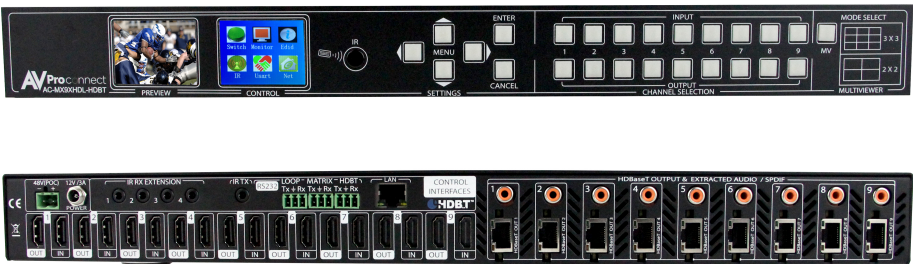


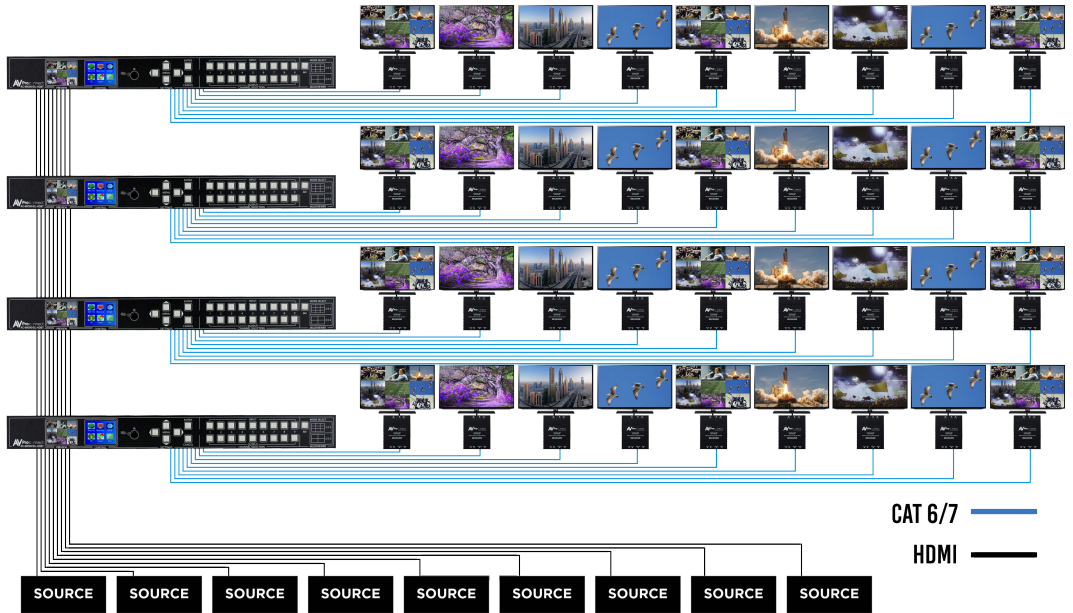
User Manual

AC-MX9XHDL-HDBT

9x9 seamless HDBaseT matrix with quadview, multiview, instant switching. Expandable to 9xUnlimited Matrix configurations.



Built For Cascading!



Specifications:

Video:	
Video Resolutions	Up to 1080P 60, Uncompressed Full HD
VESA Resolutions	Up to 1900x1200
HDR Resolutions	1080 Formats Only
Color Space	YUV, RGB (CSC: Rec. 601, Rec. 709, BT2020, DCI, P3 D6500)
Chroma Subsampling	4:4:4, 4:2:2, 4:2:0 Supported
Deep Color	Up to 12 bit
Audio:	
Audio Formats Supported HDMI	PCM 2.0 Ch, LPCM 5.1 & 7.1, Dolby Digital, DTS 5.1, Dolby Digital Plus, Dolby TrueHD, DTS-HD Master Audio, Dolby Atmos
Audio Formats Supported Extracted (Coax)	PCM 2.0 Ch, LPCM 5.1, Dolby Digital 5.1, DTS
Audio Extraction Location	Input, Output or Matrix (Independent)
Distance:	
HDBaseT outputs	70M (230 Feet)
HDMI In/Out	Up to 50 Feet
Other:	
Bandwidth	9 Gbps
HDCP	HDCP 1.4 and Earlier (2.2 w/ AC-SC1-AUHD)
Ports:	
HDMI	Type A
HDBaseT	RJ45
LAN	RJ45 w/ Web Interface/Control
Audio (Extracted)	Digital Coax
IR Tx	3.5mm Mono (2-Conductor)
IR Rx	3.5mm Stereo (3 Conductor)
RS232	3 pin terminal block
Environmental:	
Operating Temperature	23 to 125°F (-5 to 51°C)
Storage Temperature	-4 to 140°F (-20 to 60°C)
Humidity Range	5-90% RH (No Condensation)
Power:	
PoH for HDBT Rx's	Yes
Power Consumption (Total)	105 Watts
Power Supply - Matrix	Input: AC 100-240V ~ 50/60Hz Output: DC 12V 5A
Power Supply - PoH	Input: AC 100-240V ~ 50/60Hz Output: DC 48V 3A
Dimensions:	
Dimensions (Unit Only)	mm: 50.8 x 260.35 x 441.33
Height/Depth/Width	inch: 2 x 10.25 x 17.375
Dimensions (Packaged)	mm: 88.9 x 444.5 x 495.3
Height/Depth/Width	inch: 3.5 x 17.5 x 19.5
Weight (Unit)	11lbs/4.98kg
Weight (Packaged)	14lbs/6.35kg
*Specifications subject to change without notice. Mass & dimensions are approximate	

AVProConnect Presents a stable alternative to HDMI over IP with Cloud 9. The AC-MX9XHDL-HDBT is a unique piece of technology that allows you to take 9 inputs and distribute them to almost limitless outputs by adding or stacking additional units. Get all of the stuff you love from AV over IP and more with none of the headaches, including Matrixing Quad-View, 9-Source Multiview, Actual Instant Matrix Switching (AIMS), IR & RS232 control of the displays, and more.

Utilizing uncompressed HDBaseT Technology, this system will truly shine and give you actual lossless images on screen and perform more reliably, making it ideal for low-no maintenance setups. No network switch is required, making this solution a very quick and efficient installation option in larger AV systems. In addition, you will have access to dual, front panel, color screens to further simplify the setup process. One screen is for Source Preview and the other is used for Settings.

For control, the Cloud 9 features a host of ready made 3rd party control drivers (C4, RTI, Crestron, ELAN) along with a robust API for universal implementation. Additionally, with Routable IR & RS232 you can control the displays (Power on, power off) with by using same HDBaseT CAT cable runs already in place.

Features:

- Fully uncompressed video
- Instant Matrix Switching w/ AIMS Technology
- 9-Source, Unlimited Outputs
- Robust HDBaseT Technology
- Matrixable Quad View (Matrix each quadrant independently)
- 9-Source Multiview
- Dynamic Video Walls (W/ DigiBird)
- Dual Color LCD Screens for Setup
- Instantly jump from Multiview/Quadview to Single image
- IR, RS-232, or Ethernet Control
- IR, RS-232 Pass through to Displays/Projectors
- Advanced RS-232 Routing to single outputs
- 4 port IR Matrix
- Free PC Control Software (Serial)
- Web Interface for control and setup
- FPGA Based hardware
- HDBaseT Lossless Video Transport
- Instant, seamless switching of sources and into and out of Multiview mode (Or Video Wall Mode)
- Digital (Coax) audio extraction with 3 operational modes. Fixed In Inputs, Follows Outputs, and Independent Matrix.
- HDMI Audio Selection/Matrix in Quad View & 9 screen Multiview

Easy to use:

- Feature rich
- AIMS Seamless Switching
- Dual Color screens
- Preview Screen
- IR Remote
- IR & RS-232 Control
- LAN Control
- IR & RS-232 Pass Through

In The Box:

- AC-MX9XHDL-HDBT Matrix
- IR Remote Control
- IR Extension Cable
- 12V/3A Locking Power Supply
- 48V Power Supply for PoE
- Rack Ears & Phoenix Connectors
- Instruction Manual

Applications:

- Bars and Restaurants are absolutely perfect. Low downtime and robust implementation make for happy owners and repeat work.
- In medical facilities for multiview point to point training environments
- For classrooms with lots of displays and presenters
- For security applications to view 4-9 HD video cameras
- For transportation management systems for monitoring camera feeds in hi-def.
- Large homes that want the ultimate control experience

Device Feature Overview:

AIMS: "Actual Instant Matrix Switching" allows the Cloud 9 to instantly display any of the sources on any display with no delay from button push to switch. Additionally, AIMS allows you to switch in and out of multiview mode instantly.

MATRIXABLE QUAD-VIEW: This function allows you to utilize a larger display or projector to show either one source at a time or 4 sources at a time. In this mode you can matrix each quadrant individually or display one source full screen...all instantly.

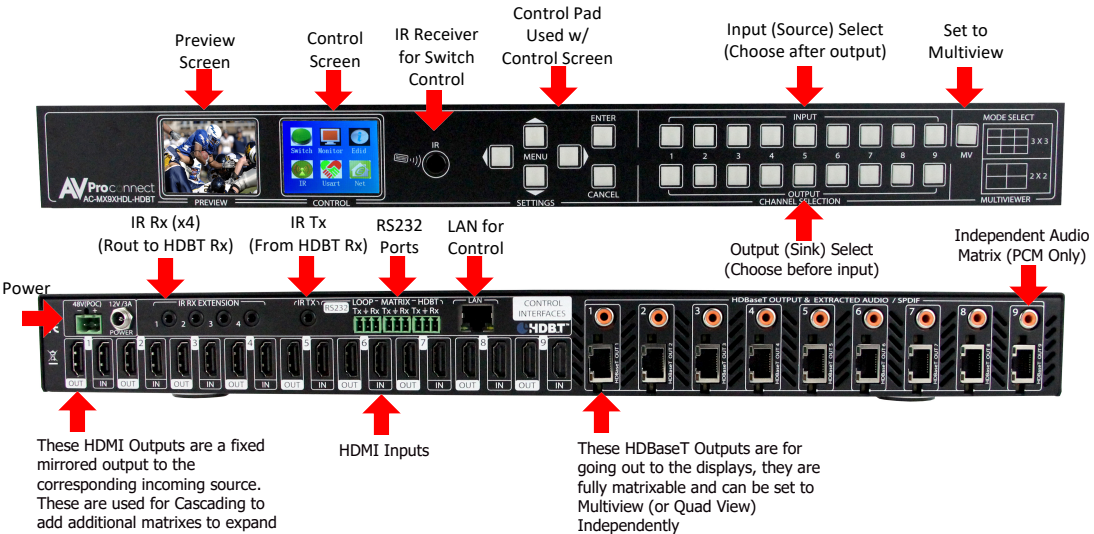
9-SOURCE MULTIVIEW: View all 9 sources on any display, ideal for large projectors, confidence monitors and eye catching dynamic video walls with a DigiBird Processor.

IR & RS-232 MATRIX & DISPLAY CONTROL: Not only can you control the matrix itself with these protocols, you have the ability to control the displays/projectors for things like power on/off without running extra wires. This often overlooked feature is fully implemented in the Cloud 9.

CASCADE: Increase the size of you matrix to limitless proportions by simply adding additional units. They only take up 1U rack space and each unit adds 9 more outputs to your system.

FPGA BACKBONE: We get asked all the time how is this possible with traditional HDMI distribution methods, and the answer is simple. While it feels simple to the installer, tons of things are happening at once behind the scenes. The signal is managed by our FPGA Modules which make for very robust mission critical installations. Our FPGA Engineers are among the best in the world and the Cloud 9 reflects this.

ISOLATED POE: Isolated PoE allows this unit to function reliably by isolating high voltage away from sensitive components



Basic Setup:

Quick Setup:

1. Connect the HDMI input sources (Blu-ray, Set Top Box, etc...) to the AC-MX9XHDL-HDBT
2. Connect the HDMI output devices (AVR, Display, Distribution Amplifier, Extender) to the AC-MX9XHDL-HDBT
3. Power on the sources
4. Connect the power supply's into the AC-MX9XHDL-HDBT (You need to plug in both supply's)
5. Turn on output devices/displays
6. You may now use the front panel controls, supplied IR remote or free PC software to control the switch.

Front Panel Control

Switching:

The AC-MX9XHDL-HDBT can be switched from the front panel by selecting the **OUTPUT first then selecting the INPUT:**

1. Press the button (1 through 9) on the bottom row that corresponds with the OUTPUT (Display, or Sink Device) you would like to send a source.
2. Now select the desired INPUT on the top row (1 through 9 or MV)
3. The route is now set.
4. **NOTE:** MV stands for Multiview and can be matrixed to any output - Press and hold MV button to toggle between Quad View and 3x3 (9-image) view.

This button sets Multiview mode to the selected OUTPUT. Think of this as another "INPUT". It can be matrixed to any output

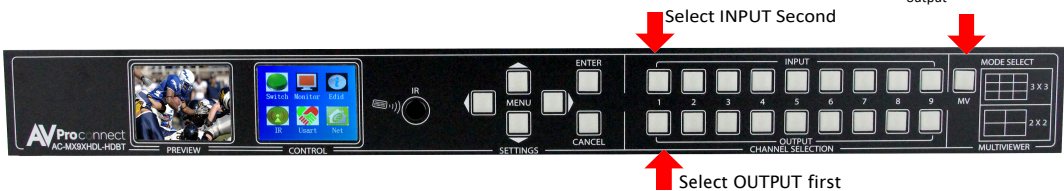
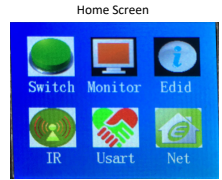


Figure 1 – Switching with the front panel controls. NOTE: Select the OUTPUT and then the INPUT or MV

Navigating the Control Screen:

You can use the control screen to setup/control several key features including:

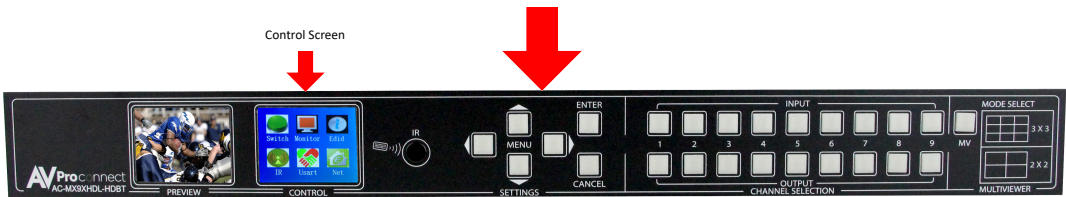
- **Matrix Switch Routing** ~ Control switching or view the current routing
- **Signal Monitor** ~ View live video feed from the active sources
- **EDID Management** ~ View, adjust EDID Configuration
- **IR Routing Management** ~ Rout the IR signal path for the IR inputs on the 9x9 to the HDBT Receivers
- **RS232 Routing Management** ~ Route RS-232 Signals to particular displays
- **Network Setup** ~ Setup IP Address, DHCP, Subnet, Etc...



To navigate the control screen you have a 6-button control panel that control the "Control" Screen.

- **"Menu"** area consists of UP, DOWN, LEFT and RIGHT - These are your navigation buttons. Press these buttons to move through them menus to your desired selections. Your desired selection will be bordered or highlighted
- **"Enter"** Selects the highlighted item and advances to the next set of options or sets your selection
- **"Cancel"** Stops what you are doing and takes you back one menu or to the home screen.

Control Screen Navigation Buttons



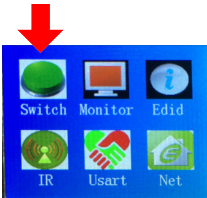
Control Screen - Switch Routing:

Once you select the "Switch" option, you have 2 primary functions:

1. View the current rout settings so you can verify that your system is working properly and the routes are correct
2. Set new matrix routes. You can change the matrix routes here as well, this is good for demonstrating switching or setting a Multiviewer confidence screen.

NOTE: When setting a new route, select OUTPUT first then INPUT

Select "Switch"



Select Output First

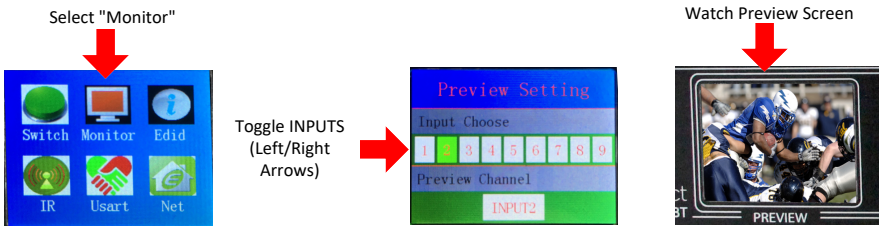


Then Choose Input

Control Screen - Signal Monitor:

The Signal Monitor feature allows you see your live source for each input. This screen allows you to toggle instantly through all sources. This function is a useful tool for the integrator because you can:

1. See that all of your sources are live and active
2. Verify that the correct input is receiving the correct source.
3. Cuts troubleshooting time in half - If you can verify that all of your sources are successfully being routed through the switch you only need to troubleshoot half of the system if problem arise.



Control Screen - EDID Management:

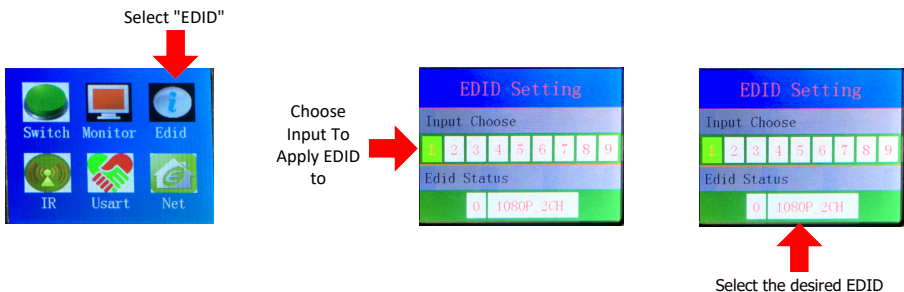
Instantly and easily set and manage EDID functions right from the front screen. EDID management will help you get the right signal from the source device adding additional security that nothing unsupported will be mistakenly fed into the system.

EDID effectively tells the source what the system is capable of handling, devices without robust EDID control just have to hope the source behaves how we want it to. With the AC-MX9XHDL-HDBT you control the sources:

To Set the EDID, just choose EDID from the "Home Screen" and then select the INPUT you want to set. Finally toggle through the EDIDs until you get the one you want. For the most plug and play compatibility, we recommend using "1080P 2CH". This is ideal for bars, restaurants, and homes. There is also the ability to upload a custom EDID is desired (Has to be done in Serial Control Software).

Available EDID Options: 1080P 2CH (Default), 1080P 6CH, USER1 (Custom), USER2 (Custom), USER3 (Custom)

Additionally, you can copy an EDID from a display using Serial (more later in this manual) - But this is recommended for advanced users only.

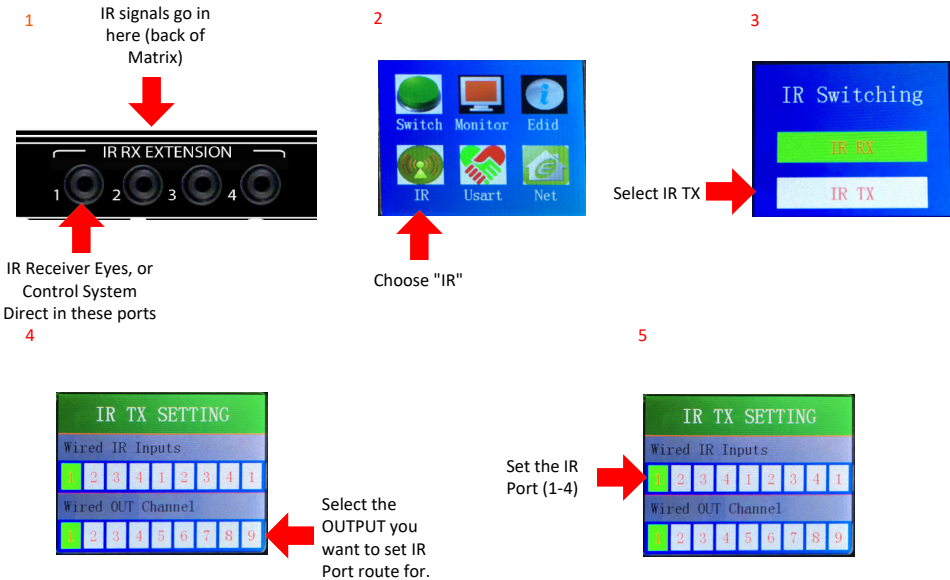


Control Screen - IR Routing (Passthrough to HDBaseT Receivers):

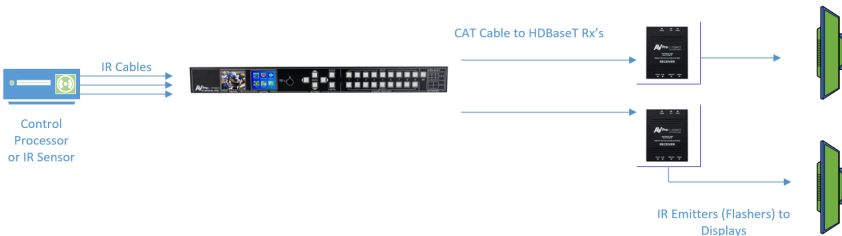
IR routing allows you to customize the signal path for IR signals. IR Routing control on the front panel refers to the route from the IR RX Extension ports on the back of the matrix to the remote HDBaseT Receiver IR OUT port. This is primarily for sending power off or power on commands to display devices.

- IR can be routed to one or to many HDBaseT receivers (Displays) at a the same time
- Each of the four IR RX Extensions port can be routed to one or many outputs
- IR Commands can be "stacked" for multiple display types, etc... using the same route.

*For more information on IR, or direct wire cable there is an IR Routing section later in the manual



Example IR Route to sink:

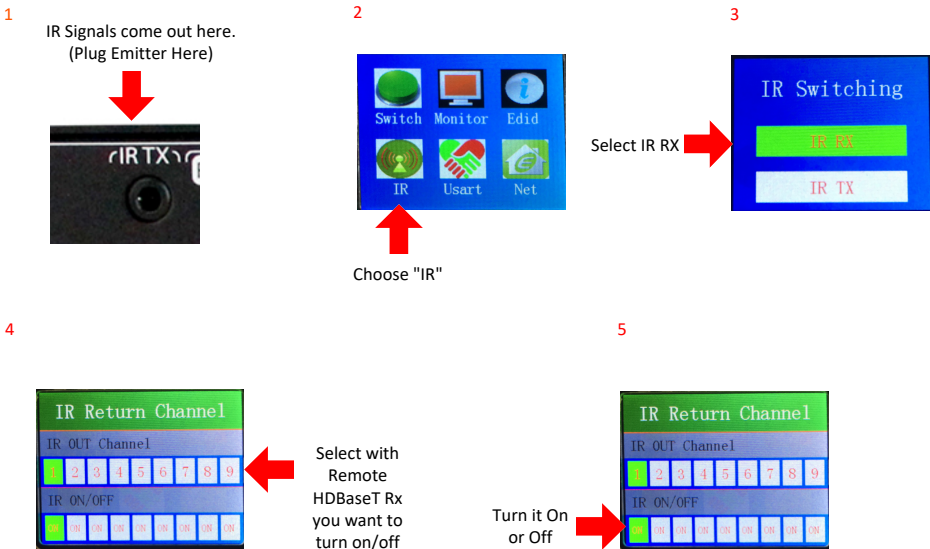


Control Screen - IR Routing (Return Channel to IR Tx Port):

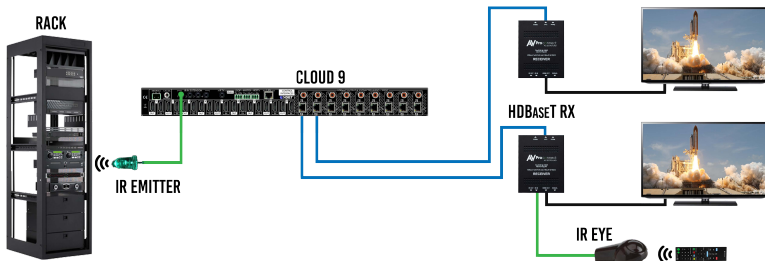
The IR Return Channel allows you to route IR Signals from a HDBaseT Receiver back to the Matrix for control of the Matrix. In addition IR signals are passed through the IR OUT on the back of the Matrix.

- IR can be routed back from the remote Rx for Matrix Control
- IR can be routed back from the remote Rx out of the IR OUT on the matrix
- You can select what HDBaseT receiver can send IR through IR return channel

**For more information on IR, there is an IR Routing section later in the manual*



Example IR Return Route:



WITH THIS CONFIGURATION YOU CAN CONTROL THE SOURCES IN THE RACK WITH YOUR REMOTE BY THE DISPLAYS.

Control Screen - USART (RS232 Route Setup) & Broadcast Mode

Here you can set up the RS232 broadcast route - You can enable or disable remote HDBaseT Rx's ability to receive & transmit RS232 signals. Some key point to remember:

1. By default all HDBT Rx's will receive and forward RS232 commands (ON)
2. IR Signals that go into the RS232 HDBT IN on the matrix get broadcast to all active (ON) output ports.
3. If you plan to do custom routed (non-broadcast) RS232 signals these must remain (ON)
4. **NOTE: For more info on advanced RS232 Routing, see that section later in the manual**



Select "Usart"

RS232 Broadcast Mode:

RS232 Broadcast Mode is a very simply way to implement things like "ALL ON" and "ALL OFF" for displays in a system. Broadcast Mode allows you simply pass RS232 signals through without having to use advanced routing details like baud rate. To send broadcast RS232 commands you must:

1. Set up the routes you want active (above).
2. Plug your RS232 Cable into the HDBT Serial Port (Pictured Right)
3. Send RS232 commands like you are sending them DIRECTLY TO THE DEVICE
4. Commands will route to ALL ports you have on.

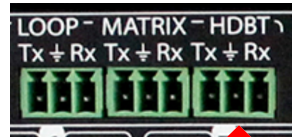
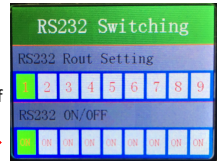
NOTE: For Broadcast Mode baud rate does not matter, this will be set by the device sending the RS232 Signal (i.e Control Processor) - RS232 command is sent to ALL open ports.

For Advanced RS232 Routing see the RS232 section later in the manual

Select the port you want to disable/enable (HDBT Side)



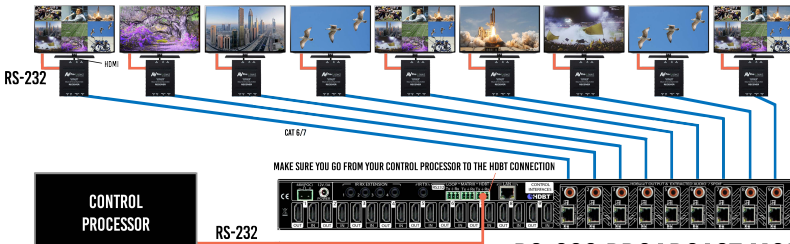
Turn On/Off



Send RS232 Broadcast Signals Here

RS232 Broadcast Mode Sample Diagram:

EVERY DISPLAY IS CONNECTED TO THE CONTROL PROCESSOR BY RS-232, ALLOWING YOU TO POWER ALL DISPLAYS ON/OFF AT THE SAME TIME



RS-232 BROADCAST MODE

Control Screen - Network (IP) Setting

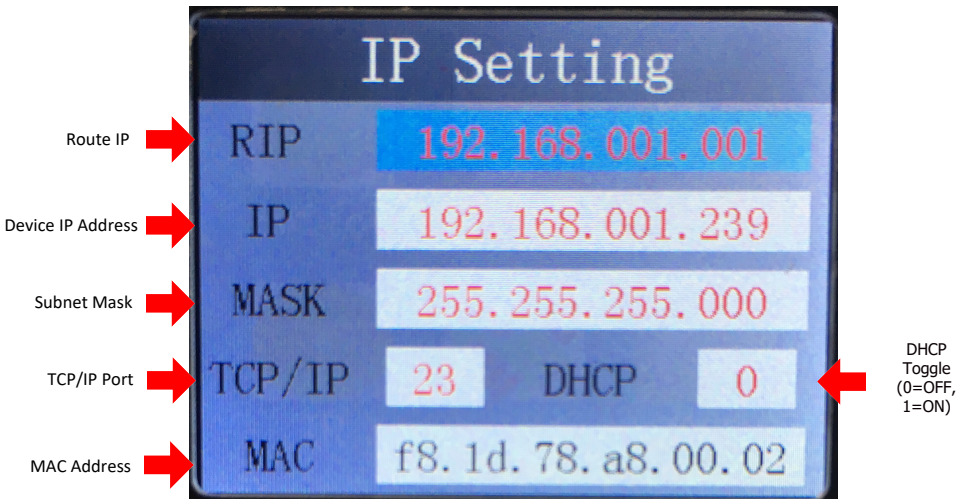
Here you can setup the Matrix with your preferred network settings. From the front panel you can:

- View the current IP Settings and MAC address
- Set static Route IP (Default is 192.168.001.001)
- Set static Device IP (**Device Default is 192.168.001.239**)
- Set Static Net Mask (Default is 255.255.255.0)
- Change the TCP/IP Port (Default is Port 23)
- Toggle DHCP (Default condition is DHCP OFF) (0=OFF, 1=ON)

To navigate the IP Setting Screen:

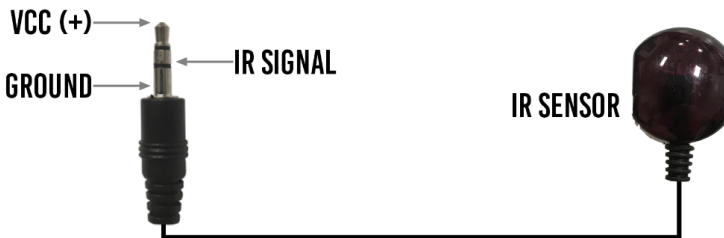
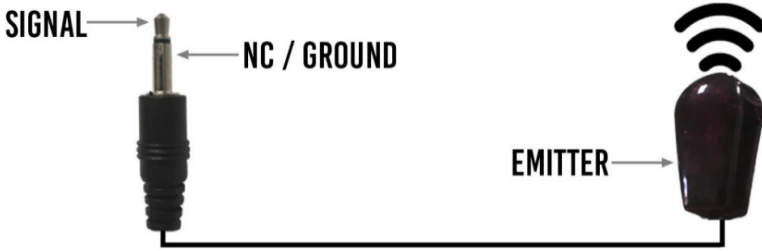
1. Navigate up and down to select (Use Enter Button) the option you want to address (RIP, IP, Mask, TCP/IP, DHCP)
2. Once selected you can use up and down to to change the first number or press enter to skip it and continue to the next.
3. Once you set the last possible number (Or complete the IP) it will back you to the main screen to make another selection

NOTE: You can send **Telnet** commands to the machine by IP, the commands are the same commands used for RS232 listed in the "Command List"

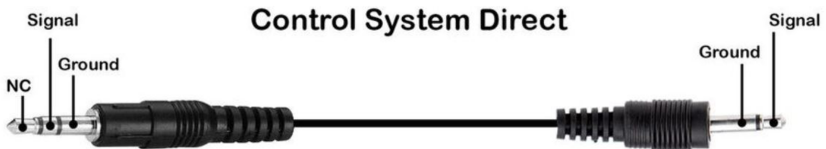


IR Details:

The IR PIN-OUT's below are consistent for the HDBaseT Receivers and for the Matrix.



To plug directly into the "IR RX EXTENTION" port from a control system you will need a cable created as pictured below - We can provide these upon request:



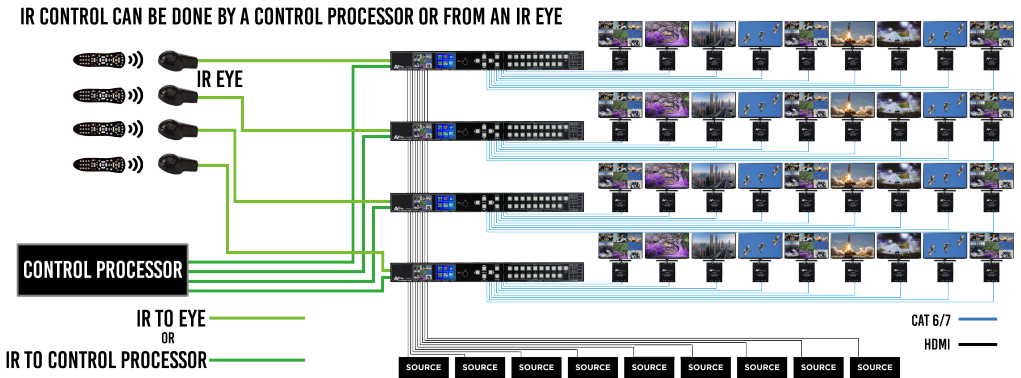
When direct wiring from an emitter or IR output on a control system.

Using IR When Cascading:

When using IR in a cascaded system, you must keep the following in mind:

- Each switch has its own IR routes etc...So for example you can route IR from switch "#1" only the the Rx's connected to it. Then likewise for switch number "#2" and so on.
- It is a good practice in a commercial application to make similar displays connected to the same switch, this can save the number of connections from you control system to the Cloud 9 System.

IR Cascading Diagram:



IR Control of the Marix:

The Matrix can be switched with IR Commands (Remote or other) in several ways:

1. IR Receiver on the front of the matrix
2. From any HDBaseT Receiver (You can select which ones)
3. From the IR Ext ports on the back of the matrix

Use the PC Software so set up the "ports" you want to open for IR control of the Matrix itself.
By Default, ALL ports are open for Matrix Control.

The screenshot shows the configuration software interface with the following sections:

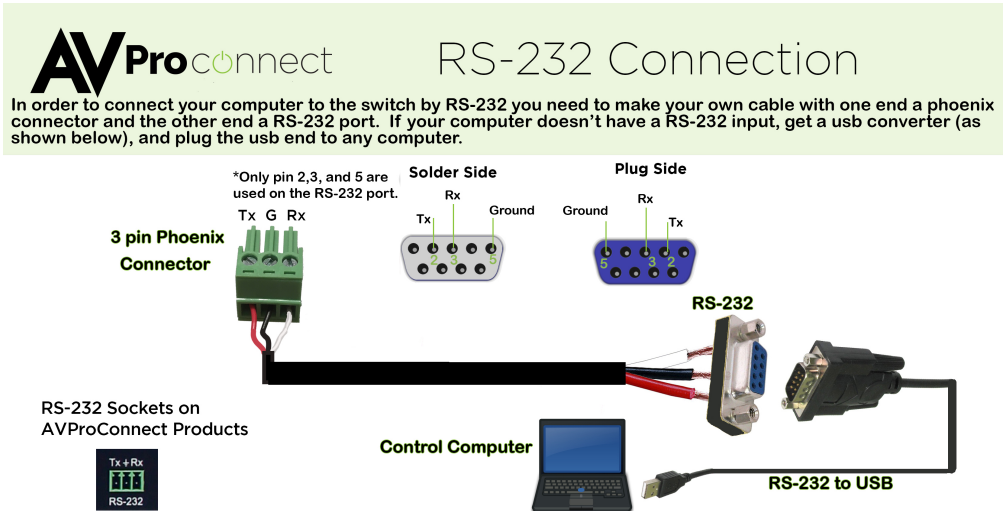
- VIDEO | EDID MANAGEMENT | IP CONFIG | SETTING |**
- Deembedded Audio Mode:** Radio buttons for "Follow the input" (selected), "Follow the output", and "Independent routing".
- Independent Audio Routing:** A vertical list of dropdown menus for Out1 through Out9.
- HDBT IR Out (to TV) Route Setting:** A vertical list of dropdown menus for Out1 through Out9, plus an "All from:" dropdown.
- IR Emitter from:** A row of checkboxes for Out1 through Out9.
- RS232 Routed To:** A row of checkboxes for Out1 through Out9.
- Deembedded audio On/Mute:** A grid of controls for Out1 through Out9, each with "On" and "Mute" radio buttons.
- Matrix IR control:** A section titled "IR signal From:" with checkboxes for HDBT1 through HDBT9, IR.ext1, and IR.ext1.



Matrix IR Control -
Choose where you can receive and IR Signal From and have those signals control the Matrix Switch

RS232 Details:

Here is a sample cable. in this example you can see how to connect or build and RS232 cable to use to control the Cloud 9. The pin configuration is shown here as well.



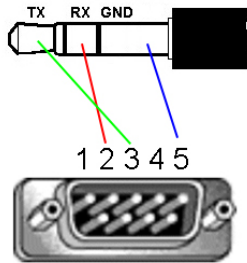
There are three RS232 ports on the Cloud 9, please see the image below for their purpose:



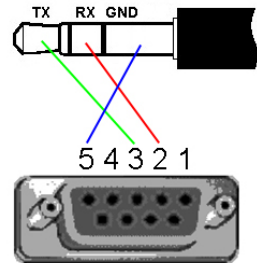
Basic RS232 Broadcast: See Page 9 - Continue for Advanced RS232 settings, routing and control.

RS232 Details: HDBaseT Receiver Pin Out

On 3.5 mm
Tip: Tx
Ring: Rx
Sleeve: Ground
9 Pin RS323 Plug



DB9 Male



DB9 Female

Device Addresses When Using Serial Communication:

NOTE: Only set device address when cascading multiple units together and using RS232 as your control method! You also have to send the device address when doing advanced routing while sending commands by serial (next page) even if it is default "A00". You NEVER use device addresses when using IP control or TELNET

When using serial communication it is good to be aware of the devices "Address" You will want to know the device address as this will determine which Cloud 9 will receive a command. All of the drivers are built so that if you use serial communication you will use ONE instance of the driver and select the size. i.e 9x18, 9x27 etc...

All Cloud 9's are address "A00" by default and if you are using just one device you do not need to place this in front of the serial command.

EX1: If you have a standalone unit and are using serial control you can just send a command without the address:

"SET OUT5 VS IN3" ----This will set Output 5 to Input 3

EX2: If you have two units in a "stack" you have to label them A01 and A02, so a command will look like:

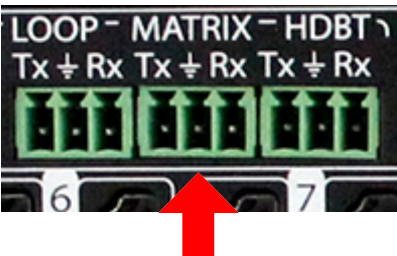
"A02SET OUT5 VS IN3" ----This will set Output 5 to Input 3 ON SWITCH TWO. Also, please note that there is no "space" between the address and the command

To set and device address you can use the PC Control Software or send the command "SET ADDR xx" (xx = 01 through 99)

Advanced RS232 Routing:

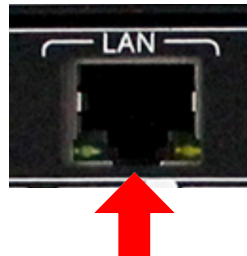
In addition to doing RS232 "Broadcast" (Described in the beginning of the manual) you can route RS232 commands to a single specific output. This allow for finite control of displays and the ability to create specific zones. You can send advanced routing commands:

1. By directly plugging a serial cable into the "Matrix" port on the Cloud 9
2. Sending Telnet commands via the LAN Port.



To do Advanced Routing, send RS232 signals here

OR



Send TELNET Commands through LAN

How to route RS232 Commands when using serial:

The routing command is very straight forward but you have to take care to make sure you format it correctly. The main thing to consider before you begin:

1. You are actually sending 2 commands (route & device command) so depending on what you are using to send the command the format varies slightly - We show some examples below.
2. You have to know the baud rate of the device you are sending the command to.
3. For "hybrid" ASCII commands, you may have to convert the numbers to the decimal value.

Ex: If the command is "ka 00 01" you only send "ka 0 1"

The Command:

The first command is your "route" and it looks like this: **AxxSET RS PTH OUTx LENx BRx**

A = Device Address (use this even if using a single unit, just put 00)

OUT = The Output you want to rout the forthcoming command to

LEN = Forthcoming command length - for ASCII this includes EVERY character including spaces. For HEX it includes only the BYTE count.

Ex1: If the ASCII command is "ka 0 1" the length is 6. Count spaces. NOTE: You can exceed the length by 2 if unsure. If you exceed the length by more than 2 it will not work.

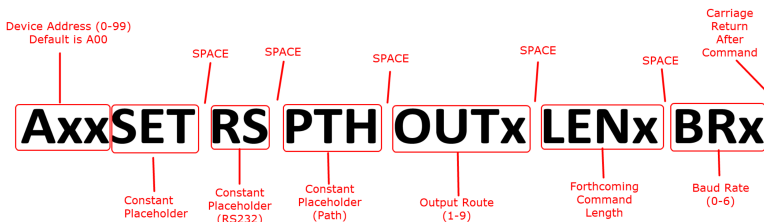
Ex2: If HEX command is "6B 68 20 30 20 31" the length is 6. Do not count spaces. Again, you can exceed by 2.

BR = Baud Rate of the device you are sending to - You use a single digit to replace "x" and they are:

- 0 - 9600
- 1 - 14400
- 2 - 19200
- 3 - 38400
- 4 - 57600
- 5 - 115200

There is a carriage return immediately following this command.

After this command you immediately follow it with the command you want to send to the device (no spaces). That command it then followed by another carriage return.



Command Examples:

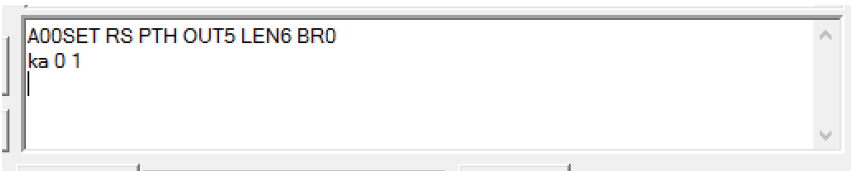
Using A Terminal Program (RS232):

In the following example we are using a program called MYUART Assist. We make this program freely available from www.avproconnect.com.

You will notice in the example that it is on 2 lines. This is because you have to separate the commands with a return.

The command below was sent through the HDBaseT Rx on Output 5 to successfully "Power On" a LG TV.

The firmware will send a command acknowledgment at 57600 to the extender. This shows up as "RS DEV MUX 0.0.0.0.0.0.0.0.0", if the end device is receiving at 57600. The Matrix itself also sends an acknowledgment commands SET RS PTH OUT5 LEN10 to confirm the rout was set and command sent.



```
A00SET RS PTH OUT5 LEN6 BR0
ka 0 1
```

Using TELNET (IP):

You can also send these commands by TELNET. When sending TELNET you **do not** send the "Axx" portion of the command. Here is an example command that has been tested:

Green = Route Command

Red = Command to be sent to device

```
"\rSET RS PTH OUT3 LEN10 BR0\r\n\rka 0 1\r\n\r"
```

This example will send the string "\n\rka 0 1\r\n" at 9600 baud to the extender on output #3.

Note that "\n" and "\r" need to be replaced by the literal newline (\n) and carriage-return (\r) characters (hex 0x0a 0x0d). How this is done is dependent on what the control system does, later you see examples from On Controls that uses HEX for commands. The leading and trailing "\r" are for the 9x9 firmware to be able to sync and parse the command correctly. The leading and trailing \n\r are for the end device to be able to parse the command. Because we added 2 characters on each end of the string, I also added 4 to the overall length.

The firmware will send a command acknowledgment at 57600 to the extender. This shows up as "RS DEV MUX 0.0.0.0.0.0.0.0.0", if the end device is receiving at 57600. The Matrix itself also sends an acknowledgment commands SET RS PTH OUT5 LEN10 to confirm the rout was set and command sent.

Using TELNET (IP): On Controls Examples

Green = Route Command

Red = Command to be sent to device

This first example is when sending an ASCII Command

```
\x0DA01SET RS PTH OUT1 LEN17 BR4\x0D\x0A\x0DSET OUT4 VS IN5\x0A\x0D\x0D
```

You can also convert to pure HEX and send a command this way:

```
\x0A\x41\x30\x31\x53\x45\x54\x20\x52\x53\x20\x50\x54\x48\x20\x4F\x55\x54\x31\x20\x4C\x45\x4E  
\x31\x37\x20\x42\x52\x34\x0D\x0A\x53\x45\x54\x20\x4F\x55\x54\x32\x20\x56\x53\x20\x49\x4E\x32  
\x0D\x0A
```

A hybrid ascii-hex combo:

Notice one less carriage return at the end of the string - because the device we were sending to did not require a carriage return at the end of the command:

```
\x0DSET RS PTH OUT1 LEN13 BR5\x0D\x0A\x0D\xAA\x02\x00\x07\x00\x00\x00\x00\x10\x03\x00\x3A  
\x0A\x0D
```

Cascading with RS232 Control:

When cascading and using RS232 you have to enable the device address in the following fashion, the example have four Cloud 9's:

- Device with OUTPUT's 1-9 = A01
- Device with OUTPUT's 10-18 = A02
- Device with OUTPUT's 19-27 = A03
- Device with OUTPUT's 28-36 = A04

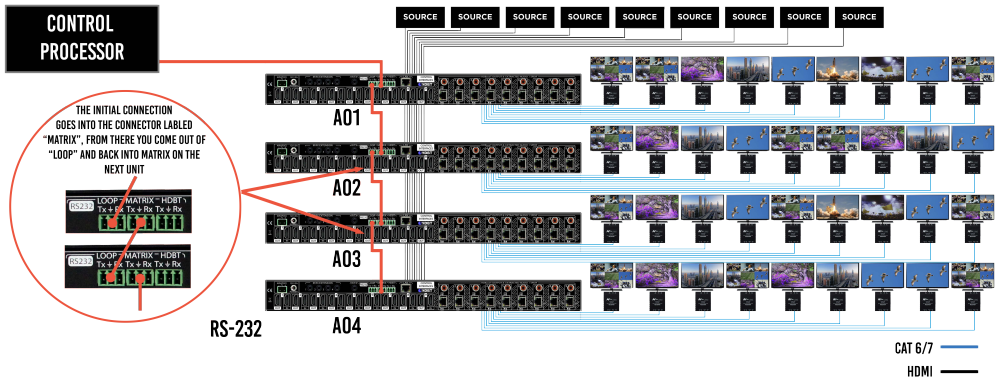
To set and device address you can use the PC Control Software or send the command "SET ADDR xx" (xx = 01 through 99)

Check with your sales rep, this is normally done if the units were purchased for a specific project.

If you are using a control driver, you can use a single instance of the driver, but you have to choose the size - 9x9, 9x18, etc...

Cascading with RS232 Control Diagram:

YOU ARE ABLE TO CONNECT AN RS232 CABLE TO THE FIRST UNIT, AND THEN DIASY CHAIN VIA RS-232 CABLE BETWEEN EACH ADDITIONAL UNIT TO CONTROL THE ENTIRE SYSTEM



Cascading with IP Control:

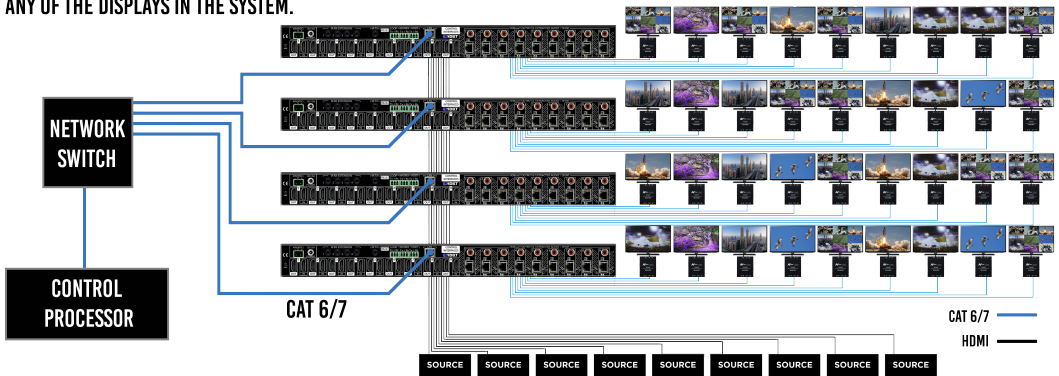
With IP you have to have a direct IP connection to each unit, and regard them as individual 9x9 matrixes. So for a 9x81 matrix with IP control, you have to connect ethernet to all 9 matrixes. If you are using a 3rd party control driver, install 9 instances of the drivers, and regard them all as individual 9x9 matrixes.

When using IP DO NOT use serial system addresses, as the IP addresses will serve the same purpose. While it can be done if one so desires, it complicates the programming.

A best practice is to set a static IP address for each unit, rather than DHCP.

Cascading with IP Control Diagram:

WITH IP CONTROL, YOU CAN CONNECT EACH UNIT IN THE SYSTEM TO ONE NETWORK SWITCH, THIS WILL ALLOW YOU CHOOSE WHAT GOES ON ANY OF THE DISPLAYS IN THE SYSTEM.



Command List & Settings

Settings: Baud Rate 57600, Data Bits 8, No Parity, 1 Stop Bit

All Commands start by Prefix System Address zz, if [01-99] If it is default (A00), no prefix is necessary

```

=====
= H : Help =
= STA : Show Global System Status =
= SET RST : Reset to Factory Defaults =
= SET ADDR xx : Set System Address to xx {xx=[00-99]}(00=Single) =
= SET CAS EN/DIS : Set Cascade Mode Enable/Disable =
= SET LCD DP MODEx : Set LCD Display Mode{x=[0~2]}(0=Always ON,1=Auto,2=Always OFF) =
= SET LCD ON Tx : Set LCD Remain On Time{x=[0~3]}(0=Always ON,1=15,2=30,3=60Sec) =
= SET KEY LOCK ON/OFF : Set Key Lock On/Off =
= SET PVW INx : Set Preview Channel x{x=[1-9]} =
= GET ADDR : Get System Address =
= GET STA : Get System System Status =
= GET CAS : Get Cascade Mode Status =
= GET LCD DP MODE : Get LCD Display Mode =
= GET LCD ON T : Get LCD Remain On Time =
= GET KEY LOCK : Get Key Lock Status =
= GET PVW IN : Get Preview Channel =
=====
=Output Setup Commands: =
= SET OUTx VS INy : Set Output x To Input y{x=[0-9]}(0=ALL, y=[1-10]}(10=Multiview) =
= SET OUTx EXA EN/DIS : Set Ex-Audio Output Enable/Disable{x=[0-9]}(0=ALL) =
= SET EXA MODEy : Set Ex-Audio Output Mode{y=[0-2]}(0=From Input,1=From output,2=Independent) =
= SET OUTx EAS INy : Set Ex-Audio Output x To Input y{x=[0-9]}(0=ALL, y=[1-9]) =
= SET OUTx MAS INy : Set HDMI Audio Output x To Input y In Multiview Mode{x=[0-9]}(0=ALL, y=[1-10]
(10=Mute)) =
= GET OUTx VS : Get Output x Video Route{x=[0-9]}(0=ALL) =
= GET OUTx EDID DATA : Get Output x EDID DATA{x=[1-9]} =
= GET OUTx EXA : Get Ex-Audio Output Enable/Disable Status{x=[0-9]}(0=ALL) =
= GET EXA MODE : Get Ex-Audio Output Mode =
= GET OUTx EAS : Get Ex-Audio Output x Audio Route =
= GET OUTx MAS : Get HDMI Audio Output x Audio Route In Multiview Mode} =
=====
=Input Setup Commands: =
= SET INx EDID y : Set Input x EDID{x=[0-9]}(0=ALL, y=[0-4]) =
= 0:1080P_2CH 1:1080P_6CH 2:USER1_EDID 3:USER2_EDID 4:USER3_EDID =
= SET INx EDID CY OUTy : Copy Output y EDID To Input x(USER1 BUF){x=[0-9]}(0=ALL, y=[1-9]) =
= SET INx EDID Uy DATAz : Write EDID To User y Buffer of Input x{x=[0-9]}(0=ALL, y=[1-3],z=[EDID Data]) =
= GET INx EDID : Get Input x EDID Index{x=[0-9]}(0=ALL) =
= GET INx EDID y DATA : Get Input x EDID y Data{x=[1-9],y=[0-4]} =
=====

```

Command List cont:

```
=Multiview Setup Command:
= SET BLW z : Set Border Line Width by z {z = [0-15]}(0=None, 1-15Pixels)
= SET BLC rrr.ggg.bbb : Set Border Line Color by RED/GREEN/BLUE{rrr=[000-255], ggg=[000-255], bbb=[000-255]}
= SET MVW MODEx : Set Multiview Mode x{x=[0-1]}(0=3x3,1=Quad)
= SET QVW VS x.x.x.x : Set Quad Video Source (x1-x4 = [1-9]) (0 leaves quadrant unchanged)
= GET BLW : Get Border Line Width
= GET BLC : Get Border Line Color
= GET MVW MODE : Get Multiview Mode
= GET QVW VS : Get Quad Video Source
-----
=Network Setup Command: ( xxx=[000-255], zzzz=[0001-9999]
= SET RIP xxx.xxx.xxx.xxx : Set Route IP Address to xxx.xxx.xxx.xxx
= SET HIP xxx.xxx.xxx.xxx : Set Host IP Address to xxx.xxx.xxx.xxx
= SET NMK xxx.xxx.xxx.xxx : Set Net Mask to xxx.xxx.xxx.xxx
= SET TIP zzzz : Set TCP/IP Port to zzzz
= SET DHCP y : Set DHCP {y=[0-1]}(0=Dis,1=Enable)
= GET RIP : Get Route IP Address
= GET HIP : Get Host IP Address
= GET NMK : Get Net Mask
= GET TIP : Get TCP/IP Port
= GET DHCP : Get DHCP Status
= GET MAC : Get MAC Address
-----
=IR Route Setup Command:
= SET IRC MUX x1.x2.x3.x4.x5.x6.x7.x8.x9 : Set the IR return Channel MUX{x1~x9=[0-1]}(0=Disable,1=Enable)
= SET IRT OUTx IS INy : Set Output x IR Route{x=[0-9]}(0=all),y=[1-4]
= SET IR EXT SW x1.x2.x3.x4.x5.x6.x7.x8 : Set IR Extender Switch{x1~x9,y1~y4=[0-1]}(0=Disable,1=Enable)
= .x9.y2.y3.y4 :
= GET IRC MUX : Get the IR MUX Status
= GET IRT OUTx IS : Get Output x IR Route{x=[0-9]}(0=all)
= GET IR EXT SW : Get IR Extender Switch Status
-----
=RS232 Route Setup Command:
= SET RS MUX x1.x2.x3.x4.x5.x6.x7.x8.x9 : Set the RS232 MUX{x1~x9=[0-1]}(0=Disable,1=Enable)
= SET RS PTH OUTx LENy BRz : Set RS232 Pass Through to Output
= {x=[0-9]}(0=ALL),y=[1~800],z=[0~5]}(0=9600,1=14400,2=19200,3=38400,4=57600,5=115200)
= GET RS MUX : Get the RS232 MUX Status
-----
=IR Code Setup Command:
= SET IR SYS xx.yy : Set IR Custom Code{xx=[00-FFH],yy=[00-FFH]}
= SET IR OUTx INy CODE zz : Set IR Data Code{x=[1-9],y=[1-10],zz=[00-FFH]}
= GET IR SYS : Get IR Custom Code
= GET IR OUTx INy CODE : Get IR Data Code
-----
```

Extracted Audio:

The extracted audio ports have distinct operating modes. Your desired mode can be set to suite your particular installation. The 3 modes are:

From Input ~ This is the default configuration. In this mode the audio port number corresponds to the INPUT signal. This is ideal for systems where audio is matrixed separately in a zoned amplifier.

From Output ~ This configuration will automatically have the audio follow OUTPUT, so the audio from the extracted port always matches the HDMI output. This is ideal for systems that use local AVR's for some of the zones.

Independent ~ This mode allows you matrix the extracted audio outputs independent of HDMI. In this mode a new set of commands becomes available to be able to route audio however you want. This can be used as a separate zoned audio matrix with only using an amplifier.

Setting up Extracted Audio Routing:

You can set up Extracted Audio Routing in the PC Software, Driver or by sending the following command:

SET EXA MODEy -- Where (y=0-2) 0=From Input, 1=From Output, 2=Independent.

If you set to "Independent" a new set of commands is available to you to matrix the ports:

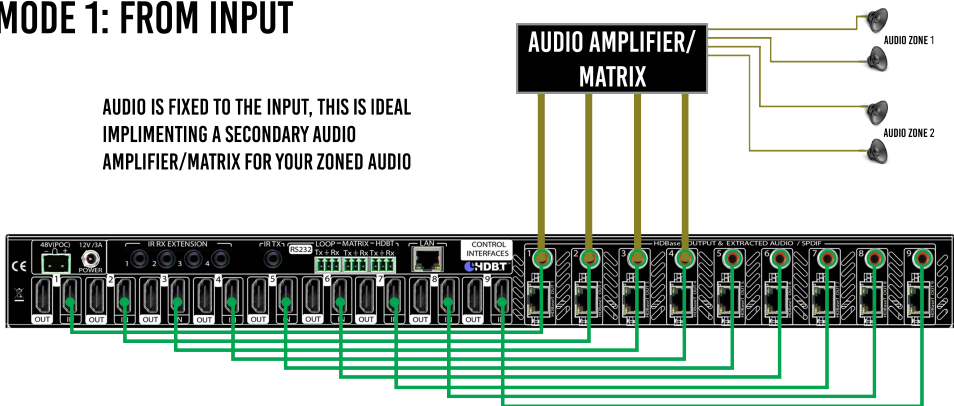
SET OUTx EAS Iny -- Where (x=0-9) 0=ALL, 1-9=Desired Output & (y=1-9) 1-9=Desired Input

NOTE: Extracted Audio Ports are PCM 2CH audio up to LPCM 6 CH, Dolby Digital 5.1 & DTS. No down-mix.

Audio Diagrams:

MODE 1: FROM INPUT

AUDIO IS FIXED TO THE INPUT, THIS IS IDEAL IMPLEMENTING A SECONDARY AUDIO AMPLIFIER/MATRIX FOR YOUR ZONED AUDIO



Extracted Audio cont:

Audio Diagrams:

MODE 2: FROM OUTPUT

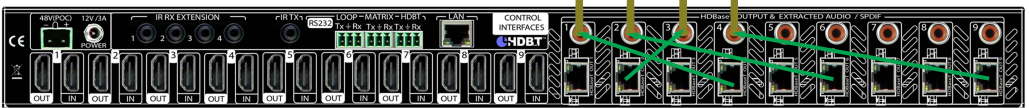
AUDIO AUTOMATICALLY
FOLLOWS THE OUTPUT



IN THIS MODE THE AUDIO OUTPUT WOULD MATCH THE VIDEO BEING DISTRIBUTED IN THAT OUTPUT BLOCK

MODE 3: INDEPENDENT

AUDIO IS ROUTED COMPLETELY
INDEPENDENTLY FROM ANY OUTPUTS



MATCHES VIDEO OUTPUT WITH AUDIO OUTPUT →

Multiview Setup and Usage:

The Multiview display can be matrixed just like a "source". Actually it is easiest to think of the Multiview as your "10th" source. The Multiview function on the Cloud 9 has 2 distinct operating modes, the Cloud 9 is capable of EITHER 3x3 View OR Quad View:

3x3 Mode ~ In this mode all 9 sources will show on a single display

Quad View Mode ~ In this mode 4 sources will show on one screen.

The Cloud 9 is capable of switching instantly between 3x3 & Quad View. Here are the default configurations:

3x3 Multiview Mode (Fixed)

1	2	3
4	5	6
7	8	9

Quad View (Matrixable)

1	2
3	4

Quad View Matrix:

After you set the Cloud 9 to Quad View Mode, you can set each quadrant using the command showed here:

SET QVW VS 5.3.1.4

This will set Quad 1 to IN 5, Quad 2 to IN 3, Quad 3 to IN 1, and Quad 4 to IN 4. Doing it this way is ideal for having preset modes.

Additionally, you can matrix or address one quadrant independently by just sending it with "0" to not change a quadrant. So it would look like this example:

SET QVW VS 0.0.5.0

This will set Quad 3 to IN 5 and leave the other 1,2 and 4 unchanged. This makes a true real-time matrix for each Quadrant.

The logic on the Quad View mode work in a way that wont allow you to put 2 things up at the same time so, for example, if you set Quad 1 to IN 1 and Quad 4 is already on IN 1, they will swap.

This is available in the PC Software and most drivers as well, please check with your representative for the most current information on drivers.

Multiview cont:

HDMI Audio When in Multiview:

The audio from HDMI can also be switched when in Multiview mode (3x3 or Quad View). You can do this easily from the PC software, driver or using the command here:

SET OUTx MAS INy --

x=0-9 (0=ALL OUTPUTS IN MULTIVIEW, 1-9=Desired Output)
&
y=1-10 (1-9=Desired Input, 10=Mute)

Multiview with a serial cascade:

If you are using serial (RS232) control to cascade multiple units together, you will have one multiview configuration, so this means that every display that switches to "MV" it will receive the same image, no matter what unit the output is connected to.

See diagram on next page.

Multiview with a IP cascade:

IP Cascading give you another unique element with Multiview mode. You can have separate multiview configurations per Cloud 9. Sources connected to specific Cloud 9's can behave differently when switched to "MV":

- Outputs 1-9 (Connected to matrix 1) can have a 3x3 when switched to "MV"
- Outputs 10-18 (Connected to matrix 2) can have a Quad View (wit independent quadrant control)
- Outputs 19-27 9Connected to matrix 3) can have a separate Quad View (with independent control)

See Diagram on next page.

Additional Multiview Functionality:

You can also do some mild customization of the appearance of the multiview screen. You can:

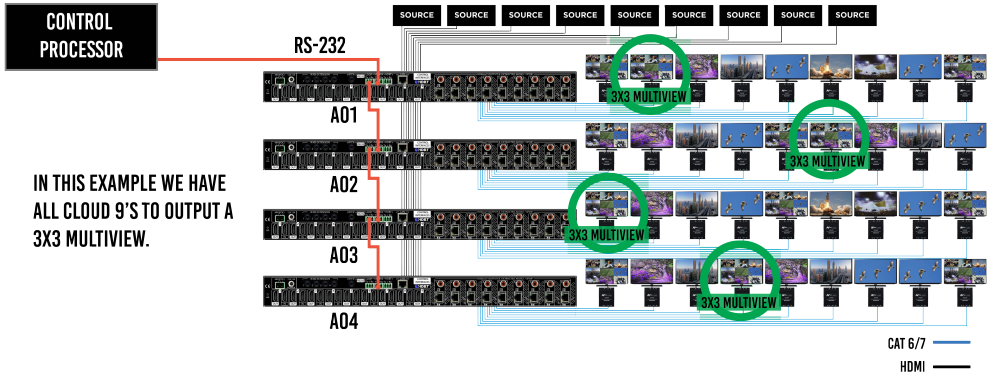
- Set the boarder line pixel width between the images
- Set the color of the boarder line with a R-G-B color coordinate

By default the boarder width is 1 px and the color is white. Consult the command list for setting options, or use the Free PC Software

Multiview Examples:

RS232:

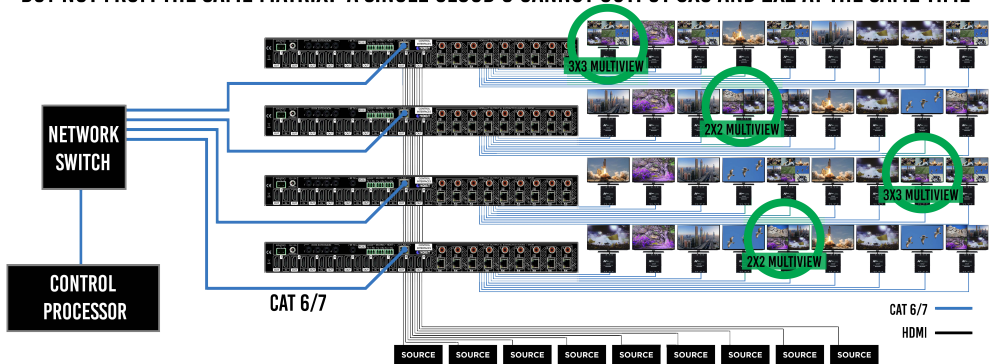
WHILE CASCADING WITH RS-232 CONTROL, YOUR MULTIVIEW MODE MUST BE SELECTED TO ALL 2X2 MULTIVIEW OR ALL 3X3 MULTIVIEW, YOU ARE NOT ABLE TO HAVE THEM BOTH UP AT THE SAME TIME.



IN THIS EXAMPLE WE HAVE ALL CLOUD 9'S TO OUTPUT A 3X3 MULTIVIEW.

IP Control

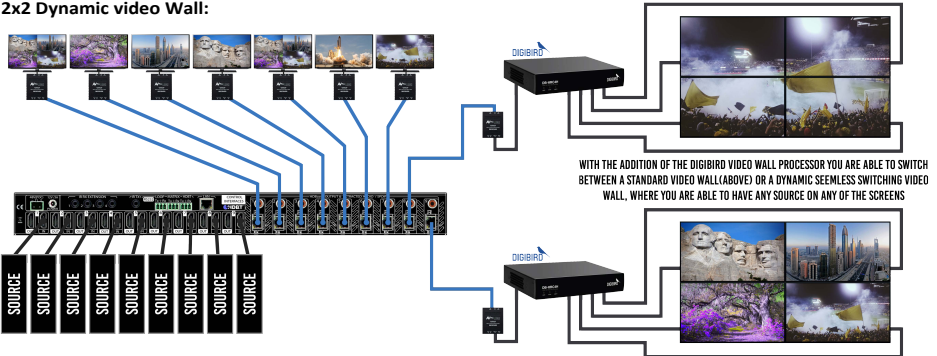
WHEN CONTROLLING WITH IP AND CASCADING, YOU CAN HAVE 3X3 AND 2X2 MULTIVIEW AT THE SAME TIME, BUT NOT FROM THE SAME MATRIX. A SINGLE CLOUD 9 CANNOT OUTPUT 3X3 AND 2X2 AT THE SAME TIME



Video Wall:

The Cloud 9 has proprietary FPGA technology built in that allows it to do the robust multiviewing (described above). This can be paired with the DigiBird video wall processor, offering a low cost highly robust video walls in these systems. While a video wall is only limited by your own creativity, there are 2 simple ways to do it:

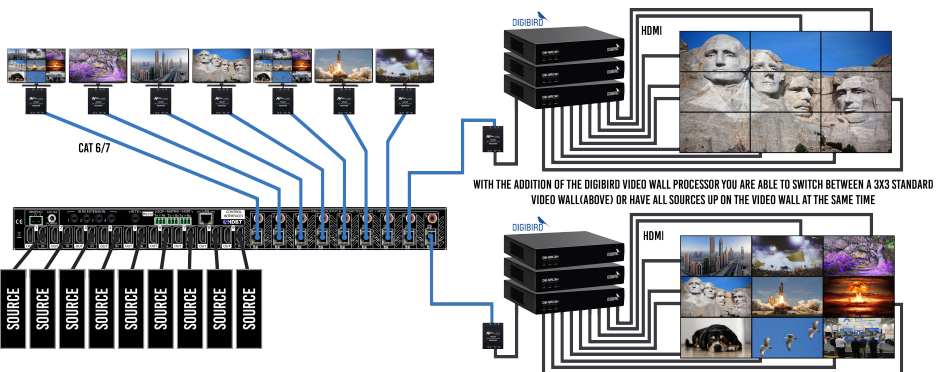
2x2 Dynamic video Wall:



EACH QUADRANT CAN BE MATRIXED INDIVIDUALLY WHILE IN 2X2 MULTIVIEW MODE:

INPUT 1-9	INPUT 1-9
INPUT 1-9	INPUT 1-9

3x3 Switchable Video Wall:



WHEN IN 9 SCREEN MULTIVIEW MODE, YOU ARE NOT ABLE TO MATRIX WITHIN THE MULTIVIEW DISPLAYS, THE INPUTS ARE IN A STANDARD FORMAT SHOWN HERE:

INPUT 1	INPUT 2	INPUT 3
INPUT 4	INPUT 5	INPUT 6
INPUT 7	INPUT 8	INPUT 9

Video Wall cont:

Using the DigiBird also offers you the ability to do stylized video walls with very little effort. The processing power the Cloud 9 and the simple programming of the DigiBird make for a compelling video wall that you don't need to make custom content for. To learn how simple it is to create a video wall like this contact us or download the software from www.avprostore.com. Again, you are only limited by your creativity, but here are some popular examples:



Windmill



Doughnut



Asymmetric



2x2 Layouts



Windmill



Doughnut



Asymmetric



45°



135°



135° & 225°



135° & 315°

PC Control Software - Side Bar:

Note: PC Control Software can be used when connected to the "Matrix" port using RS232.

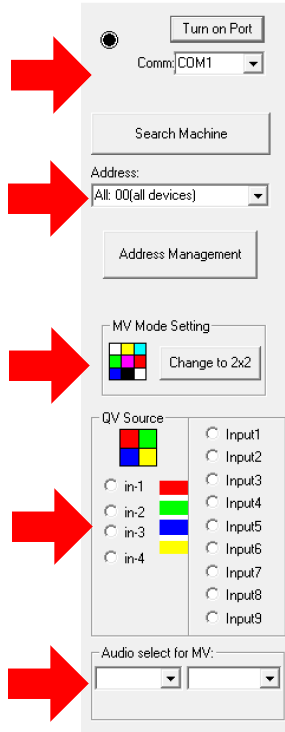
Connection Area - Use the drop down to select the COM Port or press "Search Machine" to search your computer for open COM Ports. The light will be red if there is a successful connection.

Select/Manage Addresses - Use the drop down to select the Address of the device you want to control (If cascading multiple units). Press "Address Management" to set the Addresses. View "Address Management" Tab later for more.

Toggle Multiview Mode Setting - Click this button to toggle between 3x3 Multiview and Quad view.

Quad View Matrix Control - Use this section to set the source for individual quadrants when in Quad View. First select the Quad you want (Red, Green Blue or Yellow), then choose the input .

Audio Selection in Multiview - Use this section to select the audio you want to hear in multiview mode. This is for the HDMI audio. First drop down selects the Output, the second one selects the audio source.



PC Control Software - Video Tab:

Note: PC Control Software can be used when connected to the "Matrix" port using RS232.

Switching - Simply choose the INPUT radio button you want to see on each output. MV = Multiview

The screenshot shows the 'VIDEO' tab selected in the software interface. Below the navigation tabs, there are nine output sections labeled 'Out1' through 'Out9', and an 'All Output Port' section. Each section contains radio buttons for inputs 'in1' through 'in9' and 'MV'. At the bottom, there is a 'Border line setting' section with a 'Width' input field set to '0', and color selection buttons for red, green, and blue, each with an input field set to '0'. An 'Update' button is located to the right of these color fields.

Set Multiview Border Color/Width- Use this area to set the multiview border line width (1-15 Pixels) and the color. For color use a RGB color mixture. Click update to make the change.

PC Control Software - EDID Tab:

Note: PC Control Software can be used when connected to the "Matrix" port using RS232.

Set EDID - Choose the EDID you want to use from the drop down and press "Apply to Input x" to set it.

Load EDID-
This allows you to load a previously saved EDID File and store it to a "User" Memory.

Read EDID and save as file- Select the Output from the drop-down and click the button to save the EDID as a file, you can upload the EDID later and apply it to one of the "USER" EDIDs. You can then apply that USER EDID to one or more of the inputs.

EDID Information- This box shows basic EDID information from the output chosen in the drop-down on the left.

PC Control Software - IP Config Tab:

Note: PC Control Software can be used when connected to the "Matrix" port using RS232.

The screenshot shows the 'IP CONFIG' tab of the software interface. At the top, there are navigation tabs: VIDEO, EDID MANAGEMENT, IP CONFIG, and SETTING. A red arrow labeled 'Reset to default' points to a 'Reset to Default Setting' button on the right side. On the left, a red arrow labeled 'Toggle DHCP' points to a checkbox labeled 'DHCP'. Below this, a red arrow labeled 'Set IP Settings' points to a section titled 'ip address setting' which contains three input fields: 'Host IP Address:', 'Net Mask:', and 'Router IP Address:'. Below these fields are two more input fields: 'MAC Address(hex):' and 'TCP Port:'. At the bottom center, a red arrow labeled 'Save Settings' points to a 'Save Setting' button.

PC Control Software - Settings Tab:

Extracted Audio mode-
Choose audio routing configuration on the extracted ports.

HDBT IR Rout - Select the IR Port the Rx receives from.

Matrix IR Control -
Choose where you can receive and IR Signal From and have those signals control the Matrix Switch

Load EDID-
This allows you to load a previously saved EDID File and store it to a "User" Memory.

The screenshot shows the 'SETTING' tab of the software interface. It is divided into several sections: 'Deembedded Audio Mode' with radio buttons for 'Follow the input', 'Follow the output', and 'Independent routing'; 'Independent Audio Routing' with dropdown menus for Out1 through Out9; 'HDBT IR Out (to TV) Route Setting' with dropdown menus for Out1 through Out9 and an 'All from' dropdown; 'Matrix IR control' with checkboxes for HDBT1-HDBT8 and IR_ext1; 'IR Emitter from:' with checkboxes for Out1-9; 'RS232 Routed To:' with checkboxes for Out1-9; and 'Deembedded audio On/Mute' with On/Mute buttons for Out1-9. Red arrows point from external text blocks to these sections.

Read EDID and save as file- Select the Output from the drop-down and click the button to save the EDID as a file, you can upload the EDID later and apply it to one of the "USER" EDIDs. You can then apply that USER EDID to one or more of the inputs.

IR Emitter From - Choose what IR Signals come out of the IR TX Port on the Matrix

RS232 Routed To - Choose which HDBT Rx receives a "Broadcast" IR Signal

PC Control Software - Address Management:

Read/Set Address- You can read the address of the current connected device and write a new one here. **NOTE: When reading and writing address only connect one device at a time!**

Address Table - This is RS232 Command Routing, after you give the addresses, you can make labels in this table for quick recall on the "Side Bar" Tab. **THIS TABLE DOES NOT SET ADDRESSES.** It is strictly for labeling & routing within this software. This can be helpful if you want to use multiple units and PC Control. It Automatically puts the Address command in for correct routing, also you can send"00" to manage ALL Matrixes at once

Save Button

Web Interface: Sense Switch

To access the Web Interface, simply type in the IP address of the device. The default IP address 192.168.001.239, if you have setup a different IP or are not sure simply view the "Net" section on the control screen on the front panel.

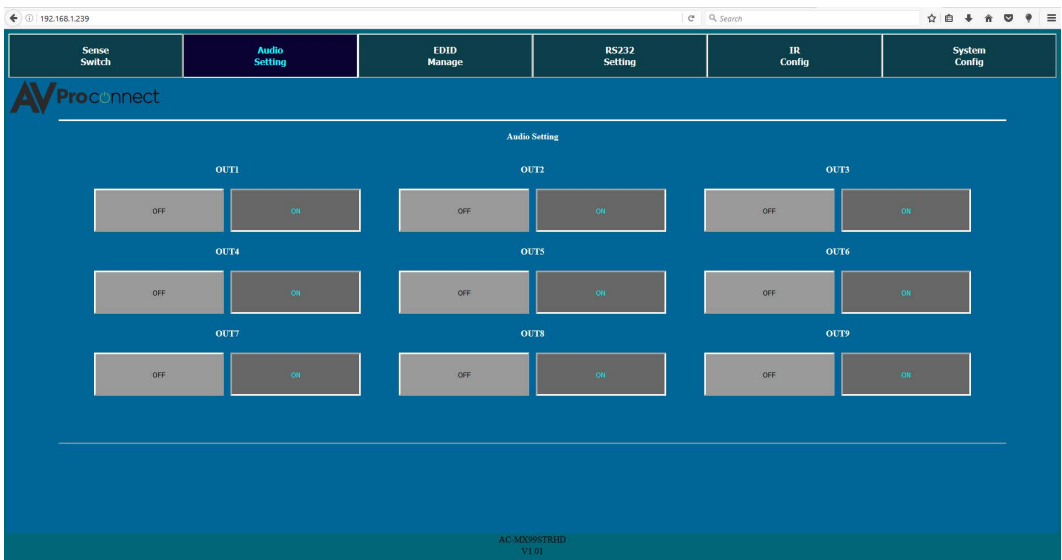
The Sense Switch page is the main page of the Web Interface. Here you can easily control switching of the matrix. With this screen you can also see the current routes and also set Multiview for a specific output.

NOTE: The inputs and outputs can be labeled in the "System Config" Tab.

	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT1	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT2	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT3	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT4	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT5	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT6	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT7	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT8	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV
OUT9	IN1	IN2	IN3	IN4	IN5	IN6	IN7	IN8	IN9	MV

Web Interface: Audio Setting

The Audio Setting tab allows to to ENABLE or DISABLE the extracted audio ports. ON means that audio will play out of the SPDIF Coax port. OFF means that that port will NOT play audio.

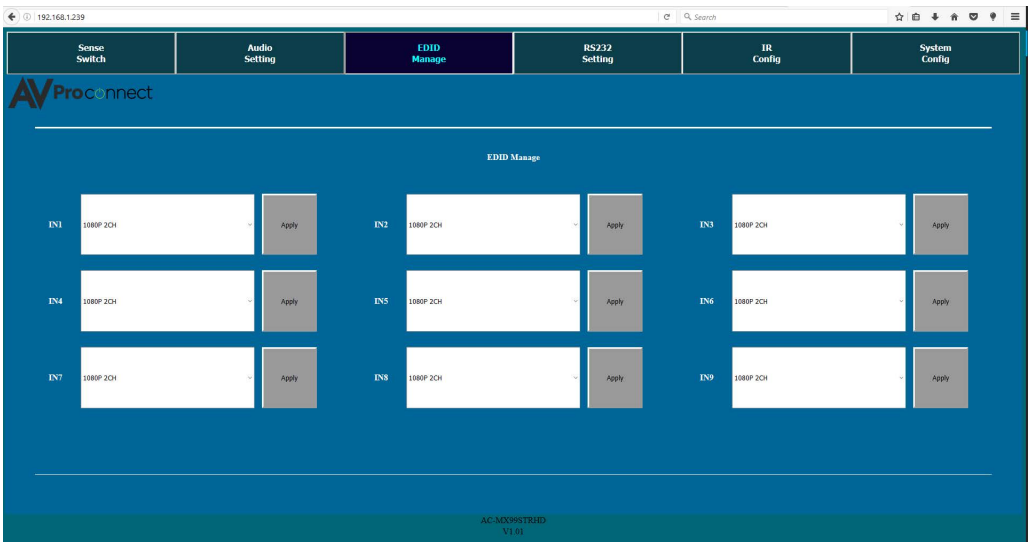


Web Interface: EDID Manage

The EDID Manage tab allows you to set the EDID for each input. To set the EDID:

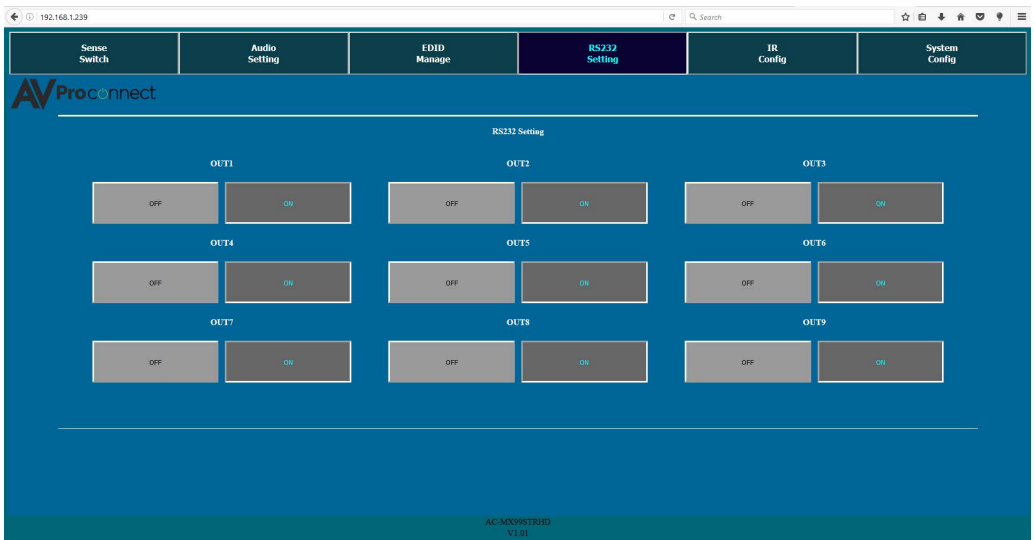
1. Select the desired EDID form the drop down menu of the input you want.
2. Press Apply

Available EDID Options: 1080P 2CH (Default), 1080P 6CH, USER1 (Custom), USER2 (Custom), USER3 (Custom)



Web Interface: RS232 Config

The RS232 Setting tab allows you to ENABLE or DISABLE with HDBASET outputs will get a broadcast RS232 command. NOTE: These ports must be ON if you are using advanced routing. For more on RS232 routing please see the RS232 sections above.

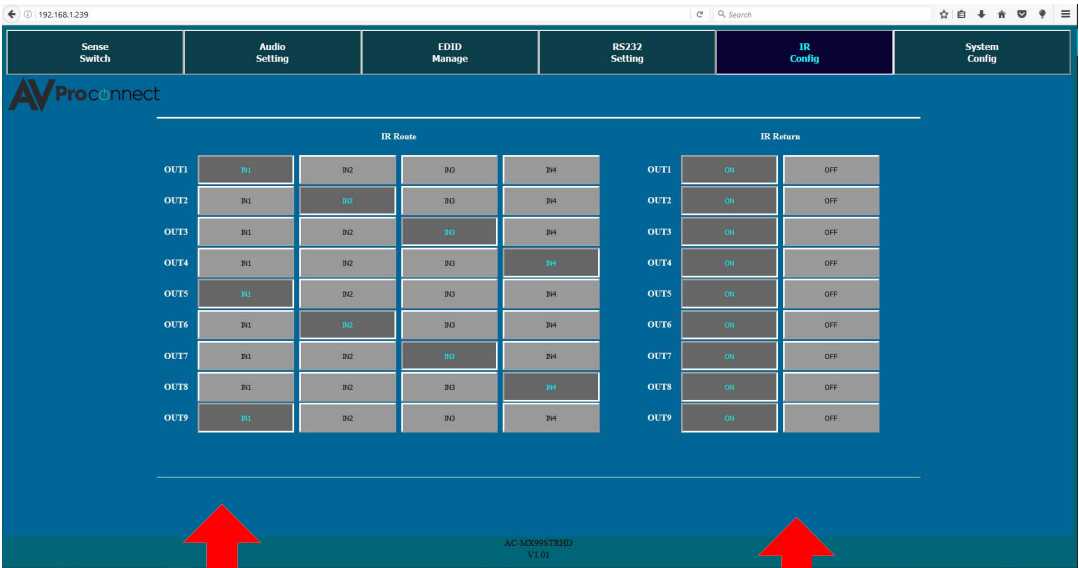


Web Interface: IR Config

The IR Config tab allows you to set up 2 basic IR Routes:

1. Routing IR Inputs on the matrix to the HDBT receivers
2. Which HDBaseT Receivers can send commands back to the IR out on the Matrix

For more advanced information of IR routing please see the IR section of the Manual.



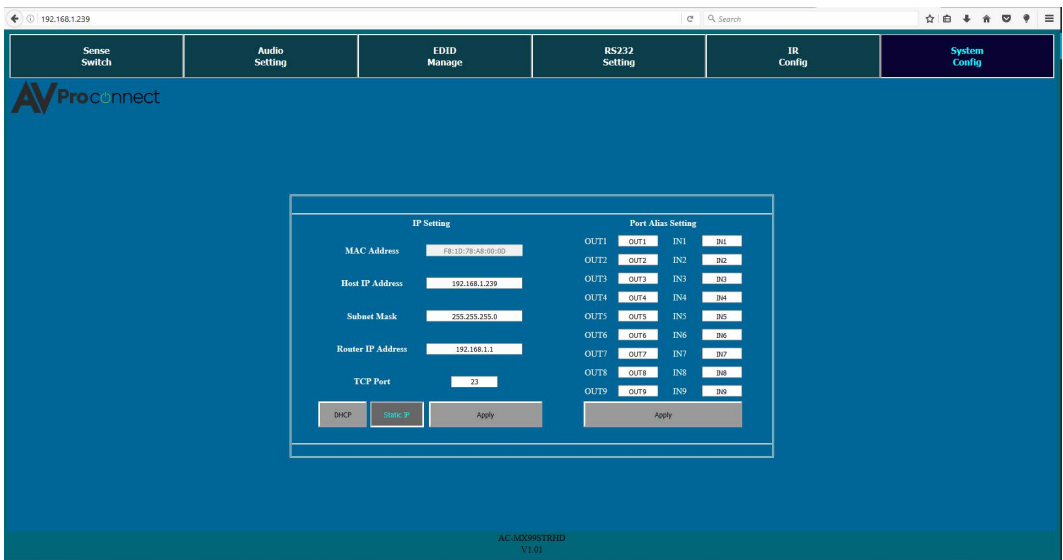
Set IR routes TO the HDBT Receivers. A single IR signal can go to one or many.

Sets what HDBT Receivers can route back to the Matrix

Web Interface: System Config

The System Config tab let you achieve two functions.

1. Setting up your network (IP) settings
2. Labeling the Inputs and Outputs for the "Sense Switch" Tab



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Cascading with IP Control:

With IP you have to have a direct IP connection to each unit, and regard them as individual 9x9 matrixes. So for a 9x81 matrix with IP control, you have to install 9 instances of the drivers, and regard them all as individual 9x9 matrixes.

In this case, it is best NOT to use system addresses, as the IP addresses will serve the same purpose.

A best practice is to set a static IP address for each unit, rather than DHCP.

Cascading with IP Control Diagram:

Thank you for choosing AVProConnect!

Please contact us with any questions, we are happily at your service!



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