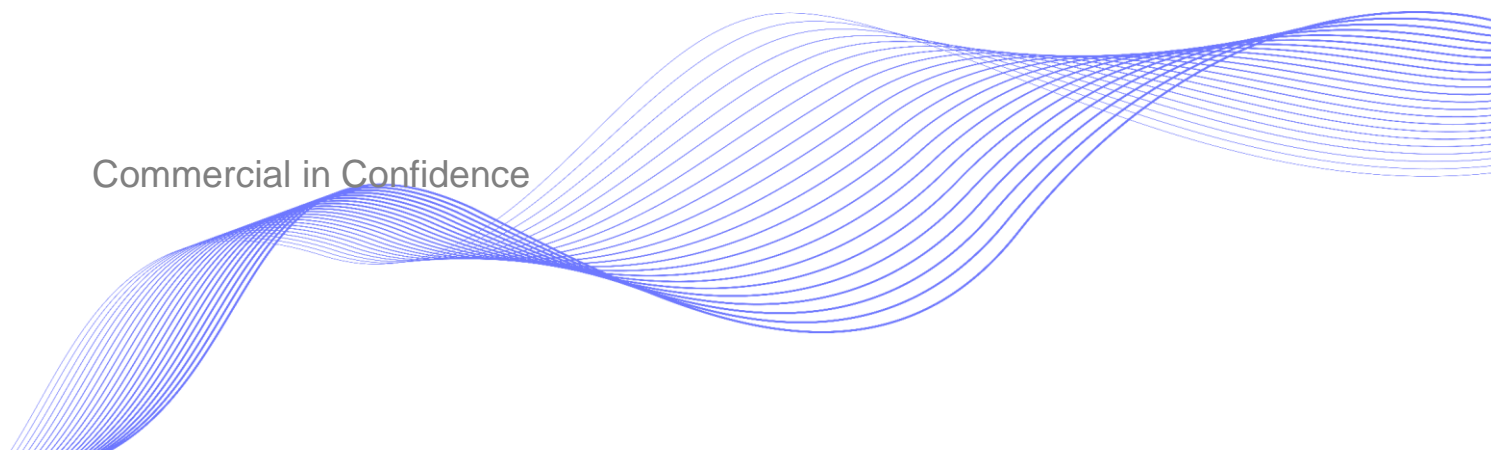For the
moments
that matter

Eclipse User Guide

0. Preface

0.1 About this Document

This document contains relevant information required to identify, install, and control the equipment or system.

Since the available functions can be licensed and depend on the specific implementation, not all the functions and or applications contained in this document may be relevant or applicable to the system you will be working with.

The actual presentation may differ from those in this document due to hardware or software changes.

0.2 Notice about this Publication

While every attempt is made to maintain the accuracy of the information in this product manual, it is subject to change without notice.

Performance specifications are included for guidance. All particulars are given in good faith, actual performance may vary.

0.3 Copyright

This document contains information that is proprietary to Domo Tactical Communications (DTC) Limited trading as Domo Broadcast Systems (DBS). Any copying or reproduction in any form whatsoever is prohibited without the written permission of DTC.

0.4 Related Documents

The following documents may also need to be referred to when configuring the device. All DTC documents can be downloaded from WatchDox, see *Section 15.1*.

- PRORXD Receiver HEVC Decoder User Guide
- Sapphire-RXD4 Setup Guide

0.5   Document History

This is a controlled document, written and produced by the DTC Technical Publications team. Changes are recorded in the table below.

Revision	Date	Author	Summary of Changes
1.0	29/03/2021	IR	First release.
1.1	06/07/2021	IR	Updates for v6.3.2.
1.2	29/04/2022	IR	Minor correction on CC ODU pinout. Updates for v6.3.3. Added dual band variant.
1.3	16/08/2022	IR	Updates for v6.3.5.
1.4	30/08/2022	IR	Updates for v6.3.6.
1.5	26/01/2023	IR	Updates for v6.3.9.
1.6	24/04/2023	IR	Updates for v6.3.10.
1.7	23/11/2023	IR	Updates for v8.0.3.1
2.0	05/02/2024	IR	New React WUI.

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CONTENTS

1. Product Overview

1.1 Description

Based around DTC's industry leading "Single Frame Latency" HEVC H.265 encoding technology, the Eclipse is a compact yet fully featured outside broadcast transmitter.

Operating in DVB-T mode with Dual-Pedestal capability and 200mW output power, the Eclipse offers robust transmission in the most demanding of environments.

The Eclipse can transmit single 12G-SDI UHD video or four 3G-SDI HD video inputs with embedded audio. It also offers dual high performance stereo analogue audio inputs with phantom power as well as the option of integrated UHF camera control.

1.2 Basic Specifications

DC Input	9.2V to 17.8V reverse polarity protected
Power consumption	Less than 25W @100mW RF power with 4K video
Temperature range	-10°C to +50°C
Dimensions	L 181mm (165mm excluding connectors)
	W 110mm
	D 46mm (without battery plates) or
	D 85mm (with V-Lock plates) or
	D 77mm (with Anton Bauer plates)
Dimensions (dual band variant)	L 193mm (177mm excluding connectors)
	W 115mm
	D 46mm (without battery plates) or
	D 85mm (with V-Lock plates) or
	D 77mm (with Anton Bauer plates)
Weight	1.4kg (approx.)

Note: Detailed technical specifications are given in the product datasheet. Please contact DBS for latest specifications.

1.3 Approval Notices

1.3.1 EMC/Safety and CE Marking

The equipment has been designed to meet and has been tested against harmonized EMC and safety standards. The CE mark is indicated on all product labels.

The CE Declaration of Conformity as well as the technical file are available on request.

2.   Product Package

2.1   Overview

Carefully open the packaging and verify that all the parts have been included, as ordered. Retain the packing materials for storage.

The part numbers are useful for identification and if you need to order a new part. The part number codes mean:

- CA: cable assembly

- SA: sub assembly

- AP: assembly part

Note: If you do not have all the parts or are not happy with the condition of your delivered product, please contact DTC, see *Section 15.2*.

2.2   Variants

This part number will identify the product; it is also on the label.

2.2.1   Product Code

Note: *xxxyyy* denotes frequency, see *Frequency Options* below.

Part Number	Description
ECLIPSE-*xxxyyy*	Eclipse transmitter, no battery plates
ECLIPSE-AB-*xxxyyy*	Eclipse transmitter, AB mount battery
ECLIPSE-V-*xxxyyy*	Eclipse transmitter, V mount battery
ECLIPSE-CCCAM-*xxxyyy*	Eclipse transmitter with camera control, no battery plates
ECLIPSE-AB-CCCAM-*xxxyyy*	Eclipse transmitter with camera control, AB mount battery
ECLIPSE-V-CCCAM-*xxxyyy*	Eclipse transmitter with camera control, V mount battery

2.2.2   Frequency Options

Code	Frequency
114150	1.14-1.50GHz
167235	1.67-2.35GHz
198270	1.98-2.70GHz
440500	4.40-5.00GHz
550600	5.50-6.00GHz
198750D	Dual band 1.98-2.70GHz and 6.40-7.50GHz

2.3   Parts List

These items will be in the package.

2.3.1   Base Product

Part Number	Description
Eclipse unit	Eclipse HEVC Outside Broadcast Transmitter (part number is dependent on the variant, see *Section 2.2*)
CA0579	Audio 5-way circular to XLR cable
SA4615	Eclipse USB support stick

2.3.2   CCCAM Product

Note: CCCAM products also include control software and interface cable, see *Section 2.5*.

Part Number	Description
Eclipse Camera Control unit	Eclipse HEVC Outside Broadcast Transmitter with Camera Control (part number is dependent on the variant, see *Section 2.2*)
AP008822	Telemetry antenna SMA, 433MHz
CA0579	Audio 5-way circular to XLR cable
CA3919	CCCAM Ethernet cable
SA4615	Eclipse USB support stick

2.4   Accessory Options

If you have purchased any of these items, they will also be in the package.

Part Number	Description
Antennas	N-type omni antenna dependent on frequency
CA0340	Data 4-way circular to 9-way D-sub cable
CA0579	Additional audio 5-way circular to XLR cable
CA3421	Power 4-way circular cable to 15V 90W PSU
CA3348	HD-BNC right-angle to BNC cable
CA3552	HD-BNC straight to BNC cable
ECLIPSE-KIT-AB	AB mount camera and battery plate kit
ECLIPSE-KIT-V	V mount camera and battery plate kit

2.5 Camera Control Options

Camera control units can be integrated into the Eclipse assembly at DTC on order.
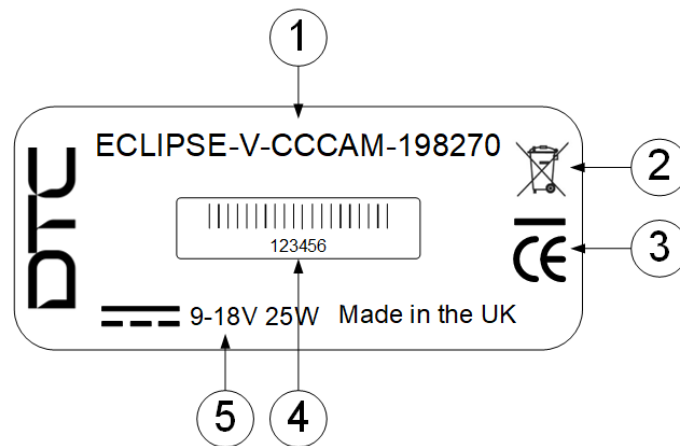
Part Number	Description
ECLIPSE-VS-CCCAM-ARRI-UP	Arri control software with cable
ECLIPSE-VS-CCCAM-GVLDX-UP	Grass Valley control software with LDX cable
ECLIPSE-VS-CCCAM-GVLDXC-UP	Grass Valley control software with LDX compact cable
ECLIPSE-VS-CCCAM-HIT-UP	Hitachi control software with cable
ECLIPSE-VS-CCCAM-IKE-UP	Ikegami control software with cable
ECLIPSE-VS-CCCAM-PAN-UP	Panasonic control software with cable
ECLIPSE-VS-CCCAM-SON-UP	Sony control software with cable

2.6 Licensing Options

Some product functions are enabled by licenses. The license for your product can be viewed in the control software.

Part Number	Description
Silver (base license)	DVB-T Modulation, UMVL Modulation, Streaming, HD-H.264 and HD H.265 Encoder
ECLIPSE-GOLD	Silver plus 4K UHD Encoder and 4 x HD Video Services
LIC-DP-TX	Dual Pedestal Modulation

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2.7   Labelling

No.	Description
1	Part number: this is the variant explained above.
2	This symbol indicates that the unit should be disposed of in accordance with the WEEE Directive.
3	The CE mark certifies that a product has met EU consumer safety, health and environmental requirements.
4	A barcoded, six-digit serial number. This may be required during a support call.
5	Power requirements.

3. Hardware

3.1   Introduction

This chapter will help identify all the connections and interfaces needed to install, control, and monitor the Eclipse transmitter.

CAUTION: Precautions may need to be taken to avoid burns when operating the Eclipse in high ambient temperatures due to excessive heat from the unit metalwork.
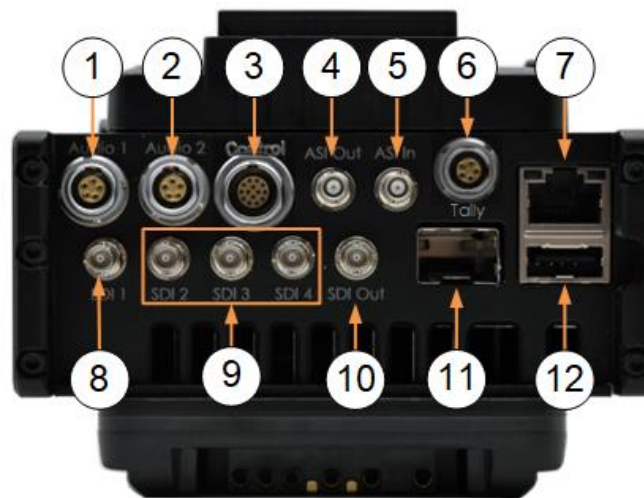
3.2   Antenna Panel

Figure 3-1: Eclipse Single Band (left) and Dual Band (right) Variants

No.	Item	Connection
1	N-type jack (f)	RF antenna B connector.
		Note: 1.98-2.70GHz for dual band variant.
2	N-type jack (f)	RF antenna A connector.
		Note: 1.98-2.70GHz for dual band variant.
3	LED	Red = power applied; RF power off.
		Green = RF power on.
4	SMA jack (f)	CCCAM telemetry antenna connector.
		Connect AP008822 433MHz antenna supplied with CCCAM option.
5	N-type jack (f)	RF antenna C connector – 6.40-7.50GHz.
		Note: Dual band variant only.

3.3   Interface Panel

No.	Item	Connection
1	5-way circular (f)	Channel 1 balanced left and right audio input with switchable 12V/48V phantom power.
2	5-way circular (f)	Channel 2 balanced left and right audio input with switchable 12V/48V phantom power.
3	14-way circular (f)	Camera control data/Ethernet connection. Connect to the camera using the camera specific data cable or connect CA3919 Ethernet cable to a PC for WUI control. **Note**: This is a component of the optional camera control module, this will not be fitted if it has not been purchased.
4	High density BNC (f)	ASI video output.
5	High density BNC (f)	ASI video input (not enabled).
6	5-way circular (f)	Tally light connection. **Note**: This is a component of the optional camera control module, this will not be fitted if it has not been purchased.
7	RJ45 jack	Ethernet connection for WUI control and IP streaming.
8	High density BNC (f)	SDI input 1. 12G-SDI, 6G-SDI, 3G-SDI or 1.5G-SDI video.
9	High density BNC (f)	SDI input 2-4. 3G-SDI or 1.5G-SDI video.
10	High density BNC (f)	SDI monitor output (not enabled).
11	SFP+ cage	3G-SDI or 1.5G-SDI video (not enabled).
12	USB type A jack	The USB port can be used for firmware upgrades and configuration upload/download via a USB stick. It also allows 4G dongles, see below.

3.4　OLED Display Panel

> **Note**: For details of operation and button functions refer to *Chapter 12*.

No.	Item	Connection
1	Push pad buttons	Six control buttons for navigation and selection of the OLED display functions.
2	OLED display	A sunlight readable display covering all major functions.

3.5　Power and Data Panel

> **Note**: Pinout is provided in *Section 3.8*.
> **Note**: The connectors are keyway protected to prevent incorrect mating.

No.	Item	Connection
1	4-way circular (f)	RS-232 data interface and external power out.
2	4-way circular (f)	DC power input: 10V to 18V.

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3.6   Battery Plate

The battery plate mates the battery to the Eclipse to provide power.

The Eclipse may be supplied with AB or V mount battery fitting. Battery/camera plate kits are available to change the battery fitting, see options in *Section 2.4*.

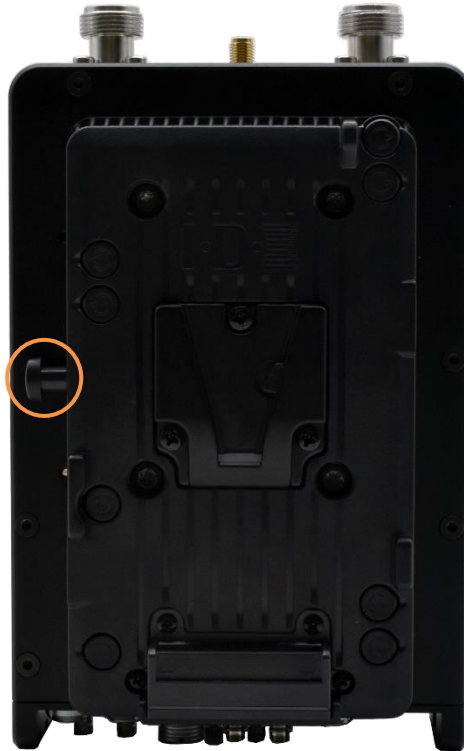The battery release is indicated by the orange circle in the illustration below.

Figure 3-2: Eclipse with V Mount Battery Plate

Note Please read *Section 4.3* if switching to an external power source.

3.7   Camera Plate

The camera plate mates the Eclipse to the camera to provide power to the camera via the Eclipse.

The Eclipse may be supplied with AB or V mount camera fitting. Battery/camera plate kits are available to change the camera fitting, see options in *Section 2.4*.

Figure 3-3: Eclipse with V Mount Camera Plate

3.8 Pinout

3.8.1 Power

4-way circular – Lemo EEG.0B.304.CLL or ODU GK0L0C_P04LFG0-0000

Pin	Function
1	VIN
2	VIN
3	GND
4	GND

3.8.2 Data

4-way circular – Lemo EEA.0B.304.CLL

Pin	Function
1	RS232 DATA TX
2	RS232 DATA RX
3	EXT PWR (battery voltage)
4	GND

3.8.3 Audio 1 and Audio 2

5-way circular – Lemo EEA.0B.305.CLL or ODU GK0LAC_P05LFG0-0000

Pin	Function
1	AUD_IN_L+
2	AUD_IN_L-
3	GND
4	AUD_IN_R+
5	AUD_IN_R-

3.8.4   Camera Control (CCCAM option)

14-way circular– ODU GK1L0C-P14LCC0-0000

Pin	Function
1	ETH TX+
2	ETH TX-
3	ETH RX+
4	ETH RX-
5	RS422/RS485 RX+
6	RS422/RS485 RX-
7	RS422/RS485 TX+
8	RS422/RS485 TX-
9	GND
10	RS232 TX
11	RS232 RX
12	GND
13	N/C
14	N/C

3.8.5   Tally (CCCAM option)

5-way circular – Lemo EGG.0B.305.CLL

Pin	Function
1	GND
2	VBATT Out
3	RED
4	GREEN
5	N/C

4. Getting Started

4.1 Introduction

This chapter will help the user power up and communicate with the Eclipse HEVC Outside Broadcast Transmitter. It will explain software installation instructions for any relevant applications and provide a basic set up guide.

4.2 USB Support Stick

The supplied USB support stick contents will provide you with all the user guides and applications needed to operate an Eclipse.

1. Plug the USB stick into the USB port of your PC.

2. The USB stick device drivers will load the first time you plug it in to your PC. Wait for the drivers to load successfully, you should see the progress in the bottom right of your PC screen.

3. Once they have loaded, a USB drive will have been created. Open Windows Explorer and you will be able to view the USB stick contents.

4.3 Power

The Eclipse will boot up the moment the power supply is connected. Power can be supplied in two ways:

- Via a battery – AB or V mount depending on the device battery plate
- Via 9.2–17.8VDC input to the 4-way circular power connector on the bottom panel

Note: Power will not switch reliably between the DC supply and battery or vice versa. It is recommended that a reboot of the device is carried out if switching power sources.

CAUTION: Precautions may need to be taken to avoid burns when operating the Eclipse in high ambient temperatures due to excessive heat from the unit metalwork.

4.4   Node Finder Application

4.4.1   Introduction

Our devices are shipped to you with the IP address DHCP setting enabled. This means that if the product is connected to a network that is administered by a DHCP server, the IP address will be automatically assigned.

Node Finder can be used to identify DTC device IP addresses connected on a network and make changes to IP settings if not connected to a DHCP server.

Node Finder can be found on the supplied USB stick or downloaded from DTC's WatchDox facility, see *Section 15.1* for details.

> **Note**: If you are using a standalone PC or laptop, you will also need to set the IP address of the PC. Refer to *Section 14.1* to find out how to do this.
>
> If the device is connected to a network which does **not** have a DHCP server, contact your Network Administrator for an IP address you can use.

4.4.2   Install Node Finder

Double click the **Node Finder.exe** installer. The Node Finder setup window will open.
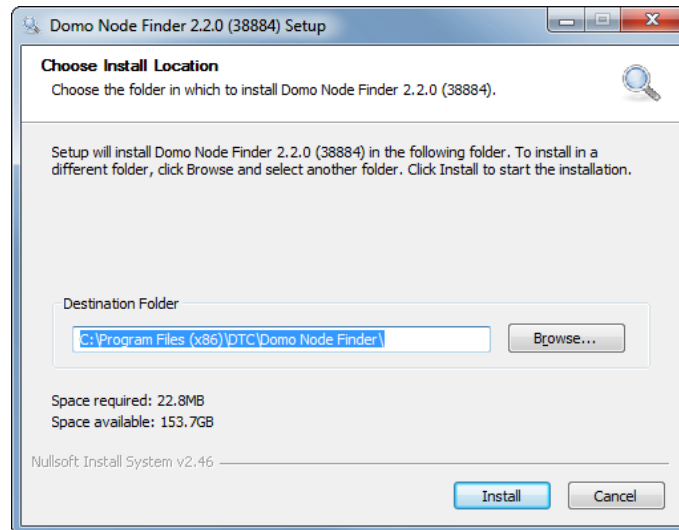
Browse to the location where you wish to install the software or leave the **Destination Folder** at default (recommended). Click the **Install** button.

On completion, **Close** the installer. A Node Finder icon will have been placed on your PC desktop.
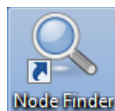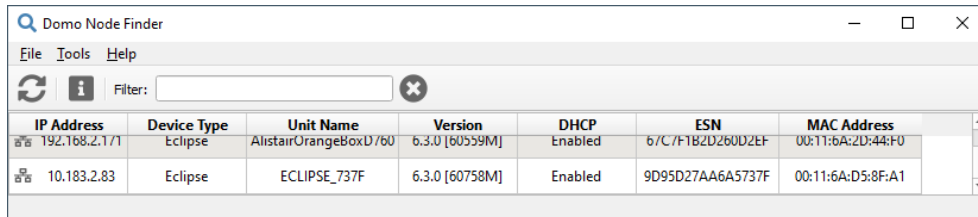
4.5 Establish the Eclipse IP Address
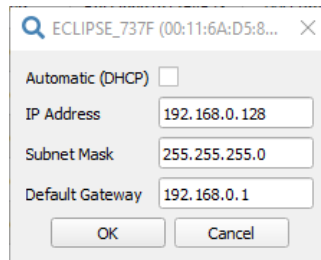
4.5.1 Using Node Finder

1. Power up the Eclipse and ensure there is an Ethernet connection to a network or PC.

2. Double-click the Node Finder icon from the PC desktop.

3. Find the IP address for your device from the Node Finder list. The device type will be Eclipse.

Note: If the device is not connected to a network with a DHCP server, the IP address may appear as 0.0.0.0.

4. Right click on the IP address to reconfigure, if required:

4.5.2 Using the OLED Display

It is also possible to discover the Eclipse IP address using the OLED display status in the Overview screen. See *Section 12.3.*
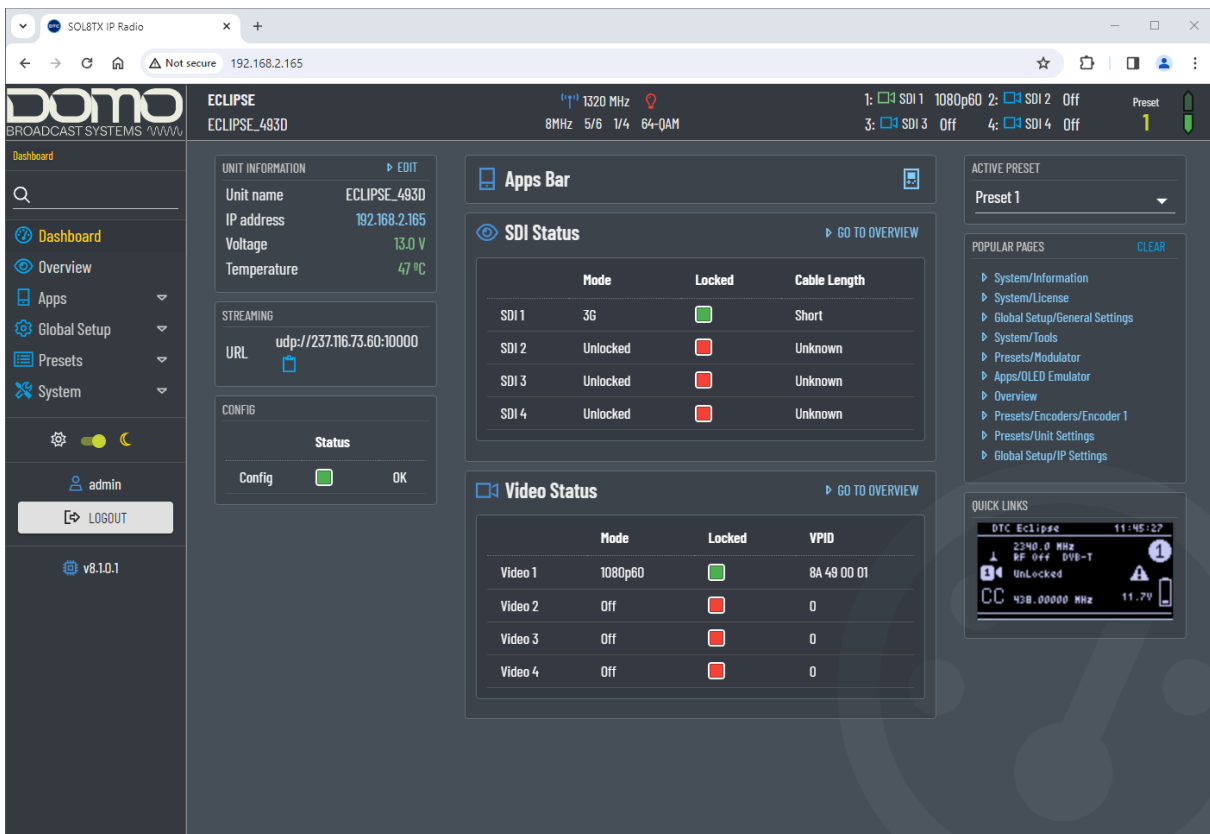
4.6   Web Browser Control

When the IP address is established, a web user interface (WUI) will allow you to configure and monitor the Eclipse prior to deployment.

1. Open a web browser and enter the IP address of the Eclipse in the address bar or double-click the IP address in Node Finder.

2. An authentication dialogue box will open (appearance will depend on web browser).
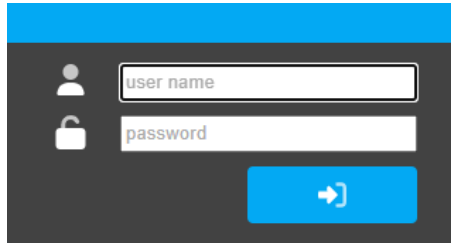
3. Leave the user name blank and enter the password as **dtcweb**.

4. Click Login and the web user interface application will open.

4.7 Password Reset

If the WUI password is forgotten and the user is locked out, Node Finder provides a means to reset the password.

Right-click on the Eclipse in Node Finder and select **Request Password Reset Token**.
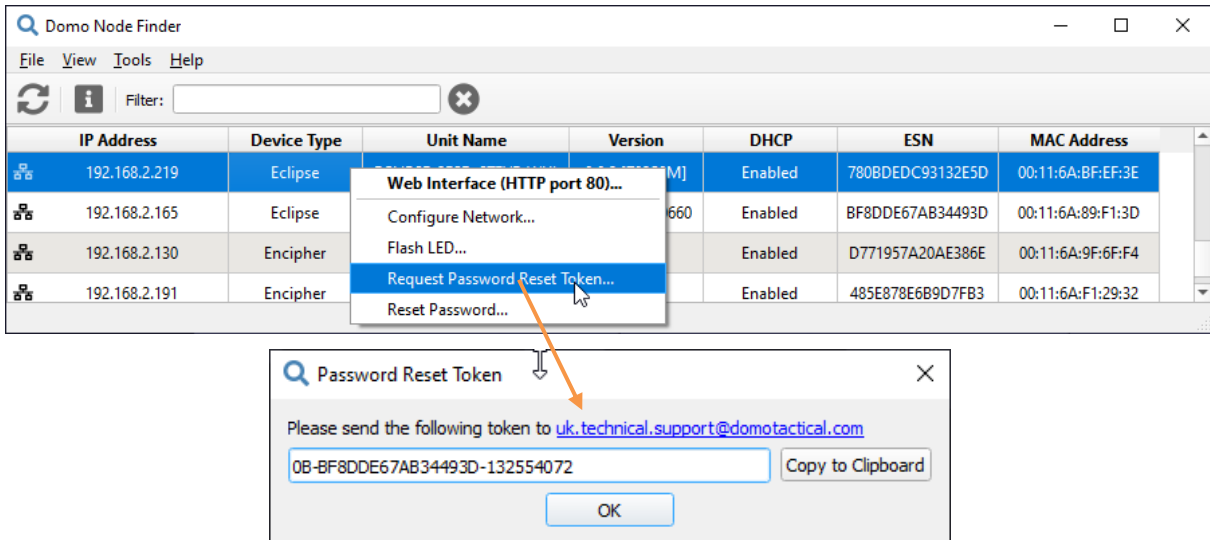
If you click the link a pre-filled email will be generated to send to Technical Support. A code will be returned which needs to be entered in Node Finder **Reset Password** dialogue box.
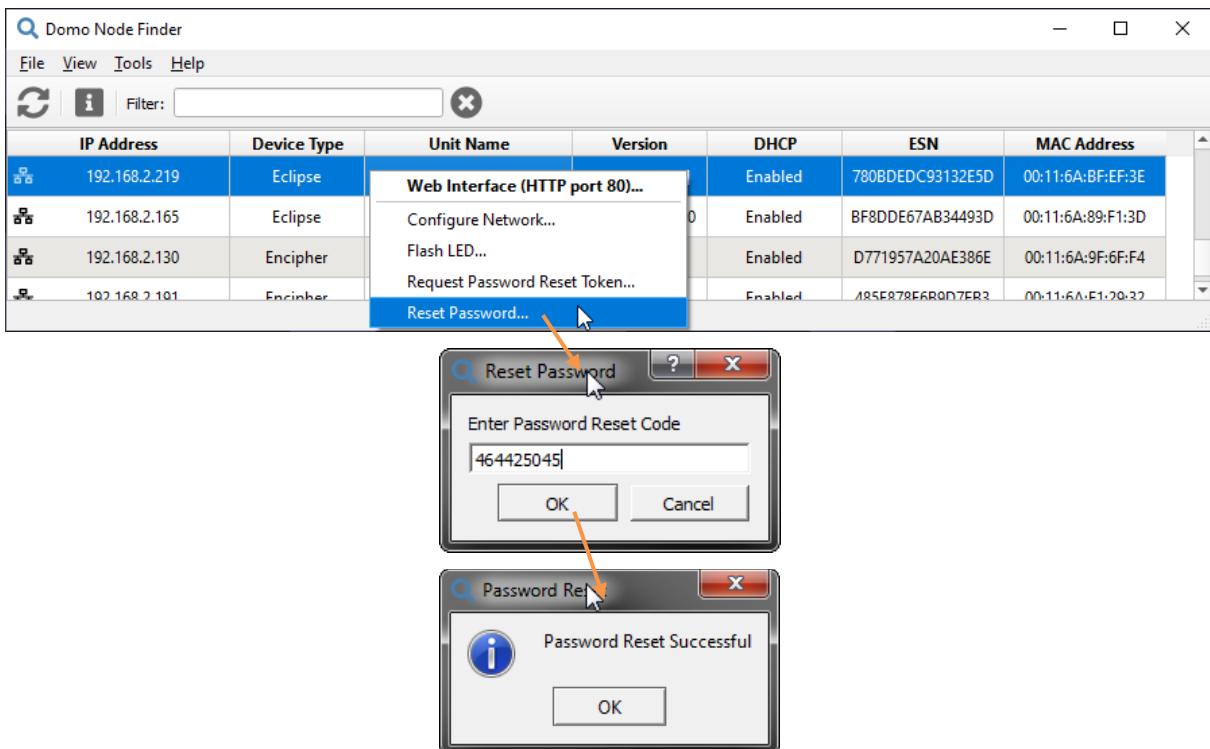
On successful reset, the web browser application will be unlocked to the default password (**dtcweb**).

Note: You can only enter an incorrect reset code five times before a new token will need to be generated.

4.8　OLED Display

An integrated OLED display and control buttons are provided on the Eclipse assembly to provide field control and monitoring.

Note: Refer to *Chapter 12* for detailed OLED operation.
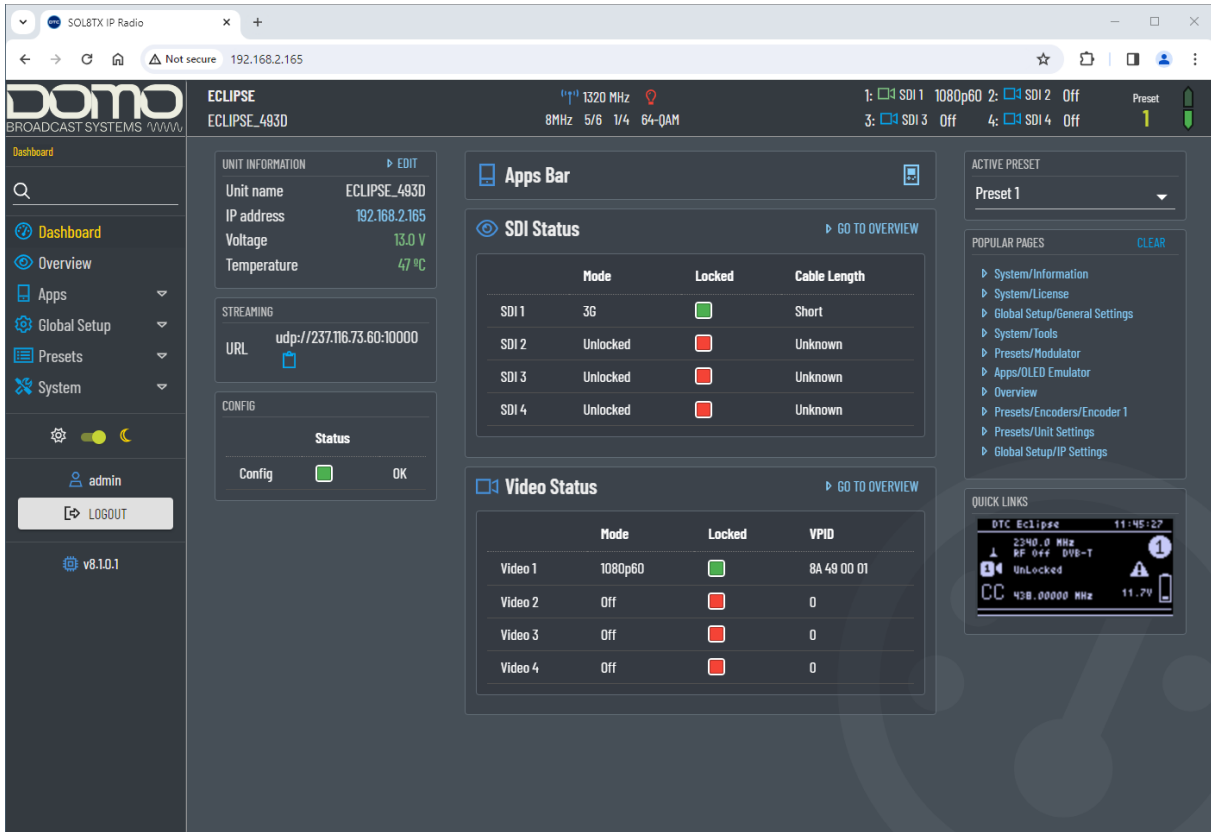
5. Web User Interface (WUI) Overview

5.1 Introduction

The web user interface (WUI) is an application for effective operation and monitoring of the Eclipse. The WUI can be accessed by any web browser application.

This chapter will provide a brief explanation of the structure of the interface for new users.

5.2   Information Panel

The information panel is at the top of the page and shows parameters of interest.
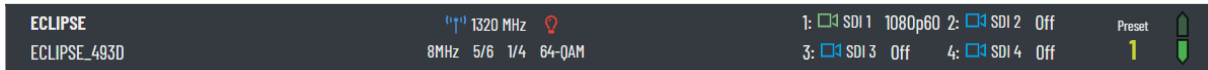
If you hover the mouse over the icons, tool tips will show. The icons will hyperlink to the page where the setting can be edited.
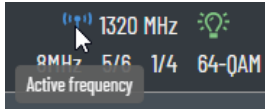
When you click **Preset**, a dialogue box will open to allow you to change the active preset. Preset settings are detailed in *Chapter 10*.
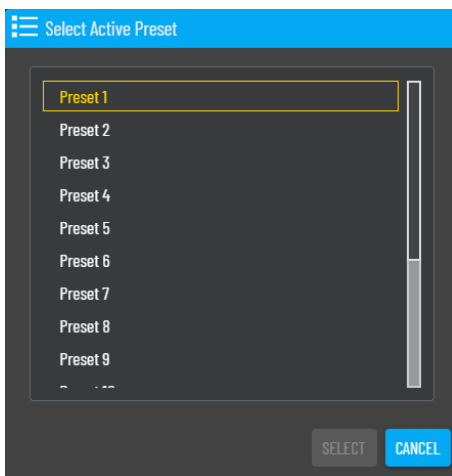
If the communication arrows at the right of the panel turn amber or red, this means that IP communications to the device has failed.
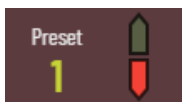
5.3   Interface Menu

The interface menu allows you to navigate settings and monitor the status of the network. The parameters are discussed in detail in the subsequent chapters.

The search feature requires a minimum of three characters to look through all pages for the parameter of interest.
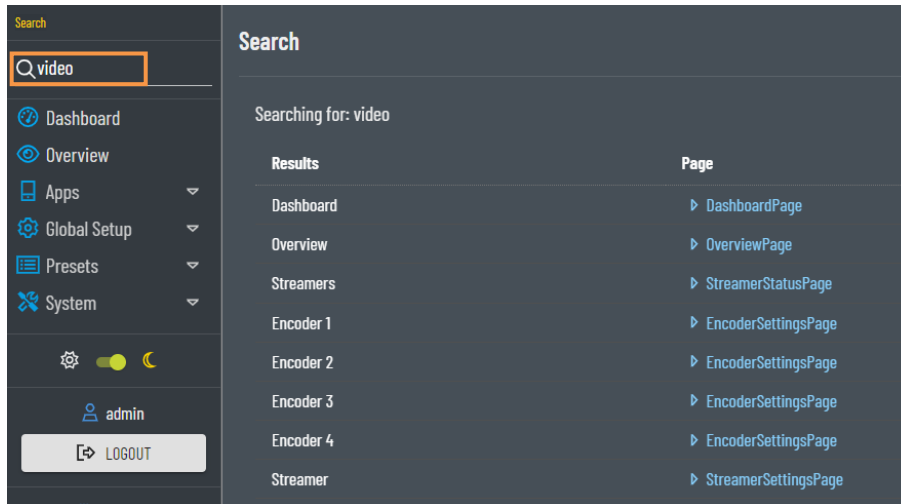
When a page or sub-page is selected from the top-level menu, the display will change according to the selection.
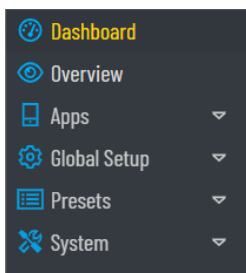
- Dashboard: see *Chapter 6*
- Overview: see *Chapter 7*
- Apps: *Chapter 8*
- Global Setup: *Chapter 9*
- Presets: *Chapter 10*
- System: *Chapter 11*

The display appearance can be changed to suit the user's preference or need.

Users can be added with managed permissions in the **System>Users** page.
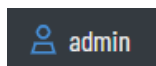
The logout button will end the WUI session and return to the login page if password protection has been applied.

The software version is displayed with a shortcut to the **System>Information** page.
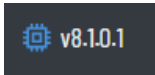
5.4 Display View

The display will change depending on the selection from the interface menu. The example below is of the **Presets>Modulator** page.

Hyperlinks can be found on each page and are a useful way to navigate to related pages.
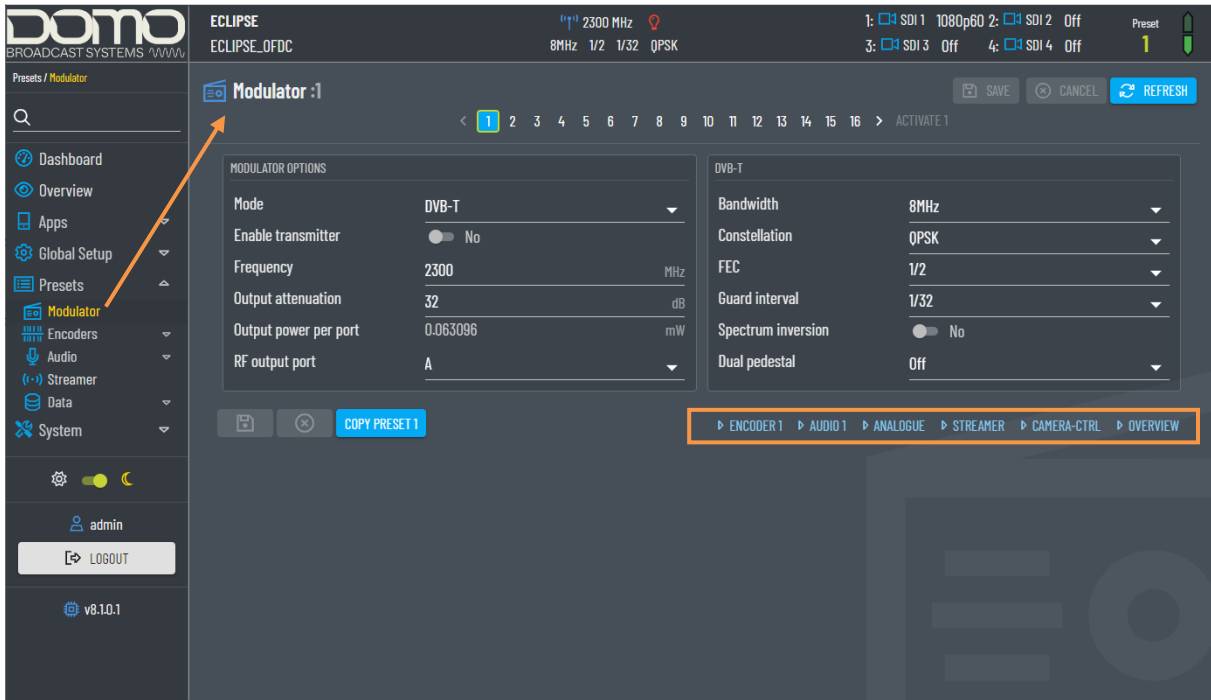
6. WUI Dashboard Page

The Dashboard is a summary page which can be referred to during operation.

The blue text or icons are hyperlinks that will take you to the page where parameters can be viewed in closer detail or edited.
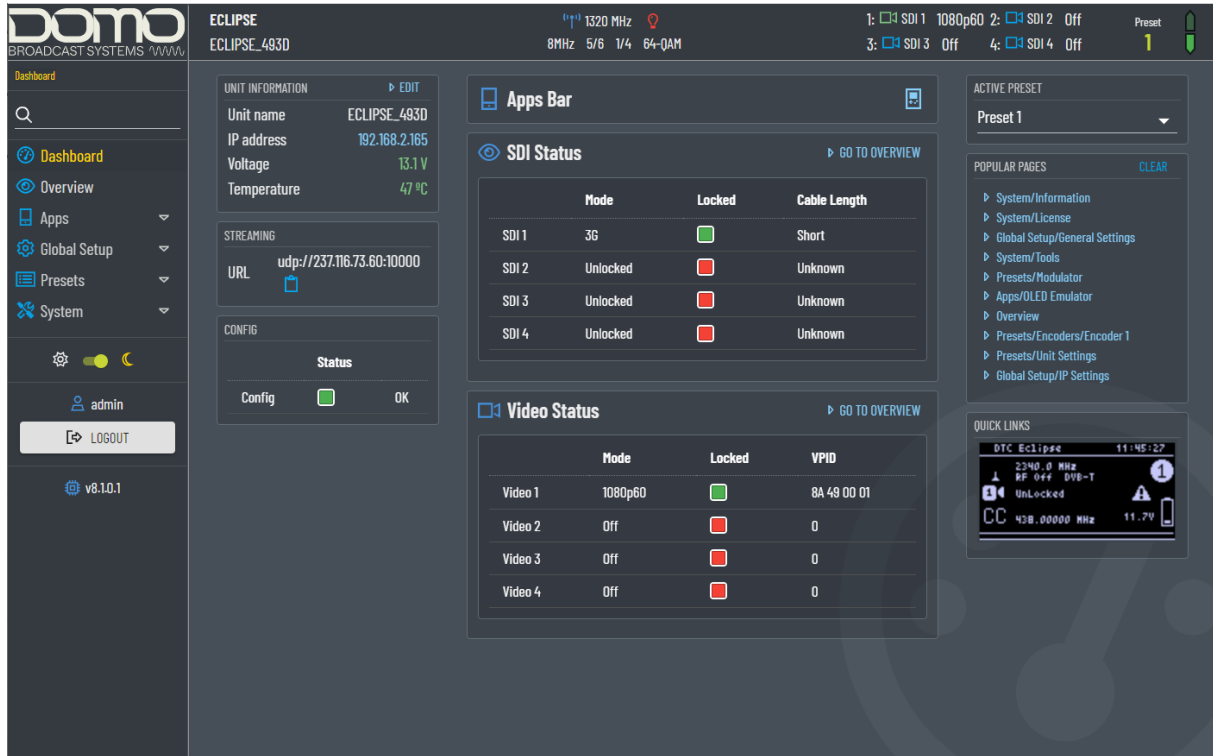
Colour-coded FPGA temperature measurements can be monitored. This can also be seen in the **System>Information** page.

Colour	Temperature	Notes
Green	Less than 80°C	Operating temperature is satisfactory.
Orange	Greater than 80°C but less than 90°C	Video encoding may be disabled. **CAUTION**: Take immediate action to reduce the operating temperature.
Red	Greater than 90°C	RF power may be disabled. **WARNING**: Damage to internal components may occur. Switch off the device, allow to cool and take action to reduce the operating temperature.

7. WUI Overview Page

The Overview page provides an outline block diagram of Eclipse system components.

Green links are used to indicate successful passthrough of data. Red links indicate no data.
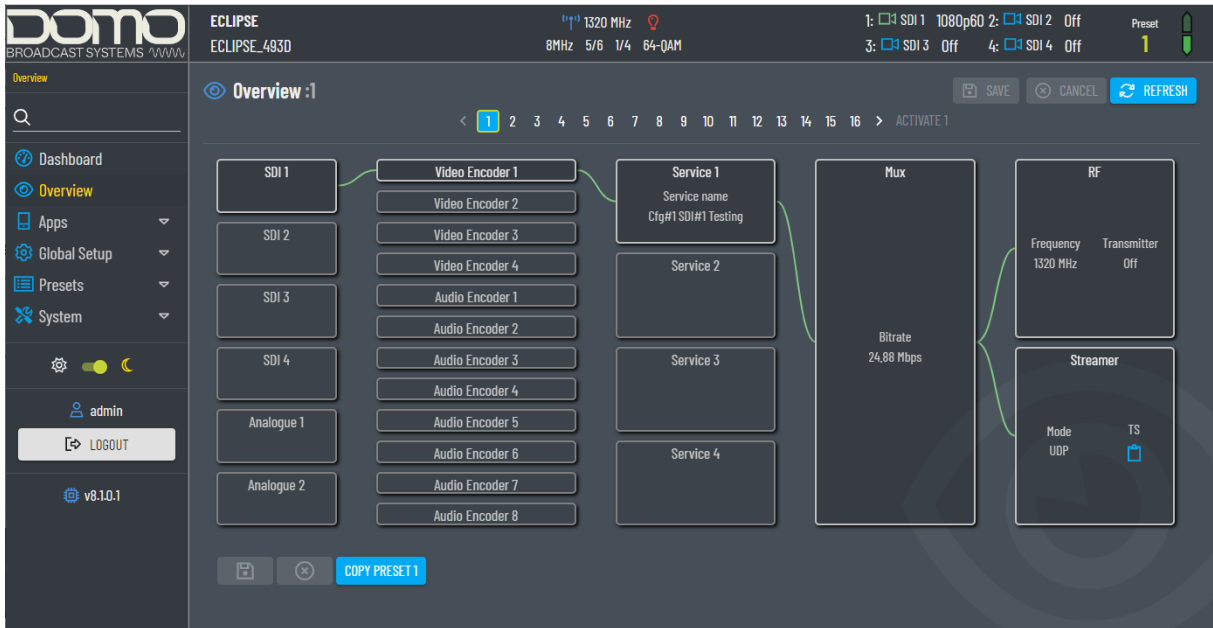
If you select a system component it will become highlighted yellow and display status and basic settings at the bottom of the screen. Click the component again to hide the settings.
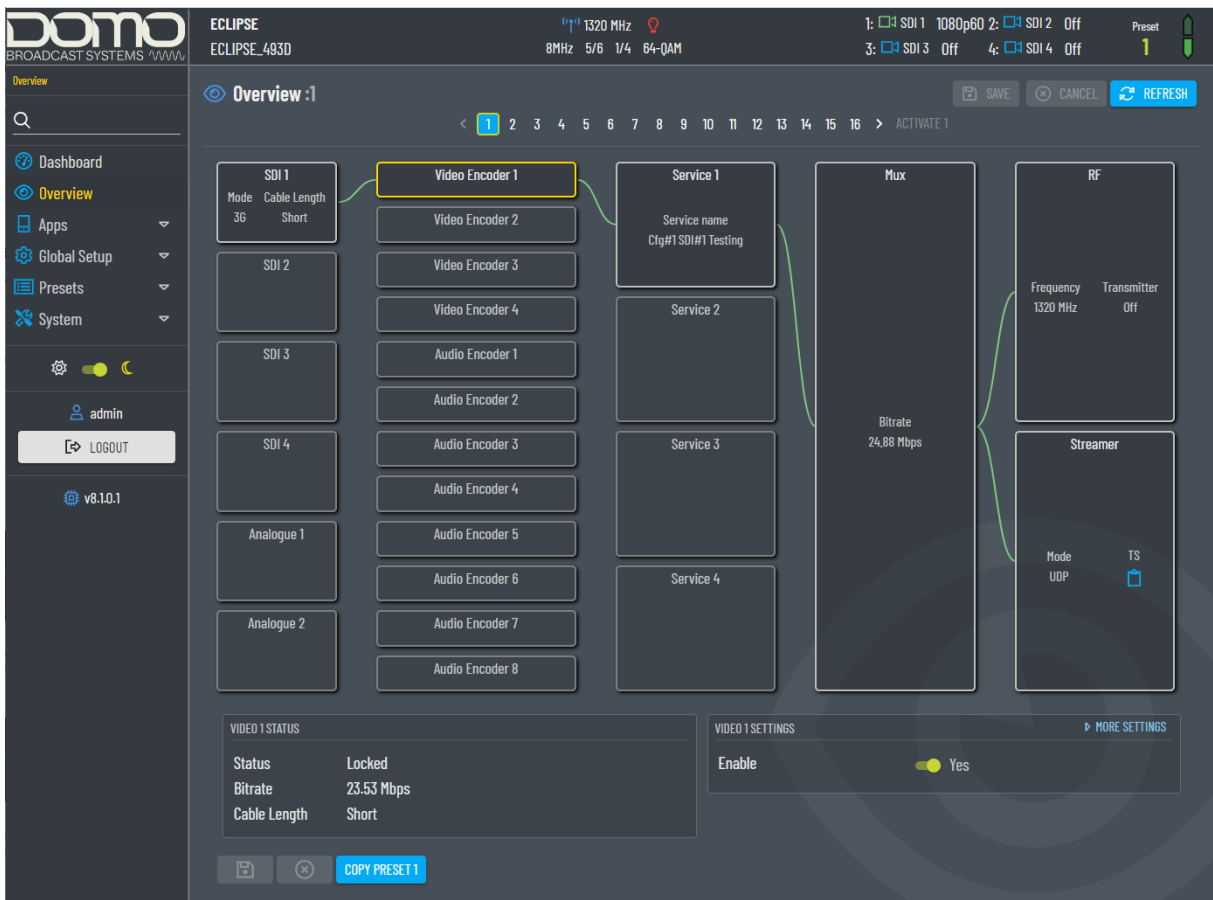
8. WUI Apps Pages

8.1 Introduction

Apps are features that can be used to enhance operation.

8.2 OLED Emulator

The OLED emulator page imitates the Eclipse OLED display operation, see *Chapter 12*.

This feature may be particularly useful for access to Camera Control settings which otherwise would require an additional cable and web interface, see *Chapter 13*.

The emulator buttons will function similarly to the OLED display:

- The **enter** button can be activated by clicking the tick (✓) or Enter on a keyboard
- The **cancel** button can be activated by clicking the cross (x) or Esc on a keyboard
- The **arrow** keys can be activated by clicking the arrows (↑→↓←) or the arrows on a keyboard

9. WUI Global Setup Pages
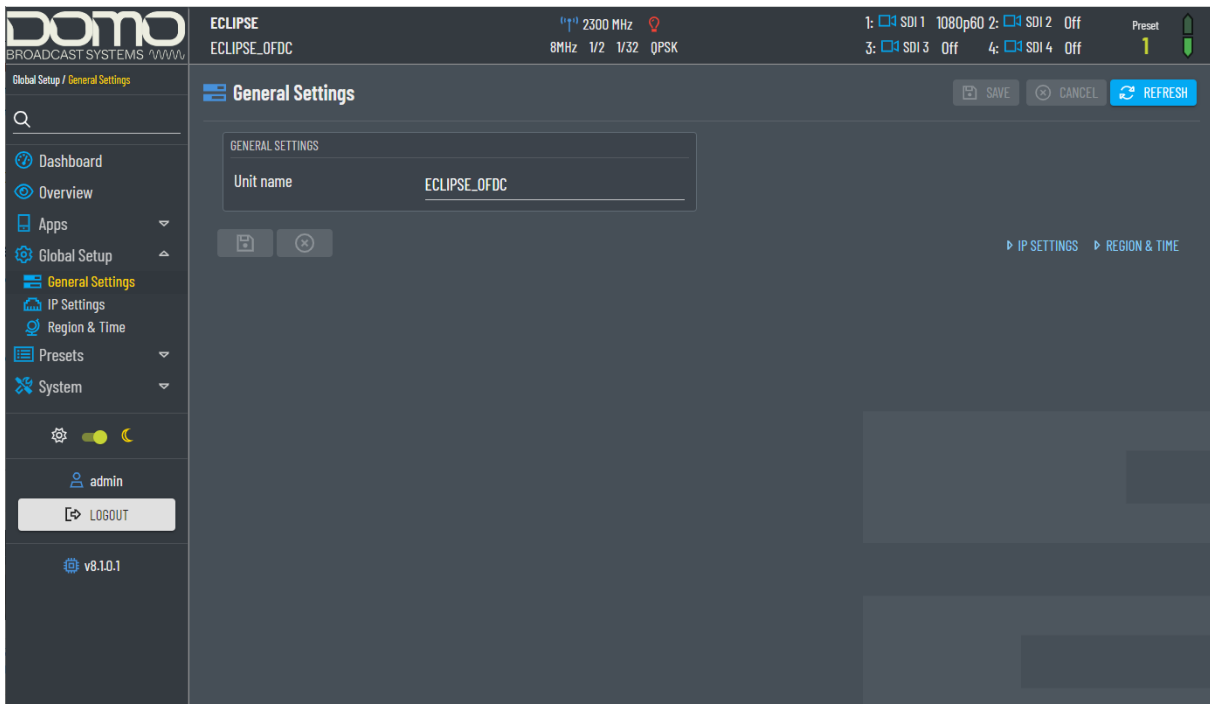
9.1 Introduction

The **Global Setup** pages will allow you to make changes to settings that are applied globally and are not affected by the preset settings.

When settings are edited, they must be saved to make them active.
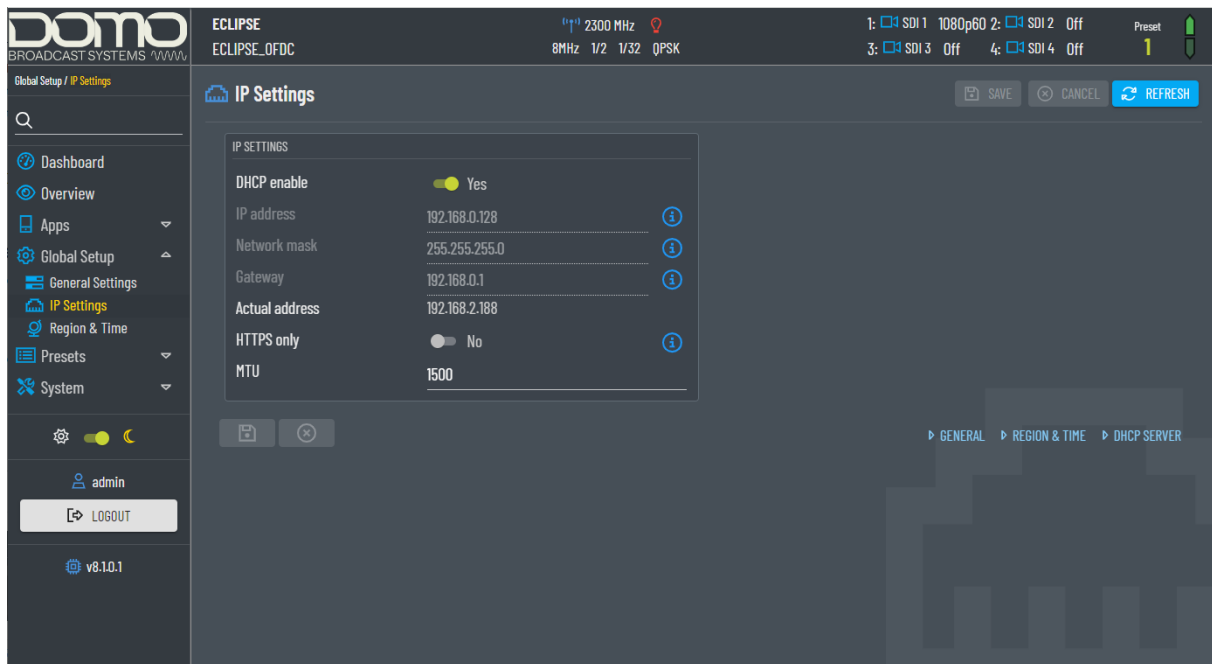
Property	Description
SAVE	Click the Save button to save changes. There is a save button at the top and bottom of the display.
CANCEL	If you make changes but do not click Save, click the Cancel button to return the current settings. There is a cancel button at the top and bottom of the display.
REFRESH	Click Refresh to update the browser settings. This may be necessary if more than one user has access to the device and may have made changes to the setup.

9.2 General Settings

The General Settings page allows you to apply a unit name to identify the device on the network. Can be up to 40 characters in length.

9.3   IP Settings

Property	Description
DHCP enable	If set to **Yes**, the IP address is automatically allocated by a DHCP server and all other IP settings are greyed out. If set to **No**, the remaining IP settings will have to be entered manually.
IP address	If the radio is not automatically acquiring its IP address through a DHCP server then a fixed IP address needs to be assigned to the unit.
Network mask	The network mask divides a network into smaller more efficient subnets.
Gateway	A gateway is an access point to another network. The gateway address is usually a router interface to send IP packets out of the local network.
Actual address	This is the IP address that has been allocated to the device.
HTTPS only	HTTPS is used for secure communication over a computer network between a web browser and server. HTTPS only will ensure that only HTTPS communications are possible.
MTU	The maximum transmission unit (MTU) should be set to the highest value that the network infrastructure supports. For most LANs and public networks this would be 1500 bytes, but networks that use links that encapsulate IP packets within IP packets (e.g., a VPN), or cellular networks, will have a reduced MTU. **Note**: If packets are being dropped, a ping length can be sent to discover the maximum MTU, i.e., ping *<ip_address>* -f -l 500. The number can be adjusted until the maximum is found. Because the length of the ping does not take account of 28 bytes of IP and ICMP packet headers, a length of 1472 creates packets that have 1500 bytes of payload. Therefore, the MTU should be set to the Lmax + 28 where Lmax is the largest ping that will go through the network unfragmented and without timeout.

9.4 Region & Time

The Region & Time page allows you to configure settings which can be used for timestamps.
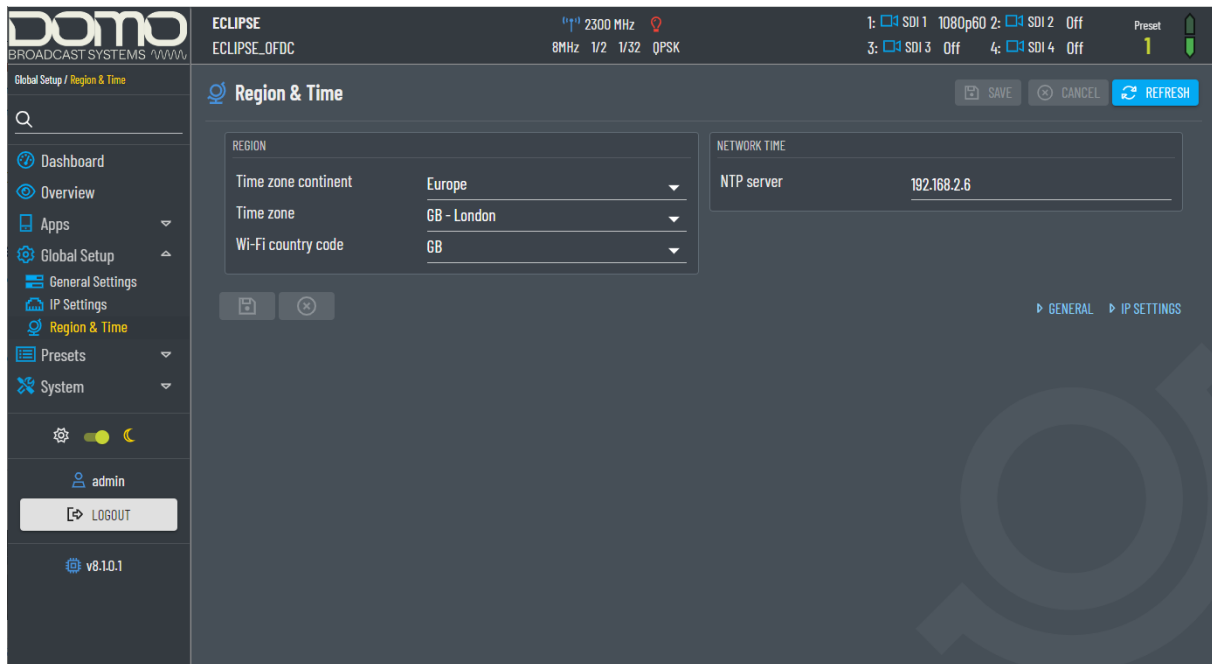
9.4.1 Region

Property	Description
Time zone continent	Select the time zone for the continent.
Time zone	Select the time zone for the country. No selection will default to UTC time. This will be displayed on the OSD, if selected.
Wi-Fi country code	If you are using a Wi-Fi dongle, you will need to select the country code. This will ensure that channel selection is valid for the country it is being used in.

9.4.2 Network Time

Enter a Network Time Protocol (NTP) server IP address for clock synchronization. This can be verified in the **System>Information** page.

If the address is 0.0.0.0, the clock will align to the PC time and will have to be set manually, see the **System>Tools** page, *Section 11.4.2*.

10. WUI Presets Pages

10.1 Introduction

Up to sixteen presets that can be configured. The active preset will be outlined, and the selected preset will be highlighted blue. The selected preset can be edited without being activated.

Settings can be edited and must be saved to make them active. Copy preset can save time on repeated entries.

Item	Description
SAVE	Click the Save button to save changes. There is a save button at the top and bottom of the display.
CANCEL	If you make changes but do not click Save, click the Cancel button to return the current settings. There is a cancel button at the top and bottom of the display.
REFRESH	Click Refresh to update the browser settings. This may be necessary if more than one user has access to the device and may have made changes to the setup.
COPY PRESET 2	Click Copy Preset to copy settings to other presets. You can choose to copy the selected settings or all preset settings.

10.2 Modulator

The Modulator page allows you to make changes to the RF modulator settings.
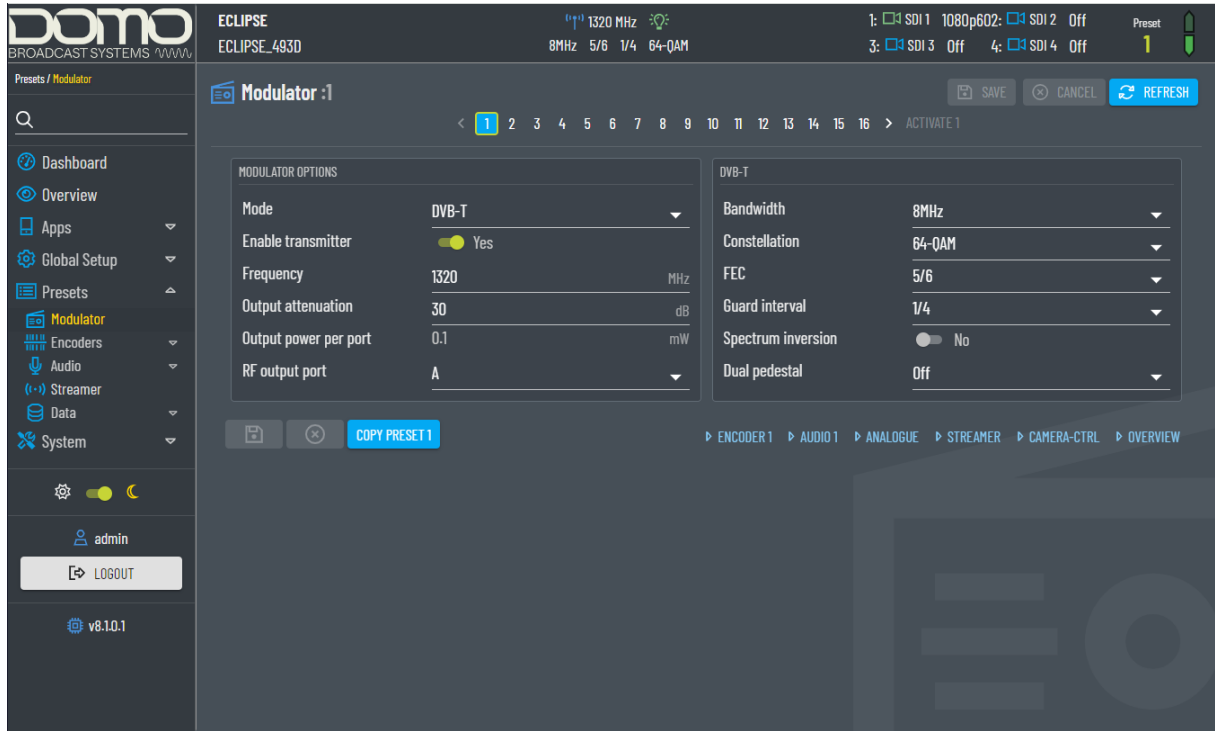
10.2.1 Modulator Options

Property	Description
Mode	**DVB-T** gives excellent data throughput but shorter range than Narrowband modes. **Narrowband** gives excellent range and best use of available channel bandwidth. **UMVL** (Ultra Mobile Video Link) is optimised for operation in high-speed mobile environments. UMVL is also excellent when you are operating with high frequency (4GHz and above) transmissions.
Enable transmitter	When set to **Yes**, this will turn the RF output power on.
Frequency	Enter the frequency you wish to use for the system. **Note**: The frequency range of the unit can be found in the **System>Information** page.
Output attenuation	The level of attenuation in dB that can be applied to the output. Refer to *Section 14.2* for a dBm to watts conversion table and example calculation.
Output power per port	Indication only. This represents the power in mW at the RF port including the output attenuation.
RF output port	The transmitter has two COFDM antennas, A and B. A is selected as the output antenna by default, but you can select B or both if required.

10.2.2　DVB-T or Narrowband/UMVL

DVB-T	
Bandwidth	8MHz ▼
Constellation	64-QAM ▼
FEC	5/6 ▼
Guard interval	1/4 ▼
Spectrum inversion	◖ No
Dual pedestal	Off ▼

NARROWBAND / UMVL	
Bandwidth	6MHz ▼
Constellation	QPSK ▼
FEC	2/3 ▼
Guard interval	1/16 ▼
Spectrum inversion	◖ No

Property	Description
Bandwidth	Select the bandwidth for the transmission. The wider bandwidths offer greater data throughput but with shorter range.
Constellation	**QPSK**, **BPSK** and **8-PSK** – less user data, more robust, more range. **16QAM** – more user data, less robust, less range (link performance reduced by 5db). **64QAM** – max user data, least robust, least range.
FEC	The forward error correction (FEC) rate. **1/2** – 1 bit out of 2 bits is data and 1 bit is for error correction. **7/8** – 7 bits out of 8 bits are data and 1 bit is for error correction. More user data means better picture quality, but less error correction means less robust signal and thus less range.
Guard Interval	The guard interval is an extension of the RF symbol period to give immunity to reflections. **1/32** – deals with fast reflections. More data, less range. **1/4** – deals with slower reflections. Less data, more range.
Spectrum inversion	Set this to **Yes** if you needed to invert the COFDM spectrum to align with third party equipment. When operating with DTC products, this is not necessary.
Dual Pedestal (DVB-T only)	Dual pedestal mode is a licensed feature which will double the bitrate by using two adjacent COFDM channels, e.g., 8MHz will give a nominal bandwidth of 16MHz. See *Figure 10-1* and *Figure 10-2* dual pedestal images. **Single Port** – 100mW output for both channels on a single port. **Dual Port** – 100mW output for each channel across both ports (200mW total). **Note**: Dual port (A+B) will give the best adjacent channel performance at higher power but will produce more heat. Ensure sufficient heatsinking is provided.
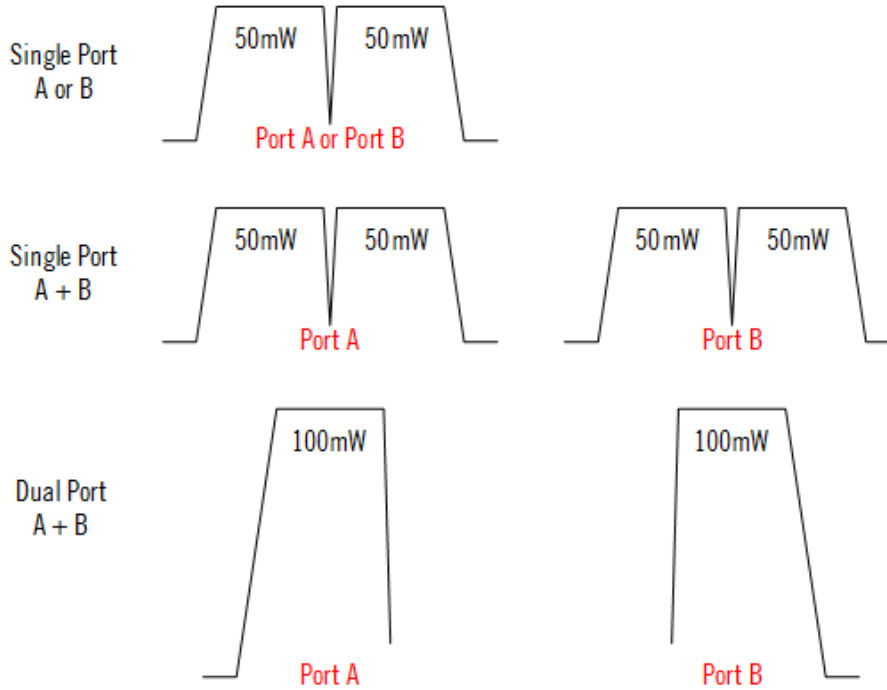
Figure 10-1 Dual Pedestal COFDM Representation
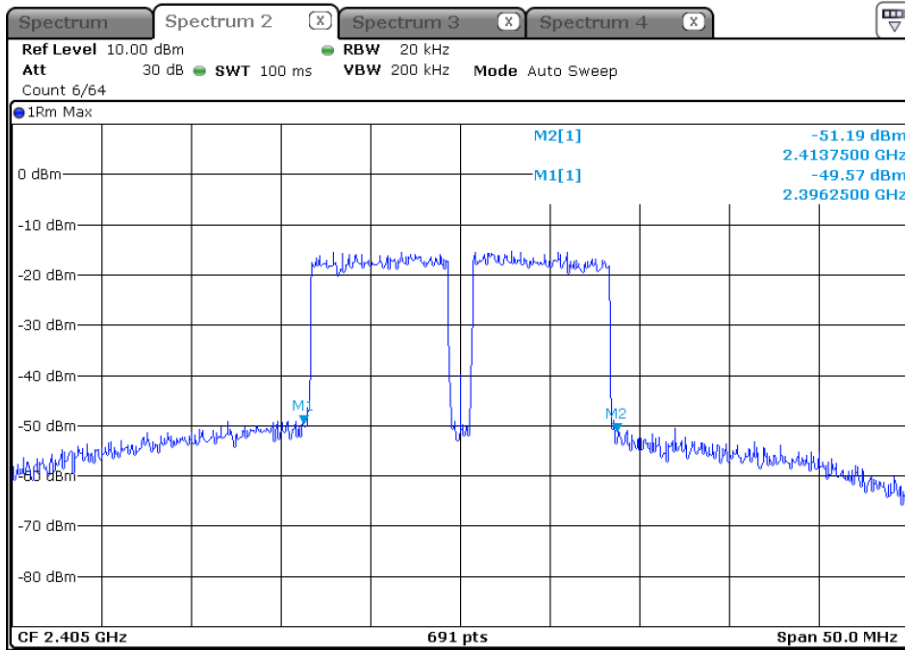
Figure 10-2 Dual Pedestal Spectrum Analyser Plot

10.3   Encoders

Four encoder inputs can be configured.
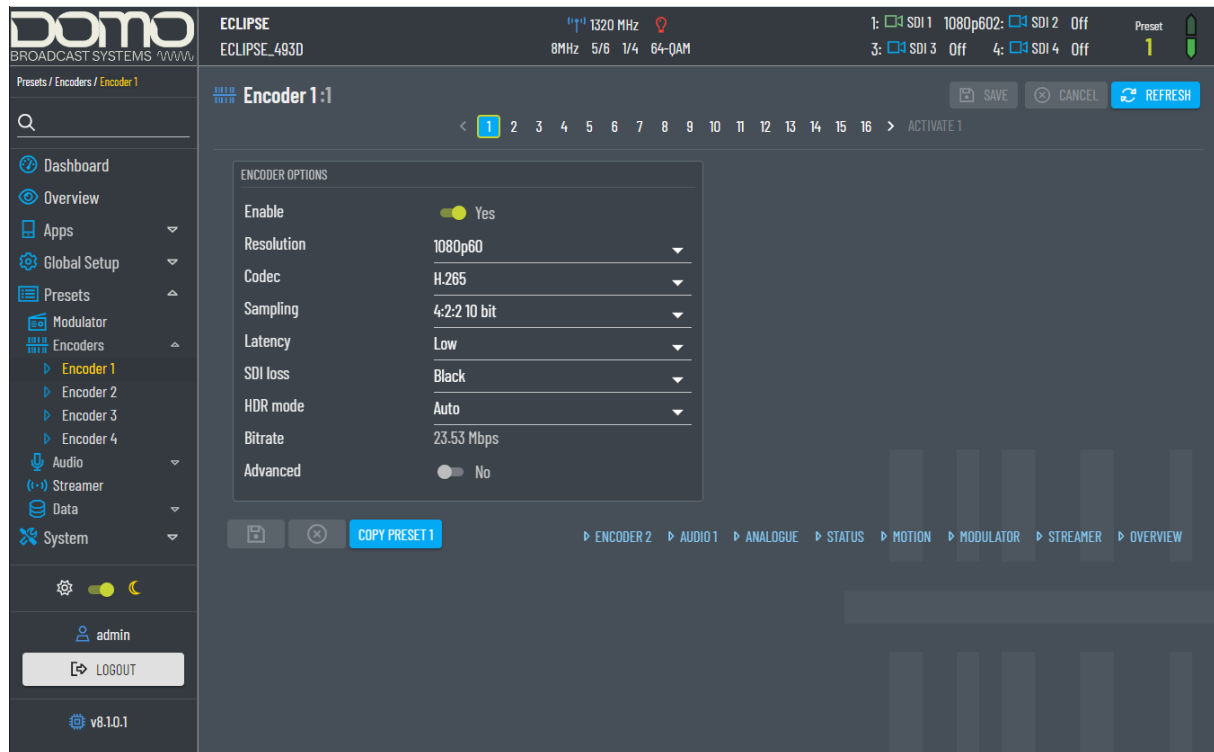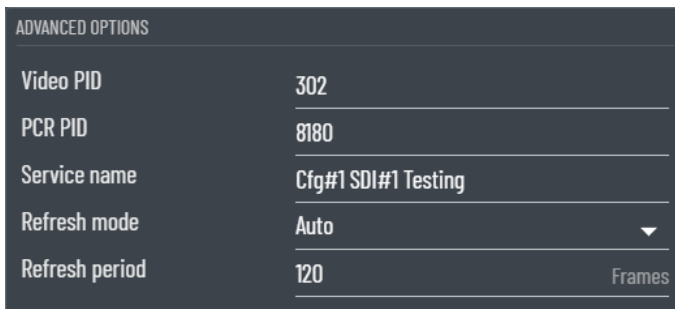
10.3.1   Encoder Options

Property	Description
Enable	Set this to **Yes** to enable the video content in the COFDM transmission.
Resolution	**Encoder 1** supports resolutions for 12G/6G/3G/1.5G-SDI. **Encoder 2-4** supports resolutions for 3G/1.5G-SDI. **Encoder 2** supports deinterlacing for H.264 encoding. **Encoder 4** supports 1080psf resolutions. **Note**: SDI video resolutions are defined in *Section 14.3*. Square Division (**SQD**) formats require four 3G-SDI or 1.5G-SDI inputs (1-4) containing one quarter of the original image. 2 Sample Interleave (**2SI**) formats require four 3G-SDI or 1.5G-SDI inputs (1-4) containing a full image at 1/4 resolution.
Codec	H.265 and H.264 video compression codecs. Please ensure receiver compatibility.
Sampling	4:2:2 **10 bit** and **8-bit** sampling are currently supported. Please ensure receiver compatibility.
Latency	High prioritises higher picture quality at the expense of latency. Low prioritises low latency at the expense of picture quality.
SDI loss	Select what is displayed on the screen when the video input fails.

Property	Description
HDR mode	This allows High Dynamic Range (HDR) video sources to be processed by the transmitter. Specific HDR modes may be selected if **Auto** fails to detect the source correctly; currently supported modes are **REC 2020**, **HLG** and **PQ**. This can be monitored on a compatible receiver.
Bitrate	Indication only. This is the bitrate allocation for the video content.
Advanced	Select this box to show the advanced options, see below.

10.3.2   Advanced Options

ADVANCED OPTIONS

Video PID	302
PCR PID	8180
Service name	Cfg#1 SDI#1 Testing
Refresh mode	Auto ▼
Refresh period	120 Frames

Property	Description
Video PID	The packet ID for the video content in the transport stream service information.
PCR PID	The packet ID for the PCR in the transport stream service information. The PCR (Program Clock Reference) is used to sync the audio and video.
Service name	A name to identify the service in the transport stream.
Refresh mode	**Auto**, **Vertical** or **Horizontal**. If **Disabled**, the picture may not recover if the RF or video signal is lost.
Refresh period	The video refresh period in frames; minimum of 5. **Note**: Picture quality may be adversely for low refresh periods.

10.4   Audio>Input

Up to eight audio inputs can be added to the transport stream.
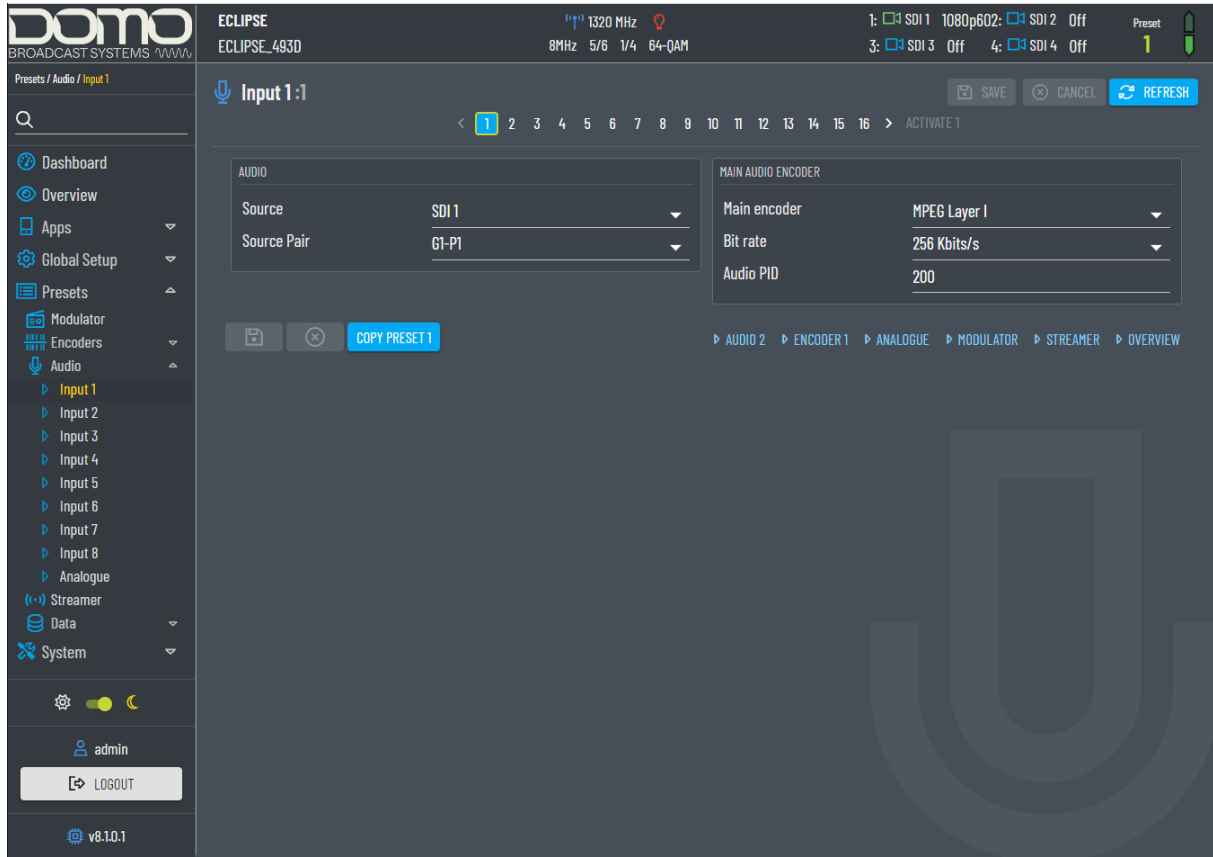
10.4.1   Audio

Property	Description
Source	If an Analog input is selected, the gain and phantom power settings may need to be entered in the **Audio>Analogue** page.
	Embedded digital audio is included in the SDI video input.
Source Pair	SDI provides for 16 channels (8 pairs) of embedded audio in 4 groups (G1-G4) of 2 pairs (P1/P2).

10.4.2   Main Audio Encoder

Property	Description
Main encoder	Select a codec to suit operating and bandwidth requirements.
	MPEG is compressed audio and will allow you to choose how much bitrate is used for encoding. LPCM audio is uncompressed.
Bit rate	MPEG audio allows you to select the amount of bitrate for audio encoding.
Audio PID	The packet id for the audio content in the transport stream service information. It is recommended that this is left at the default value unless an advanced user.

10.5   Audio>Analogue

10.5.1   Analogue Audio

There can be two analogue audio inputs.
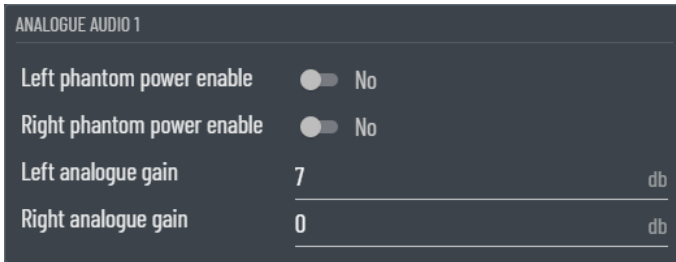
Property	Description
Left phantom power enable Right phantom power enable	Set this to **Yes** to supply phantom power to the audio source. The voltage level is set in the Power pane, see below.
Left analogue gain Right analogue gain	Gain can be applied to each channel to boost low input levels.
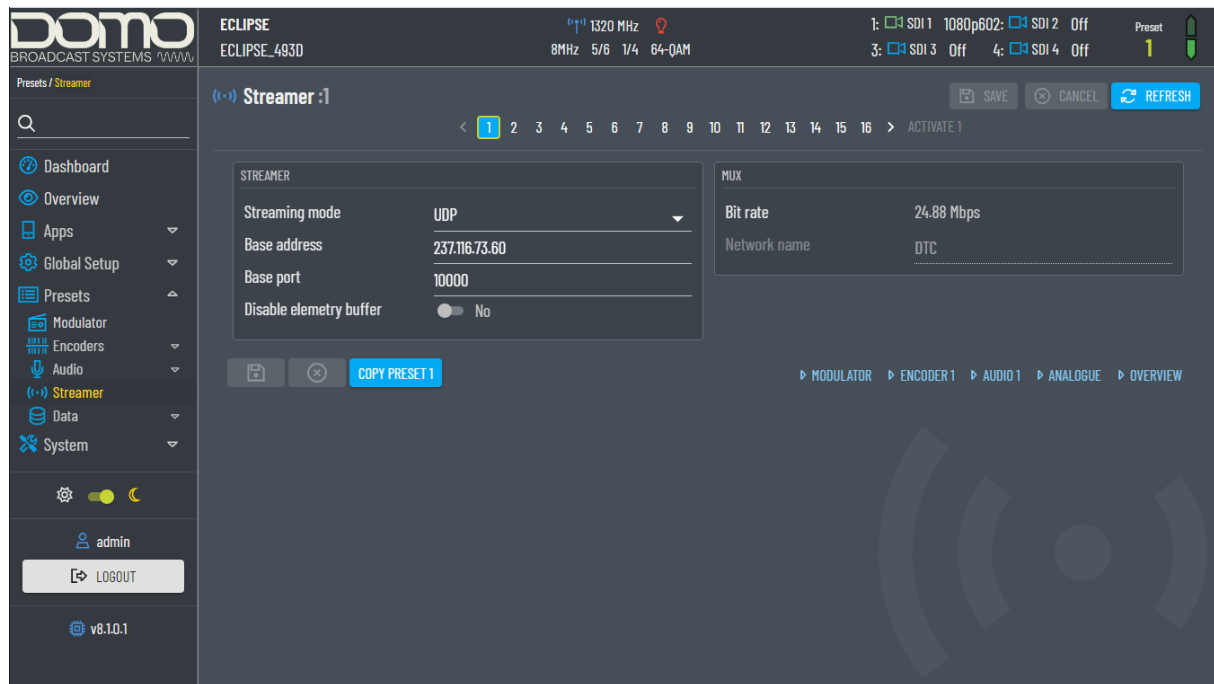
10.5.2   Power
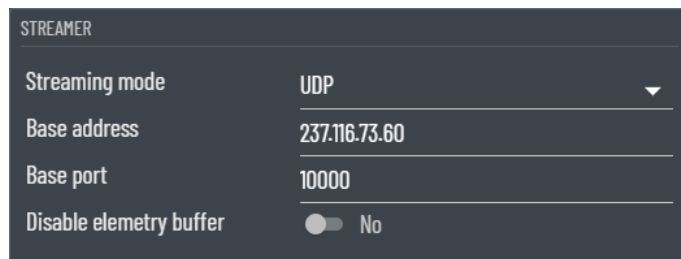
Select from 12V or 48V.

Phantom power is used to supply power to the audio source, if required.

10.6 Streamer

10.6.1 Streamer

Property	Description
Streaming mode	**RTSP TCP** and **RTSP UDP** are both unicast. **RTSP TCP** streaming does not have issues with firewall blocking making it more user friendly for VMS customers.
Base address	This enables you to change the address used by the unit for multicast streaming. The default value is random to make sure different devices have different addresses.
Base port	Port numbers in the header are used to direct traffic around the network.
Disable elementary buffer	Elementary streams are encoded video data that is carried within the transport stream. The elementary data will vary depending on the content. If unset, the elementary stream bitrate is kept constant within the transport stream. If set, this will disable elementary stream buffering but will ensure correct timing of video frames within the transport stream. This may be useful when playing elementary streams into media players which can struggle with fluctuating bitrate.

10.6.2 Mux

The Mux parameters are for indication only.

MUX	
Bit rate	24.88 Mbps
Network name	DTC

Property	Description
Bit rate	The Mux bit rate is the total bit rate for the transport stream.
Network name	A name to identify the transport stream.

10.7 Data>Camera Control

Property	Description
Camera control PID	The packet ID for the camera control content in the transport stream service information. It is recommended that this is left at the default value unless an advanced user.
Camera control enable	Set this to **Yes** to allow bi-directional data communications with the camera unit.

11. WUI System Pages

11.1 Information

The Information page provides details and features that may be useful during a service call.

The system time is displayed in UTC time. To set the time go to the **Global Setup>Region & Time** page, see *Section 9.4*.

Colour-coded FPGA temperature can also be viewed on the **Dashboard**, see *Chapter 6*.

11.2 License

The License page provides a list of features which will provide functionality.

The enabled licenses are highlighted and marked with a tick. New licenses can be uploaded from the **System>Maintenance** page.
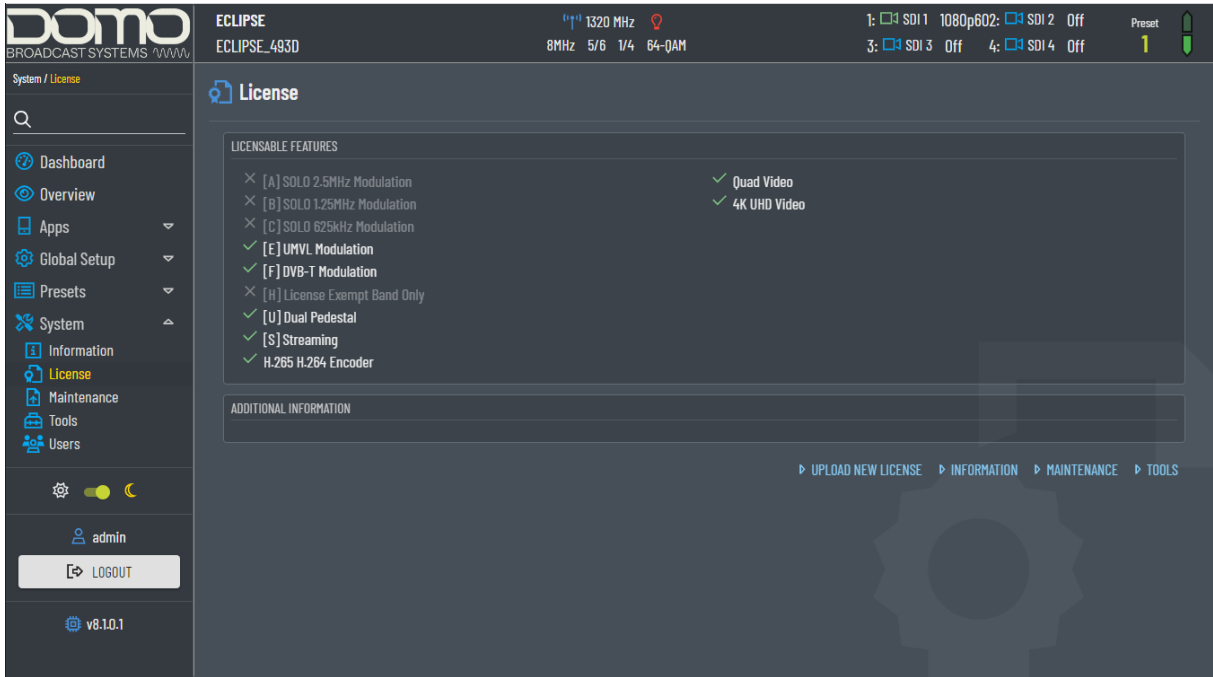
11.3 Maintenance

The Maintenance page is used to upload or download files to and from the device.
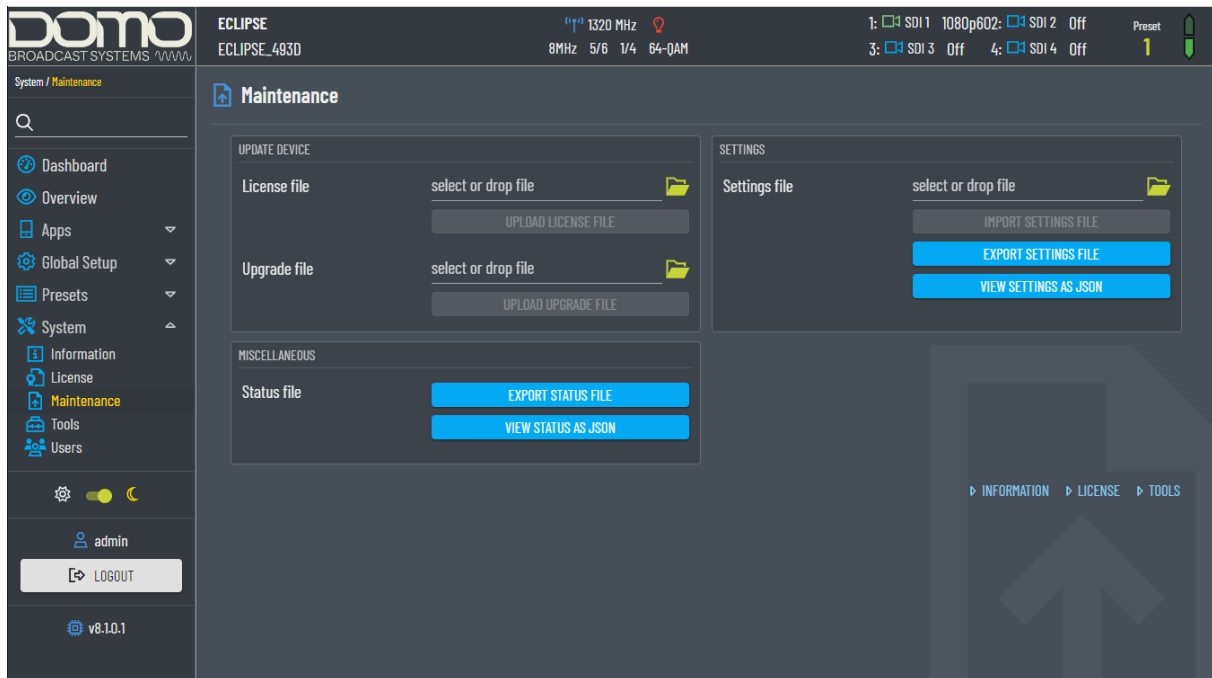
11.3.1 Update Device

Update Device provides the recommended method to upgrade software and licenses.
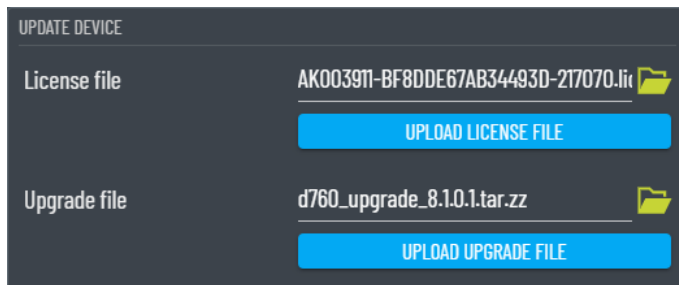
Browse for files by clicking the file icon or alternatively, files can be loaded by drag and drop. Initialise the upgrade by clicking the **Upload License File** or **Upload Upgrade File** button.

Update progress will be displayed throughout the process. When the upgrade is complete, refresh the browser to enable new software features.

Note: If the device loses power during a software upgrade, the upgrade will start again when the unit is repowered.

11.3.2   Miscellaneous
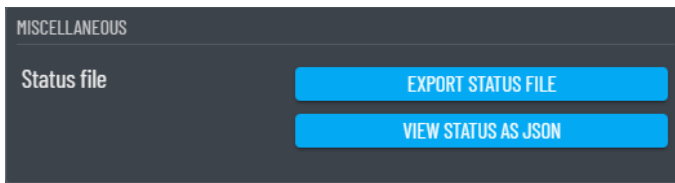
The Miscellaneous pane provides an easy way to export or view JSON **status** files.

11.3.3   Settings
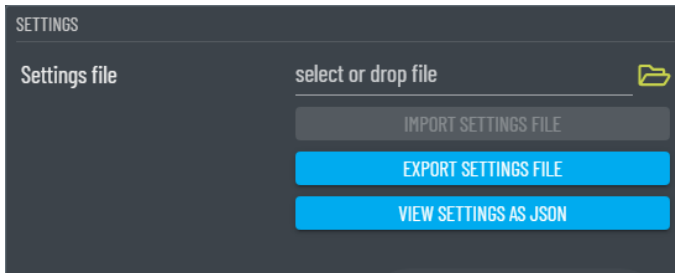
The Settings pane provides an easy way to import, export or view JSON **configuration** files.

11.4   Tools

11.4.1   Restore Factory Settings
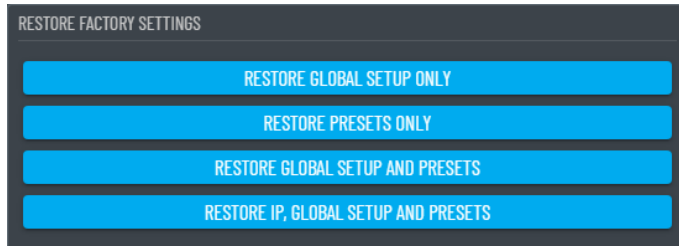
Property	Description
Restore Global Setup Only	Restores the Global Setup to factory default conditions. The IP settings and unit name will be retained.
Restore Presets Only	Restores the 16 Preset configurations to factory default conditions. The IP settings and unit name will be retained.
Restore Global Setup and Presets	Restores Global Setup and 16 Preset configurations to factory default conditions. The IP settings and unit name will be retained.
Restore IP, Global Setup and Presets	Restores all settings to factory default settings, including IP settings and unit name.

11.4.2 System Actions
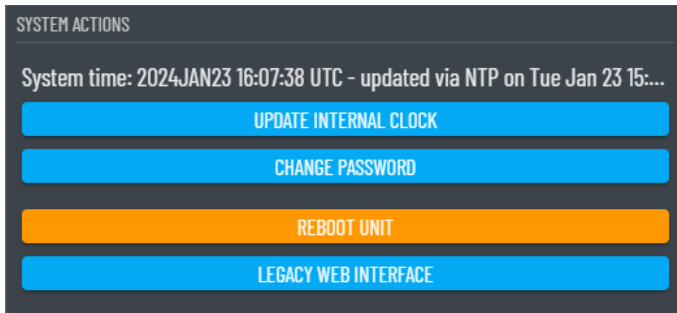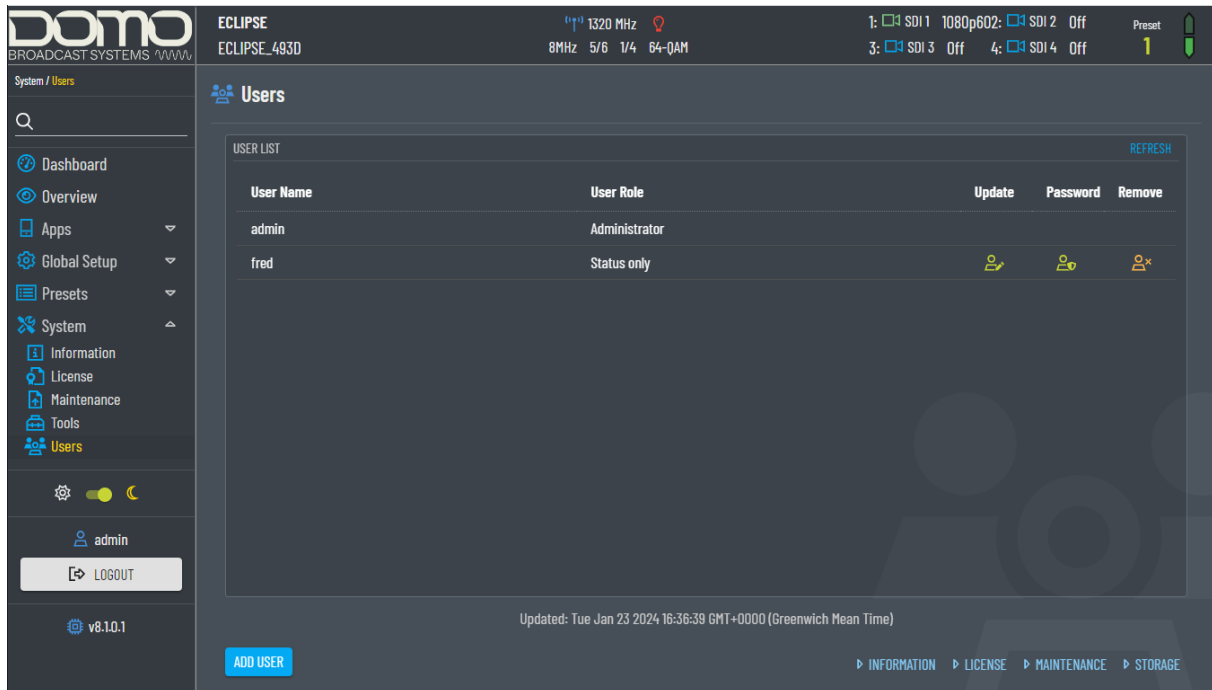
Property	Description
Update Internal Clock	Sets the internal clock to the PC system time.
Change Password	The login password can be changed from the default **dtcweb**. If the password is changed and then forgotten, there is a password reset process, see *Section 4.7*.
Reboot Unit	This selection will force a reboot of the device.
Legacy Web Interface	This button will revert the WUI to the legacy version.

11.5 Users

Web users can have four levels of access:

Administrator; **Full Control**; **Status and Change Config**; **Status Only**
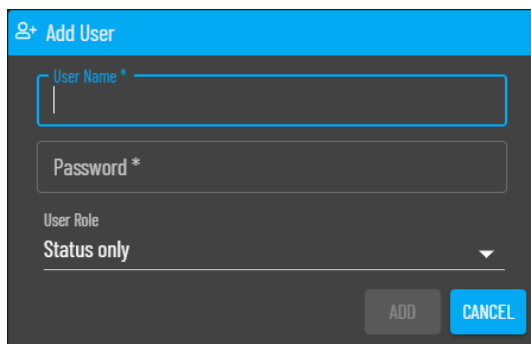
The **Administrator** uses the default login password. The Administrator has full user interface access and can add new user credentials and manage their permissions.

Click the **Add User** button to open a dialogue box.

Note: User names and passwords are case sensitive.

User Roles:

- **Full control** allows most administrator permissions but will not allow user management or restore factory settings.

- **Status and change config** allows the user to change the preset configuration and view settings and status. There is limited access to **System** information and can change password.

- **Status only** allows the user to view status but does not allow visibility of the settings. There is limited access to **System** information to change password.

12. OLED Operation

12.1 Introduction

The following sections will explain in detail the OLED control buttons and display. It will detail how to navigate the OLED display and the menu structure to configure and monitor the Eclipse when an Ethernet connection is not available.

Note: If the display is not used for a period of approximately 30 seconds after boot-up, it will automatically turn off.

12.2 Control Buttons

You can scroll through, select, and save settings on the OLED display using the navigation buttons which are located adjacent to the OLED display (shown above). The button functions are:

No.	Description
1	The top left button is the **enter** button.
	If the OLED display is off, press to turn the display on.
	From the status screen, press to enter the configuration menus.
	Press to select the highlighted menu or select a parameter.
2	The bottom left button is the **cancel** button.
	From the status screen, press this button to close the OLED display.
	Press this button to return to the previous menu.
3	The up/down buttons will scroll through the display.
	When a property has been selected for editing, use the up/down arrows to select a new character or number, see the *Character Editing Guide* below.
4	When a property has been selected for editing, use the left/right buttons to select a character or number to be changed.
5	If an invalid selection is pressed, a button help image will pop-up momentarily, indicating the valid options.

Character Editing Guide

When editing characters with the up/down buttons, it may be useful to know the order in which characters can be selected:

Space	,	8	D	P	\	h	t
!	-	9	E	Q	]	i	u
"	.	:	F	R	^	j	v
#	/	;	G	S	_	k	w
$	0	<	H	T	`	l	x
%	1	=	I	U	a	m	y
&	2	>	J	V	b	n	z
'	3	?	K	W	c	o	}
(	4	@	L	X	d	p	|
)	5	A	M	Y	e	q	{
*	6	B	N	Z	f	r	~
+	7	C	O	[	g	s	

12.3 OLED Status

When the Eclipse has booted up, the OLED will display status overview.

> **Note**: If a camera control module is not fitted, the IP address will be displayed where the CC frequency is shown.

Press the up/down arrow buttons to scroll through the status pages. The status pages are categorized:

- SDI Input
- SDI Cable Length
- SDI Decoder (VPID)
- Video Encoder
- Audio Source
- Audio Codec (1-4 / 5-8)
- Modulation
- RF
- Camera Control
- License RF
- License Encoder
- Misc Status
- Engineering Overview (includes current **IP address**)

12.4   OLED Configuration Menus

From the status menu, press the enter button once to enter the Eclipse configuration menus.

```
Menu
1  Configuration Preset
2  RF Enable
3  RF Settings
4  Video Encoder
5  Audio Encoder
6  Analogue Audio
7  Camera Control
```

12.4.1   Configuration Preset

```
Menu : Configuration Preset



          1


               OK Cancel
```
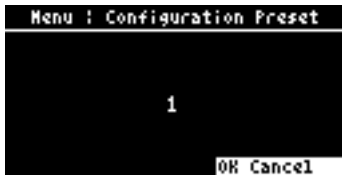
Menu	Notes
Configuration Preset	Select a preset from 1-16.
	This will apply the settings for the selected preset.

12.4.2   RF Enable

```
Menu : RF
1  RF Off
2  RF On
```

Menu	Notes
RF Enable	Set RF power on or off.

12.4.3 RF Settings

Menu	Sub-Menu	Notes
RF Settings	Modulation	As for WUI, see *Section 10.2.1*.
	Frequency	As for WUI, see *Section 10.2.1*.
	Output Attenuation	As for WUI, see *Section 10.2.1*.
	RF Output Port	As for WUI, see *Section 10.2.1*.
	Bandwidth	As for WUI, see *Section 10.2.2*.
	Constellation	As for WUI, see *Section 10.2.2*.
	FEC Rate	As for WUI, see *Section 10.2.2*.
	Guard Interval	As for WUI, see *Section 10.2.2*.
	Dual Pedestal	As for WUI, see *Section 10.2.2*.
	Spectrum Inversion	As for WUI, see *Section 10.2.2*.

12.4.4 Video Encoder

Menu	Sub-Menu	Notes
Video Encoder	Resolution (SDI1-4)	As for WUI, see *Section 10.3.1*.
	Codec (SDI1-4)	As for WUI, see *Section 10.3.1*.
	Sampling (SDI1-4)	As for WUI, see *Section 10.3.1*.
	Latency (SDI1-4)	As for WUI, see *Section 10.3.1*.
	Loss of Video	As for WUI, see *Section 10.3.1*.
	HDR Mode	As for WUI, see *Section 10.3.1*.
	Service Name (SDI1-4)	As for WUI, see *Section 10.3.2*.

12.4.5 Audio Encoder

Menu	Sub-Menu 1	Sub-Menu 2	Notes
Audio Encoder	Audio (1-8)	Source	As for WUI, see *Section 10.4.1*.
		SDI Pair	As for WUI, see *Section 10.4.1*.
		Codec	As for WUI, see *Section 10.4.2*.
		Bitrate	As for WUI, see *Section 10.4.2*.

12.4.6 Analogue Audio

Menu	Sub-Menu	Notes
Analogue Audio	Phantom Power Voltage	As for WUI, see *Section 10.5.2*.
	A1 Left Phantom Power Enable	As for WUI, see *Section 10.5.1*.
	A1 Right Phantom Power Enable	As for WUI, see *Section 10.5.1*.
	A2 Left Phantom Power Enable	As for WUI, see *Section 10.5.1*.
	A2 Right Phantom Power Enable	As for WUI, see *Section 10.5.1*.
	A1 Left Gain	As for WUI, see *Section 10.5.1*.
	A1 Right Gain	As for WUI, see *Section 10.5.1*.
	A2 Left Gain	As for WUI, see *Section 10.5.1*.
	A2 Right Gain	As for WUI, see *Section 10.5.1*.

12.4.7   Camera Control (Option)

```
Camera Control
1  Control Frequency
2  Control Frequency 2
3  Camera Number
4  Camera Type
5  IP Address
6  IP Netmask
7  IP Gateway
```

Menu	Sub-Menu	Notes
Camera Control	Control Frequency	Telemetry control frequency.
	Control Frequency 2	A frequency to allow the camera to move to a second area of control.
	Camera Number	A number that identifies the camera
	Camera Type	Please check the license has been enabled for the required camera.
	IP Address	IP settings will need to be configured to enable web user interface communications with the camera control module.
	IP Netmask	
	IP Gateway	The default IP address is 192.168.1.240.
	License Key	Licenses can also be uploaded via the camera control module WUI front panel emulator.
	Option 5600K	Please contact DTC Technical Support for advice.
	Option Tally Mode	Please contact DTC Technical Support for advice.
	Option Hitachi HD	Please contact DTC Technical Support for advice.
	Option Sony Colour	Please contact DTC Technical Support for advice.

12.4.8 IP

Menu	Sub-Menu	Notes
IP	IP Address	Indication only. The current IP address.
	DHCP Enable	As for WUI, see *Section 9.3*.
	Static IP Address	
	Network Mask	
	Gateway	
	Disable Web Password	When you select this, it will not be necessary to enter password credentials when opening the WUI. Restore global defaults to reinstate the default password. **Note**: If a web interface is already open, it may be necessary to log in with no credentials entered.

12.4.9 Misc

Menu	Sub-Menu	Notes
Misc	External Power Output	Enables a DC output on the Eclipse Data connector which will be at the battery voltage. See *Section 3.5*, and *Section 3.8.2* for pinout.
	QR Code	When the QR code is scanned, it will pass the RF settings to a phone.
	Engineering Mode	This mode is reserved for use at DTC.
	SW Version	Information only.
	Board Revision	Information only.
	License RF	Information only.
	License Encoder	Information only.
	Temperature	Information only.

12.4.10 Restore Defaults

Menu	Sub-Menu	Notes
Restore Defaults	Config	As for WUI, see *Section 11.4.1*.
	Globals	
	Configs + Globals	
	IP + Configs + Globals	

12.4.11 USB

Note: There must be a USB stick attached to access this menu. The USB stick must have the relevant files to perform Load Config or firmware upgrades.

Menu	Sub-Menu	Notes
USB	Load Config	Select this to load a config settings file from the USB stick to the Eclipse. This file will override all current settings. **Note**: The file name must be in the format *cfgs.json* for the load to be successful.
	Save Config	This provides an easy way to save the Eclipse settings. Config files can be transferred to other units to ensure settings are consistent across a system.
	Upgrade	Select this to select an upgrade file from the USB stick. Scroll through the files and select the upgrade file to begin the firmware upgrade. A restore to defaults must be carried out after a firmware upgrade, see *Section 12.4.10*.

12.4.12   Setup Wizard

The setup wizard guides you through some key configuration parameters.

Menu	Sub-Menu	Notes
Setup Wizard	Resolution	As for WUI, see *Section 10.3.1*.
	Latency	As for WUI, see *Section 10.3.1*.
	Audio Source	As for WUI, see *Section 10.4.1*.
	SDI Audio Pair	As for WUI, see *Section 10.4.1*.
	Frequency	As for WUI, see *Section 10.2.1*.
	Output Attenuation	As for WUI, see *Section 10.2.1*.
	Constellation	As for WUI, see *Section 10.2.2*.
	Guard Interval	As for WUI, see *Section 10.2.2*.
	FEC	As for WUI, see *Section 10.2.2*.
	RF Enable	As for WUI, see *Section 10.2.1*.

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13. Camera Control (Option)

13.1　Introduction

The optional camera control module provides a robust, wireless link to a remote-control system via a UHF antenna on the Eclipse top panel.

Data communications to and from the camera are provided by the supplied cable on the bottom panel.

An Ethernet cable is also supplied to enable IP communications with the camera control module.

Note: User guides and support for the camera control system can be accessed from the VideoSys Broadcast website, https://videosys.tv/.

13.2　OLED Control

Camera control module settings can be configured using the Eclipse OLED, these are explained in *Section 12.4.7*.

The settings will allow you to establish wireless communications with the system and IP communications with the camera, if required.

The default IP address for the module is 192.168.1.240, this can be configured via the OLED if required.

13.3　Web User Interface

13.3.1　Introduction

The web user interface is the recommended application for software upgrades. The WUI also provides an OLED emulator for configuration.

Ensure the supplied ODU to Ethernet cable (CA3919) is connected to a network or PC. The IP address of the camera module can be established in the OLED display.

Open a web browser and enter the IP address in the address bar.

13.3.2 Network

The camera control module IP parameters can be re-configured from the **Network** page. The IP address is fixed, so this may need to be changed to match the network or PC that it will be connected to.

Click **Save Settings** to save the settings and make them active.

13.3.3 Maintenance

Camera control module upgrades can be performed from the **Maintenance** page. System information and licensing details are also displayed which may be useful in a service call.

When a software upgrade is available, DTC will provide the upgrade file, save this file to a convenient location on the PC. Select **Choose File** and browse to the location of the upgrade file, the file name will appear adjacent to the Choose File button when selected. Select **Perform Upgrade** to start the upgrade, do not switch off the unit until the new software version is displayed.

Note: It is important that the Eclipse does not lose power whilst the upgrade is taking place.

13.3.4 Front Panel

| Network | Maintenance | Front Panel |

The **Front Panel** page emulates an OLED display for camera control configuration. Use the arrows and enter button to access and edit settings.

14. Appendix A: Reference Material

14.1 How to Configure a PC IP Address

The following guide will tell you how to configure a PC or laptop IP address so that it matches the IP address range of the unit you are connected to. This is important because if they don't match, you will not be able to communicate with your device.

The IP address range given in this example is a good one to use if you are unsure.
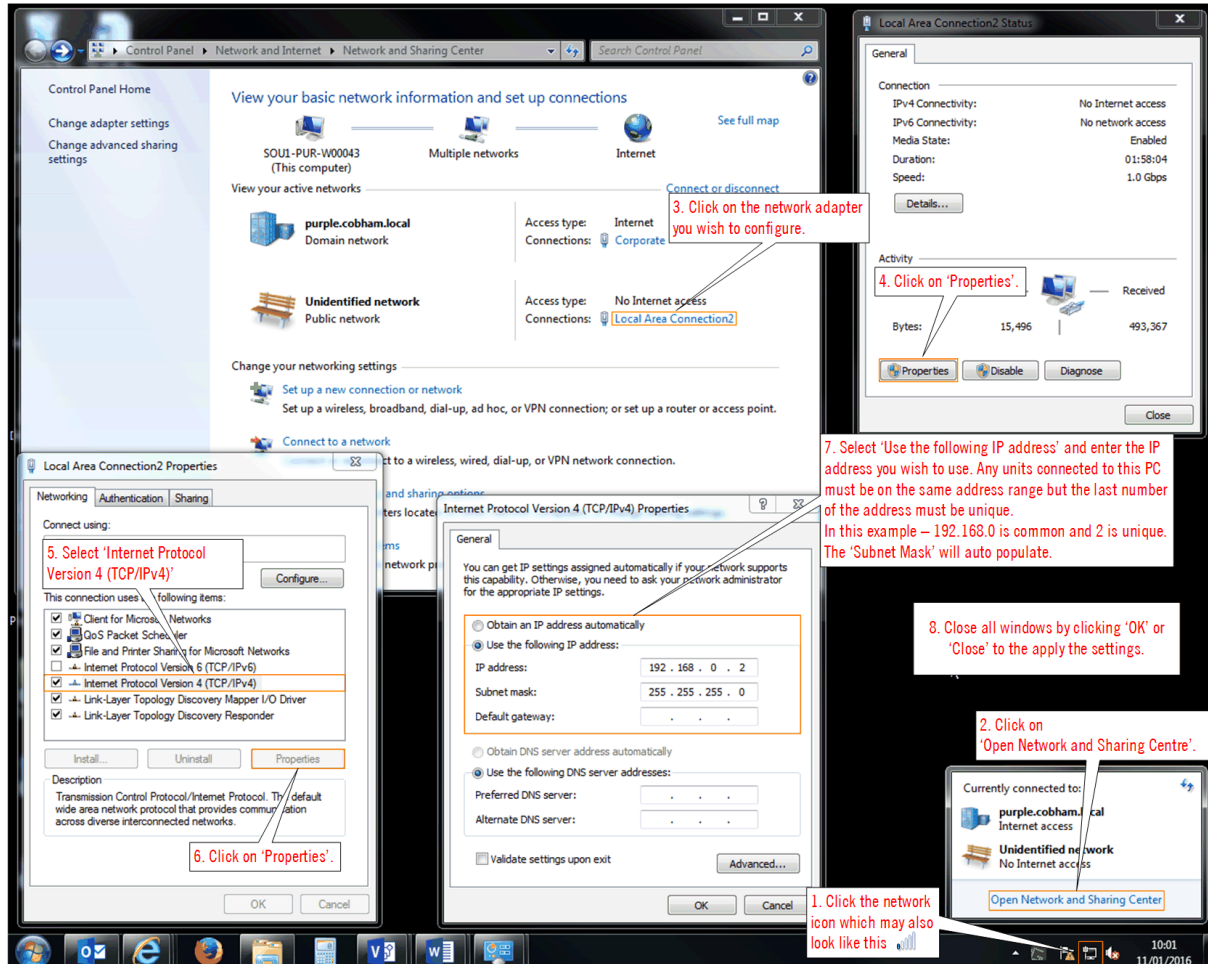
Figure 14-1 How to configure a PC IP address

14.2   dBm to Watts Conversion

It will be useful to know the equivalent dBm to watts power conversion when adding attenuation to the modulator RF output.

The standard Eclipse has a maximum RF output of 20dBm (100mW) per port and the dual band variant has 23dB (200mW) on the C-band port.

When calculating, do not convert the equivalent watt value until after the sum has been done:

i.e., 20dBm-3dBm = 17dBm (50mW)

dBm	Watts		dBm	Watts
0	1.0mW		17	50mW
1	1.3mW		18	63mW
2	1.6mW		19	79mW
3	2.0mW		20	100mW
4	2.5mW		21	126mW
5	3.2mW		22	158mW
6	4mW		23	200mW
7	5mW		24	250mW
8	6mW		25	316mW
9	8mW		26	398mW
10	10mW		27	500mW
11	13mW		28	630mW
12	16mW		29	800mW
13	20mW		30	1.0W
14	25mW		31	1.3W
15	32mW		32	1.6W
16	40mW		33	2.0W

14.3 Video Resolutions

The following table defines video resolution to the SDI interface.

SDI	Resolution
12G-SDI	2160p60, 2160p59.94, 2160p50
6G-SDI	2160p30, 2160p29.97, 2160p25, 2160p24, 2160p23.98
3G-SDI	1080p60, 1080p59.94, 1080p50
1.5G-SDI	1080p30, 1080p29.97, 1080p25, 1080p24, 1080p23.98 1080i60, 1080i59.94, 1080i50

15. Appendix B: After Sales Support

15.1 Documentation and Software

It is DTC's practise to make the majority of our latest user guides and software available to customers online, by using our WatchDox facility. To access this site, please contact your Account Manager or send a request to uk.technical.support@domotactical.com.

You will be sent a link where you can log in and create your own password followed by a confirmation email. Once you have done this, you can then log in to your account.

15.2 Contact Technical Support

The Technical Support team can be accessed by one of the following:

- **Phone US**: +1 571 563 7077
- **Phone UK**: +44 1489 884 550
- **Email US**: us.technical.support@domotactical.com (no restricted content)
- **Email ROW**: uk.technical.support@domotactical.com (no restricted content)

15.3 Using the DTC RMA Service

15.3.1 Contact DTC

If there is a problem and our technical support team have been unable to resolve the issue, email dtc.rma@domotactical.com (US) or solent.customerhub@domotactical.com (UK/ROW) to request a Return Material Authorisation (RMA) form.

Note: Alternatively, use the online form at https://www.domotactical.com/support/.

15.3.2 Complete and Return the RMA Form

Complete the RMA form with the following information and return to the customer hub:

- Name
- Address
- Unit serial number
- Date of purchase or the original invoice number
- Date of failure
- A detailed description of the problems you have encountered
- A list of the hardware/software configuration if applicable

When the hub receives the completed form, an RMA number and shipping instructions will be sent.

15.3.3 Pack the Device

Note: Before packing, remove all personal non-DTC kit or media from the device.

Use the original shipping container and packing materials, if possible.

If the original packing materials are not available, wrap the equipment with soft material (e.g., PU/PE form) then put the wrapped equipment into a hard cardboard shipping box.

15.3.4 Put the RMA Number on the Box

Clearly mark the outside of the shipping box with the RMA number. If an RMA number is not present on the shipping box, receiving will be unable to identify it and it might be returned.

15.3.5 Send the Box to DTC

Send the box using your normal shipping process.

16. Appendix C: Safety and Maintenance

Note: The following guidelines may or may not be applicable to your product. However, we would ask that you read them to assess their relevance.

16.1 Cautions and Warnings

Area	Note
Aircraft safety	Use of this equipment on board aircraft is strictly forbidden without the required testing and qualification for aircraft type. Use of radio transmitter equipment in an aircraft can endanger navigation and other systems without appropriate testing, or carry-on certification by a competent certified body.
Cables	Connecting cables should not be positioned where they are likely to become damaged or where they may present a trip hazard.
Electrostatic discharge	ESD guidelines must be followed for this electrostatic sensitive device.
Enclosures	Do not remove any factory installed screws or fastenings as this may void any warranties. There are no functions that require the user to gain access to the interior of the product. There are no user serviceable parts inside.
Environment	The equipment should not be used in hazardous or corrosive atmospheres. Users are reminded of the necessity of complying with restrictions regarding the use of radio devices in fuel depots, chemical plants and locations where explosives are stored and/or used.
Lightning strike	There is a risk of lightning strike to antennas. The equipment should not be assembled in an area at the time of lightning activity. Antennas should be adequately protected from lightning strikes.
Power supply	Ensure that the power supply arrangements are adequate to meet the stated requirements of each product. Observe all electrical safety precautions.
Risk of eye injury	Care should be taken to avoid eye contact with the antennas.
RF emissions	When using this device please ensure 20cm is maintained between your device and your body while the device is transmitting.
Thermal control system	If you operate this device in an enclosed space, you must ensure it has adequate airflow to keep it cool. If worn close to the body, care must be taken to protect the operator from excessive temperatures.
Working at height	Observe caution when locating the device at height, for example on a mast. Ensure the unit is well secured to prevent it falling and injuring personnel.

16.2   Repairs and Alterations

Attempted repairs, alterations, improper installations, or connections may invalidate the warranty.

Please contact Technical Support if you suspect a faulty or defective component, see *Section 15.2*.

16.3   Caring for your Equipment

- Do not subject the unit to physical abuse, excessive shock or vibration
- Do not drop, jar or throw the unit
- Do not carry the unit by the antenna
- Avoid exposure to excessive moisture or liquids
- Do not submerse the unit unless it is designed to be submersible
- Do not expose the unit to corrosives, solvents, cleaners or mineral spirits
- Avoid exposure to excessive cold and heat
- Avoid prolonged exposure to direct sunlight
- Do not place or leave units on surfaces that are unstable
- Only use accessories intended for the specific make and model of your unit, especially batteries, chargers, and power adapters.

16.4   Charging

- Use approved batteries, chargers and adapters designed specifically for your make and model unit
- Do not attempt to charge a wet unit or battery pack
- Do not charge the unit or battery pack near anything flammable
- Stabilize the battery pack to room temperature (22°C) before charging
- Do not charge units and/or battery packs on wet or unstable surfaces
- Do not leave units and/or batteries in chargers for excessive periods

16.5 Working with Lithium Batteries

- Charge only with the approved charging cable

- Batteries are to be used only for the specified purpose. Incorrect use will invalidate the warranty and may make the battery become dangerous.

- Charge in a clean, dry environment ideally at 10°C (0 to 45°C is permissible).

- Do not store or operate in direct sunlight for extended periods. Battery can be damaged by over-heating, for example if placed on the rear parcel shelf of a motor vehicle.

- Store in a cool dry environment. Storage at elevated temperatures can cause permanent loss of capacity.

- For short term storage (less than six months), store in a fully charged state.

- For extended periods of storage (more than one year), charge before storage and recharge every six to nine months.

- Always fully recharge the battery after any storage period greater than one month before use.

- Do not store the battery with the charge depleted as this can cause failure of the battery and invalidate warranty.

- Do not short circuit

- Do not immerse in water

- Do not incinerate. Cells are likely to explode if placed in a fire.

- Dispose of batteries in accordance with the regulations in place for the country of use. Batteries are normally considered separate waste and should not be allowed to enter the normal waste stream. Either return to the seller or deliver to an approved re-cycling facility.

16.6 Cleaning

- Turn off the unit and remove batteries (if applicable) before maintenance

- Use a clean, soft, damp cloth to clean the unit. A microfiber cloth is recommended.

- Do not use alcohol or cleaning solutions to clean the unit

- Do not immerse the unit in water to clean it

- If the unit becomes wet, immediately dry it with a microfiber or other lint-free cloth

16.7 Storage

- Turn off the unit and remove batteries before storage

- Store units and battery packs in a cool, dry area at room temperature (22°C)

- Do not store units and/or batteries in active chargers