



AV OVER IP DEMYSTIFIED

INTRODUCTION

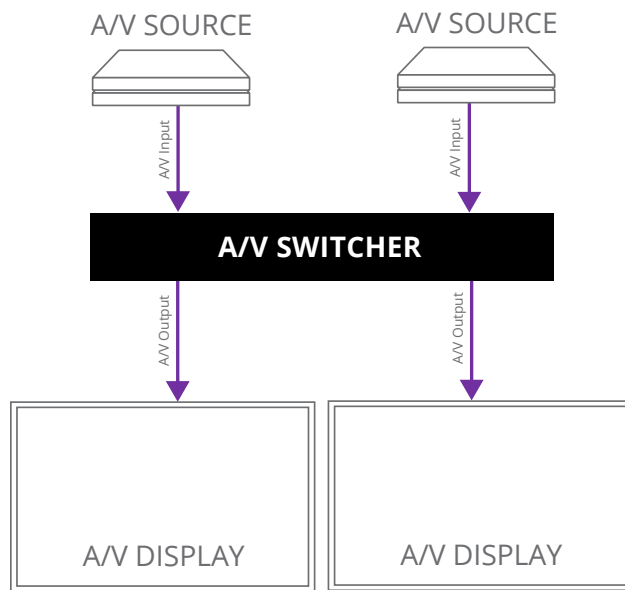
Audio/visual (AV) over internet protocol (IP) suite is the routing of high definition video, audio and control signals to various destinations using a standard Ethernet network. Adoption of this technology is increasing rapidly within the AV and IT industry. Thanks to the advancements of recent AV hardware, sending AV streams over IP switches is now easier than ever.

Distributing AV over IP has many advantages: switching configurations are not confined to standard port limitations therefore systems can be much more scalable and flexible, IP switches allow for longer cabling lengths to be run using standard Cat5e cable and best of all AV over IP offers tremendous cost savings versus traditional AV switchers in larger deployments. Integrating an appropriate AV over IP system into an AV environment will ensure that future scalability and flexibility will be a priority for the customer while keeping integration and operating costs down for the systems integrator.

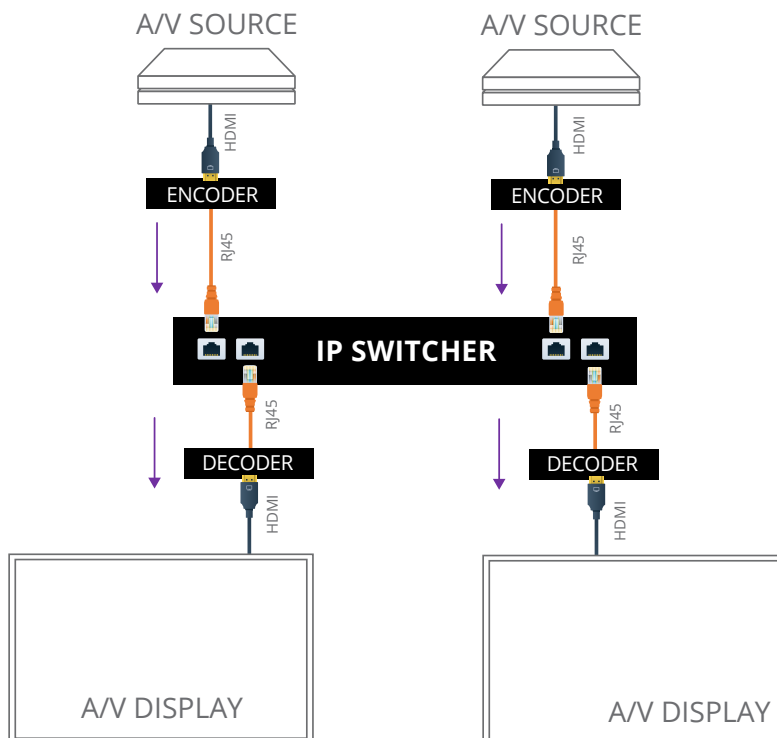
HOW AV OVER IP WORKS

There are two types of networking methods: packet switching and circuit switching. AV has primarily used circuit switching for AV switching networks and IT has traditionally used packet switching for data networks. In a circuit switched network, dedicated point to point connections are made to distribute the streams. In a packet switched network, data is sliced up into small packets and delivered to various destinations that request that data. Traditional AV switchers have typically offered uncompressed video switching and have rarely relied on coding to compress and transmit the AV and control signals. However dedicated AV hardware can now encode / decode AV and control signals so it can be transmitted over a packet switched network. In order to distribute AV signals onto a packet switched network, the signals must pass through a dedicated encoder that converts the signals to an IP compatible packet format. To receive those same signals on a display or speaker system a decoder must also be used to convert the packets into compatible AV signals for a display or speaker system to process.

The concerns with AV utilizing IP technology is that HD video streams are typically very large in nature and these high bandwidth signals may not pass through a standard Ethernet switch. It is important to make the distinction between a compressed and an uncompressed distribution system before designing the network infrastructure. It is typical that most AV over IP hardware will encode AV signals using standard video codecs such as h.264 or JPEG2000 that will compress the signals to a usable bit rate so it can be utilized over a 1 Gigabit network switch. There are also uncompressed formats but will typically require the use of much larger and more expensive 10 Gigabit switches.



Traditional A/V switchers are limited to a specific number of inputs and outputs, and must be dedicated to one location. Long cabling lengths can be difficult to incorporate or manage therefore signal extenders are usually required in this scenario which can add multiple points of failure to a system.

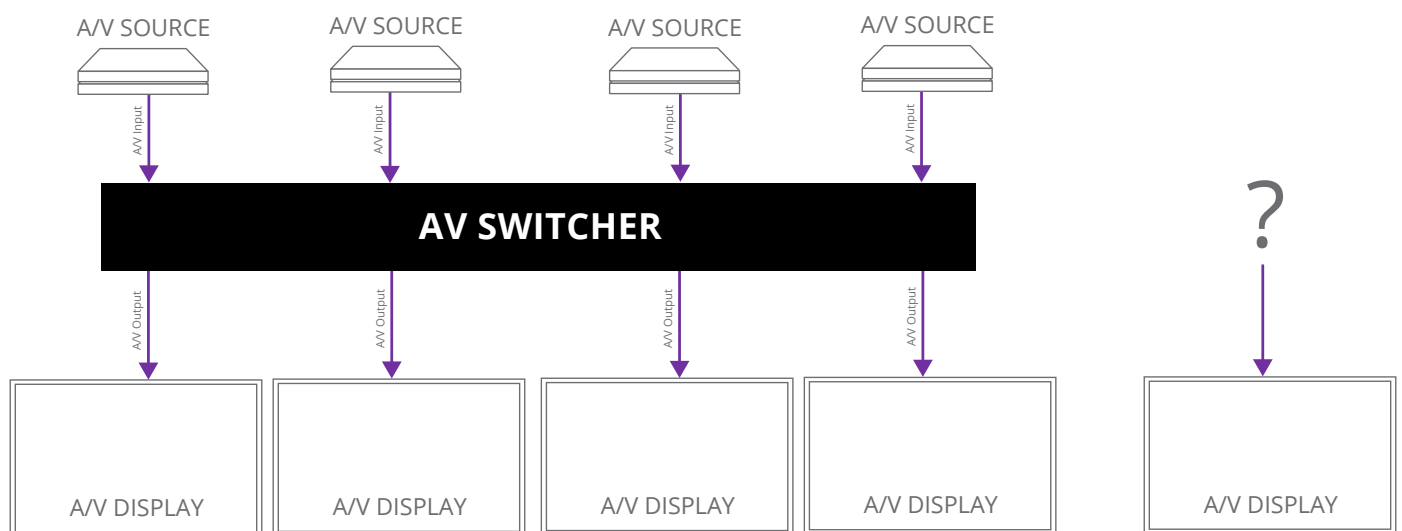


A/V over IP utilizes IP switches and is not limited to a particular number of ports. This allows port expansion to be flexible and scalable. Because we are using IP switches, Ethernet standards apply. TIA/EIA-568-B states that the total maximum cabling distance is 100 meters to each endpoint.

TRADITIONAL AV SWITCHERS VS IP SWITCHERS

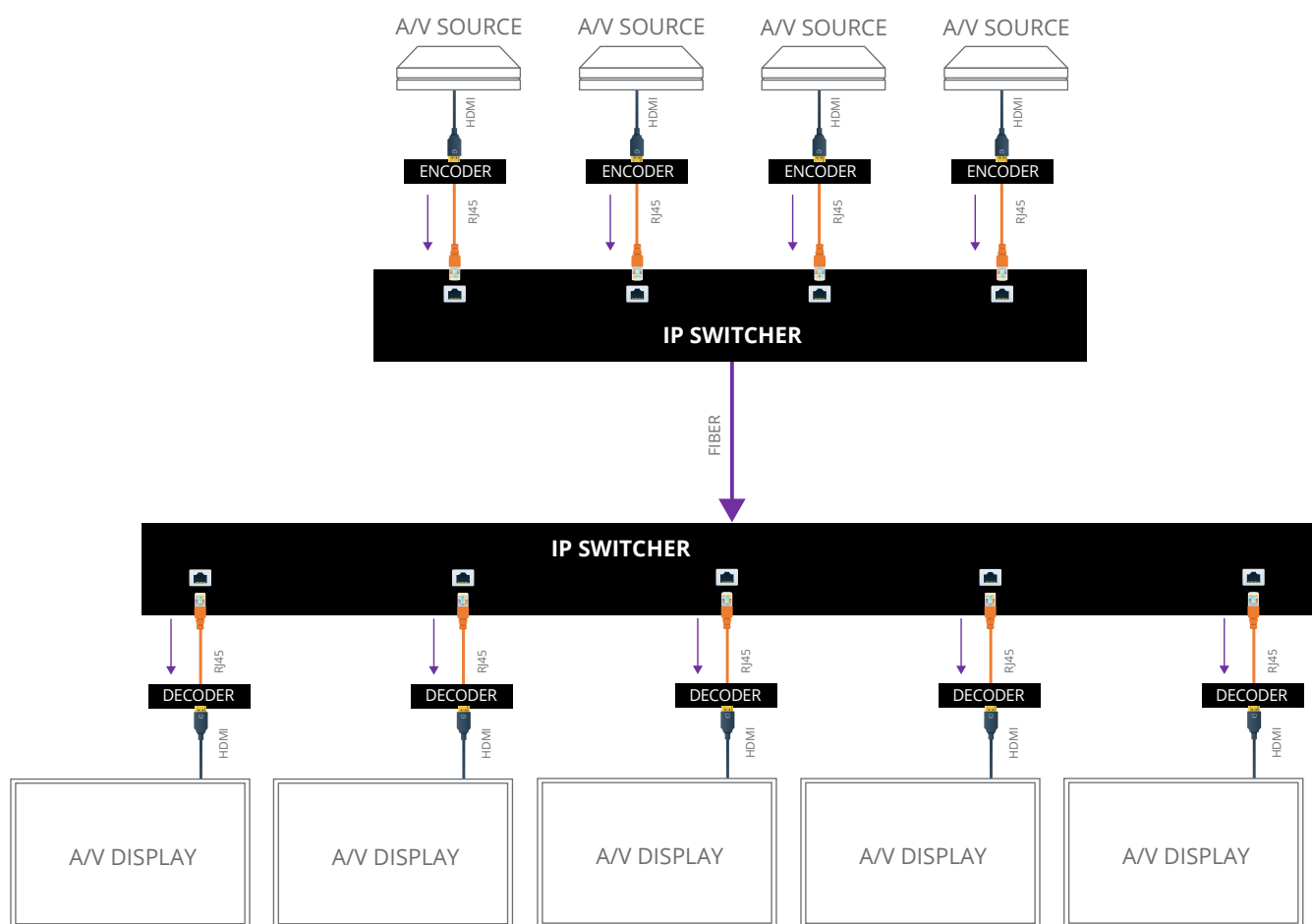
In any vertical market, an AV signage or distribution scheme throughout a building or building(s) is usually required. To achieve this, integrators have traditionally installed proprietary circuit switched networks to distribute these signals. These proprietary switches have always been expensive to integrate, had multiple points of failure, difficult to service and have always confounded the IT professionals employed with the task of managing the AV systems.

In a traditional AV matrix switch, the number of input and output ports can be a huge limitation. Usually these devices are pre-configured as 4x4, 8x8, 16x16, 32x32 and 64x64 with some switchers offering modular input and output offerings. A common issue for integrators is filling up the matrix: allowing no room for growth in the event that new sources and displays are introduced to the system. Or, as growth and expansion occurs and the switcher reaches maximum capacity it forces the client and integrator into buying and integrating a newer, much larger and much more expensive switch: decreasing the ROI value for the customer.



What happens if a 5th source or device is introduced to a 4x4 matrix system?

The right kind of AV over IP platform will allow you to always expand the system by simply integrating an off the shelf IP switch into the existing system using packet switched networking. This ensures that the customer can always grow at any time. As an added AV over IP benefit, you can also run Category cabling 100 meters per IP connection for each device. Cable length capabilities are expanded to 200 meters total point to point versus 100 meters total using standard AV extenders.



Multiple switches can be deployed throughout a facility and carry the same A/V signals over the same network. Encoder and decoder cabling limitations are 100m for each point allowing flexible cabling schemes using standard Category cable.

IP MULTICASTING

IP multicasting is a broadcast method that is utilized in certain Ethernet switches that allows a subscribed group of encoders to receive multicast data. Even though various manufacturers will employ various technology to distribute multimedia data over IP, most AV over IP products will utilize IP multicasting for audio and video communication over an IP infrastructure. IP multicasting can facilitate a 'one to many' or 'many to many' communication structure. Multicasting is also widely considered to be very efficient over an IP network as it only requires the source to send a packet only once, then the network switch will take care of duplicating the packet to reach multiple decoders so that data is sent over each link of the network only once.

LEVEL 2+ / LEVEL 3 SWITCHES

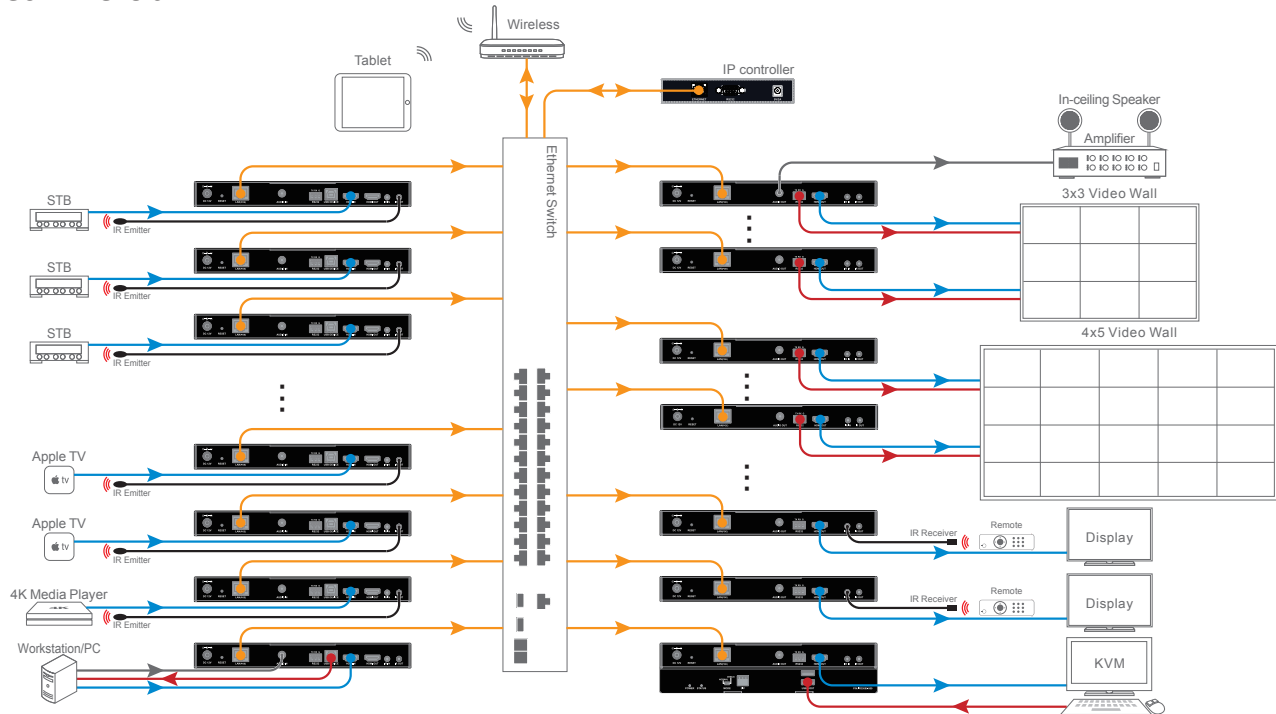
Level 3 managed switches are most commonly used and recommended for AV over IP applications as the switches incorporate the use of Static Routing and Dynamic Routing which is integral to managing and routing IP multicast messages. In most instances Static Routing is only required for an AV over IP network as it allows traffic to be manually routed between VLANs. Some network switch manufacturers add this feature to a Level 2 switch and is referred to as a Level 2+ switch and in some cases this will work well in an AV over IP system.

HOW DO YOU CHOOSE THE RIGHT SWITCH?

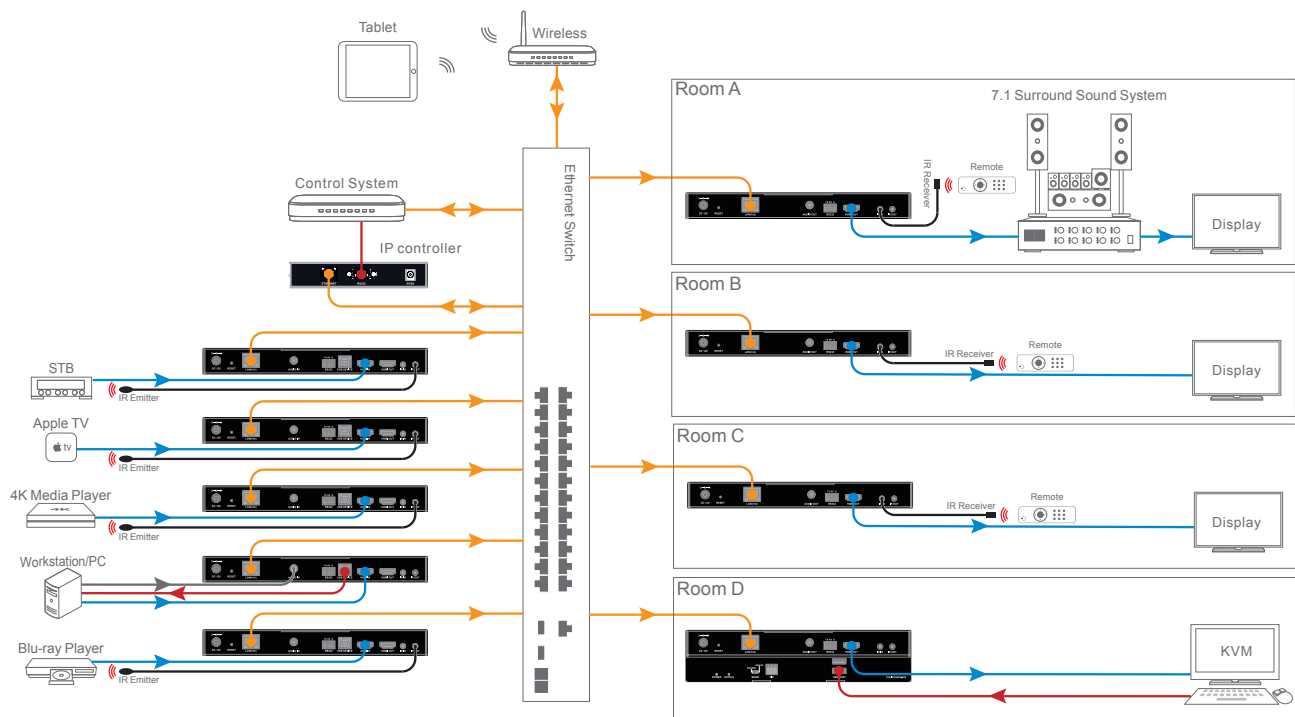
Choosing a switch for your AV over IP system is critical as this is the heart of the system and the quality of the network switch can dictate quality of video and stability. In most cases the manufacturer will suggest a recommended list of network switches that have been "approved". This usually means the switch has been tested and verified to operate in various configurations. It is important to note what switches have been tested and approved for single switch network or multiple switch network usage. In most cases a Level 2+ managed switch will suffice for single switch networking and a Level 3 switch may be more appropriate for multi switch networking.

SAMPLE SYSTEM DIAGRAMS FOR AV OVER IP SYSTEMS

Commercial



Residential



SUMMARY

Certainly, there are advantages of using AV over IP networks. Utilizing IP technology can cut down on costs for larger deployments where traditional AV system switchers are typically costly and limited on scalability. A true convergence of AV and IT is discovered through AV over IP, and new systems are designed with this in mind. With the development of AV over IP, IT professionals can manage their AV network using switch technology they are already comfortable with, and they won't have to worry about costly port expansions in case growth occurs. For the AV integrator, AV over IP offers their clients a much more scalable, flexible and easier option to integrate; reassuring their customers that their AV system can always grow with them.

Liberty offers flexibility and options in AV over IP technology with their new DigitaLinxIP line of products. You can learn more [HERE](#).