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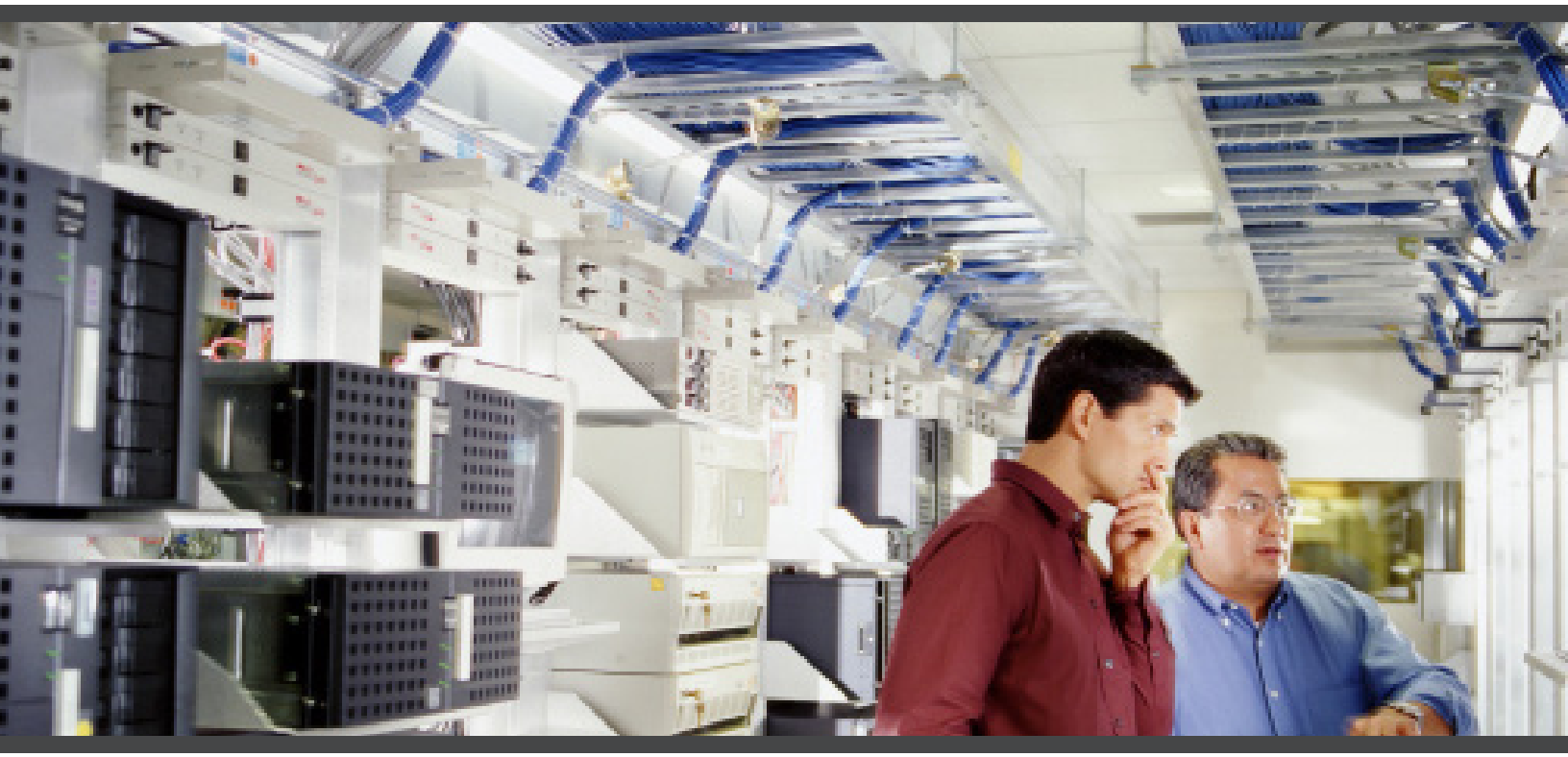
Toner

ADVANTAGES OF AV OVER IP



More organizations than ever before are looking for cost-effective ways to distribute large digital communications files. One of the best ways to achieve this is with an AV over IP solution. Compared to traditional coax video distribution, an IP-based solution offers significantly more flexibility, including reduced cost. IP-based solutions can be up to 30 percent less expensive to purchase, take 30 percent less time to install and require 30 percent less time to learn.

Video over IP networks provide several key advantages compared to non-networked solutions, including support for multi-point distribution for high-resolution video with low latency. Depending on the bandwidth requirements of the application, modern IP video solutions can travel over an existing LAN infrastructure or may require a dedicated network.

There are five main advantages to implementing AV over IP:

- Point-to-Multipoint Content Distribution
- Enhanced Resolution and Image Quality
- High Quality, Low Bandwidth
- Reduced Implementation Cost
- Scalability and Flexibility
- Long-Term Cost Effectiveness

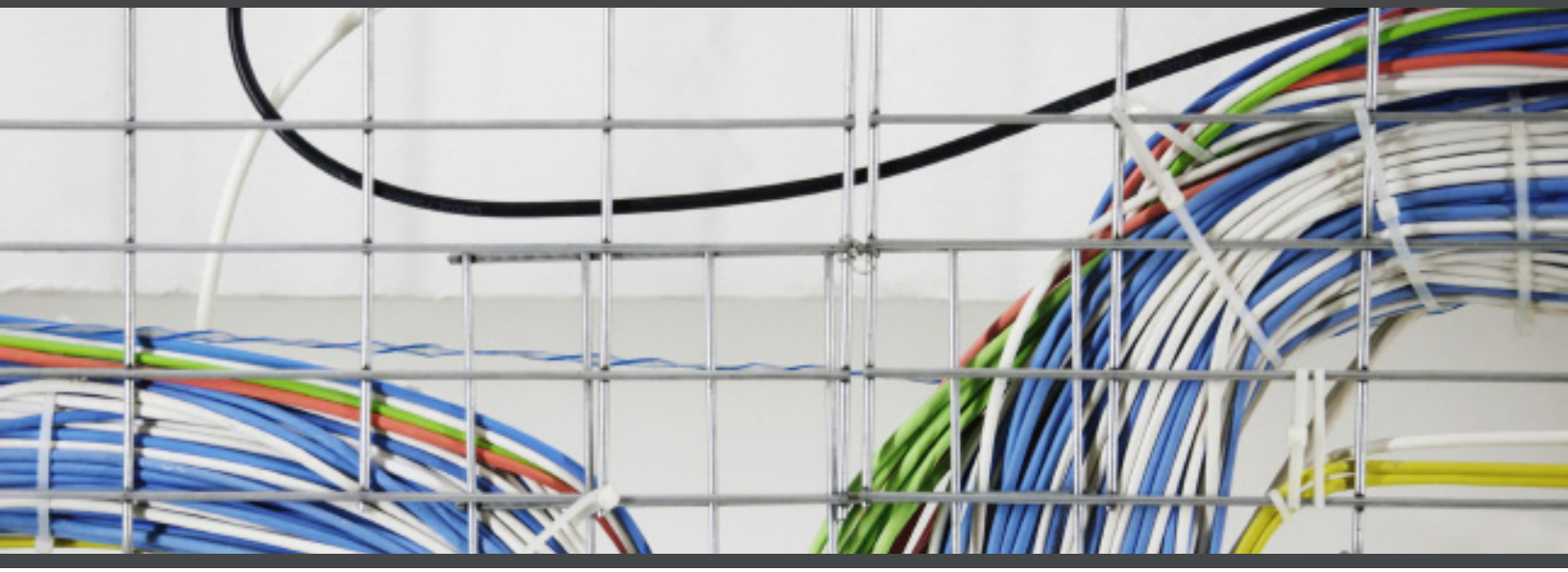
POINT-TO-MULTIPOINT CONTENT DISTRIBUTION

The biggest advantage of video over IP is point-to-multipoint content distribution. We see multicasting used most often in distance learning, video conferencing, command and control, broadcast applications, security and digital signage.

Distance learning over IP was first utilized in Higher Education in the late 90's using MPEG-2 and H.323 compression technologies. A typical setup is one classroom with the instructor, distributing to multiple remote locations. The biggest problem with many Education networks is that they have limited bandwidth connections with little funding for upgrades, as well as, most schools fill the pipe with Internet traffic leaving little room for distance learning applications. Innovations like the H.264 high definition video compression format are helping schools better manage their bandwidth needs.

Hospitals also have active learning programs, where lectures and surgeries are distributed for doctor training, and surgery assistance is utilized in real-time. Surgeries are recorded from multiple camera angles and archived for future study opportunities and insurance reasons. Hospitals require the highest resolutions, near-zero latency, and lossless distribution, therefore, often requiring dedicated IP infrastructures in a campus network design.

Command and control systems in Government and Military also have demanding multicasting requirements. Government command centers include police, traffic, energy, and transportation networks and must aggregate multiple, disparate communications streams, including phone, radio, security and other video and audio streams, into a unified system. Here too we often see the need for dedicated IP lines to handle bandwidth requirements.



Broadcast is unique in that the industry is heavily invested in the SDI format and has to send raw, uncompressed signals, which are then edited and compressed along the pipeline before reaching homes. Many broadcast facilities have already upgraded their systems to handle 3G HD-SDI but the move towards 12G HD-SDI promises an even bigger investment, therefore, dedicated IP infrastructures are being pursued as an alternative, scalable option. 10GE Ethernet transmission is the most affordable at this point for 4K 30hz, which uses about 9 Gb/s of that, but moving to 4K 60hz 4:4:4 requires about 18 Gb/s, therefore, the employment of all-IP distribution network for broadcast TV utilizing 25GE transmission is still many years away. Despite the slower adoption of IP by the major telcos, there are plenty of private IPTV operators rolling out subscriber services using a packet-switched network, such as a LAN or the Internet. Unlike traditional television delivery, in which all programming is broadcast simultaneously, IPTV sends only one program at a time, making it an efficient means of delivery.

For other applications such as digital signage and security, the multi-point attributes of an IP transport network allow for one or more sources to be sent to multiple displays. Examples are school administrators providing signage content across a network of individual schools, monitoring of campus security cameras, and control rooms that make use of video walls.

ENHANCED RESOLUTION AND IMAGE QUALITY

Another big advantage that IP video systems have over analog systems is that they provide up to five times the resolution over a standard Ethernet network, thanks to innovations like the H.264 codec. Coming in 2016, the H.265/HEVC compression format promises a halving of current bandwidth requirements of H.264 to support 4K mainstream content distribution and future 8K (resolutions up to 8192×4320), really testing the limits of streaming video over IP.

HIGH QUALITY, LOW BANDWIDTH

When it comes to video and audio streaming, image compression, transmission and storage require a lot of bandwidth. IP video solutions use more effective compression protocols than traditional coax systems, helping to minimize network bandwidth requirements, especially if images are compressed. Moreover, IP distribution is flexible in that users can modify image compression specifications, size and frame rates without negatively impacting image quality.

At the present time many companies are still using 1080P video, so the biggest consideration is not resolution requirements, but how much bandwidth is available on their IP network, what latency and compression are required for the application. Bandwidth needs as low as 2-30 mb/s can be achieved on a shared IP network, but requirements can go as high as 100 mb/s, which then requires a dedicated video IP network. For some applications, low latency – delays resulting from buffering into memory and processing – is good enough, whereas with other applications near-zero latency for as close to real-time video as possible is required. And for some applications, visually lossless compression is good enough – where the data that is lost after the file is compressed and decompressed is not detectable to the naked eye – but for mission-critical applications, true lossless compression is required.

REDUCED IMPLEMENTATION COST

As mentioned above, if bandwidth requirements are low then companies can take advantage of their current Ethernet infrastructure, thus costs are minimal to move to a video over IP network. However, if bandwidth needs are greater for large deployments, the costs for scaling up Ethernet is less than alternative networks.

SCALABILITY AND FLEXIBILITY

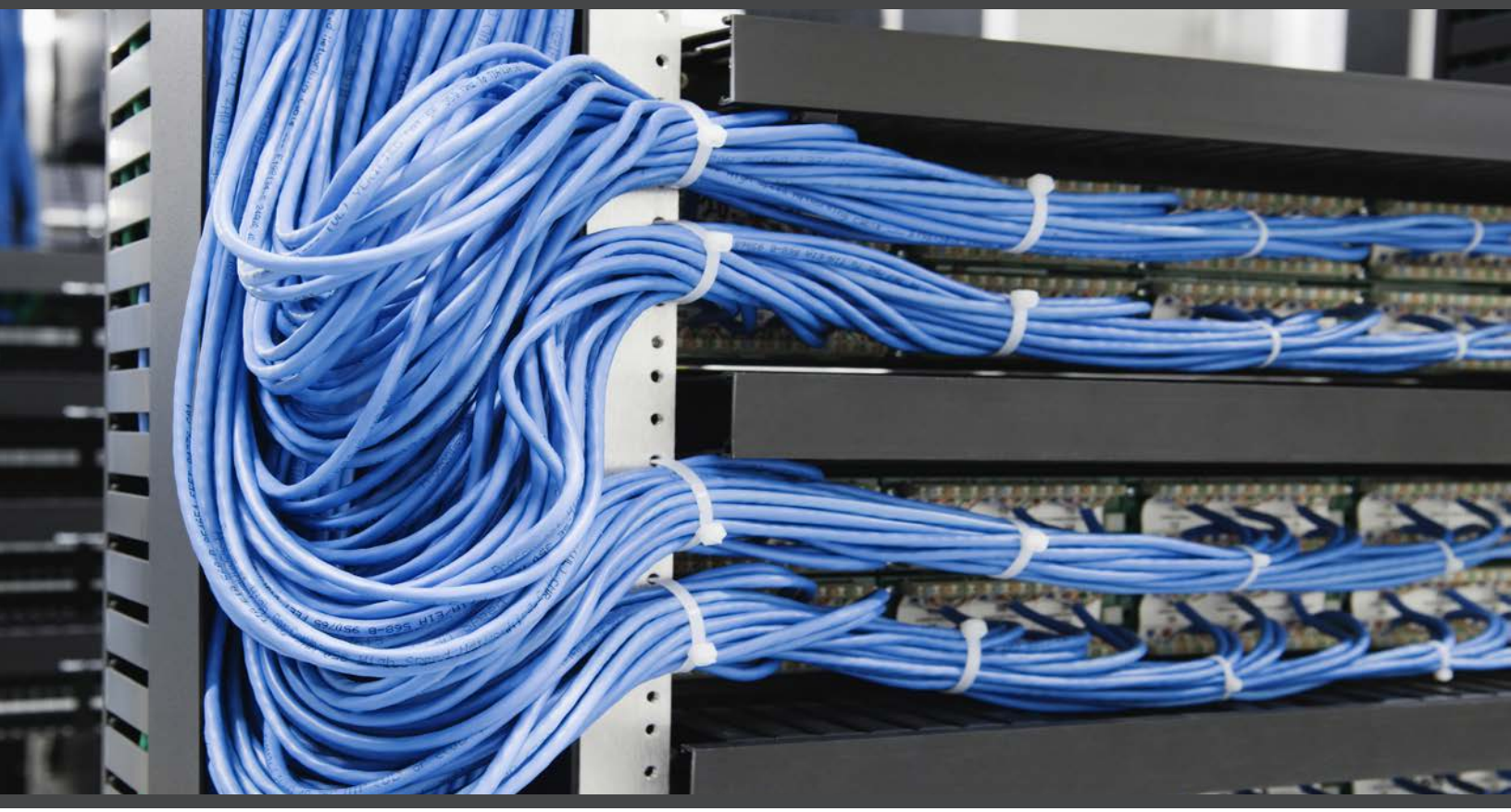
Compared to an analog system, IP video designs are more versatile in terms of scalability. They are far more flexible in terms of bandwidth, server capability, expansion and growth.

Multicast IP routing is more efficient than broadcasting. In traditional broadcasting, all of the packets have to be received by everyone on the link. This is much like you receiving every channel on your TV even though you may watch only a few of them. In multicasting, however, you only get the channels that you want, when you want. Using a packet-switched network means that if you want to watch a video on your computer, every router on the Internet doesn't consume the bandwidth required to deliver that video to every computer on the network. Instead, the video is delivered to a single multicast address, or multicast group, which is then distributed to a set of recipients that are interested in that video by the use of routers that serve to duplicate the data packets and forward multiple copies wherever the path to recipients diverge, thus optimizing the use of the network.

IP systems are more flexible than in the past because data, voice and video can be sent on a single network, so long as the video and audio bandwidth requirements are not at a level that require a dedicated IP network for those functions. One of the main drivers of a more flexible system is voice over IP (VoIP), which in addition to PC-based phone calls of old, can now also handle desktop phones, video conferencing, cloud-based applications, on-demand recording, as well as, unified voice and video calling, e-mail, and instant messaging. New users can be added, removed and moved to any location, instantly.

LONG-TERM COST EFFECTIVENESS

Since IP distribution systems are effectively modular they are scalable, making them simple to expand or reconfigure as the organization's needs change. These systems may not require additional cabling installation because organizations can use their existing LAN infrastructure up to a certain point. For increased bandwidth beyond that point, duplication wiring may be laid next to the current setup to carry additional bandwidth loads without interrupting other business processes.



CHOOSING THE RIGHT SOLUTION FOR YOUR VIDEO OVER IP APPLICATION

For an optimal IP architecture, it's important to choose a solution that can best manage your content based on the tradeoffs that are suitable for your application. Success comes in achieving the optimum balance of hardware, processing speed, transmission speed, and video quality. Opticomm-EMCORE offers two encoder/decoder solutions depending upon your application needs, the NV series and the HD4 series.

The NV encoder and decoder are suitable when the highest-quality transmission requirements are needed along with the lowest latency, for bandwidth requirements up to 100 mb/s, using lossless JPEG 2000 compression and Forward Error Correction (FEC), which helps to reduce errors in data transmission without the system requesting a retransmission of data.

The HD4 encoder and decoder are lower cost and suitable for bandwidth requirements of 2-30 mb/s, using visually lossless MPEG-4 / H.264 compression.

To learn more about these products and determine which is the right fit for your application, **click here to view the NV Series** and **here to view the HD4 series** and download the datasheets.