



## IP Video with Audio Processing

PAV-VIMAP8S | PAV-VIMAP4S

### Deployment Guide

Document Number: 009-1621-00

Document Date: June 2018

Document Supports: da Vinci 8.8

# Contents

To access the link to the topics in this document, click the topic page




1	Introduction.....	4
2	Deployment Steps.....	6
3	IP Video Equipment Overview .....	7
3.1	Box Contents and Specifications.....	7
3.2	PAV-VIMAPxS.....	7
3.3	PAV-VOMVP1x.....	9
4	Wiring and Connections.....	10
4.1	HDMI Cables .....	10
4.2	10G Ethernet.....	10
4.3	1G Ethernet/LAN.....	10
4.4	IR Wiring.....	11
4.5	RS-232 Wiring.....	11
4.6	Network .....	12
4.7	AC Power Connection.....	12
4.8	Checking and Replacing the Fuse.....	12
5	Installation .....	13
6	Blueprint Configuration.....	14
6.1	Basic Blueprint Layout.....	14
6.2	Adding a Video Input IP Transmitter to a Configuration .....	15
6.3	Adding a Video Output IP Receiver to a Configuration .....	16
6.4	Adding a 10G switch to a Configuration .....	17
6.5	Adding an AVB/TSN Switch.....	18
6.6	Making 10G/AVB Connections .....	19
6.7	External AVB Sources .....	20
7	Best Practices .....	21
8	System Monitor .....	22
8.1	Video/Audio Status.....	22
8.2	Video/Audio Setting.....	23
8.3	NetGear Switch Information .....	24
	Appendix A: 10G Network Requirements .....	25
	Appendix B: Accessories.....	26
	Appendix C: UPS Recommendations.....	28
	Appendix D: EDID Optimization .....	29

## Important Safety Information - Read First

Before installing, configuring, and operating Savant equipment and other vendor equipment, Savant recommends that each dealer, integrator, installer, etc. access and read all the required technical documentation. Savant technical documentation can be located by visiting [Savant.com](http://Savant.com). Vendor documentation is supplied with the equipment.

**Read and understand all safety instructions, cautions, and warnings in this document and the labels on the equipment.**

### Safety Classifications in this Document

<b>NOTE:</b>	Provides special information for installing, configuring, and operating the equipment.
 <b>IMPORTANT!</b>	Provides special information that is critical to installing, configuring, and operating the equipment.
 <b>CAUTION!</b>	Provides special information for avoiding situations that may cause damage to equipment.
 <b>WARNING!</b>	Provides special information for avoiding situations that may cause physical danger to the installer, end user, etc.

### Electric Shock Prevention

#### **ELECTRIC SHOCK!**

The source power poses an electric shock hazard that has the potential to cause serious injury to installers and end users.

#### **ELECTRICAL DISCONNECT:**

The source power outlet and power supply input power sockets should be easily accessible to disconnect power in the event of an electrical hazard or malfunction.

### Weight Injury Prevention

#### **WEIGHT INJURY!**

Installing some of the Savant equipment requires two installers to ensure safe handling during installation. Failure to use two installers may result in injury.

## Safety Statements

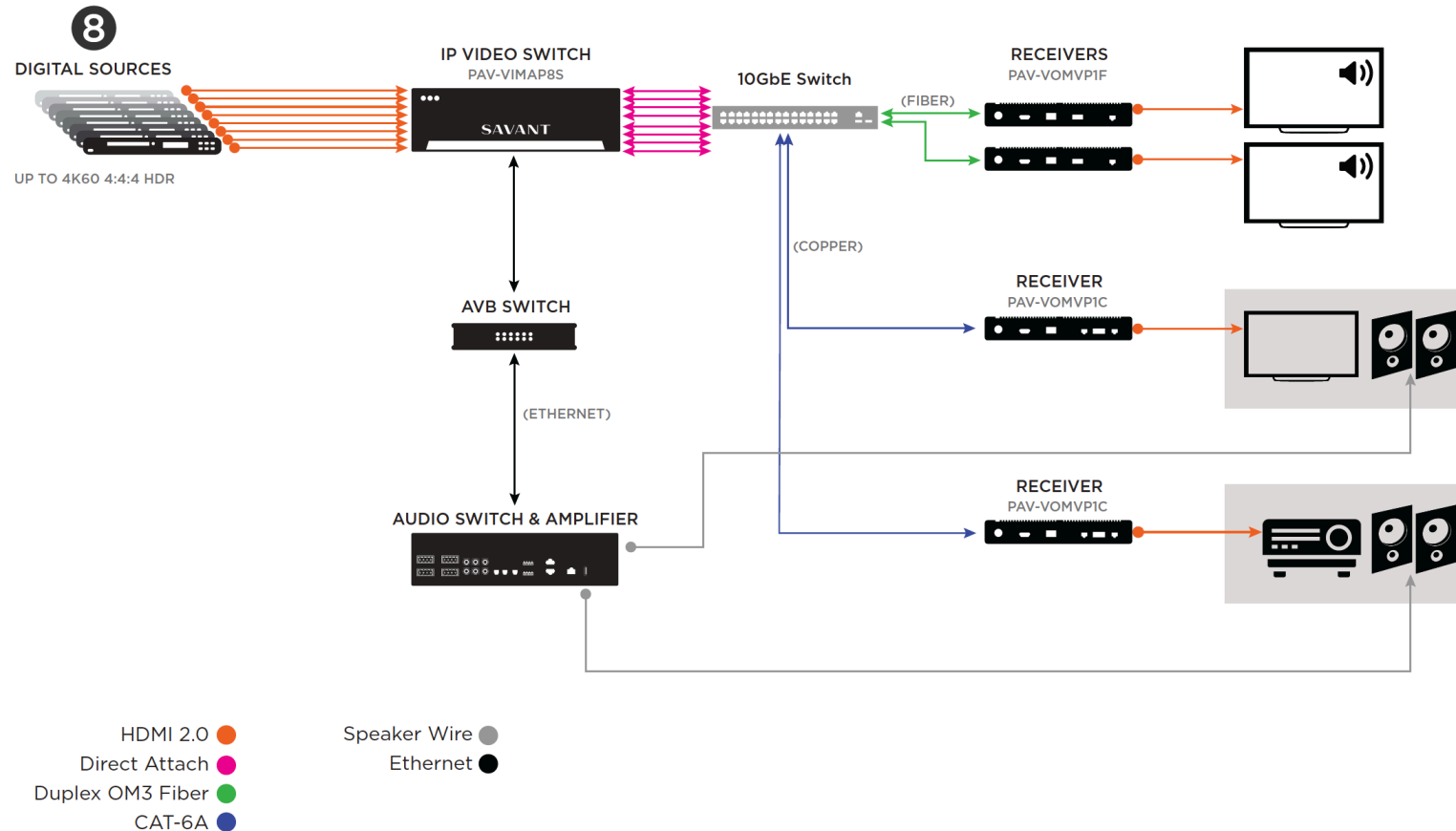
Follow all of the safety instructions listed below and apply where applicable. Additional safety information will be included where applicable.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. To completely disconnect this equipment from the AC mains, disconnect the power supply cord plug from the AC receptacle.

# 1 Introduction

The Savant IP Video is a scalable UHD (4K) Video Matrix using a Savant verified 10G network switch. This document will guide the installer through the process of installing, configuring, and adding Savant IP Video devices to a RacePoint Blueprint® configuration.

The figure below is a basic system diagram showing a PAV-VIMAP8S and a PAV-SIPA50SM to distribute the audio to some of the zones.



The audio processing chassis can provide four audio paths with the system. Below is a list of these paths and a description of their basic function.

**Pass-through** – encoded audio that is received from the HDMI is passed to the HDMI endpoint.

**Down-mix to AVB** – encoded audio is down-mixed to stereo and distributed to any AVB endpoint.

**Down-mix through HDMI** – encoded audio is down-mixed and embedded back into the IP Video stream, so it can be distributed to any PAV-VOM endpoint.

**AVB to HDMI** – Stereo audio that is received from any AVB source can be routed through the HDMI paths in the IP Video system.

## Before You Begin

Read through this document in its entirety and ensure that the following required items are available:

1. Savant IP Video Input Transmitter ..... ☐
2. Savant IP Video Single Port 4K UHD Video Output Receiver ..... ☐
3. 10G Network Switch that meets Savant requirements ..... ☐  
(see [Appendix A: 10G Network Requirements](#))
4. Unique IDs (UID) of the IP Video devices ..... ☐  
(located on the back of the units)
5. Savant Pro Host licensed and running da Vinci 8.8 or higher ..... ☐  
(Mac based Pro Host only)
6. Savant Development Environment (SDE/MacBook®) ..... ☐  
RacePoint Blueprint da Vinci 8.8 or higher
7. Source equipment that will be used in the system ..... ☐
8. Displays that will be used in the system ..... ☐

# 2 Deployment Steps

Follow these steps to successfully deploy Savant IP Video devices. This page can be used as a checklist to record which steps have been completed.

- 1. Review product specifications and connection details.....☐  
See [IP Video Equipment Overview](#)
- 2. Install the Savant IP Video devices.....☐  
See [Installation](#)
- 3. Install Savant qualified 10G Network Switch .....☐  
See the IP Video Network Configuration Guide
- 4. Add the Savant IP Video devices into a RacePoint Blueprint® configuration .....☐  
See [Blueprint Configuration](#)

### 3 IP Video Equipment Overview

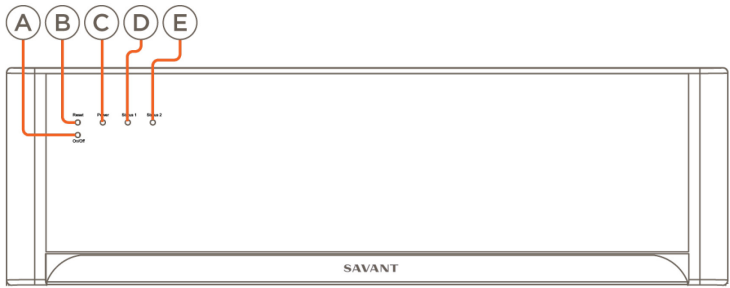
This section covers the IP Video Audio Processing chassis and just the PAV-VOMVP1x for information on deploying other IP Video devices see the **Savant IP Video Deployment Guide** on the **Savant Customer Community**.

#### 3.1 Box Contents and Specifications

Refer to the Quick Reference Guide for these products located on the **Savant Customer Community** for Box Contents and Specifications.

#### 3.2 PAV-VIMAPxS

Front Panel



Ⓐ	On / Off Button	Reboots the main board (mcu) and power cycles the IP Video transmit (Tx) cards
Ⓑ	Reset Button	<b>Press and Release</b> - Resets the IP Video transmit (Tx) cards. <b>Press and hold</b> - Clears the network settings. Press and hold button for 5 seconds until Status LED blinks red rapidly; then release.
Ⓒ	Power LED	<b>Off</b> - Device is off. No power applied. <b>Green</b> - Main board is powered

Ⓓ Status 1 LED

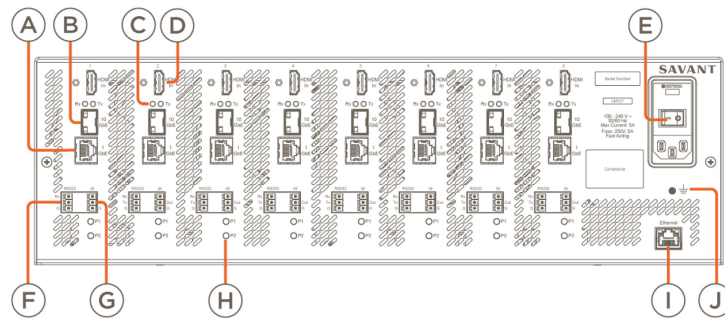
**Green Blinking:** Embedded system is ready, but no communication has been established with the host.  
**Green:** Host has established communications with the embedded system.  
**Red Blinking:** Embedded firmware is running, but has not received a DHCP IP Address.  
**Red:** Host has determined the firmware needs to be updated, but a problem occurred during the process that will initiate a reset.  
**Amber Blinking:** Embedded system has a valid link local IP Address and is connecting to the host.  
**Amber:** Host is updating the embedded firmware.  
**Off:** Embedded processor is resetting, or is powered up, and is booting the embedded firmware.

Ⓔ Status 2 LED

**Hardware Failure:** If a hardware failure occurs, the status LED indication will be interrupted every three seconds with a solid red indication. For example, if the LED is blinking green when a hardware failure occurs, the LED will alternate between blinking green and solid red at three-second intervals.

Reserved for future use.

## Rear Panel



(A) 1 Gigabit Ethernet

1G of reserved network data bandwidth commonly used to connect any network compliant device to transmit its data onto the Ethernet network by sharing the 10G network link. 8-Pin RJ-45 female connection.

This is a courtesy port it will not work for all network functions. Example: Spanning tree devices are not supported by this port.

**IMPORTANT!** Do not connect these ports to a network switch.

(B) 10 Gigabit Ethernet

SFP+ Housing; Used for connectivity to the 10G Ethernet Network Switch

**IMPORTANT!** For all 10G connections, use only Savant certified SFP+ Direct-Attach Copper (DAC) cables, or Savant certified fiber and fiber connectors along with Savant certified SFP+ modules.

(C) Rx/Tx LEDs (10 GbE)

Rx - Link Activity LED indicator for all data received on the 10G connection  
Tx - Link Activity LED indicator for all data transmitted from the 10G connection

(D) HDMI In

19-Pin Type A HDMI female digital audio/video input.  
Supports HDMI 2.0a  
HDMI 2.0 compliant cable is required for 4K content.

(E) Power Input Module

100-240V AC 5A 50/60Hz power input module with On/Off switch.  
I - Applies power to the device.  
O - Removes power to the device.  
**NOTE:** Includes a field replaceable 5A 250V Fast acting fuse.

(F) RS-232 Control Port

3-pin Screw down plug-in connection.  
Transmits and receives serial data to and from serial controllable devices. For pin-out information, refer to the RS-232 Wiring section below

(G) IR Control Port

3-pin Screw down plug-in connection.  
Transmits IR signals via an IR Flasher (5V tolerant) to devices with an IR input or IR receiver. For pin-out information, refer to the IR Wiring section below.

(H) Push Buttons

Reserved for future use.

(I) Ethernet

8-Pin RJ-45 female connection. Used to communicate with the Savant System Host.  
Supports Audio Video Bridging (AVB)/Time Sensitive Networking (TSN)  
**NOTE:** This port must be connected to a AVB switch in order to use the breakout down-mixed audio.

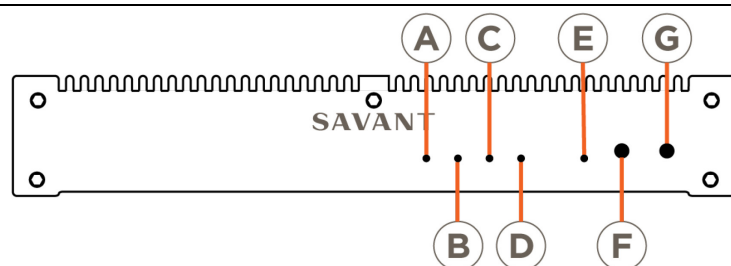
(J) Grounding

Chassis Ground (optional)



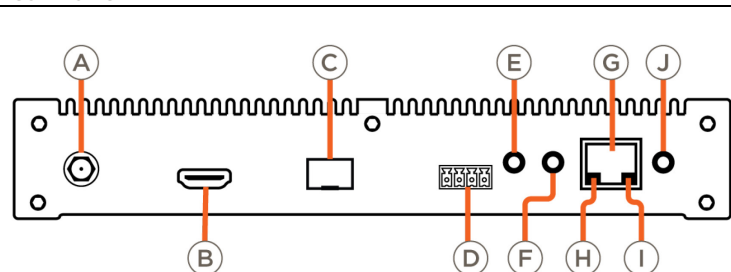
### 3.3 PAV-VOMVP1x

#### Front Panel



(A)	RSVD LED	Reserved for future use. <b>Blue</b> - LED on by default.
(B)	Link TX LED	<b>Off</b> - No valid connection <b>Blue</b> - Valid link <b>Blinking</b> - Sending Ethernet Data
(C)	Link RX LED	<b>Off</b> - No valid connection <b>Blue</b> - Valid link <b>Blinking</b> - Receiving Ethernet
(D)	Video LED	<b>Off</b> - No video signal detected. <b>Blue</b> - Video signal detected.
(E)	Power LED	<b>Off</b> - Device is off. No power applied. <b>Red</b> - Main board is powered
(F)	P1	Reserved for future use.
(G)	RSVD	Reserved for future use.

#### Rear Panel



(A)	Power Input	12V DC
(B)	HDMI Out	19-Pin Type A HDMI female digital audio/video output. Supports HDMI 2.0a HDMI 2.0 compliant cable required for 4K content.
(C)	Optical In or 10 GbE	10G input from the Audio/Video over IP 10G network switch. SFP+ (PAV-VOMVP1F) RJ-45 (PAV-VOMVP1C)
(D)	RS-232	4-pin Control Connector. Transmits and receives serial data to and from serial controllable devices. For pin-out information, refer to the <a href="#">RS-232 Wiring</a> section below.
(E)	IR OUT	3.5 mm IR Emitter connection. Transmits IR signals via an IR Flasher (5V tolerant) to devices with an IR input or IR receiver
(F)	IR IN	Not used.
(G)	LAN (C)	1G of reserved network data bandwidth commonly used to connect any network compliant device to transmit its data onto the Ethernet network by sharing the 10G network link. 8-pin RJ-45 female connection. This is a courtesy port it will not work for all network functions. Example: Spanning tree devices are not supported by this port. <b>IMPORTANT!</b> Do not connect this port to a network switch.
(H)	Link LED	<b>Solid Orange</b> - Link is established. <b>Off</b> - No link established
(I)	Link Activity LED	<b>Green Blinking</b> - Indicates data activity. <b>Off</b> - No Activity
(J)	Audio Out	Reserved for future use.

## 4 Wiring and Connections

### 4.1 HDMI Cables

Important items to consider when planning or installing a system using IP Video devices.

- High quality HDMI cables are very important when passing UHD. Adding deep color and HDR raises the need for high quality cables.
- Long HDMI cables can introduce signal degradation so Savant recommends using the shortest possible HDMI cables.

### 4.2 10G Ethernet

#### Fiber (SFP+)

Enhanced small form-factor pluggable connection. Use a Savant certified Direct Access Copper (DAC) SFP+ cable to connect the chassis to the 10G switch, or Savant certified fiber and fiber connectors along with Savant certified SFP+ modules.

#### Transport Distance

DAC cable	6ft (2 m)
OM3 multi-mode Fiber	1000ft (300 m)

#### Copper (RJ-45)

RJ-45 10G Ethernet connection.

#### Transport Distance

Cat6	100ft (30m)
Cat6a	300ft (100m)
Cat7	300ft (100m)

### 4.3 1G Ethernet/LAN

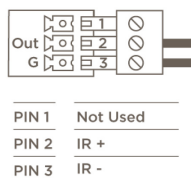
Standard RJ-45 port that uses 1G reserved data bandwidth commonly used to connect any network compliant device to transmit its data onto the Ethernet network by sharing the 10G network link. This is a courtesy port it will not work for all network functions. Example: Spanning tree devices are not supported by this port.

**IMPORTANT!** Do not connect this port to a network switch.

## 4.4 IR Wiring

### PAV-VIMAPxS

IR connections are made using a 3-pin Control Connector supplied with the device. The wire slips into the hole and locks with a screw located at the top of the connector.



### PAV-VOMVP1x

IR connection are made using 3.5 mm IR Emitter supplied with the device.



### IMPORTANT: IR Wiring Precautions

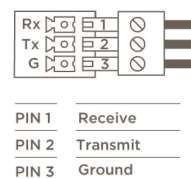
Ensure that all IR emitters are within 15 feet (4.6 meters) from the controller's location.

Use of 3rd party blinking IR emitters with Talk Back is not recommended. These types of emitters can draw voltage away from the IR signal that can degrade IR performance.

## 4.5 RS-232 Wiring

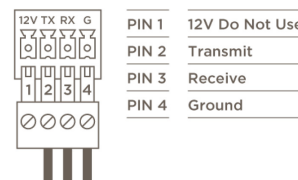
### PAV-VIMAPxS

Serial control connections are made using a 3-pin Control Connector supplied with the device. The wire slips into the hole and locks with a screw located at the top of the connector.



### PAV-VOMVP1x

Serial control connection are made using a 4-pin Control Connector supplied with the device. The wire slips into the hole and locks with a screw located at the top of the connector.



## 4.6 Network

The PAV-VIMAPxS uses a standard RJ-45 port complying with IEEE 802.3 Ethernet standards. This port supports AVB/TSN for communication with the Savant Host and with Savant IP Audio devices. If the breakout down-mixed audio is going to be used this port must be connected to a AVB switch.

The VOMVP1x uses a shared Ethernet connection from its 10G connection.

## 4.7 AC Power Connection



### **SURGE PROTECTION!**

Use a surge-protected circuit for all components and power supplies requiring 100/240V (AC 50/60 Hz) source power.



### **ELECTRICAL DISCONNECT!**

The source power outlet and power supply input power sockets should be easily accessible to disconnect power in the event of an electrical hazard or malfunction.

### **Power Management Recommendations**

Savant recommends a pure sine wave uninterruptible power supply (UPS) with the ability to shut down the Savant Host before the battery runs out of power. Never remove power from the Savant Video over IP devices before shutting it down. See [Appendix C: UPS Recommendations](#) for more information.

## 4.8 Checking and Replacing the Fuse

Only the PAV-VIMAPxS has a field replaceable fuse. For fuse information please see the products Quick Reference Guide.



### **ELECTRIC SHOCK HAZARD:**

Disconnect the unit from AC power by removing the power cord from the AC outlet and the unit before replacing the fuse.



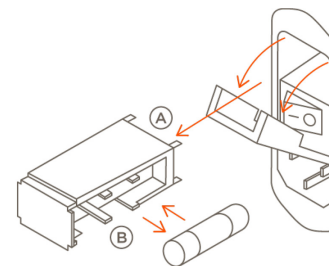
**IMPORTANT:** The orientation of the cartridge within the unit and location of the fuse within the cartridge are crucial to proper operation. Make note of the orientation of the cartridge and the fuse location within the cartridge before removing.

1. Disconnect the unit from AC power by removing the power cord.
2. Open the fuse cover on the AC power input using a flat head screwdriver or similar thin flat head tool. This will allow access to the fuse cartridge.
3. Using a flat head screwdriver or similar thin flat head tool, gently loosen the cartridge and pull the cartridge out of the unit slowly. As the cartridge is removed, make note of the orientation, as it is important to proper operation.



**TIP:** Mark the chassis and fuse holder with a marker in order to align when replacing.

4. Remove the old fuse from the cartridge and discard.
5. Gently place the new fuse in the cartridge and place the cartridge part way into the receptacle aligning it as defined in the diagram.
6. Gently press on the cartridge the rest of the way until it seats into the terminals at the rear of the slot.



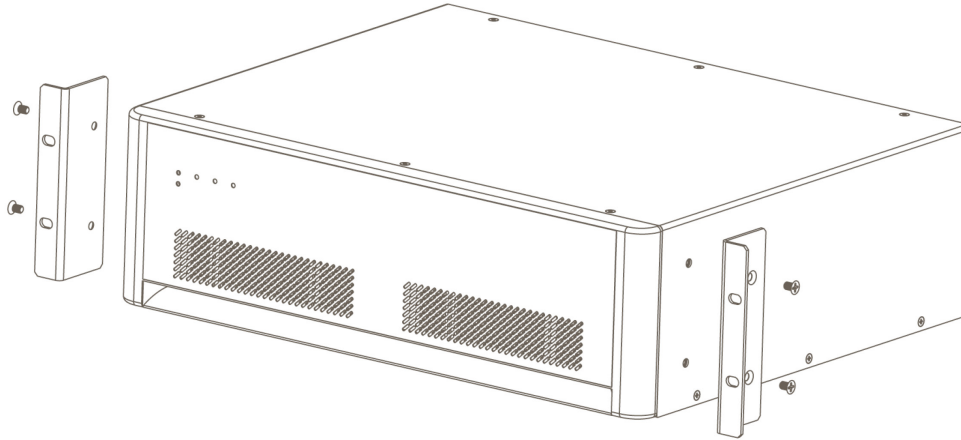
(A) Connection Pins Towards Unit

(B) Open Side of Cartridge Towards Power Switch

**NOTE:** If any resistance is encountered during seating the cartridge, DO NOT apply more pressure. Stop pressing on the cartridge, remove it, verify the orientation, and repeat step.

## 5 Installation

The Savant IP Video Input Transmitter can be mounted in a 3U rack style enclosure and is compatible with all standard 19-inch NEMA rack mounts. The rack ears need to be attached prior to placing in a rack

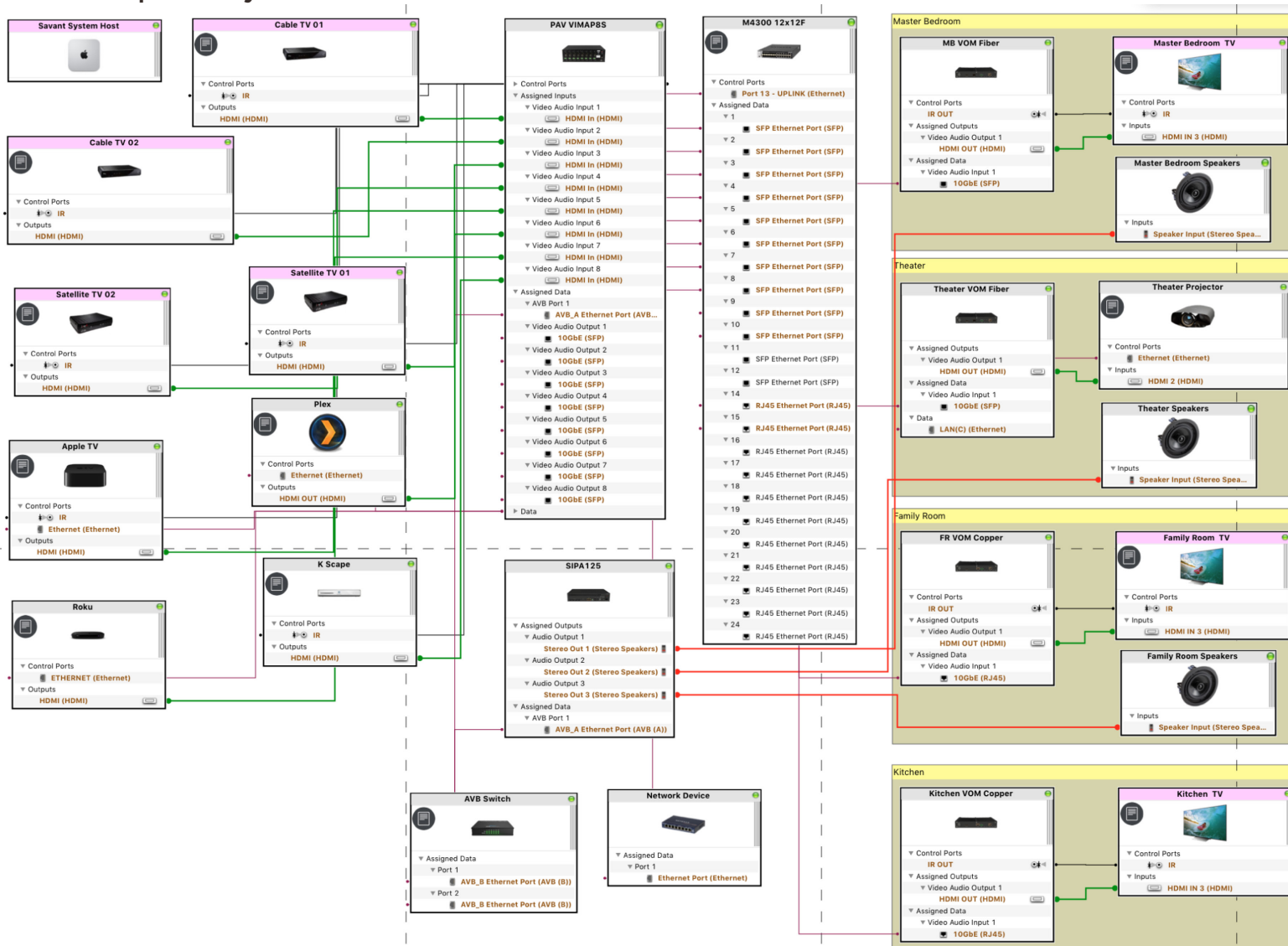


## 6 Blueprint Configuration

### Required Devices

- Savant Host
- IP Video Transmitter
- IP Video Receiver
- 10G Network Switch
- Video Sources
- HD/UHD Displays

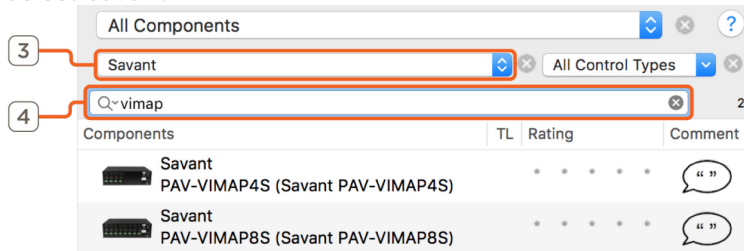
### 6.1 Basic Blueprint Layout



## 6.2 Adding a Video Input IP Transmitter to a Configuration

This process can be used for any of the Video over IP input chassis. In an open Blueprint configuration do the following.

1. Click **Show Library**.
2. Click the All Manufacturers.
3. Select Savant.



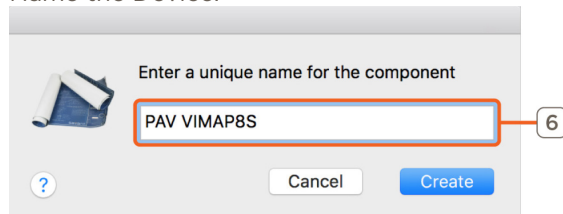
4. In the Search bar type VIMAP.
5. Select the Video Input IP Transmitter that is needed and drag it into a Shared Equipment zone.



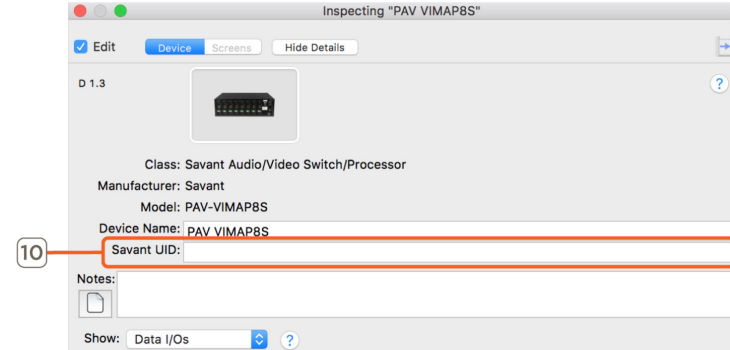
### HELPFUL INFO:

It is recommended to place any type of A/V switch in a Shared Equipment zone. If placed in a User zone the outputs cannot leave that zone.

6. Name the Device.



7. Place the Video IP Transmitter in the layout window.
8. Select the Video Input IP Transmitter.
9. Open Inspector.
10. Enter the UID.



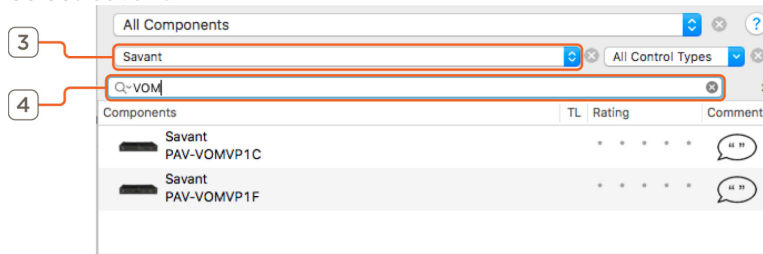
11. Make the AVB connection.

**NOTE:** This connection can only be made to a AVB switch.

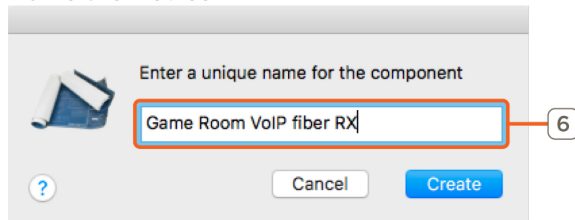
## 6.3 Adding a Video Output IP Receiver to a Configuration

This process can be used for any of the Video over IP output device. In an open Blueprint configuration do the following.

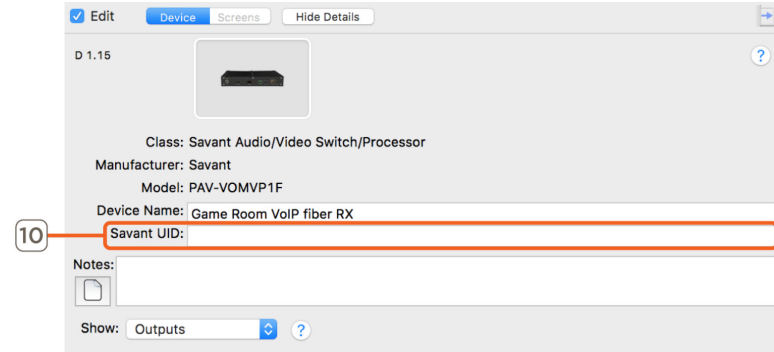
1. Click **Show Library**.
2. Click the All Manufacturers.
3. Select Savant.



4. In the Search bar type VOM.
5. Select the Video Output IP Receiver that is needed and drag it into the User zone that is will be used.
6. Name the Device.



7. Place the Video IP Transmitter in the layout window.
8. Select the Video Input IP Transmitter.
9. Open Inspector.
10. Enter the UID.

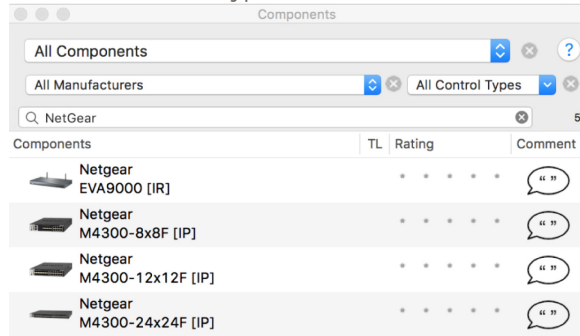




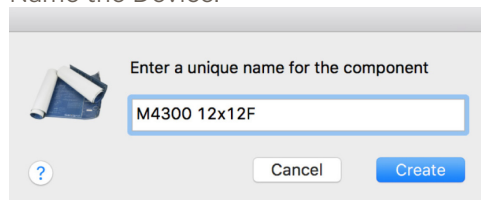
## 6.4 Adding a 10G switch to a Configuration

This process is to add a NetGear ProSafe M4300 10G network switch to the configuration. See **Savant Video over IP Network Configuration Guide** on the **Savant Customer Community** for information on how to set up this device before its Video connection are made. In an open Blueprint configuration do the following.

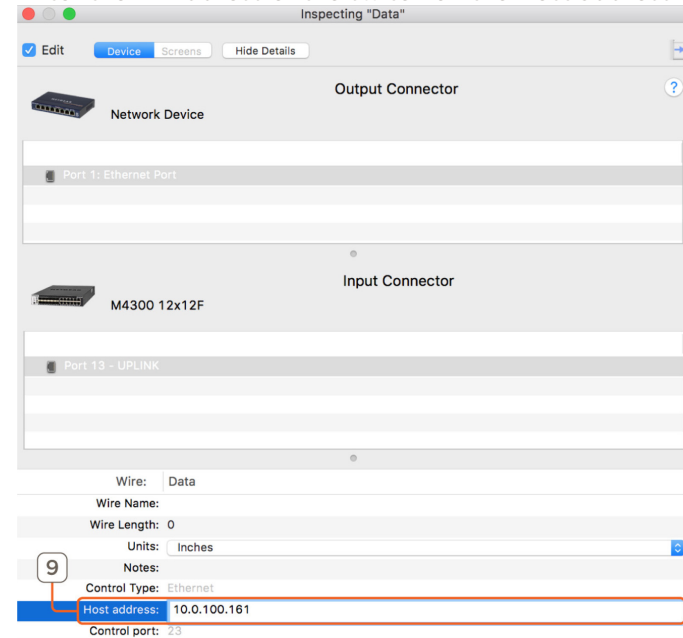
1. Click **Show Library**.
2. In the Search bar type NetGear.



3. Select the M4300 10G switch that is needed and drag it into a Shared Equipment zone.
4. Name the Device.



5. Place the M4300 10G switch in the Layout window.
6. Make Control Connection.
7. Select the Control Connection.
8. Open Inspector.
9. Enter the IP Address of the switch on the Host address field.



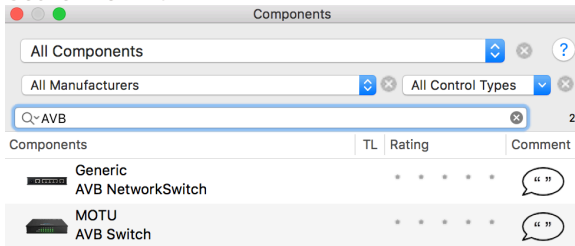
### NOTES:

- This is needed for System Monitor information to populate.
- In the physical installation this control connection uses one of the RJ-45 10G connections. This is the switch's uplink port that is configured in the Savant Video over IP Network Configuration Guide.

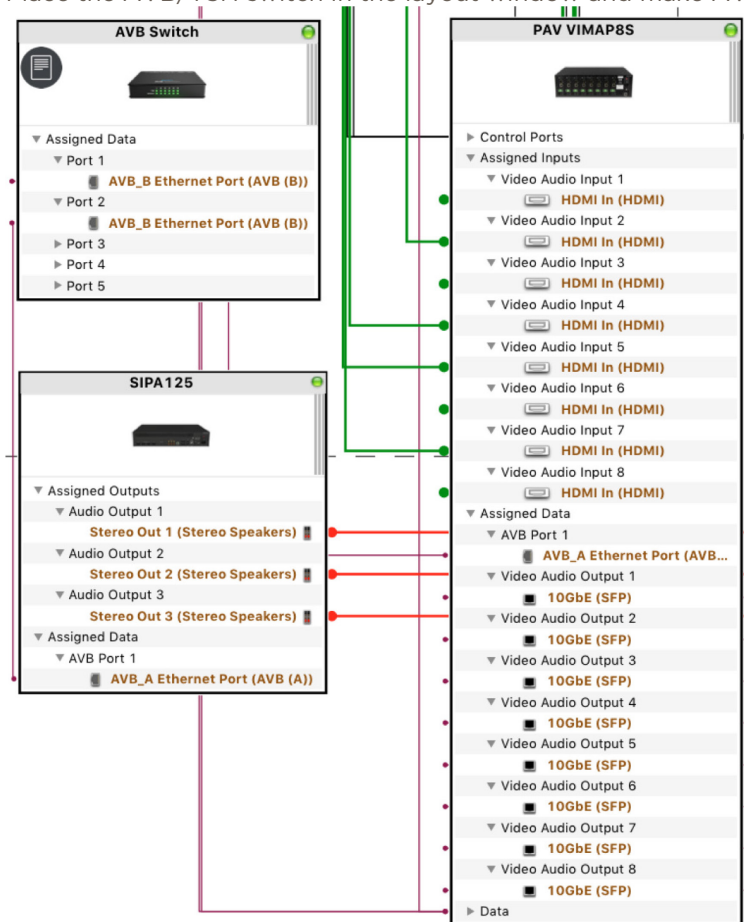
## 6.5 Adding an AVB/TSN Switch

An AVB/TSN switch is only needed if more than one IP Audio device is being used.

1. From Blueprint Click Show Library
2. Search for AVB.



3. Drag into a Shared Equipment zone.
4. Name the Device.
5. Place the AVB/TSN switch in the layout window and make AVB connections.



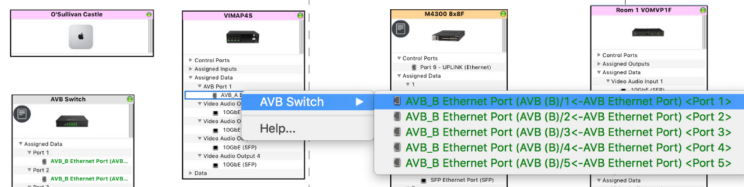
## 6.6 Making 10G/AVB Connections

This section is an example of how to correctly make the 10G/AVB Blueprint connections. All components must be added to the configuration and placed in the Layout window first. Connecting sources and endpoints is not detailed in this example.

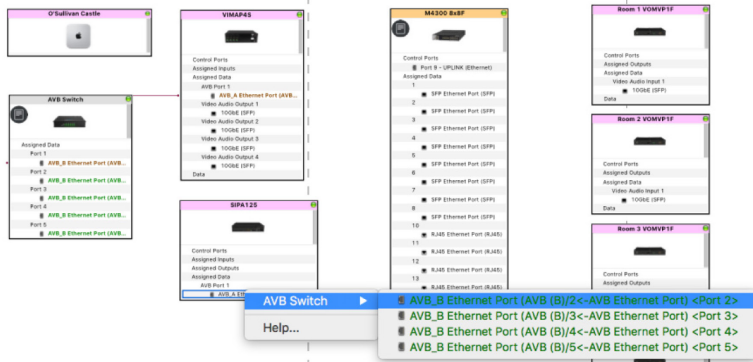
The example below uses the following components:

- (1) - PAV-VIMAP4S
- (1) - PAV-SIPA125
- (4) - PAV-VOMVP1F
- (1) - AVB switch
- (1) - NetGear M4300 8x8F switch

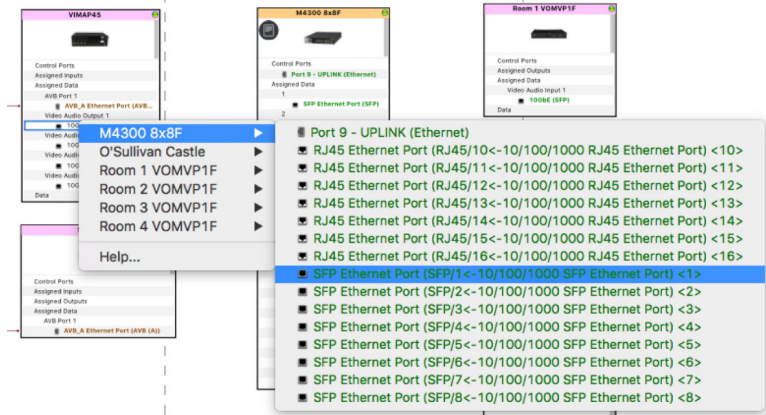
1. Select the PAV-VIMAP4S.
2. Right-click on AVB\_A Ethernet Port.
3. Highlight the AVB Switch then the desired AVB Port and left-click.



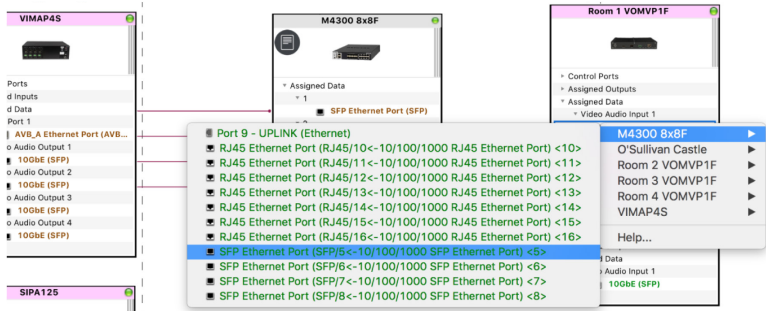
4. Select the PAV-SIPA125.
5. Right-click on the AVB\_A Ethernet Port.
6. Highlight the AVB Switch then the desired AVB Port and left-click.



7. Select the VIMAP4S.
8. Right-click on the first 10GbE (SFP) port.
9. Highlight the M4300 8x8F then the desired SFP port and left-click.



10. Repeat steps 7 to 9 for each Input on the PAV-VIMAP chassis that is used.
11. Select the first PAV-VOMVP1F.
12. Right-click on the 10GbE (SFP) port.
13. Highlight the M4300 8x8F then the desired SFP port and left-click.



14. Repeat steps 11 to 13 for each PAV-VOM in the system.

## 6.7 External AVB Sources

The Savant IP Video with Audio Processing Input chassis can be used to pass AVB audio to IP Video endpoints. There is a 4 stream limit per PAV-VIMAPxS. The audio service path must be set in Blueprint. Below is an example of how to configure AVB services for PAV-VOM endpoints.

**IMPORTANT!** PAV-VOM1C do not support this feature.

In an open Blueprint configuration do the following:

1. Open the Services Window.
2. Select the service for a AVB source.

3. Click the disclosure triangle to expand the available Service Paths.
4. Select the PAV-VIMAP8S in the Service Resources Window.
5. Highlight each service path to view input and output details at the lower right.  
In this example, Service Path 3 uses the desired output Slot 1.
6. Select the desired Service path.

**TIP!** Service paths are generated in random order for each service. Therefore, the input and output details may differ across service for a given path number. Use the same slot number for a given service in every zone.

For more information on service path selection see **Service Selection RacePoint Blueprint Programming Guide** on the **Savant Customer Community**.

## 7 Best Practices

Once the system is installed and the configuration has been uploaded to the Host, there are a couple best practices to test a Savant IP Video system.

Initial Audio and Video setup/testing should be done using the default EDID. The default EDID has support for video resolutions up to 4k 60hz 4:2:0 8-bit.

Video EDID Settings

<input checked="" type="checkbox"/>	Format: 720x576p Frequency: 50Hz	Aspect ratio: 4:3 Format type: short
<input checked="" type="checkbox"/>	2160p 30Hz Format: 4096x2160p Frequency: 30Hz	Aspect ratio: 256:135 Format type: short
<input checked="" type="checkbox"/>	2160p 25Hz Format: 4096x2160p Frequency: 25Hz	Aspect ratio: 256:135 Format type: short
<input checked="" type="checkbox"/>	2160p 24Hz Format: 4096x2160p Frequency: 24Hz	Aspect ratio: 256:135 Format type: short
<input checked="" type="checkbox"/>	2160p 60Hz Format: 3840x2160p Frequency: 60Hz	Aspect ratio: 16:9 Format type: short
<input checked="" type="checkbox"/>	2160p 50Hz Format: 3840x2160p Frequency: 50Hz	Aspect ratio: 16:9 Format type: short
<input checked="" type="checkbox"/>	2160p 60Hz Format: 4096x2160p Frequency: 60Hz	Aspect ratio: 256:135 Format type: short
<input checked="" type="checkbox"/>	2160p 50Hz Format: 4096x2160p Frequency: 50Hz	Aspect ratio: 256:135 Format type: short
<input checked="" type="checkbox"/>	Unknown video mode Format: 1920x540 Frequency: 60.05Hz	Aspect ratio: 32:9 Format type: detailed

☐ Deep Color ☐ HDR

Check boxes selected by default

☒ YCbCr 4:2:0 Only  
☒ YCbCr 4:2:0 Only  
☒ YCbCr 4:2:0 Only  
☒ YCbCr 4:2:0 Only

### Testing

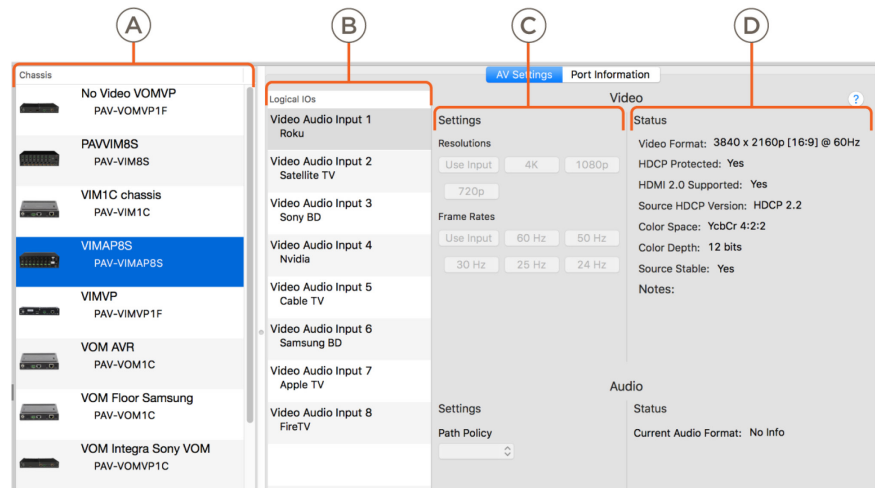
Every source should be tested with every A/V zone. Savant recommends testing a single source with one A/V zone at a time.

1. Activate the first Video source to a single Zone.
2. Does Video pass?
  - a. NO: Check System Monitor for the resolution of the Input and then the output, Scale the VOM to 1080p. If 1080p passes there may be an issue with either the TV or cabling. Replace HDMI cable and test again.
  - b. YES: Check Audio
3. Does Audio pass?
  - a. NO: In System Monitor set the audio path policy for the PAV-VOM to "Downmix". If audio is still not present verify audio is enabled on the source.
  - b. YES: Continue to the next Zone.
4. Repeat with the same source until all Video zones have been tested. Repeat with all other Video sources in the same manner as shown above.

After this testing is complete. Add more advanced EDIDs and test again.

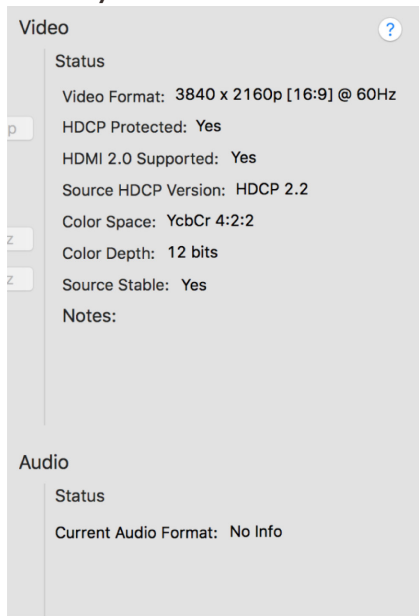
# 8 System Monitor

In System Monitor, there is an **AVoIP Info** tab for information gathering and changing settings. This System Monitor tab will only display in a system that has the Video over IP devices in the configuration.



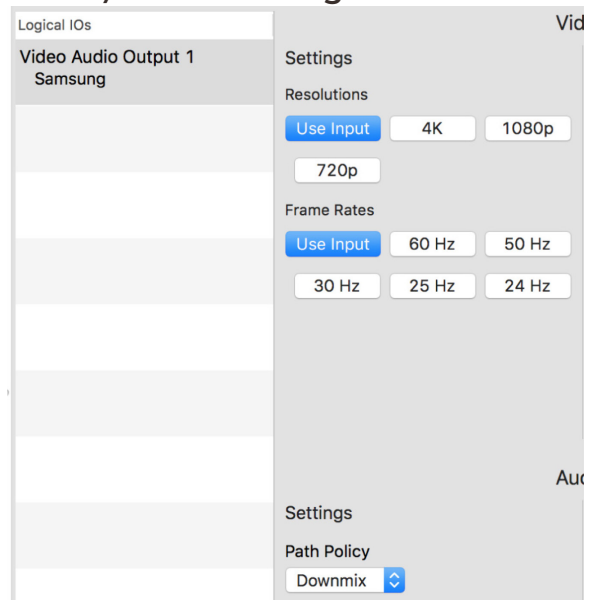
A	Chassis	List of Video over IP devices in the configuration.
B	Logical I/Os	List of inputs or outputs on the device selected in the Chassis window.
C	Settings	Video and Audio settings, down mixing audio or video scaling settings can be changed in this section. See <a href="#">Video/Audio Settings</a> section below for more information.
D	Status	Displays the current status of selected I/O. See <a href="#">Video/Audio Status</a> section below for more information.

## 8.1 Video/Audio Status



- Video Format** – Displays active video resolution and frame rate.
- HDCP Protected** – Displays if HDCP is enabled
- HDMI 2.0 Supported** – Displays if the connected device supports HDMI 2.0.
- Source HDCP Version** – Displays the HDCP version from the source content.
- Color Space** – Displays the color format used in the current Video
- Color Depth** – Displays the active number of bits for color data.
- Source Stable** – Displays if video is received from the connected source.
- Current Audio Format** – Displays current audio format.

## 8.2 Video/Audio Setting



### Resolutions

- **Use Input:** Will pass the received video resolution to the endpoint.
- **4K:** Scale to UHD (3840x2160).
- **1080p:** Scale to Full HD (1920x1080)
- **720p:** Scale to HD (1280x720)

### Frame Rates

- **Use Input:** Will pass the received video frame rate to the endpoint.
- **60 Hz:** Fixed Frame Rate of 60 frames per second.
- **50 Hz:** Fixed Frame Rate of 50 frames per second.
- **30 Hz:** Fixed Frame Rate of 30 frames per second.
- **25 Hz:** Fixed Frame Rate of 25 frames per second.
- **24 Hz:** Fixed Frame Rate of 24 frames per second.

### Path Policy - Dropdown menu with the following options.

- **Dynamic:** Uses the EDID read from the connected endpoint. If the endpoint EDID supports the current source's incoming audio format, the pass-through path will be used. If the endpoint's EDID does not support the current source's incoming audio format, the down mixed path will be used.
- **Pass-thru:** Pass-thru the HDMI audio format to the endpoint.
- **Downmix:** Uses audio processing to downmix the audio to 2 channel PCM.

**NOTE:** Scaling HDCP 2.2 sources to a HDCP 1.4 sync device requires the resolution input of the HDCP 2.2 source to be 4K 60 4:2:0 8Bit or below.

For a Basic understanding of how these options affect the system review the following:

#### Use Input resolution and frame rate

- Virtually no switching latency, always less than 120 microseconds of video latency.
- Output colorspace is the same as the source.
- Video latency depends on display to source synchronization time.
- HDR supported.
- 3D modes supported.

#### Scale video output resolution only

- Very low switching latency (less than 4ms).
- Output colorspace is always RGB 8bit.
- Video latency depends on display to source synchronization time.

#### Fixed Frame Rate used

- Display timing remains constant. There is no need to resync on input changes.
- Switching time is dependent on the network switch. For switches with the IGMP FASTLEAVE feature enabled, switching time is < 0.1 seconds.
- Output colorspace is always RGB 8bit
- Latency is never less than one frame, but never more than two frames.
- Video stutter may occur due to frame rate conversion frame slips.



### 8.3 NetGear Switch Information

The NetGear M4300 switches display status information in System Monitor. This requires a control connection to be made in Blueprint and the IP Address of the NetGear switch to be defined.

**Logical IOs** – Lists port number and the name of the connected device. Selecting a Logical IO can take up to 20 seconds for the status information to fully populate. Port numbering is x/x/x. The first number is the switch number. None of the NetGear switches are stackable so this is always a one (1). The second number is the module/slot number. This only affects the M4300 96X switch, all the other M4300 switches this number is zero (0). On the M4300 96X the module number starts at one (1). The last number is the port number. The port numbers start at one (1).

**Port Information** – Displays connection status of the connected port. This information is mainly used it troubleshooting.



## Appendix A: 10G Network Requirements

The following list is the settings that need to be configured on any Switch that is being used for the Audio/Video over IP system.



### IMPORTANT!

Not all of these settings are on all network switches.







- 10G Managed Switch with SFP+ ports
- IGMP Snooping Enabled.
- Enable IGMP Snooping on all ports for the VLAN in use.
- IGMP Querier Enabled.
- Enable IGMP Querier on all ports for the VLAN in use.
- Filter/Drop Unregistered Multicast Traffic Enabled.
- Unregistered Multicast Flooding Disabled.
- FASTLEAVE enabled (Optional\*).
- Enable FASTLEAVE on all ports for the VLAN in use (Optional\*).

\* FASTLEAVE will make changing services faster.

### Switch considerations

One SFP+ port is needed for each source. And one 10G port is needed for each endpoint. The type of port needed depends on the cable length to the Video Output IP Receiver. If the cable length is more than 300ft (100m) it will require the use of a PAV-VOMVPF1 using a SFP+ port on the switch.

## Appendix B: Accessories

SKU	Description	Image
CON-FSFP1-00 CON-FSFP10-00	Fiber Transceiver Module (Single or 10 Pack)	
CON-F2010-00	LC Multimode OM3 Fiber Connectors (10 Pack)	
CBL-F2500-00	Duplex OM3 Indoor/Outdoor Plenum Rated Multi-Mode Fiber (1000ft)	
CBL-HDMI2M1-00 CBL-HDMI2M2-00 CBL-HDMI2M3-00	High Speed Category HDMI 2.0 Cable (1,2, or 3 Meter)	
CBL-SFPDACM2-00	SFP+ Direct Attach Copper Cable (2 meter)	
FTK-F2000-00	Fiber Termination kit	

---

FTK-FTEST-00

Fiber Test Kit



## Appendix C: UPS Recommendations

Savant does not recommend any brand or model UPS, however there are a couple of factors that should be considered. It is important that the UPS does not only work during complete power loss but protects devices and their functionality during events like surges and brownouts. It is not uncommon for a residence or small business to see variations in power service that do not result in a complete black-out. These periods can be the most frustrating to end users as they do not realize what the cause of the operation disturbance may be.

Below are some specific design considerations when assembling your power management designs.

- Pure Sine Wave Inverter.
- Online/double-conversion power supply: This type of UPS always supplies power to the equipment this will eliminate any period where the power is interrupted. This will also address many issues if the site has regular “brown outs” or if the site has frequent under or over voltage situations.
- Max power output: The UPS needs to be properly sized for the equipment connected to it, and unnecessary loads should not be included on the UPS. For instance, putting an audio amplifier on the UPS will either drive up the cost of the UPS system to support the load or drastically shorten the period that the UPS can keep devices up and running.  
Remember to consider devices that you may not have directly installed, for instance modems, routers, switches, APs, PoE injectors, and the like. This is especially important if you are using software that relies on the network for communication. Power cycling segments of the network can cause network conflicts. It is important to consider this during your network design and configuration to ensure that there is the greatest likelihood of success.
- “Graceful” shut down: The UPS should communicate with the devices connected to it so that when necessary they are properly shut down. Many UPS manufacturers offer a software suite so that hard-drive based devices may go through a ‘graceful’ shut down procedure. This feature should be vetted in a test environment prior to implementation so that the integrator understands how the system will respond during shutdown and start-up periods.
- Power consumption monitoring.  
It is nice to have the ability to monitor the draw from each outlet to determine if an item is running through a remote console.
- Remote Access.: The ability to remotely power cycle an outlet or a group of outlets.



**IMPOTANT!** Be VERY CAUTIOUS using with a UPS with the ability to cycle power an outlet remotely, devices with hard drives DO NOT like to be power cycled in this manner, and will be damaged by this action. Savant Hosts in particular need to be shut down correctly in order to restart correctly when power is restored.

- Generators: Generators are not a replacement for a UPS and should be considered as an augment to the UPS. Having a generator on site increases the need for a UPS because the equipment needs greater protection from power cycles when the generator comes online during testing. A generator is also likely to introduce electrical conditions like under and over voltage or frequency modulation while running. All of these circumstances stress power supplies and hard drives increasing the odds of premature failure.

Savant does have a variety of IP & Serial controlled UPS devices currently profiled (these can be found under Trigger Devices).

- The UPS profiles are designed to give the integrator a set of variables and triggers to perform actions with. The Savant User Interface has no default screen(s) that will auto populate for any of these devices.
- For feedback: All devices support a variety of different state information so make sure to put the device in an example configuration and check what states you can use as a trigger to make sure the profile supports the information you require. The easiest method to accomplish this is to add the desired device to a configuration, make the necessary control connection, generate services, create a new trigger (Tools->Review->State Triggers...), add a transition condition then select the UPS device under the component tab. This will show you all of the states that profile supports in the “State Name” table.
- For Control: Since many devices have different configurations as to what outlets shut off together etc. Savant recommends that you use a CPT kit and test the control commands prior to install to verify it is possible to accomplish the automation task which is proposed.

## Appendix D: EDID Optimization

Enhanced HDMI source capabilities can create compatibility issue with less capable displays. Below are tables to show examples of possible EDID changes for testing and use.

**Default EDID (4K@60hz 4:2:0 8 bit video, PCM audio up to 8 channel)**

	HDCP 1.4 Source	HDCP 2.2 4K@60hz 4:4:4 HDR capable TV	HDCP 2.2 4K@60hz 4:4:4 non-HDR capable TV	HDCP 2.2 4K@60hz 4:2:0 non-HDR capable TV	HDCP 1.4 1080p TV	HDCP 2.2 4K@60hz 4:4:4 HDR AVR HBR audio capable	HDCP 2.2 4K@60hz 4:2:0 non-HDR AVR HBR audio capable	HDCP 1.4 1080p AVR Up to Dolby audio capable	Analog audio output on the VIM chassis in use
VOM Video Mode	N/A	Pass-Through (Use Input)	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	N/A
VOM Audio Mode	N/A	Multi to 2 Channel checked	Multi to 2 Channel checked	Multi to 2 Channel checked	Multi to 2 Channel checked	Native HDMI audio (Multi-channel PCM)	Native HDMI audio (Multi-channel PCM)	All HDMI audio	Source audio input 2 channel PCM only

**EDID: 4K@60hz 4:2:0 8 bit video, PCM audio up to 8 channel, Dolby/DTS surround audio**

	HDCP 1.4 Source	HDCP 2.2 4K@60hz 4:4:4 HDR capable TV	HDCP 2.2 4K@60hz 4:4:4 non-HDR capable TV	HDCP 2.2 4K@60hz 4:2:0 non-HDR capable TV	HDCP 1.4 1080p TV	HDCP 2.2 4K@60hz 4:4:4 HDR AVR HBR audio capable	HDCP 2.2 4K@60hz 4:2:0 non-HDR AVR HBR audio capable	HDCP 1.4 1080p AVR Up to Dolby audio capable	Analog audio output on the VIM chassis in use
VOM Video Mode	N/A	Pass-Through (Use Input)	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	N/A
VOM Audio Mode	N/A	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output)	Native HDMI audio	Native HDMI audio	Native HDMI audio	Source audio input 2 channel PCM only (If encoded audio is used by the source analog outputs will output audio noise)

**EDID: 4K@60hz 4:2:0 8 bit video, PCM audio up to 8 channel, Dolby/DTS surround audio, Dolby Digital Plus**

	HDCP 1.4 Source	HDCP 2.2 4K@60hz 4:4:4 HDR capable TV	HDCP 2.2 4K@60hz 4:4:4 non-HDR capable TV	HDCP 2.2 4K@60hz 4:2:0 non-HDR capable TV	HDCP 1.4 1080p TV	HDCP 2.2 4K@60hz 4:4:4 HDR AVR HBR audio capable	HDCP 2.2 4K@60hz 4:2:0 non-HDR AVR HBR audio capable	HDCP 1.4 1080p AVR Up to Dolby audio capable	Analog audio output on the VIM chassis in use
VOM Video Mode	N/A	Pass-Through (Use Input)	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	N/A
VOM Audio Mode	N/A	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (Many TVs do not decode Dolby Digital Plus)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (Many TVs do not decode Dolby Digital Plus)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (Many TVs do not decode Dolby Digital Plus)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (Many TVs do not decode Dolby Digital Plus)	Native HDMI audio	Native HDMI audio	Native HDMI audio	Source audio input 2 channel PCM only (If encoded audio is used by the source analog outputs will output audio noise)

**EDID: 4K@60hz 4:2:0 8 bit video, PCM audio up to 8 channel, Dolby/DTS surround audio, HBR audio (Dolby TureHD/DTS HD)**

	HDCP 1.4 Source	HDCP 2.2 4K@60hz 4:4:4 HDR capable TV	HDCP 2.2 4K@60hz 4:4:4 non-HDR capable TV	HDCP 2.2 4K@60hz 4:2:0 non-HDR capable TV	HDCP 1.4 1080p TV	HDCP 2.2 4K@60hz 4:4:4 HDR AVR HBR audio capable	HDCP 2.2 4K@60hz 4:2:0 non-HDR AVR HBR audio capable	HDCP 1.4 1080p AVR Up to Dolby audio capable	Analog audio output on the VIM chassis in use
VOM Video Mode	N/A	Pass-Through (Use Input)	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	Pass-Through (Use Input)	Pass-Through (Use Input)	Resolution Scaled to 1080p	N/A
VOM Audio Mode	N/A	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (TVs are not HBR audio capable)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (TVs are not HBR audio capable)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (TVs are not HBR audio capable)	Multi to 2 Channel checked (If Dolby/DTS are used they will be passed to the HDMI output) (TVs are not HBR audio capable)	Native HDMI audio	Native HDMI audio	Native HDMI audio	Source audio input 2 channel PCM only (If encoded audio is used by the source analog outputs will output audio noise)

**EDID: 4K@60hz 4:4:4 8 bit video, PCM audio up to 8 channel)**

	HDCP 1.4 Source	HDCP 2.2 4K@60hz 4:4:4 HDR capable TV	HDCP 2.2 4K@60hz 4:4:4 non-HDR capable TV	HDCP 2.2 4K@60hz 4:2:0 non-HDR capable TV	HDCP 1.4 1080p TV	HDCP 2.2 4K@60hz 4:4:4 HDR AVR HBR audio capable	HDCP 2.2 4K@60hz 4:2:0 non-HDR AVR HBR audio capable	HDCP 1.4 1080p AVR Up to Dolby audio capable	Analog audio output on the VIM chassis in use
VOM Video Mode	N/A	Pass-Through (Use Input)	Pass-Through (Use Input)	Pass-Through (Use Input) (4:4:4 content will need to be scaled)	Resolution Scaled to 1080p (If source uses HDCP 2.2 video will NOT display)	Pass-Through (Use Input)	Pass-Through (Use Input) (4:4:4 content will need to be scaled)	Resolution Scaled to 1080p (If source uses HDCP 2.2 video will NOT display)	N/A
VOM Audio Mode	N/A	Multi to 2 Channel checked	Multi to 2 Channel checked	Multi to 2 Channel checked	Multi to 2 Channel checked	Native HDMI audio (Multi-channel PCM)	Native HDMI audio (Multi-channel PCM)	All HDMI audio	Source audio input 2 channel PCM only

**EDID: 4K@60hz 4:4:4 8 bit video, HDR and Deep Color enabled, PCM audio up to 8 channel)**

	HDCP 1.4 Source	HDCP 2.2 4K@60hz 4:4:4 HDR capable TV	HDCP 2.2 4K@60hz 4:4:4 non-HDR capable TV	HDCP 2.2 4K@60hz 4:2:0 non-HDR capable TV	HDCP 1.4 1080p TV	HDCP 2.2 4K@60hz 4:4:4 HDR AVR HBR audio capable	HDCP 2.2 4K@60hz 4:2:0 non-HDR AVR HBR audio capable	HDCP 1.4 1080p AVR Up to Dolby audio capable	Analog audio output on the VIM chassis in use
VOM Video Mode	N/A	Pass-Through (Use Input)	Pass-Through (Use Input) (Video will display but will not be in HDR)	Pass-Through (Use Input) (Video will display but will not be in HDR) (4:4:4 content will need to be scaled)	Resolution Scaled to 1080p (If source uses HDCP 2.2 video will NOT display)	Pass-Through (Use Input)	Pass-Through (Use Input) (Video will display but will not be in HDR) (4:4:4 content will need to be scaled)	Resolution Scaled to 1080p (If source uses HDCP 2.2 video will NOT display)	N/A
VOM Audio Mode	N/A	Multi to 2 Channel checked	Multi to 2 Channel checked	Multi to 2 Channel checked	Multi to 2 Channel checked	Native HDMI audio (Multi-channel PCM)	Native HDMI audio (Multi-channel PCM)	All HDMI audio	Source audio input 2 channel PCM only

# Important Notice

## Disclaimer

Savant Systems, LLC. reserves the right to change product specifications without notice, therefore, the information presented herein shall not be construed as a commitment or warranty.

Savant Systems, LLC. shall not be liable for any technical or editorial errors or omissions contained herein or for incidental or consequential damages resulting from the performance, furnishing, reliance on, or use of this material.

## Patents

Certain equipment and software described in this document is protected by issued and pending U.S. and foreign patents.

All products and services are trademarks or registered trademarks of their respective manufacturer.

## Copyright

This document contains confidential and proprietary information protected by copyright. All rights reserved. Copying or other reproduction of all or parts of this document is prohibited without the permission of Savant Systems.

## Trademarks

© 2018 Savant Systems, LLC. All rights reserved. Savant, Savant App, Savant Host, Now You Can, RacePoint Blueprint, Single App Home, TrueCommand, TrueControl, and the Savant logo are trademarks of Savant Systems, LLC.

AirPlay, Apple, AirPort Express, AirPort Extreme, Apple TV, Apple Remote Desktop, FireWire, iMac, iTunes, iPad, iPad mini, iPad Air, iPhone, MacBook, Mac and OS X are trademarks or trade names of Apple Inc. iOS is a trademark of Cisco®. Android, Google, Google Play, and other Google marks are trademarks of Google, Inc. Wi-Fi is a registered trademark of the Wi-Fi Alliance®. HDMI® is a trademark of HDMI Licensing, LLC. MOTU® is a registered trademark of Mark of the Unicorn, Inc. Luxul is a registered trademark of Luxul Wireless. NETGEAR®, the NETGEAR Logo and ProSAFE are trademarks of NETGEAR, Inc. Extreme™ is a trademark of Extreme Networks, Inc.

All other brand names, product names, and trademarks are the property of their respective owners.

## Technical and Sales Support

Savant Systems, LLC is dedicated to providing prompt and effective support in a timely and efficient manner.

- To contact Savant Support, access the **Savant Customer Community** and create a support case.
- To contact Savant Sales, visit Savant.com and select **Contact Us** to locate a local sales representative in your area.