Product Code: TX160-CC
Revision: 01

Transmitter – TX160-CC Product Manual

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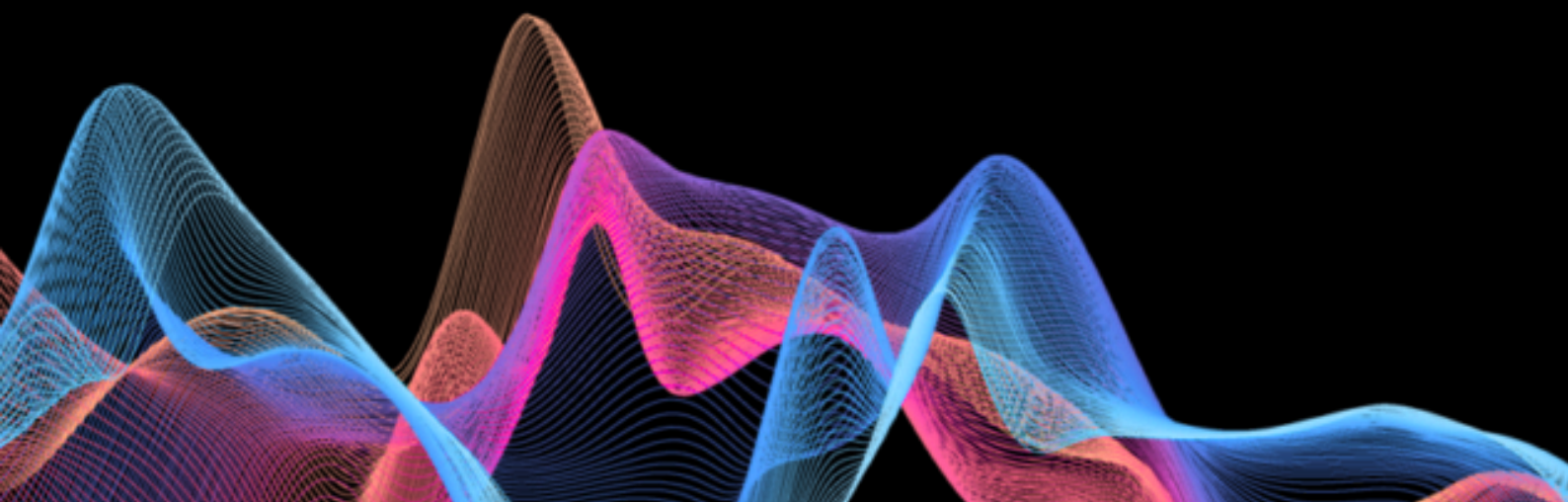
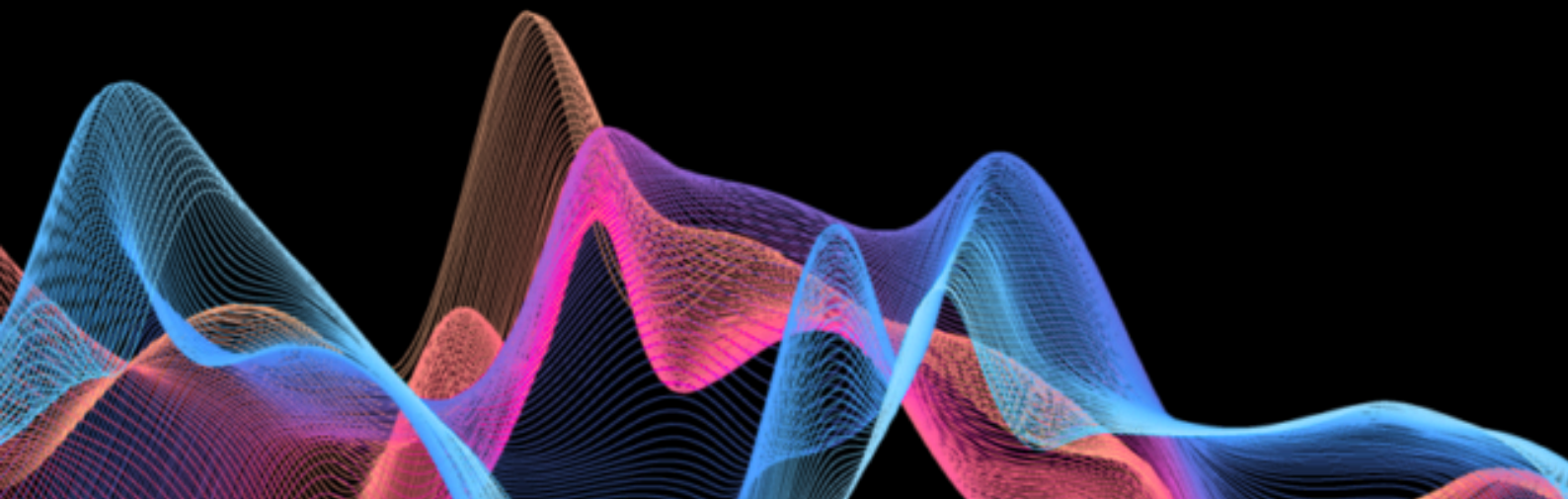
VideoSys Broadcast

TABLE OF CONTENTS



VideoSys Broadcast

PRODUCT DATA SHEET



DATA SHEET
TX160
TRANSMITTER

VideoSys Broadcast

TX 160CC

Our integrated transmitter combines a high quality HEVC encoder and a DVB-T/UMVL COFDM modulator with our proprietary, industry-leading camera control to create a powerful unit suitable for demanding live broadcast environments. The transmitter comes with a single-link 12G SDI video input that can handle all video formats up to UHD at 60 frames per second, and RF parameters can be configured remotely via a base station without interrupting the production flow. The 10 bit 4:2:2 H.265 encoding is suitable for HDR sources, and when combined with one of our HEVC decoders (e.g. DEC150) it can operate at an ultra-low latency of down to 40 ms (frame rate dependant). The integrated camera control allows for unidirectional and bidirectional camera control, it can connect to both serial and ethernet cameras (ask for more compatibility information), and offers unparallel robustness that is powered by our proprietary bidirectional control algorithm.

Key Features:

- 100mW COFDM Transmitter (DVB-T or UMVL)
- Remote Transmitter Control over UHF
- Supports sources up to UHD at 60 fps
- HEVC 10 bit 4:2:2 encoding (compatible with HD HDR sources)
- Ancillary Metadata Encoding (including Timecode and Rec Flag)
- Analogue audio input & audio encoding of up to 8 channels.
- Build-in camera control over UHF for all main manufacturers
- Sturdy Machined Aluminium Enclosure & Accessories
- Various Battery Plate options (V-mount, Anton Bauer)

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DATA SHEET
TX160
TRANSMITTER

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Technical Specification:

Connectors

RF Output	N-type (f) for Video Transmitter Antenna
UHF Input	SMA (f) for Camera Control Receiver Antenna
Video Input	12G BNC
Analogue Audio Input	5-way 0B Lemo
Camera Control	10-way Hirose
Tally Output	5-way 0B Lemo
Power Input	4-way 0B Lemo
Ethernet Control	RJ14 and 4-way 0B Lemo

Video & Audio

Analogue Audio Input 1 pair line/mic level at max 24dBu (balanced)

Phantom Power	48V
Digital Audio Input	SDI de-embedding
Coding Modes	Up to 8 channels (4 pairs) MPEG-1 Layer 1 (licenced feature), MPEG-2 Layer 2, AAC-LC, Linear Audio
Video Formats	4K UHD. 4:2:2/4:2:0, 8/10-bit 2160p / 23.98 / 24 / 25 / 29.97 / 30 / 50 / 59.94 / 60 Full HD. 4:2:2/4:2:0, 8/10-bit 720p / 50 / 59.94 / 60 1080i / 50 / 59.94 / 60 1080p / 23.98 / 24 / 25 / 29.97 / 30 / 50 / 59.94 / 60 1080psf / 23.98 / 24 / 25 / 29.97 / 30 (licensed feature) SD 4.2.2/4.2.0 480i / 29.9
Video Encoders	MPEG2, H.264, H.265 (HEVC)

RF Specifications

Camera Control	403-473 MHz
DVB-T Bandwidth	6, 7, 8 MHz
DVB-T FEC	1/2, 2/3, 3/4, 5/6, 7/8
DVB-T Constellation	QPSK, 16QAM, 64QAM
DVB-T Guard Interval	1/4, 1/8, 1/16, 1/32
Other Modulations	UMVL, Dual Pedestal
Power Output	10, 50, 100 mW
Frequency Ranges	1.0 - 1.5 GHz 2.0 - 2.9 GHz 3.0 - 3.5 GHz 5.5 - 6.0 GHz

General Specifications:

Input Voltage	7 – 35 V (reverse polarity protected)
Power Consumption	13 W
Dimensions	170mm(L) X 106mm(W) X 83mm(H)
Weight	0.96kg

Available accessories & add-ons (optional)

Anton Bauer Battery Plates
Licence – 4K Encoding

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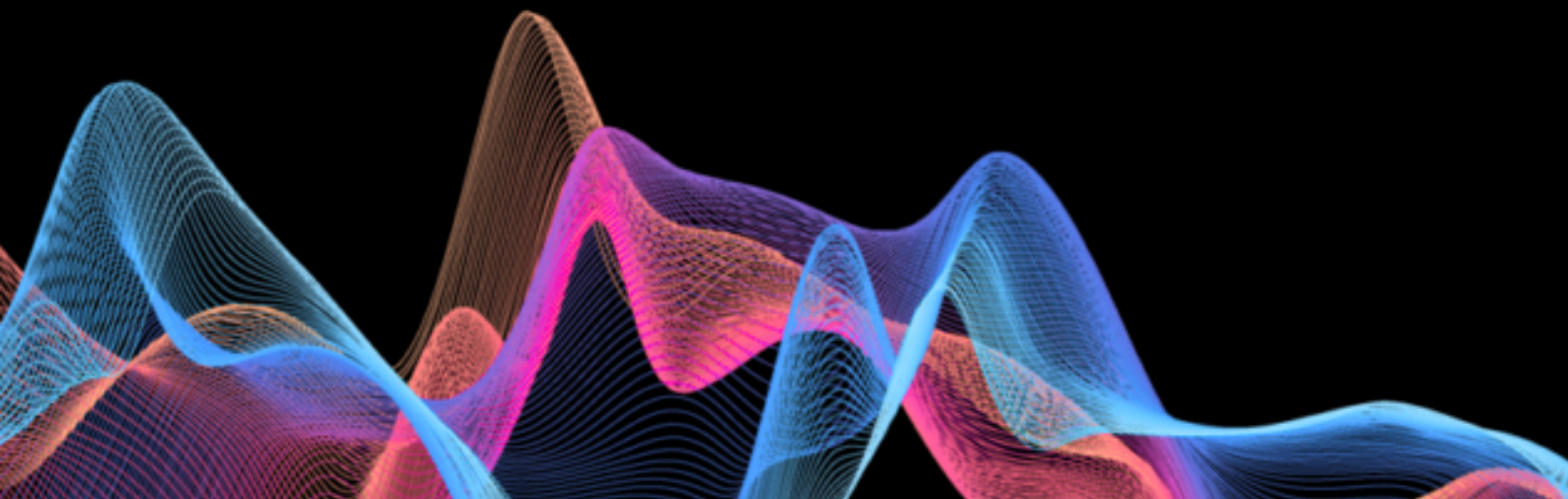
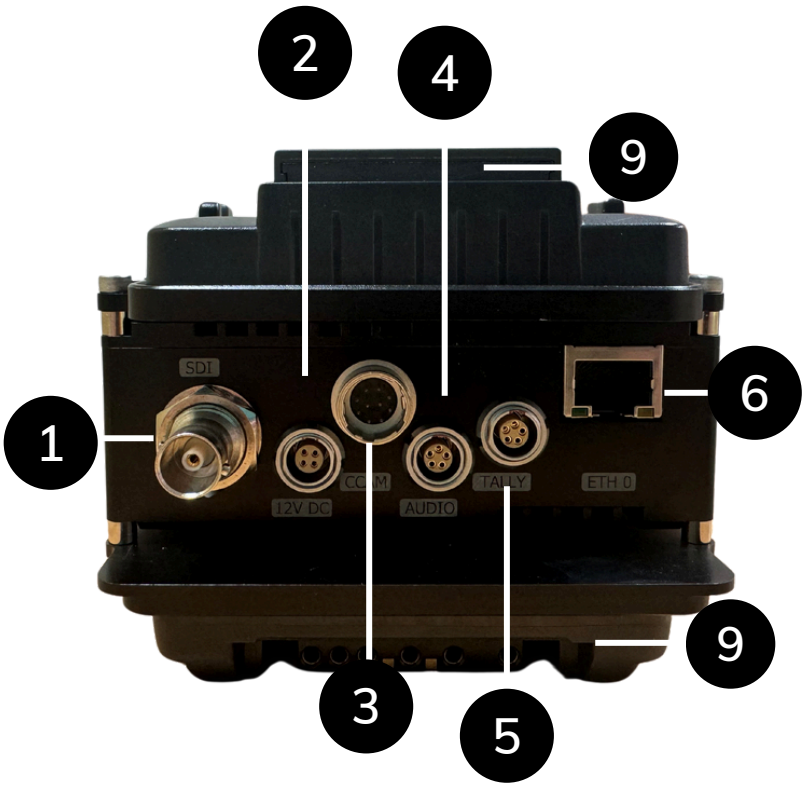
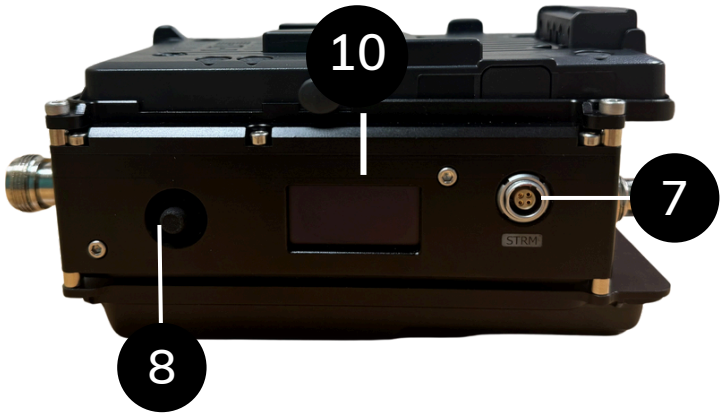
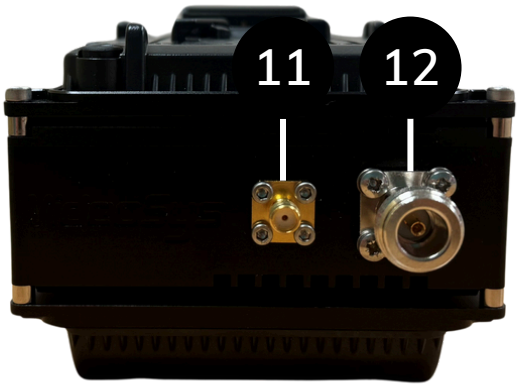
CONNECTOR GUIDE



BROADCAST SYSTEM - TX160-CC







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BROADCAST SYSTEM - TX160-CC

No	Item	Used for
1	BNC x 1 labelled SDI	SDI In Video Input (12G BNC)
2	Lemo 4-way jack (sockets) labelled 12V DC	Power connector
3	Hirose 10-way jack (pins) x 1 labelled CCAM	Camera Control. Data and power to the camera.
4	Lemo 5-way jack (sockets) x 1 labelled AUDIO	Balanced audio connector
5	Lemo 5-way jack (sockets) x 1 labelled Tally	Tally Output (and via camera's protocol when supported)
6	RJ45 x 1 labelled ETH 0	Ethernet Connector for Transmitter web GUI.
7	Lemo 4-way jack (sockets) x 1 labelled STRM	Ethernet Connector for Encoder web GUI access
8	Navigation Switch x 1	The Up, Down, Left, Right, Enter and Cancel the Navigation Switch used to navigate through the menus
9	Battery Plates	V-Mount Battery Plates OR Anton Bauer Battery Plates
10	Display Screen	User control interface

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BROADCAST SYSTEM - TX160-CC

No	Item	Used for
11	N-Type RF jack (socket)	RF power out for Video Transmitter Antenna
12	SMA jack (socket)	Camera Control Telemetry Receiver Antenna (403-474MHz)

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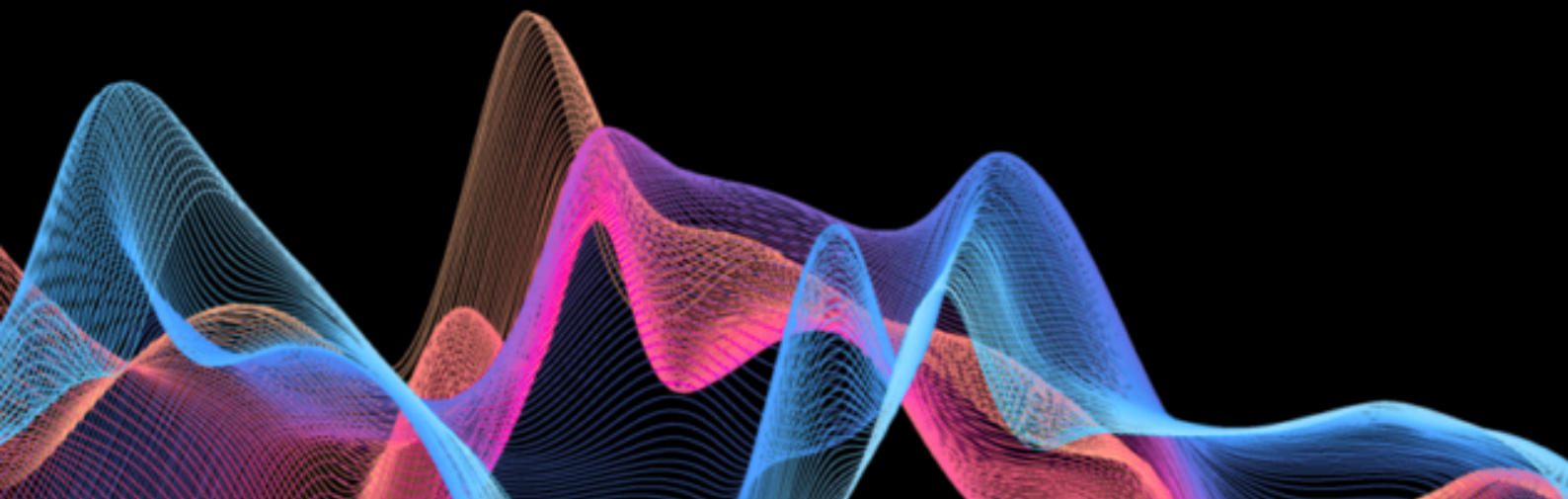
VideoSys Broadcast

MENU STRUCTURE



TX160 Menu Structure

Main Menu

Status Page:	Menus:
Transmitter Main Menu →	Transmitter Menu Camera Control Menu

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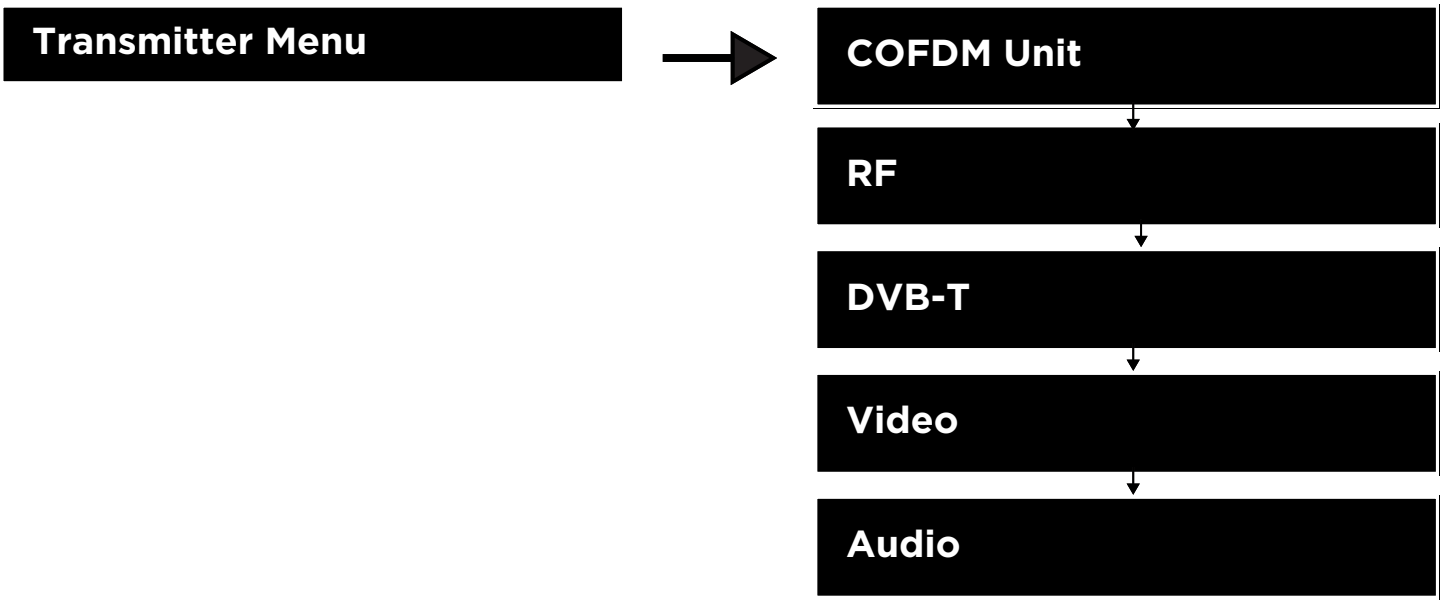
Transmitter Menu Structure



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Transmitter Menu Structure

COFDM Unit Menu Structure

Status

COFDM Unit → **Status** → **Data Baud** →
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

COFDM Unit → **Status** → **ANC Mode** →
- HANC Type 2
- Ignore
- All Type 2

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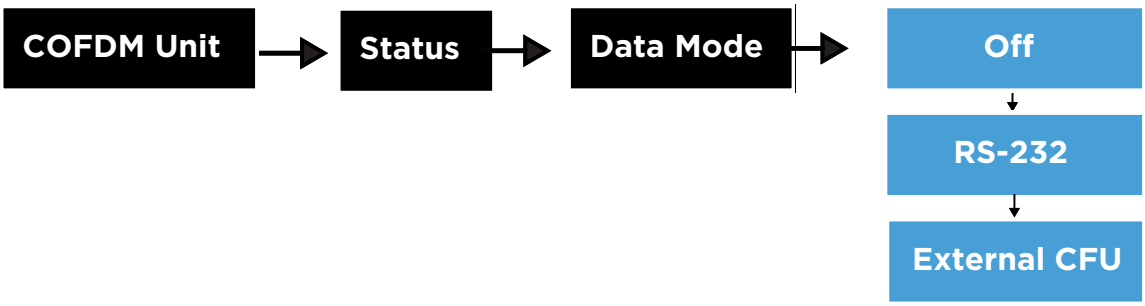
Transmitter Menu Structure

COFDM Unit Menu Structure

Status



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Transmitter Menu Structure

COFDM Unit Menu Structure

Data

COFDM Unit → **Data** → **Data Baud** →
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

COFDM Unit → **Data** → **ANC Mode** →
- HANC Type 2
- Ignore
- All Type 2

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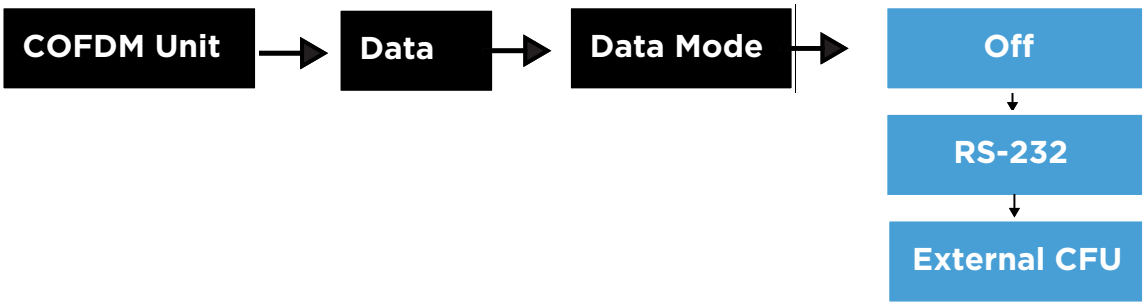
Transmitter Menu Structure

COFDM Unit Menu Structure

Data



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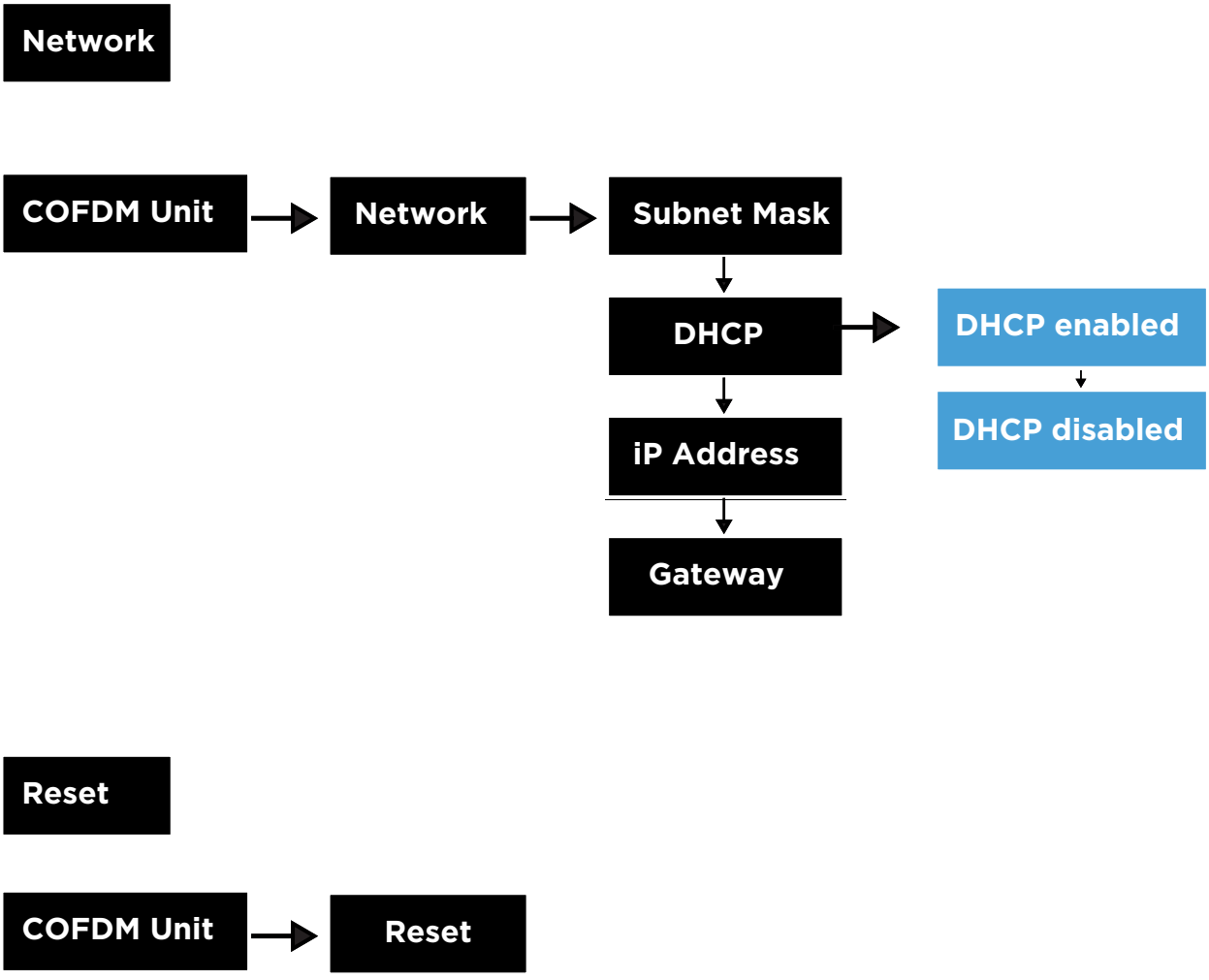
Transmitter Menu Structure

COFDM Unit Menu Structure



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Transmitter Menu Structure

COFDM Unit Menu Structure

Web Config

COFDM Unit → **Web Config** → **Data Baud** →
- 4800
- 9600
- 19200
- 38400
- 57600
- 115200

COFDM Unit → **Web Config** → **ANC Mode** →
- HANC Type 2
- Ignore
- All Type 2

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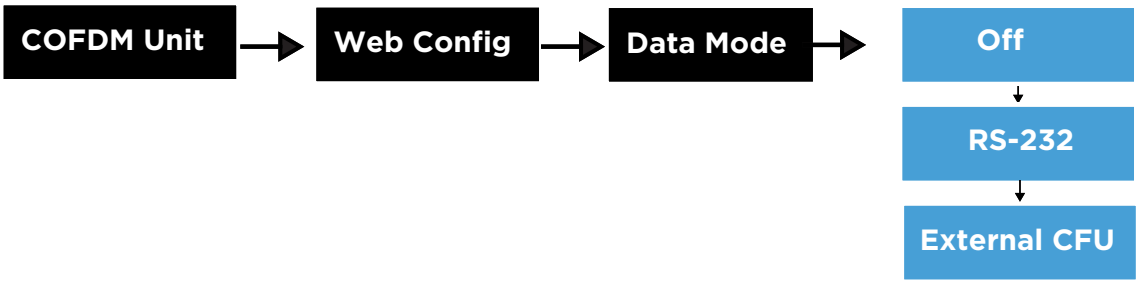
Transmitter Menu Structure

COFDM Unit Menu Structure

Web Config



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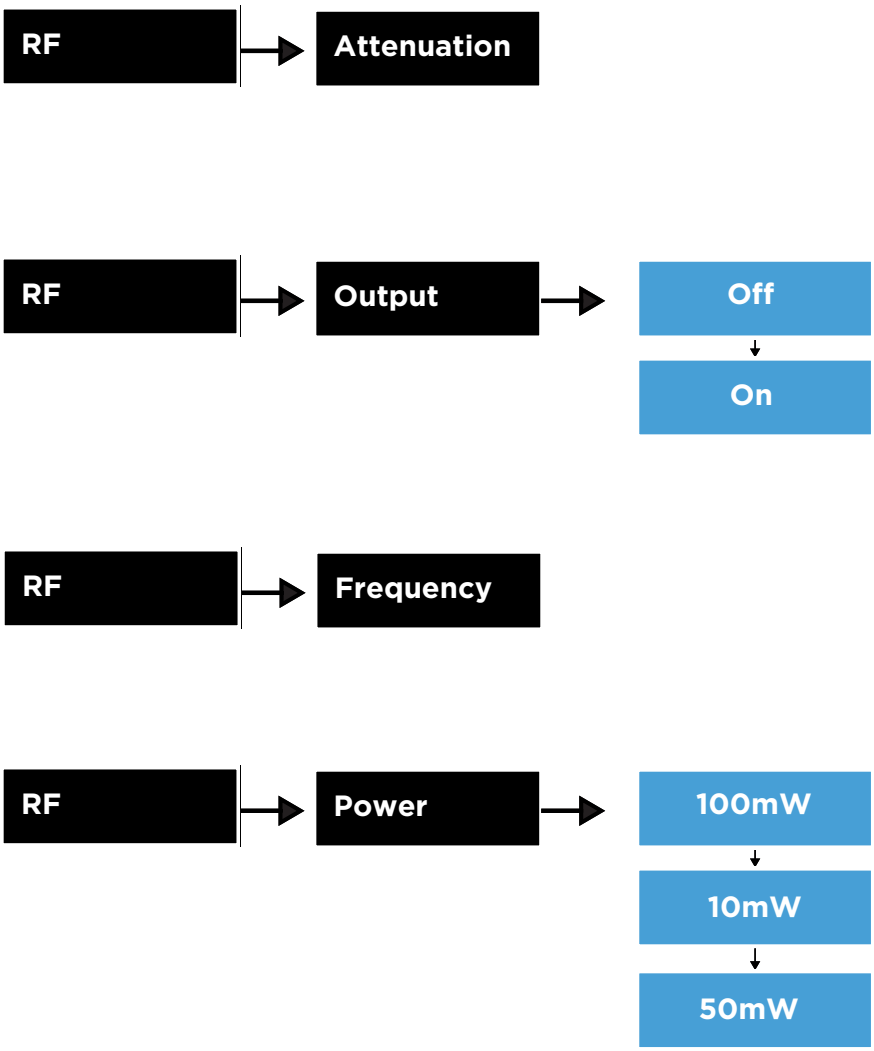
Transmitter Menu Structure

RF Menu Structure



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Transmitter Menu Structure

DVB-T Structure

Polarity

DVB-T → **Polarity** → **Inverted** / **Normal**

Dual Pedestal

DVB-T → **Dual Pedestal** → **On** / **Off**

Bandwidth

DVB-T → **Bandwidth** → **7MHz** / **8MHz** / **6MHz**

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Transmitter Menu Structure

DVB-T Structure

Constellation

DVB-T → **Constellation** →
- QPSK
- 16-QAM
- 64-QAM

FEC

DVB-T → **FEC** →
- 1/2
- 2/3
- 3/4
- 5/6
- 7/8

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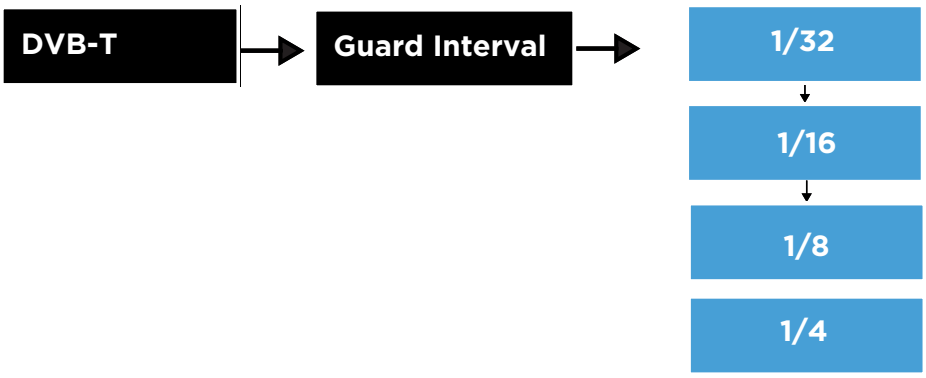
Transmitter Menu Structure

DVB-T Structure

Guard Interval



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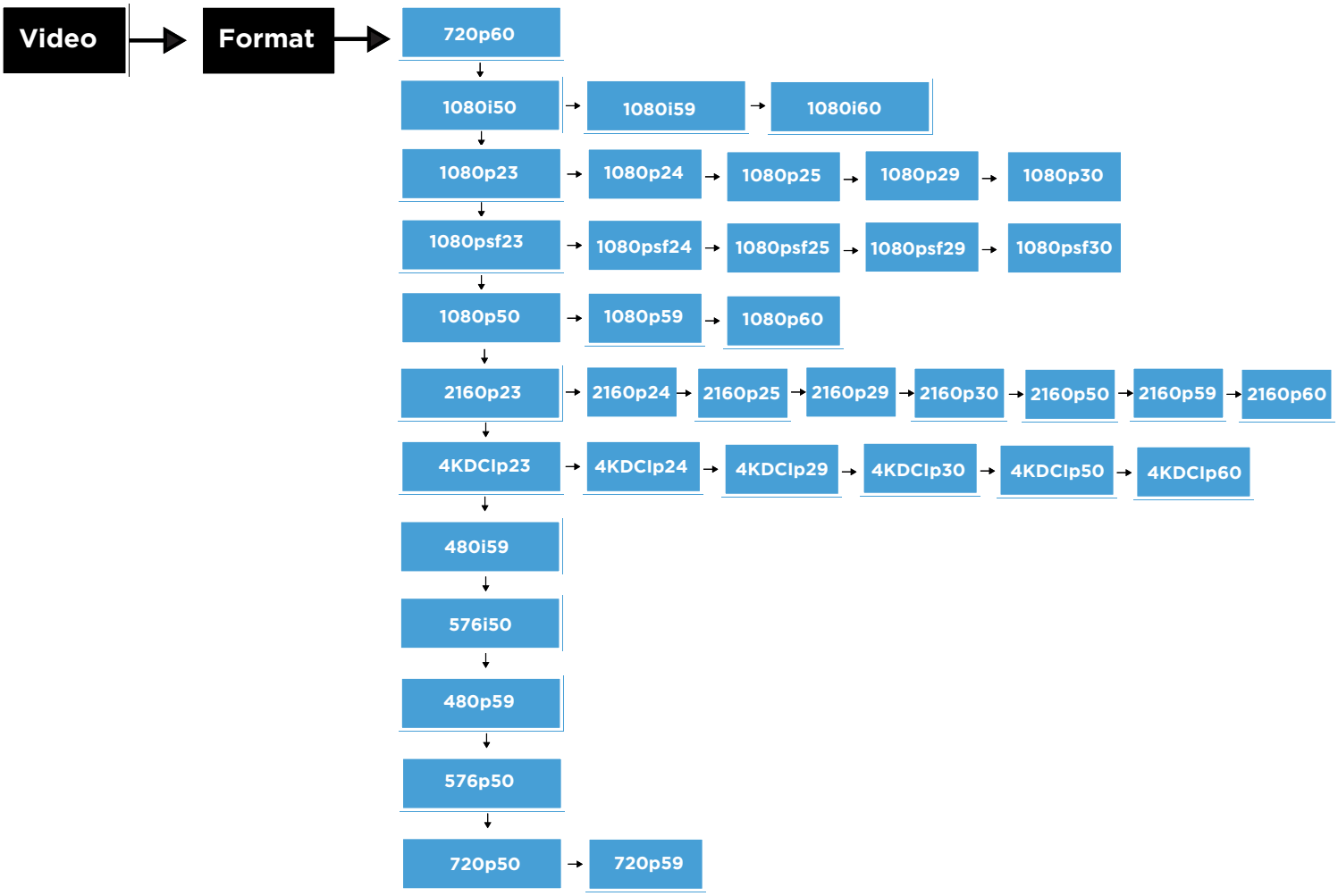
Transmitter Menu Structure

Video Menu Structure

Format



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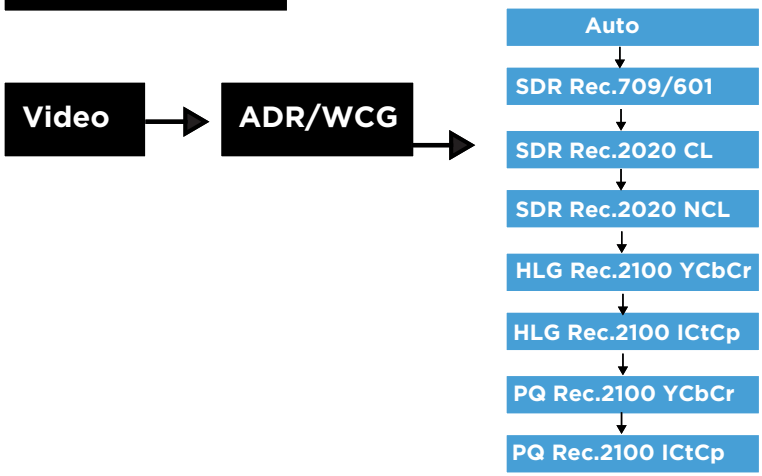
Transmitter Menu Structure

Video Menu Structure

Chroma

Bit Depth

ADR/WCG



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Transmitter Menu Structure

Video Menu Structure

Delay Mode

Video → **Delay Mode** → **Normal Delay** → **Low Delay** → **Ultra Low Delay**

Encoder Mode

Video → **Encoder Mode** → **MPEG2** → **HEVC** → **H264**

Source

Video → **Source** → **Pattern** → **Default**

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Transmitter Menu Structure

Video Menu Structure

Service Name

Video → **Service Name**

Service Number

Video → **Service Number**

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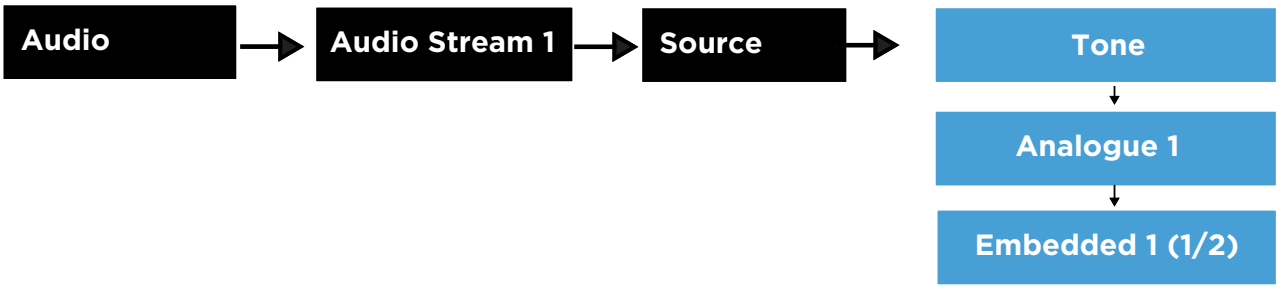
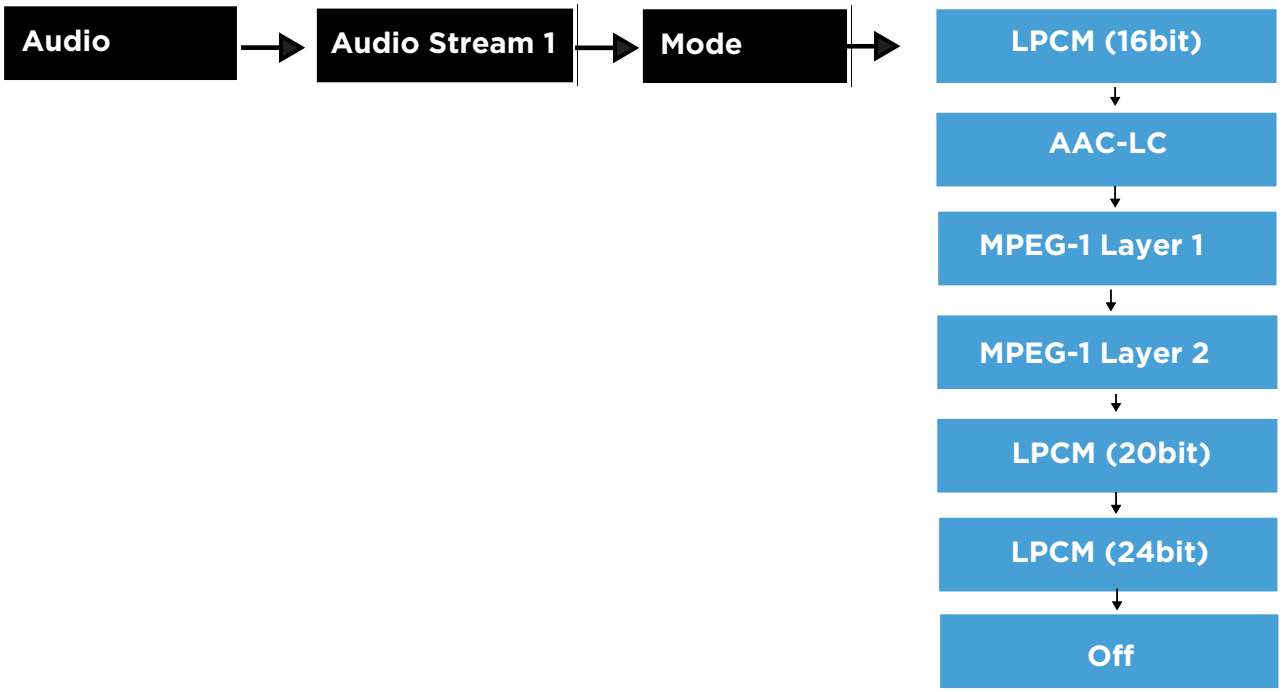
Transmitter Menu Structure

Audio Menu Structure

Audio Stream 1





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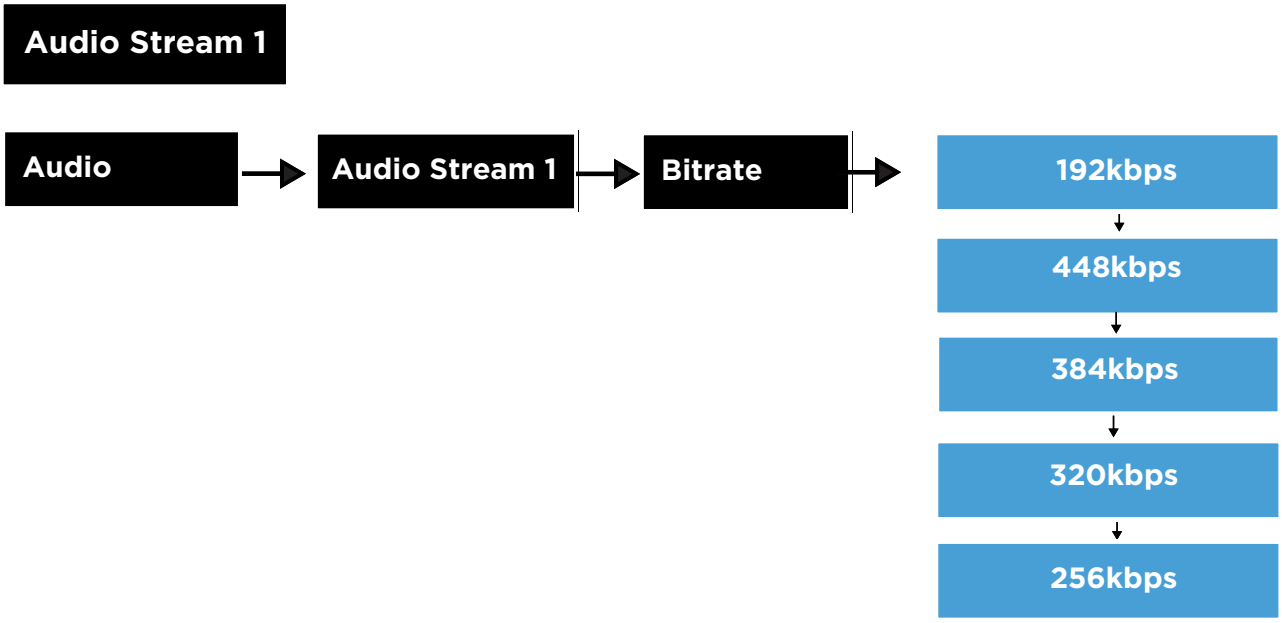
Transmitter Menu Structure

Audio Menu Structure



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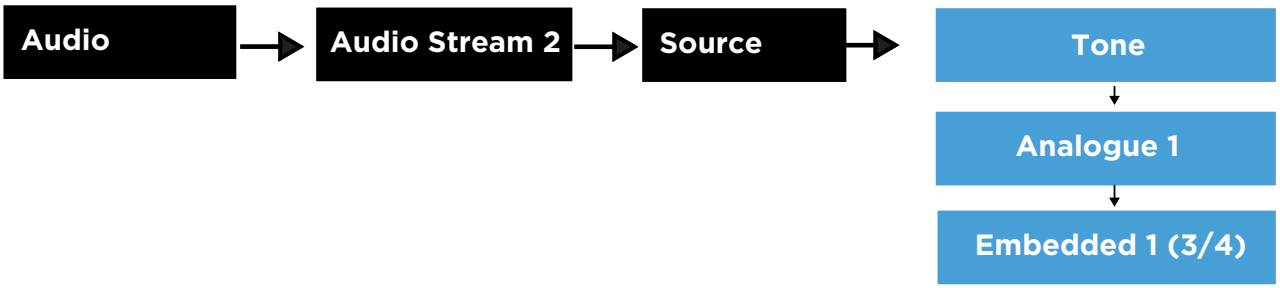
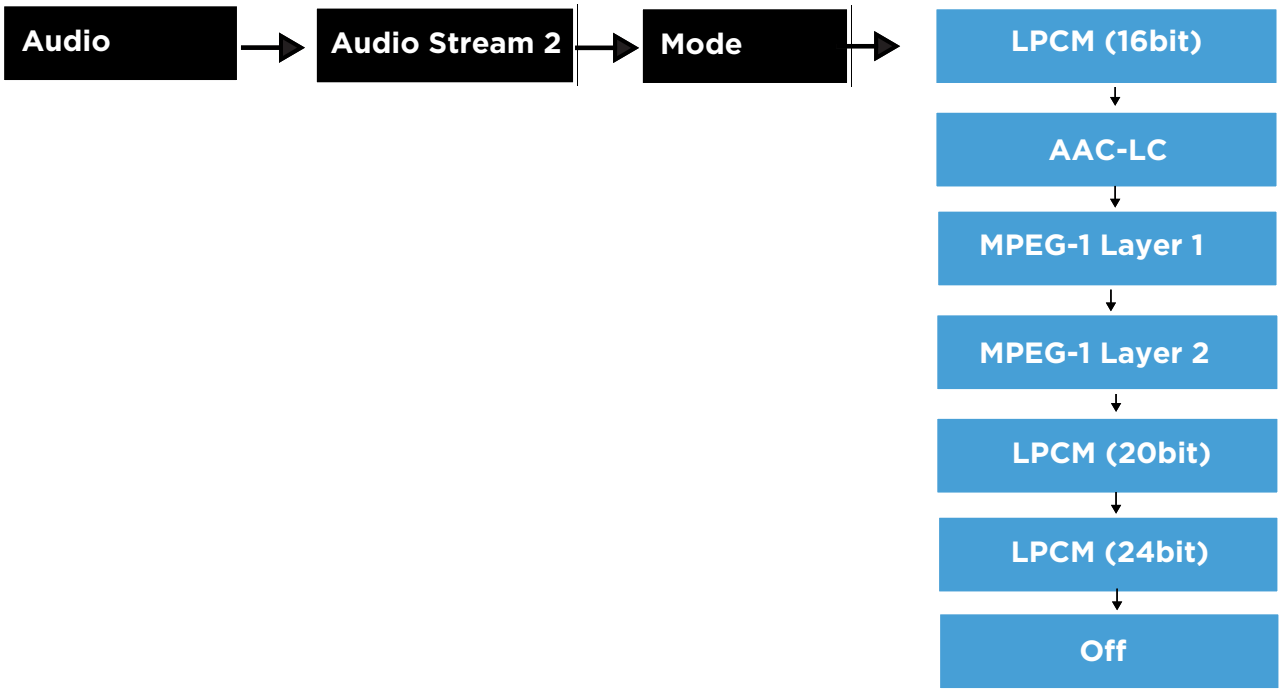
Transmitter Menu Structure

Audio Menu Structure

Audio Stream 2





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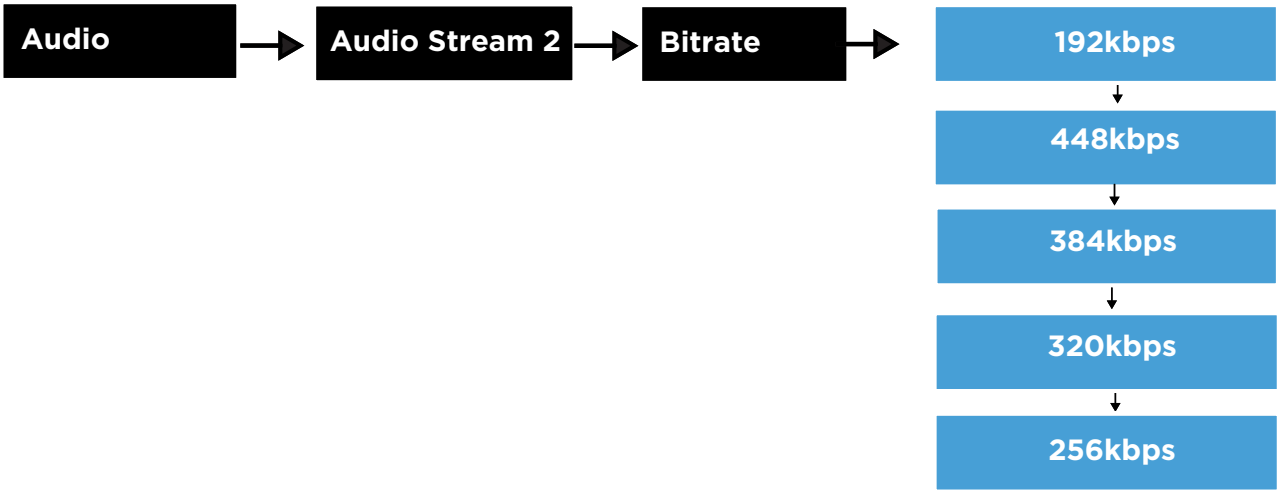
Transmitter Menu Structure

Audio Menu Structure



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Transmitter Menu Structure

Audio Menu Structure

Analogue Input 1

Audio → **Analogue Input 1** → **Reference Level** →
- **+24dbu**
- **+18dbu**
- **+20dbu**

Audio → **Analogue Input 1** → **Left Gain (0.5dB)**

Audio → **Analogue Input 1** → **Right Gain (0.5dB)**

Audio → **Analogue Input 1** → **Phantom Power**

Audio → **Analogue Input 1** → **Off**

Audio → **Analogue Input 1** → **On**

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Camera Control Menu Structure

Camera Control Menu Structure

Status Page:

Camera Control Main Menu

Menus:

- Controller Network
- Camera Manufacturer
- Camera Number
- Radio
- System Settings

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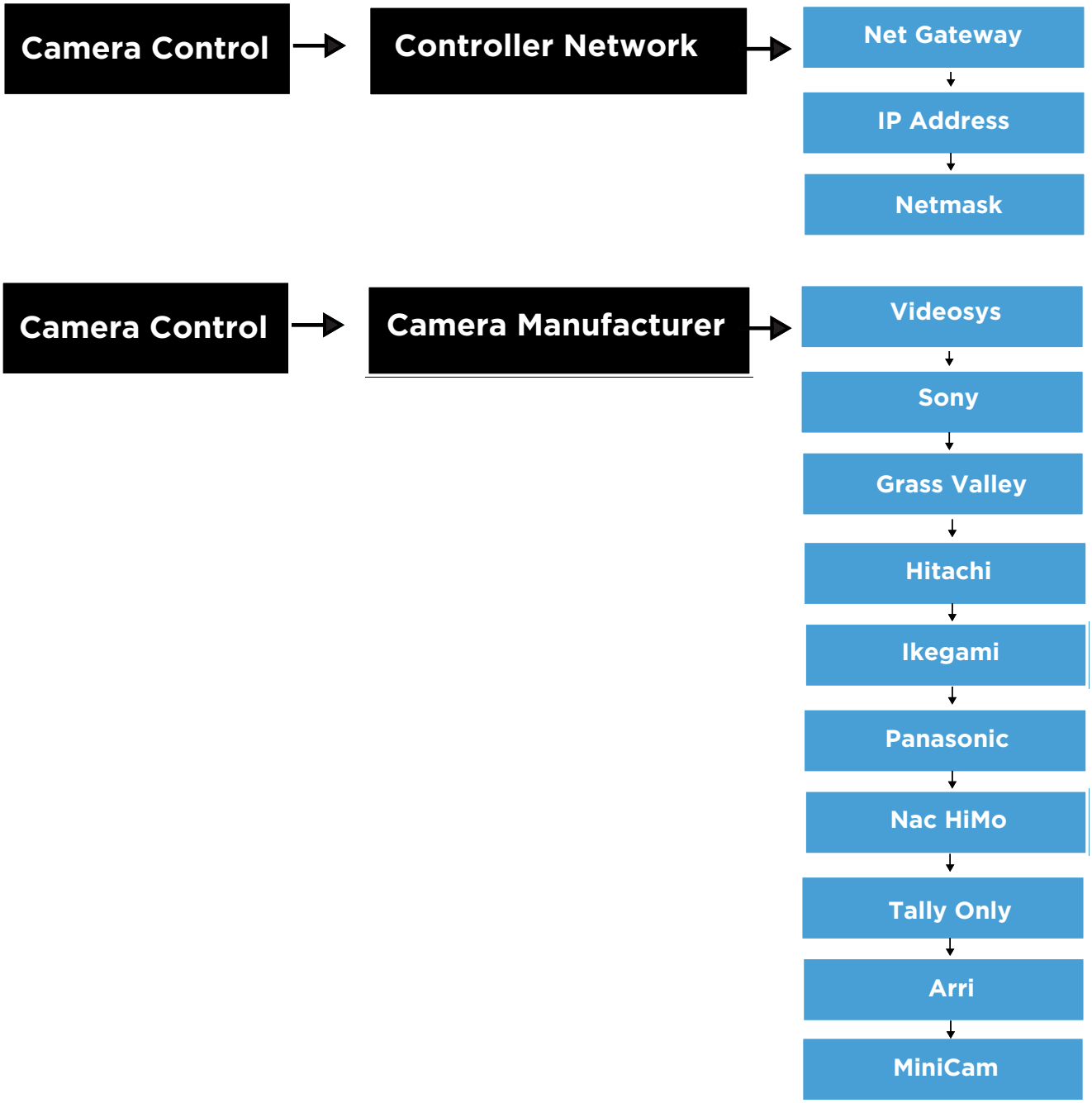
Camera Control Menu Structure

Camera Control Menu Structure

Status Page: **Menus:**



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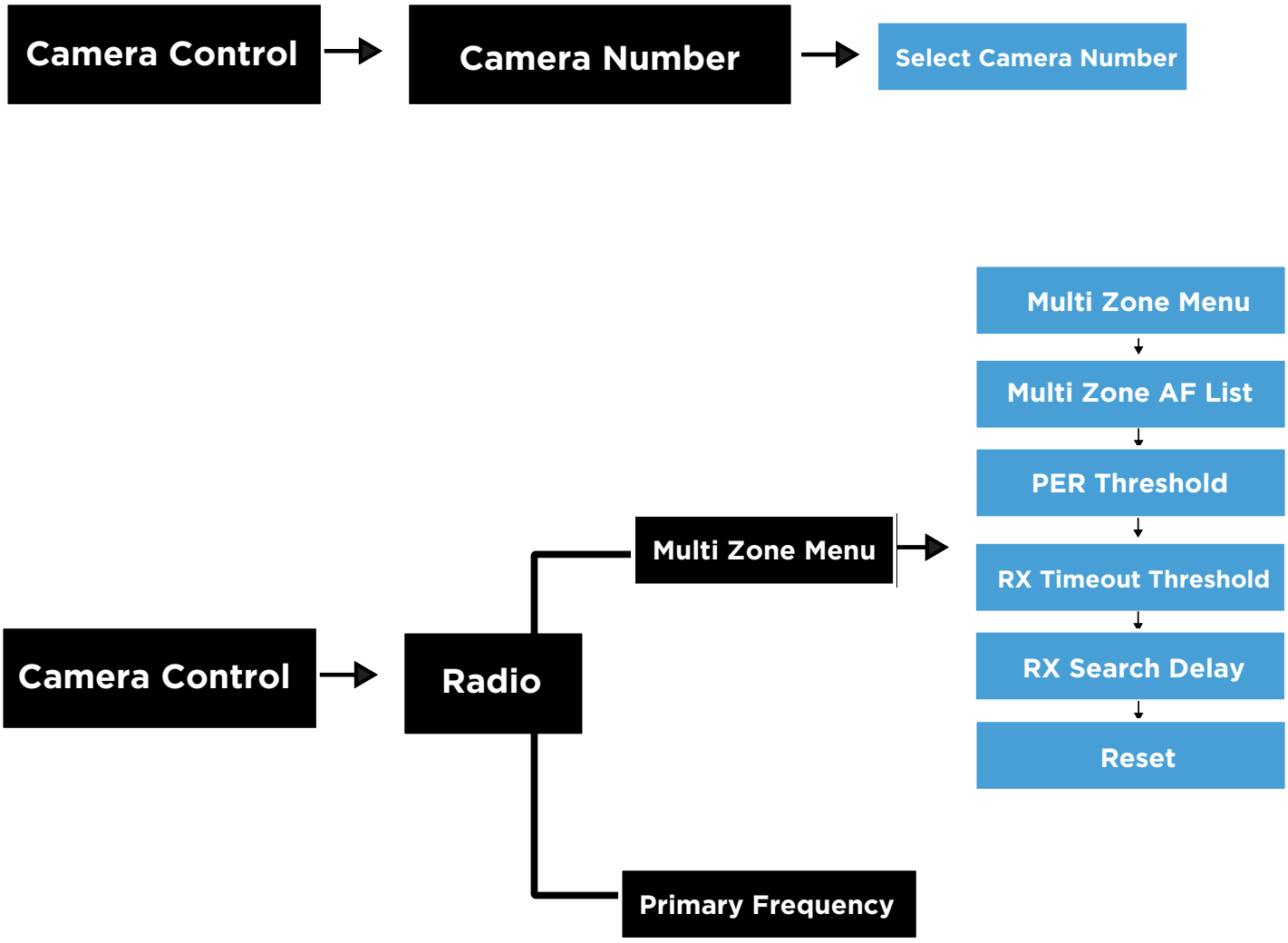
Camera Control Menu Structure

Camera Control Menu Structure

Status Page: **Menus:**



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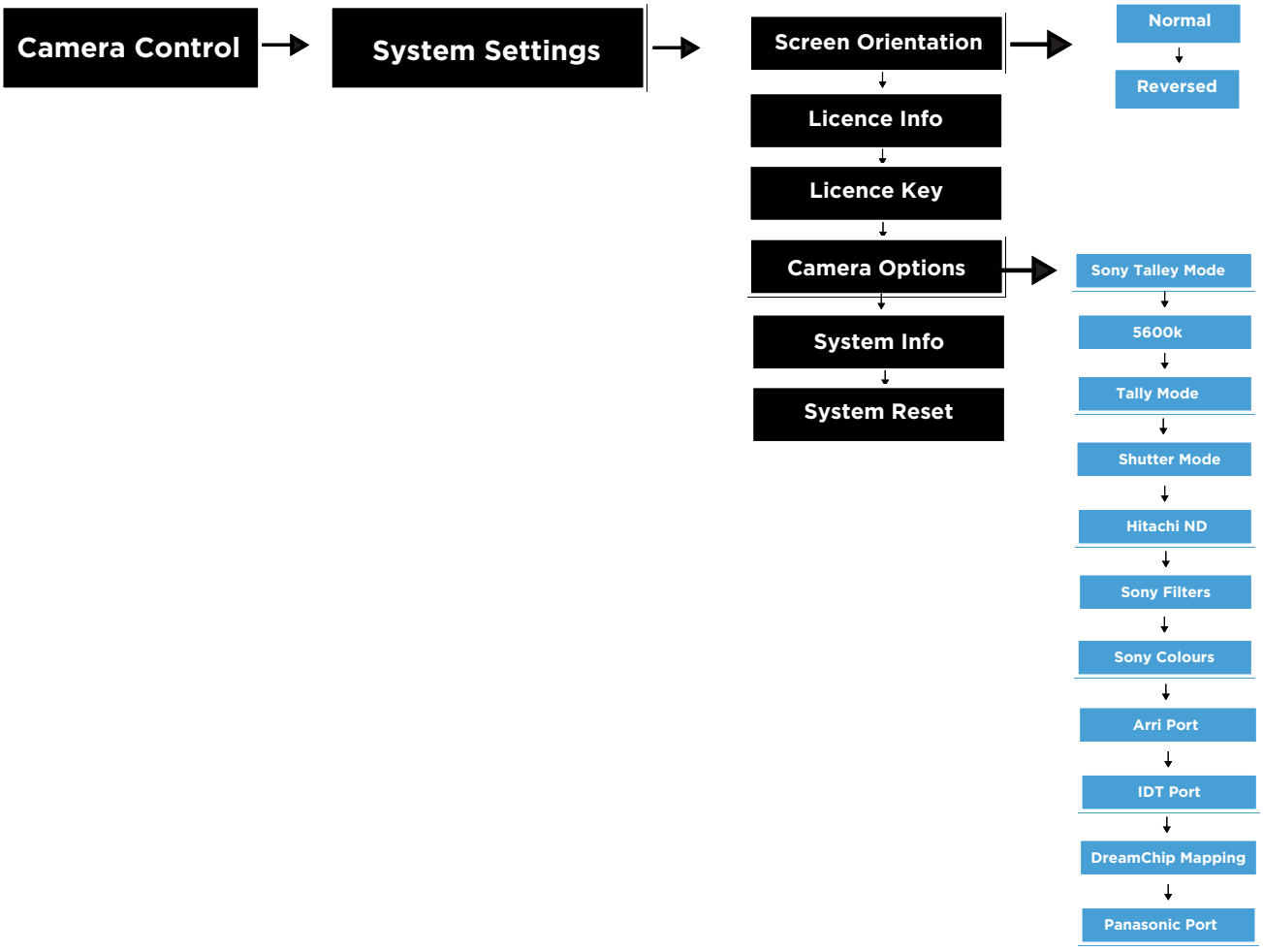
Camera Control Menu Structure

Camera Control Menu Structure

Status Page:

Menus:



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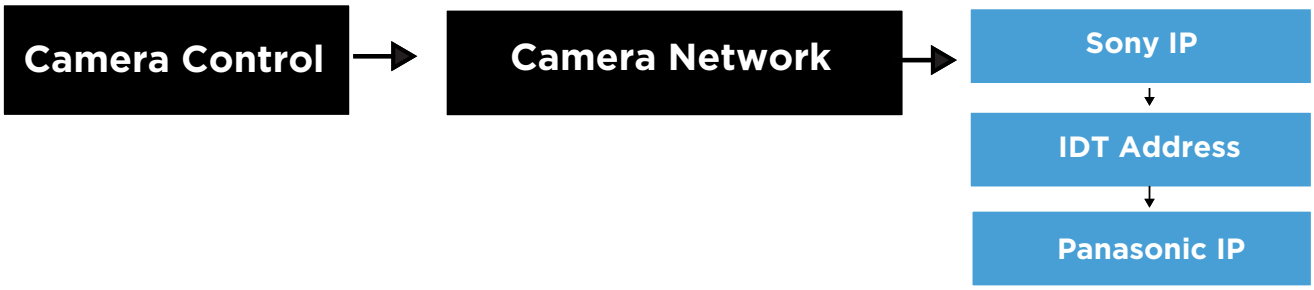
Camera Control Menu Structure

Camera Control Menu Structure

Status Page:

Menus:



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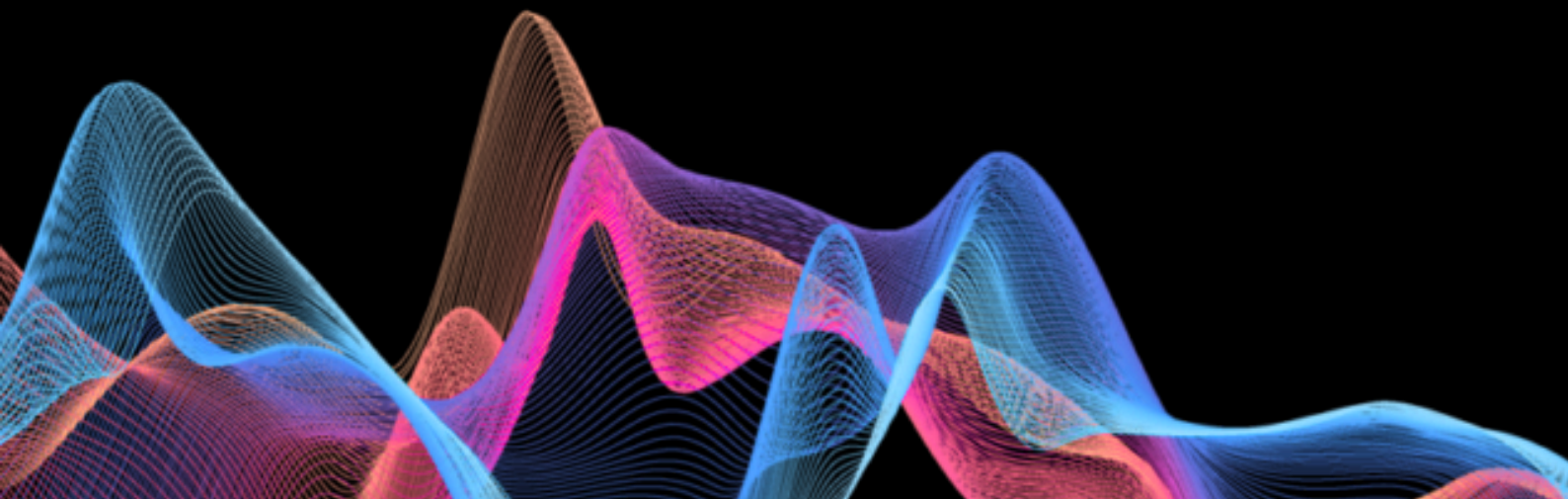
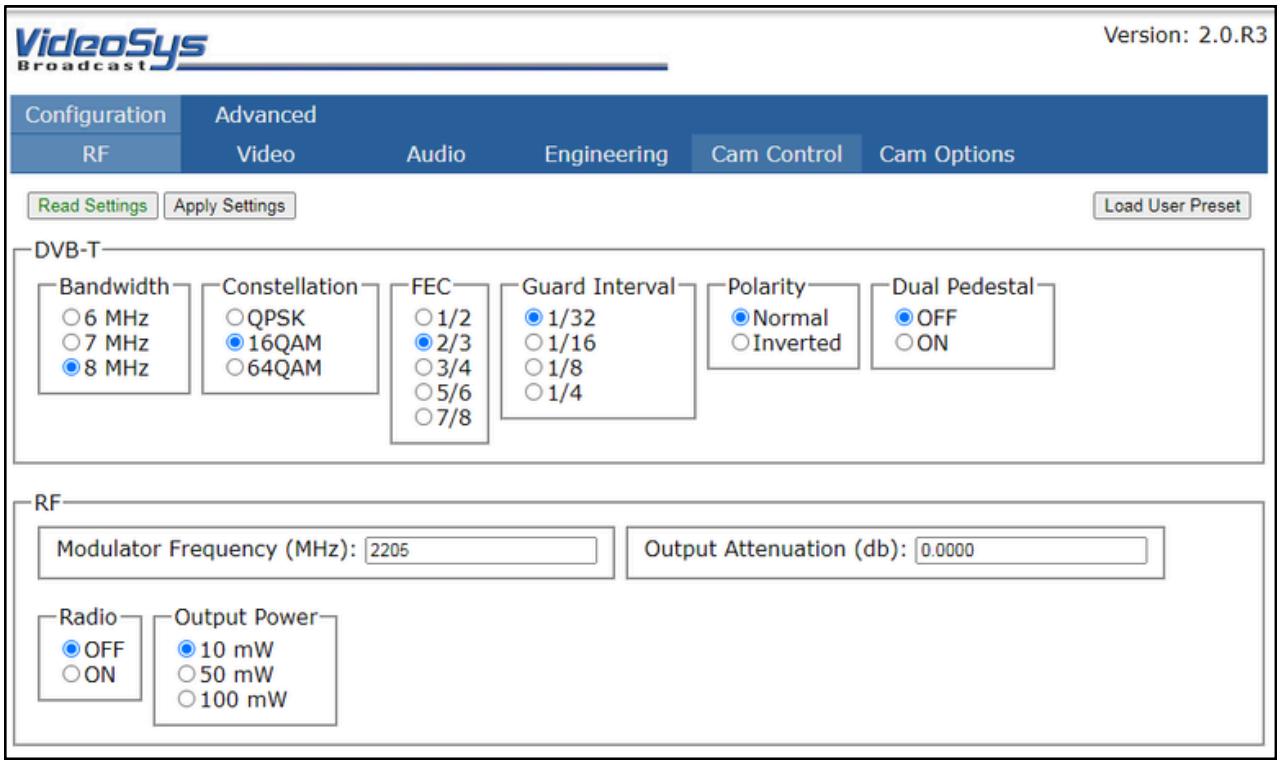
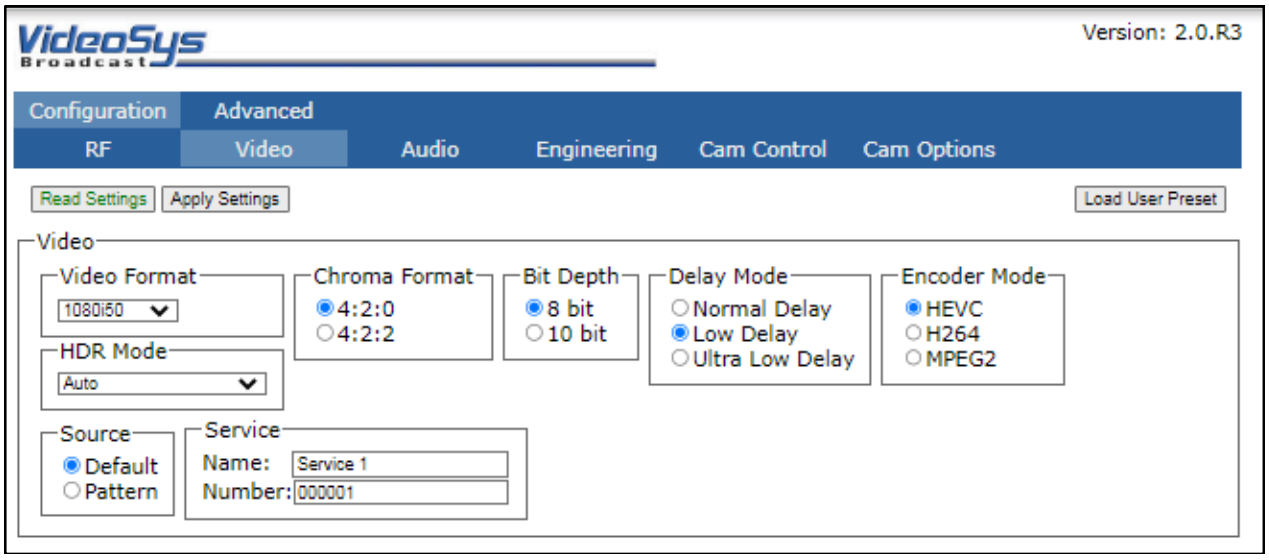
WEB PAGES



Configuration - RF



Configuration - Video



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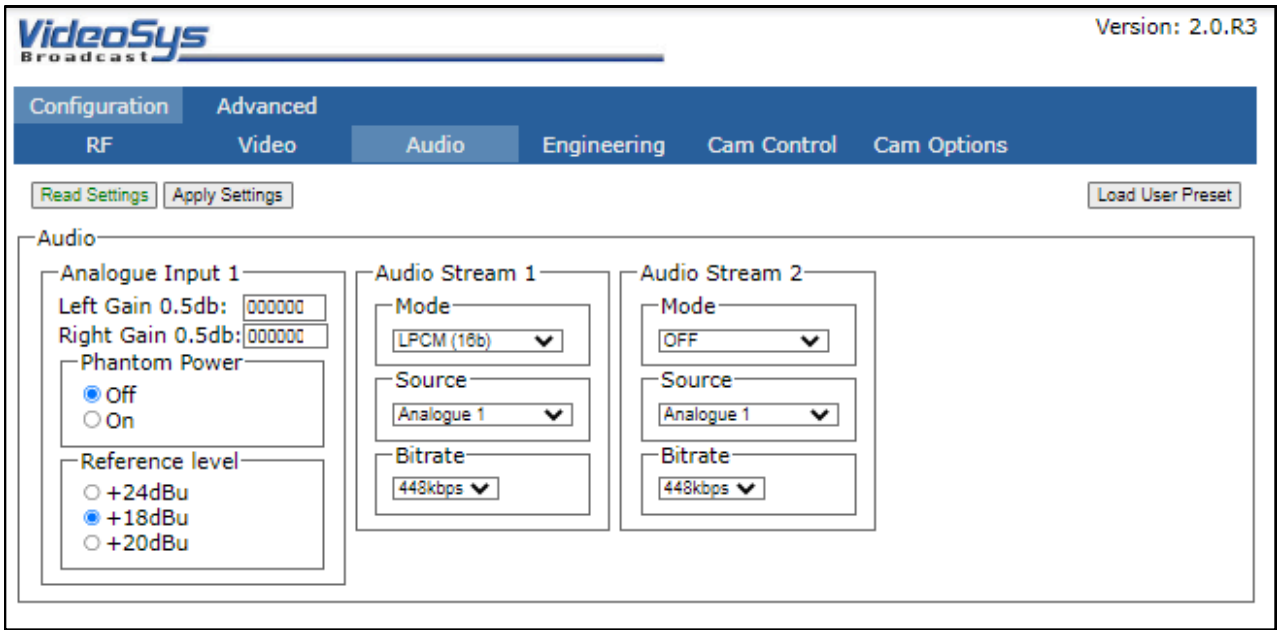
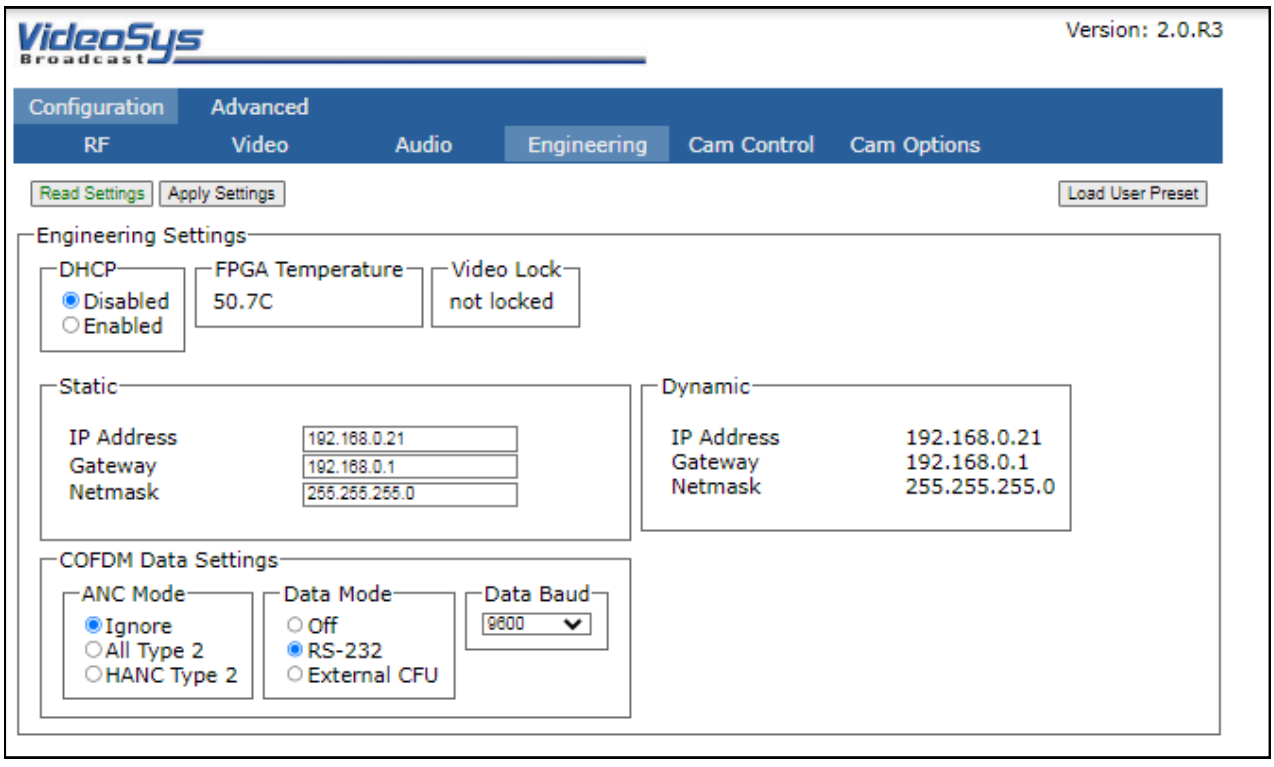
Configuration - Audio



Configuration - Engineering



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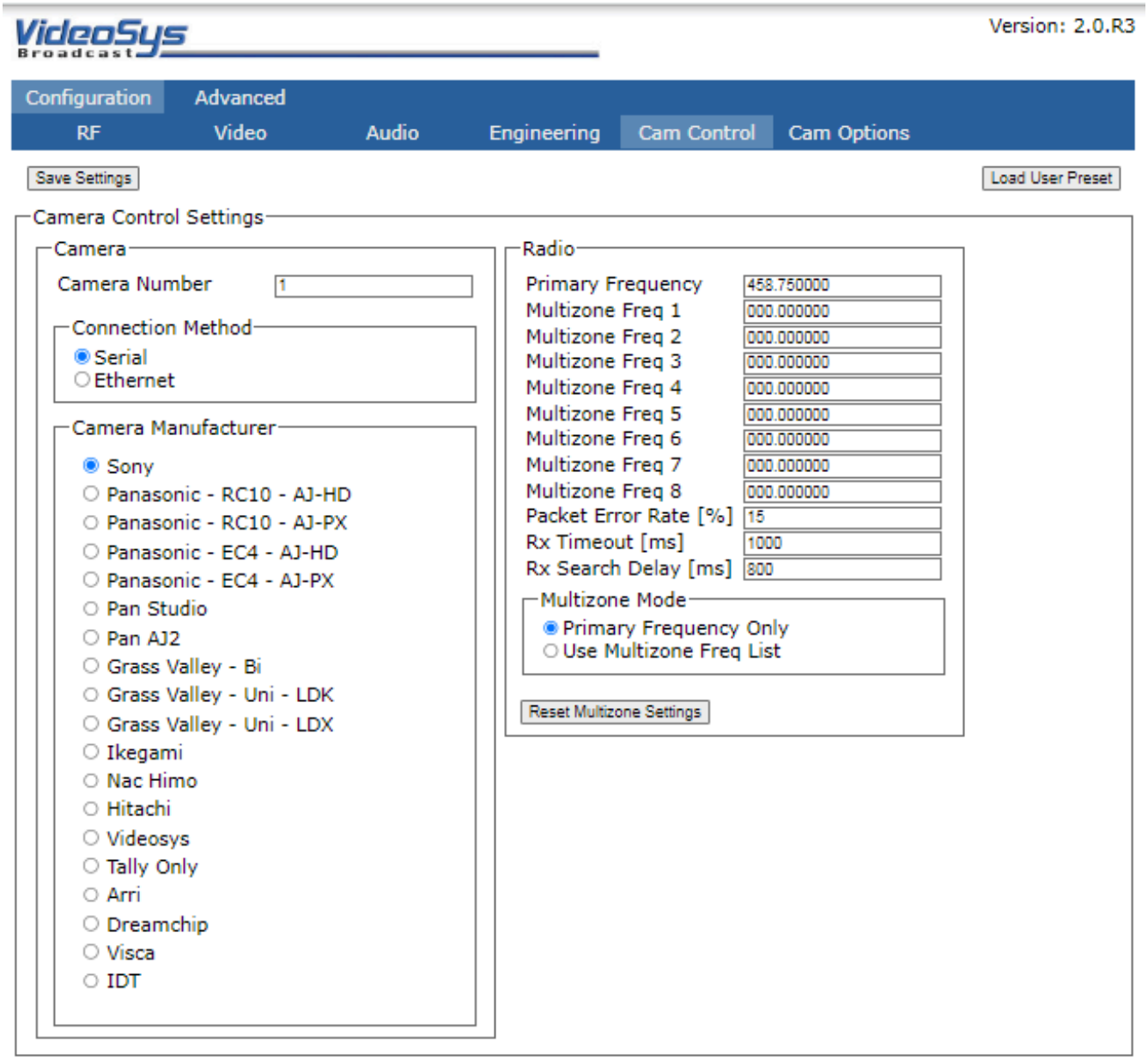
Configuration - Cam Control



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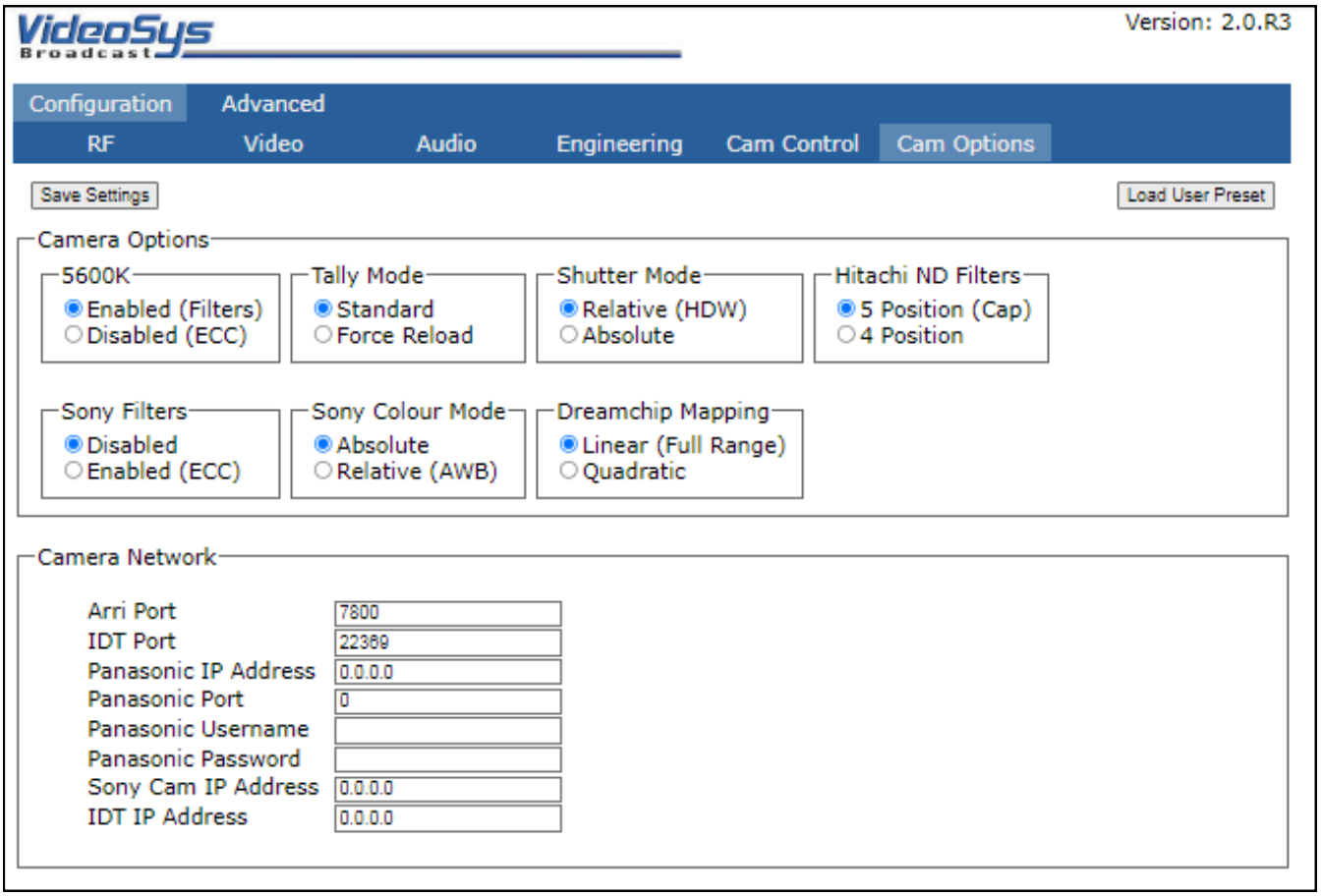
Configuration - Cam Options



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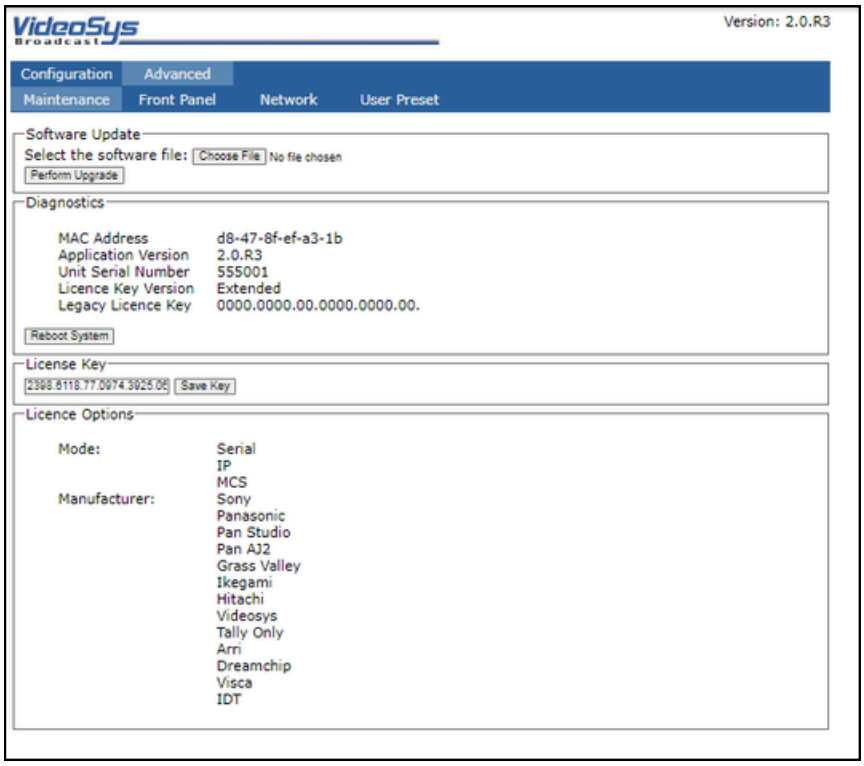
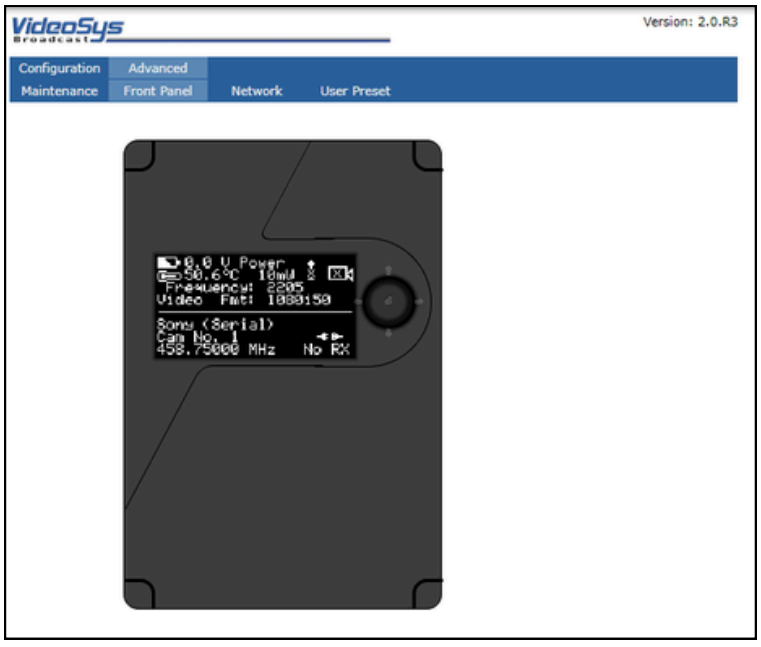
Advanced - Maintenance



Advanced - Front Panel



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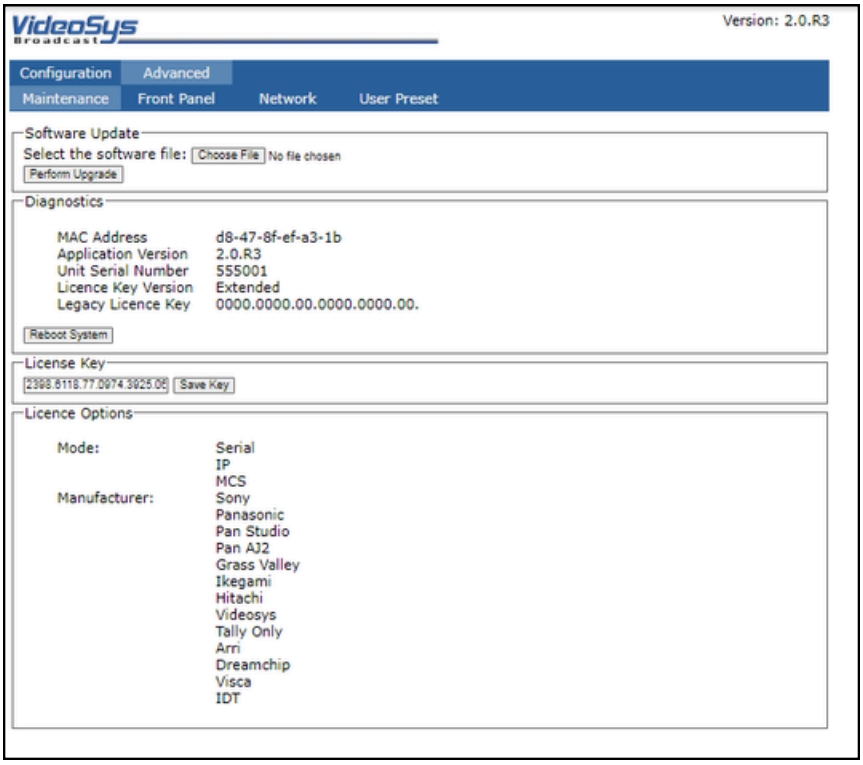
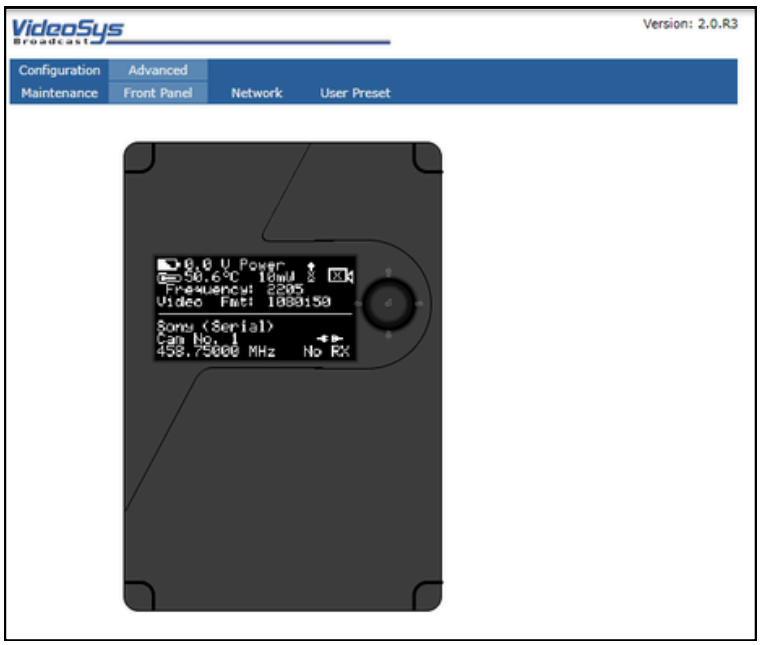
Advanced - Maintenance



Advanced - Front Panel



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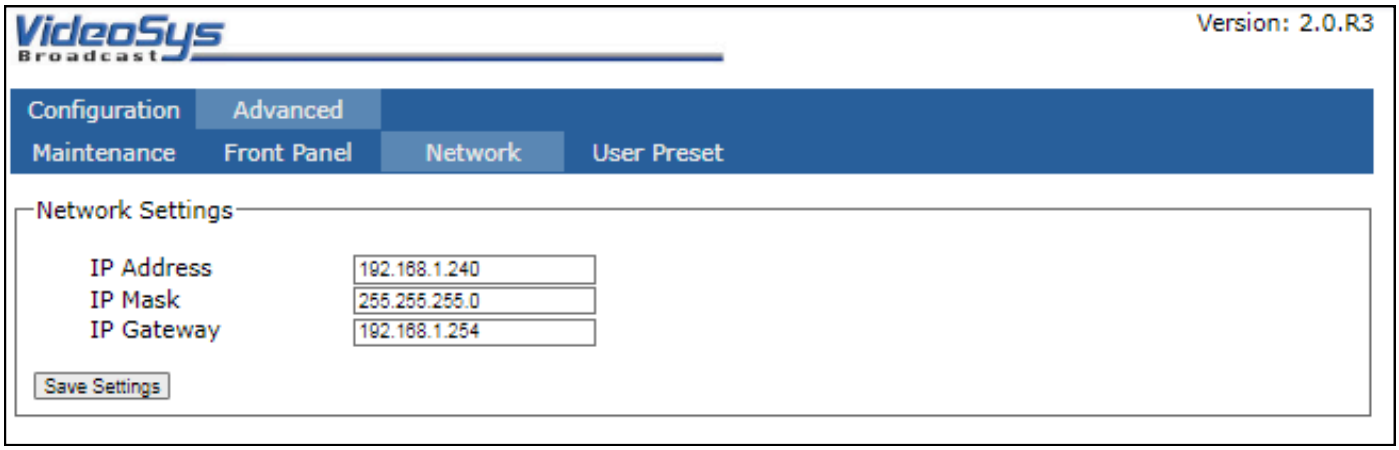
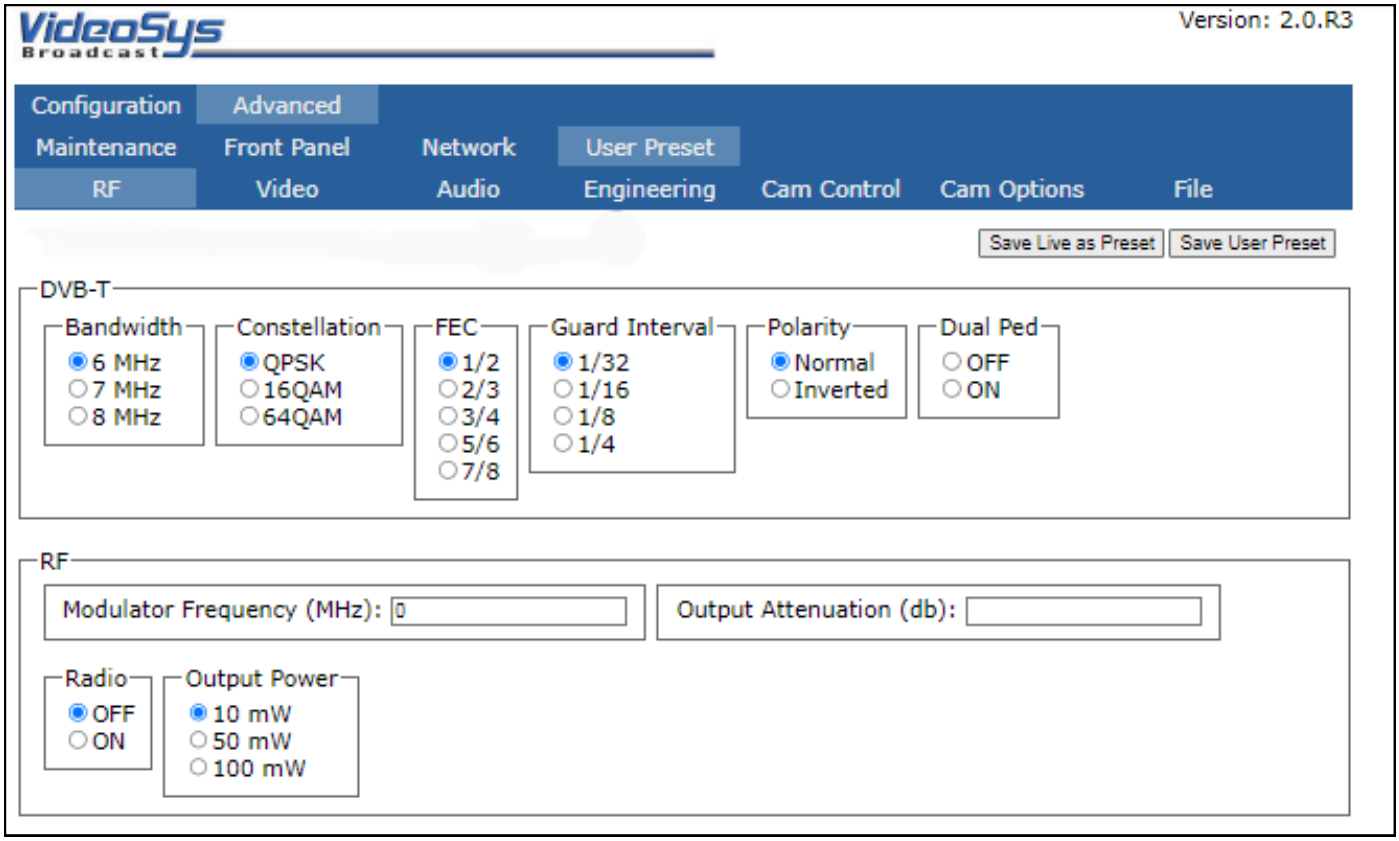
Advanced - Network



Advanced - User Preset - RF



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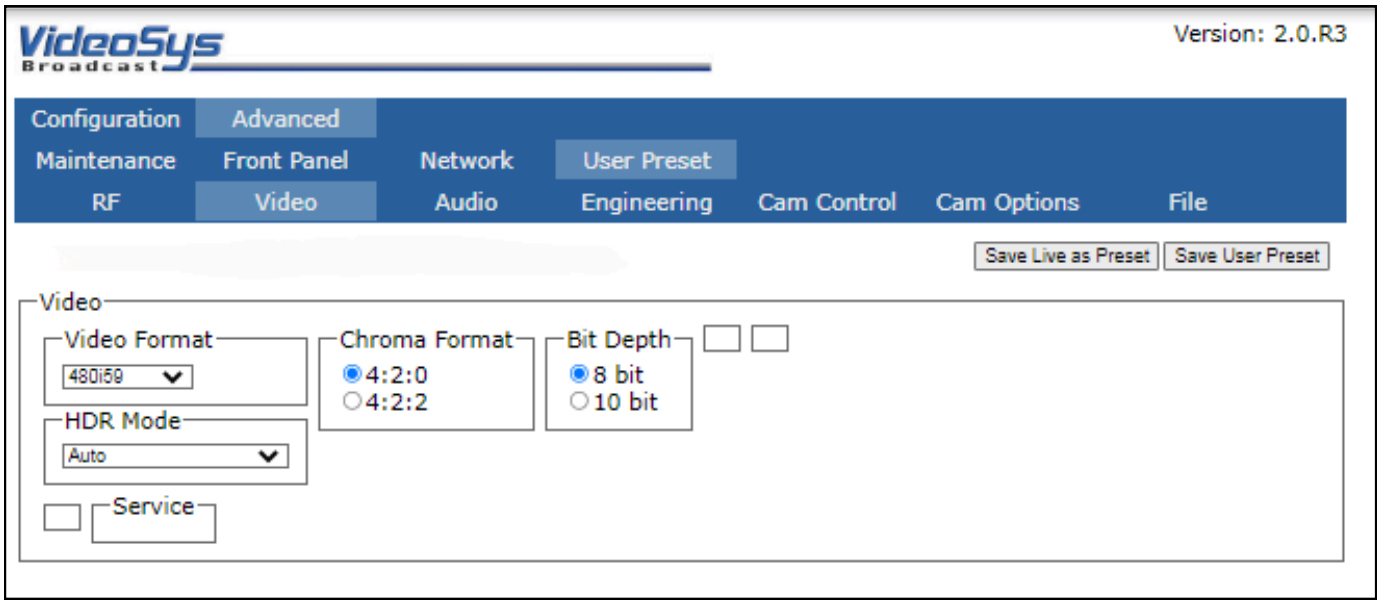
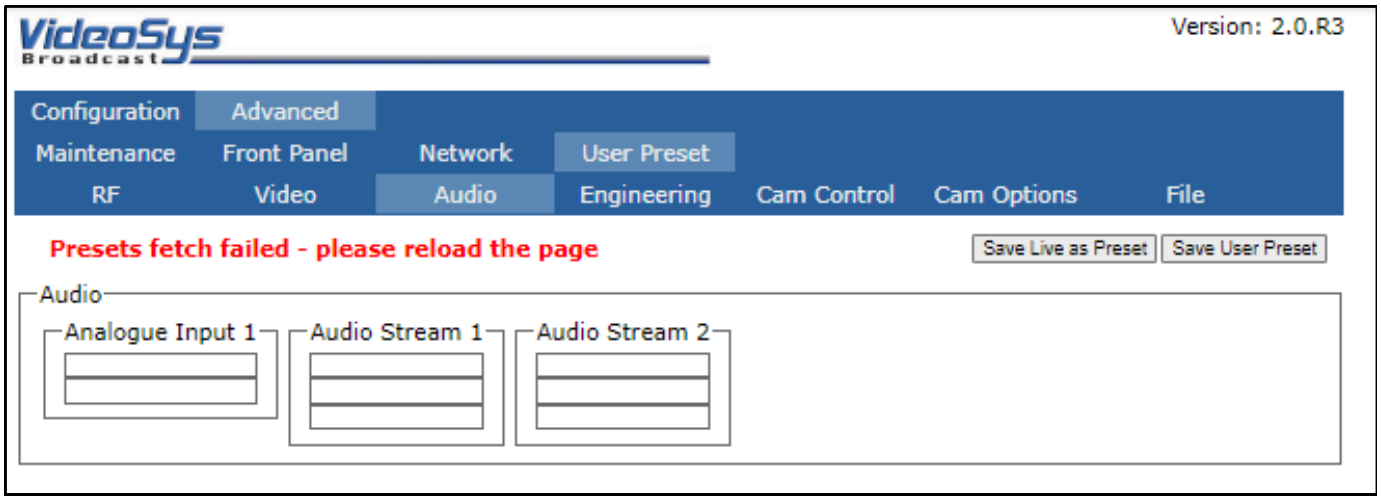
Advanced - User Preset - Video



Advanced - User Preset - Audio



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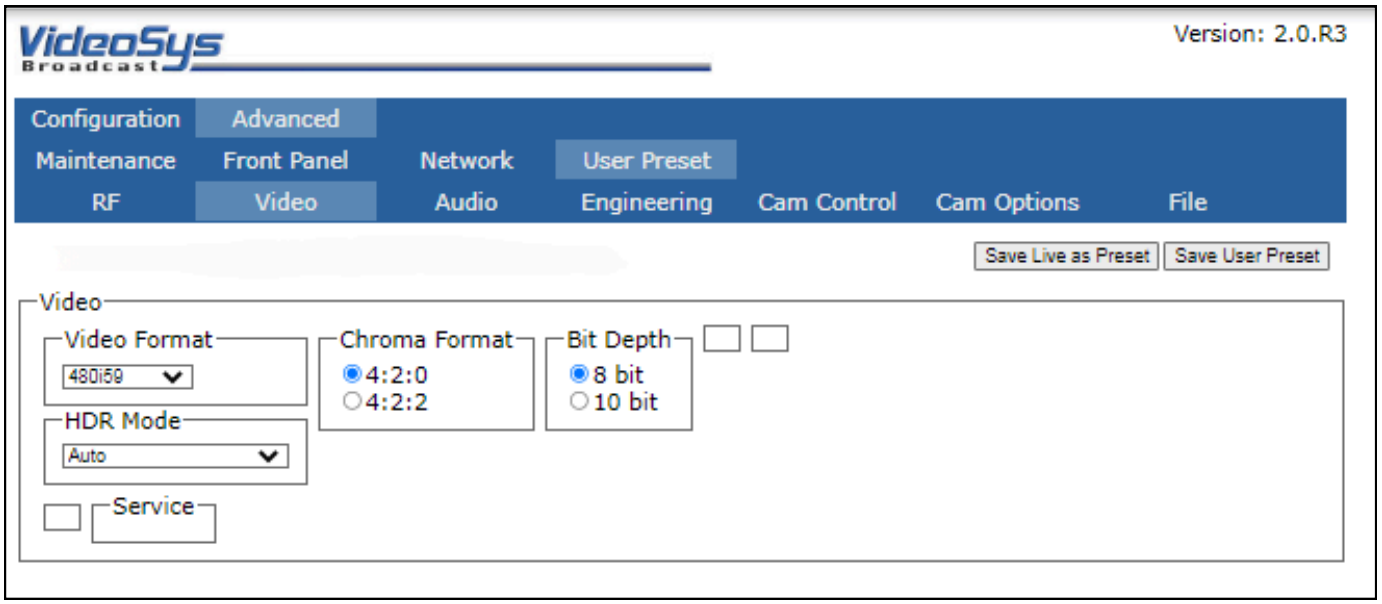
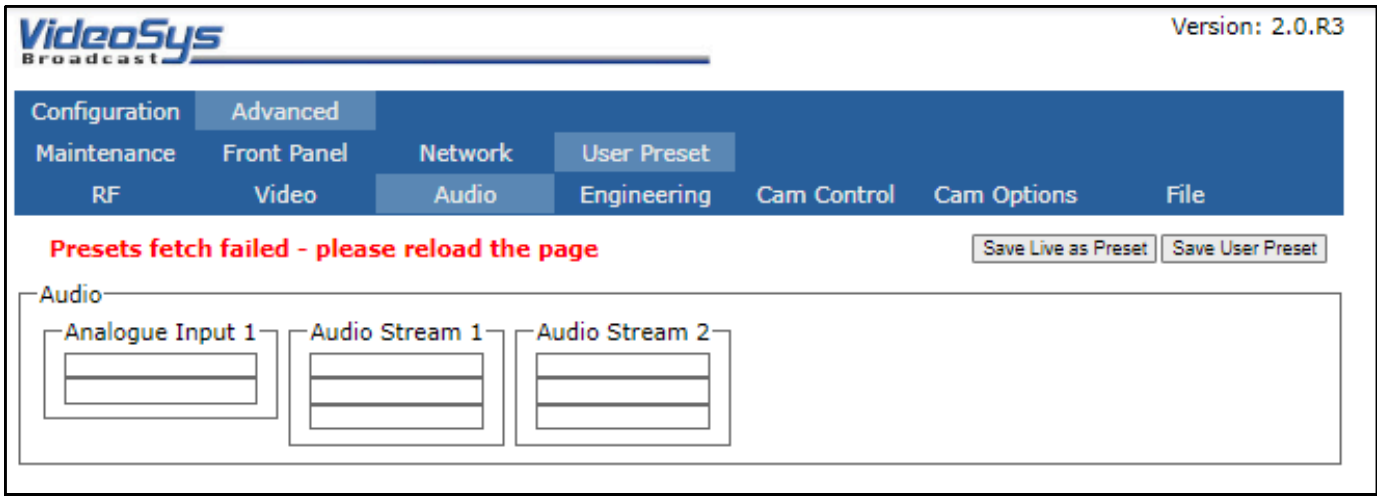
Advanced - User Preset - Video



Advanced - User Preset - Audio



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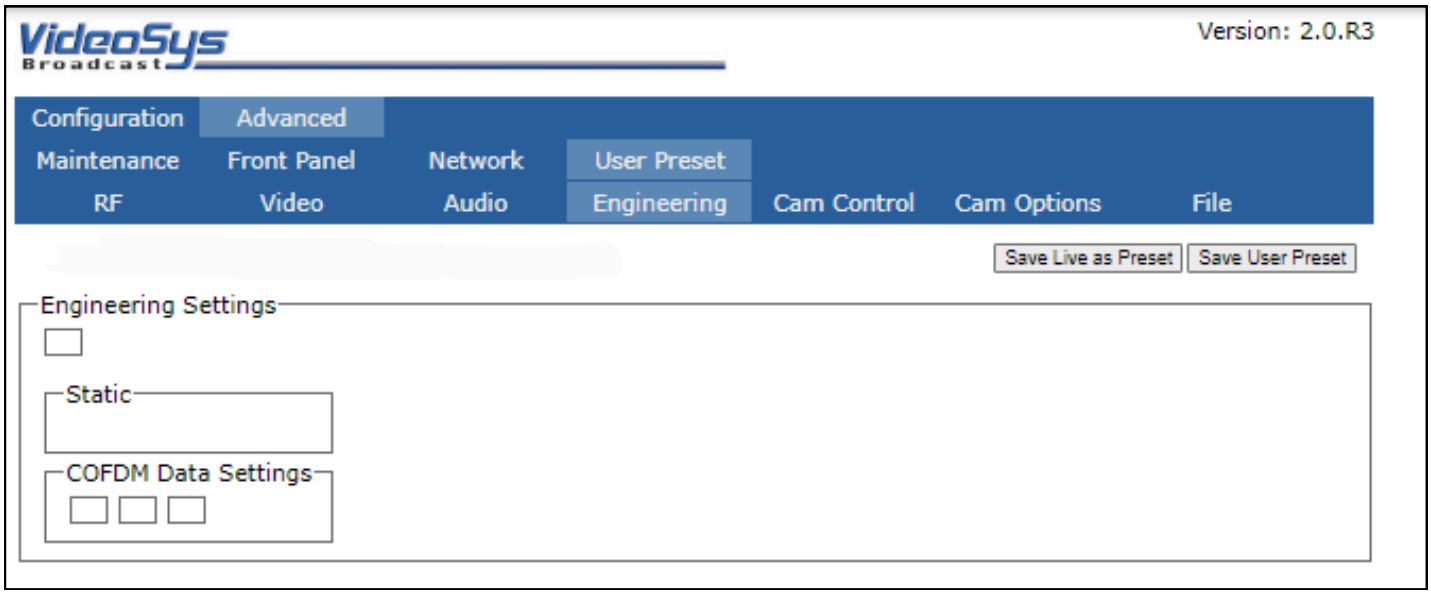
Advanced - User Preset - Engineering



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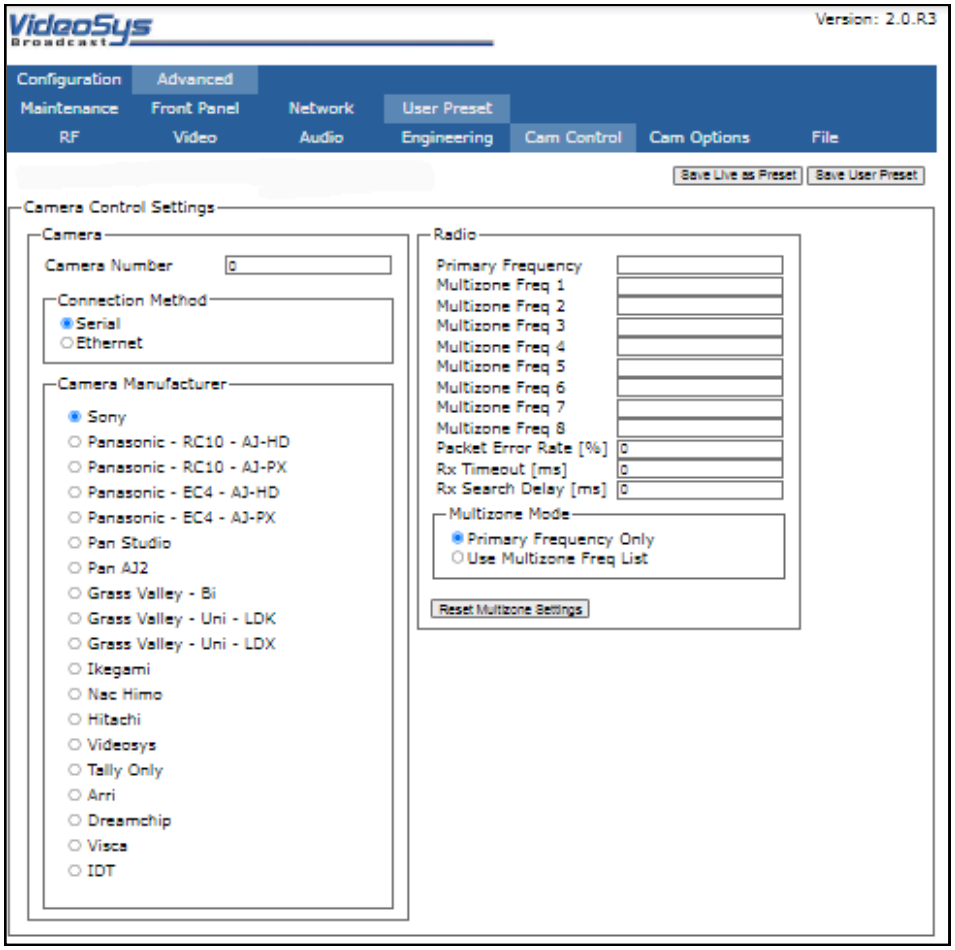
Advanced - User Preset - Cam Control



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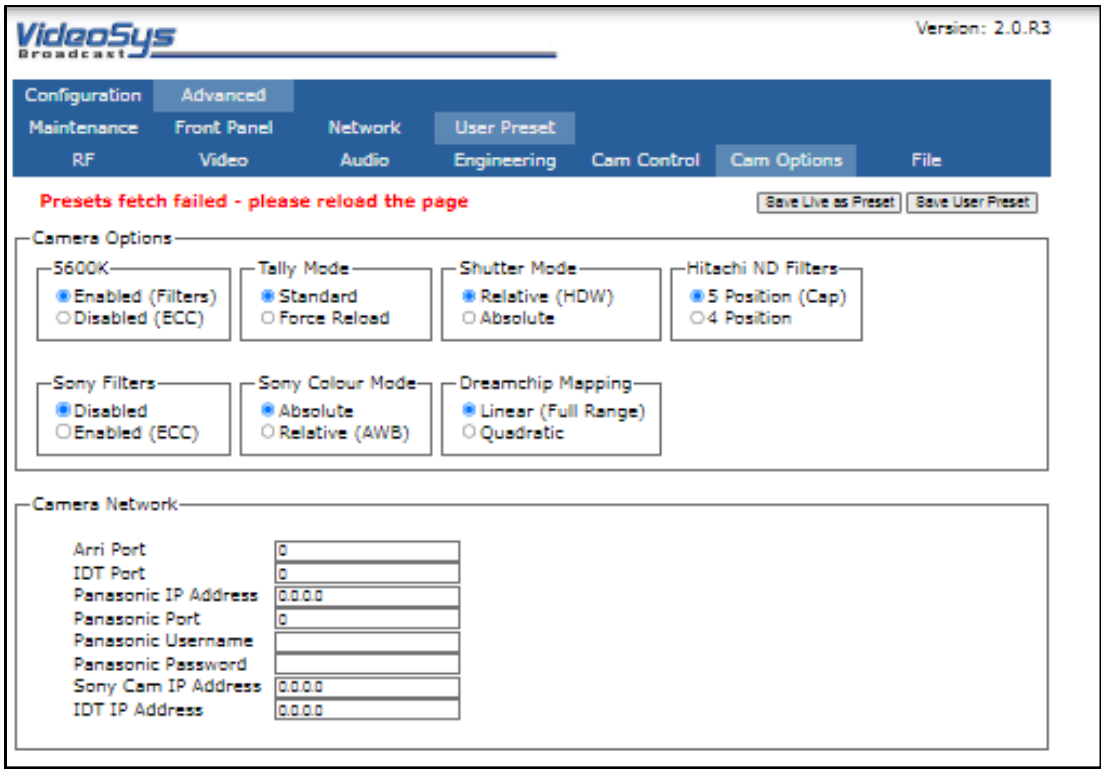
Advanced - User Preset - Cam Options



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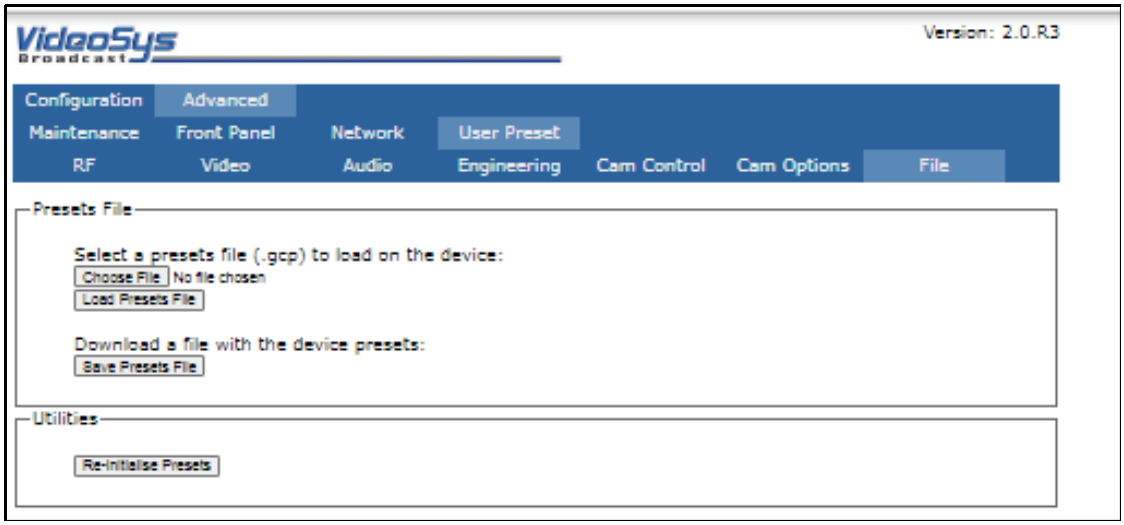
Advanced - User Preset - File



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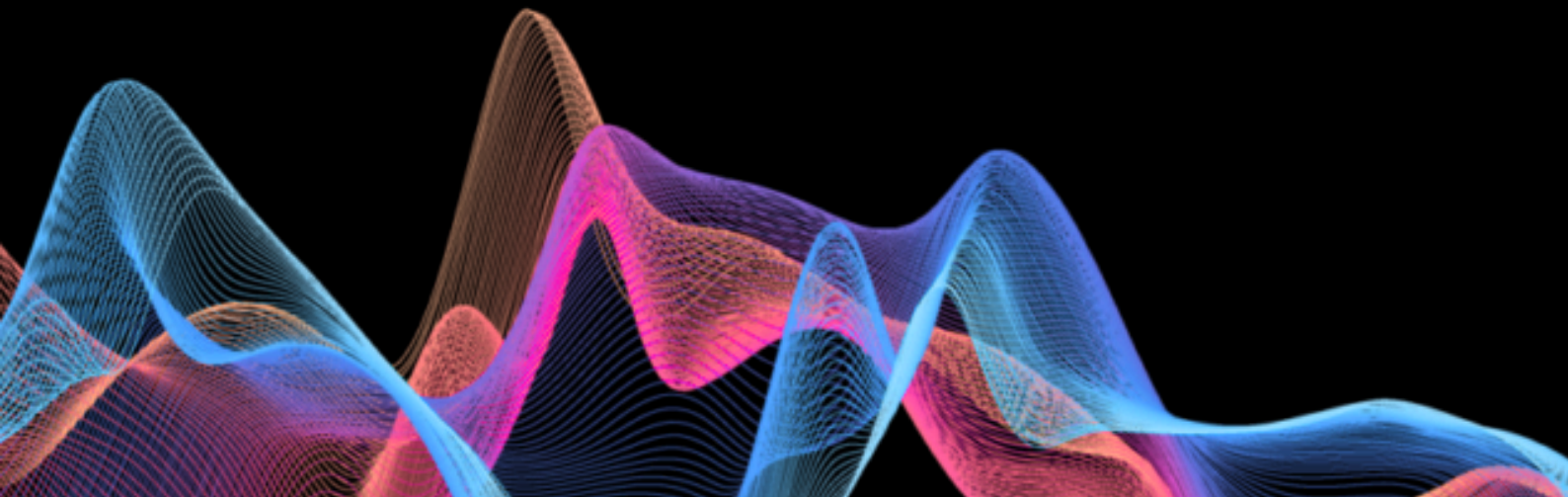
VideoSys Broadcast

TRANSMITTER GUIDE



This part of the document is designed to help an operator successfully and quickly configure the RF System. It contains background information on the technology behind the video link and how to best configure it for the environment, as well as settings an operator may have to configure in order to get the video and camera control paths operational. We would recommend that for configuring the video path it is best to start at the signal source, in this case the camera, and to work backwards to the monitor output on the RX380 and DEC150.

The RF System is designed to leverage DVB-T to get the best picture and performance. DVB-T is an industry standard Digital Video Broadcasting standard that uses COFDM to transmit compressed video over the air. Most DVB-T transmitters allow settings to be changed to trade off data bandwidth for video link robustness.

DVB-T transmitters typically allow the following settings;

Constellation/Modulation setting
QPSK, 16 QAM, and 64 QAM
QPSK allows for two bits per symbol, 16 QAM allows for four bits per symbol, 64 QAM six bits per symbol. This means that 16 QAM allows twice the raw data rate of QPSK and 64 QAM three times QPSK.

Coding rate or FEC
Typically 1/2, 2/3, 3/4, 5/6 or 7/8 This is the percentage of the data bandwidth that is used for transmission payload (video/audio) instead of error correction data - ⅞ would mean that only 1/8th of the data bandwidth is correction data, giving the most bandwidth for video (better picture quality) but potentially at the expense of link robustness - RF breakup may occur in some situations.

Guard Interval
DVB-T Values are 1/4, 1/8, 1/16, 1/32, Guard intervals are pauses in transmission that are necessary to prevent the system from accidentally interpreting signal reflections and echoes. With insufficient guard interval, reflections and echoes may reach the receiver in combination with valid transmitted data, this will reduce performance and potentially cause RF breakup, in environments where RF reflections are less likely (very open environments) a lower Guard interval can be used. Whereas in areas where reflections are more likely to occur, such as near large concrete structures, a larger guard interval might be needed.

Channel Bandwidth
Typically 6MHz, 7MHz or 8Mhz this is the RF bandwidth occupied by the transmission, more bandwidth allows for higher data rates, but may require additional licensing is some areas.

The RF System can operate in a non-standard DVB-T mode called dual Pedestal. Dual Pedestal is where a pair of DVB-T channels spaced 1MHz apart are used in unison to deliver twice the data rate of a single channel. Videosys recommend dual pedestal operation and at least 20Mbps data rate for UHD operation.

For an ultra robust RF link but a poor picture quality we would recommend (Yellow)
For normal usage we would recommend (Green) and for controlled studio environments where the best image quality is required we would recommend (Blue)

Modulation	Coding rate	Guard Interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	3/4	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.6769	10.246	10.556
16-QAM	1/2	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.806
	3/4	14.929	16.588	17.564	18.096
	5/6	16.588	18.431	19.516	20.107
	7/8	17.418	19.353	20.491	21.112
64-QAM	1/2	14.929	16.588	17.564	18.096
	2/3	19.906	22.118	23.419	24.128
	3/4	22.394	24.882	26.346	27.14
	5/6	24.882	27.647	29.273	30.16
	7/8	26.126	29.029	30.737	31.668

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