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Analog/Digital Mixed Format AV Systems

An Atlona White Paper Exclusive

The video system and its related technology is here to stay in the sanctuary and other parts of the house of worship. Video technology is changing rapidly as we move from analog to digital. There are many strategies for implementing this change in your facility and each has its own advantages.

Why make the change?

In a word: quality. Today most sources are digital, examples include PCs, Blu-ray players, and cameras. VCRs and standard-definition cameras are rapidly filling dumpsters and landfills. Digital quality is better because digital signals remain pristine through storage and transmission. Digital sources can individually address each pixel, and that results in better, sharper images. Conversion from analog to digital (or digital to analog) degrades the image. Beyond quality, digital sources afford production companies copy protection. While compression can degrade the digital image, judicious use of compression technology can offer excellent compromises in quality, bandwidth and storage capacity.

Conversion

It is unlikely that every source in a system will instantly be upgraded from analog to digital so a strategy of conversion is essential. There are many simple devices available to convert any analog source to digital and most digital sources to analog. The first decision is the point in the system where the conversion occurs.

– At the Digital Source

From a financial standpoint (always important to churches) the easy decision is to take the new digital source, convert it to VGA or component and continue to use the legacy analog display system. This strategy has several pitfalls.

The obvious one is that pre-recorded material cannot legally be used with HDMI to analog convertors. It also fails to take advantage of the additional image quality afforded by digital transmission. It might work if a single PC with a digital output is all that is added, but many Apple products and most Blu-ray players will have problems.

– At the Analog Source

It makes a lot more sense to upgrade the displays and switchers to digital formats and then adapt the analog sources to the digital displays. This may be a good time to upgrade from 3:4 aspect ratio displays to a widescreen ratio. If the existing displays are of reasonable quality and recent vintage, it is likely that they already have digital inputs such as DVI or HDMI that can be utilized and then only the switching equipment will need upgrading. HDBaseT technology has made it simple to get signals from your switch to your displays using conventional category cable. New HDMI switchers are available with HDBaseT



Figure 1- Typical VGA to HDMI converter

HDBaseT has been adopted by virtually all the switcher and extender manufacturers as the best way move these signals. Capable of not only transmitting video (up to 4Kx2K), it can also transmit audio, enough power for receiver electronics, and control signals including IR, RS-232 and Ethernet. It uses conventional category cable. If the switcher has an HDMI output, you'll need both a transmitter and receiver. Many switchers include outputs with HDBaseT capabilities which make installation simple.



Figure 4 - Typical HDBaseT Transmitter with Ethernet

There are two versions of HDBaseT. The first has a nominal distance of 328 feet (100 meters), the second 230 feet (70 meters). At the highest resolutions these distances are reduced 30% unless CAT 6a or CAT 7 cables are used. The short distance version of HDBaseT does not support Ethernet.

A third way of extending signals has recently become more popular: IP Video. This technology is very useful in some applications. Unfortunately there is considerable latency in the data stream so it can't be used if audio isn't embedded in the video signal. If the audio stream of the IP video can be used for breakout rooms, nurseries or other areas away from the sanctuary it has several advantages including the ability to share LAN network infrastructure with other data. Wireless networking is not normally recommended for streaming HDTV.

The Next Level

The systems we've discussed are basic in that while they switch between sources to one or more displays, they don't allow multiple sources to appear on the screen simultaneously. That technology is finally coming to digital systems. Mixing (on a single screen) copy protected content with non-copy protected content had difficult implications for production companies as it is similar to the technology used for many illegal piracy activities. Whether it is a dissolve, a picture in a picture, or some other special effect, check with your potential supplier to see how their equipment manages these effects when copy protected material is involved.

Other Infrastructure

In the digital world just as in the analog world, there are many products from many different manufacturers. Switchers (many sources to one display), matrix switchers (many sources to many displays), and distribution amplifiers (one source, many displays) help get images where you need them. In most cases they work just as they did in the analog world.

Just as in the analog world, good design practice dictates that the designer minimize the number of layers of electronics a signal passes through. However unlike the analog world there is usually only one symptom of bad design: no picture and no sound. In the analog world, bad design made the image and sound a little poorer so that only the trained eye or ear would hear the difference. In the digital world no changes occur until the signal is so degraded that it is unusable and the picture is blank and the audio is silent. This makes troubleshooting difficult.

All Together

The digital revolution has come to the audio and video industry. Ultimately many installation issues are solved simply and easily. The technology is as robust as the analog systems being replaced. Image quality is better. With HDBaseT, wire is less expensive and easier to terminate. The analog methods were quite difficult when we started doing video projectors 25 years ago. Remember telephone directory sized books listing all the terminals and computer cards and the recommended interfaces? Remember 2-3 hours to converge multiple resolutions on a CRT projector? Remember using an 8x4 matrix to manage RGBHV, YUV, S-Video and Composite into one display? Remember pulling cable the thickness of a garden hose on long runs? I challenge you to learn the new digital technology, master it and use it for better audio and video!

