



# CH-331H-TX

HDMI over IP Transmitter



## Operation Manual



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## SAFETY PRECAUTIONS

Please read all instructions before attempting to unpack, install or operate this equipment and before connecting the power supply. Please keep the following in mind as you unpack and install this equipment:

- Always follow basic safety precautions to reduce the risk of fire, electrical shock and injury to persons.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture or install this product near water.
- Never spill liquid of any kind on or into this product.
- Never push an object of any kind into this product through any openings or empty slots in the unit, as you may damage parts inside the unit.
- Do not attach the power supply cabling to building surfaces.
- Use only the supplied power supply unit (PSU). Do not use the PSU if it is damaged.
- Do not allow anything to rest on the power cabling or allow any weight to be placed upon it or any person walk on it.
- To protect the unit from overheating, do not block any vents or openings in the unit housing that provide ventilation and allow for sufficient space for air to circulate around the unit.
- Please completely disconnect the power when the unit is not in use to avoid wasting electricity.

## VERSION HISTORY

REV.	DATE	SUMMARY OF CHANGE
VS1	2019/01/28	Final technical review
VS2	2019/01/31	Updated Section 1, 5



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## 1. INTRODUCTION

This unit is an HDMI over IP Transmitter that allows you to extend HDMI signals using the TCP/IP protocol over regular Cat.5e network cable. This extender supports the transmission of High-Definition signals (up to 1080p@60Hz) with audio up to 100m on a single cable. The transmission distance can be further extended (up to 100m per segment) by using Gigabit Ethernet network switches, allowing the user to cascade the system without signal loss or introducing delay. This Transmitter also features bi-directional IR and RS-232 pass-through. It is also possible for this Transmitter to operate in multicast mode, allowing you to send a single AV signal to a large number of Receivers within the same local network with no additional bandwidth cost. Additionally, that same multicast signal can be used to create large multi-display video walls with amazing simplicity.

This Video over IP system is perfect for both residential and commercial installation environments. Configuration information is provided via the On-Screen Display (OSD) on connected (but unlinked) Receivers and control is via WebGUI, Telnet, or the AV over IP Master Controller.

## 2. APPLICATIONS

- HDMI, IR, and RS-232 extension
- Hotel or convention center display multi-monitor broadcast
- Long distance data and video transmission via cascading
- Distributed video matrix system
- Distributed video wall system

## 3. PACKAGE CONTENTS

- 1×HDMI over IP Transmitter
- 1×5V/2.6A DC Power Adapter
- 1×3.5mm to IR Extender Cable
- 1×3.5mm to IR Blaster Cable
- 1×3.5mm to DE-9 Female Adapter Cable
- 1×Shockproof Feet (Set of 4)
- 1×Operation Manual

## 4. SYSTEM REQUIREMENTS

- HDMI source equipment such as a media player, video game console, PC or set-top box.
- A compatible HDMI over IP Receiver is required.
- A Gigabit Ethernet network switch with jumbo frame support is required for multi-endpoint extension. (8K jumbo frames are strongly recommended.)
- A Gigabit Ethernet switch with “IGMP snooping” enabled is required for multicast support.
- A managed Gigabit Ethernet switch with VLAN support is strongly recommended.

### *Special Notes:*

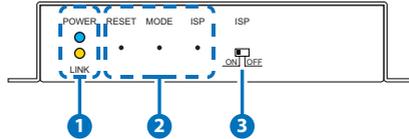
- *Most consumer-grade routers are not able to handle the high traffic rates generated by multicast mode, so using one as your VoIP network switch is discouraged.*
- *Avoid mixing regular network traffic with VoIP traffic. If physically separating the network is not possible, VoIP traffic should reside within its own subnet or VLAN.*

## 5. FEATURES

- HDMI 1.4 and DVI 1.0 compliant
- HDCP 1.4 compliant
- 1 HDMI input
- Video, audio and control transmission over TCP/IP in Unicast (point-to-point) or Multicast (single-to-many) modes
- Multi-monitor video wall support with 180° and 270° rotation options
- HDMI input supports resolutions up to 1080p@60Hz/WUXGA
- Supports pass-through of audio formats including LPCM 2.0/5.1/7.1, Bitstream and HD Bitstream
- Supports IR and RS-232 bypass
- Unit can be controlled via WebGUI, Telnet, and the AV over IP Master Controller

## 6. OPERATION CONTROLS AND FUNCTIONS

### 6.1 Front Panel



**1 POWER LED:** This LED will flash while the unit is powering on and will illuminate solidly once it has finished booting and is ready for use.

**LINK LED:** If the unit has no network connection this LED will not illuminate. While the unit is attempting to establish a connection with a Receiver this LED will flash. When the unit has established a stable connection with a Receiver this LED will illuminate solidly.

**2 RESET Pinhole:** Press this recessed button with a paperclip tip to reboot the unit.

*Note: Settings will not be reset.*

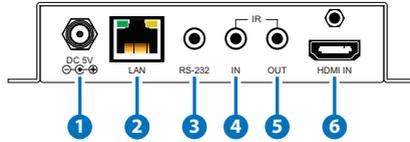
**MODE Pinhole:** Press this recessed button with a paperclip tip momentarily to toggle the video data streaming method between “Graphic” and “Video” modes. “Graphic” mode is optimized for high-detail static displays and “Video” mode is optimized for full motion video.

*Note: Pressing and holding the MODE button while the unit is powered on will perform a full factory reset on the unit. Once the reset is complete, both LEDs will flash rapidly and the unit must then be manually power cycled.*

**ISP Pinhole:** For factory use only.

**3 ISP Switch:** For factory use only. For normal operation, this switch should be set to “OFF”.

## 6.2 Rear Panel



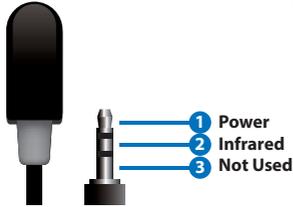
- 1 **DC 5V Port:** Plug the 5V DC power adapter into this port and connect it to an AC wall outlet for power.
- 2 **LAN Port:** Connect to a Gigabit Ethernet switch for signal extension to compatible Receiver(s), and to allow WebGUI/Telnet control.
- 3 **RS-232 Port:** Connect to a PC, laptop, or serial controllable device for the extension of RS-232 signals. The baud rate is configurable, but the default baud rate is 115200.

*Note: When a Transmitter is in multicast mode, every connected Receiver unit will send RS-232 commands to that Transmitter and commands sent from the Transmitter side will be sent to all associated Receivers.*

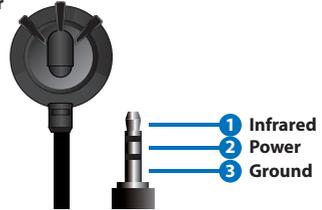
- 4 **IR IN Port:** Connect to an IR Extender to receive IR control signals and extend them to devices connected to a Receiver on the same broadcast channel. Ensure that the remote being used is within direct line-of-sight of the IR Extender.
- 5 **IR OUT Port:** Connect to the provided IR Blaster to transmit IR signals from a Receiver on the same broadcast channel to devices within direct line-of-sight of the IR Blaster.
- 6 **HDMI IN Port:** Connect to HDMI source equipment such as a media player, game console or set-top box.

### 6.3 IR Cable Pinouts

IR Blaster Cable

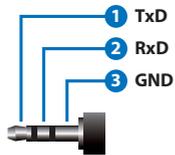


IR Extender Cable



### 6.4 Serial Port Pinout and Defaults

3.5mm to DE-9 Adapter Cable



Serial Port Default Settings	
Baud Rate	115200
Data Bits	8
Parity Bits	None
Stop Bits	1
Flow Control	None

## 6.5 WebGUI Control

- **Accessing the WebGUI**

All major functions of the unit, including status, streaming method, streaming channel selection, output resolution, video wall configuration, EDID management, Ethernet settings, and reset/firmware functions are controllable via multiple tabs in the WebGUI interface allowing for reasonably intuitive operation.

Each Transmitter and Receiver in the system is controlled by its own WebGUI interface which may be accessed by opening a standard web browser on a PC and typing in the IP address of the unit you wish to connect to. If you do not already know the IP addresses of the units in your system, you can discover the IP addresses by disabling the streaming link on the Receiver units in a connected system and connecting an HDMI display to each Receiver. This is done by pressing and holding the "LINK" button on the front of a Receiver for 3 seconds (The LINK light will blink rapidly, then turn off).

Once the link is broken, each connected Receiver will output a 640×480 black screen with OSD text at the bottom identifying its own IP address (Local IP), as well as the IP address of the Transmitter (Remote IP) that shares the same broadcasting channel with it (channel 0 by default). After obtaining the IP address information, press and hold the "LINK" button again for 3 seconds to return the unit to normal operation (The LINK light will light up solid yellow).

```
FW: 15-Nov-10 4298
Local IP: 169.254.9.180
Remote IP: 169.254.11.173
ID: FFFFFFFF
```

Once you have connected to a unit's WebGUI, you will be presented with a screen containing multiple tabs for each functionality area of the unit. To view the contents of a tab, click on the appropriate button at the top of the window. The individual tabs and functions will be introduced in the following sections.



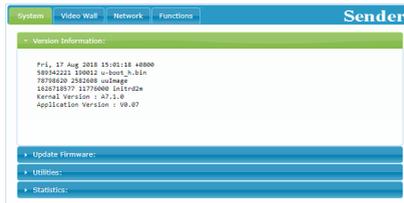
*Note: Video over IP streaming uses a large amount of bandwidth and a Gigabit Ethernet network switch with jumbo frame support and IGMP snooping is required. A managed switch with VLAN support is strongly recommended.*

## 6.5.1 System Tab

The System tab contains four windows that provide access to firmware version information, a firmware update interface, utilities for rebooting and resetting the unit, basic EDID management, Telnet command entry, and a variety of statistics and information about the operational state of the unit.

- **Version Information**

This window displays detailed information about the unit's current firmware version.



- **Update Firmware**

Provides a way to update the unit's firmware.

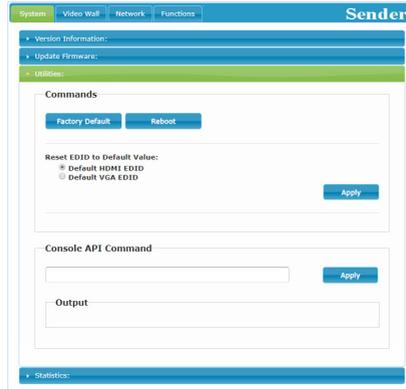


- 1) **Choose File/Upload:** Click "Choose File" to select the firmware update file from the local PC (\*.bin format). After selecting an appropriate file, click the "Upload" button to begin the update process.

*Note: The update process takes several minutes to complete and the unit will automatically reboot as a part of the process. While updating, video output may become unstable.*

- **Utilities**

The Utilities window allows users to reset/reboot the unit, configure the EDID behavior, and send Telnet commands to the unit.



- 1) Factory Default:** Click this button to return the unit to its factory defaults.  
*Note: Networking configuration details will not be reset.*
- 2) Reboot:** Click this button to reboot the unit.
- 3) Reset EDID to Default Value:** If the EDID received from the primary Receiver unit (selected via a checkbox on the preferred Receiver in Multicast mode) has compatibility issues with the connected HDMI source, the internal HDMI EDID (up to 1080p w/audio) can be selected. Please press "Apply" after making the selection.  
*Note: This EDID setting will be reset if the unit is rebooted.*
- 4) Console API Command:** Individual Telnet commands may be sent to the unit by using the "Console API Command" text entry field and pressing "Apply". Any responses from the unit will be displayed in the "Output" field.

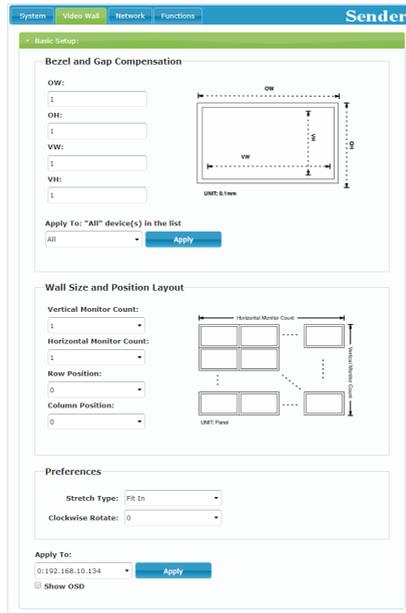
- **Statistics**

The Statistics window shows all available information about the operational status of the unit, including current Host ID Name, SN, Ethernet information, MAC address, unicast/multicast mode, link status and mode.



## 6.5.2 Video Wall Tab

The Video Wall tab allows the user to design, edit and manipulate a video wall system created using multiple Receiver units connected to identical displays. The bezel and video size of the displays being used, as well as the horizontal and vertical monitor count, is defined here. Video stretch and rotation can also be controlled on this tab. Receivers in the video wall group (all Receivers sharing the same channel) can be controlled by any other unit within the same group. The Video Wall tab is accessible on both Transmitters and Receivers, however video wall settings may only be applied to Receiver units.



The screenshot shows the 'Video Wall' configuration tab in the 'Sender' application. It is organized into three main sections:

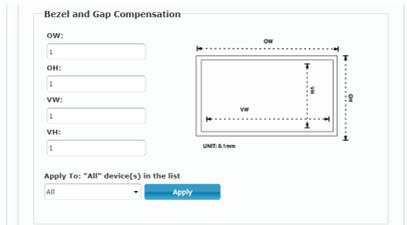
- Basic Setup:**
  - Bezel and Gap Compensation:** Includes input fields for OW, OH, VW, and VH, each with a value of '1'. A diagram illustrates a single monitor with dimensions for bezel (OW, OH) and gap (VW, VH). Below the fields is an 'Apply To: "All" device(s) in the list' dropdown and an 'Apply' button.
  - Wall Size and Position Layout:** Includes input fields for Vertical Monitor Count, Horizontal Monitor Count, Row Position, and Column Position, all with values of '1'. A diagram shows a grid of monitors with labels for 'Horizontal Monitor Count' and 'Vertical Monitor Count'. Below the fields is an 'Apply To:' dropdown and an 'Apply' button.
  - Preferences:** Includes a 'Stretch Type' dropdown set to 'Fit In' and a 'Clockwise Rotate' dropdown set to '0'.
- Apply To:** A dropdown menu currently showing '0:192.168.10.134' and a 'Show OSD' checkbox.

When saving changes on the Video Wall tab, remember to select the appropriate "Apply To:" target unit before pressing the "Apply" button. Select the IP address of the Receiver you want to apply changes to from the "Apply To:" drop down.

*Note: While it is possible to create small video walls using unicast mode, doing so wastes bandwidth. In order to more efficiently use the available network bandwidth, it is strongly recommended to only use multicast mode when creating video walls.*

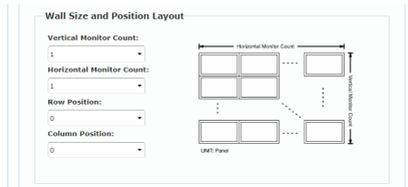
**1) Bezel and Gap Compensation:** This section of the Video Wall tab is used to define the physical dimensions of each display being used in the video wall. Accurate measurements are needed of the monitor's outer frame (OW, OH) and the video screen (VW, VH). The measurements may be made using any unit of measurement (inches, mm, cm, etc.) as long as **ALL** measurements in the same wall are made using the exact same units and the numbers are integers.

*Note: Typically all monitors in a video wall are identical and have the same dimensions, but it is also possible to make a 2x2 wall using differently sized displays as long as the same measurement units are used to measure each display and the displays are still arranged in a normal rectangular layout with all 4 corners meeting at the same place.*



- **OW (Outer Width):** This is the horizontal measurement of the display's outer case (screen plus bezel).
- **OH (Outer Height):** This is the vertical measurement of the display's outer case (screen plus bezel).
- **VW (Video Width):** This is the horizontal measurement of the display's video screen.
- **VH (Video Height):** This is the vertical measurement of the display's video screen.
- **Apply To:** Select which unit(s) to send updated settings to when "Apply" is pressed.
  - Selecting "All" will send video wall bezel setting changes to all units in the current video wall group.
  - Selecting an IP address from the "Clients" list will send any bezel setting changes to the Receiver with that IP address.

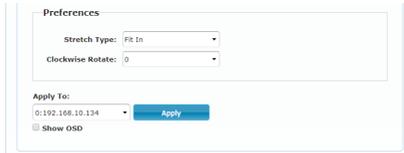
**2) Wall Size and Position Layout:** This section of the Video Wall tab is used to define the number of displays used in the video wall as well as the location of the specific display within the video wall. A typical video wall consists of an equal number of horizontal and vertical monitors (for example: 2×2 or 3×3), however it is possible to create video walls using this system with a wider variety of dimensions as long as the end result is still a rectangle (for example: 5×1 or 2×3). Both horizontal and vertical dimensions are limited to a maximum of 16 displays.



- **Vertical Monitor Count:** Define the number of displays in the video wall, measured vertically. (Maximum is 16 displays)
- **Horizontal Monitor Count:** Define the number of displays in the video wall, measured horizontally. (Maximum is 16 displays)
- **Row Position:** Set the vertical location of the currently controlled display. (Counts top to bottom, from 0 to 15)
- **Column Position:** Set the horizontal location of the currently controlled display. (Counts left to right, from 0 to 15)

**3) Preferences:** This section of the Video Wall tab provides additional controls over how the source video is displayed on the video wall as well as providing a drop down to determine which Receiver to apply changed settings to.

*Note: When setting up a new video wall, or changing the configuration of an existing one, remember to update the configuration of each Receiver in the system.*



The screenshot shows a 'Preferences' window with the following elements:

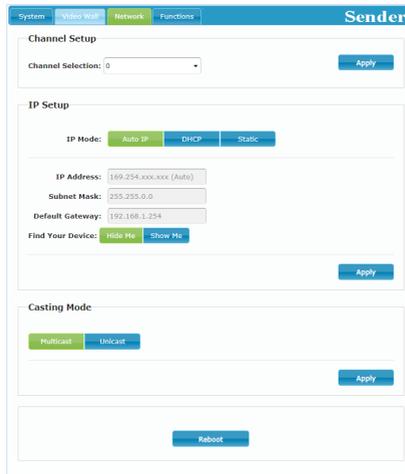
- Stretch Type:** A dropdown menu currently set to 'Fit In'.
- Clockwise Rotate:** A dropdown menu currently set to '0'.
- Apply To:** A dropdown menu currently set to '0:192.168.10.134'.
- Apply:** A blue button to apply the settings.
- Show OSD:** A checkbox that is currently checked.

- **Stretch Type:** Set the video stretch method.
  - Selecting “Fit In” will expand the video to exactly fit the dimensions of the video wall regardless of the source's original aspect ratio.
  - Selecting “Stretch Out” will zoom the video until the video wall is filled in all 4 dimensions while maintaining the aspect ratio of the original source.
- **Clockwise Rotate:** Set the rotation of the video output in 0, 180 and 270 degree increments.
- **Apply To:** Select which unit(s) to send updated settings to when “Apply” is pressed.
  - Selecting an IP address from the “Clients” list will send video wall setting changes to the Receiver with that IP address.
- **Show OSD:** Enables or disables the OSD display of the current channel selection.

### 6.5.3 Network Tab

The Network tab provides controls over the Transmitter's broadcast channel, IP configuration, and network broadcast mode. Changes made to the network settings will require a reboot of the unit. After clicking on "Apply" please follow the reboot instructions in the WebGUI.

*Note: If the IP address is changed then the IP address required for WebGUI access will also change accordingly. If the new address is assigned via "Auto IP" or "DHCP" it might be necessary to temporarily disable the Video Link between the Receiver and Transmitter in order to display the units' new IP addresses on the Receiver's HDMI output. Press and hold the LINK button for 3 seconds to enable or disable the Video Link.*



The screenshot shows the 'Sender' WebGUI interface with the 'Network' tab selected. The interface is divided into three main sections:

- Channel Setup:** Features a 'Channel Selection' dropdown menu set to '0' and an 'Apply' button.
- IP Setup:** Includes radio buttons for 'Auto IP' (selected), 'DHCP', and 'Static'. Below are input fields for 'IP Address' (169.254.xxx.xxx (Auto)), 'Subnet Mask' (255.255.0.0), and 'Default Gateway' (192.168.1.254). There are also 'Hide MG' and 'Show MG' buttons. An 'Apply' button is at the bottom right of this section.
- Casting Mode:** Features radio buttons for 'Multicast' (selected) and 'Unicast'. An 'Apply' button is at the bottom right of this section.

At the bottom of the page, there is a 'Reboot' button.

- 1) **Channel Setup:** Use the dropdown to select the broadcast channel for the Transmitter. All Receivers on the local network that are set to the same channel will receive video from this Transmitter. The available channel range is from 0 to 255.

*Note: Every Transmitter within the same local network must be assigned a different broadcast channel in order to avoid conflicts.*

The Channel Setup form features a title "Channel Setup" at the top left. Below it is a "Channel Selection:" label followed by a dropdown menu currently showing "0". To the right of the dropdown is a blue "Apply" button.

- 2) **IP Setup:** This section allows for configuration of the IP acquisition mode and Ethernet settings of the unit. It also provides an easy way to find the physical unit when installed with many other similar units.

The IP Setup form has a title "IP Setup" at the top left. Below the title are three tabs: "Auto IP" (highlighted in green), "DHCP", and "Static". Under the "Auto IP" tab, there are three input fields: "IP Address:" with the value "169.254.xxx.xxx (Auto)", "Subnet Mask:" with the value "255.255.0.0", and "Default Gateway:" with the value "192.168.1.254". Below these fields are two buttons: "Hide Me" (highlighted in green) and "Show Me". A blue "Apply" button is located at the bottom right of the form.

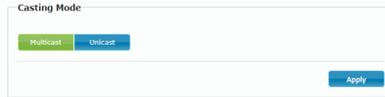
- **IP Mode & Settings:** The IP mode may be switched between "Auto IP", "DHCP" or "Static IP". When the unit is set to Auto IP mode it will automatically assign itself an APIPA address from the 169.254.xxx.xxx range. When the unit is set to DHCP mode it will attempt to automatically obtain an IP address from a DHCP server. When the IP mode is set to static IP, you can manually set the IP address, netmask and gateway address. Click the "Apply" button to save changes made to the IP Mode or Configuration.

*Note: The default network setting for this unit is "Auto IP".*

- **Find Your Device:** Selecting "Show Me" will cause the unit to immediately begin flashing the LEDs on the front of the unit to make it easy to find. Selecting "Hide Me" returns the LEDs to their normal behavior. This setting is useful when troubleshooting an installation with a large number of units in a rack.

3) **Casting Mode:** Allows for the selection of the broadcasting mode used by the Transmitter. Click the “Apply” button to save changes made to the broadcasting mode.

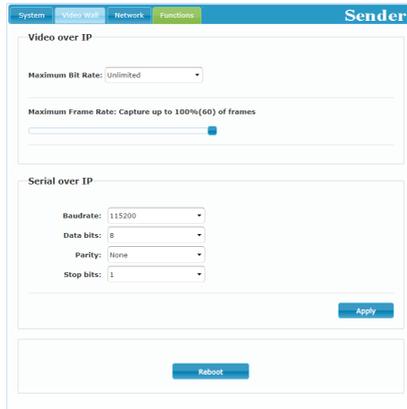
*Note: Receivers must be set to the same mode as the Transmitter in order to receive video.*



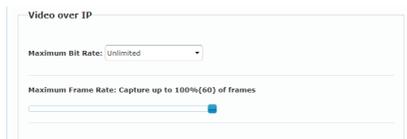
- **Multicast:** This mode sends a single video stream that can be viewed simultaneously by multiple receivers without increasing bandwidth usage. This mode is ideal for video wall or matrixing scenarios. Multicast mode requires a network switch with IGMP snooping enabled.
- **Unicast:** This mode uses a discrete video stream for every connected Receiver and is ideal for simple, point-to-point, streaming setups. This mode uses considerably more bandwidth than Multicast mode when multiple Receivers are being used, however it does not require a network switch that supports IGMP snooping.

## 6.5.4 Functions Tab

The Functions tab provides control over the Transmitter's maximum streaming bitrate, maximum frame rate, as well as serial control extension configuration. Changes made to these settings typically require a reboot of the unit. After clicking on "Apply" please follow the reboot instructions in the WebGUI, if necessary.



- 1) **Video over IP:** This section allows control over critical functions of the Transmitter such as controlling the streaming bit rate and quality.



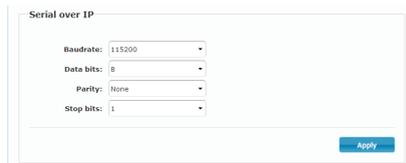
- Maximum Bit Rate:** Set the maximum bit rate that can be used by a single video stream. Available options are: Unlimited, 400 Mbps, 200 Mbps, 100 Mbps, 50 Mbps. Selecting "Unlimited" will use up to the maximum available bandwidth in order to maintain a full framerate video stream.

*Note: While it is generally suggested to select "Unlimited" when streaming 1080p video sources, the amount of bandwidth required can be large and will limit the number of concurrent video streams.*

- **Maximum Framerate:** Adjusting this slider will set the percentage of frames from the source video to encode (2% – 100%). This is ideal for reducing the bandwidth requirements of sources with high detail, but limited motion, such as power point presentations or information screens.

*Note: If the framerate is lowered too far with full motion video sources the video will become noticeably choppy.*

- 2) **Serial over IP:** This section provides controls for the Serial over IP extension functionality, allowing the configuration of the supported the RS-232 signal.



- **Serial Settings:** Set the desired baud rate, data bits, parity, and stop bit for the RS-232 signal to extend.

*Note: The Transmitter and Receiver must have the same serial settings.*

## 6.6 Telnet Control

Before attempting to use Telnet control, please ensure that both the unit and the PC are connected to the same active networks.

To Access the Command Line Interface (CLI)	
Windows 7	Click <b>Start</b> , type "cmd" in the search field, and press <b>Enter</b> .
Windows XP	Click <b>Start &gt; Run</b> , type "cmd", and press <b>Enter</b> .
Mac OS X	Click <b>Go &gt; Applications &gt; Utilities &gt; Terminal</b> .

Once in the Command Line Interface (CLI) type "**telnet**" followed by the IP address of the unit (and the port number if it is non-standard) and then hit "Enter". This will connect us to the unit we wish to control.

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>telnet 192.168.1.50 23
```

*Note: If the IP address is changed then the IP address required for Telnet access will also change accordingly.*

## 6.7 Telnet Commands

### 6.7.1 System Commands

COMMAND	
Description and Parameters	
<b>help</b> ↵	Show the full command list.
<b>help N1</b> ↵	Show help details about command <b>N1</b> . <b>N1</b> = {Any command name}
<b>get_hardware_version</b> ↵	Show the current hardware version.
<b>get_firmware_version</b> ↵	Show the current firmware version.
<b>set_device_name N1</b> ↵	Set the device name <b>N1</b> <b>N1</b> = {Name} [29 characters max]
<b>get_device_name</b> ↵	Show the current device name.
<b>factory_reset N1</b> ↵	Perform a factory reset on the unit and select the IP mode after the reset completes. Available values for <b>N1</b> : 0 [Reset into Static IP mode] 1 [Reset into Auto IP mode]
<b>reboot</b> ↵	Reboot the unit.

## 6.7.2 Network Commands

COMMAND
<b>Description and Parameters</b>
<b>get_ipconfig</b> ↵
Show the current IP configuration.
<b>set_ip_mode N1</b> ↵
Set the IP configuration mode. Available values for <b>N1</b> :
0 [Static IP Mode]
1 [DHCP Mode]
2 [Auto IP Mode]
<b>get_ip_mode</b> ↵
Show the current IP configuration mode.
<b>set_ip_address N1</b> ↵
Set the static IP address. <b>N1</b> = X.X.X.X [X = 0 ~ 255]
<b>get_ip_address</b> ↵
Show the current IP address.
<b>set_netmask N1</b> ↵
Set the Ethernet netmask. <b>N1</b> = X.X.X.X [X = 0 ~ 255]
<b>get_netmask</b> ↵
Show the current Ethernet netmask.
<b>set_gateway N1</b> ↵
Set the IP gateway address. <b>N1</b> = X.X.X.X [X = 0 ~ 255]
<b>get_gateway</b> ↵
Show the current gateway address.

COMMAND	
Description and Parameters	
<b>set_net_mode N1</b> ↵	
Set the network broadcast mode.	
Available values for <b>N1</b> :	
0	[Unicast Mode]
1	[Multicast Mode]
<b>get_net_mode</b> ↵	
Show the current network broadcast mode.	
<b>set_jumbo_mtu N1</b> ↵	
Enable/disable the jumbo frame MTU.	
Available values for <b>N1</b> :	
0	[Disabled]
1	[Enabled]
<b>get_jumbo_mtu</b> ↵	
Show the jumbo frame MTU state.	

### 6.7.3 Discovery Service Commands

COMMAND	
Description and Parameters	
<b>set_showme N1</b> ↵	
Enable/Disable the discovery “Show Me” feature .	
Available values for <b>N1</b> :	
0	[Disabled]
1	[Enabled]
<b>get_showme</b> ↵	
Show the current state of the “Show Me” feature.	

## 6.7.4 Transmitter Specific Commands

COMMAND
Description and Parameters
<b>set_tx_channel N1</b> ↵
Set the VoIP transmission channel. <b>N1</b> = 0 ~ 255                      [VoIP channel]
<b>get_tx_channel</b> ↵
Show the current VoIP transmission channel.
<b>set_quality N1</b> ↵
Set the Tx picture quality mode. Available values for <b>N1</b> : 0                                      [Graphic] 1                                      [Video]
<b>get_quality</b> ↵
Show the current Tx picture quality mode.
<b>set_hdcp_allow N1</b> ↵
Enable/disable HDCP encrypted source support. Available values for <b>N1</b> : 0                                      [Disabled] 1                                      [Enabled]
<b>get_hdcp</b> ↵
Show the current HDCP support state.
<b>set_bandwidth N1</b> ↵
Set the broadcast stream bandwidth maximum. Available values for <b>N1</b> : 0                                      [50 Mbps] 1                                      [100 Mbps] 2                                      [200 Mbps] 3                                      [400 Mbps] 4                                      [Unlimited]

COMMAND	
Description and Parameters	
<b>set_frame_rate N1</b> ↵	<p>Set the percentage of frames from the source video to encode.</p> <p>Available values for <b>N1</b>:</p> <p>0 [Disable] 1 ~ 60 [Frame Rate]</p>
<b>set_vw_osd N1 {N2}</b> ↵	<p>Enable/disable the video wall OSD to display the Target Receiver number on the designated display.</p> <p>Available values for <b>N1</b>:</p> <p>0 [Disable] 1 [Enable]</p> <p>Available values for <b>N2</b>:</p> <p><b>N2</b> = 0 ~ 255 [Target Receiver {Optional}]</p> <p><i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N2 makes the setting global to all Receivers.</i></p>
<b>set_vw_layout N1 N2 {N3}</b> ↵	<p>Set the video wall's total horizontal and vertical display count.</p> <p><b>N1</b> = 1 ~ 16 [Horizontal display count] <b>N2</b> = 1 ~ 16 [Vertical display count] <b>N3</b> = 0 ~ 255 [Target Receiver {Optional}]</p> <p><i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N3 makes the settings global to all Receivers.</i></p>

COMMAND	
Description and Parameters	
<b>set_vw_pos N1 N2 {N3}</b> ↵↵	
Set the display's position within the video wall. (Cannot exceed the video wall's horizontal and vertical display count.)	
<b>N1</b> = 0 ~ 15	[Row]
<b>N2</b> = 0 ~ 15	[Column]
<b>N3</b> = 0 ~ 255	[Target Receiver {Optional}]
<i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N3 makes the settings global to all Receivers.</i>	
<b>set_vw_bc N1 N2 N3 N4 {N5}</b> ↵↵	
Set the video wall display's bezel compensation values.	
<b>N1</b> = 0 ~ 99999	[Video width]
<b>N2</b> = 0 ~ 99999	[Total display width]
<b>N3</b> = 0 ~ 99999	[Video height]
<b>N4</b> = 0 ~ 99999	[Total display height]
<b>N5</b> = 0 ~ 255	[Target Receiver {Optional}]
<i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N5 makes the settings global to all Receivers.</i>	
<b>set_vw_hscale N1 {N2}</b> ↵↵	
Set the video wall display's horizontal zoom amount.	
<b>N1</b> = 0 ~ 99999	[Zoom amount in 1 pixel units]
<b>N2</b> = 0 ~ 255	[Target Receiver {Optional}]
<i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N2 makes the setting global to all Receivers.</i>	

COMMAND	
Description and Parameters	
<b>set_vw_vscale N1 {N2}</b> ↵	
Set the video wall display's vertical zoom amount.	
<b>N1</b> = 0 ~ 99999	[Zoom amount in 1 pixel units]
<b>N2</b> = 0 ~ 255	[Target Receiver {Optional}]
<i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N2 makes the setting global to all Receivers.</i>	
<b>set_vw_shift N1 N2 {N3}</b> ↵	
Set the video wall display's output shift.	
Available values for <b>N1</b> :	
U	[Shift up]
D	[Shift down]
L	[Shift left]
R	[Shift right]
<b>N2</b> = 0 ~ 80000	[Pixel shift amount. Must be in increments of 8.]
<b>N3</b> = 0 ~ 255	[Target Receiver {Optional}]
<i>Note: The Target Receiver number can be obtained by turning on the Video Wall OSD. Omitting N3 makes the setting global to all Receivers.</i>	

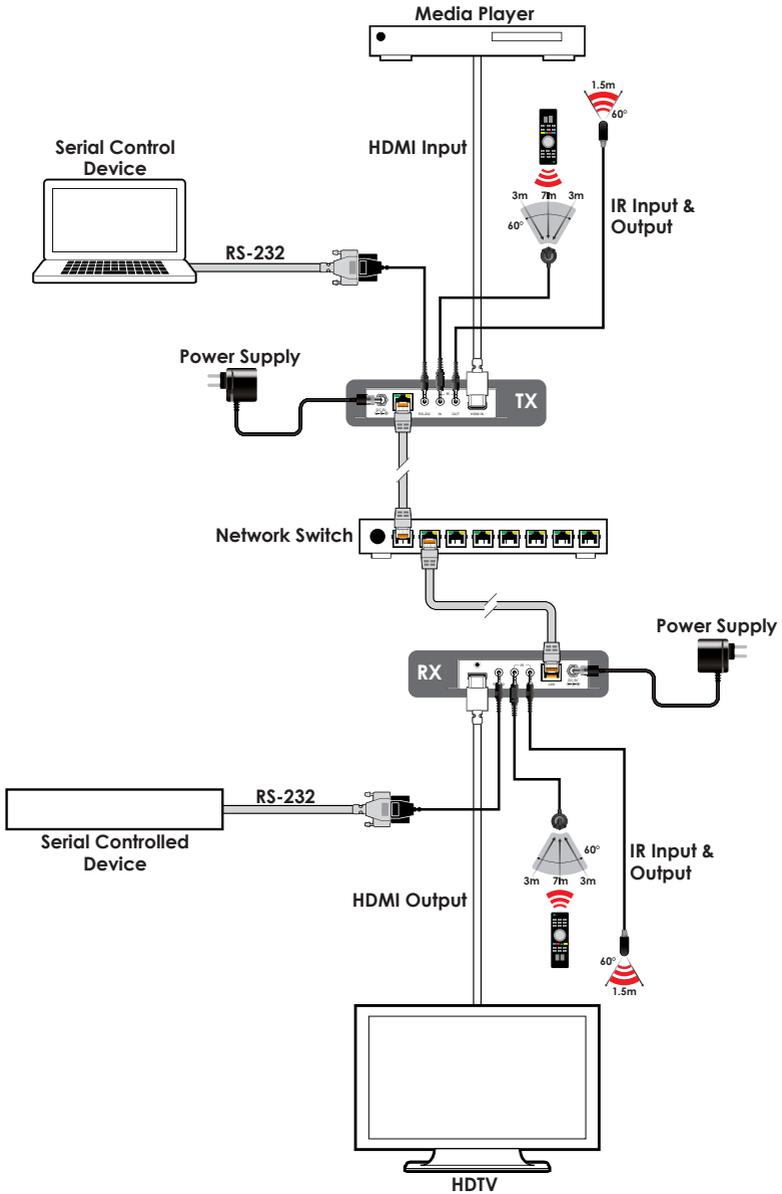
## 6.7.5 Serial Commands

COMMAND	
Description and Parameters	
<b>set_serial_baud N1</b> ↵	
Set the serial baud rate.	
Available values for <b>N1</b> :	
0	[300]
1	[600]
2	[1200]
3	[2400]
4	[4800]
5	[9600]
6	[19200]
7	[38400]
8	[57600]
9	[115200]
<b>get_serial_baud</b> ↵	
Show the current serial baud rate.	
<b>set_serial_bits N1</b> ↵	
Set the number of serial data bits.	
Available values for <b>N1</b> :	
0	[5 bits]
1	[6 bits]
2	[7 bits]
3	[8 bits]
<b>get_serial_bits</b> ↵	
Show the current number of serial data bits.	

COMMAND	
Description and Parameters	
<b>set_serial_parity N1</b> ↵	
Set the serial parity bit.	
Available values for <b>N1</b> :	
0	[None]
1	[Odd]
2	[Even]
<b>get_serial_parity</b> ↵	
Show the current serial parity bit.	
<b>set_serial_stop N1</b> ↵	
Set the serial stop bits.	
Available values for <b>N1</b> :	
0	[1 stop bit]
1	[2 stop bits]
<b>get_serial_stop</b> ↵	
Show the current serial stop bits.	

*Note: Commands will not be executed unless followed by a carriage return. Commands are not case-sensitive.*

## 7. CONNECTION DIAGRAM



## 8. SPECIFICATIONS

### 8.1 Basic Specifications

<b>HDMI Bandwidth</b>	225MHz/6.75Gbps
<b>Input Port</b>	1×HDMI
<b>Output Port</b>	1×LAN (RJ-45)
<b>Pass-through Ports</b>	1×IR Extender (3.5mm) 1×IR Blaster (3.5mm) 1×RS-232 (3.5mm)
<b>IR Frequency</b>	30 – 50kHz (30 – 60kHz under ideal conditions)
<b>Baud Rate</b>	Up to 115200
<b>Power Supply</b>	5V/2.6A DC (US/EU standards, CE/FCC/UL certified)
<b>ESD Protection (HBM)</b>	±8kV (Air Discharge), ±4kV (Contact Discharge)
<b>Dimensions (W×H×D)</b>	128mm×25mm×108mm [Case Only] 128mm×25mm×116mm [All Inclusive]
<b>Weight</b>	364g
<b>Chassis Material</b>	Metal (Steel)
<b>Chassis Color</b>	Black
<b>Operating Temperature</b>	0°C – 40°C/32°F – 104°F
<b>Storage Temperature</b>	-20°C – 60°C/-4°F – 140°F
<b>Relative Humidity</b>	20 – 90% RH (Non-condensing)
<b>Power Consumption</b>	5.17W

## 8.2 Video Specifications

Supported Resolutions (Hz)	Input	Output
	HDMI	Streaming
720×400p@70/85	✓	✓
640×480p@60/72/75/85	✓	✓
720×480i@60	✓	✓
720×480p@60	✓	✓
720×576i@50	✓	✓
720×576p@50	✓	✓
800×600p@56/60/72/75/85	✓	✓
848×480p@60	✓	✓
1024×768p@60/70/75/85	✓	✓
1152×864p@75	✓	✓
1280×720p@50/60	✓	✓
1280×768p@60/75/85	✓	✓
1280×800p@60/75/85	✓	✓
1280×960p@60/85	✓	✓
1280×1024p@60/75/85	✓	✓
1360×768p@60	✓	✓
1366×768p@60	✓	✓
1400×1050p@60	✓	✓
1440×900p@60/75	✓	✓
1600×900p@60RB	✓	✓
1600×1200p@60	✓	✓
1680×1050p@60	✓	✓
1920×1080i@50/60	✓	✓
1920×1080p@24/25/30	✓	✓
1920×1080p@50/60	✓	✓

Supported Resolutions (Hz)	Input	Output
	HDMI	Streaming
1920×1200p@60RB	✓	✓
2560×1440p@60RB	×	×
2560×1600p@60RB	×	×
2048×1080p@24/25/30	×	×
2048×1080p@50/60	×	×
3840×2160p@24/25/30	×	×
3840×2160p@50/60 (4:2:0)	×	×
3840×2160p@24, HDR10	×	×
3840×2160p@50/60 (4:2:0), HDR10	×	×
3840×2160p@50/60	×	×
4096×2160p@24/25/30	×	×
4096×2160p@50/60 (4:2:0)	×	×
4096×2160p@24/25/30, HDR10	×	×
4096×2160p@50/60 (4:2:0), HDR10	×	×
4096×2160p@50/60	×	×

### 8.3 Audio Specifications

HDMI Input/Streaming Output	
LPCM	
Max Channels	8 Channels
Sampling Rate (kHz)	32, 44.1, 48, 88.2, 96, 176.4, 192
Bitstream	
Supported Formats	Standard

## 8.4 Cable Specifications

Cable Length	1080p		4K30	4K60
	8-bit	12-bit	(4:4:4) 8-bit	(4:4:4) 8-bit
<b>High Speed HDMI Cable</b>				
<b>HDMI Input</b>	15m	10m	x	x
<b>Ethernet Cable</b>				
<b>Cat.5e/6</b>	100m		x	
<b>Cat.6a/7</b>	100m		x	

- **1080p (FHD Video)**
  - Up to 1080p@60Hz, 12-bit color
  - Data rates lower than 5.3Gbps or below 225MHz TMDS clock
- **4K30 (UHD Video)**
  - 4K@24/25/30Hz & 4K@50/60Hz (4:2:0), 8-bit color
  - Data rates higher than 5.3Gbps or above 225MHz TMDS clock but below 10.2Gbps
- **4K60 (UHD+ Video)**
  - 4K@50/60Hz (4:4:4, 8-bit)
  - 4K@50/60Hz (4:2:0, 10-bit HDR)
  - Data rates higher than 10.2Gbps

## 9. ACRONYMS

ACRONYM	COMPLETE TERM
<b>ASCII</b>	American Standard Code for Information
<b>AV</b>	Audio/Video
<b>AVR</b>	Audio/Video Receiver or Recorder
<b>Cat.5e</b>	Enhanced Category 5 cable
<b>Cat.6</b>	Category 6 cable
<b>Cat.6a</b>	Augmented Category 6 cable
<b>Cat.7</b>	Category 7 cable
<b>CLI</b>	Command-Line Interface
<b>DHCP</b>	Dynamic Host Configuration Protocol
<b>DVI</b>	Digital Visual Interface
<b>EDID</b>	Extended Display Identification Data
<b>GbE</b>	Gigabit Ethernet
<b>GUI</b>	Graphical User Interface
<b>HD</b>	High-Definition
<b>HDCP</b>	High-bandwidth Digital Content Protection
<b>HDMI</b>	High-Definition Multimedia Interface
<b>HDTV</b>	High-Definition Television
<b>IGMP</b>	Internet Group Management Protocol
<b>IP</b>	Internet Protocol
<b>IR</b>	Infrared
<b>KVM</b>	Keyboard/Video/Mouse
<b>LAN</b>	Local Area Network
<b>LED</b>	Light-Emitting Diode
<b>LPCM</b>	Linear Pulse-Code Modulation
<b>MAC</b>	Media Access Control
<b>MJPEG</b>	Motion JPEG
<b>NTSC</b>	National Television System Committee

ACRONYM	COMPLETE TERM
<b>PAL</b>	Phase Alternating Line
<b>PC</b>	Personal Computer
<b>SDTV</b>	Standard-Definition Television
<b>TCP</b>	Transmission Control Protocol
<b>VGA</b>	Video Graphics Array
<b>VLAN</b>	Virtual LAN
<b>VoIP</b>	Video over IP
<b>WUXGA (RB)</b>	Widescreen Ultra Extended Graphics Array (Reduced Blanking)
<b>XGA</b>	Extended Graphics Array









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