E31N2V1 DOCSIS 3.1 EMTA

User's Guide

Version 1.0 - 11/2017

hitron

About This User's Guide

Intended Audience

This manual is intended for people who want to configure the E31N2V1's features via its Graphical User Interface (GUI).

How to Use this User's Guide

This manual contains information on each the E31N2V1's GUI screens, and describes how to use its various features.

- Use the Introduction on page 9 to see an overview of the topics covered in this manual.
- Use the Table of Contents (page 5), List of Figures (page 7) and List of Tables (page 8) to quickly find information about a particular GUI screen or topic.
- Use the Index (page 45) to find information on a specific keyword.
- Use the rest of this User's Guide to see in-depth descriptions of the E31N2V1's features.

Related Documentation

- **Quick Installation Guide**: see this for information on getting your E31N2V1 up and running right away. It includes information on system requirements, package contents, the installation procedure, and basic troubleshooting tips.
- **Online Help**: each screen in the E31N2V1's Graphical User Interface (GUI) contains additional information about configuring the screen.

Document Conventions

This User's Guide uses various typographic conventions and styles to indicate content type:

- Bulleted paragraphs are used to list items, and to indicate options.

1 Numbered paragraphs indicate procedural steps.

NOTE: Notes provide additional information on a subject.

Warnings provide information about actions that could harm you or your device.

Product labels, field labels, field choices, etc. are in **bold** type. For example:

> Select **UDP** to use the User Datagram Protocol.

A mouse click in the Graphical User Interface (GUI) is denoted by a right angle bracket (>). For example:

> Click **Settings** > **Advanced Settings**.

means that you should click **Settings** in the GUI, then **Advanced settings**.

A key stroke is denoted by square brackets and uppercase text. For example:

> Press [ENTER] to continue.

Customer Support

For technical assistance or other customer support issues, please consult your Hitron representative.

Default Login Details

The E31N2V1's default IP address and login credentials are as follows. For more information, see Logging in to the E31N2V1 on page 17.

Table 1: Default Credentials

IP Address	192.168.100.1
Username	technician
Password	PoD Tool

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1

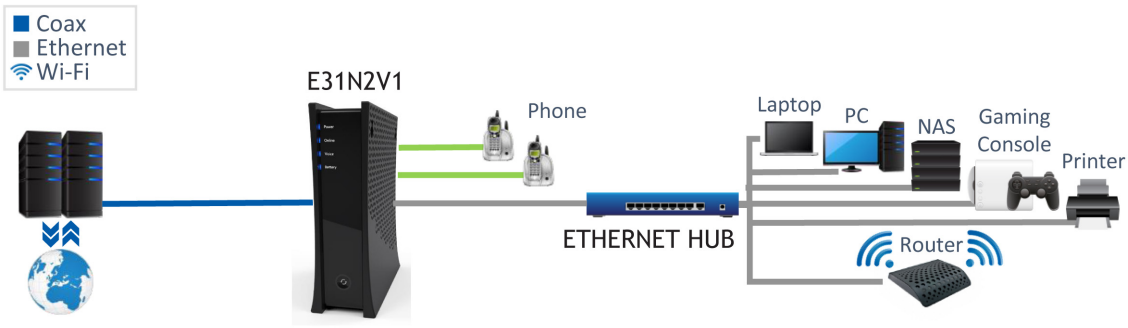
Introduction

This chapter introduces the E31N2V1 and its GUI (Graphical User Interface).

1.1 E31N2V1 Overview

Your E31N2V1 is a DOCSIS cable modem, router and embedded Multimedia Terminal Adapter (eMTA) that allows you to connect your cabled Ethernet and analog telephones to one another and to the Internet via your building's cable connection.

Figure 1: Application Overview



1.1.1 Key Features

The E31N2V1 provides:

- DOCSIS 3.1 certified.
- Integrated DLNA media server with support for video, audio and image serving.

- Two RJ11 FXS (Foreign Exchange Station) ports to connect analog telephones for use with VoIP services.
- Extensive operator control via configuration file and SNMP.
- Well-defined LEDs clearly display device and network status.
- TR-069 and HNAP for easy setup and remote management.
- Enhanced management and stability for low total cost of ownership.

1.2 Hardware Connections

This section describes the E31N2V1's physical ports and buttons.

Figure 2: Hardware Connections

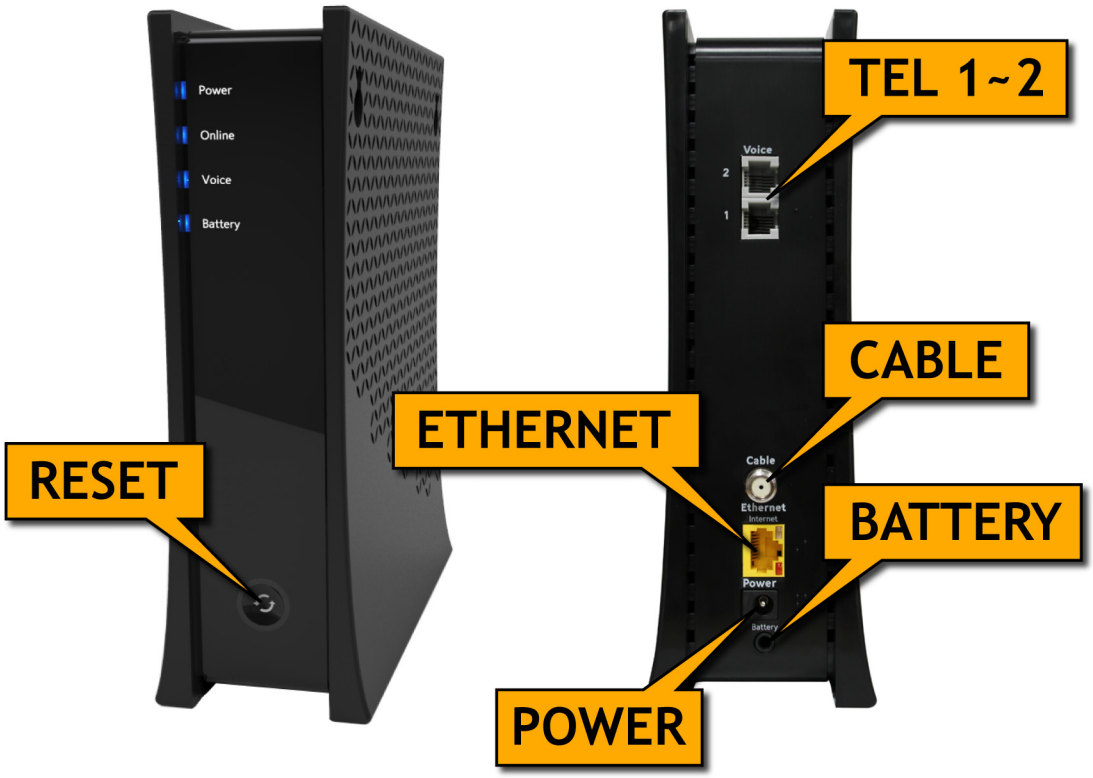


Table 2: Hardware Connections

RESET	Use this button to reboot or reset your E31N2V1 to its factory default settings. To reboot the E31N2V1, press the button and hold it for four seconds, then release. The E31N2V1 restarts, using your existing settings. To reset the E31N2V1, press the button and hold it for ten seconds or more, then release. All user-configured settings are deleted, and the E31N2V1 restarts using its factory default settings.
TEL 1	Use these ports to connect your analog phones for VoIP services, using cables with RJ11 connectors.
TEL 2	
CABLE	Use this to connect to the Internet via an F-type RF cable.

Table 2: Hardware Connections

ETHERNET	Use this port to connect your computer and/orother network devices, using a Category 5 or 6 Ethernet cable with RJ45 connectors. The LED on the left displays the speed of the connection on the relevant port: • When the LED on the left is off, the connection is at 10Mbps (Megabits per second). • When the LED on the left glows green, the connection is at 100Mbps. • When the LED on the left glows amber, the connection is at 1Gbps (Gigabits per second). The LED on the right displays whether or not there is activity on the relevant port: • When the LED on the right is blinking, there is activity on the port. • When the LED on the right is off, there is no activity on the port.

Table 2: Hardware Connections

POWER	Use this to connect to the 12v/1.5A power adapter that came with your E31N2V1. **NEVER use another power adapter with your E31N2V1. Doing so could harm your E31N2V1.** Figure 3: Power Adaptor 
BATTERY	Use this port to connect the optional battery back up unit (see Battery Operations on page 13).

1.3 Battery Operations

The E31N2V1 has an optional battery backup unit (BBU) enabling you to connect a lithium-ion battery that provides emergency power to the device in the event of a power outage. If you ordered this option, connect the battery by following the Quick Installation Guide that accompanied it.

NOTE: The E31N2V1 battery is intended for use as a backup to the main power source, not as a replacement for it. For optimal power performance you should use the battery in conjunction with the main power source.

1.4 LEDs

This section describes the E31N2V1's LEDs (lights).

Figure 4: LEDs

Table 3: LEDs

LED	STATUS	**DESCRIPTION**
Power	Off	The E31N2V1 is not receiving power.
	On	The E31N2V1 is receiving power, has completed powering-up, and is ready to use.
	Blinking	The E31N2V1 is receiving power and is powering-up.
Online	Blinking	The E31N2V1's cable modem is registering with the service provider's CMTS.
	On	The E31N2V1's cable modem has successfully registered with the service provider and is ready for data transfer (see DOCSIS on page 19).
	Off	The E31N2V1's cable modem is offline.

Table 3: LEDs

Voice	Off	No telephone is connected to either the **TEL 1** or **TEL 2** port, or both, or voice service has not been enabled by your service provider.
	Blue, steady	A telephone is connected to either the **TEL 1** or **TEL 2** port, or both, one or both of which are off-hook.
	Blue, blinking	A telephone is connected to either the **TEL 1** or **TEL 2** ports, or both, both of which are on-hook.
Battery	Off	No battery is connected to the E31N2V1.
	Blue, blinking	A battery is connected to the E31N2V1, and is charging (with more than 10% of its charge remaining).
	Red, blinking	A battery is connected to the E31N2V1, and is charging (with 10% or less of its charge remaining).

1.5 IP Address Setup

Before you log into the E31N2V1's GUI, your computer's IP address must be in the same subnet as the E31N2V1. This allows your computer to communicate with the E31N2V1.

If your computer is configured to get an IP address automatically, or if you are not sure, try to log in to the E31N2V1 (see GUI Overview on page 17).

- If the login screen displays, your computer is already configured correctly.
- If the login screen does not display, your computer is not configured correctly. Follow the procedure in Manual IP Address Setup on page 16 and set your computer to get an IP address automatically. Try to log in again. If you cannot log in, follow the manual IP address setup procedure again, and set a specific IP address as shown. Try to log in again.

NOTE: If you still cannot see the login screen, your E31N2V1's IP settings may have been changed from their defaults. If you do not know the E31N2V1's new address, you should return it to its factory defaults. See Resetting the E31N2V1 on page 18. Bear in mind that ALL user-configured settings are lost.

1.5.1 Manual IP Address Setup

By default, your E31N2V1's local IP address is **192.168.100.1**. If your E31N2V1 is using the default IP address, you should set your computer's IP address to be between **192.168.100.2** and **192.168.100.254**.

Take the following steps to manually set up your computer's IP address to connect to the E31N2V1:

NOTE: This example uses Windows 7; the procedure for your operating system may be different.

1. Click the **Start Orb**, then click **Control Panel**.
2. In the window that displays, double-click **Network And Sharing Center**.
3. In the left-hand panel, click **Change Adapter Settings**.
4. Right-click your network connection (usually **Local Area Connection**) and click **Properties**.
5. In the **Networking** tab's **This connection uses the following items** list, scroll down and select **Internet Protocol (TCP/IPv4)**. Click **Properties**.
6. You can get an IP address automatically, or specify one manually:
   - If your network has an active DHCP server, select **Get an IP address automatically**.
   - If your network does not have an active DHCP server, select **Use the following IP address**. In the **IP address** field, enter a value between **192.168.100.2** and **192.168.100.254** (default). In the **Subnet mask** field, enter **255.255.255.0** (default). In the **Default Gateway** field, enter **192.168.100.1** (default).

NOTE: If your E31N2V1 is not using the default IP address, enter an IP address and subnet mask that places your computer in the same subnet as the E31N2V1.

7. Click **OK**. The **Internet Protocol (TCP/IP)** window closes. In the **Local Area Connection Properties** window, click **Close**.

Your computer now obtains an IP address from the E31N2V1, or uses the IP address that you specified, and can communicate with the E31N2V1.

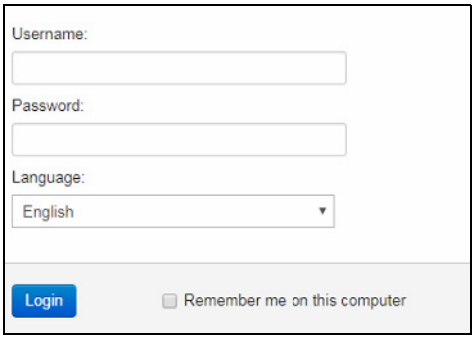
1.6 Logging in to the E31N2V1

Take the following steps to log into the E31N2V1's GUI.

1 Open a browser window.

2 Enter the E31N2V1's IP address (default **192.168.100.1**) in the URL bar. The **Login** screen displays.

Figure 5: Login



3 Enter the **Username** and **Password**. The default user name is **technician** and the default password is **PoD Tool**.

NOTE: The Username and Password are case-sensitive; "password" is not the same as "PASSWORD".

4 If you want to use a language other than English, select it from the **Language** dropdown.

5 If you want to log in without entering the password in future, select **Remember me on this computer**. Only select this on your own, private computer (not public computers, or those easily-accessible by others).

6 Click **Login**. The **System Information** screen displays (see The Status: System Information Screen on page 26).

1.7 GUI Overview

This section describes the E31N2V1's GUI.

Figure 6: GUI Overview

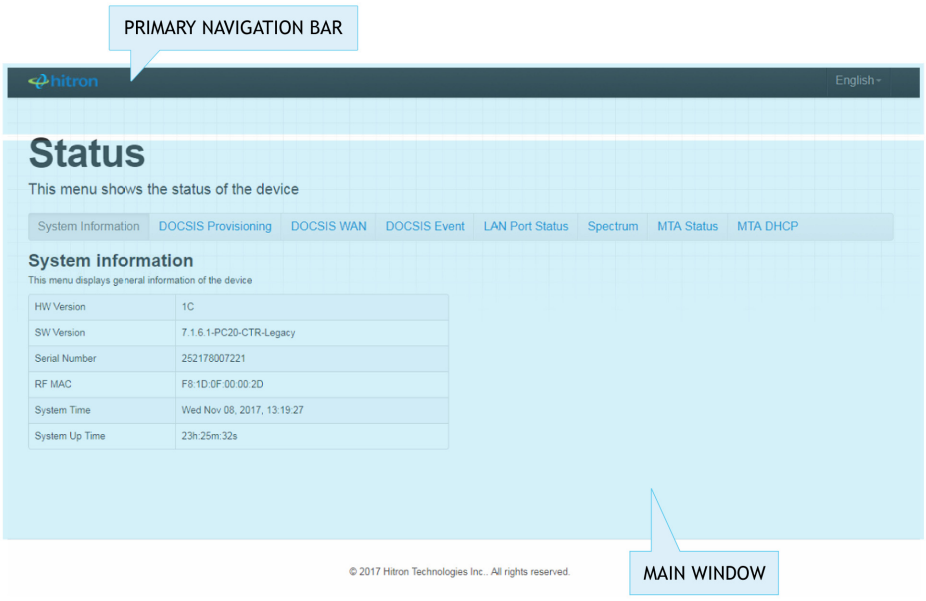


Table 4: GUI Overview

Primary Navigation Bar	Use this section to move from one part of the GUI to another.
Main Window	Use this section to read information about your E31N2V1's configuration, and make configuration changes.

1.8 Resetting the E31N2V1

When you reset the E31N2V1 to its factory defaults, all user-configured settings are lost, and the E31N2V1 is returned to its initial configuration state.

To reset the E31N2V1, press and hold the **RESET** button for ten seconds. The E31N2V1 turns off and on again, using its factory default settings.

NOTE: Depending on your E31N2V1's previous configuration, you may need to re-configure your computer's IP settings; see IP Address Setup on page 15.

1

Status

This chapter describes the screens that display when you click **Status** in the toolbar. It contains the following sections:

1.1 Status Overview

This section describes some of the concepts related to the **Status** screens.

1.1.1 DOCSIS

The Data Over Cable Service Interface Specification (DOCSIS) is a telecommunications standard that defines the provision of data services) Internet access) over a traditional cable TV (CATV) network.

Your E31N2V1 supports DOCSIS version 3.0.

1.1.2 IP Addresses and Subnets

Every computer on the Internet must have a unique Internet Protocol (IP) address. The IP address works much like a street address, in that it identifies a specific location to which information is transmitted. No two computers on a network can have the same IP address.

1.1.2.1 IP Address Format

IP addresses consist of four octets (8-bit numerical values) and are usually represented in decimal notation, for example **192.168.1.1**. In decimal notation, this means that each octet has a minimum value of 0 and a maximum value of 255.

An IP address carries two basic pieces of information: the "network number" (the address of the network as a whole, analogous to a street name) and the "host ID" (analogous to a house number) which identifies the specific computer (or other network device).

1.1.2.2 IP Address Assignment

IP addresses can come from three places:

- The Internet Assigned Numbers Agency (IANA)
- Your Internet Service Provider
- You (or your network devices)

IANA is responsible for IP address allocation on a global scale, and your ISP assigns IP addresses to its customers. You should never attempt to define your own IP addresses on a public network, but you are free to do so on a private network.

In the case of the E31N2V1:

- The public network (Wide Area Network or WAN) is the link between the cable connector and your Internet Service Provider. Your E31N2V1's IP address on this network is assigned by your service provider.

- The private network is your Local Area Network (LAN) and Wireless Local Area Network (WLAN), if featured and enabled. You are free to assign IP addresses to computers on the LAN and WLAN manually, or to allow the E31N2V1 to assign them automatically via DHCP (Dynamic Host Configuration Protocol). IANA has reserved the following blocks of IP addresses to be used for private networks only:

Table 1: Private IP Address Ranges

FROM...	...TO
10.0.0.0	10.255.255.255
172.16.0.0	172.31.255.255
192.168.0.0	192.168.255.255

If you assign addresses manually, they must be within the E31N2V1's LAN subnet.

1.1.2.3 Subnets

A subnet (short for sub-network) is, as the name suggests, a separate section of a network, distinct from the main network of which it is a part. A subnet may contain all of the computers at one corporate local office, for example, while the main network includes several offices.

In order to define the extent of a subnet, and to differentiate it from the main network, a subnet mask is used. This "masks" the part of the IP address that refers to the main network, leaving the part of the IP address that refers to the sub-network.

Each subnet mask has 32 bits (binary digits), as does each IP address:

- A binary value of **1** in the subnet mask indicates that the corresponding bit in the IP address is part of the main network.
- A binary value of **0** in the subnet mask indicates that the corresponding bit in the IP address is part of the sub-network.

For example, the following table shows the IP address of a computer (**192.168.1.1**) expressed in decimal and binary (each cell in the table indicates one octet):

Table 2: IP Address: Decimal and Binary

192	168	0	1
11000000	10101000	00000000	00000001

The following table shows a subnet mask that "masks" the first twenty-four bits of the IP address, in both its decimal and binary notation.

Table 3: Subnet Mask: Decimal and Binary

255	255	255	0
11111111	11111111	11111111	00000000

This shows that in this subnet, the first three octets (**192.168.1**, in the example IP address) define the main network, and the final octet (**1**, in the example IP address) defines the computer's address on the subnet.

The decimal and binary notations give us the two common ways to write a subnet mask:

- Decimal: the subnet mask is written in the same fashion as the IP address: **255.255.255.0**, for example.
- Binary: the subnet mask is indicated after the IP address (preceded by a forward slash), specifying the number of binary digits that it masks. The subnet mask **255.255.255.0** masks the first twenty-four bits of the IP address, so it would be written as follows: 192.168.1.1**/24**.

1.1.3 DHCP

The Dynamic Host Configuration Protocol, or DHCP, defines the process by which IP addresses can be assigned to computers and other networking devices automatically, from another device on the network. This device is known as a DHCP server, and provides addresses to all the DHCP client devices.

In order to receive an IP address via DHCP, a computer must first request one from the DHCP server (this is a broadcast request, meaning that it is sent out to the whole network, rather than just one IP address). The DHCP server hears the requests, and responds by assigning an IP address to the computer that requested it.

If a computer is not configured to request an IP address via DHCP, you must configure an IP address manually if you want to access other computers and devices on the network. See IP Address Setup on page 15 for more information.

By default, the E31N2V1 is a DHCP client on the WAN (the CATV connection). It broadcasts an IP address over the cable network, and receives one from the service provider. By default, the E31N2V1 is a DHCP server on the LAN; it provides IP addresses to computers on the LAN which request them.

1.1.4 DHCP Lease

"DHCP lease" refers to the length of time for which a DHCP server allows a DHCP client to use an IP address. Usually, a DHCP client will request a DHCP lease renewal before the lease time is up, and can continue to use the IP address for an additional period. However, if the client does not request a renewal, the DHCP server stops allowing the client to use the IP address.

This is done to prevent IP addresses from being used up by computers that no longer require them, since the pool of available IP addresses is finite.

1.1.5 MAC Addresses

Every network device possesses a Media Access Control (MAC) address. This is a unique alphanumeric code, given to the device at the factory, which in most cases cannot be changed (although some devices are capable of "MAC spoofing", where they impersonate another device's MAC address).

MAC addresses are the most reliable way of identifying network devices, since IP addresses tend to change over time (whether manually altered, or updated via DHCP).

Each MAC address displays as six groups of two hexadecimal digits separated by colons (or, occasionally, dashes) for example **00:AA:FF:1A:B5:74**.

NOTE: Each group of two hexadecimal digits is known as an "octet", since it represents eight bits.

Bear in mind that a MAC address does not precisely represent a computer on your network (or elsewhere), it represents a network device, which may be part of a computer (or other device). For example, if a single computer has an Ethernet card (to connect to your network via a wired interface) and also has a wireless card (to connect to your network over the wireless interface) the MAC addresses of the two cards will be different. In the case of the E31N2V1, each internal module (cable modem module, Ethernet module, etc.) possesses its own MAC address.

1.1.6 Downstream and Upstream Transmissions

The terms "downstream" and "upstream" refer to data traffic flows, and indicate the direction in which the traffic is traveling. "Downstream" refers to traffic from the service provider to the E31N2V1, and "upstream" refers to traffic from the E31N2V1 to the service provider.

1.1.7 Cable Frequencies

Just like radio transmissions, data transmissions over the cable network must exist on different frequencies in order to avoid interference between signals.

The data traffic band is separate from the TV band, and each data channel is separate from other data channels.

1.1.8 Modulation

Transmissions over the cable network are based on a strong, high frequency periodic waveform known as the "carrier wave." This carrier wave is so called because it "carries" the data signal. The data signal itself is defined by variations in the carrier wave. The process of varying the carrier wave (in order to carry data signal information) is known as "modulation." The data signal is thus known as the "modulating signal."

Cable transmissions use a variety of methods to perform modulation (and the "decoding" of the received signal, or "demodulation"). The modulation methods defined in DOCSIS 3 are as follows:

- **QPSK**: Quadrature Phase-Shift Keying
- **QAM**: Quadrature Amplitude Modulation
- **QAM TCM**: Trellis modulated Quadrature Amplitude Modulation

In many cases, a number precedes the modulation type (for example **16 QAM**). This number refers to the complexity of modulation. The higher the number, the more data can be encoded in each symbol.

NOTE: In modulated signals, each distinct modulated character (for example, each audible tone produced by a modem for transmission over telephone lines) is known as a symbol.

Since more information can be represented by a single character, a higher number indicates a higher data transfer rate.

1.1.9 TDMA, FDMA and SCDMA

Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA) and Synchronous Code Division Multiple Access (SCDMA) are channel access methods that allow multiple users to share the same frequency channel.

- TDMA allows multiple users to share the same frequency channel by splitting transmissions by time. Each user is allocated a number of time slots, and transmits during those time slots.
- FDMA allows multiple users to share the same frequency channel by assigning a frequency band within the existing channel to each user.
- SCDMA allows multiple users to share the same frequency channel by assigning a unique orthogonal code to each user.

1.1.10 OFDM

Orthogonal Frequency-Division Multiplexing (OFDM) is a physical-layer data encoding method for transmitting and receiving data on Radio Frequency (RF) media, such as the E31N2V1's cable connection.

OFDM takes a single wide-band signal and separates it into multiple simultaneous subcarriers across the available RF spectrum, separated by the minimum frequency necessary to ensure non-interference among sub-carriers. "Orthogonal", in this usage, refers to this non-interfering quality of the technique.

The primary advantage of OFDM is that a signal encoded using the method can withstand suboptimal conditions on the RF medium. Depending on its implementation, OFDM can also enable faster signal throughput.

1.1.11 FFT

The Fast Fourier Transform (FFT) is an algorithm for rapidly implementing Fourier analysis of a data stream, used by modulation methods such as OFDM. Fourier analysis is a mathematical technique that enables the representation of data using simpler trigonometric functions.

In this implementation, Fourier analysis is used to construct the frequency data for transmission, and to deconstruct received frequency data.

1.1.12 OFDMA

Orthogonal Frequency-Division Multiple Access (OFDMA) is a multiuser adaptation of OFDM (see OFDM on page 25) that permits simultaneous use by multiple users by assigning a specific group of OFDM subcarriers to each individual user.

1.2 The Status: System Information Screen

Use this screen to view information about the E31N2V1's system and statistics.

Click **Status** > **System Information**. The following screen displays.

Figure 1: The Status: System Information Screen

The following table describes the labels in this screen.

Table 4: The Status: System Information Screen

HW Version	This displays the version number of the E31N2V1's physical hardware.
SW Version	This displays the version number of the software that controls the E31N2V1.

Table 4: The Status: System Information Screen (continued)

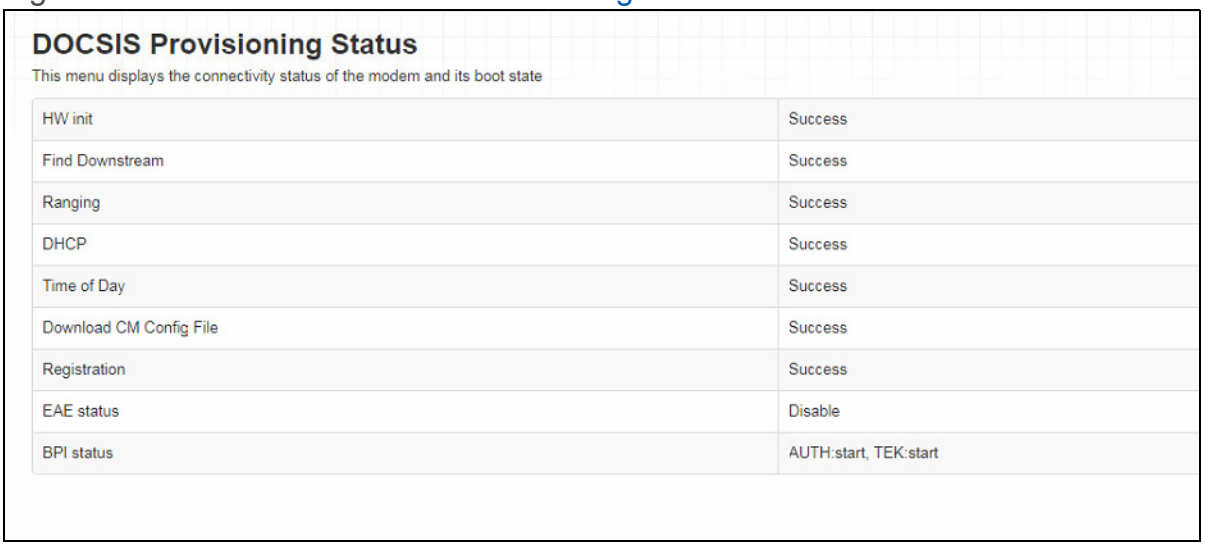
Serial Number	This displays the uniquely identifying number of the E31N2V1. If you contact your cable service provider for assistance, they may ask you for this number.
RF MAC	This displays the Media Access Control (MAC) address of the E31N2V1's radio frequency (RF) module. This is the module that connects to the Internet through the **Cable** connection.
System Time	This displays the current date and time.
System Up Time	This displays the amount of time that has elapsed since the E31N2V1 was last restarted.

1.3 The Status: DOCSIS Provisioning Screen

This screen displays the steps successfully taken to connect to the Internet over the **Cable** connection.

Use this screen for troubleshooting purposes to ensure that the E31N2V1 has successfully connected to the Internet; if an error has occurred you can identify the stage at which the failure occurred.Click **Status** > **DOCSIS Provisioning**. The following screen displays.

Figure 2: The Status: DOCSIS Provisioning Screen



For each step:

- **Process** displays when the E31N2V1 is attempting to complete a connection step.
- **Success** displays when the E31N2V1 has completed a connection step.
- **Disable** displays when the relevant feature has been turned off.

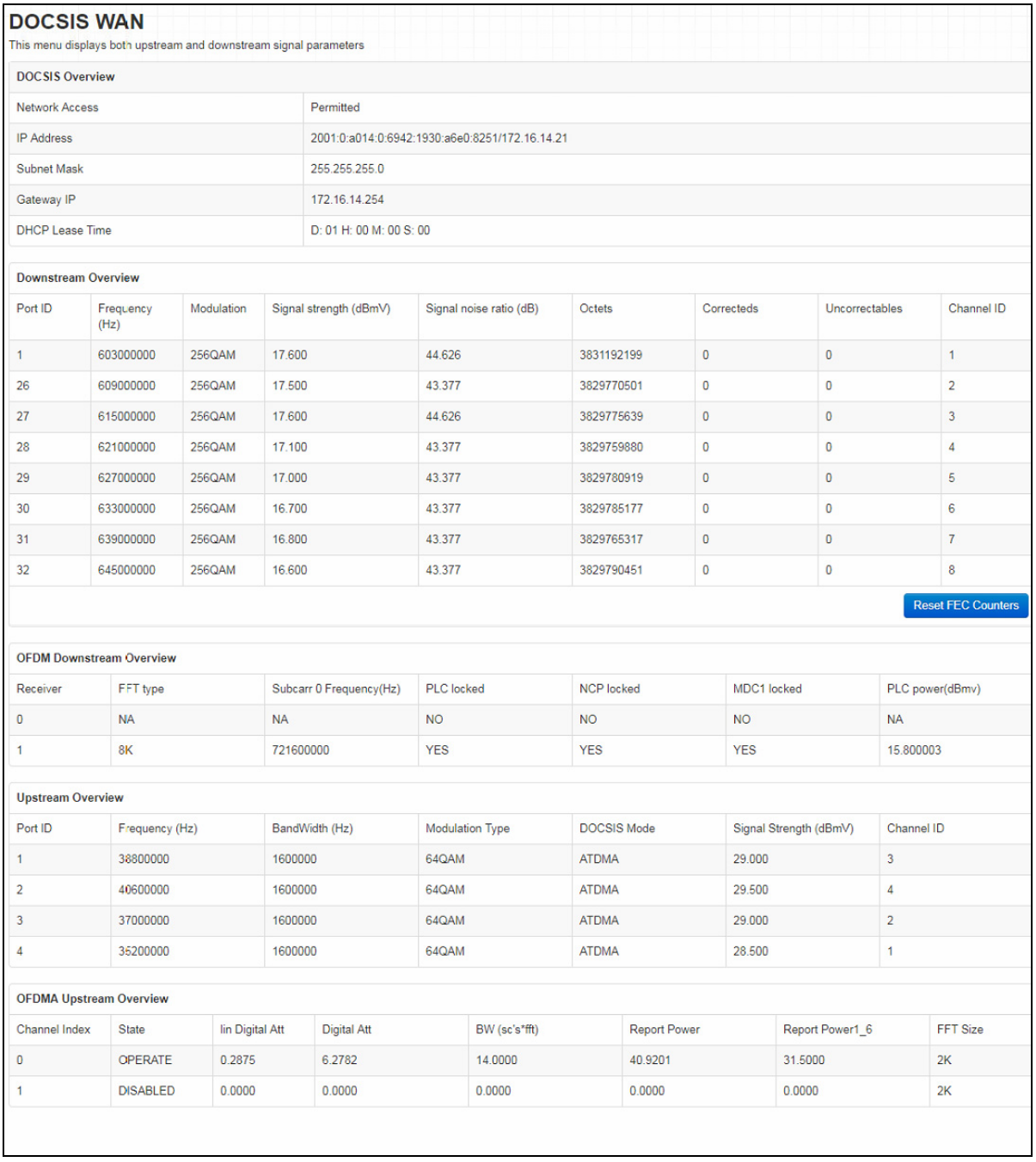
1.4 The Status: DOCSIS WAN Screen

Use this screen to discover information about:

- The nature of the upstream and downstream connection between the E31N2V1 and the device to which it is connected through the **CABLE** interface.
- IP details of the E31N2V1's WAN connection.

Click **Status** > **DOCSIS WAN**. The following screen displays.

Figure 3: The Status: DOCSIS WAN Screen



DOCSIS WAN

This menu displays both upstream and downstream signal parameters

DOCSIS Overview

Network Access	Permitted
IP Address	2001:0:a014:0:6942:1930:a6e0:8251/172.16.14.21
Subnet Mask	255.255.255.0
Gateway IP	172.16.14.254
DHCP Lease Time	D: 01 H: 00 M: 00 S: 00

Downstream Overview

Port ID	Frequency (Hz)	Modulation	Signal strength (dBmV)	Signal noise ratio (dB)	Octets	Correcteds	Uncorrectables	Channel ID
1	603000000	256QAM	17.600	44.626	3831192199	0	0	1
26	609000000	256QAM	17.500	43.377	3829770501	0	0	2
27	615000000	256QAM	17.600	44.626	3829775639	0	0	3
28	621000000	256QAM	17.100	43.377	3829759880	0	0	4
29	627000000	256QAM	17.000	43.377	3829780919	0	0	5
30	633000000	256QAM	16.700	43.377	3829785177	0	0	6
31	639000000	256QAM	16.800	43.377	3829765317	0	0	7
32	645000000	256QAM	16.600	43.377	3829790451	0	0	8

Reset FEC Counters

OFDM Downstream Overview

Receiver	FFT type	Subcarr 0 Frequency(Hz)	PLC locked	NCP locked	MDC1 locked	PLC power(dBmv)
0	NA	NA	NO	NO	NO	NA
1	8K	721600000	YES	YES	YES	15.800003

Upstream Overview

Port ID	Frequency (Hz)	BandWidth (Hz)	Modulation Type	DOCSIS Mode	Signal Strength (dBmV)	Channel ID
1	38800000	1600000	64QAM	ATDMA	29.000	3
2	40600000	1600000	64QAM	ATDMA	29.500	4
3	37000000	1600000	64QAM	ATDMA	29.000	2
4	35200000	1600000	64QAM	ATDMA	28.500	1

OFDMA Upstream Overview

Channel Index	State	Iin Digital Att	Digital Att	BW (sc's*fft)	Report Power	Report Power1_6	FFT Size
0	OPERATE	0.2875	6.2782	14.0000	40.9201	31.5000	2K
1	DISABLED	0.0000	0.0000	0.0000	0.0000	0.0000	2K

The following table describes the labels in this screen.

Table 5: The Status: DOCSIS WAN Screen

DOCSIS Overview	
Network Access	This displays whether or not your service provider allows you to access the Internet over the **CABLE** connection. ▸ **Permitted** displays if you can access the Internet. ▸ **Denied** displays if you cannot access the Internet.
IP Address	This displays the E31N2V1's WAN IP address. This IP address is automatically assigned to the E31N2V1
Subnet Mask	This displays the E31N2V1's WAN subnet mask.
Gateway IP	This displays the IP address of the device to which the E31N2V1 is connected on the WAN.
DHCP Lease Time	This displays the time that elapses before your device's IP address lease expires, and a new IP address is assigned to it by the DHCP server.
Downstream Overview NOTE: The downstream signal is the signal transmitted to the E31N2V1.	
Port ID	This displays the ID number of the downstream connection's port.
Frequency (Hz)	This displays the actual frequency in Hertz (Hz) of each downstream data channel to which the E31N2V1 is connected.
Modulation	This displays the type of modulation that each downstream channel uses.
Signal Strength (dBmV)	This displays the power of the signal of each downstream data channel to which the E31N2V1 is connected, in dBmV (decibels above/below 1 millivolt).
Signal Noise Ratio (dB)	This displays the Signal to Noise Ratio (SNR) of each downstream data channel to which the E31N2V1 is connected, in dB (decibels).
Octets	This displays the total number of octets received.
Correcteds	This displays the number of blocks received that required correction due to corruption, and were corrected.

Table 5: The Status: DOCSIS WAN Screen (continued)

Uncorrectables	This displays the number of blocks received that required correction due to corruption, but were unable to be connected.
Channel ID	This displays the ID number of each channel on which the downstream signal is transmitted.
Reset FEC Counters	Click this to return the Forward Error Connection (FEC) columns (**Correcteds** and **Uncorrectables**).
OFDM Downstream Overview	
Receiver	This displays the index number of the OFDM receiver (see OFDM on page 25).
FFT Type	This displays the type of Fast Fourier Transform in use on the relevant OFDM receiver (see FFT on page 25).
Subcarr 0 Frequency (Hz)	Each OFDM signal consists of multiple subcarriers.This displays the frequency, in Hertz, of the first OFDM subcarrier on the relevant receiver.
PLC Locked	This displays whether or not the relevant OFDM connection's physical link channel (PLC) data is locked. The PLC tells the E31N2V1 how to decode the OFDM signal, and what power level to use. Once the E31N2V1 receives a PLC without uncorrectable errors, the PLC is locked and subsequent communication can continue.
NCP Locked	This displays whether or not the relevant OFDM connection's next codeword pointer (NCP) data is locked. The NCP tells the E31N2V1 which codewords are to be used for OFDM communication, and which profile to use for each codeword. Once the E31N2V1 receives an NCP without uncorrectable errors, the NCP is locked and subsequent communication can continue.
MDC1 Locked	This displays whether or not the relevant OFDM connection's Multipath Delay Commutator (MDC) data is locked. This provides information about the method of Fast Fourier Transform (FFT) to be used on the OFDM connection. Once the E31N2V1 receives an MDC1 without errors, the MDC1 is locked and subsequent communication can continue.
PLC Power (dBmV)	This displays the power level the E31N2V1 has been instructed to use on the relevant OFDM connection by the physical link channel (PLC) data, in dBmV (decibels above/below 1 millivolt).

Table 5: The Status: DOCSIS WAN Screen (continued)

Upstream Overview NOTE: The upstream signal is the signal transmitted from the E31N2V1.	
Port ID	This displays the ID number of the upstream connection's port.
Frequency (Hz)	This displays the actual frequency in Hertz (Hz) of each upstream data channel to which the E31N2V1 is connected.
Bandwidth	This displays the maximum available bandwidth on the relevant channel.
Modulation Type	This displays the type of modulation that each upstream channel uses.
DOCSIS Mode	This displays the DOCSIS communications standard that each upstream channel uses.
Signal Strength (dBmV)	This displays the power of the signal of each upstream data channel to which the E31N2V1 is connected, in dBmV (decibels above/below 1 millivolt).
Channel ID	This displays the ID number of each channel on which the upstream signal is transmitted.
OFDMA Upstream Overview	
Channel Index	This displays the index number of the OFDM/OFDMA channel.
State	This displays whether or not the relevant channel is currently in use, or not. • **ENABLED** displays when the channel is in use. • **DISABLED** displays when the channel is not in use.
Lin Digital Att.	This displays the digital attenuation, or signal loss, of the transmission medium on which the channel's signal is carried, in decibels (dB).
Digital Att.	This displays the measured digital attenuation of the channel's signal, in decibels (dB). Digital attenuation is affected by the frequency of the signal; a higher-frequency signal will suffer more attenuation than a lower-frequency signal.

Table 5: The Status: DOCSIS WAN Screen (continued)

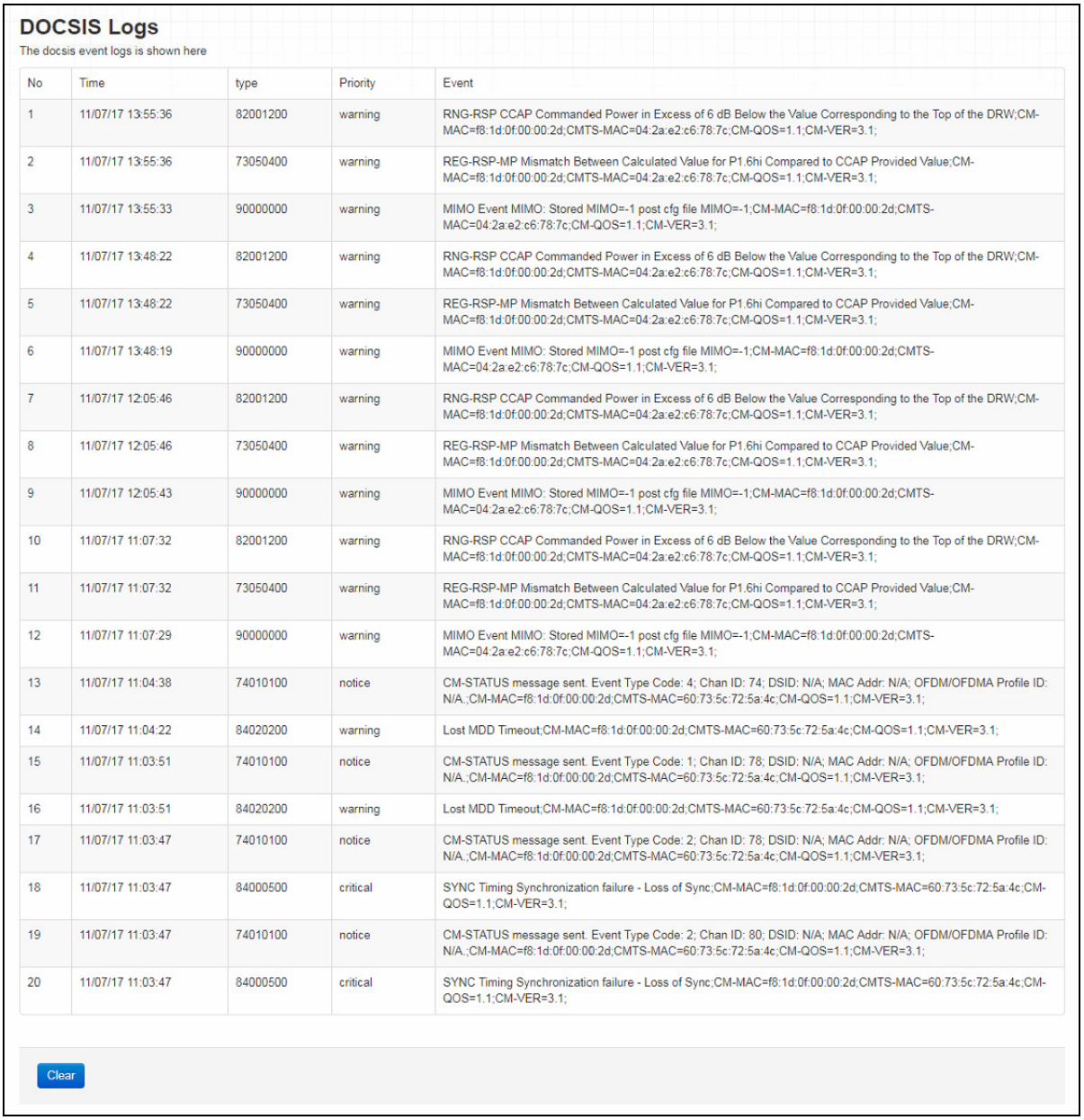
BW (sc's*fft)	This displays the bandwidth of the relevant channel, expressed as the number of subchannels multiplied by the channel's Fast Fourier Transform size, in megahertz (MHz).
Report Power	This displays the reported power of the relevant channel, in quarter-decibels above/below 1 millivolt (quarter-dBmV).
Report Power 1_6	This displays the target power (P1.6r_n, or power spectral density in 1.6MHz) of the relevant channel, in quarter-decibels above/below 1 millivolt (quarter-dBmV).
FFT Size	This displays the type of Fast Fourier Transform in use on the relevant channel.

1.5 The Status: DOCSIS Event Screen

Use this screen to view information about local WAN activity events.

Click **Status** > **DOCSIS Event**. The following screen displays.

Figure 4: The Status: DOCSIS Event Screen



DOCSIS Logs

The docsis event logs is shown here

No	Time	type	Priority	Event
1	11/07/17 13:55:36	82001200	warning	RNG-RSP CCAP Commanded Power in Excess of 6 dB Below the Value Corresponding to the Top of the DRW;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
2	11/07/17 13:55:36	73050400	warning	REG-RSP-MP Mismatch Between Calculated Value for P1.6hi Compared to CCAP Provided Value;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
3	11/07/17 13:55:33	90000000	warning	MIMO Event MIMO: Stored MIMO=-1 post cfg file MIMO=-1;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
4	11/07/17 13:48:22	82001200	warning	RNG-RSP CCAP Commanded Power in Excess of 6 dB Below the Value Corresponding to the Top of the DRW;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
5	11/07/17 13:48:22	73050400	warning	REG-RSP-MP Mismatch Between Calculated Value for P1.6hi Compared to CCAP Provided Value;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
6	11/07/17 13:48:19	90000000	warning	MIMO Event MIMO: Stored MIMO=-1 post cfg file MIMO=-1;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
7	11/07/17 12:05:46	82001200	warning	RNG-RSP CCAP Commanded Power in Excess of 6 dB Below the Value Corresponding to the Top of the DRW;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
8	11/07/17 12:05:46	73050400	warning	REG-RSP-MP Mismatch Between Calculated Value for P1.6hi Compared to CCAP Provided Value;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
9	11/07/17 12:05:43	90000000	warning	MIMO Event MIMO: Stored MIMO=-1 post cfg file MIMO=-1;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
10	11/07/17 11:07:32	82001200	warning	RNG-RSP CCAP Commanded Power in Excess of 6 dB Below the Value Corresponding to the Top of the DRW;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
11	11/07/17 11:07:32	73050400	warning	REG-RSP-MP Mismatch Between Calculated Value for P1.6hi Compared to CCAP Provided Value;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
12	11/07/17 11:07:29	90000000	warning	MIMO Event MIMO: Stored MIMO=-1 post cfg file MIMO=-1;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=04:2a:e2:c6:78:7c;CM-QOS=1.1;CM-VER=3.1;
13	11/07/17 11:04:38	74010100	notice	CM-STATUS message sent. Event Type Code: 4; Chan ID: 74; DSID: N/A; MAC Addr: N/A; OFDM/OFDMA Profile ID: N/A.;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
14	11/07/17 11:04:22	84020200	warning	Lost MDD Timeout;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
15	11/07/17 11:03:51	74010100	notice	CM-STATUS message sent. Event Type Code: 1; Chan ID: 78; DSID: N/A; MAC Addr: N/A; OFDM/OFDMA Profile ID: N/A.;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
16	11/07/17 11:03:51	84020200	warning	Lost MDD Timeout;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
17	11/07/17 11:03:47	74010100	notice	CM-STATUS message sent. Event Type Code: 2; Chan ID: 78; DSID: N/A; MAC Addr: N/A; OFDM/OFDMA Profile ID: N/A.;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
18	11/07/17 11:03:47	84000500	critical	SYNC Timing Synchronization failure - Loss of Sync;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
19	11/07/17 11:03:47	74010100	notice	CM-STATUS message sent. Event Type Code: 2; Chan ID: 80; DSID: N/A; MAC Addr: N/A; OFDM/OFDMA Profile ID: N/A.;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;
20	11/07/17 11:03:47	84000500	critical	SYNC Timing Synchronization failure - Loss of Sync;CM-MAC=f8:1d:0f:00:00:2d;CMTS-MAC=60:73:5c:72:5a:4c;CM-QOS=1.1;CM-VER=3.1;

Clear

The following table describes the labels in this screen.

Table 6: The Status: DOCSIS Event Screen

No	This displays the arbitrary, incremental index number assigned to the event.
Time	This displays the date and time at which the event occurred.
Type	This displays the nature of the event.

Table 6: The Status: DOCSIS Event Screen (continued)

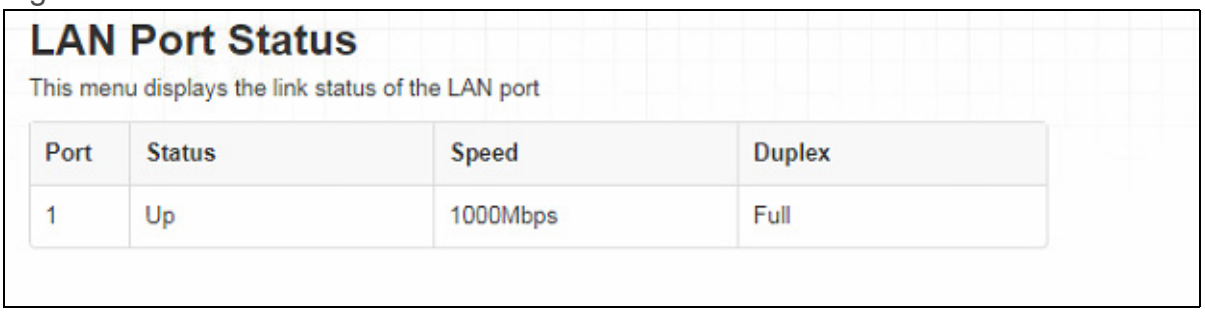
Priority	This displays the severity of the event.
Event	This displays a description of the event.
Clear	Click this to remove all DOCSIS event logs from the system.

1.6 The Status: LAN Port Status Screen

Use this screen to see information about the data rate and flow of the E31N2V1's **LAN** port.

Click **Status** > **LAN Port Status**. The following screen displays.

Figure 5: The Status: Port Status Screen



The following table describes the labels in this screen.

Table 7: The Status: Port Status Screen

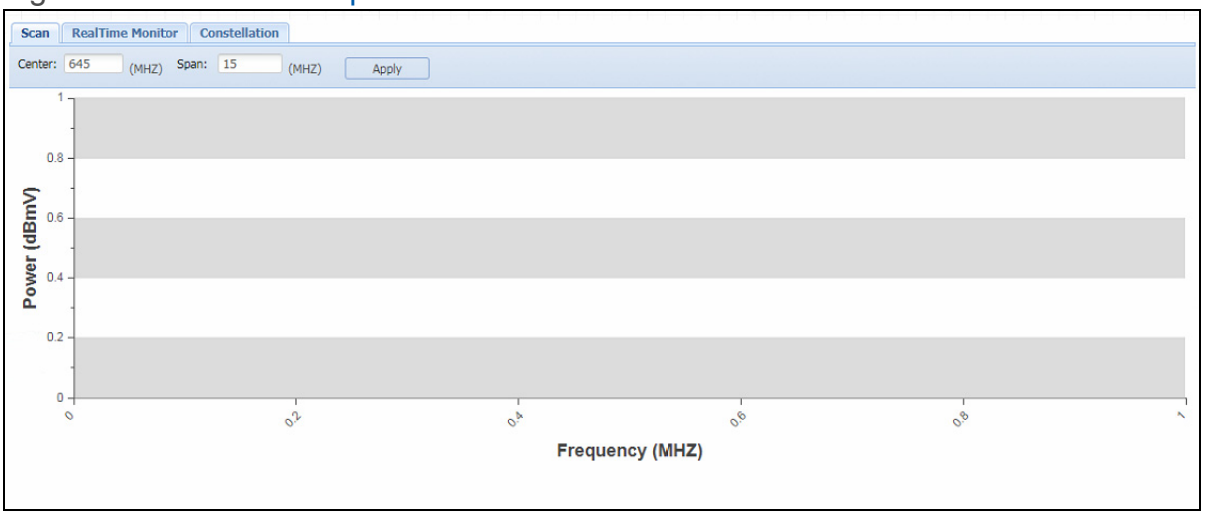
Port	This displays the physical LAN port number.
Status	This displays whether or not there is a functioning device connected to the port (**Up**) or not (**Down**).
Speed	This displays the maximum achievable data speed in megabits per second (Mbps).
Duplex	▸ This displays **Full** when data can flow between the E31N2V1 and the connected device in both directions simultaneously. ▸ This displays **Half** when data can flow between the E31N2V1 and the connected device in only one direction at a time.

1.7 The Status: Spectrum Screen

Use this screen to examine the radio frequency (RF) spectrum on the cable connection between the E31N2V1 and the Internet.

Click **Status** > **Spectrum**. The following screen displays.

Figure 6: The Status: Spectrum Screen



The following table describes the labels in this screen.

Table 8: The Status: Spectrum Screen

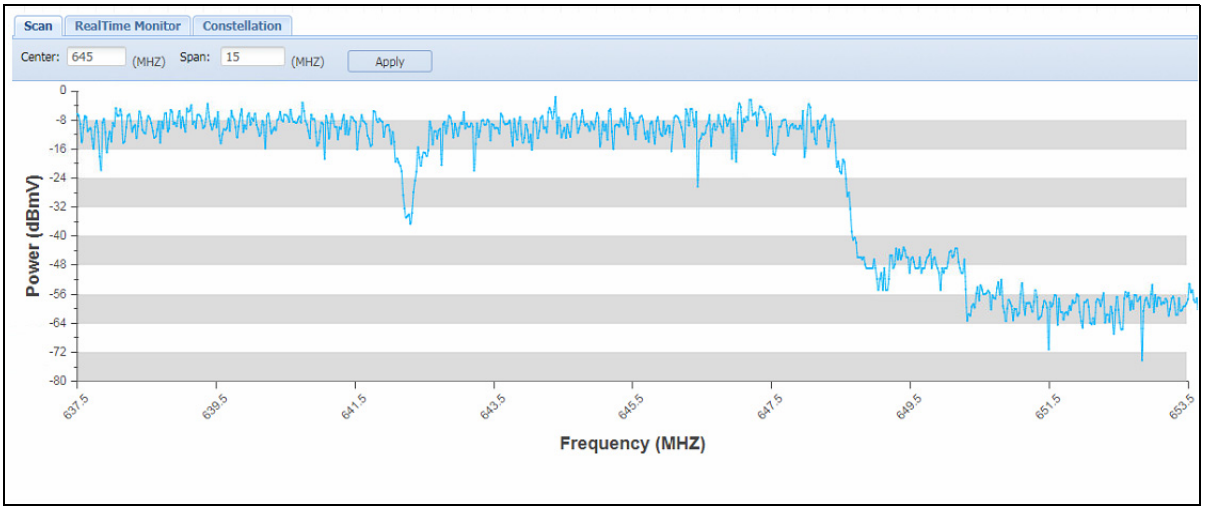
Scan	Use this to perform a scan of the RF signal spectrum and view results. See The Spectrum Scan Screen on page 36.
RealTime Monitor	Use this to observe fluctuations in the RF signal spectrum as they happen. See The Spectrum RealTime Monitor Screen on page 37.
Constellation	Use this to view a representation of the digitally-modulated RF signal. See The Spectrum Constellation Screen on page 38.

1.7.1 The Spectrum Scan Screen

Use this to perform a scan of RF communications, and view results as a graph of power against frequency.

Click the **Scan** tab in the **System**: **Spectrum** screen. The following screen displays.

Figure 7: The Spectrum Scan Screen



The following table describes the labels in this screen.

Table 9: The Spectrum Scan Screen

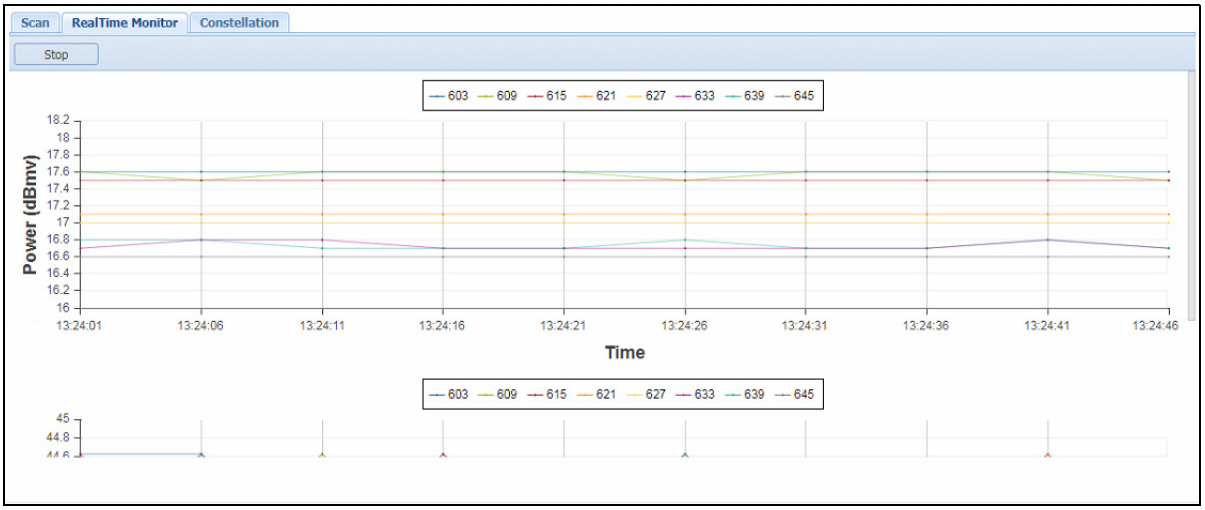
Center	Enter the center frequency for the scan, in megahertz (MHz).
Scan	Enter the bandwidth of the scan, in megaherts. For example, if you set a **Center** frequency of 645MHz and a **Scan** bandwidth of 15 MHz, the system will scan the band 637.5~652.5 MHz.
Apply	Click this to start the scan.
Power (dBmV)	This displays the signal power in decibels relative to one millivolt.
Frequency (MHZ)	This displays the signal frequency in megahertz.

1.7.2 The Spectrum RealTime Monitor Screen

Use this to observe fluctuations in the RF signal spectrum as they happen.

Click the **RealTime Monitor** tab in the **System**: **Spectrum** screen. The following screen displays.

Figure 8: The Spectrum RealTime Monitor Screen



The following table describes the labels in this screen.

Table 10: The Spectrum RealTime Monitor Screen

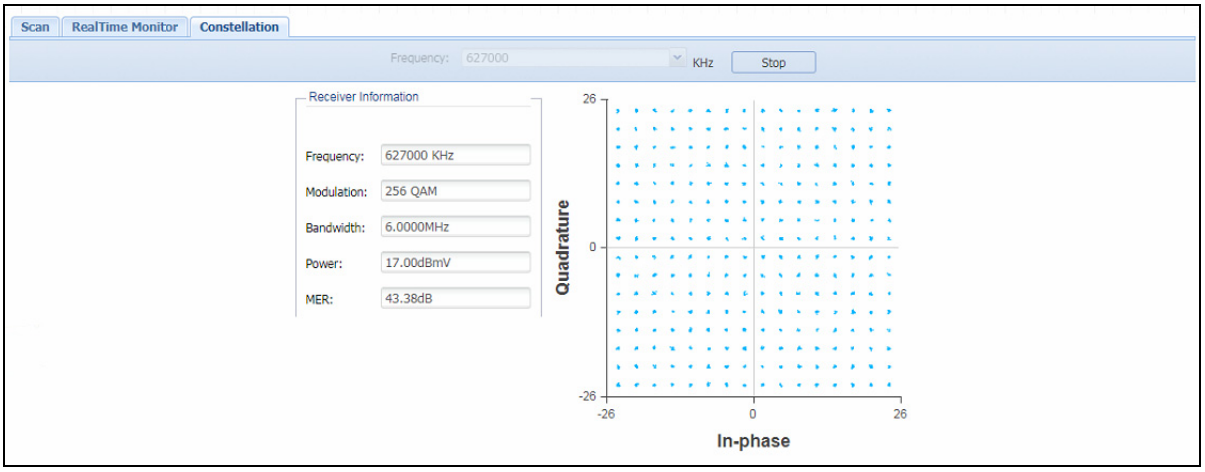
Start	Click this to begin monitoring.
Stop	Click this to end monitoring.
(Index)	The graph displays a differently-colored line for each of the frequencies on which the E31N2V1 is communicating on the RF network. The index lets you know which color line represents which frequency.
Power (dBmV)	This displays the power of each channel, in decibels relative to one millivolt.
Time	This displays the system time at which the power measurement was taken.

1.7.3 The Spectrum Constellation Screen

Use this to view a representation of the digitally-modulated RF signal, depicted as a two-dimensional scatter diagram. You can use this diagram to troubleshoot RF communication issues by identifying signal interference and/or distortion.

Click the **Constellation** tab in the **System**: **Spectrum** screen. The following screen displays.

Figure 9: The Spectrum Constellation Screen



The following table describes the labels in this screen.

Table 11: The Spectrum Constellation Screen

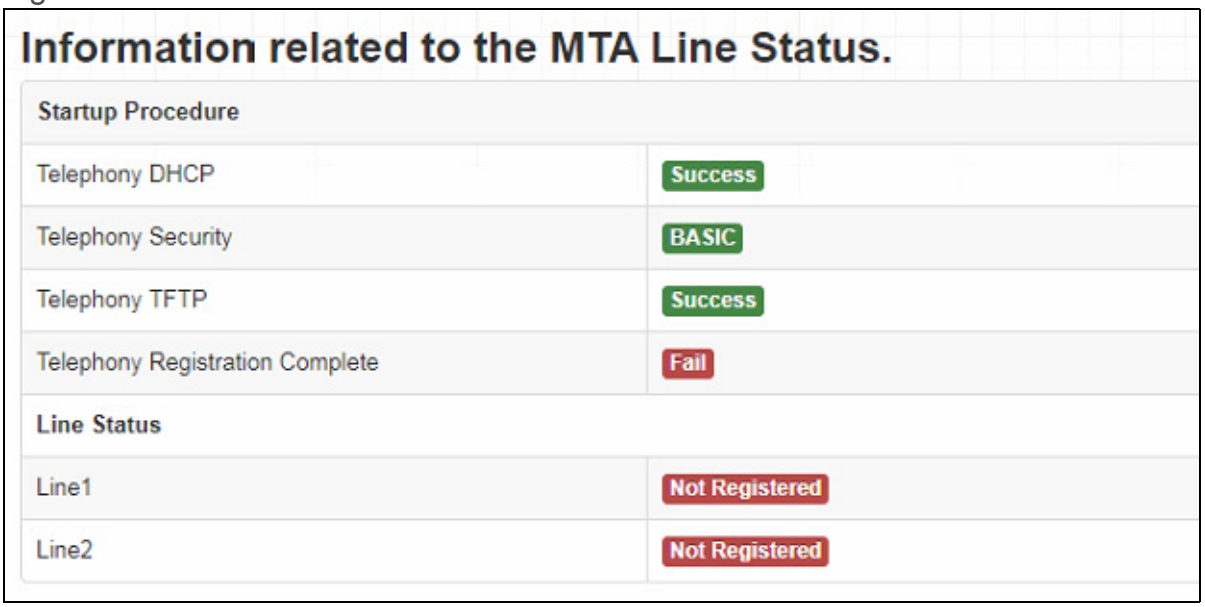
Frequency	Select the frequency of the RF signal you want to monitor.
Start	Click this to begin monitoring the selected **Frequency**.
Stop	Click this to end monitoring.
Receiver Information	
Frequency	This displays the frequency of the signal currently being monitored.
Modulation	This displays the type of modulation being used on the monitored signal.
Bandwidth	This displays the channel width of the signal currently being monitored.
Power	This displays the measured power of the signal currently being monitored, in decibels relative to one millivolt.
MER	This displays the Modulation Error Ratio.
Quadrature	This diagram displays the measured spectrum constellation.
In-Phase	

1.8 The Status: MTA Line Status Screen

Use this screen to see general information about the E31N2V1's embedded Multimedia Terminal Adapter module.

Click **Status** > **MTA Line Status**. The following screen displays.

Figure 10: The Status: MTA Line Status Screen



The following table describes the labels in this screen.

Table 12: The Status: MTA Line Status Screen

Startup Procedure	
Telephony DHCP	This field displays the status of the remote telephony DHCP (Direct Host Configuration Protocol) server.
Telephony Security	This displays the type of security used for voice calls through the E31N2V1.
Telephony TFTP	This field displays the status of the remote telephony TFTP (Trivial File Transfer Protocol) server.
Telephony Registration Complete	This field displays the overall status of voice call registration, and displays **SUCCESS** once the registration process has concluded.
Line Status	
Line 1	These fields display the current status of each phone connected to the E31N2V1.
Line 2	

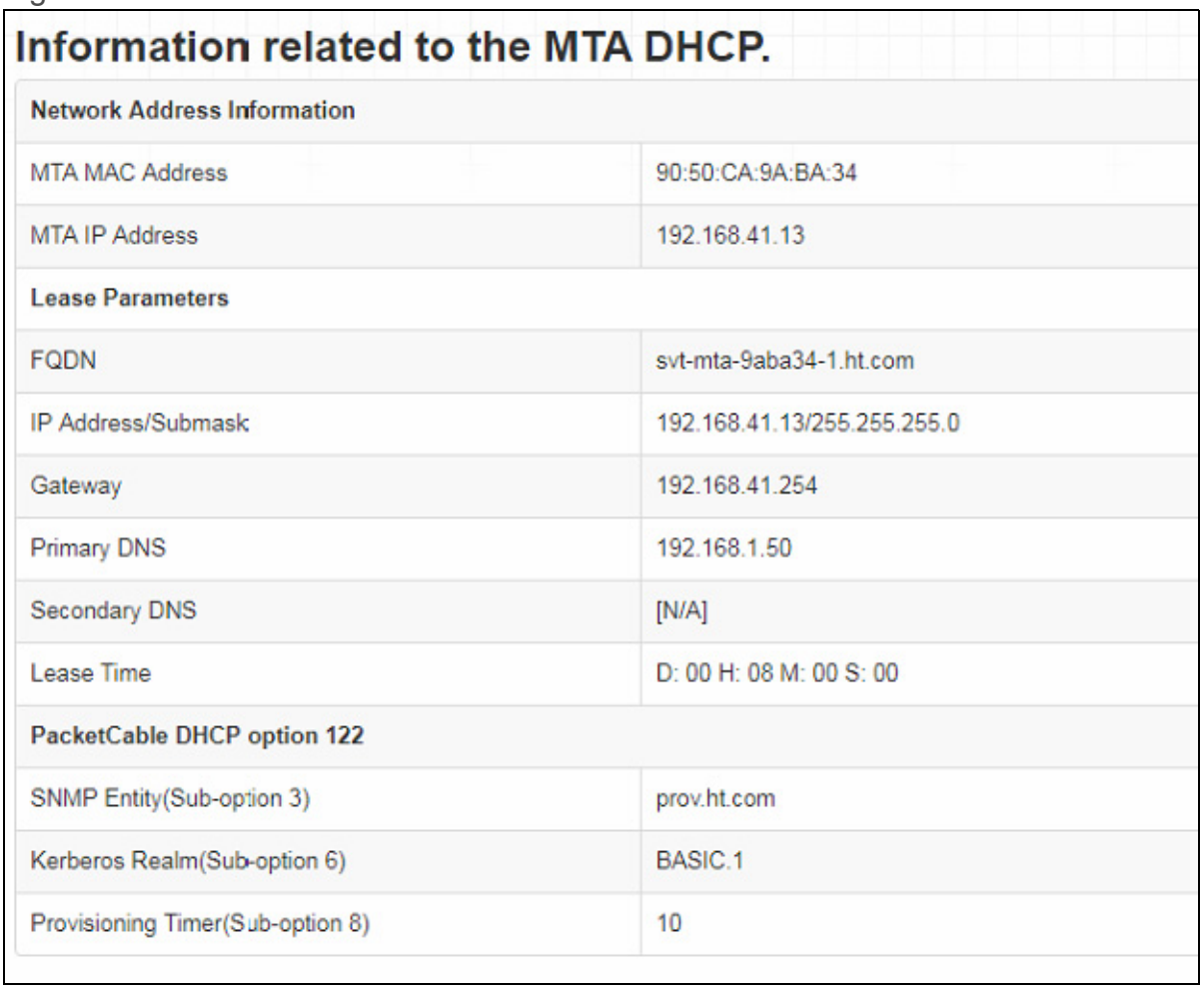
1.9 The Status: MTA DHCP Screen

Use this screen to see information about the MTA module's connections to the

service provider.

Click **Status** > **MTA DHCP**. The following screen displays.

Figure 11: The Status: MTA DHCP Screen



Information related to the MTA DHCP.

Network Address Information	
MTA MAC Address	90:50:CA:9A:BA:34
MTA IP Address	192.168.41.13
Lease Parameters	
FQDN	svt-mta-9aba34-1.ht.com
IP Address/Submask	192.168.41.13/255.255.255.0
Gateway	192.168.41.254
Primary DNS	192.168.1.50
Secondary DNS	[N/A]
Lease Time	D: 00 H: 08 M: 00 S: 00
PacketCable DHCP option 122	
SNMP Entity(Sub-option 3)	prov.ht.com
Kerberos Realm(Sub-option 6)	BASIC.1
Provisioning Timer(Sub-option 8)	10

The following table describes the labels in this screen.

Table 13: The Status: MTA DHCP Screen

Network Address Information	
MTA MAC Address	This field displays the Media Access Control (MAC)address of the Media Terminal Adapter (MTA) module
MTA IP Address	This field displays the IP address of the MTA module.
Lease Parameters	

Table 13: The Status: MTA DHCP Screen (continued)

FQDN	This displays the Fully-Qualified Domain Name of the DHCP server from which the MTA module derives its IP address and subnet mask.
IP Address / Submask	This displays the MTA module's IP address and subnet mask, derived by DHCP.
Gateway	This displays the IP address of the MTA module's gateway on the WAN.
Primary DNS	This displays the IP address of the MTA module's primary Domain Name System (DNS) server
Secondary DNS	This displays the IP address of the MTA module's secondary DNS server.
Lease Time	This displays the time that elapses before your device's IP address lease expires, and a new IP address is assigned to it by the DHCP server.
PacketCable DHCP Option 122 NOTE: DHCP Option 122 is defined in RFC 3495.	
SNMP Entity (Sub-Option 3)	This displays the Telephony Service Provider's provisioning server address.
Kerberos Realm (Sub-Option 6)	This displays the TSP's Kerberos realm name.
Provisioning Timer (Sub-Option 8)	This displays the TSP's provisioning timer value.

2

Troubleshooting

Use this section to solve common problems with the E31N2V1 and your network. It contains the following sections:

Problem: None of the LEDs Turn On

The E31N2V1 is not receiving power, or there is a fault with the device.

1. Ensure that you are using the correct power adaptor.

Using a power adaptor other than the one that came with your E31N2V1 can damage the E31N2V1.

2. Ensure the power adaptor is connected to the E31N2V1 and the wall socket (or other power source) correctly.
3. Ensure that the power source is functioning correctly. Replace any broken fuses or reset any tripped circuit breakers.
4. Disconnect and re-connect the power cable to the power source and the E31N2V1.
5. If none of the above steps solve the problem, consult your vendor.

Problem: One of the LEDs does not Display as Expected

1. Ensure that you understand the LED's normal behavior (see LEDs on page 14).
2. Ensure that the E31N2V1's hardware is connected correctly; see the Quick Installation Guide.
3. Disconnect and re-connect the power adaptor to the E31N2V1.
4. If none of the above steps solve the problem, consult your vendor.

Problem: I Forgot the E31N2V1's Admin Username or Password

The default username is "technician", and the password is "PoD Tool".

Problem: I Cannot Access the E31N2V1 or the Internet

1. Ensure that you are using the correct IP address for the E31N2V1.
2. Check your network's hardware connections, and that the E31N2V1's LEDs display correctly (see LEDs on page 14).
3. Make sure that your computer is on the same subnet as the E31N2V1; see IP Address Setup on page 15.
4. If the above steps do not work, you need to reset the E31N2V1. See Resetting the E31N2V1 on page 18. All user-configured data is lost, and the E31N2V1 is returned to its default settings.
5. If the problem persists, contact your vendor.

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