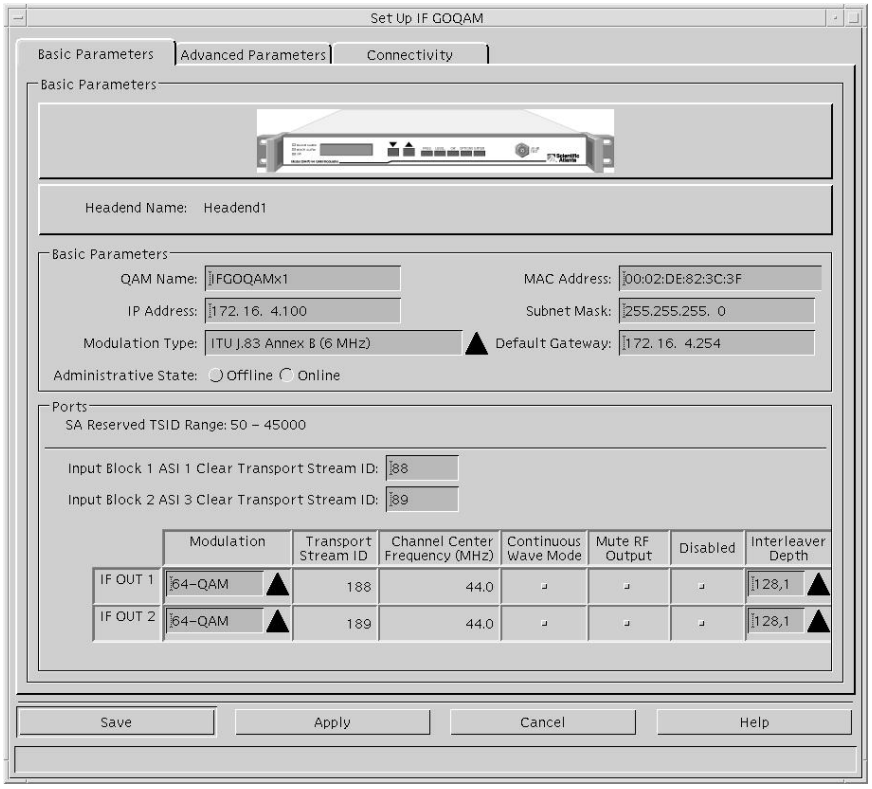


6 Enter the required configuration information into the blank fields on the Basic Parameters tab in the Set Up IF GoQAM window, then go to step 9.

7 From the QAM List, highlight a GoQAM in the list, select **File > Open**. The Set Up IF GoQAM window opens with the Basic Parameters tab to the forefront displaying the Basic Parameters configuration fields.

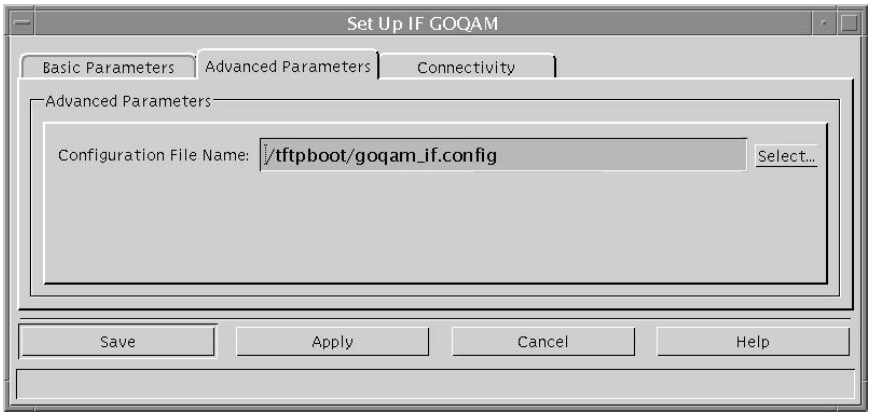


8 Enter or change the desired information in the Basic Parameters fields, then go to step 9.

Notes:

- See the Basic Parameters field descriptions, earlier in this section, for descriptions of each field.
- Refer to the *Digital Network Control System Online Help* for your system release for more details about required DNCS procedures.

9 Click the **Advanced Parameters** tab. The Set Up IF GOQAM window opens with the Advanced Parameters tab to the forefront displaying the Advanced Parameters configuration fields.

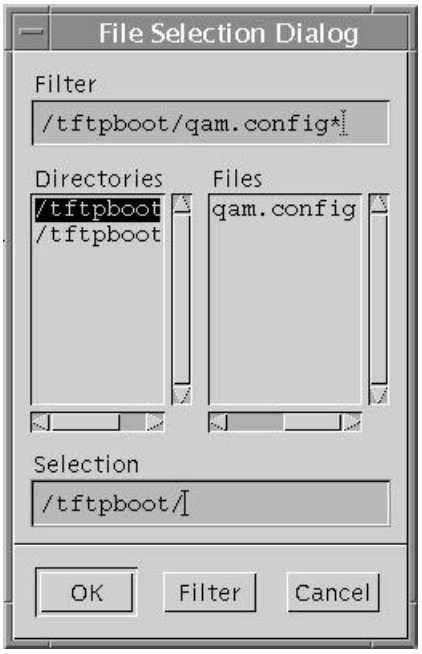


10 Enter or change the desired information in the Advanced Parameters fields.

Notes:

- See the Advanced Parameters field descriptions, earlier in this section, for more details.
- Refer to the *Digital Network Control System Online Help* for your system release for more details about required DNCS procedures.

11 To define the Configuration File Name, click **Select**. The File Selection Dialog window opens.



12 Enter the configuration file in the Selection field; then, click **OK**. The File Selection Dialog window closes.

Note: See the **File Selection Dialog** tab description, earlier in this section for more information.

13 Choose one of the following options:

- To provision the connectivity settings for a new IF GoQAM, go to step 14.
- To adjust the connectivity settings for an existing IF GoQAM, go to step 15.

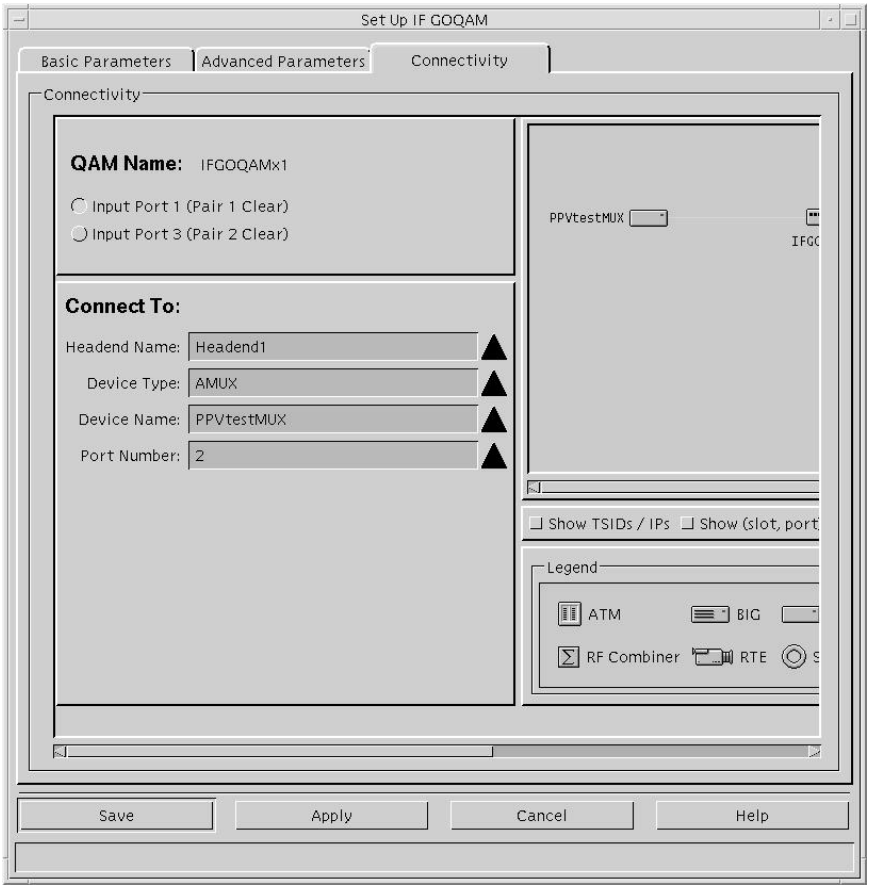
14 On the Set Up IF GOQAM window, click **Apply**.

Results:

- The system saves the settings for the new IF GoQAM.
- The Connectivity tab becomes sensitized.

Note: When you first provision the IF GoQAM, the Connectivity tab is accessible only after you click **Apply** or **Save** from the Set Up IF GOQAM window. Thereafter, the Connectivity tab is accessible for viewing or modification.

15 Click the **Connectivity** tab. The Set Up IF GOQAM window opens with the Connectivity tab to the forefront displaying the Connectivity configuration fields.



16 Select the IF GoQAM input port you want to connect to the network.

17 Select the device you want to connect to the IF GoQAM in the **Connect To** fields of the Connectivity tab; then, click **Save**. The QAM List is updated to include the IF GoQAM.

Notes:

- The fields available in the Connect To panel of the Connectivity tab vary according to which device is selected.
- See the Connectivity field descriptions, earlier in this section, for descriptions of each field.
- Refer to the *Digital Network Control System Online Help* for your system release for more details about required DNCS procedures.

5

Operating the RF Modulator

Introduction

This chapter contains procedures for viewing and changing GoQAM RF settings, descriptions of screens and messages, and instructions for performing routine maintenance.

Note: Actual screen settings may differ slightly from the examples presented in this guide.

In This Chapter

Understand the Boot Process

This section describes the boot process and lists examples of the screens that appear during a normal boot process. The Bootstrap (BOOTP) protocol is used to initialize and to acquire the following configuration information:

- IP address
- Address mask
- Location of default gateway
- Addresses of important servers
- Name and location of software download file(s) from the network BOOTP server

Note: The GoQAM downloads software using Trivial File Transfer Protocol (TFTP), which is a simplified version of FTP.

See ***Change the Boot Mode*** (on page 81) for a description of the boot modes available and instructions for changing the boot mode.

See ***Troubleshooting Boot Screen Error Messages*** (on page 143) for troubleshooting booting conditions.

1. The GoQAM sends a BOOTP request to the DNCS.
2. The DNCS responds to the BOOTP request, sending the IP address for the GoQAM.
3. The GoQAM sends a TFTP request for the configuration file.

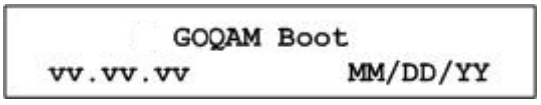
   Note: The configuration file (goqam.config) contains environment variables, download files, and server addresses.
4. The DNCS sends the TFTP goqam.config file.
5. If the files in the goqam.config file are different from those stored in the GoQAM, then the GoQAM requests the download files, which consist of the following:
   - Boot code for Host, NP1, NP2, and NP3
   - Application code for Host, NP1, NP2, and NP3
   - RF module code for RF Modules 1, 2, 3, and 4

   Note: The messages that appear on the front panel of the GoQAM during the boot process are described in Initial Boot Screens and Code Download Screens.

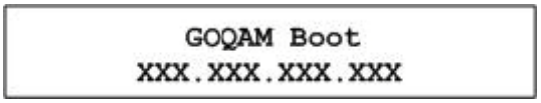
The following illustrations show examples of the initial boot screens.

Note: Actual screen settings may differ from the examples presented in this guide.

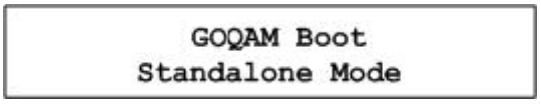
When the GoQAM boots, the boot code version and release date appear.



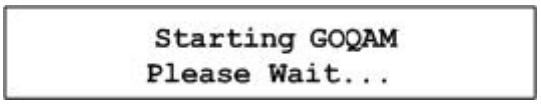
If BOOTP completes successfully, the IP address boot screen appears.



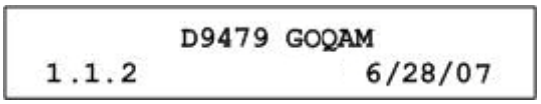
Note: Although it is not a typical setting, if the GoQAM is set to run in a Standalone mode (boot mode 0), the following Standalone mode boot screen appears instead of the "Starting GoQAM" boot screen.



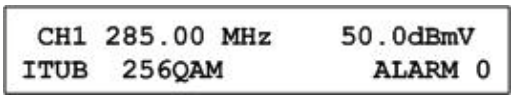
The IP address boot screen remains visible for approximately 2 seconds. If no errors occur and no downloads are attempted, the boot code starts the application code and the following screen appears.



Next, a screen similar to the following appears.



Then, the default status screen appears.



The boot code, application code, and RF module code messages appear on the front panel LCD screen during code download or during a download attempt. The following table represents the sequence of events that occur during a complete boot code, application code, and RF module code upgrade.

Code Type	**Front Panel Screen Message**
Initial Boot	GoQAM Boot vv.vv.vv MM/DD/YY
	GoQAM Boot xxx.xxx.xxx.xxx
Host Processor Boot Code	Downloading Host Code !!! Do Not Power Off !!!
	GoQAM Boot vv.vv.vv MM/DD/YY
	GoQAM Boot xxx.xxx.xxx.xxx
Host Processor Application Code	Downloading Host Code Please Wait ….
	Writing App Code Flash Please Wait ….
RF Code	Downloading RF # Code Please Wait …. (where # = 1-4)
Input Processor Boot Code	Downloading NP1 Code Please Wait ….
Output Processor 1 & 2 Boot Code	Downloading NP2&3 Code Please Wait ….
	GoQAM Boot vv.vv.vv MM/DD/YY
	GoQAM Boot xxx.xxx.xxx.xxx
Input Processor Application Code	Downloading NP1 Code Please Wait ….
Output Processor 1 & 2 Application Code	Downloading NP2&3 Code Please Wait ….
	Starting GoQAM Please Wait….
	(a blank screen appears momentarily)
	D9479 GoQAM vv.vv.vv MM/DD/YY
When the code download is complete, the default status screen appears.	CH 1 300.00 MHz 50.0 dBmV ITUB 256QAM Alarm 0

Change the Boot Mode

This section describes the available boot modes available and contains instructions for changing the boot mode from the craft port using a diagnostic PC.

Boot Modes

Three boot modes (0 through 2) exist and are described in the following list:

- **0 - Skip BootP** (Standalone mode) – This mode bypasses the boot mode when you power on the GoQAM. Use the Skip BootP mode when operating in Standalone mode, when provisioning and monitoring the GoQAM from the front panel or the craft port, or when operating without the control of the DNCS. This mode skips the BOOTP and TFTP processes and jumps directly to the application code.
- **1 - Attempt BootP One Time** (Attempt Bootp Once mode) – This mode is not normally used in network operation. If used when the GoQAM is connected to the network and the network connection is lost or reset, the GoQAM must be rebooted. This mode attempts each BOOTP and TFTP step only once. If a failure occurs during any step, the step is skipped; the GoQAM attempts the remaining steps and eventually attempts to start the application. If the BOOTP and/or configuration file TFTP steps are aborted due to errors, the GoQAM may not communicate with the DNCS.
- **2 - Bootp Until Successful** (Boot Until Successful mode) – This is the default mode. This mode continues to boot until the GoQAM receives an IP address and all download images. This setting is useful when upgrading the software. Booting until successful ensures that the GoQAM completes all startup procedures successfully. Use the standard mode (boot forever until successful) when a network controller such as the DNCS monitors and provisions the GoQAM through the Ethernet port. This mode attempts to boot and to TFTP the configuration file and any requested boot and/or application code files until the entire process is successful. If an error occurs at any step, the GoQAM restarts until a successful boot occurs.

  Important! Do not select this setting when operating the GoQAM outside a DNCS environment.

Changing the Boot Mode

1. Connect a diagnostic PC to the **CRAFT PORT** on the back panel of the GoQAM.
2. Power on the diagnostic PC and activate a Procomm or Hyperterminal window using the following modem connection settings:
   - 9600 baud
   - 1 stop bit
   - No parity
   - 8 data bits
   - No flow control
3. Power on the GoQAM; then, during the boot sequence, watch for the following message on the PC monitor screen:
   Type any key within 2 seconds to get shell prompt

   Note: See the ***Connect Power Sources*** (on page 27) section for more details about powering on the GoQAM.
4. Press any key on the PC to display the boot prompt. The following boot prompt appears: **boot>**

   Note: If you do not press a key in time to get the boot prompt, do one of the following:
   - Cycle power to the GoQAM, and repeat this step. See Resetting the Modulator for more details.
   - At the **GoQAM>** prompt, type **boot**; then, after the **Type any key** message appears, press any key to display the boot prompt.
5. At the boot prompt, type **setbootmode** and press **Enter**. The current boot mode setting appears.
6. Type one of the following numbers to select the boot mode:
   - **0** - Skip BootP
   - **1** - Attempt BootP One Time
   - **2** - Bootp Until Successful

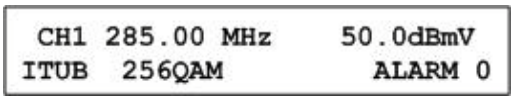
   Result: The system saves the new boot mode to nonvolatile memory (NVRAM) with the new setting.
7. Type **exit** and press **Enter**. The GoQAM reboots using the new boot mode.
8. Disconnect the diagnostic PC.

Read the Default Status Screen

The Default Status screen provides status information such as the channel frequency setting, RF level settings, modulation type, and the number of active alarms. The default status screen displays after one of the following occurs:

- The reset process is complete.
- You press **ENTER** to complete a command.

The following is an example of the Default Status screen.



Reading the Default Status Screen

The following table describes the information displayed on the default status screen.

Display	Function
CH1	Current RF Channel output selected. The CH number corresponds to the channel number **Note:** The GoQAM uses only CH1 and CH2.
285.00 MHz	Established RF frequency setting for the selected RF modulator (91 MHz to 869 MHz)
50.0 dBmV	Configured RF level setting (42 dBmV to 56 dBmV)
ITUB 64QAM	Selected modulation type. Values are: ■ ITUB 64 QAM ■ ITUB 256 QAM ■ DAVIC 256 QAM ■ DAVIC 16 QAM ■ DAVIC 64 QAM
Alarm 0	Current number of active alarms

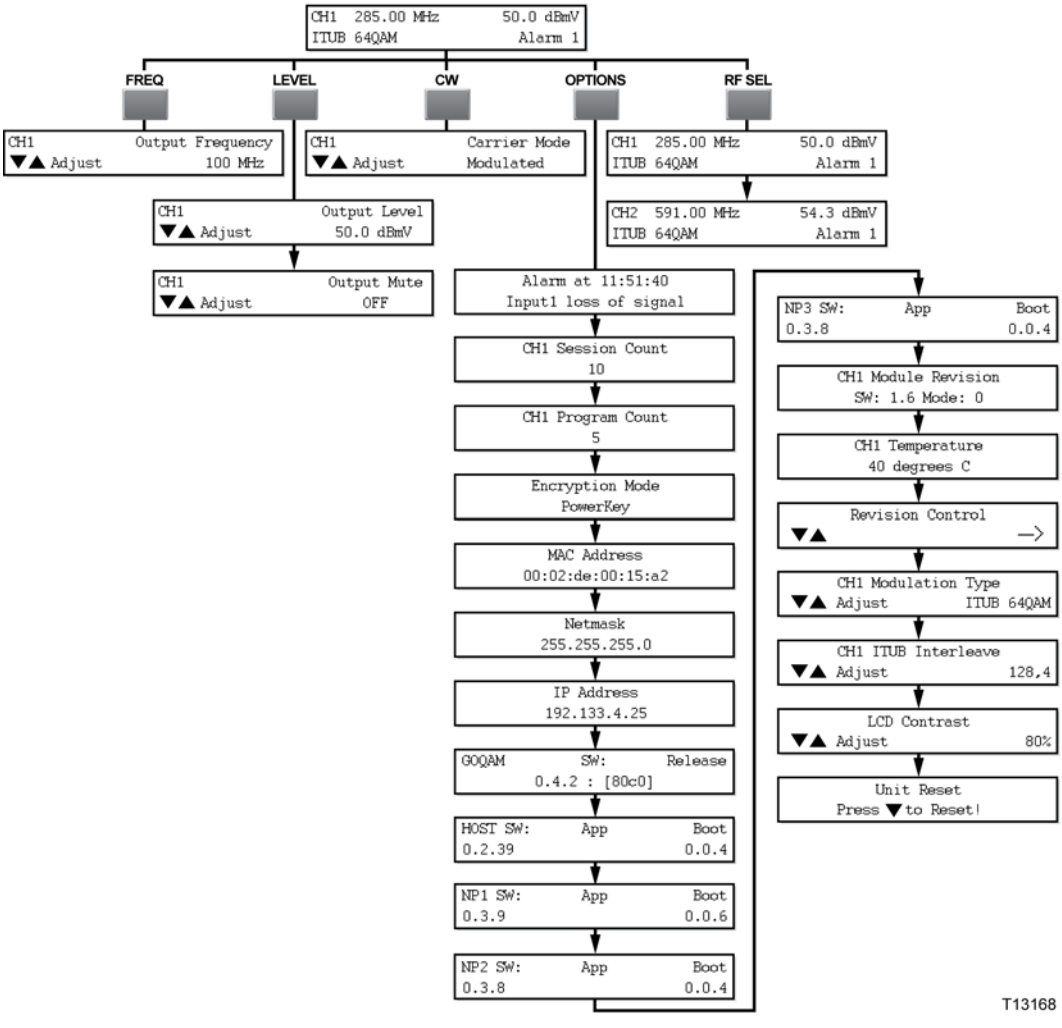
Use the Front Panel Keys to Change Configuration Settings

The front panel of the GoQAM contains an alphanumeric LCD screen and three alarm indicators. There are also several keys on the front panel to allow you to change parameters. See the ***Front Panel Overview*** (on page 10) section for more information on the front panel components.

Diagram of RF GoQAM Menu Structure

The following diagram illustrates the RF GoQAM menu structure in sequential order.

Note: The settings on this menu are examples, not recommended settings.



Accessing the GoQAM Menus

You can access GoQAM menus and screens by pressing the FREQ, LEVEL, CW, and OPTIONS keys on the front panel.

Pressing the LEVEL, OPTIONS, and RF SEL keys repeatedly scrolls through their respective sequential menus.

The following sections in this chapter describe the functions associated with each key:

- FREQ - **Adjust the Frequencies of a Selected Carrier**
- LEVEL
  - **Adjust the RF Output Level of a Selected Carrier**
  - **Mute the RF Output of a Selected Carrier**
- CW - **Change the Carrier Mode of a Selected Carrier**
- OPTIONS - **Monitor GoQAM Setup Options**
- RF SEL **– Change an RF Carrier Frequency**

Note: See ***Front Panel Overview*** (on page 10) for detailed descriptions of these keys.

Navigating Within a Menu or Changing a Screen Value

The Up and Down arrow keys are used in conjunction with the other front panel keys to increment or decrement the values of a selected parameter within a screen or to scroll up and down through a set of selections.

Saving Changes to Configuration Settings

Pressing the **Enter** key saves changes to the configuration settings. You must also press the **Enter** key to return to the default status screen. Changes to any settings are saved into NVRAM. This memory is located on the digital board and is used to restore settings in the event of a power reset of the device.

Adjust the Frequencies of a Selected Carrier

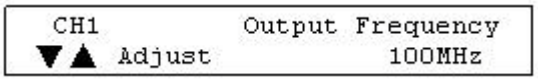
Pressing the FREQ key allows you to access the output frequency screen, from which you can select an RF output group and adjust the individual carrier (CH) output frequency.

Important! Frequencies set from the front panel of the GoQAM are not recorded by the DNCS. At the next GoQAM restart, the frequencies are reset to the values stored in the DNCS.

Adjusting the Output Frequency

Follow these steps to adjust the output frequency.

1. Press **FREQ** on the front panel of the GoQAM. An output frequency setting (CH1 or CH2) appears with the frequency setting blinking.

   Note: Each frequency setting (CH1 or CH2) reflects the channel number.

2. Press **RF SEL** to select a channel frequency setting.

   Note: Press the **RF SEL** key repeatedly to view the RF output frequencies (CH1 or CH2).

3. Press the Up or Down Arrow keys to increase or decrease the output frequency value of a selected RF module.

   Note: The output frequency can be changed in 0.25 MHz increments from 91 MHz to 869 MHz. To increment or decrement the frequency value in 6 MHz steps, press and hold the Up or Down Arrow keys for about 2 seconds.

4. Press **ENTER**. The system saves the output frequency changes to NVRAM and the default screen appears.

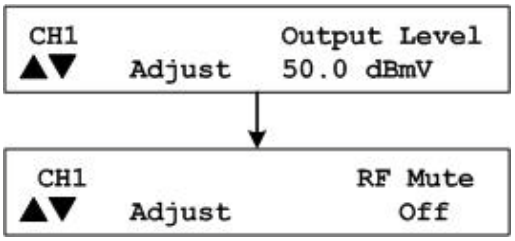
Adjust the RF Output Level of a Selected Carrier

Pressing the **LEVEL** key displays screens that allow you to perform the following functions:

- Set the RF output level of a selected RF carrier (channel)
- Enable or disable a muting option for the selected RF carrier (channel)

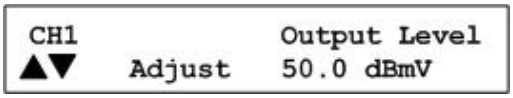
LEVEL Button Menu Flow

The following diagram shows the sequence of screens that appear when the LEVEL button is repeatedly pressed.



Adjusting the RF Output Level

1. Press **LEVEL**. The RF Output Level screen appears.



2. Press **RF SEL** to choose a channel.
3. Press and hold the Up or Down Arrow keys to increase or decrease the output level.

   Notes:

   - The level changes in 0.1 dB increments from 42 dBmV to 56 dBmV. The output level is valid in the range between 44 dBmV and 54 dBmV. The range on the front panel extends 2 dB above and below this range to compensate for variations between the displayed level and the actual level due to temperature fluctuations and the tuning range.
   - The system automatically saves the output level changes to NVRAM.
4. Press **OPTIONS** to return to the default screen.

Mute the RF Output of a Selected Carrier

This section contains instructions for enabling the RF mute option. During installation, for example, use this procedure to mute the RF output before you connect the RF OUT ports to the distribution plant.

Enabling or Disabling a Muting Option

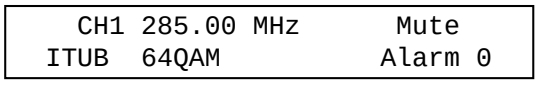
Follow these steps to enable or disable a muting option for a selected RF output.

Important: The RF output state established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the RF output state reverts to the value stored in the DNCS.

1. On a GoQAM that has power connected and has finished booting, press the **LEVEL** key twice. The Output Mute screen appears.

2. Press **RF SEL** to choose a channel (CH1 or CH2).
3. Press the Up and Down Arrow keys to toggle the selected RF Mute between **Off** and **Mute**.

   Note: When the selected output is set to **Mute**, the GoQAM displays **Mute** on the default screen.
4. Press **ENTER**. The system saves the output muting changes to NVRAM and the default screen appears.



   Note: Mute appears on the default status screen for the selected channel.

Change the Carrier Mode of a Selected Carrier

This function allows you to toggle RF output to either a modulated (normal) carrier mode or a continuous wave (CW) carrier mode.

Important! The carrier mode established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the carrier mode for the GoQAM reverts to the value stored in the DNCS.

Selecting Modulated or Continuous Wave Carrier Mode

Follow these steps to change the carrier mode for an RF module.

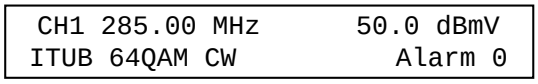
1 Press **CW**. The Carrier Mode screen appears.

2 Press **RF SEL** to choose a channel (CH1 or CH2).

3 Press the Up and Down Arrow keys to toggle the carrier mode between Modulated (normal) and CW (not modulated or continuous wave).

Note: The factory default for the carrier mode setting is Modulated.

4 Press **ENTER**. The system saves the carrier mode setting changes to NVRAM and the default screen appears.



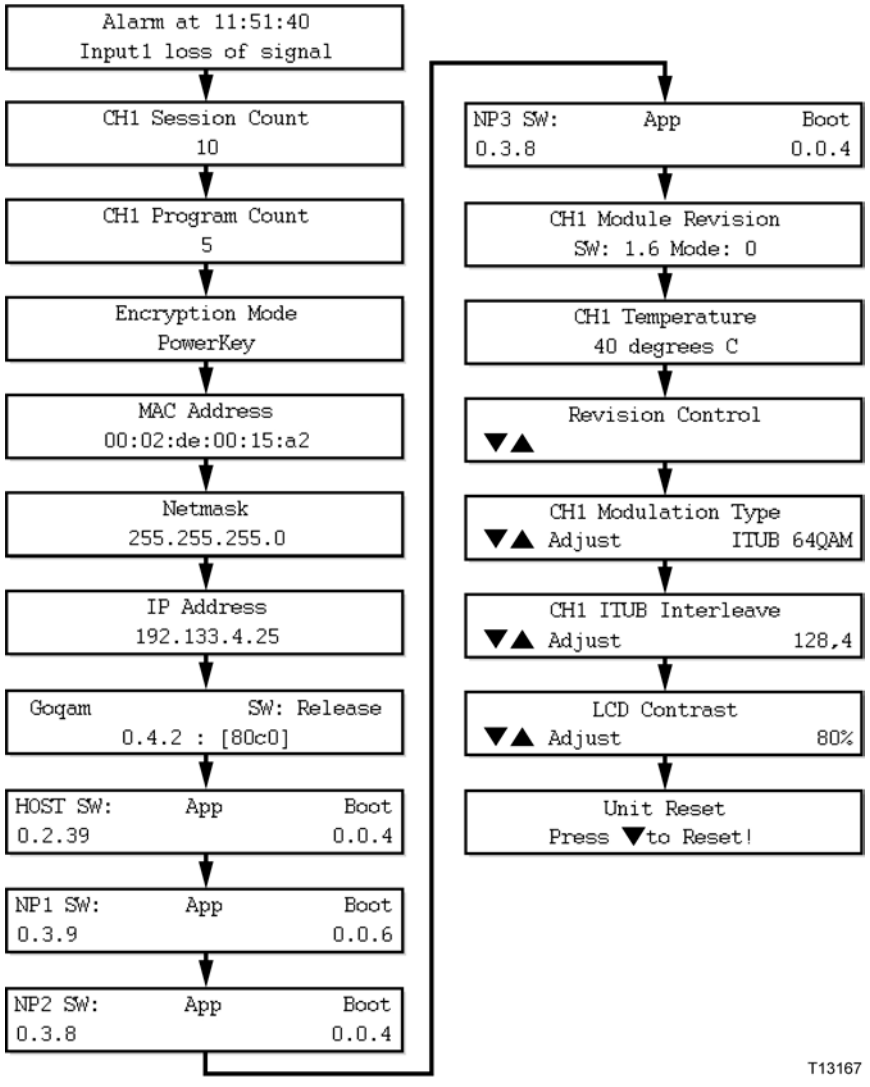
Note: When choosing CW mode, the CW LED on the front panel of the GoQAM lights and CW appears on the default screen.

Monitor Setup Options

OPTIONS Menu

The following RF GoQAM setup screens appear, in sequential order, when you press the OPTIONS key repeatedly. These screens allow you to monitor alarms, the number of sessions, and the program count for the GoQAM. This section provides instructions for viewing the RF GoQAM settings on each screen and explanations of screen information

Important! The screens in the following diagram are examples, not recommended settings.



Displaying Alarm Status

Follow these steps to display the list of active alarms.

1 Press **OPTIONS**. The Alarm Status screen appears.

```
Alarm at 11:51:03
Input1 loss of signal
```

Notes:

- Each alarm description appears for approximately 1 second before displaying the next alarm. If no alarms are active, a **No Active Alarms** message appears.
- See **Troubleshooting Alarm Messages** for detailed descriptions of alarms.

2 Press **ENTER**. The default screen appears.

Viewing the Session Count

The Session Count screen displays the count of all active sessions for the selected RF output. Follow these steps to view the total number of active sessions.

1 Press **OPTIONS** twice. The Session Count screen appears.

```
CH1 Session Count
10
```

Note: The session count for the GoQAM will differ from the session count on the DNCS if the GoQAM does not find needed MPEG programs within MPEG Program Specific Information (PSI). By design, the GoQAM responds positively to a session setup request even if the requested MPEG program is not present on the input transport stream.

2 Press **RF SEL** to view the session count for each channel (CH1 or CH2).

3 Press **ENTER** to return to the default screen.

Viewing the Program Count

The Program Count screen displays the encrypted programs currently running on the selected RF output. Follow these steps to view the program count for an RF module.

1 Press **OPTIONS** three times. The Program Count screen appears.

```
CH1 Program Count
5
```

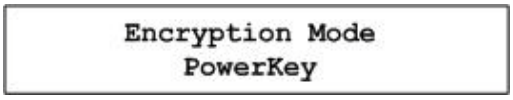
2 Press **RF SEL** to view the program count for each channel (CH1 or CH2).

3 Press **ENTER** to return to the default screen.

Viewing the Encryption Mode

The Encryption Mode screen displays the current encryption mode setting. The mode is saved in the NVRAM and is selected during the boot process. To display the current encryption mode, complete the following steps.

1 Press **OPTIONS** until the Encryption Mode screen appears.

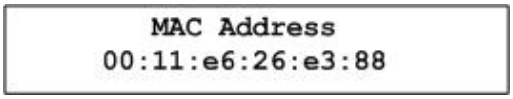


2 Press **ENTER** to return to the default screen.

Viewing the MAC Address

To view the MAC address used for GoQAM Ethernet communication, complete the following steps.

1 Press **OPTIONS** until the MAC Address screen appears.

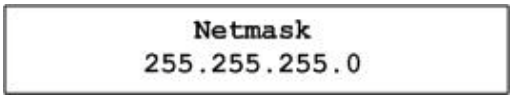


2 Press **ENTER** to return to the default screen.

Viewing the Netmask Screen

To display the currently assigned Netmask for all Ethernet communications, complete the following steps.

1 Press **OPTIONS** until the Netmask screen appears.

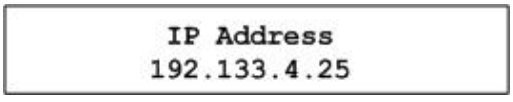


2 Press **ENTER** to return to the default screen.

Viewing the IP Address

To display the currently assigned IP address for all Ethernet communications, complete the following steps.

1 Press **OPTIONS** until the IP Address screen appears.



2 Press **ENTER** to return to the default screen.

Viewing the Software Package Release Version

The Software Package Release version screen displays the top-level software release version for the GoQAM. To display the Software Package Release version screen, follow these steps.

1 Press **OPTIONS** until the Software Package Release version screen appears.

```
GOQAM    SW:      Release
 1.0.0           :[2922]
```

Notes:

- In the above example, **1.0.0** is the software package release version.
- In the above example, **[2922]** is the overall checksum calculated from individual checksums.

2 Press **Enter** to return to the default screen.

Viewing the Host Software Revision Level

The Host Software Revision screen displays the revision level for the host processor in the GoQAM. To display the Host Software Revision screen, complete the following steps.

1 Press **OPTIONS** until the Host Software Revision screen appears.

```
HOST SW:      App Boot
4.0.5            4.0.5
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (4.0.5) and the boot code (4.0.5), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the NP1 Software Revision Level

The NP1 software revision screen displays the revision level for the Input processor in the GoQAM. To display the NP1 software revision screen, follow these steps.

1 Press **OPTIONS** until the NP1 Software Revision screen appears.

```
NP1 SW:     App          Boot
1.0.0                   1.0.0
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (1.0.0) and the boot code (1.0.0), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the NP2 Software Revision Level

The NP2 software revision screen displays the revision level for Output 1 processor in the GoQAM. To display the NP2 software revision screen, follow these steps.

1 Press **OPTIONS** until the NP2 Software Revision screen appears.

```
NP2 SW:     App          Boot
1.0.0                   1.0.0
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (1.0.0) and the boot code (1.0.0), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the NP3 Software Revision Level

The NP3 software revision screen displays the revision level for Output 2 processor in the GoQAM. To display the NP3 software revision screen, follow these steps.

1 Press **OPTIONS** until the NP3 Software Revision screen appears.

```
NP3 SW:    App          Boot
1.0.0                   1.0.0
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (1.0.0) and the boot code (1.0.0), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the Module Revision Numbers

The Module Revision screen displays the revision numbers for the hardware and software of the selected RF channel. To display the Module Revision screen, complete the following steps.

1 Press **OPTIONS** until the Module Revision screen appears.

```
CH2 Module Revision
  SW: 2.5 Mode: 1
```

Notes:

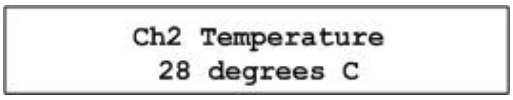
- SW shows the RF board microprocessor firmware revision displayed as major release and minor release.
- If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.
- Mode is the PWB assembly of configuration. The 0 indicates a Standard/Domestic Mode (Baseband to RF Output) PWB assembly.

2 Press **RF SEL** to display Module Revision information for each channel.

3 Press **ENTER** to return to the default screen.

Checking the Temperature of an RF Module

1 Press **OPTIONS** until the Temperature screen appears.



2 Press **RF SEL** to display information for each RF channel.

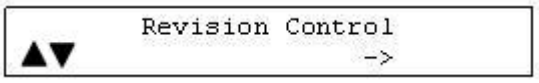
Note: Each channel displays the temperature of its RF output group.

3 Press **ENTER** to return to the default screen.

Viewing the HW Rev String GoQAM

The Revision Control screen displays the hardware revision string of the GoQAM. This string is 31 bytes long and is stored in non-volatile memory. Only eight characters of the string can be viewed at a time.

1 Press **OPTIONS** until the Revision Control screen appears.



2 Press the Up or Down Arrow keys to display the next or previous eight characters of the hardware revision string.

Note: The " ->" indicates that more characters are available.

3 Press **ENTER** to return to the default screen.

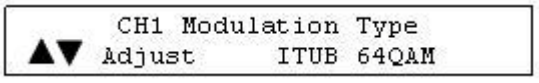
Setting the Modulation Type RF GoQAM

The Modulation Type screen allows you to set the modulation type for each of the RF channels.

Important! The modulation type established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the modulation type for the GoQAM reverts to the value stored in the DNCS.

To set the modulation type, follow these steps.

1 Press **OPTIONS** until the Modulation Type screen appears.



2 Press the **RF SEL** key to display information for each channel (CH1 or CH2).

3 Press the Up or Down Arrow keys to scroll through the following available modulation types:

- DAVIC 16QAM
- DAVIC 64QAM
- DAVIC 256QAM
- ITUB 64QAM
- ITUB 256QAM

4 Press **ENTER**. The system saves the selected modulation type in NVRAM memory and the default screen appears.

ITUB Interleave Screen

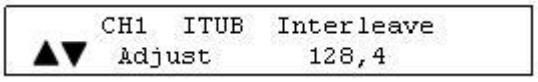
The ITUB Interleave screen displays the interleave depth factor for all ITU-B modulation settings. The interleave depth factor specifies the spacing for the forward error correction (FEC) code within the MPEG transport data. Interleaving evenly disperses the data to transport it reliably over the cable channel.

Important: The recommended setting for this screen is 128,4. Only Cisco service representatives should modify this setting.

Viewing the Interleave Values

To display the ITUB Interleave screen, follow these steps.

1 Press **OPTIONS** until the ITUB Interleave screen appears.



2 Press **RF SEL** to choose a Channel.

Important! You can edit this value from the front panel, but this value will be overwritten by the value stored on the DNCS.

3 Press **ENTER** to return to the default screen.

Adjusting the LCD Contrast

1 Press **OPTIONS** until the LCD Contrast screen appears.

2 Press the Up or Down Arrow keys to decrease or increase the contrast from 0% to 100% in 5% increments.

Note: The default contrast setting is 80%.

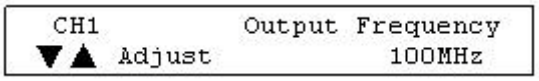
3 Press **ENTER** to save the changes to NVRAM and return to the default screen.

Change an RF Carrier Frequency

RF Module Example

The FREQ key allows you to view the frequency setting for each individual carrier channel in the RF output modules. The RF SEL key allows you to select additional carrier channels.

A frequency setting of **100.00 MHz** for CH1 in the following illustration means that carrier channel 1 (CH1) has a frequency of 100.00 MHz. Each frequency setting also applies to the corresponding carrier channel.



Important! Frequencies set from the front panel of the GoQAM are not recorded by the DNCS. At the next GoQAM restart, the frequencies are reset to the values stored in the DNCS.

Changing an RF Carrier Frequency

Follow these steps to change an RF carrier frequency.

1. Press the **FREQ** key on the front panel of the GoQAM. The current carrier frequency for CH1 appears in the front panel LCD screen.
2. Press the Up or Down Arrow keys to scroll through the carrier frequency settings until you select the desired carrier frequency.
3. Press the **ENTER** key to store the new frequency.
4. Press the **RF SEL** key to select another carrier.
5. Repeat steps 1 through 3 to select and store a carrier frequency for any additional carriers.

Important: Frequencies set from the front panel of the GoQAM are not recorded by the DNCS. At the next GoQAM restart, the frequencies are reset to the values stored in the DNCS.

Resetting the GoQAM

Follow these steps to reboot the GoQAM from the front panel.

1 Press **OPTIONS** until the Unit Reset screen appears.

2 Press the **Down Arrow** key. The GoQAM reboots.

6

Operating the IF GoQAM

Introduction

This chapter contains procedures for viewing and changing IF GoQAM settings, descriptions of screens and messages, and instructions for performing routine maintenance.

Note: Actual screen settings may differ slightly from the examples presented in this guide.

In This Chapter

Understand the Boot Process

This section describes the boot process and lists examples of the screens that appear during a normal GoQAM boot process.

The GoQAM uses Bootstrap (BOOTP) protocol to initialize and to acquire the following configuration information:

- IP address
- Address mask
- Location of default gateway
- Addresses of important servers
- Name and location of software download file(s) from the network BOOTP server

Note: The GoQAM downloads software using Trivial File Transfer Protocol (TFTP), which is a simplified version of FTP.

See ***Change the Boot Mode*** (on page 105) for a description of the boot modes available on the GoQAM and instructions for changing the boot mode.

See ***Troubleshooting Boot Screen Error Messages*** (on page 143) for troubleshooting booting conditions.

1. The GoQAM sends a BOOTP request to the DNCS.
2. The DNCS responds to the BOOTP request, sending the IP address for the GoQAM.
3. The GoQAM sends a TFTP request for the configuration file.

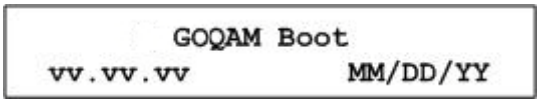
   Note: The configuration file (goqam.config) contains environment variables, download files, and server addresses.
4. The DNCS sends the TFTP goqam.config file.
5. If the files in the goqam.config file are different from those stored in the GoQAM, then the GoQAM requests the download files, which consist of the following:
   - Boot code for Host, NP1, NP2, and NP3
   - Application code for Host, NP1, NP2, and NP3
   - RF module code for RF Modules 1, 2, 3, and 4

   Note: The messages that appear on the front panel of the GoQAM during the boot process are described in Initial Boot Screens and Code Download Screens.

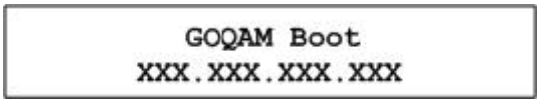
The following illustrations show examples of the initial boot screens.

Note: Actual screen settings may differ from the examples presented in this guide.

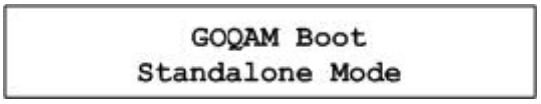
When the GoQAM boots, the boot code version and release date appear.



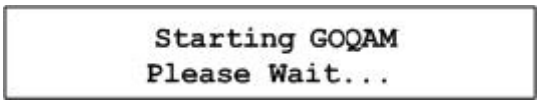
If BOOTP completes successfully, the IP address boot screen appears.



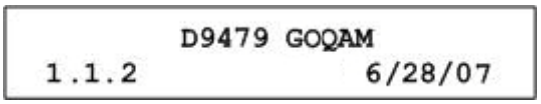
Note: Although it is not a typical setting, if the GoQAM is set to run in a Standalone mode (boot mode 0), the following Standalone mode boot screen appears instead of the "Starting GoQAM" boot screen.



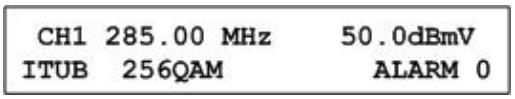
The IP address boot screen remains visible for approximately 2 seconds. If no errors occur and no downloads are attempted, the boot code starts the application code and the following screen appears.



Next, a screen similar to the following appears.



Then, the default status screen appears.



Code Download Screens

The boot code, application code, and RF module code messages appear on the front panel LCD screen during code download or during a download attempt. The following table represents the sequence of events that occur during a complete boot code, application code, and RF module code upgrade.

Code Type	Front Panel Screen Message
Initial Boot	GOQAM Boot vv.vv.vv MM/DD/YY
	GOQAM Boot xxx.xxx.xxx.xxx
Host Processor Boot Code	Downloading Host Code !!! Do Not Power Off !!!
	GOQAM Boot vv.vv.vv MM/DD/YY
	GOQAM Boot xxx.xxx.xxx.xxx
Host Processor Application Code	Downloading Host Code Please Wait ….
	Writing App Code Flash Please Wait ….
Input Processor Boot Code	Downloading NP1 Code Please Wait ….
Output Processor 1 & 2 Boot Code	Downloading NP2&3 Code Please Wait ….
	GOQAM Boot vv.vv.vv MM/DD/YY
	GOQAM Boot xxx.xxx.xxx.xxx
Input Processor Application Code	Downloading NP1 Code Please Wait ….
Output Processor 1 & 2 Application Code	Downloading NP2&3 Code Please Wait ….
	Starting GOQAM Please Wait….
	(a blank screen appears momentarily)
	D9479 GOQAM vv.vv.vv MM/DD/YY
When the code download is complete, the default status screen appears.	IF 1 300.00 MHz 50.0 dBmV ITUB 256QAM Alarm 0

Change the Boot Mode

This section describes the available boot modes available and contains instructions for changing the boot mode from the craft port using a diagnostic PC.

Boot Modes

Three boot modes (0 through 2) exist and are described in the following list:

- **0 - Skip BootP** (Standalone mode) – This mode bypasses the boot mode when you power on the GoQAM. Use the Skip BootP mode when operating in Standalone mode, when provisioning and monitoring the GoQAM from the front panel or the craft port, or when operating without the control of the DNCS. This mode skips the BOOTP and TFTP processes and jumps directly to the application code.
- **1 - Attempt BootP One Time** (Attempt Bootp Once mode) – This mode is not normally used in network operation. If used when the GoQAM is connected to the network and the network connection is lost or reset, the GoQAM must be rebooted. This mode attempts each BOOTP and TFTP step only once. If a failure occurs during any step, the step is skipped; the GoQAM attempts the remaining steps and eventually attempts to start the application. If the BOOTP and/or configuration file TFTP steps are aborted due to errors, the GoQAM may not communicate with the DNCS.
- **2 - Bootp Until Successful** (Boot Until Successful mode) – This is the default mode. This mode continues to boot until the GoQAM receives an IP address and all download images. This setting is useful when upgrading the software. Booting until successful ensures that the GoQAM completes all startup procedures successfully. Use the standard mode (boot forever until successful) when a network controller such as the DNCS monitors and provisions the GoQAM through the Ethernet port. This mode attempts to boot and to TFTP the configuration file and any requested boot and/or application code files until the entire process is successful. If an error occurs at any step, the GoQAM restarts until a successful boot occurs.

  Important! Do not select this setting when operating the GoQAM outside a DNCS environment.

Changing the Boot Mode

1. Connect a diagnostic PC to the **CRAFT PORT** on the back panel of the GoQAM.
2. Power on the diagnostic PC and activate a Procomm or Hyperterminal window using the following modem connection settings:
   - 9600 baud
   - 1 stop bit
   - No parity
   - 8 data bits
   - No flow control
3. Power on the GoQAM; then, during the boot sequence, watch for the following message on the PC monitor screen:
   Type any key within 2 seconds to get shell prompt

   Note: See the ***Connect Power Sources*** (on page 27) section for more details about powering on the GoQAM.
4. Press any key on the PC to display the boot prompt. The following boot prompt appears: **boot>**

   Note: If you do not press a key in time to get the boot prompt, do one of the following:
   - Cycle power to the GoQAM, and repeat this step. See Resetting the Modulator for more details.
   - At the **GoQAM>** prompt, type **boot**; then, after the **Type any key** message appears, press any key to display the boot prompt.
5. At the boot prompt, type **setbootmode** and press **Enter**. The current boot mode setting appears.
6. Type one of the following numbers to select the boot mode:
   - **0** - Skip BootP
   - **1** - Attempt BootP One Time
   - **2** - Bootp Until Successful

   Result: The system saves the new boot mode to nonvolatile memory (NVRAM) with the new setting.
7. Type **exit** and press **Enter**. The GoQAM reboots using the new boot mode.
8. Disconnect the diagnostic PC.

Read the Default Status Screen

The Default Status screen provides status information such as the channel frequency setting, IF level settings, modulation type, and the number of active alarms for the GoQAM unit. The IF GoQAM displays the default status screen after one of the following occurs:

- The reset process is complete.
- You press **ENTER** to complete a command.

The following is an example of the Default Status screen.

```
IF1 44.00 MHz      30.0 dBmV
ITUB  64QAM          Alarm 0
```

Reading the Default Status Screen

The following table describes the information displayed on the Default Status screen.

Display	Function
IF1	Current IF Channel output selected. The IF number corresponds to the channel number **Note:** The GoQAM uses only IF1 and IF2.
44.00 MHz	Established IF frequency setting for the selected IF modulator
30.00 dBmV	Configured IF power level setting **Note:** The range for IF power level is 27.00 dBmV to 37.00 dBmV.
ITUB 64QAM	Selected modulation type. Values are: ■ ITUB 64 QAM ■ ITUB 256 QAM ■ DAVIC 256 QAM ■ DAVIC 16 QAM ■ DAVIC 64 QAM
Alarm 0	Current number of active alarms

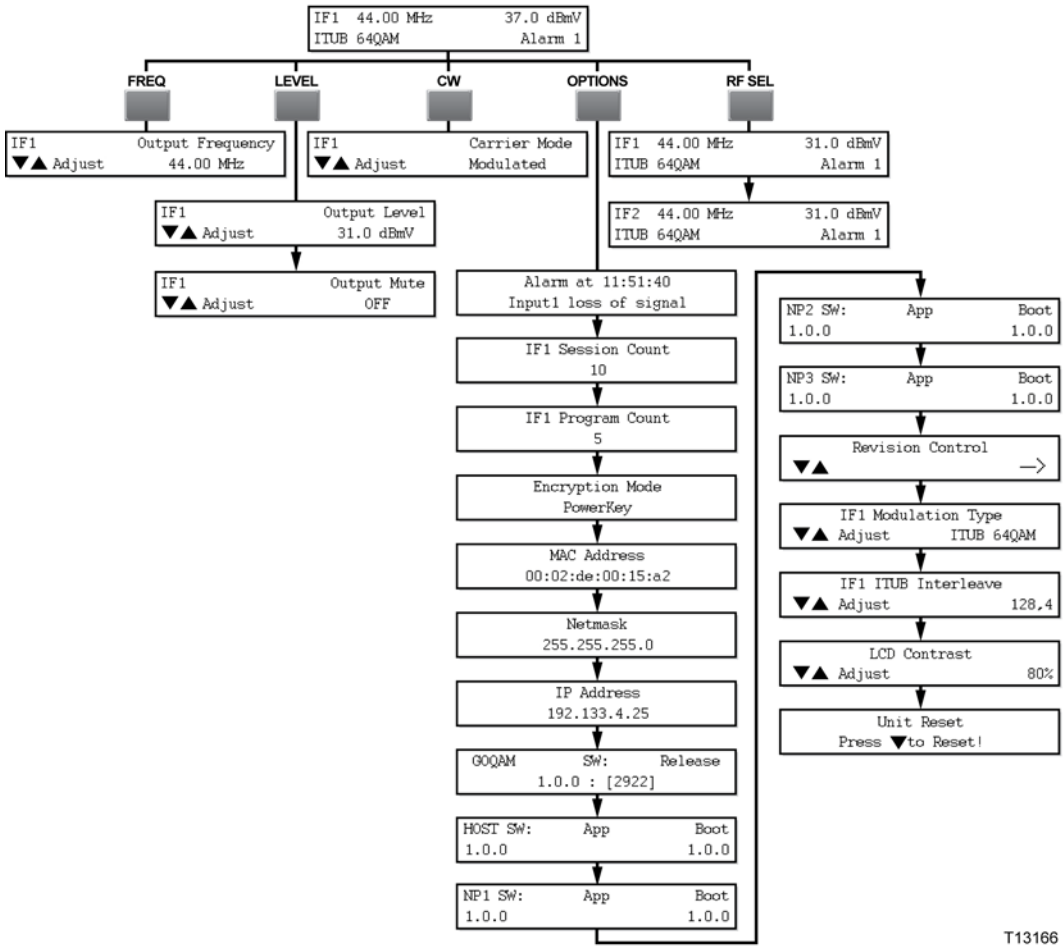
Use the Front Panel Keys to Change Configuration Settings

The front panel of the GoQAM contains an alphanumeric LCD screen and three alarm indicators. There are also several keys on the front panel to allow you to change parameters. See the ***Front Panel Overview*** (on page 10) section for more information on the front panel components.

Diagram of IF GoQAM Menu Structure

The following diagram illustrates the IF GoQAM menu structure in sequential order.

Note: The settings on this menu are examples, not recommended settings.



Accessing the GoQAM Menus

You can access GoQAM menus and screens by pressing the FREQ, LEVEL, CW, and OPTIONS keys on the front panel.

Pressing the LEVEL, OPTIONS, and RF SEL keys repeatedly scrolls through their respective sequential menus.

The following sections in this chapter describe the functions associated with each key:

- FREQ - **Adjust the Frequencies of a Selected Carrier**
- LEVEL
  - **Adjust the RF Output Level of a Selected Carrier**
  - **Mute the RF Output of a Selected Carrier**
- CW - **Change the Carrier Mode of a Selected Carrier**
- OPTIONS - **Monitor GoQAM Setup Options**
- RF SEL **– Change an RF Carrier Frequency**

Note: See ***Front Panel Overview*** (on page 10) for detailed descriptions of these keys.

Navigating Within a Menu or Changing a Screen Value

The Up and Down arrow keys are used in conjunction with the other front panel keys to increment or decrement the values of a selected parameter within a screen or to scroll up and down through a set of selections.

Saving Changes to Configuration Settings

Pressing the **Enter** key saves changes to the configuration settings. You must also press the **Enter** key to return to the default status screen. Changes to any settings are saved into NVRAM. This memory is located on the digital board and is used to restore settings in the event of a power reset of the device.

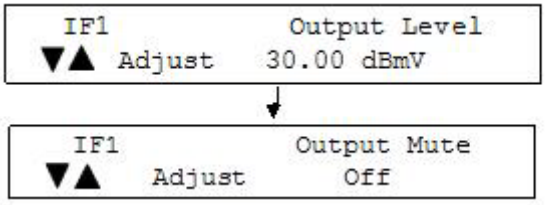
Adjust the IF Output Level of a Selected Carrier

Pressing the LEVEL key displays screens that do the following:

- Set the IF output level of a selected IF carrier (channel)
- Enable or disable a muting option for the selected IF carrier (channel)

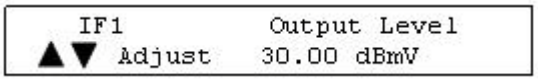
LEVEL Button Menu Flow

The following diagram shows the sequence of screens that appear when the LEVEL button is repeatedly pressed.



Adjusting the IF Output Level

1 Press **LEVEL**. The IF Output Level screen appears.



2 Press **RF SEL** to choose a channel (IF1 or IF2).

3 Press and hold the Up or Down Arrow keys to increase or decrease the output level.

Note: The level changes in 0.1 dB increments from 27 dBmV to 37 dBmV. The output level is valid in the range between 29 dBmV and 35 dBmV. The range on the front panel extends 2 dB above and below this range to compensate for variations between the displayed level and the actual level due to temperature fluctuations and the tuning range.

Result: The system automatically saves the output level changes to NVRAM and the default screen appears.

Mute the IF Output of a Selected Carrier

This section contains instructions for enabling the IF mute option from the front panel of the GoQAM. During installation, for example, use this procedure to mute the IF output before you connect the RF OUT ports to the distribution plant.

Enabling or Disabling a Muting Option

Follow these steps to enable or disable a muting option for a selected IF output.

Important: The IF output state established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the IF output state reverts to the value stored in the DNCS.

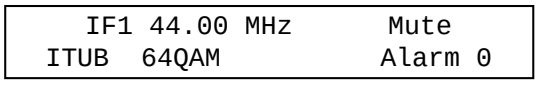
1 On a GoQAM that has power connected and has finished booting, press the **LEVEL** key twice. The Output Mute screen appears.

2 Press **RF SEL** to choose a channel (IF1 or IF2).

3 Press the Up and Down Arrow keys to toggle the selected IF Mute between **Off** and **Mute**.

Note: When the selected output is set to **Mute**, the GoQAM displays **Mute** on the default screen.

4 Press **ENTER**. The system saves the output muting changes to NVRAM and the default screen appears.



Note: Mute appears on the default status screen for the selected channel.

Change the Carrier Mode of a Selected Carrier

This function allows you to toggle IF output to either a modulated (normal) carrier mode or a continuous wave (CW) carrier mode.

Important! The carrier mode established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the carrier mode for the GoQAM reverts to the value stored in the DNCS.

Selecting Modulated or Continuous Wave Carrier Mode

Follow these steps to change the carrier mode for an IF module.

1 Press **CW**. The Carrier Mode screen appears.

2 Press **RF SEL** to choose a channel (IF1 or IF2).

3 Press the Up and Down Arrow keys to toggle the carrier mode between Modulated (normal) and CW (not modulated or continuous wave).

Note: The factory default for the carrier mode setting is Modulated.

4 Press **ENTER**. The system saves the carrier mode setting changes to NVRAM and the default screen appears.

Note: When choosing CW mode, the CW LED on the front panel of the GoQAM lights and CW appears on the default screen.

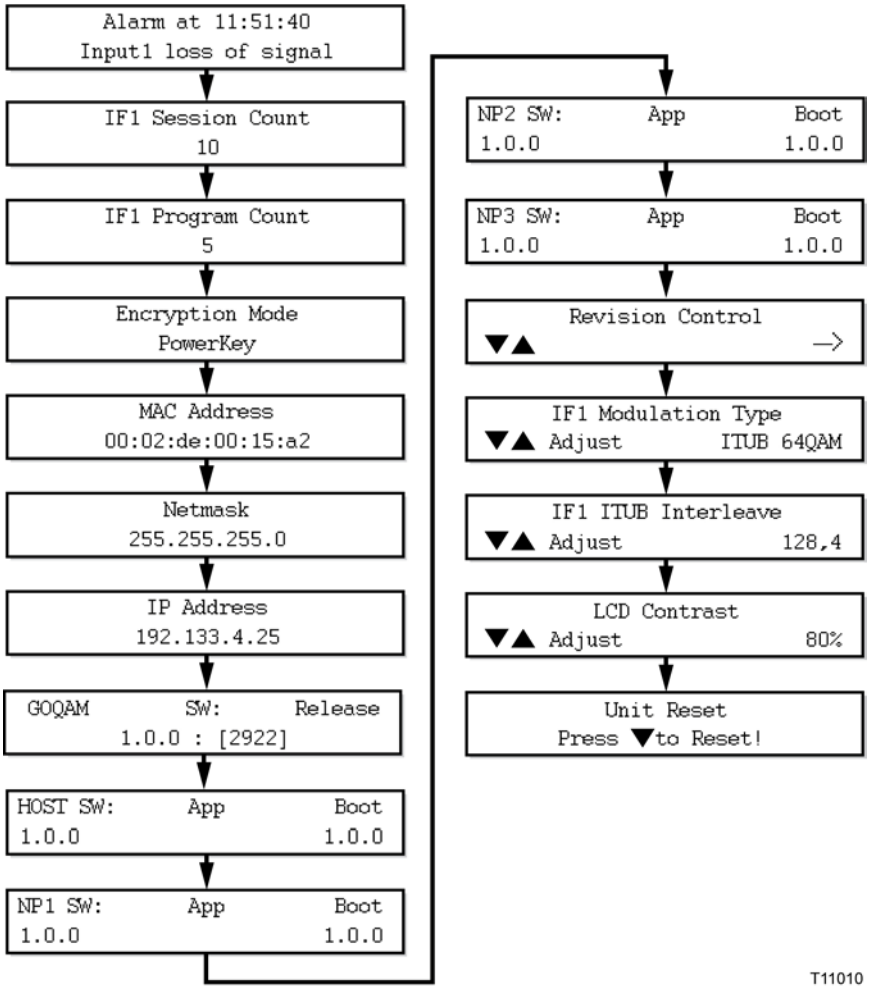
Important! The carrier mode established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the carrier mode for the GoQAM reverts to the value stored in the DNCS.

Monitor Setup Options

OPTIONS Menu

The following GoQAM setup screens appear, in sequential order, when you press the **OPTIONS** key repeatedly. These screens allow you to monitor alarms, the number of sessions, and the program count for the GoQAM. This section provides instructions for viewing the GoQAM settings on each screen and explanations of screen information

Important! The screens in the following diagram are examples, not recommended settings.



Displaying Alarm Status

Follow these steps to display the list of active alarms.

1 Press **OPTIONS**. The Alarm Status screen appears.

```
Alarm at 11:51:03
Input1 loss of signal
```

Notes:

- Each alarm description appears for approximately 1 second before displaying the next alarm. If no alarms are active, a **No Active Alarms** message appears.
- See **Troubleshooting Alarm Messages** for detailed descriptions of alarms.

2 Press **ENTER**. The default screen appears.

Viewing the Session Count

The Session Count screen displays the count of all active sessions for the selected IF output. Follow these steps to view the total number of active sessions.

1 Press **OPTIONS** until the Session Count screen appears.

```
IF1 Session Count
10
```

Note: The session count for the GoQAM will differ from the session count on the DNCS if the GoQAM does not find needed MPEG programs within MPEG Program Specific Information (PSI). By design, the GoQAM responds positively to a session setup request even if the requested MPEG program is not present on the input transport stream.

2 Press **RF SEL** to view the session count for each channel (IF1 or IF2).

3 Press **ENTER** to return to the default screen.

Viewing the Program Count

The Program Count screen displays the encrypted programs currently running on the selected IF output. Follow these steps to view the program count for an IF module.

1 Press **OPTIONS** until the Program Count screen appears.

```
IF1 Program Count
5
```

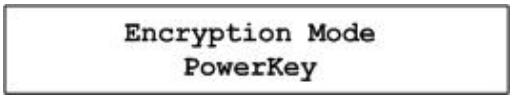
2 Press **RF SEL** to view the program count for each channel (IF1 or IF2).

3 Press **ENTER** to return to the default screen.

Viewing the Encryption Mode

The Encryption Mode screen displays the current encryption mode setting. The mode is saved in the NVRAM and is selected during the boot process. To display the current encryption mode, complete the following steps.

1 Press **OPTIONS** until the Encryption Mode screen appears.

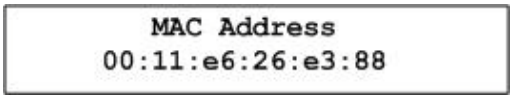


2 Press **ENTER** to return to the default screen.

Viewing the MAC Address

To view the MAC address used for GoQAM Ethernet communication, complete the following steps.

1 Press **OPTIONS** until the MAC Address screen appears.

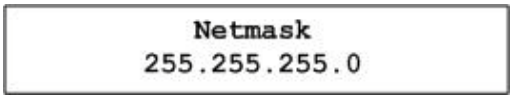


2 Press **ENTER** to return to the default screen.

Viewing the Netmask Screen

To display the currently assigned Netmask for all Ethernet communications, complete the following steps.

1 Press **OPTIONS** until the Netmask screen appears.

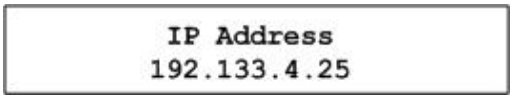


2 Press **ENTER** to return to the default screen.

Viewing the IP Address

To display the currently assigned IP address for all Ethernet communications, complete the following steps.

1 Press **OPTIONS** until the IP Address screen appears.



2 Press **ENTER** to return to the default screen.

Viewing the Software Package Release Version

The Software Package Release version screen displays the top-level software release version for the GoQAM. To display the Software Package Release version screen, follow these steps.

1 Press **OPTIONS** until the Software Package Release version screen appears.

```
GOQAM    SW:      Release
 1.0.0           :[2922]
```

Notes:

- In the above example, **1.0.0** is the software package release version.
- In the above example, **[2922]** is the overall checksum calculated from individual checksums.

2 Press **Enter** to return to the default screen.

Viewing the Host Software Revision Level

The Host Software Revision screen displays the revision level for the host processor in the GoQAM. To display the Host Software Revision screen, complete the following steps.

1 Press **OPTIONS** until the Host Software Revision screen appears.

```
HOST SW:      App Boot
4.0.5            4.0.5
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (4.0.5) and the boot code (4.0.5), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the NP1 Software Revision Level

The NP1 software revision screen displays the revision level for the Input processor in the GoQAM. To display the NP1 software revision screen, follow these steps.

1 Press **OPTIONS** until the NP1 Software Revision screen appears.

```
NP1 SW:     App          Boot
1.0.0                   1.0.0
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (1.0.0) and the boot code (1.0.0), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the NP2 Software Revision Level

The NP2 software revision screen displays the revision level for Output 1 processor in the GoQAM. To display the NP2 software revision screen, follow these steps.

1 Press **OPTIONS** until the NP2 Software Revision screen appears.

```
NP2 SW:     App          Boot
1.0.0                   1.0.0
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (1.0.0) and the boot code (1.0.0), represented in the above example, contains the major release number, minor release number, and the point release number.

Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the NP3 Software Revision Level

The NP3 software revision screen displays the revision level for Output 2 processor in the GoQAM. To display the NP3 software revision screen, follow these steps.

1 Press **OPTIONS** until the NP3 Software Revision screen appears.

```
NP3 SW:    App          Boot
1.0.0                   1.0.0
```

Notes:

- In the above example, **App** is the application code and **Boot** is the boot code.
- This revision number for the application code (1.0.0) and the boot code (1.0.0), represented in the above example, contains the major release number, minor release number, and the point release number.

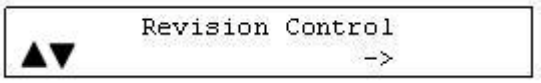
Important! If an asterisk (*) appears after one of the code version numbers, this indicates that the code version is a mismatch to the GoQAM software package version.

2 Press **ENTER** to return to the default screen.

Viewing the HW Rev String GoQAM

The Revision Control screen displays the hardware revision string of the GoQAM. This string is 31 bytes long and is stored in non-volatile memory. Only eight characters of the string can be viewed at a time.

1 Press **OPTIONS** until the Revision Control screen appears.



2 Press the Up or Down Arrow keys to display the next or previous eight characters of the hardware revision string.

Note: The " ->" indicates that more characters are available.

3 Press **ENTER** to return to the default screen.

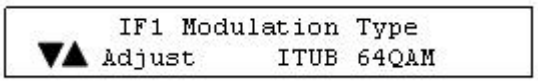
Setting the Modulation Type

The Modulation Type screen allows you to set the modulation type for each of the IF channels.

Important! The modulation type established from the front panel of the GoQAM is not recorded by the DNCS. At the next GoQAM restart, the modulation type for the GoQAM reverts to the value stored in the DNCS.

To set the modulation type, follow these steps.

1 Press **OPTIONS** fourteen times. The Modulation Type screen appears.



2 Press the **RF SEL** key to display information for each channel (IF1 or IF2).

3 Press the Up or Down Arrow keys to scroll through the following available modulation types:

- DAVIC 16QAM
- DAVIC 64QAM
- DAVIC 256QAM
- ITUB 64QAM
- ITUB 256QAM

4 Press **ENTER**. The system saves the selected modulation type in NVRAM memory and the default screen appears.

ITUB Interleave Screen

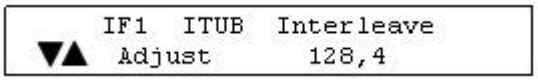
The ITUB Interleave screen displays the interleave depth factor for all ITU-B modulation settings. The interleave depth factor specifies the spacing for the forward error correction (FEC) code within the MPEG transport data. Interleaving evenly disperses the data to transport it reliably over the cable channel.

Important: The recommended setting for this screen is 128,4. Only Cisco service representatives should modify this setting.

Viewing the Interleave Values

To display the ITUB Interleave screen, follow these steps.

1 Press **OPTIONS** until the ITUB Interleave screen appears.



2 Press **RF SEL** to choose a Channel.

Important! You can edit this value from the front panel, but this value will be overwritten by the value stored on the DNCS.

3 Press **ENTER** to return to the default screen.

Adjusting the LCD Contrast

1 Press **OPTIONS** until the LCD Contrast screen appears.

2 Press the Up or Down Arrow keys to decrease or increase the contrast from 0% to 100% in 5% increments.

Note: The default contrast setting is 80%.

3 Press **ENTER** to save the changes to NVRAM and return to the default screen.

Resetting the GoQAM

Follow these steps to reboot the GoQAM from the front panel.

1 Press **OPTIONS** until the Unit Reset screen appears.

2 Press the **Down Arrow** key. The GoQAM reboots.

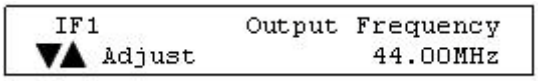
Select an IF Channel or Carrier

IF Module Example

The FREQ key allows you to view the frequency setting for each individual carrier channel in the IF output modules. The RF SEL key allows you to select another carrier channel.

Important! The IF output is fixed at 44.00 MHz on the IF GoQAM.

Example: A frequency setting of **44.00 MHz** for IF1 in the following illustration means that carrier channel 1 (IF1) has a frequency of 44.00 MHz. Each frequency setting also applies to the corresponding carrier channel.



Note: Press the **RF SEL** key to select and view the other IF carrier channel (IF2).

7

Inspect the Modulator

Introduction

Performing routine maintenance helps prevent the need for troubleshooting. See ***Troubleshooting the GoQAM*** (on page 131) for instructions to troubleshoot the GoQAM and to address alarm conditions that occur in the GoQAM.

This chapter includes information on inspecting the GoQAM modulator, replacing the fuse, and diagnosing and replacing the fan.

In This Chapter

Quarterly Inspection

Although, the modulator can operate unattended for extended periods. Cisco recommends that you perform a visual inspection once every 3 months.

Important: Only qualified personnel should maintain and service the GoQAM.

Check the following items during a visual inspection:

- **Cables and connectors**—Verify that all cables are mated properly and all retaining screws are tight. Inspect cables for stress and chafing.
- **Cover and rear panel**—If necessary, clean the cover and rear panel with a soft cloth dampened with a mild detergent solution.
- **Fan intakes on side panel**—Check the fan intakes on the side panel for excessive lint or dust buildup. Remove the lint and dust from the intakes using a damp cloth or a small hand vacuum.

Replace the Fuse

Each GoQAM contains a power fuse. We recommend keeping spare 4.0 A, SLO BLO 250V fuses (Cisco part number 188106) for the 120/230V AC model GoQAM and spare 6.3 A, SLO BLO 250V fuses (Cisco part number 180522) for the 48V DC model GoQAM.

Replacing the Fuse

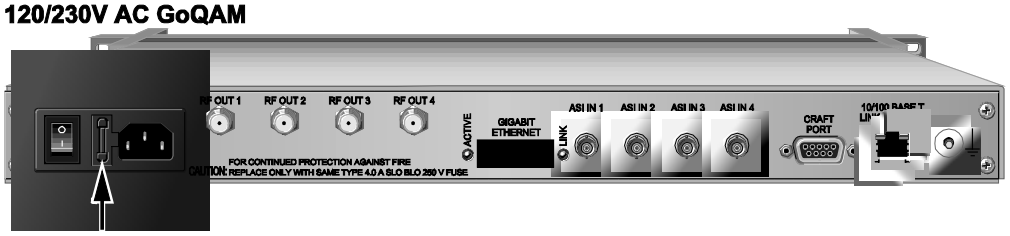
WARNING:

Avoid electric shock! Disconnect the power cord on this product before you remove the fuse and only use a fuse that has the correct type and rating.

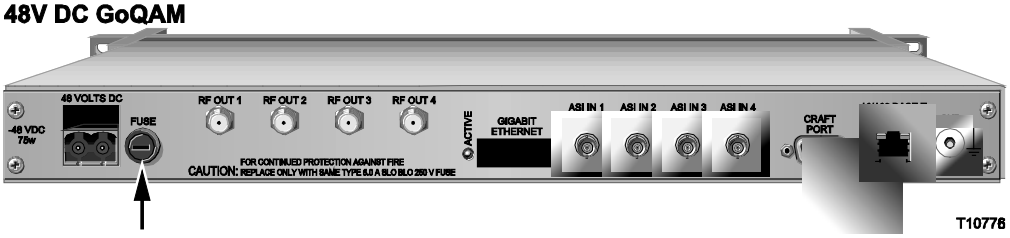
To replace the SLO BLO 250 V fuse, follow these steps.

1. Power down the GoQAM and remove the power cord.
2. Locate the fuse holder on the left side of the back panel of your RF GoQAM model.

120/230V AC GoQAM



48V DC GoQAM



3. Choose one of the following options:
   - For the 120/230V AC model, use a small flat-blade screwdriver to pry out the fuse holder, then go to step 7.
   - For the 48V DC model, go to step 4.
4. Loosen the fuse holder by using a small flat-blade screwdriver to turn the fuse holder counter-clockwise.
5. Remove the fuse.
6. Insert a new fuse into the fuse holder, then go to step 10.
7. Locate and remove the spare fuse from the hidden compartment on the fuse holder.

8. Remove and discard the blown fuse, and then replace the blown fuse with the spare fuse.
9. Place a new fuse in the hidden compartment where you removed the spare. This fuse will now be your spare fuse.
10. Insert the fuse holder into the back panel.
11. Choose one of the following options:
    - For the 120/230V AC model, snap the fuse holder in place.
    - For the 48V DC model, tighten the fuse holder by using a small flat-blade screwdriver to turn the fuse holder clockwise.
12. Replace the power cord and power on the GoQAM.

Diagnose the Fan

If a fan fails or is failing, either the **MAJOR** LED or the **MINOR** LED on the front panel will light and you will see *either* a fan failure alarm message or an excessive temperature alarm message on the front panel LCD screen, or perhaps both.

WARNING:

Avoid electric shock and damage to this product! Replace the fan only with a genuine replacement fan from Cisco. Contact Cisco Services to order replacement fans.

Diagnosing the Fan

The following illustrations are examples of the alarm displays you will see on the front panel LCD screen.

Fan Failure Alarm

```
Alarm at 16:20:32
 Fan Failure #1
```

Notes:

- The fan failure alarm is a Major alarm.
- The fan failure alarm can display for fan number 1 through fan number 6.

Excessive Temperature Alarm

```
Alarm at 16:20:48
RF1 Exceeded max temp
```

Notes:

- The excessive temperature alarm is a Minor alarm.
- The excessive temperature alarm can display for RF module 1 through RF module 4.

Replace the Fan

The GoQAM modulator has three dual fan units on the side panel. Each of these units contains two fan rotors. You must replace the *entire* dual fan unit if one of the fan rotors should fail. The fan units are designed to be "hot swappable," meaning that you do not necessarily have to power down the GoQAM to replace a fan unit that has failed.

Important! In order to hot swap a dual fan unit, you must have the following:

- Sufficient length in all cords and cables so you can slide the device forward in the rack far enough to fully access the dual fan units on the side panel.
- The ability to externally support the GoQAM with a cart or table or with the assistance of another person.

Note: If you do *not* have sufficient length in all cords and cables, you will have to power off the unit, disconnect all cords and cables, and completely remove the GoQAM from the rack to replace a dual fan unit that has failed.

Important! If a fan fails or is failing, contact Cisco Services to obtain a replacement fan.

Notes:

- The part number for the replacement fan unit is **4003088**.
- The part number for the kit that includes the replacement fan and instruction sheet is **4007620-40**.

This section provides the procedure for replacing a dual fan unit on the GoQAM by either hot swapping the fan unit, or by powering off, disconnecting, and removing the GoQAM completely from the rack.

When Can I Perform This Procedure?

If you cannot hot swap the dual fan unit, you need to replace the fan unit during a maintenance window. This is necessary because you will have to power off and disconnect the GoQAM to replace the fan unit, thereby temporarily disrupting all broadcast services configured and provisioned on this GoQAM.

Important! Schedule the maintenance window to replace the fan as soon as possible to avoid damage to the GoQAM.

Location of Fans

The fans are located on the GoQAM side panel as follows:

- Fans 1 and 2 are located nearest to the back panel.
- Fans 3 and 4 are the middle fans.
- Fans 5 and 6 are located nearest to the front panel.

Replacing the Fan

WARNING:

Avoid damage to this product! Replace the dual fan unit only with a genuine replacement fan unit from Cisco. Contact Cisco Services to order replacement fan units.

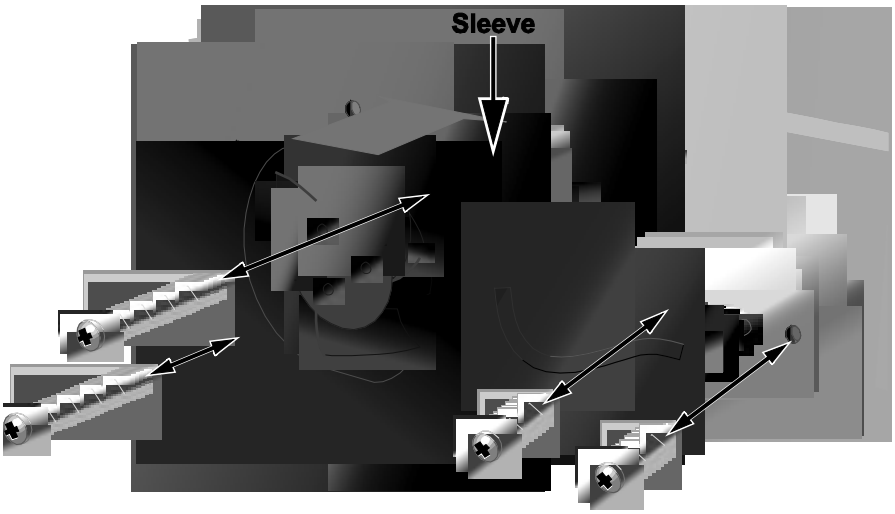
1. Are the cables connected to the back panel long enough to allow you to slide the GoQAM forward into the rack to sufficiently access the side panel where the fan units are located?
   - If **yes**, carefully remove the screws that secure the GoQAM in the rack, and carefully slide the GoQAM forward in the rack until you can access the fan units. Then, go to step 5.

     CAUTION:

     You must be able to externally support the GoQAM with a cart or table or with the assistance of another person when you slide the chassis forward in the rack.
   - If **no**, go to step 2.
2. If you cannot slide the GoQAM forward in the rack because some or all of the cables in the rack are not long enough to access the fan, wait to replace the fan until you have a maintenance window. Then, choose one of the following options:
   - If *some* of the cables are not long enough, you must power off the GoQAM and disconnect any cables that are not long enough.
   - If *all* of your cables are too short, you must power off the GoQAM and disconnect all the cables, including the power cable.
3. Remove the screws that secure the GoQAM in the rack. Then, remove the GoQAM completely from the rack to replace the fan unit.
4. After removing the GoQAM, place it carefully on a sturdy flat surface.
5. Carefully remove the screws that secure the 9-pin connector to the side panel and place them in a safe location nearby.

6 Carefully remove the screws and sleeves that secure the fan unit to the side panel and place them in a safe location nearby.

Important: The sleeves are loose and are not connected to the fan. Be careful not to drop them.



7 Remove the non-functioning fan unit and carefully disconnect the 9-pin connector. Set this fan unit aside for safe disposal later.

8 Hold the new fan unit in place on the side panel of the GoQAM so that the rotor with three fan blades is visible.

9 Place the sleeves in the proper location on the fan (as shown in the diagram), insert the screws through the sleeves, and then carefully tighten the screws that secure the fan to the side panel.

Important: Do not over tighten or cross thread the screws!

10 Carefully insert the 9-pin connector into the 9-pin socket, and then replace and carefully tighten the screws that secure the 9-pin connector to the side panel.

Important: Do not over tighten or cross thread the screws!

11 Did you have to remove the GoQAM completely from the rack?

- If **yes**, go to step 13.
- If **no**, go to step 12.

12 Replace the GoQAM into its original position in the rack and secure it in the rack using the original screws. Then, go to step 14.

13 Replace the GoQAM into its original position in the rack, secure it in the rack using the original screws, reconnect all cables, reconnect the power cord, and then power on the GoQAM.

14 Does the new fan unit operate properly?

- If **yes**, you have completed this procedure.
- If **no**, contact Cisco Services for assistance.

8

Troubleshooting the GoQAM

Introduction

This chapter provides explanations of major, minor, and status alarm conditions and instructions for checking alarms. This chapter also includes an alarm troubleshooting table, arranged alphabetically according to the front panel LCD message, with additional information for resolving alarm conditions. In addition, this chapter provides examples of boot screen error messages identifying booting and software loading errors or failures.

Important! The RF alarms listed in this chapter apply only to the RF GoQAM. RF alarms do *not* occur on the IF GoQAM.

In This Chapter

Alarm Conditions

This section describes major, minor, and status alarms and explains how to access and read the alarms displayed on the front panel LCD of the GoQAM. Refer to ***Troubleshooting Alarm Messages*** (on page 134) for a list of alarm messages that appear on the LCD screen, their level of severity, and possible solutions.

Purpose and Severity Levels of GoQAM Alarms

Alarms provide system operators with an indication of an abnormal condition. Alarm messages appear on the Alarm Status screen when hardware or software conditions occur that might cause the GoQAM to operate incorrectly or fail. Examples of such conditions include temperature fluctuations, power supply failure, communication problems, or the detection of bad data. All alarms are automatically enabled after powering up the GoQAM.

Alarm levels are classified as major, minor, and status alarms. Each level is described as follows:

- **Major Alarms –** A major alarm indicates a fatal error, that is, a complete loss of functionality. Major alarms occur for hardware or software conditions that indicate a serious disruption of service or the malfunctioning or failure of important circuits. These situations require the immediate response of the technician to restore or maintain system operability. The front panel of the GoQAM contains a MAJOR LED to alert the operator that a major alarm is pending.
- **Minor Alarms –** A minor alarm indicates a non-fatal error condition. The GoQAM may continue to operate with some loss of functionality. The front panel of the GoQAM contains a MINOR LED to alert the operator that a minor alarm is pending.
- **Status Alarms –** The status alarm indicates that some state in the GoQAM has changed. Status alarms are provided to alert the DNCS operator that possible changes are occurring at the GoQAM site by someone pressing the front panel keys or by someone using the craft port. These are generally one-time events, such as a front panel event change. In this case, the alarm is issued with the level "status" each time you press the **ENTER** key on the front panel of the GoQAM. Status alarms might not affect GoQAM functionality.

LCD Alarm Display

The front panel of the GoQAM displays alarm messages in the following standard display.

```
      Alarm at 11:51:40
  Input1  loss of  signal
```

The alarm message appears on the second line of the display. In this example, the message indicates a loss of signal to the ASI Input, which is a major alarm condition.

Reading the Display

To display the list of active alarms, follow these steps.

1 Press **OPTIONS**. The Alarm Status Level screen appears.

```
      Alarm at 11:51:40
  Input1  loss of  signal
```

Note: Each alarm description appears for approximately 1 second before displaying the next alarm. If no alarms are active, a **NO Active Alarms** message appears.

2 Press **ENTER**. The default screen appears.

Troubleshooting Alarm Messages

If the GoQAM displays an alarm condition, fails a self-test, or does not work properly, refer to the table in this section to find and correct the cause. Some alarm conditions may require you to contact Cisco. See ***Customer Information*** (on page 147) for contact information.

Important! The RF alarms listed in this section apply only to the RF GoQAM. RF alarms do *not* occur on the IF GoQAM.

See ***Troubleshooting Boot Screen Error Messages*** (on page 143) for resolving problems encountered during the start-up process.

Front Panel LCD Alarm Messages

The following table lists Alarm Messages displayed on the front panel LCD of the GoQAM, the default level of severity defined for the GoQAM, a probable cause for the alarm, and suggestions for correcting the alarm condition.

Notes:

- The LCD descriptions for each alarm are arranged in alphabetical order.
- Alarm messages that occur for the two outputs (RF or IF) or the four ASI input ports are listed only once. The numbers in parentheses indicate the range of port numbers that might be affected by the alarm.

Example: The "Input (1-4) errored MPEG packet" description corresponds to the Input port that is affected.

LCD Description	Alarm Level	Probable Cause	Check and Correct
Craft event change	Status	Someone viewed or changed the GoQAM settings from the craft port	Verify that all services are still functioning correctly
Fans failure (1-6)	Major	One of the ventilation fans failed.	Contact Cisco Services
Front panel event change	Status	Someone changed the GoQAM settings from the front panel	Verify that all services are still functioning correctly
Hardware error	Major	General-purpose hardware error or hardware failure occurred	Contact Cisco Services
Encrypted packets on clear port 1	Major	A system operator swaps the clear and encrypted inputs for input pair 1 (Input port 1 and Input port 2)	Reverse the connections
Encrypted packets on clear port 3	Major	A system operator swaps the clear and encrypted inputs for input pair 2 (Input port 3 and Input port 4)	Reverse the connections

LCD Description	Alarm Level	Probable Cause	Check and Correct
Input (1-4) errored MPEG packets	Minor	An error occurred in the header of MPEG packets as they arrived at the indicated Input port	Contact Cisco Services
Input (1-4) FIFO overflow See also Input (1-4) packets were dumped	Minor	A first-in first-out (FIFO) overflow occurred and packet data has been lost. This indicates one or more of the following conditions: ■ Too many sessions defined from the DNCS for the GoQAM ■ The data rate as defined from the DNCS for the GoQAM session is too low, which also means that the data rate of the ASI input to the GoQAM is too high ■ Hardware problem ■ Incorrect modulation mode	■ Reduce the data rate of input to the GoQAM by doing the following: – Reducing the amount of incoming data – Reducing the amount of data added to the stream – Increasing the GoQAM modulation mode ■ Verify and correct session rate targets and threshold values ■ Contact Cisco Services
Input (1-4) loss of signal	Major	No signal. This indicates one or more of the following conditions: ■ An upstream device that provides input to the GoQAM has failed or is offline ■ A cable has been disconnected	■ Check for loose or broken DVB ASI cable connections to the GoQAM ■ Check that the DVB ASI outputs of upstream devices are active ■ Run the Doctor Report to troubleshoot any network connectivity issues ■ Contact Cisco Services
Input (1-4) MPEG continuity error	Minor	MPEG continuity error counter. One or more of the MPEG packets are being dropped	■ Check one or more upstream devices connected to the DVB ASI input ports ■ Contact Cisco Services

LCD Description	Alarm Level	Probable Cause	Check and Correct
Input (1-4) MPEG Transport error	Minor	MPEG transport error indicator counter. An error occurred in the header of the MPEG packet	■ Check one or more upstream devices connected to the DVB ASI input ports ■ Run the Doctor Report to troubleshoot network connectivity issues ■ Contact Cisco Services
Input (1-4) packets were dumped See also Input (1-4) FIFO overflow	Minor	A FIFO overflow occurred and packet data has been lost. This indicates one or more of the following conditions: ■ Too many sessions defined from the DNCS for the GoQAM ■ The data rate as defined from the DNCS for the GoQAM session is too low, which also means that the data rate of the ASI input to the GoQAM is too high ■ Hardware problem ■ Incorrect modulation mode	■ Reduce the data rate of input to the GoQAM by doing the following: – Reducing the amount of incoming data – Reducing the amount of data added to the stream – Increasing the GoQAM modulation mode ■ Run the Doctor Report to troubleshoot network connectivity issues ■ Contact Cisco Services
Input (1-4) PAT Update	Status or Minor	The PAT seen at one of the inputs (1-4) on the GoQAM yields a version number change indicating that the input stream has changed.	■ If the GoQAM handles the PAT, the alarm is for information only (Status) and will clear. No user action required. ■ If the GoQAM does *not* handle the PAT update, the alarm is sent as a Minor alarm, and does not clear. You may need to reboot the GoQAM to re-acquire the input stream.

LCD Description	Alarm Level	Probable Cause	Check and Correct
Input (1-4) PMT Update	Status or Minor	The PMT seen at one of the inputs (1-4) on the GoQAM yields a version number change indicating that the input stream has changed.	■ If the GoQAM handles the PMT, the alarm is for information only (Status) and will clear. No user action required. ■ If the GoQAM does *not* handle the PMT update, the alarm is sent as a Minor alarm, and does not clear. Yo may need to reboot the GoQAM to re-acquire the input stream.
OUT (1-2) FIFO overflow	Minor	A FIFO overflow occurred and packet data has been lost indicating one or more of the following conditions: ■ Too many sessions defined from the DNCS for the GoQAM ■ The data rate as defined from the DNCS for the GoQAM session is too low, which also means that the data rate of the ASI input to the GoQAM is too high ■ Hardware problem Incorrect modulation mode	■ Reduce the data rate of input to the GoQAM by doing one of the following: – Reducing the amount of incoming data – Reducing the amount of data added to the stream – Increasing the GoQAM modulator mode

LCD Description	Alarm Level	Probable Cause	Check and Correct
OUT (1-2) Packets dropped. See also Input (1-4) FIFO overflow	Minor	Low priority packets are being dropped. The number of packets at the identified RF output carrier exceeds its capacity. This indicates one or more of the following conditions: ■ Too many sessions defined from the DNCS for the GoQAM ■ The data rate as defined from the DNCS for the GoQAM session is too low, which also means that the data rate of the ASI input to the GoQAM is too high ■ Hardware problem ■ Incorrect modulation mode	■ Reduce the data rate of input to the GoQAM by doing the following: – Reducing the amount of incoming data – Reducing the amount of data added to the stream – Increasing the GoQAM modulation mode ■ Verify and correct session rate targets and threshold values ■ Reduce the total number of MPEG programs by deleting sessions ■ Use a TV to verify program availability ■ Contact Cisco Services
Reset detected	Status	The GoQAM has been reset by either a power loss or a manual reset	Session and alarm provisioning are sent to the GoQAM again automatically from the DNCS. However, you should also check the following: ■ Verify that there are still broadcast services on this GoQAM ■ Verify that the reset did not adversely affect broadcast services ■ Run the Doctor Report to troubleshoot any network connectivity issues ■ Contact Cisco Services

LCD Description	Alarm Level	Probable Cause	Check and Correct
RF (1-2) Comm. Failure **(RF GoQAM only)**	Major	The digital I/O board is not able to communicate with the modulator RF board MCU at the specified RF OUT module (1-2). This problem could be caused by a loose or broken cable or by the modulator MCU not being programmed correctly	■ Reset the GoQAM ■ Contact Cisco Services
RF (1-2) DC Lock detect error. See also RF (1-2) UC Lock detect error. **(RF GoQAM only)**	Major	■ Downconverter (DC) lock detect signal not functioning correctly. During Modulator MCU Power On Self Test (POST), the lock detect signal from the downconverter phase-locked loop (PLL) did not indicate an unlocked condition when one existed **Note:** Since the MCU cannot correctly detect locked or unlocked status, the RF Output field displays "MUTED" when this condition exists ■ The output converter synthesizer lock detect circuitry has malfunctioned	Contact Cisco Services
RF (1-2) DC PLL unlocked **(RF GoQAM only)**	Major	The downconverter (DC) PLL synthesizer cannot lock. The output frequency may not be correct. The RF Output field displays "MUTED" when this condition exists	Contact Cisco Services
RF (1-2 EEPROM failure **(RF GoQAM only)**	Minor	Modulator EEPROM failure. The EEPROM on the modulator board is not present or is not operational. If this alarm is set, RF calibration data is not be available, and the "RF (1-4) Level not calibrated" alarm is also active	Contact Cisco Services
RF (1-2) Exceeded max temp **(RF GoQAM only)**	Minor	The internal temperature of the GoQAM is more than 70°C (158°F)	■ Remove vent obstructions ■ Provide more cooling and ventilation ■ Check the temperature-sensing hardware ■ Check the exhaust fans ■ Contact Cisco Services

LCD Description	Alarm Level	Probable Cause	Check and Correct
RF (1-2) Level not calibrated **(RF GoQAM only)**	Minor	One of the RF Level settings on the GoQAM is not calibrated to the correct frequency, or the EEPROM that stores the calibration data is not operational	Contact Cisco Services
RF (1-2) Power supply failure **(RF GoQAM only)**	Minor	At least one internal power regulator failed. The RF Output field displays "MUTED" when this condition exists	Contact Cisco Services
RF (1-2) UC Lock detect error **(RF GoQAM only)**	Major	The upconverter (UC) PLL lock detect signal is functioning incorrectly. The RF Output field displays "MUTED" when this condition exists	Contact Cisco Services
RF (1-2) UC PLL unlocked **(RF GoQAM only)**	Major	Modulator UC PLL is unlocked. The output frequency may not be correct. The RF Output field displays "MUTED" when this condition exists	Contact Cisco Services
Runtime error (Operating System)	Major	General-purpose software error	■ Reset the GoQAM by the power switch or, if possible, by DNCS control ■ Contact Cisco Services
"Session *xxx* ca error" where xxx is a number from 0 to 991	Minor	An error in the CA encryption for a session has been detected. This could mean that an unencrypted signal is being transmitted	■ Delete the failed session and then restart the session ■ Check and correct the package setup and encryption settings on the DNCS ■ Check all hardware settings ■ Contact Cisco Services

"Session *xxx* data error" where xxx is a number from 0 to 991	Minor	The data flow for the session is less than or greater than what has been defined by the DNCS for the session indicating one of the following underflow or overflow conditions: ■ Cause Code 1-Underflow-The session data rate for the session drops to 0 (zero) or is less than expected. **Important:** The session rate dropping to 0 (zero) triggers an underflow alarm, but is not the result of a loss of signal condition. When a loss of signal occurs, the underflow alarm is *not* reported. This prevents the system from being overwhelmed with a large number of session data alarms. Alarms that occur as a result of higher level alarms are not reported. ■ Cause Code 2-Overflow-The data rate for this session exceeds the provisioned data rate. ■ Cause Code 3 - PID enable error - A packet identifier (PID) that should be enabled is not enabled in the GoQAM modulator. ■ Cause Code 6 - Continuity error - This alarm identifies the specific session on which the Input Port (1-4) continuity error alarm occurred. ■ Cause Code 8 - Excess glue frame events - Glue frames prevent macroblocking. Excess glue frame events indicate that the associated output port is receiving too much data. When the MPEG engine in the GoQAM nears full output capacity, it begins to selectively choose video PIDs on which it will issue a "freeze frame" code in the MPEG video stream for that program and will drop the video packets for that session momentarily. If this alarm occurs frequently, it is a signal that the output QAM carrying that session contains too much data.	■ Verify and correct any session setup problems including the session rate target value. If session data is correct, data may be corrupted because of hardware problems. **Note:** Select data rates that you believe the program should not exceed. ■ For the overflow condition, teardown, rebuild, and then restart the session using a higher bandwidth. ■ Run the Doctor Report on the DNCS, and examine the report for any network connectivity issues or indications of loss of services. ■ Contact Cisco Services ■ If this alarm occurs with this Cause Code and then quickly clears, it is not a cause for concern. ■ Check the content of the input stream using an MPEG analyzer. ■ Contact Cisco Services ■ Reallocate the session from the QAM that appears to contain too much data to another QAM on the same GoQAM modulator or to another GoQAM modulator.

"Session *xxx* program error" where xxx is a number from 0 to 991	Minor	Cause Code 1 - A cyclic redundancy check (CRC) error was detected on a program map table (PMT). Cause Code 2 - A new PMT was detected. Cause Code 3 - An attempt to create a session failed. Program Specific Information (PSI) table data changed in the input stream with the following cause codes: ■ Cause Code 4 - Program Association Table (PAT) update ■ Cause Code 5 - PMT packet identifier (PID) conflict ■ Cause Code 6 - Elementary PID conflict ■ Cause Code 7 - Entitlement Control Message (ECM) PID conflict ■ Cause Code 8 - Program number conflict	Delete the session. This is for information only. No action is required. Teardown and rebuild the session. ■ Check the upstream MPEG input sources connected to the GoQAM ■ For Cause Code 8, teardown and rebuild the session with a program number that does not conflict with the session ■ If the alarm does not automatically clear, contact Cisco Services
System Hardware Alarm	Major	The GoQAM cannot communicate with the RF network.	■ Check for loose connections or defective cables, tighten any loose cable connections, and replace any defective cables ■ Reset the GoQAM by the power switch or, if possible, by DNCS control ■ Contact Cisco Services

Troubleshooting Boot Screen Error Messages

This section contains examples of warning screens associated with booting error conditions. Some booting error conditions may require you to contact Cisco Services.

Booting Error Messages

The following table lists booting error conditions sorted alphabetically by error type, and provides suggestions for correcting the error condition.

Error Condition	LCD Messages	Check and Correct

Application Code Download Failure Screens	■ Bad TFTP Checksum
	The following message appears if the GoQAM is unable to download application code execution files from the TFTP server due to a bad checksum.
	`Bad TFTP App Checksum`
	`Restarting...`
	The GoQAM automatically reboots.
	■ Unable to TFTP App Code (Boot Mode=2)
	The following message appears if the GoQAM is unable to download application code execution files from the TFTP server during boot mode 2.
	`Unable to TFTP App Code`
	`Restarting...`
	The GoQAM automatically reboots.
	Unable to TFTP App Code (Boot Mode=1)
	The following message appears if the GoQAM is unable to download the application code execution files from the TFTP server during boot mode 1.
	`Unable to TFTP App Code`
	`Continuing Startup...`
	The GoQAM then starts the application program.
		■ A corrupted application file may cause this condition.
		■ Reinstall the GoQAM package on the DNCS if all GoQAMs have this error condition.
		■ Check IP connectivity.
		■ Contact Cisco Services.
		Note: Refer to ***Understand the Boot Process*** (on page 78) for detailed descriptions of the boot process.

Boot Download Failure Screens	■ Unable to TFTP Boot Code (Boot Mode=1)
	The following message appears if the GoQAM is unable to download the boot code execution file from the TFTP server during boot mode 1.
	`Unable to TFTP Boot Code Continuing Startup...`
	The GoQAM then starts the application program.
	■ Unable to TFTP Boot Code (Boot Mode=2)
	The following message appears if the GoQAM is unable to download the boot code execution file from the TFTP server during boot mode 2.
	`Unable to TFTP Boot Code Restarting...`
	The GoQAM then automatically reboots.
		■ An incorrect DNCS configuration may also cause this condition.
		■ Reinstall the GoQAM package on the DNCS if all GoQAMs have this error condition.
		■ Check IP connectivity.
		■ Contact Cisco Services.

Default Status Screen	If an RF carrier channel cannot be accessed or is missing, the following message appears: `CH1 Info Not Available`	■ A possible RF hardware problem occurred. ■ Contact Cisco Services.

Incorrect Configuration File Screens	■ Invalid Config File (Boot Mode 1)
	The following message appears when in boot mode 1 and the configuration file type is incorrect for the GoQAM. The first line of the configuration file contains GqamBootpFileType=1.0.
	`Invalid File format Continuing Startup...`
	The GoQAM then starts the application program.
	■ Invalid Config File (Boot Mode 2)
	The following message appears when in boot mode 2 and the configuration file type is incorrect for the GoQAM. The first line of the configuration file contains GqamBootpFileType=2.0.
	`Invalid File format Restarting...`
	The GoQAM then automatically reboots.
		■ Correct the configuration file.
		■ Contact Cisco Services.

RF Module Code Download Failure Screen	■ Unable to TFTP RF Code The following message appears if the GoQAM is unable to download the RF module code execution files for boot mode 1 or boot mode 2 from the TFTP server. `Unable to TFTP RF Code Restarting...` The GoQAM then automatically reboots.	■ Check the configuration file. ■ Check for an incorrect IP address, boot mode, or DNCS address. ■ Reinstall the GoQAM package on the DNCS if all GoQAMs have this error condition. ■ Check IP connectivity. ■ Contact Cisco Services.

Unable to Boot Successfully	■ Unable to perform BootP (Boot Mode 1)
	The following message appears if the GoQAM is in boot mode 1 while unable to perform a successful boot process (BootP).
	`Unable to perform BootP Continuing Startup...`
	The GoQAM then starts the application program.
	■ Unable to perform Bootp (Boot Mode 2)
	The following message appears if the GoQAM is in boot mode 2 while unable to obtain a successful BootP.
	`Unable to perform BootP Restarting...`
	The GoQAM then automatically reboots.
		■ Verify that the Ethernet port is connected and that the MAC address for the unit matches the MAC address listing on the DNCS.
		■ Contact SciCare Broadband Services.

Unable to Download Configuration File from TFTP Server	■ Unable to TFTP Config File (Boot Mode 1)
	The following message appears when in boot mode 1 and the GoQAM is unable to download the configuration file from the TFTP server.
	`Problem with Config File`
	`Continuing Startup...`
	The GoQAM then starts the application program.
	■ Unable to TFTP Config File (Boot Mode 2)
	The following message appears when in boot mode 2 and the GoQAM is unable to download the configuration file from the TFTP server.
	`Problem with Config File`
	`Restarting...`
	The GoQAM then automatically reboots.
		■ Verify that the configuration file provisioned on the DNCS is present in the DNCS File system.
		■ An incorrect DNCS configuration may cause this error condition.
		■ Contact SciCare Broadband Services.

9

Customer Information

If Your Have Questions

If you have technical questions, call Cisco Services for assistance. Follow the menu options to speak with a service engineer.

Access your company's extranet site to view or order additional technical publications. For accessing instructions, contact the representative who handles your account. Check your extranet site often as the information is updated frequently.

A

Technical Specifications

Introduction

This appendix lists the power, rack, and environmental requirements for installing the GoQAM and provides technical specifications.

In This Appendix

Installation and Operation Requirements

This section contains tables that define specifications specific to installing and operating the GoQAM.

Power Requirements Table

The following table describes the power specifications for the GoQAM.

Item	Specification
Supply Voltage	■ 90V to 130V AC @ 47 to 63 Hz (AC unit) ■ 180V to 264V AC @ 47 to 63 Hz (AC unit) ■ –42V to –57V DC (DC unit)
Fuses	■ 4.0 A SLO BLO 250V (AC unit) ■ 6.3 A SLO BLO 250V (DC unit)
Line Frequency	■ 47 to 63 Hz (AC unit only)
Power Required	■ RF GoQAM: 155 VA (typical) ■ IF GoQAM: 85 VA (typical)
Power Dissipated	■ RF GoQAM: 151 Watts (typical) ■ IF GoQAM: 80 Watts (typical)
In Rush Current	■ 35 amps maximum, Vin = 130V AC (AC unit) ■ 75 amps maximum, Vin = 264V AC (AC unit) ■ 15 amps maximum, Vin = -57V DC (DC unit)

Rack Requirements Table

Item	Specification
Rack Mount Type	EIA RS-310
Height	1.75 in./44.45 mm
Width	19 in./482.6 mm
Depth	22.5 in./571.5 mm
Weight	13.5 lb./5.4 kg

Environmental Requirements Table

Item	Specification
Operating Temperature	0° to 50°C (32° to 122°F) **CAUTION:** **Avoid damage to this product! Your warranty is void if you operate this product above the maximum specified operating temperature.** **Use caution when installing wiring and racks to avoid obstruction of air flow into the side air vents of the GoQAM, or out of the vent fans at the GoQAM side panel**. **Important:** You must use the supplied notched rack mounts (Cisco part numbers 734845 and 734846) to mount the GoQAM in the rack. These rack mounts allow correct air circulation through the unit.
Storage Temperature Range	-10° to 70°C (14° to 158°F)
Operating Humidity	5 to 95%, non-condensing
Vibration Susceptibility	No data errors with a chassis vibration of 0.5 Gs. No data errors with a vibration frequency of 10 to 400 Hz
Electrostatic Shock Susceptibility	No damage sustained from five discharges of 15 KV IEC electrostatic discharge model (150pF + 150 Ω) to all exposed connections

IF Specifications

IF Specifications Table

The following table provides various IF specifications and ranges for the IF GoQAM.

Specification	Range
Frequency Range	44.00 MHz
Minimum Tuning Step Size	N/A
Output Power Level	+27 to +37 dBmV minimum range
Output Impedance	75 Ω
Spurious Outputs (44 MHz to ± 20 MHz) single frequency modulated output related	Less than -60 dB (relative to the average power of the QAM channel with the highest power level)
Phase Noise	-100 dBc/Hz 10 kHz from carrier -100 dBc/Hz 10 kHz from carrier (typical)
Output Frequency Error (over temperature)	Less than 3 ppm

RF Specifications

Specification	Range
Frequency Range (center frequency)	91 to 869 MHz
Minimum Tuning Step Size	250 kHz
RF Output Power Level	+42 to +54 dBmV minimum range
RF Output Impedance	75 Ω
RF Output Return Loss (carrier on)	> 12 dB (within output channel)
Spurious Outputs (50 MHz to 1.1 GHz) single frequency modulated output related	< -60 dB (relative to the average power of the QAM channel with the highest power level)
Noise Floor (out of band)	< -136 dBc/Hz > 40 MHz from center frequency
Phase Noise	-84 dBc/Hz 10 kHz from carrier -86 dBc/Hz 10 kHz from carrier (typical)
Output Power Level Change Over Tuning Range	± 2.0 dB
Output Frequency Error (over temperature)	< 3 ppm

ASI Input Specifications

Specification	Value
Minimum Sensitivity	200 mV (p-p)
Maximum Input Voltage	880 mV (p-p)
Input Impedance	75 Ω
Input Return Loss	> 17 dB (27 to 270 MHz)

Modulation Specifications

Modulation Specifications Table

The following table provides modulation specifications for the GoQAM.

6 MHz Spec	Type	Alpha	Interleaver	Symbol Rate (Msymbols/sec)	Data Rate (megabits/sec)	Bandwidth
ITU-A	DAVIC/ DVB 64	12%	I=12, J=17	5.304	29.328	6 MHz
ITU-A	DAVIC 256	12%	I=204, J=1	5.304	39.104	6 MHz
ITU-B	QAM 64	18%	I=128, J=4	5.056941	26.971 Mb/s	6 MHz
ITU-B	QAM 256	12%	I=128, J=4	5.360537	38.811 Mb/s	6 MHz
ITU-C	DAVIC/ DVB 64	13%	I=12, J=17	5.274	29.162 Mb/s	6 MHz

Digital I/O Performance Specifications

Digital I/O Performance Specifications Table

The following table provides digital input and output performance specifications for the GoQAM.

Specification	Value
Maximum Input Rate	216 Mbps for each of the four ASI input ports
Maximum Aggregate Output Rate (including data insertion)	39.104 Mbps for each of the RF output ports (620 Mbps)
Maximum Total Sessions	122
Maximum Number of Sessions per Output	61 sessions per channel
Maximum Number of PIDs per Session	16
Maximum Number of PIDs per Input Transport	8192, per MPEG spec
Maximum Number of PIDs for all Input Transports	32K
Maximum Packet Insertion Rate (for externally sourced packets)	500 Kbps maximum; 1 Kbps minimum

Connector Type

Connector Type Table

The following table lists the various types of connectors for the GoQAM.

Item	Connector
10/100 Base-T Ethernet	RJ-45
AC Power	IEC 320 connector
DC Power	2 Termi-Blok 90 degree header
ASI Inputs (4)	BNC, 75 Ω
Craft (serial port) I/O	DB-9 female
RF Output (only 2 are used)	Type F connectors, 75 Ω

Factory Default Settings

Factory Default Settings Table

The following table lists default settings for the GoQAM.

Value	Factory Setting
Boot Mode	2
Carrier Mode	Modulated
Encryption	PowerKEY
ITUB Interleave	128, 4
LCD Contrast	80%
Modulation Type	ITUB 64
RF Freq (RF GoQAM only)	Highest Center Frequency Setting (867 MHz)
IF Freq (IF GoQAM only)	44 MHz
RF Mute	Off (the output is not muted)
RF Output Level	■ IF GoQAM: +37 dBmV ■ RF GoQAM: +50 dBmV

Standard Output Frequencies

The following table provides an example of channel center frequency settings listed in 6 MHz increments between 93 MHz and 867 MHz.

Important: This modulator also supports all Standard, Harmonically Related Carrier (HRC), and Incremental Related Carrier (IRC) frequency lineups. This table is for reference purposes only.

93	99	105	111	117	123	129	135	141	147
153	159	165	171	177	183	189	195	201	207
213	219	225	231	237	243	249	255	261	267
273	279	285	291	297	303	309	315	321	327
333	339	345	351	357	363	369	375	381	387
393	399	405	411	417	423	429	435	441	447
453	459	465	471	477	483	489	495	501	507
513	519	525	531	537	543	549	555	561	567
573	579	585	591	597	603	609	615	621	627
633	639	645	651	657	663	669	675	681	687
693	699	705	711	717	723	729	735	741	747
753	759	765	771	777	783	789	795	801	807
813	819	825	831	837	843	849	855	861	867

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Cisco Systems, Inc.
5030 Sugarloaf Parkway, Box 465447
Lawrenceville, GA 30042

678 277-1120
800 722-2009
www.cisco.com

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