MuxLab

Over IP ST-2110 Gateway Transceiver
12G-SDI or HDMI2.0

User Manual

500775-2110

500794-2110

Table of Contents

1. Safety Precautions

To ensure the best performance from the product, please read all instructions carefully before using the device. Save this manual for future reference.

- Follow basic safety precautions to reduce the risk of fire, electrical shock, and injury.
- Do not dismantle the housing or modify the module. It may result in electrical shock or burns.
- Do not open or remove the housing of the device as you may be exposed to dangerous voltage or other hazards.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture and do not install this product near water. Keep the product away from liquids.
- Spillage into the housing may result in fire, electrical shock, or equipment damage. If an object or liquid falls or spills on the housing, unplug the module immediately.
- Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.
- Using supplies or parts not meeting the product specifications may cause damage, deterioration or malfunction.
- Refer all servicing to qualified service personnel.
- Install the device in a place with adequate ventilation to avoid damage caused by overheat.
- Unplug the power when left unused for a long period of time.
- Information on disposal of devices: do not burn or mix with general household waste, please treat them as normal electrical waste.

2. Products list

Model/Part number	Description	Media type
500775-2110	12GSDI over IP, ST2110 transceiver	SDI
500794-2110	HDMI2.0 over IP, ST2110 transceiver	HDMI

3. Product overview

3.1. Introduction

The transceiver unit allows SDI or HDMI equipment to be converted to ST-2110 protocol and propagated to an IP network. This Uncompressed Gateway Converter supports the ST-2110 AV over IP protocol standard for Broadcast applications. It supports audiovisual data up to uncompressed 4K@60Hz resolution video and 16 audio channels (12Gbps bandwidth).

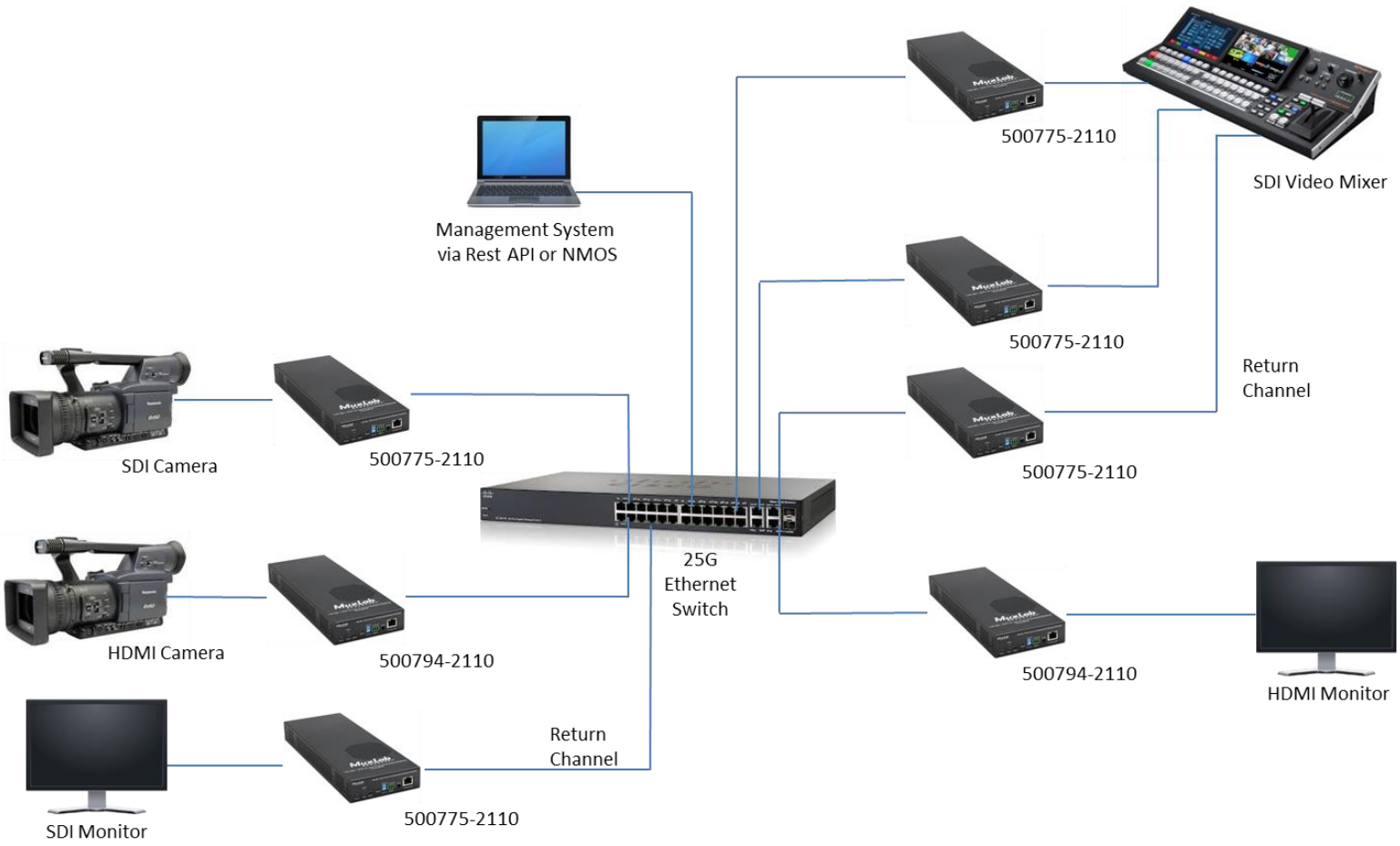
This unit is a transceiver and can be configured as a Transmitter or Receiver for added flexibility and convenience.

The unit converts AV data from 12G-SDI (model 500775) or HDMI2.0 (model 500794) to be utilized in a ST-2110 broadcast environment over a network, while extending end point source and sink devices at up to 6.2mi (10km) via duplex single mode fiber, and up to 320ft(100m) for the multimode model. Point-to-point configuration is supported as well as point-to-multipoint and multipoint-to-multipoint configurations by connecting several units to a 25G Ethernet network. This device is versatile and can also be used over 10G network. In this case, maximum video resolution is uncompressed 4K@30Hz (6Gbps bandwidth).

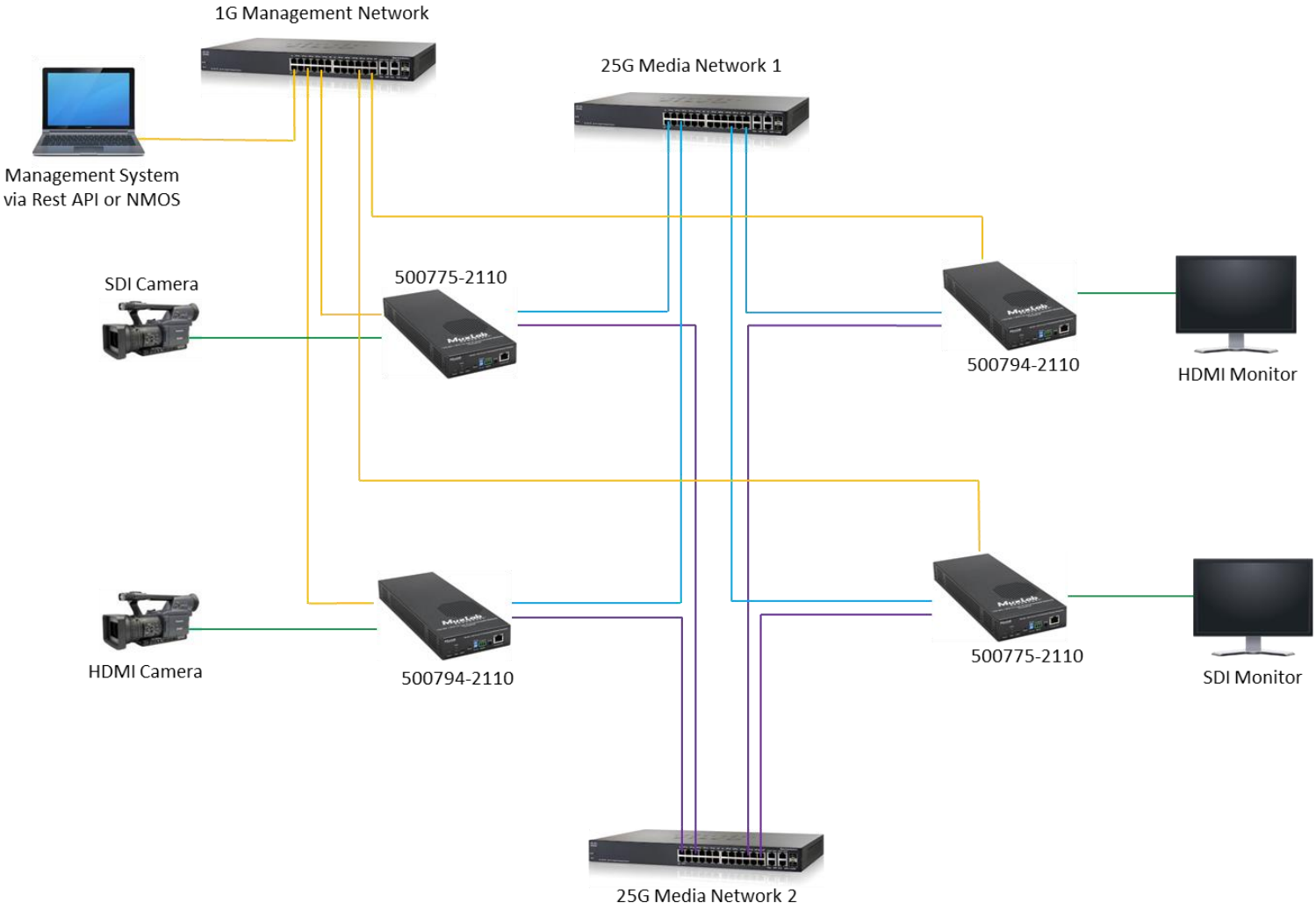
The device supports ST-2022-7 (Class D) Redundancy for critical fail-safe applications allowing the audio/video signal to run over two independent 25G/10G Ethernet Networks. The unit provides a 1G Management Ethernet port for control via Web interface or 3rd party management platforms supporting a RestAPI, or NMOS (IS-04 for discovery and IS-05 for connectivity management).

3.2. Application Diagrams

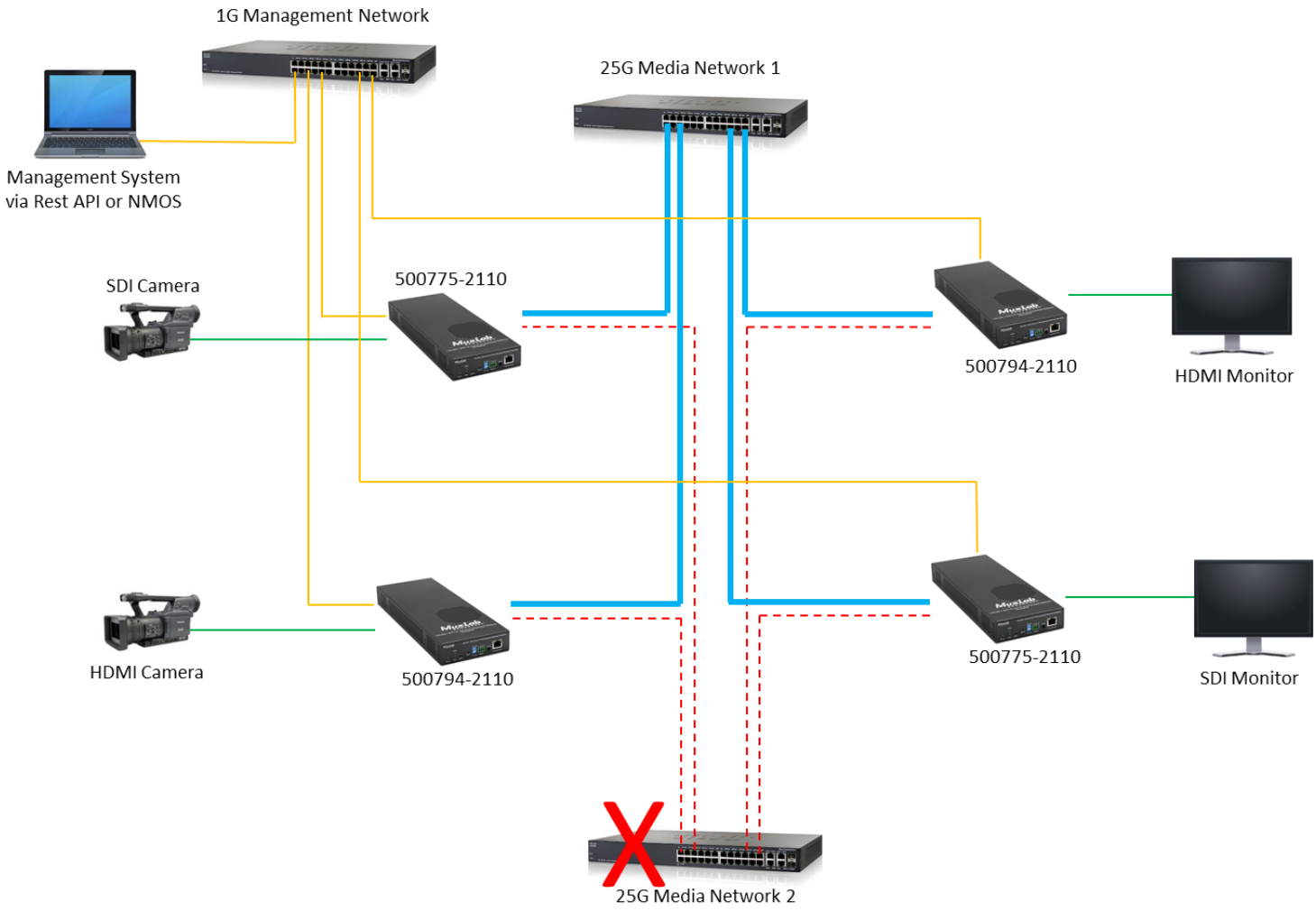
The following diagrams illustrate typical multipoint-to-multipoint LAN configuration.



Application diagram with redundancy (without fault):



Application diagram with redundancy (with fault):



3.3. Features

- Supports SMPTE ST-2110 uncompressed video up to 4K@ 60Hz.
- Supports SMPTE ST-2022-7 (Class D, supporting up to 150usec delay with no frame lose) AV signal Redundancy (Seamless Protection Switching).
- Model 500775-2110: Convert 12G-SDI audio/video over an IP network using ST-2110 Protocol.
- Model 500794-2110: Convert HDMI2.0 audio/video over an IP network using ST-2110 Protocol.
- This device is a Transceiver and can be configured as a Transmitter (Encoder), or Receiver (Decoder).
- This device can be used over 25Gbps Network or 10Gbps Network.
- Supports many Transmitters and Receivers depending on network bandwidth.
- Supports point-to-point, point-to-multipoint and multipoint-to-multipoint applications.
- Supports two (2) 25G/10G Media Ethernet ports (labelled as: Media 1 & Media 2) for AV Media/Data transmission, and a 1G Management Ethernet port for device control via Web interface, a RestAPI or NMOS based management platform.
- RS232 port is included for future use.
- USB-C port is included for future use.
- Audio 3.5mm port is included for future use.
- May be managed via a Web interface and third-party control software platforms supporting a RestAPI or NMOS.

3.4. Package Contents

- One (1) ST2110 Transceiver (HDMI or SDI)
- One (1) Power Supply Unit
- One (1) 3 pin connection plug
- One (1) User manual (available via download)

Important note: The two (2) SFPs are not included in the package. Please order them separately, depending on your needs. This transceiver can be used with Multimode SFPs or Single mode SFPs. Please find list of compatible SPFs in the next table, at “accessories” section.

Note: Confirm that the product and accessories are all included. If not, please contact the supplier from which you purchased the unit.

3.5. Specifications for 500775-2110 (SDI) model

Specification	
Environment	Up to 12G-SDI
Devices	Cameras, mixers, media players, monitors, TVs, PCs, laptops, servers supporting up to 12G-SDI
Signals	• Up to 12G-SDI (4k @ 60Hz), supporting ST-2110, in 25G network environment • Up to 6G-SDI (4k @ 30Hz), supporting ST-2110, in 10G network environment
End device connectors	Two (2) BNC connectors for SDI
Other Connectors/Switches	Two (2) SFP Cages for 25G/10G Ethernet ports for redundant AV transmission One (1) RJ45S Connector for 1G Ethernet port for management One (1) 2.1mm locking power connector One (1) Switch for device functionality Tx or Rx One (1) Switch for Media Network 25G or 10G One (1) USB-C Connector (for future use) One (1) 3-position Phoenix Connector for RS232 (for future use) One (1) 3.5mm audio connector (for future use)
Cable (not included)	Two (2) Dual MM fiber cables (when using MM SFP) Or Two (2) Dual SM fiber cables (when using SM SFP)
Max Distance	330ft (100m), when using 25G MM SFP. 6.2mi (10km), when using 25G SM10 SFP 25mi (40km), when using 25G SM40 SFP
Latency	Zero latency
Compression	None (uncompressed)
Network Bandwidth	Up to 12 Gbps over 25G network Up to 6 Gbps over 10G network
Network Requirement	25G/10G Ethernet LAN for AV transmission, and 1G LAN for 3rd party management platforms
3rd Party Control	Via RestAPI and NMOS (IS-04 for discovery & IS-05 for connectivity management)
Power Supply	12V / 3A
Power Consumption	RX mode : 23 Watt, TX mode : 21 Watt
Temperature	Operating: 0° to 40°C Storage: -20° to 85°C Humidity: Up to 95% non-condensing
Enclosure	Aluminum
Dimensions	4.4” x 12” x 1.3” (11.1 x 30.5 x 3.3 cm)
Weight	1.4 lbs (0.65 kg)
Compliance	Regulatory: FCC, CE, RoHS Flammability: 94V0
Warranty	2 years
Order Information	500775-2110: 12G-SDI/ST2110 over IP Gateway Transceiver (UPC: 627699007754)
Accessories (Sold separately)	• 500920 16-Port Rackmount Transceiver Chassis • 500917 Wall Mount Transceiver Bracket Kit For Media/Data Ports: • 500971-25G-MM SFP Module, **25G**, Multimode, 100m • 500971-25G-SM10 SFP Module, **25G**, Single mode, 10Km • 500970-MM SFP Module, **10G**, Multimode, 300m • 500970-UTP SFP Module, **10G**, UTP, 30m • 500970-SM10 SFP Module, **10G**, Single mode, 10Km • 500970-SM40 SFP Module, **10G**, Single mode, 40Km

3.6. Specifications for 500794-2110 (HDMI) model

Specification	
Environment	HDMI2.0
Devices	Cameras, mixers, media players, monitors, TVs, PCs, laptops, servers supporting HDMI2.0
Signals	• HDMI2.0 (up to 4k @ 60Hz), supporting ST-2110, in 25G network environment • HDMI1.4 (up to 4k @ 30Hz), supporting ST-2110, in 10G network environment
End device connectors	Two (2) HDMI connectors
Other Connectors/Switches	Two (2) SFP Cages for 25G/10G Ethernet ports for redundant AV transmission One (1) RJ45S Connector for 1G Ethernet port for management One (1) 2.1mm locking power connector One (1) Switch for device functionality Tx or Rx One (1) Switch for Media Network 25G or 10G One (1) USB-C Connector (for future use) One (1) 3-position Phoenix Connector for RS232 (for future use) One (1) 3.5mm audio connector (for future use)
Cable (not included)	Two (2) Dual MM fiber cables (when using MM SFP) Or Two (2) Dual SM fiber cables (when using SM SFP)
Max Distance	330ft (100m), when using 25G MM SFP. 6.2mi (10km), when using 25G SM10 SFP 25mi (40km), when using 25G SM40 SFP
Latency	Zero latency
Compression	None (uncompressed)
Network Bandwidth	Up to 12 Gbps over 25G network Up to 6 Gbps over 10G network
Network Requirement	25G/10G Ethernet LAN for AV transmission, and 1G LAN for 3rd party management platforms
3rd Party Control	Via RestAPI and NMOS (IS-04 for discovery & IS-05 for connectivity management)
Power Supply	12V / 3A
Power Consumption	RX mode : 23 Watt, TX mode : 21 Watt
Temperature	Operating: 0° to 40°C Storage: -20° to 85°C Humidity: Up to 95% non-condensing
Enclosure	Aluminum
Dimensions	4.4” x 12” x 1.3” (11.1 x 30.5 x 3.3 cm)
Weight	1.4 lbs (0.65 kg)
Compliance	Regulatory: FCC, CE, RoHS Flammability: 94V0
Warranty	2 years
Order Information	500794-2110: HDMI2.0/ST2110 over IP Gateway Transceiver (UPC: 627699007945)
Accessories (Sold separately)	• 500920 16-Port Rackmount Transceiver Chassis • 500917 Wall Mount Transceiver Bracket Kit For Media/Data Ports: • 500971-25G-MM SFP Module, **25G**, Multimode, 100m • 500971-25G-SM10 SFP Module, **25G**, Single mode, 10Km • 500970-MM SFP Module, **10G**, Multimode, 300m • 500970-UTP SFP Module, **10G**, UTP, 30m • 500970-SM10 SFP Module, **10G**, Single mode, 10Km • 500970-SM40 SFP Module, **10G**, Single mode, 40Km

3.7. Currently Supported Resolutions for 500775-2110 (SDI) model

The following are the currently supported video resolutions and frame rates over **25Gbps Network**. (Maximum data bandwidth is 12Gbps.)

Color Depth	Color Space	4k							
		60	59.94	50	30	29.97	25	24	23.976
10 bit	YCbCr 422	v	v	v	v	v	v	v	v

Color Depth	Color Space	1080p							
		60	59.94	50	30	29.97	25	24	23.976
10 bit	YCbCr 422	v	v	v	v	v	v	v	v

Color Depth	Color Space	1080i			720p		
		60	59.94	50	60	59.94	50
10 bit	YCbCr 422	v	v	v	v	v	v

The following are the currently supported video resolutions and frame rates over **10Gbps Network**. (Maximum data bandwidth is 6Gbps.)

Color Depth	Color Space	4k							
		60	59.94	50	30	29.97	25	24	23.976
10 bit	YCbCr 422	-	-	-	v	v	v	v	v

Color Depth	Color Space	1080p							
		60	59.94	50	30	29.97	25	24	23.976
10 bit	YCbCr 422	v	v	v	v	v	v	v	v

Color Depth	Color Space	1080i			720p		
		60	59.94	50	60	59.94	50
10 bit	YCbCr 422	v	v	v	v	v	v

Note: The user chooses the network bandwidth (10G or 25G) using the external switch on the transceiver's front panel. Please mind using MuxLab SFPs compatible with your network bandwidth.

3.8. Currently Supported Resolutions for 500794-2110 (HDMI) model

The following are the currently supported video resolutions and frame rates over **25Gbps Network**. (Maximum data bandwidth is 12Gbps.)

Color Depth	Color Space	4k							
		60	59.94	50	30	29.97	25	24	23.976
8 bit	RGB	v	v	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v	v	v
10 bit	RGB	v	v	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v	v	v

Color Depth	Color Space	1080p							
		60	59.94	50	30	29.97	25	24	23.976
8 bit	RGB	v	v	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v	v	v
10 bit	RGB	v	v	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v	v	v

Color Depth	Color Space	1080i			720p		
		60	59.94	50	60	59.94	50
8 bit	RGB	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v
10 bit	RGB	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v

The following are the currently supported video resolutions and frame rates over **10Gbps Network**. (Maximum data bandwidth is 6Gbps.)

Color Depth	Color Space	4k							
		60	59.94	50	30	29.97	25	24	23.976
8 bit	RGB	-	-	-	v	v	v	v	v
	YCbCr 444	-	-	-	v	v	v	v	v
	YCbCr 422	-	-	-	v	v	v	v	v
10 bit	RGB	-	-	-	v	v	v	v	v
	YCbCr 444	-	-	-	v	v	v	v	v
	YCbCr 422	-	-	-	v	v	v	v	v

Color Depth	Color Space	1080p							
		60	59.94	50	30	29.97	25	24	23.976
8 bit	RGB	v	v	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v	v	v
10 bit	RGB	v	v	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v	v	v

Color Depth	Color Space	1080i			720p		
		60	59.94	50	60	59.94	50
8 bit	RGB	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v
10 bit	RGB	v	v	v	v	v	v
	YCbCr 444	v	v	v	v	v	v
	YCbCr 422	v	v	v	v	v	v

Note: The user chooses the network bandwidth (10G or 25G) using the external switch on the transceiver's front panel. Please mind using MuxLab SFPs compatible with your network bandwidth.

3.9. Network infrastructure

This section is a guideline aiming to help user building his network infrastructure for ST2110 AV over IP. Please find below a description of a basic infrastructure.

Material needed:

- Transmitter unit
- Receiver unit
- Ethernet switch
- SFP modules
- Cables
- PTP server

Transmitter/Receiver unit choice:

- 500775-2110 for SDI type source/sink
- 500794-2110 for HDMI type source/sink

One can connect MuxLab ST2110 units with any non-MuxLab branded units that use ST2110 protocol.

Note that MuxLab unit is versatile, it can be either Transmitter, or Receiver. The user chooses functionality using dip switch on front panel.

Ethernet Network bandwidth choice:

- 25Gbps: with 25G bandwidth, user can use maximum uncompressed 4K60 resolution video resolution and 16 channels.
- 10Gbps: with 10G bandwidth, user can use maximum uncompressed 4K30 resolution video resolution and 16 channels.

This choice concerns your Network Ethernet Switch, ST2110 Transmitter unit, ST2110 Receiver unit compatibility.

Note that MuxLab unit is versatile, it can be use either over 25G Network, or over 10G Network. The user chooses functionality using dip switch on front panel.

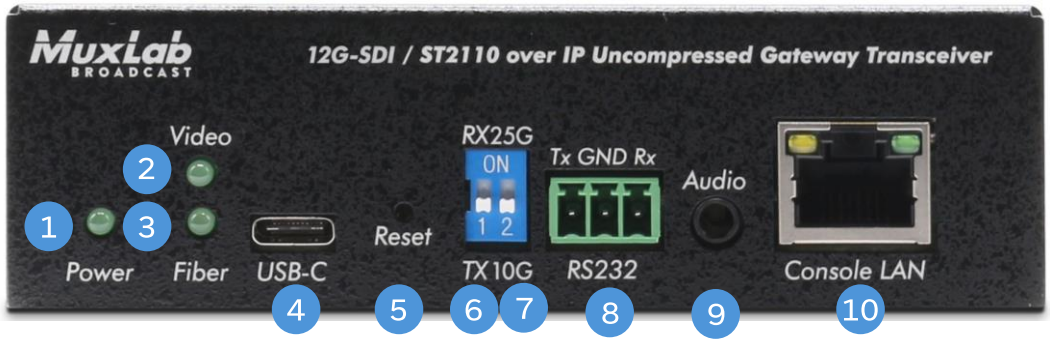
SFP choice: one can use SFPs depending on the following characteristic:

- Network bandwidth: 10G or 25G
- Type and length:
  - Multi-mode (MM) fiber → 100m over 25G network, 300m over 10G network
  - Single-mode (SM) fiber → 10km, 40km, 80km.
  - UTP → 30m over 10G network

4. Hardware Interface

4.1. Panels of the 500775-2110 (SDI)

The following section describes the external ports, LEDs and switches of 500775-2110 Gateway converter.



Front Panel

1. Power LED:
- Off: during booting-up.
- On: boot-up completed.
- Blink: factory reset is triggered.

2. Video LED:
- On: SDI signal is present (Tx mode) / media packets are present (Rx mode)
- Off: SDI signal is not present (Tx mode) / media packets are not present (Rx mode)

3. Fiber LED:
- On: one or both media network is connected.
- Off: both media networks are disconnected.

4. USB-C port: for future use.

5. Reset Button: For resetting the unit, press button using a pin. To perform factory reset, press and hold for more than 6 seconds until power Led is flashing.

6. Switch RX/TX:
- Down position for Transmitter mode (TX).
- Up position for Receiver mode (RX).

7. Switch 10G/25G:
- Down position for 10Gbps Media networks (Media ports 1 & 2).
- Up position for 25Gbps Media networks (Media ports 1 & 2).

8. RS232 port: for future use.

9. Audio port: for future use.

10. Console LAN port: Ethernet 1G port used for management/control purpose.

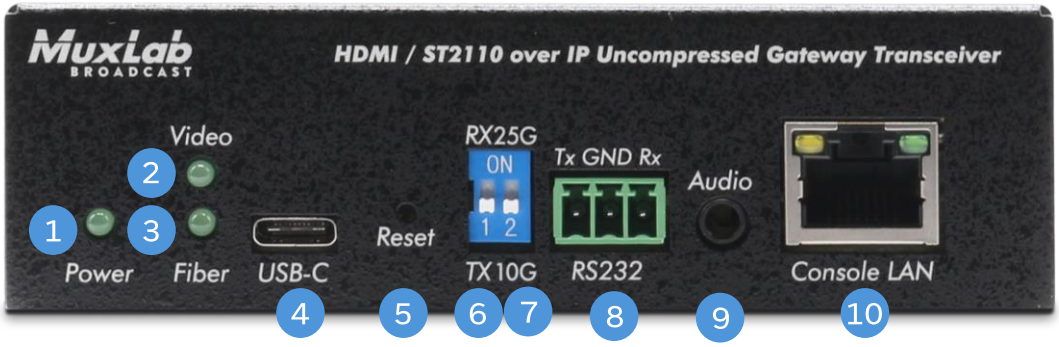
Rear Panel

(Media ports are shown with the SFPs, which are not included with the product)

11. 12VDC: locking DC power connector.
12. SFP cages for media ports: data/management. Ethernet 25Gbps or 10Gbps.
13. SDI in: input SDI signal coming from source device (used in Transmitter mode).
14. SDI out: output SDI signal going to end device (used in Receiver mode).

4.2. Panels of the 500794-2110 (HDMI)

The following section describes the external ports, LEDs and switches of 500794-2110 Gateway converter.



Front Panel

1. Power LED:
- Off: during booting-up.
- On: boot-up completed.
- Blink: factory reset is triggered.

2. Video LED:
- On: HDMI signal is present (Tx mode) / media packets are present (Rx mode)
- Off: HDMI signal is not present (Tx mode) / media packets are not present (Rx mode)

3. Fiber LED:
- On: one or both media network is connected.
- Off: both media networks are not connected.

4. USB-C port: for future use.

5. Reset Button: For resetting the unit, press button using a pin. To perform factory reset, press and hold for more than 6 seconds until power Led is flashing.

6. Switch RX/TX:
- Down position for Transmitter mode (TX).
- Up position for Receiver mode (RX).

7. Switch 10G/25G:
- Down position for 10Gbps Media networks (Media ports 1 & 2).
- Up position for 25Gbps Media networks (Media ports 1 & 2).

8. RS232 port: for future use.

9. Audio port: for future use.

10. Console LAN port: Ethernet 1G port used for management/control purpose.

Rear Panel

(media ports are shown with the SFPs, which are not included with the product)

11. 12VDC: locking DC power connector.
12. SFP cages for media ports: data/management. Ethernet 25Gbps or 10Gbps.
13. HDMI in: input HDMI signal coming from source device (used in Transmitter mode).
14. HDMI out: output HDMI signal going to end device (used in Receiver mode).

5. Getting Started

The gateway converter can be managed through its Web interface and API. The system supports the ST-2110 protocol, and ST-2022-7 Redundancy for critical applications. This section describes how to set up the 500775-2110 or 500794-2110 parameters using both the Web interface and the API.

5.1. Configuring the transceiver as Transmitter or Receiver

This section describes how to configure the unit as a Transmitter using the Web interface.

Since this device is a Transceiver, it may be set as a Transmitter (TX) or Receiver (RX). To set the unit as a Transmitter, set Dip Switch Pin #1 to the DOWN position, and power cycle the unit. To set the unit as a Receiver, set Dip Switch Pin #1 to the UP position, and power cycle the unit. The Dip Switch is located on the front panel as shown below.

5.2. Configuring Network type as 25G or 10G

This section describes how to configure Network bandwidth on Media Ports 1 and 2.

The 500775-2110 and 500794-2110 units can be used over 25Gbps network or 10Gbps network depending on your network environment. To set media 1 and media 2 network to be 25Gbps, set Dip Switch Pin #2 to the UP position, and power cycle the unit. To set media 1 and media 2 network to be 10Gbps, set Dip Switch Pin #2 to the DOWN position, and power cycle the unit. The Dip Switch is located on the front panel as shown below.

Note: Over 10Gbps network, video resolution is limited to 4K/30 fps. 4K/60 fps cannot be achieved

5.3. Web User Interface

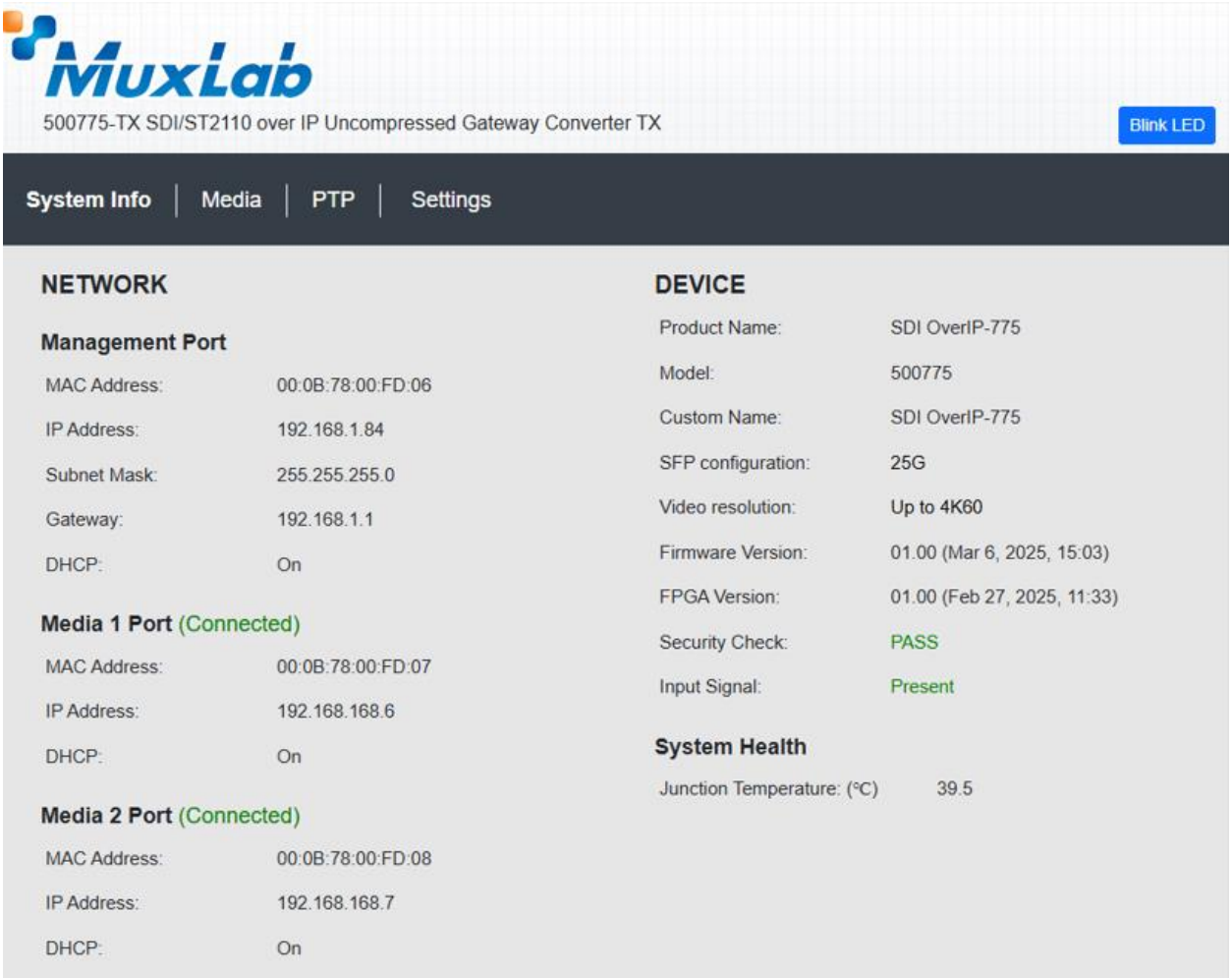
Configuring the Transceiver from the Web interface requires a TCP/IP connection from the 1G Ethernet port (Console LAN) to your network. The 1G Ethernet port default IP address is set to DHCP. If no DHCP is available on your network, the IP address is 192.168.168.64/24 on unit set as Transmitter, or 192.168.168.67/24 on unit set as Receiver.

To be able to log in to the 500775-2110/500794-2110 Web interface, your computer must be in the same subnet.

5.4. Transmitter (TX) Web pages

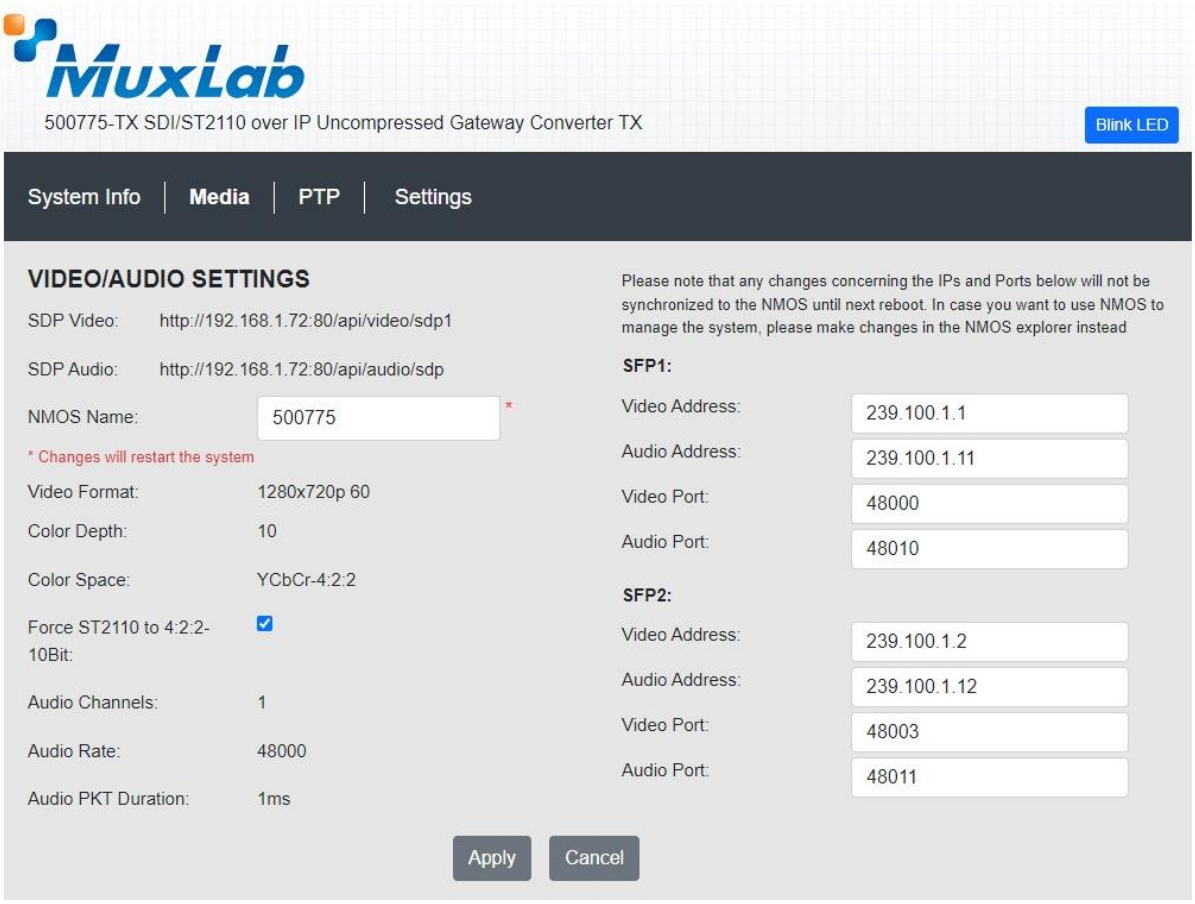
5.4.1. Transmitter System Info Page

The System Info page displays general product information such model number, firmware and FPGA version, MAC and IP address, etc.



5.4.2. Media page

To show the information of the Transmitter, you may open a Web browser and type its IP address. Once connected, the Media page opens. This page contains both the video and audio settings. See example below:



Clicking on the Apply button will allow you to submit the new changes while clicking on Cancel will discard any changes.

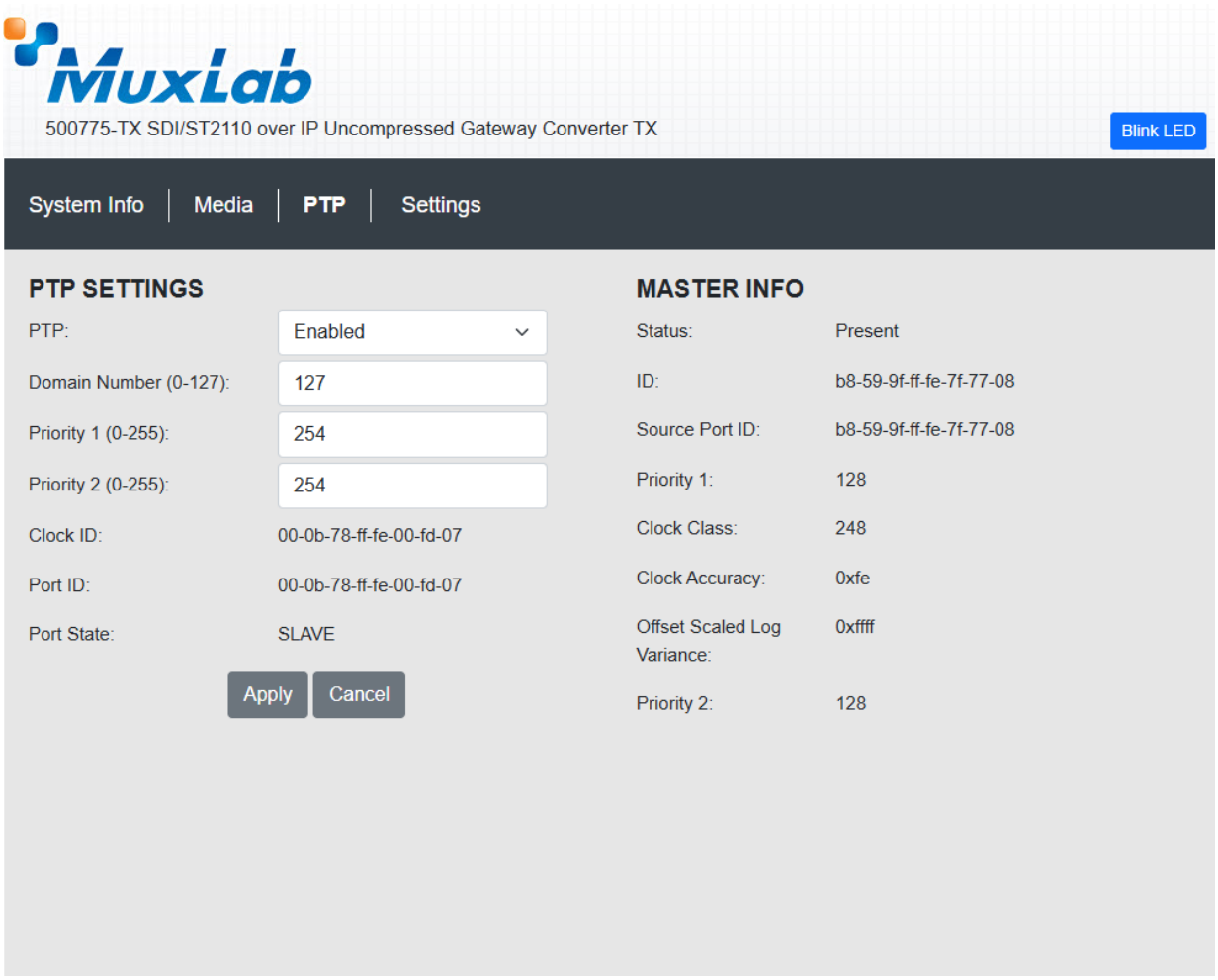
The following table describes the Media settings:

Settings	Description
SDP Video	SDP File for Video
SDP Audio	SDP File for Audio
NMOS Name	NMOS Host Name
Video Format	Detected video resolution
Color Depth	Detected color depth
Color Space	Detected color space
Audio Channels	Number of audio channels detected
Audio Rate	Detected audio rate
Audio PKT Duration	Audio packet size detected

Settings	Description
Video Address	Destination Multicast address for video
Audio Address	Destination Multicast address for audio
Video port	Destination Port number for video
Audio port	Destination Port number for audio

5.4.3. Transmitter PTP Page

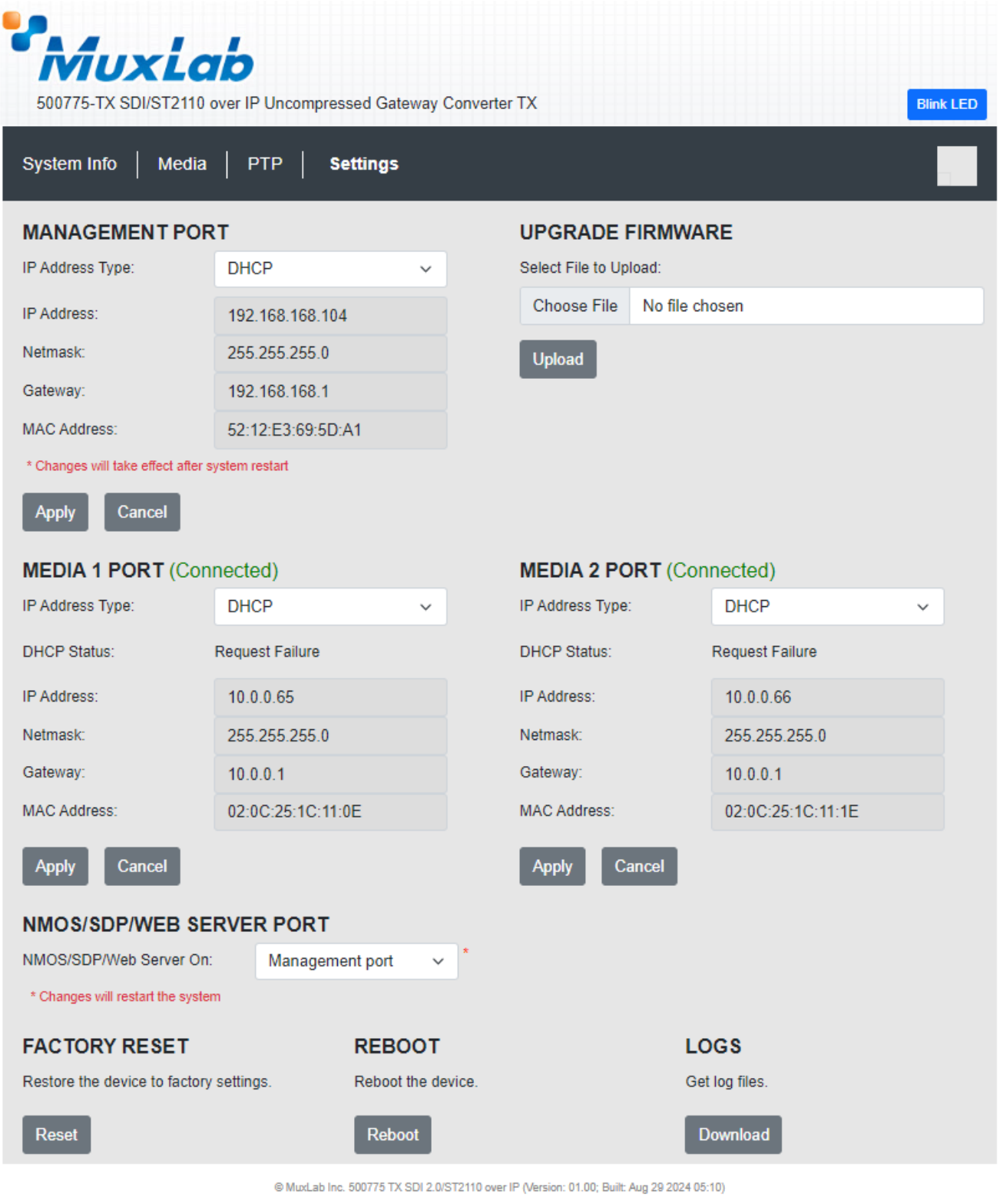
The PTP page displays information about Precise Time Protocol.



5.4.4. Transmitter Settings Page

The Settings page allows the user to configure networks. Additionally, you may load the factory configuration by clicking on the Reset button while the Reboot button will reboot the unit. **Note that performing a Reset will overwrite the unit settings and reset them to their factory default, while performing a Reboot will interrupt any active connection.**

On this page, you may also find interface to upgrade the firmware if necessary. For details, go to this section Firmware Upgrade.



Network Settings (Transmitter)

The user may set the network parameters of the 500775-2110 TX or 500794-2110 TX - including enabling or disabling DHCP, setting a static IP Address, Netmask Address, and Gateway Address - and then press on “Apply”.

The unit Transmitter default IP addresses are set to DHCP. If no DHCP server is available on your network the TX will default to the following static IP Addresses:

- 1G Management/Control port (Console LAN): 192.168.168.64/24
- Media/Data 1 port (Media 1): 10.0.0.65/24
- Media/Data 2 port (Media 2): 10.0.0.66/24

Note: If the user changes the static IP addresses from their default values, then the user defined static IP Addresses will be used when do DHCP server is present. However, if the unit is Factory Reset then the default static IP Addresses above will apply.

Important restriction: the management port should not be in the same network subnet as Media 1 & Media 2 networks, otherwise the WebUI is no longer accessible.
Please note that the unit is protected for manual modification: if the user tries to set IP address manually on the WebUI, the modification will fail if they are in the same network section as for Media ports. But, the unit is not protected when connecting the management port and Media ports to the same Ethernet Switch with DHCP ON. In this case the three ports will get their IP addresses in the same network subnet, and network access will therefore be denied.
If such situation happens, please perform one of the actions below to access again to the board networks.
1) Disconnect the two SFPs on Media ports and reboot with power cycle.
2) If the action above doesn't help, do a factory reset: using a pin, press and hold the reset button on the unit's front panel for 6 seconds until power LED is flashing.

Factory Reset

The user may perform a factory reset, by pressing on the WebUI "Reset" button. This will return the unit to the original MuxLab factory settings, and all user settings and data will be lost. Allow the process to be completed without interruption.

Reboot

The user may reboot the unit (equivalent to a power cycle), by pressing on the WebUI "Reboot" button. This will temporarily interrupt normal operation and the unit connection. Allow the process to be completed without interruption.

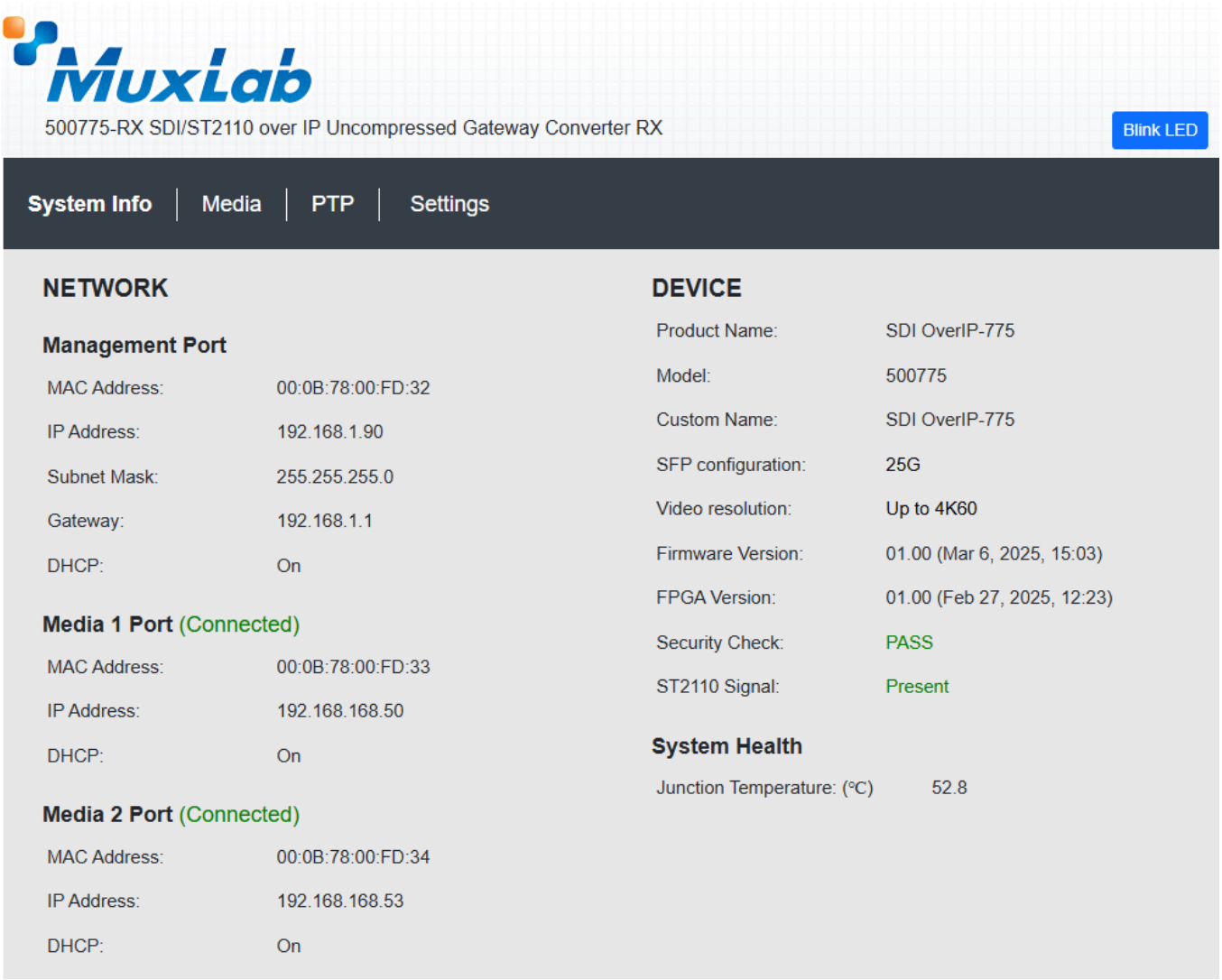
Logs

The user may get logs for his unit by pressing on the "Download" button. This may help identify the source of a possible issue you may be having, or to simply get info on the unit operation.

5.5. Receiver (RX) Web pages

5.5.1. Receiver System Info Page

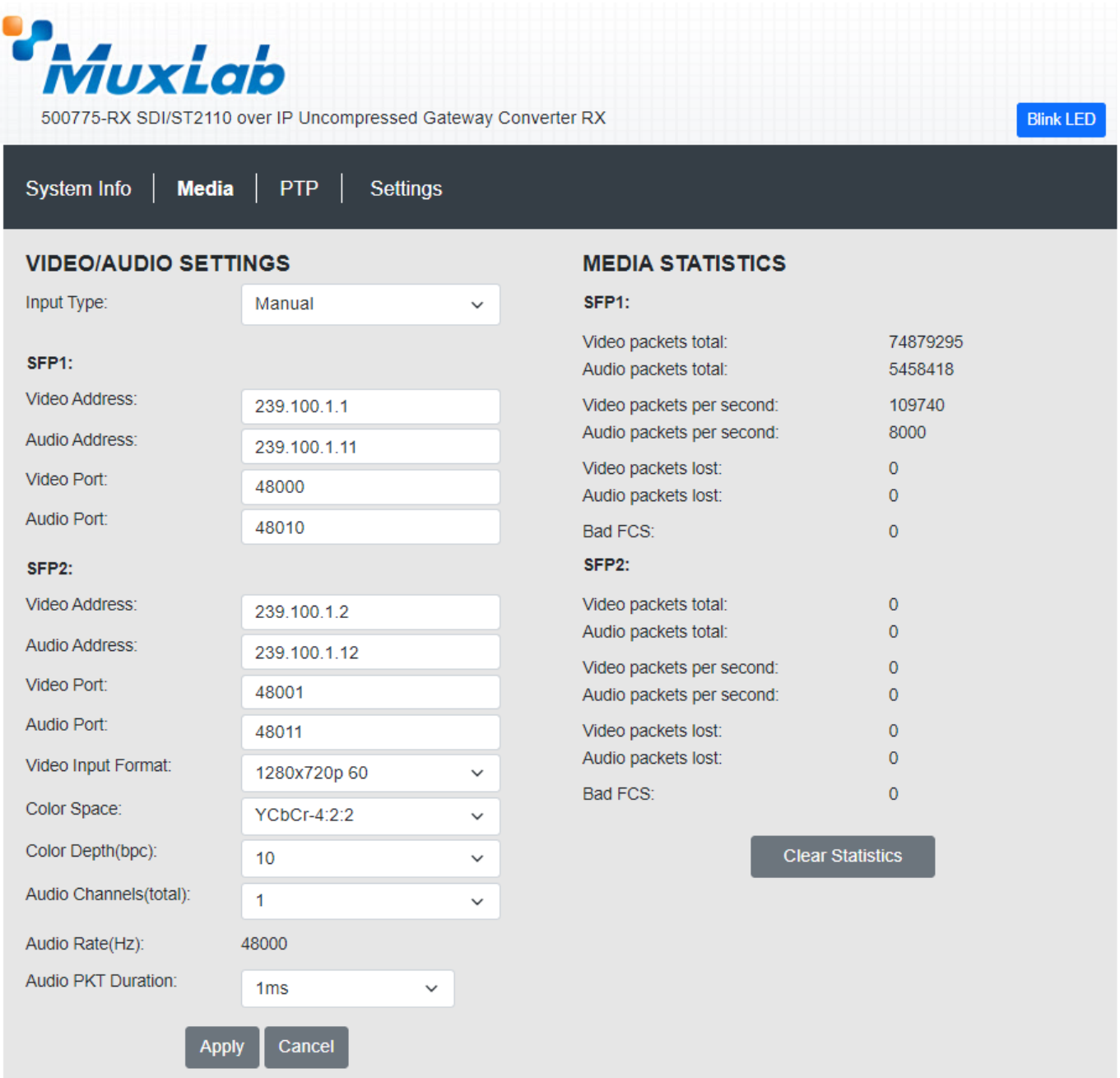
The System Info page of the Receiver unit displays information such model number, firmware and FPGA version, MAC and IP address, etc.



5.5.2. Receiver Media page

To show the information of the Receiver unit, you may open a Web browser and type its IP address. Once connected, the Media page appears. This page contains the main settings to properly receive audio and video data signals from the Transmitter unit. There are four different ways of configuring the unit: Manual, SDP and NMOS or via the custom RestAPI.

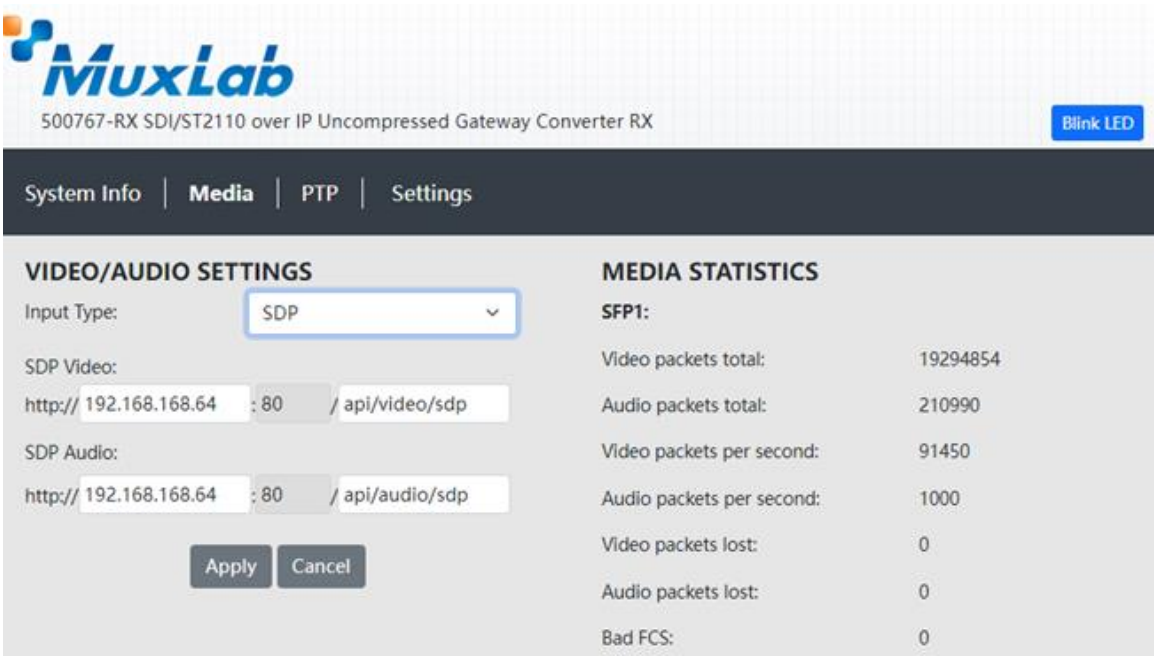
In order to use the RestAPI, select “Manual” input type, and refer to this section. The following example shows settings for Manual input type.



The following table describes the Media settings:

Settings	Description
Input type	• Manual: Audio, video and ANC data settings values are entered manually on the web page or via RestAPI commands. • SDP: File containing Audio, video and ANC data information. • NMOS: protocol that allows discovery, control and monitoring of the devices
Video Address	RX unit's multicast address for video
Audio Address	RX unit's multicast address for audio
Video port	Port number for video
Audio port	Port number for audio
Video Input Format	Force the RX to specific Video resolution
Color Space	Force the RX to specific color space value [YCbCr4:2:2, YCbCr4:4:4 and RGB]
Color Depth(bpc)	Force the RX to specific color depth value [8,10,12 and 16]
Audio Channels	Force the RX to specific number of audio channels [2,4, 8,12 and 16]
Audio Rate	Force the RX to specific audio rate [48000]
Audio PKT Duration	Force the RX to specific audio packet size [125us and 1ms]

SDP input type settings are shown here:

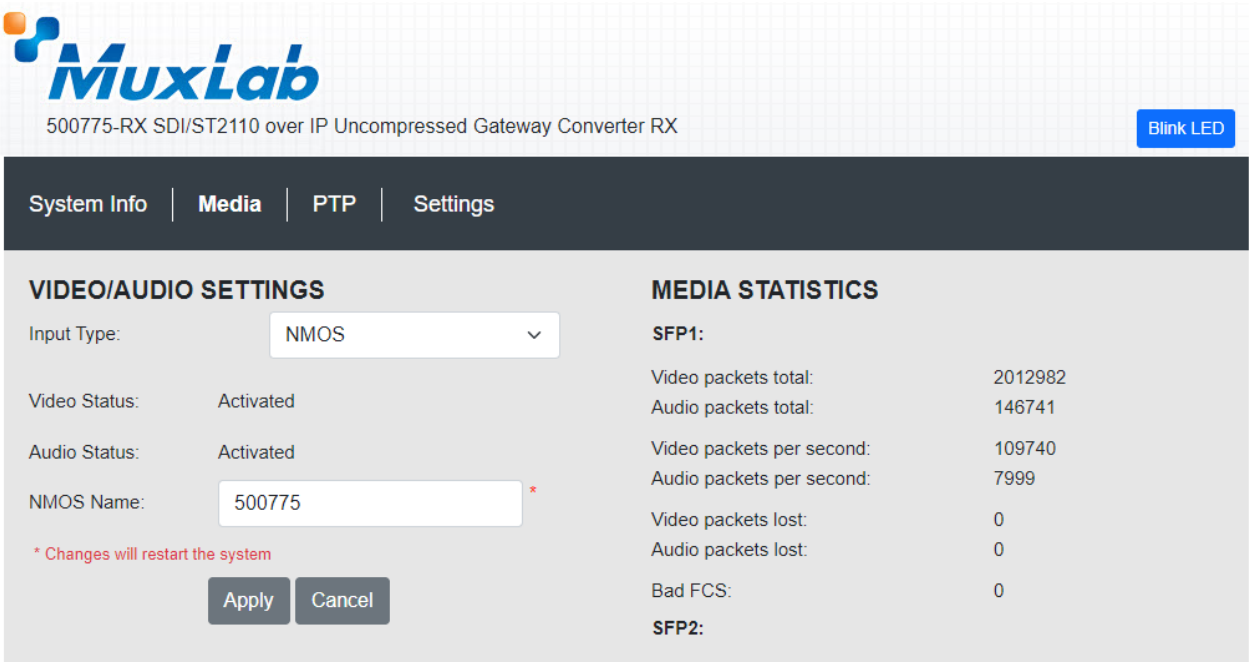


The following table describes the Media settings:

Settings	Description
Input type	• Manual: Audio, video and ANC data settings values are entered manually on the web page or via RestAPI commands.

	• SDP: File containing Audio, video and ANC data information. • NMOS: protocol that allows discovery, control and monitoring of the devices
SDP Video	SDP file for video
SDP Audio	SDP file for audio

NMOS input type setting is shown here:



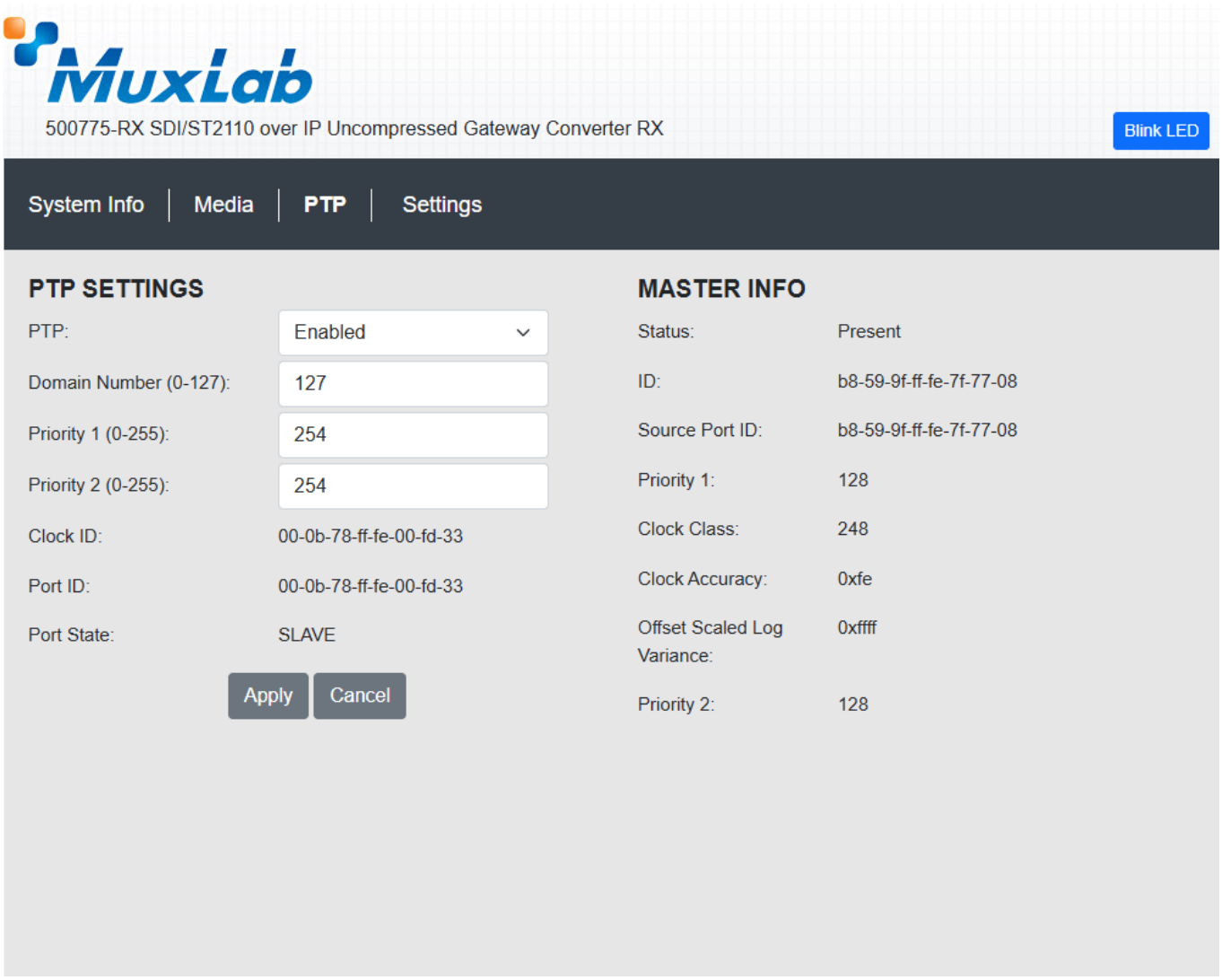
User can use any NMOS compatible controller over the network and then discover, control and configure the unit.

The following table describes the Media settings:

Settings	**Description**
Input type	• Manual: Audio, video and ANC data settings values are entered manually on the web page or via RestAPI commands. • SDP: File containing Audio, video and ANC data information. • NMOS: protocol that allows discovery, control and monitoring of the devices
NMOS name	Unit's name used by the NMOS discovery system

5.5.3. Receiver PTP Page

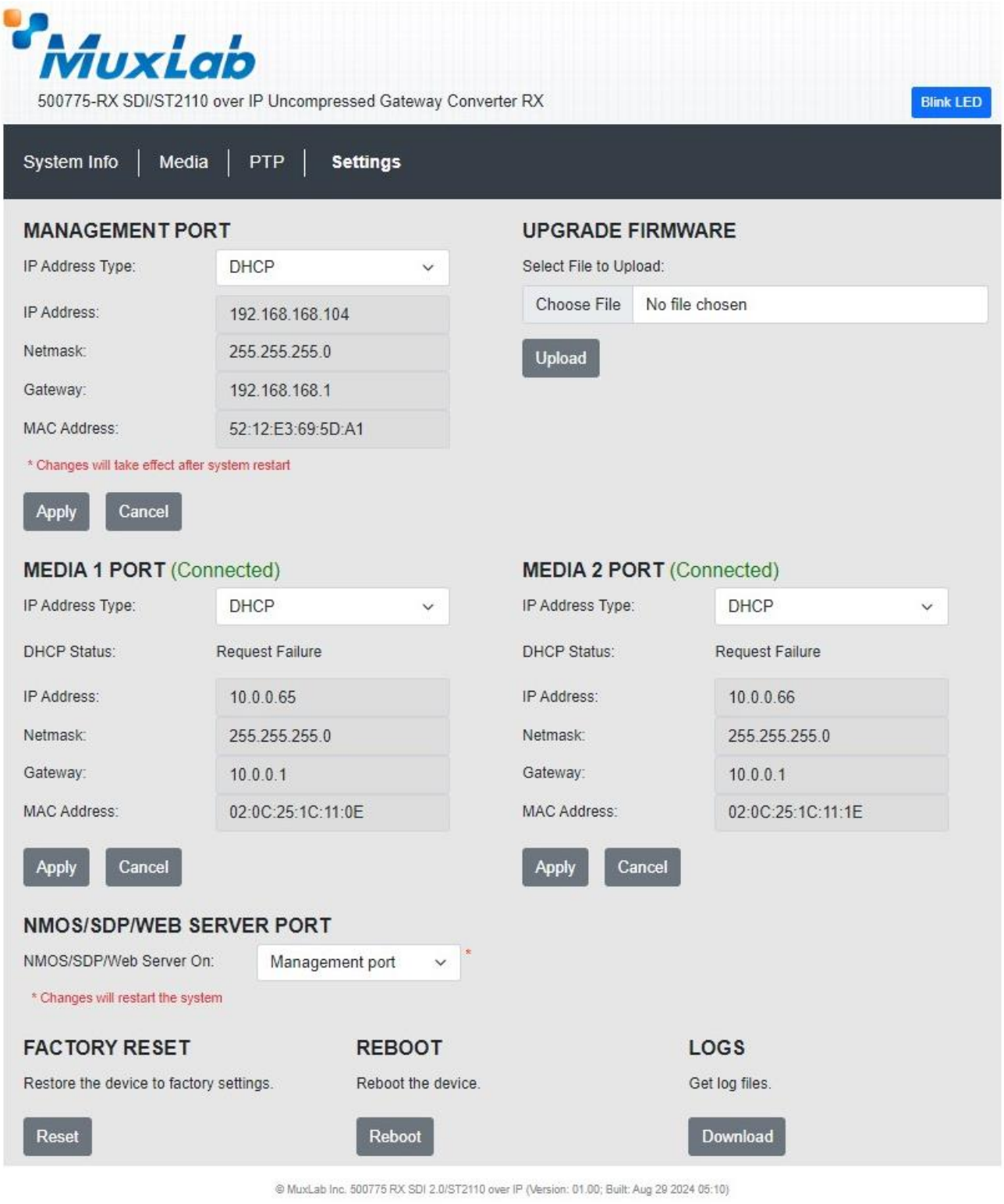
The PTP page displays information about Precise Time Protocol.



5.5.4. Receiver Settings Page

The Settings page allows the user to configure networks. Additionally, you may load the factory configuration by clicking on the Reset button while the Reboot button will reboot the unit. Note that performing a Reset will overwrite the unit settings and reset them to their factory default, while performing a Reboot will interrupt any active connection.

On this page, you may also find an interface to upgrade the firmware if necessary. For details, go to this section Firmware Upgrade



Network Settings (Receiver)

The user may set the network parameters of the 500775-2110 RX or 500794-2110 RX - including enabling or disabling DHCP, setting a static IP Address, Netmask Address, and Gateway Address - and then press on “Apply”.

The RX unit's default IP addresses are set to DHCP. If no DHCP server is available on your network the RX will default to the following static IP Addresses:

- 1G Management/Control port (Console LAN): 192.168.168.67/24
- Media/Data 1 port (Media 1): 10.0.0.68/24
- Media/Data 2 port (Media 2): 10.0.0.69/24

Note: If the user changes the static IP addresses from their default values, then the user defined static IP Addresses will be used when do DHCP server is present. However, if the unit is Factory Reset then the default static IP Addresses above will apply.

Important restriction: the management port should not be in the same network section as Media 1 & Media 2 networks, otherwise the WebUI is no longer accessible.
Please note that the unit is protected for manual modification: if the user tries to set IP address manually on the WebUI, the modification will fail if they are in the same network section as for Media ports. But, the unit is not protected when connecting the management port and Media ports to the same Ethernet Switch with DHCP ON. In this case the three ports will get their IP addresses in the same network section, and network access will therefore be denied.
If such situation happens, please perform one of the actions below to access again to the board network.
1) disconnect the two SFPs on Media ports and reboot
2) if the action above doesn't help, do a factory reset: using a pin, press and hold the reset button on the unit's front panel for few seconds until power Led is flashing.

Factory Reset

The user may perform a factory reset, by pressing on the WebUI "Reset" button. This will return the unit to the original MuxLab factory settings, and all user settings and data will be lost. Allow the process to be completed without interruption.

Reboot

The user may reboot the unit (equivalent to a power cycle), by pressing on the WebUI "Reboot" button. This will temporarily interrupt normal operation and the unit connection. Allow the process to be completed without interruption.

Logs

The user may get logs for his unit by pressing on the "Download" button. This may help identify the source of a possible issue you may be having, or to simply get info on the unit operation.

6. Managing the unit whit API

In addition to the Web interface, the 500775/500794 can also be managed through NMOS and RestAPI management platforms.

6.1. NMOS

The transceiver supports NMOS IS-04 (for unit discovery) and IS-05 (for unit connectivity management). NMOS is supported via the unit control port, which by default is the 1G Ethernet port (labelled as: Console LAN). Note that control can also be transferred to one of the media ports (labelled as: Media 1 or Media 2) via the web interface if required.

Prior to interfacing with any NMOS control software, please go to the Receiver web interface, and navigate to the Input Type field under the Media tab, and select NMOS from the pull-down menu. You can then make use of an NMOS control software (please refer to the NMOS control software operation manual for further details on this software). Note that the NMOS control software should be on the same network segment as the control port mentioned above.

6.2. RestAPI

Using RestAPI is intended for users with a programing background.

The RestAPI commands can be accessed directly from a browser by entering the IP Address and RestAPI command as follows:

- [unit IP Address]/api/[RestAPI Command]
- Enter [unit IP Address]/api/ to obtain a list of RestAPI Commands

Method	URL	Description	Range
GET	/api/	Get a list of api	N/A
GET	/api/system	Get a list of system	N/A
GET	/api/video	Get a list of video	N/A
GET	/api/audio	Get a list of audio	N/A
GET	/api/sdp	Get a list of sdp	N/A
GET	/api/ptp	Get a list of ptp	N/A
POST	/api/system/name	Update the unit's name	Maximum 31 characters
POST	/api/system/ctrl_isDhcp	Update DHCP/Static IP assignment of management port IP	0 : static 1 : DHCP
POST	/api/system/ctrl_ip	Update management port IP	A valid IP address (only applicable in static mode)

POST	/api/system/ctrl_mask	Update management port netmask	A valid netmask (only applicable in static mode)
POST	/api/system/ctrl_gateway	Update management port gateway	A valid gateway (only applicable in static mode)
POST	/api/system/sfp1_isDhcp	Update DHCP/Static IP assignment of media port 1's IP	0 : Static 1 : DHCP
POST	/api/system/sfp1_ip	Update media port 1's IP	A valid IP address (only applicable in static mode)
POST	/api/system/sfp1_mask	Update media port 1's netmask	A valid netmask (only applicable in static mode)
POST	/api/system/sfp1_gateway	Update media port 1's gateway	A valid gateway (only applicable in static mode)
POST	/api/system/sfp2_isDhcp	Update DHCP/Static IP assignment of media port 2's IP	0 : Static 1 : DHCP
POST	/api/system/sfp2_ip	Update media port 2's IP	A valid IP address (only applicable in static mode)
POST	/api/system/sfp2_mask	Update media port 2's netmask	A valid netmask (only applicable in static mode)
POST	/api/system/sfp2_gateway	Update media port 2's gateway	A valid gateway (only applicable in static mode)
POST	/api/system/reset	Perform the factory reset, all custom defined data will be deleted	1
POST	/api/system/reboot	Perform the system reboot	1
POST	/api/system/blinkLed	Blink the led	1
POST	/api/system/mediaMode	The option to update the	Manual: configure

		media parameters (Rx only)	manually SDP: fetch SDP from TX and configure automatically NMOS: configure by NMOS
POST	/api/system/forceStream	Force ST2110 to 4:2:2-10Bit (Tx only)	0: disable 1: enable
POST	/api/system/videoStatus	Turn off/on video output to network (Tx)/SDI(Rx)	0: off 1: on
POST	/api/system/audioStatus	Turn off/on audio output to network (Tx)/SDI(Rx)	0: off 1: on
POST	/api/system/patternGenerator	Generate pattern image instead of SDI source (Tx only)	0: off 1: on
POST	/api/system/nmosName	Update Unit's name used for NMOS device discovery	Maximum 31 characters
POST	/api/system/nmosOnNetwork	Update the network on which the NMOS service is running	0: management 1: media 1 2: media 2
POST	/api/system/ptpOnNetwork	Update the network on which PTP service is running	0: management 1: media 1 2: media 2
POST	/api/video/dest_port1	Update video destination port on media 1(note that the local port on media 1 will be synchronized automatically)	1024~65535
POST	/api/video/dest_ip1	Update video destination IP on media 1	A valid IP address
POST	/api/video/dest_port2	Update video destination port on media 2(note that the	1024~65535

		local port on media 2 will be synchronized automatically)	
POST	/api/video/dest_ip2	Update video destination IP on media 2	A valid IP address
POST	/api/video/sdp	Update the source of SDP data (Rx only)	A valid URL
POST	/api/video/height	Update the video output height (Rx only and mediaMode =Manual only)	See supported combinations in appendix
POST	/api/video/width	Update the video output width (Rx only and mediaMode=Manual only)	See supported combinations in appendix
POST	/api/video/fps	Update the video output frame rate (Rx only and mediaMode=Manual only)	See supported combinations in appendix
POST	/api/video/intlce	Update the video scan mode (Rx only and mediaMode=Manual only)	0: interlaced mode 1: progressive mode
POST	/api/video/depth	Update the video output color depth (Rx only and mediaMode=Manual only)	8, 10, 12
POST	/api/audio/dest_port1	Update audio destination port on media 1(note that the local port on media 1 will be synchronized automatically)	1024~65535
POST	/api/audio/dest_ip1	Update audio destination IP on media 1	A valid IP address
POST	/api/audio/dest_port2	Update audio destination port on media 2(note that the local port on media 2	1024~65535

		will be synchronized automatically)	
POST	/api/audio/dest_ip2	Update audio destination IP on media 2	A valid IP address
POST	/api/audio/channels	Update the number of audio channel (Rx only and mediaMode=Manual only)	1~16
POST	/api/audio/pktSize	Update the audio packet size	Tx: 125us, 1ms(audio channel <=8) Rx(mediaMode=Manual only): 125us, 1ms
POST	/api/sdp/{"media": "video", "ip": "192.168.168.64", "port": 80, "uri": "api/video/sdp"}	Update the video source's SDP url (Rx only and mediaMode=SDP only)	
POST	/api/sdp/{"media": "audio", "ip": "192.168.168.64", "port": 80, "uri": "api/video/sdp"}	Update the audio source's SDP url (Rx only and mediaMode=SDP only)	
POST	/api/ptp/isEnable	Turn off/on the PTP service	0: off 1: on
POST	/api/ptp/domainNumber	Update the PTP domain number	0~127
POST	/api/ptp/priority1	Update the PTP priority 1	0~255
POST	/api/ptp/priority2	Update the PTP priority 2	0~255
POST	/api/ptp/clearStat	Reset the media packet statistics (Rx only)	1

Width	Height	Frame rate	Interlaced mode
3840	2160	60	Progressive
3840	2160	59.94	Progressive
3840	2160	50	Progressive
3840	2160	30	Progressive
3840	2160	29.97	Progressive
3840	2160	25	Progressive
3840	2160	24	Progressive
3840	2160	23.98	Progressive
1920	1080	60	Progressive
1920	1080	59.94	Progressive
1920	1080	50	Progressive
1920	1080	30	Progressive
1920	1080	29.97	Progressive
1920	1080	25	Progressive
1920	1080	24	Progressive
1920	1080	23.98	Progressive
1920	1080	60	Interlaced
1920	1080	59.94	Interlaced
1920	1080	50	Interlaced
1280	720	60	Progressive
1280	720	59.94	Progressive
1280	720	50	Progressive
1280	720	30	Progressive
1280	720	29.97	Progressive
1280	720	25	Progressive
1280	720	24	Progressive
1280	720	23.98	Progressive

7. Firmware upgrade

The 500775-2110/500794-2110 unit comes with the firmware pre-installed, please check the MuxLab Web site to verify if a newer version is available. You may go to our support software/firmware page of our Web site to download the required files: https://muxlab.com/software-firmware-downloads

Important Note: Use the 1G Port (port: Console LAN) to upgrade the unit Firmware.

The unit has a System-on-Chip that contains both an FPGA and MCU (Micro-Controller Unit), and each has its own firmware. The user may upgrade the FPGA and MCU firmware from this page as follows:

1. Download the upgrade 500775-2110(12G-SDI) or 500794-2110(HDMI2.0) firmware file (which includes the FPGA and MCU code) from the MuxLab website, found under the Support Software/Firmware page.

2. Go to the Setting page on the unit Web interface.

3. In the Upgrade Firmware section press on the “Browse” button and locate and select the file you downloaded and click on the “Chose File” button. It may take 3 minutes or more to install the new version. Allow the process to be completed without interruption.

8. Frequently Asked Questions

The following FAQ section provides answers to the most frequent questions you may have regarding using the 500775-2110/500794-2110.

What are the default IP addresses of the transceiver?

By default, the unit is configured in DHCP mode. If no DHCP server is available, the unit will fall back to its default static IP address:

As a Transmitter,

Console LAN port:	192.168.168.64/255.255.255.0
Media 1 port:	10.0.0.65/255.255.255.0
Media 2 port:	10.0.0.66/255.255.255.0

As a Receiver,

Console LAN port:	192.168.168.67/255.255.255.0
Media 1 port:	10.0.0.68/255.255.255.0
Media 2 port:	10.0.0.69/255.255.255.0

How to find the unit IP addresses?

You can check the unit's IP addresses by using either Bonjour Protocol, Advanced IP Scanner or going to your network switch Web interface.

Why cannot I connect to the transceiver GUI?

Ensure that your computer is on the same subnet. For instance, if the TX's IP address is 192.168.168.64/255.255.255.0 your computer must be configured as follows: 192.168.168.x/255.255.255.0, where x may be 70 or something similar.

Management port is not accessible

The management port should not be in the same network subnet as Media 1 & Media 2 networks, otherwise the WebUI is no longer accessible.
Please note that the unit is protected for manual modification: if the user tries to set IP address manually on the WebUI, the modification will fail if they are in the same network subnet as for Media ports. But, the unit is not protected when connecting the management port and Media ports to the same Ethernet Switch with DHCP ON. In this case the three ports will get their IP addresses in the same network subnet, and network access will therefore be denied.
If such situation happens, please perform one of the actions below to access again to the board networks.
1) disconnect the two SFPs on Media ports and reboot with power cycle.
2) if the action above doesn't help, do a factory reset: using a pin, press and hold the reset button on the unit's front panel for few seconds until power Led is flashing.

Why is the Receiver not displaying video?

First, ensure your video source is valid. If using manual configuration, make sure the Multicast addresses for both audio and video match the ones from the TX. Second, validate your network supports multicast. Double check your wiring as well as fiber cable type (single mode or multimode).

Why 4K60 resolution is not working but 4K30 and below are working?

To use 4K60, your network infrastructure MUST be 25Gbps. Note that when using 10Gbps network, maximum resolution is 4K30. Please make sure following:

- your unit is configured to 25Gbps bandwidth (dip switch)
- your network infrastructure is 25Gbps bandwidth, including your Ethernet Switch and the second end device
- you use 25G compatible SFPs on the unit and on the Ethernet Switch

What is SDP?

SDP stands for Session Description Protocol which describes the parameters for both audio and video.

I am using SDP input type, but the Receiver does not display video.

Ensure you are entering the right information for each field. Please refer to section 5.4 for details on the TX SDP file.

The 500775-2110/500794-2110 Receiver does not display video from another ST2110 manufacturer.

Check media parameters and ensure you are entering the right SDP information if using this input type. If it is still not working, email the SDP file to MuxLab support.

Can I use SFPs other than the MuxLab one?

You can use other brands of SFP but if they are not qualified by MuxLab, we cannot guarantee compatibility. For now, only MuxLab's SFPs (10G/25G) have been proved compatible with the unit. If you want to use SFPs which are not MuxLab ones, it may not work at all. Especially for 25Gbps networks because those SFPs have different configurations depending on the manufacturer.

If the above does not help you to find a solution to the issue you are experiencing, please contact MuxLab Technical Support at 877-689-5228 (toll free in North America) or (+1) 514-905-0588 (International) or email info@muxlab.com. Please have the following information ready:

- Unit model number.
- Cabling layout. Please include the model of the SDI/HDMI source and sink devices, cable length and type (e.g.: 100m of Multimode fiber optic, etc.).
- Description of problem.
- List of tests performed.

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