Ubee DDM3521 Cable Modem User Guide

February 2013

Notices and Copyrights

Contents

1   Introduction

Welcome to the Ubee family of data networking products. This document provides instructions for anyone who installs, configures, maintains, and uses the DDM3521 Cable Modem. Ubee recommends that you read this chapter before installing and using the device. The following topics are provided in this section:

Topics

See the following topics:

1.1   Understanding Safety and Regulatory Information

The following information provides safety and regulatory standards for anyone installing, maintaining, and using the DDM3521.

1.1.1   Safety

WARNING: The following information provides safety guidelines for anyone installing and maintaining the DDM3521. Read all safety instructions in this guide before attempting to unpack, install, operate, or connect power to this product. Follow all instruction labels on the device itself. Comply with the following safety guidelines for proper operation of the device:

Always follow basic safety precautions to reduce the risk of fire, electrical shock and injury. To prevent fire or shock hazard, do not expose the unit to rain, moisture, or install this product near water. Never spill any form of liquid on or into this product. Do not use liquid cleaners or aerosol cleaners on or close to the product. Use a soft dry cloth for cleaning.

Do not insert any sharp object into the product's module openings or empty slots. Doing so may accidentally damage its parts and/or cause electric shock.

Electrostatic discharge (ESD) can permanently damage semiconductor devices. Always follow ESD-prevention guidelines for equipment handling and storage.

Use only the power adapter supplied with the device.

❑ Do not place heavy objects on top of the device.

❑ Rest the power cable freely without any obstacle or heavy items piled on top of it. Refrain from abusing, stepping or walking on the cable. Do not place the device on an unstable stand or table; the device may drop and become damaged.

❑ To protect the equipment from overheating, do not block the slots and openings in the module housing that provides ventilation. Do not expose this device to direct sunlight. Do not place any hot devices close to this device, as it may degrade or cause damage to it.

Federal Communications Commission (FCC) Interference Statement

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, the device may cause harmful interference to radio communications. There is no guarantee, however, that interference will not occur in a particular installation. If this device causes harmful interference to radio or television reception, which can be determined by turning it off and on, the user can try to correct the interference by one of the following measures:

♦ Increase the separation between the device and the equipment with which it is interfering (for example, a television or radio).

♦ Connect the device into an electrical outlet on a different circuit than the interfered device is connected.

♦ Consult the dealer or an experienced radio/TV technician for help.

FCC Regulatory Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

(3) There are two statements for this product:

♦ FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

♦ IEEE 802.11b or 802.11g or 802.11n operation of this device in the U.S.A. is firmware-limited to channels 1 through 11.

Safety Notices

1. **Grounding**: Install the device to include grounding the coaxial cable to the earth at the building entrance per ANSI/NFPA 70 and the National Electrical Code (NEC, in particular, Section 820.93, Grounding of the Outer Conductive Shield of a Coaxial Cable).

2. **Disconnecting**: If the device becomes damaged or encounters some other abnormality, disconnect the power plug from the wall outlet immediately.

3. **Installing**: Install the device in a location not to exceed the maximum temperature of 40 degrees Celsius (104 degrees Fahrenheit).

4. **Mounting**: When this device is placed upright with the aid of the stand, fix the stand at a 90-degree angle to the device. Otherwise, the device may tip over.
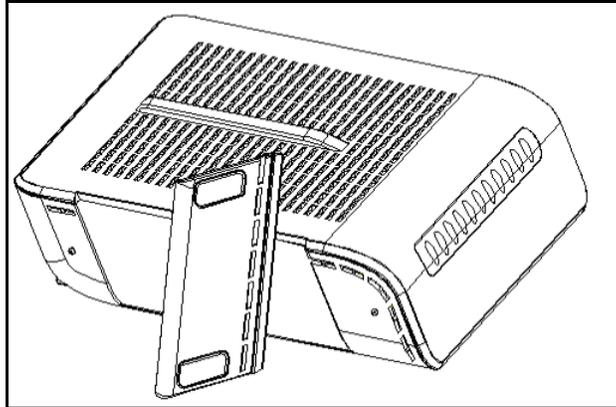
1.1.2   Eco-Environmental Statements

The following eco-environmental statements apply to the DDM3521.

Packaging Collection and Recovery Requirements:

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from sewer and waste water. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established. For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, contact Ubee Interactive at www.ubeeinteractive.com.

1.2   Understanding the Customer Premises Network

The following diagram illustrates the general connection network and uses of the DDM3521.

Application Diagram
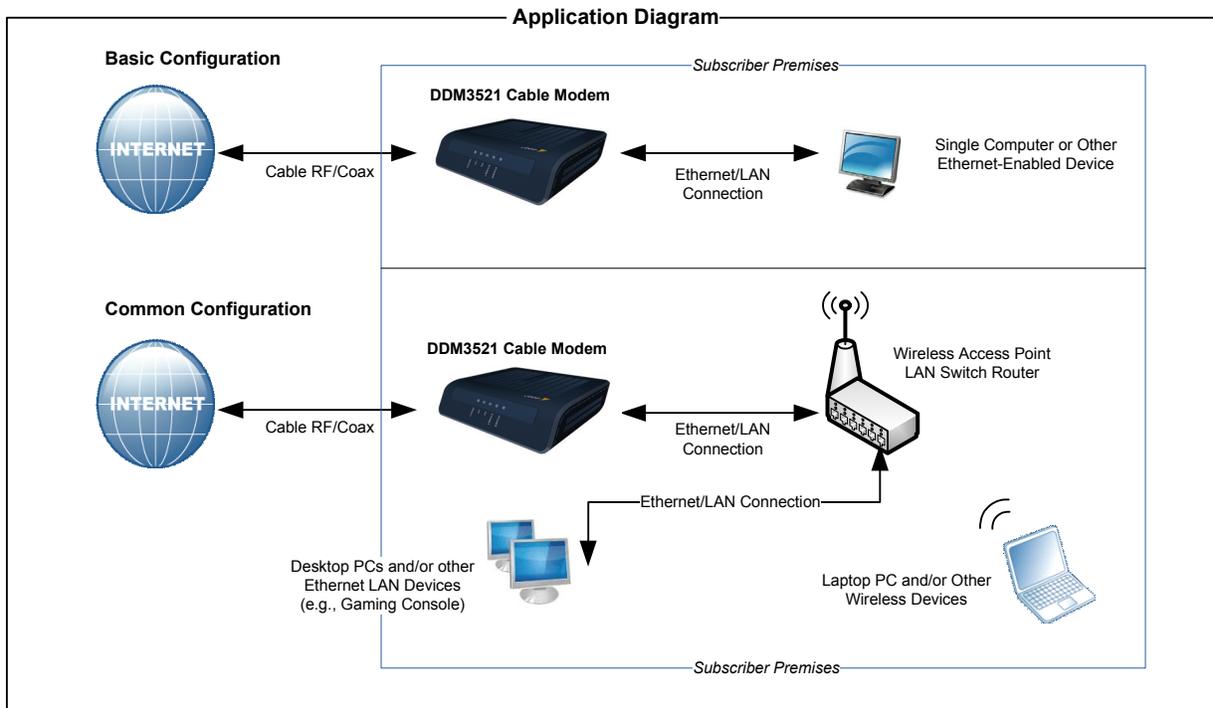
1.3   Contacting Support

Subscribers must contact their service provider for direct support. Device documentation support may be available at:

http://www.ubeeinteractive.com

1.4   Understanding Specifications, Standards, and Firmware

Following are the features and specifications of the DDM3521:

Interfaces and Standards

♦ RF Interface: External F-Connector
♦ CPE Interface: 10/100/1000 Base Ethernet
♦ DOCSIS 3.0/2.0./1.x Certified

Downstream

♦ Frequency Range: 88MHz ~ 1002 MHz
♦ Modulation: 64/256 QAM
♦ Maximum Data Rate: 8 DS: 343 Mbps*
♦ RF Input/Output Power: -15 to +15 dBmV

◆ Channel Bandwidth: 6 MHz

*Maximum Speeds (actual speeds vary based on factors such as network configuration, conditions, and service tier).

Upstream

◆ Frequency Range: 5 MHz ~ 42 MHz

◆ Modulation: QPSK, 8, 16, 32, 64 QAM, 128 QAM (S-CDMA only)

◆ Maximum Data Rate 4 US: 122 Mbps*

◆ RF Output Power: TDMA /ATDMA:
   +8 to +54 dBmV (32QAM, 64QAM ATDMA only)
   +8 to +55 dBmV (8QAM, 16QAM)
   +8 to +58 dBmV (QPSK)
   S-CDMA: +8 to +53 dBmV (all modulations)

*Maximum Speeds (actual speeds vary based on factors such as network configuration, conditions, and service tier).

Device Management

◆ Local and Remote Web Management Interface

◆ Telnet Remote Management

◆ SNMP v1/v2/v2c and v3 agent built-in

◆ IPv4 and IPv6 support

Physical and Environmental

◆ Dimensions: 6.7" W x 6" D x 1.75" H
   (170 mm x 152 mm x 44 mm)

◆ Input Power: 100-120VAC, 50-60Hz

◆ Output Power: 12V @ 1.0A

◆ Power Consumption: < 10W (full load)

◆ LEDs: Power, Ethernet, US, DS, Ready

◆ Operating temp: 0˚ C to 40˚ C (32˚ F to 104˚ F)

◆ Humidity: 5~95% (non-condensing)

◆ Storage temp: -40˚ C to 70˚ C (-40˚ F to 158˚ F)

Certifications

◆ Safety: UL 60950; CE/FCC Class B

◆ Others: RoHS, WEEE

1.5   Verifying Device Package Components

The package for the DDM3521 contains the following items:

Item	Description
DDM3521 Front View	**DDM3521 Back View**
	1 - RJ45 Cable (Ethernet) Length ~ 6.0 ft RoHS & UL compliant *Sample image, actual appearance subject to change.*
	1 - Power Adapter AC to DC Power Switching Input Power: 100-120VAC 50/60 Hz 0.3A Output Power: 12V / 1.0Amp *Sample image, actual appearance subject to change.*

1.6   Understanding the DDM3521 Back Panel

All ports to connect the device are located on the back panel. The following image and table describe the device's back panel connections.

Back Panel Label	Description
PWR	Connects to the power adapter. WARNING: Use only the power adapter shipped with this device. Failure to do so may cause damage to the device.
ETHERNET	Connects an Ethernet device such as a computer, gaming console, or a router/hub to the Internet using a standard RJ45 Ethernet cable. See the Understanding the Customer Premises Network on page 4 for more information.
RESET	Resets the device. Insert a pointed object into the opening. Press for less than10 seconds to power cycle the device. Press for more than 10 seconds to reset the device to the factory defaults.
CABLE	Connects to the coaxial cable (not included) that comes from the cable wall outlet or cable splitter (not included).

1.7 Understanding the DDM3521 Front Panel and LED Behavior

The DDM3521 has several LEDs that provide the status of the device. The following image and the table describe LED behavior.
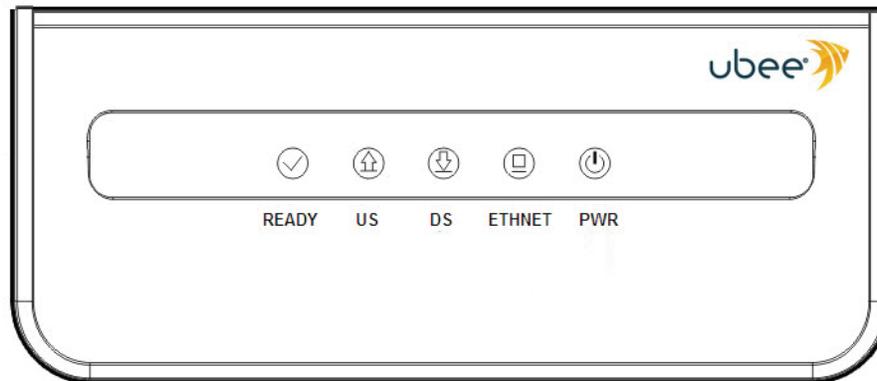
LED Name		Ready	DS		US		Ethernet	Power
			single	bonded	single	bonded		
Provisioning State								
Driver init		off	off		off		off	on
DS scanning		off	blinks		off		green/blue depending on Ethernet connection speed	on
DS locked		off	on		off			on
US ranging		off	on		blinks			on
US ranged		off	on		on			on
IP Init & Registration (& Firmware Upgrade)		blinks	on		on			on
Operational	Network Access Enabled	on	on	on	on	on		on
	Network Access Disabled	off	on	on	on	on		on
Cable interface traffic (network access enabled)		on	on	on	on	on	green/blue depending on Ethernet connection speed	on
Ethernet connected		depends on provisioning state					on	on
Ethernet traffic		depends on provisioning state					blinks	on

♦ GREEN Ethernet LED indicates 10/100 Mbps speed has been negotiated.

♦ BLUE Ethernet LED indicates 1000 Mbps speed has been negotiated.

♦ LED flashing indicates network traffic on the active port.

♦ LED dark indicates no connectivity.

2 Installing and Connecting the DDM3521

Use these instructions to install and connect the DDM3521.

Topics

See the following topics:

2.1 Understanding Minimum System Requirements

The following system requirements are for computers connecting to the cable modem and for using the Web interface of the cable modem.

PC - Minimum System Requirements

Processor	300Mhz
Operating System	Windows 2000 pro, Windows XP
Memory	128 MB RAM
Hard Drive	125 MB free space
Email Client	Outlook Express 5.5/6
Internet Browser	Internet Explorer version 5.5, 6 (sp1+sp2)
Computer Interface Ethernet card	Ethernet based connection (Network Interface Card) that can support 10/100/1000Mbps connection rates
Screen Display	SVGA display 800x600x256 colors or greater

Macintosh - Minimum System Requirements

Processor	Power PC 300Mhz +
Operating System	Mac OS 9.0+ (including OSX)
Memory	64 MB RAM
Hard Drive	150 MB free space
Email Client	Mac Mail
Internet Browser	Safari 1.2 +
Computer Interface	Ethernet based connection (Network Interface Card) that can support 10/100/1000Mbps connection rates
Screen display	SVGA display 800x600x256 colors or greater

2.2   Installing the DDM3521

Install the DDM3521 by connecting it to a power supply, a computer, and the Internet service. Subscribers must contact the Internet service provider (ISP) to enable Internet access.

Steps

To install the DDM3521:

1. Verify service has been activated on the provisioning system before installing at the customer premises. Contact your Network Operations Center (NOC) or headend for instructions if service activation is not completed.

2. Remove the contents from the device packaging.

3. Place the DDM3521 in an optimal location to connect to other devices, such as PCs or gaming consoles.

    ♦ Place the device in a location that has an operating temperature of 0˚C to 40˚C (32˚F to 104˚F). Refer to Understanding Safety and Regulatory Information on page 1 for safety regulations.

4. Power on your PC. The PC must have an Ethernet network adapter or Ethernet port and an Internet browser installed, such as Firefox or Internet Explorer. The following browsers are supported:

    ♦ For Windows 2000, XP, Vista, Windows 7: Firefox 1.07 and higher, Internet Explorer v7 and above, Netscape.

    ♦ For MAC OS X, 10.2, and higher: Firefox 1.07 and higher, Safari 1.x and higher.

5. Using the power supply included in the product package, connect the power cord to the **POWER** outlet on the back of the modem and connect the other end into the power outlet.

    Use only the power adaptor shipped with this device. Failure to do so may cause damage the device.

6. Using the Ethernet cable included in the product package, connect one end of the Ethernet cable to your computer's Ethernet port, and connect other end to the **ETHERNET** port on the cable modem.

7. Connect the coaxial cable from the cable wall outlet or a cable splitter connected to the cable wall outlet to the **CABLE** port on the device.

2.3   Connecting Devices to Your Network

Use the following sections to connect network devices and validate device functionality.

Topics

See the following topics:

♦ Connecting Ethernet Devices on page 13

♦   Troubleshooting the Installation on page 13

2.3.1   Connecting Ethernet Devices

You can connect an Ethernet device to your network, such as a computer, using an Ethernet cable.

Steps

To connect an Ethernet device to the network:

1. Verify an Ethernet device (for example, a PC) is connected to the DDM3521. See Installing and Connecting the DDM3521 on page 11.

2. Use the LEDs on the DDM3521 to confirm operations. The PWR, US, DS, and READY LEDs are solidly lit in normal operations. The ETHNET LED is lit when a device is connected to the Ethernet port.

3. Open a Web browser and navigate to a Web site to validate network connectivity (for example, http://www.wikipedia.org).

4. If the connected device is a gaming console, perform an Internet connection test provided by your console. For more information please contact your console manufacturer.

5. Refer to Troubleshooting the Installation on page 13 for troubleshooting information, if needed.

2.4   Troubleshooting the Installation

Use the following tips if you have trouble with the installation.

❑ None of the LEDs are on when I power on the DDM3521.

   ♦ Verify the power outlet is energized and the power adaptor is connected to the power outlet.

   ♦ Check the connection between the power adapter and the cable modem. Power off the cable modem by removing the power cord from the back of the unit. Wait for five seconds and power on the modem again. If the problem still exists, there may be a hardware problem.

❑ The Ethernet LED on the cable modem is not lit.

   ♦ Verify both ends of the Ethernet cable are properly connected.

   ♦ Restart the computer to re-establish a connection with the cable modem.

   ♦ Check for a resource conflict (Windows users only).

      1. Right-click **My Computer** on your desktop and choose **Properties**.

      2. Click the **Hardware** tab, and then choose **Device Manager**.

      3. Look for a yellow exclamation point or red X over the NIC in the Network Adapters field. If you see either one, you may have an IRQ conflict.

4. Refer to the manufacturers documentation or you cable service provider for further assistance.

♦ Verify TCP/IP is the default protocol for your network interface card (NIC).

♦ Power cycle the DDM3521 by removing the power adapter from the electrical outlet and plugging it back in. Wait until the cable modem re-establishes communications with the cable service provider.

❑ General Connectivity Issues:

♦ If your PC is connected to a hub or gateway, connect the PC directly into an Ethernet port on the DDM3521.

♦ If you are using a cable splitter, remove the splitter and connect the cable modem directly to the cable wall outlet. Wait several minutes for the cable modem to re-establish communications with the cable service provider.

♦ The Ethernet cable may be damaged. Try another cable.

❑ If none of these suggestions work, contact the NOC or headend for further assistance.

3 Accessing the Web User Interface

The Web user interface allows you to view modem settings, configure, troubleshoot, and monitor the DDM3521 Cable Modem.
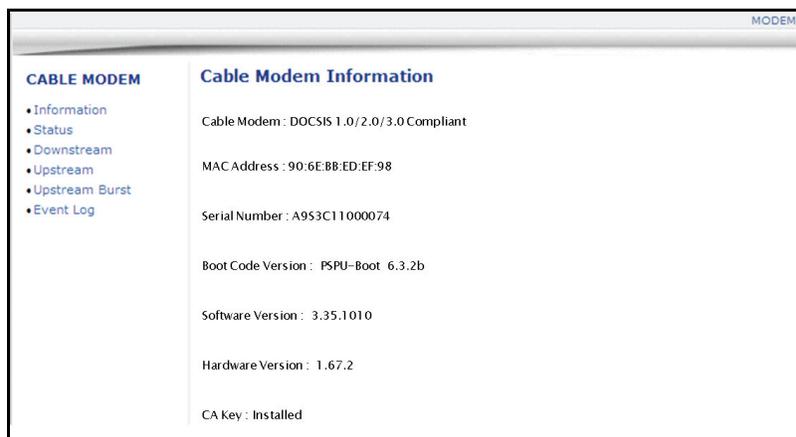
Steps

To log in to the Web interface:

1. Verify a PC is connected to the device as explained in Connecting Devices to Your Network on page 12.

2. From your PC, launch an Internet browser, for example, Internet Explorer.

3. In the Internet browser, enter the following address and press <**Enter**>.

    `http://192.168.0.1`

4. On the login page, click **Login**.

5. At the Authentication Required dialog, enter the username and password for the user account. The default is username/password is: user/user.
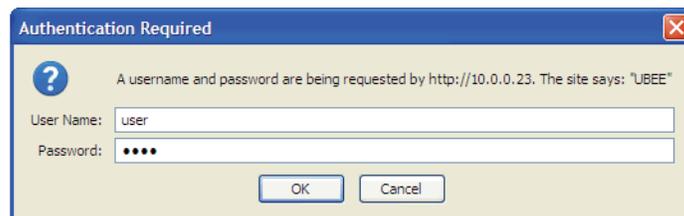
The Cable Modem main menu is displayed.

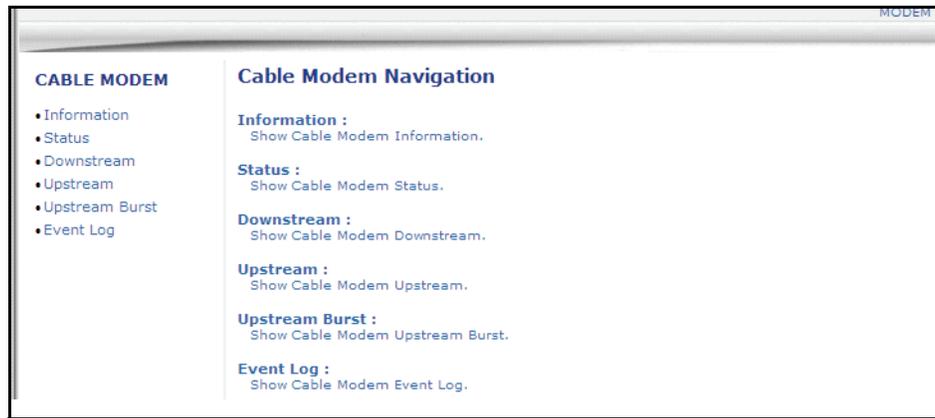# 4   Understanding the Cable Modem Menu

The **Modem** menu provides access to information about the modem, such as downstream and upstream connections and event logs.

Topics

See the following topics:

Steps

To access the Modem menu:

1. Access the Web interface. Refer to Accessing the Web User Interface on page 15.

2. Click the **Modem** link from the top menu. The Cable Modem menu is displayed.
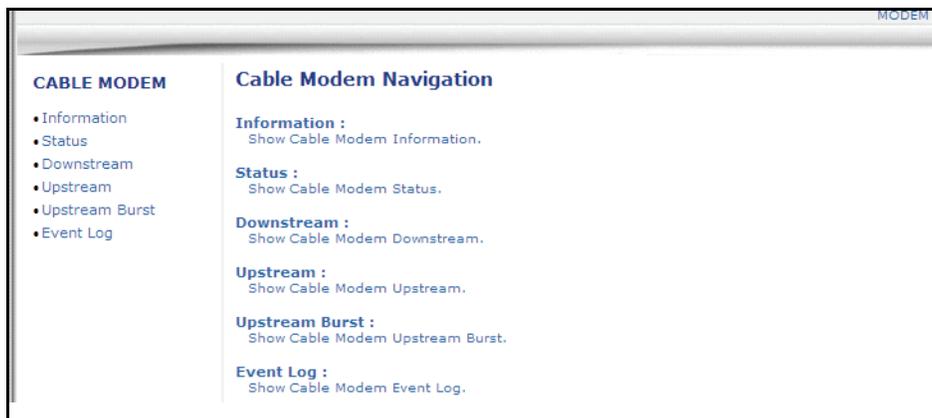
4.1   Using the Cable Modem Information Option

The **Cable Modem Information** screen is a read-only screen that displays the device's basic software and hardware configuration.

Steps

To view modem information:

1. Access the Web interface.

2. Click the **Modem** link from the top menu.

3. Click the **Information** link from the left side of the screen. Field explanations are listed following the screen example.

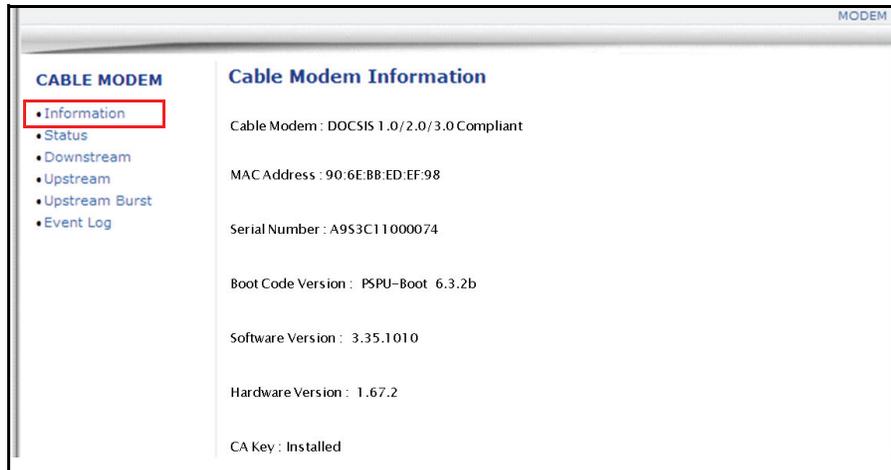| Label	Description
Cable Modem	Displays the current DOCSIS standard of the device.
MAC Address	Displays the unique Media Access Control (MAC) hardware address of cable modem RF interface.
Serial Number	Displays the unique manufacturer serial number of the device.
Boot Code Version	Displays the boot software code version of the device.
Software Version	Displays the general software version of the device.
Hardware Version	Displays the internal version number that identifies the hardware design.
CA Key	Displays the device Certificate Authority (CA) key that is transferred from the service provider's server after the cable modem is authenticated. The key is used to secure communication between the service provider and the cable modem.

4.2   Using the Cable Modem Status Option

The **Status** screen of the Web interface is a read-only screen that displays the device's general connection information.
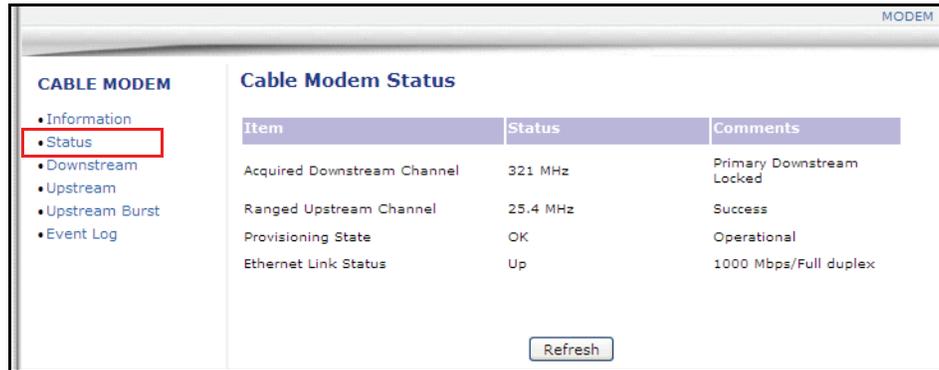
Steps

To view modem status:

1. Access the Web interface.

2. Click the **Modem** link from the top menu.

3. Click the **Status** link from the left side of the screen. Field explanations are listed following the screen example.

Label	Description
Acquired Downstream Channel	Displays the current downstream lock status. The Status field shows the downstream frequency. If the comment field shows Locked, the cable modem has locked onto this frequency. Otherwise, it shows In Progress to indicate the cable modem is trying to lock onto a frequency.
Ranged Upstream Channel	Displays the current upstream ranging status. The Status field shows the currently locked upstream frequency. The Comments field shows ranging status of locked upstream.)
Provisioning State	Indicates the current state of the cable modem. The Status field shows Ok when the cable modem is operational. Otherwise, it shows In Progress when the cable modem is in the process of provisioning. The Comments field shows the current provisioning state.
Ethernet Link Status	Displays the current link status of the Ethernet interface. The Status filed shows Up/Down to indicate if there are CPEs connected to the Ethernet interface. The comment field shows speed and duplex status of connected CPEs. Full duplex indicates the connection can send and receive data simultaneously.

4.3   Using the Cable Modem Downstream Option

The **Downstream** screen displays detailed information on the device's connection to downstream channels from the service provider.
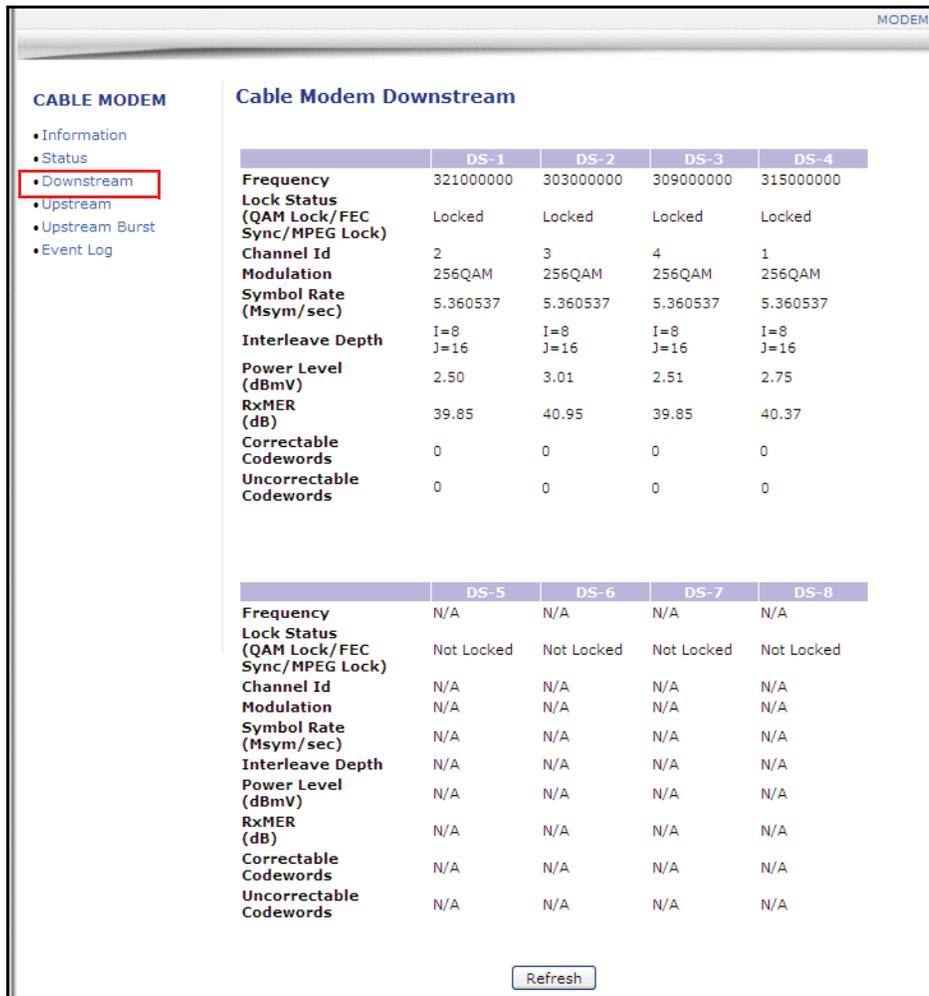
Steps

To view downstream information:

1. Access the Web interface.

2. Click the **Modem** link from the top menu.

3. Click the **Downstream** link from the left side of the screen. Field explanations are

listed following the screen example.

Label	Description
Downstream Channels 1-8	
Frequency	Displays the downstream channel frequency on which the cable modem is scanning.
Lock Status (QAM Lock, FEC Sync, MPEG Locked)	Displays if the cable modem succeeded in locking to a downstream channel. Status is indicated as Locked or Not Locked.
Channel ID	Displays the locked downstream channel ID.
Modulation	Displays the current locked modulation type required for the downstream channel to lock to by the cable modem. This method is determined by the service provider.
Symbol Rate (Msym/sec)	Displays the symbol rate. The current cable modem downstream symbol rates are: QAM64 is 5056941 sym/sec, QAM256 is 5360537 sym/sec.

Label	Description
Interleave Depth	Displays the current cable modem downstream Interleave depth. I = number of taps; J - increments. (4/8/16/32/64/128/other).
Power Level (dBmV)	Displays the receiver power level after ranging process.
RxMER (dB)	Displays the Receiver Modulation Error Ratio. The RxMER is used to quantify the performance of a digital radio receiver in a communications system using digital modulation.
Correctable Codewords	Displays the quantity of R-S codewords received on this channel with correctable errors.
Uncorrectable Codewords	Displays the quantity of R-S codewords received on this channel with uncorrectable errors.
Refresh	Recaptures and displays screen values.

4.4   Using the Cable Modem Upstream Option
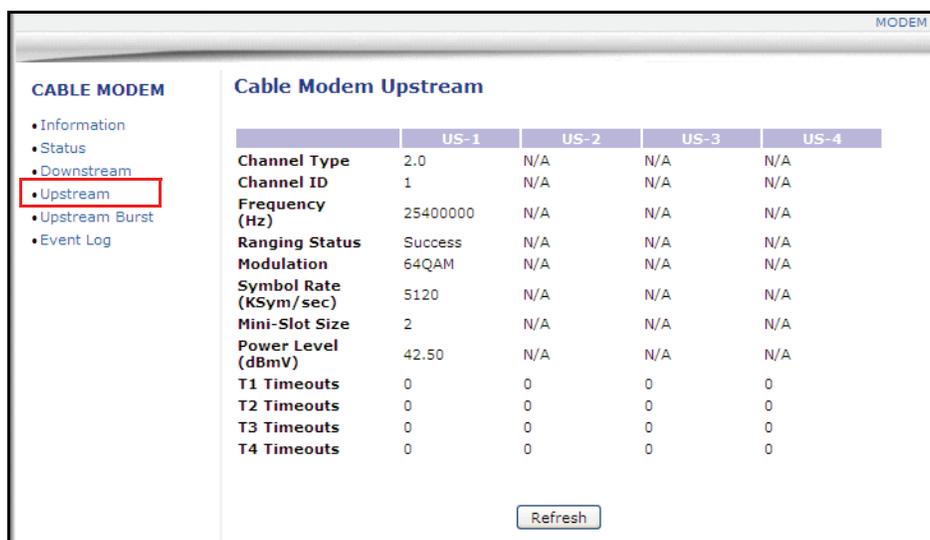
The **Upstream** screen displays detailed information on the device's connection to upstream channels to the service provider.

Steps

To view upstream information:

1. Access the Web interface.

2. Click the **Modem** link from the top menu.

3. Click the **Upstream** link from the left side of the screen. Field explanations are listed following the screen example.

Label	Description
Channel Type	Displays the channel type. Value can be 1.0/s.2/mixed/3.0 according to the collected upstream channel descriptors (UCDs).
Channel ID	Displays the current cable modem upstream channel ID.
Frequency (Hz)	Displays the current cable modem upstream frequency in hertz.
Ranging Status	Displays the upstream ranging status. Values are: Other/Aborted/Retries Exceeded/Success/Continue/ T4 Timeout.
Modulation	Displays the current cable modem upstream modulation type (QPSK/ QAM8 /QAM16/ QAM32/ QAM64/ QAM128/ QAM256).
Symbol Rate (Ksym/sec)	Displays the symbol rate in kilosymbols per second.
Mini-Slot Size	Displays the current cable modem upstream mini-slot size in Timebase Ticks of 6.25.
Power Level (dBmV)	Displays the current cable modem upstream transmit power.
T-1 through T-4 Timeouts	T-1-Displays UCD timeout. T-2-Displays broadcast ranging timeout. T-3-Displays ranging response. T-4-Displays unicast ranging opportunity.
Refresh	Recaptures and displays screen values.

4.5 Using the Modem Upstream Burst Option

The **Upstream Burst** screen displays detailed information on the device's upstream data flow to the service provider.

Steps

To view upstream burst information:

1. Access the Web interface.

2. Click the **Modem** link from the top menu.

3. Click the **Upstream Burst** link from the left side of the screen. Column and field explanations are listed following the screen example.

Note

Column headings in the Cable Modem Upstream Burst table indicate the Interval Usage Codes (IUCs) used to transmit the data. In general, advanced short grant (9) and advanced long grant (10) IUCs are used for short and long data packets respectively.

MODEM

CABLE MODEM

- Information
- Status
- Downstream
- Upstream
- Upstream Burst
- Event Log

Cable Modem Upstream Burst

US-1						
	Req (1)	Init Maint (3)	Per Maint (4)	Adv Short (9)	Adv Long (10)	Adv UGS (11)
Modulation Type	QPSK	QPSK	QPSK	64QAM	64QAM	64QAM
Differential Encoding	OFF	OFF	OFF	OFF	OFF	OFF
Preamble Length	64	640	384	64	128	128
Preamble Value Offset	652	6	6	1028	1028	1028
FEC Error Correction (T)	4	10	10	16	16	16
FEC Codeword Information Bytes (k)	16	34	34	75	219	219
Maximum Burst Size	0	0	0	3	0	0
Guard Time Size	8	48	48	8	8	8
Last Codeword Length	FIX	FIX	FIX	SHORT	SHORT	SHORT
Scrambler on/off	ON	ON	ON	ON	ON	ON

US-2
Modulation Type
Differential Encoding
Preamble Length
Preamble Value Offset
FEC Error Correction (T)
FEC Codeword Information Bytes (k)
Maximum Burst Size
Guard Time Size
Last Codeword Length
Scrambler on/off

US-3
Modulation Type
Differential Encoding
Preamble Length
Preamble Value Offset
FEC Error Correction (T)
FEC Codeword Information Bytes (k)
Maximum Burst Size
Guard Time Size
Last Codeword Length
Scrambler on/off

US-4
Modulation Type
Differential Encoding
Preamble Length
Preamble Value Offset
FEC Error Correction (T)
FEC Codeword Information Bytes (k)
Maximum Burst Size
Guard Time Size
Last Codeword Length
Scrambler on/off

Refresh

Label	Description
Modulation Type	Displays the modulation type as QPSK, 16QAM, 8QAM, 32QAM, 64QAM, 128QAM.
Differential Encoding	Displays if differential coding is on or off.
Preamble Length	Displays the preamble length 0-1536 (bits).
Preamble Value Offset	Displays the preamble value offset 0-1536 (bits).
FEC Error Correction (T)	Displays FEC error correction from 0 to 10 (0 implies no FEC. The number of codeword parity bytes is 2*T).
FEC Codeword Information Bytes (k)	Displays the FEC codeword information. Fixed: 16 to 253 (assuming FEC on). Shortened: 16 to 253 (assuming FEC on).
Maximum Burst Size	Displays the maximum burst size: 0-255 (mini-slots).
Guard Time Size	Displays the guard time size: 4-255 (symbols).
Last Codeword Length	Displays the last codeword length as FIX (fixed) or SHORT (shortened).
Scrambler on/off	Displays if the scrambler is on or off.

## 4.6   Using the Cable Modem Event Log Option

The **Event Log** screen displays log information that may be useful to diagnose operational issues with the device. It also displays all logins to this Web interface.

Steps

To view event log information:

1. Access the Web interface.

2. Click the **Modem** link from the top menu.

3. Click the **Event Log** link from the left side of the screen. Field explanations are listed following screen example.
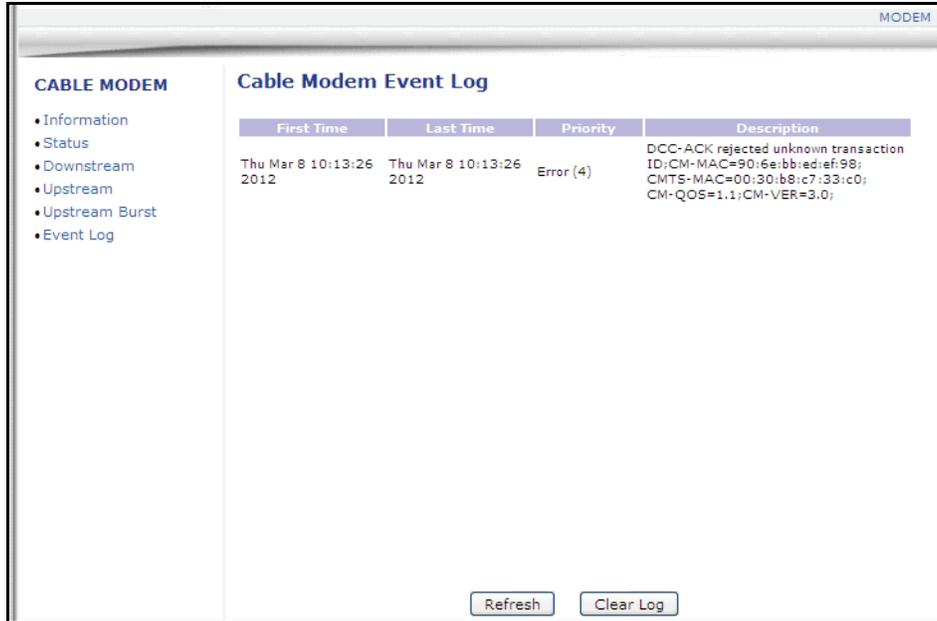
Label	Description
First Time	Displays the time of the event.
Last Time	Displays the last time of the event.
Priority	Displays the event log severity.
Description	Displays a detailed DESCRIPTIONof the event log.
Refresh/Clear Log	Refreshes the event log record. Clear Log erases the screen.