CORPORATE

Distributing 4K60 over 1GB Networks

OPPORTUNITY

Distributing video, especially in resolutions such as 4K/UHD, requires a tremendous amount of bandwidth. 4K60 video (2160p60), for example, requires 12 Gbps of bandwidth to support a full color image with no compression. When compared to 1080p—only 3 Gbps uncompressed even at 60 frames per second and full color—it's easy to see why 4K60 is still proving a challenge to distribute over IP networks. To make matters worse, none of the current IP video distribution technologies provide enough bandwidth to support uncompressed 4K60 video at full 4:4:4 color sampling. In fact, Gigabit Ethernet (GbE) doesn't even support full color, uncompressed 1080p60. While there are options for IP video distribution over 10 Gigabit networks, such networks have significantly greater hardware costs, and distribution over existing networks becomes all but impossible in most cases.

This table shows the uncompressed video bandwidth required for common HD and UHD video resolutions at different color sampling rates and frame rates. Note that most of these resolutions exceed 1 Gbps.

Uncompressed Video Bandwidth for Common HD and UHD Resolutions
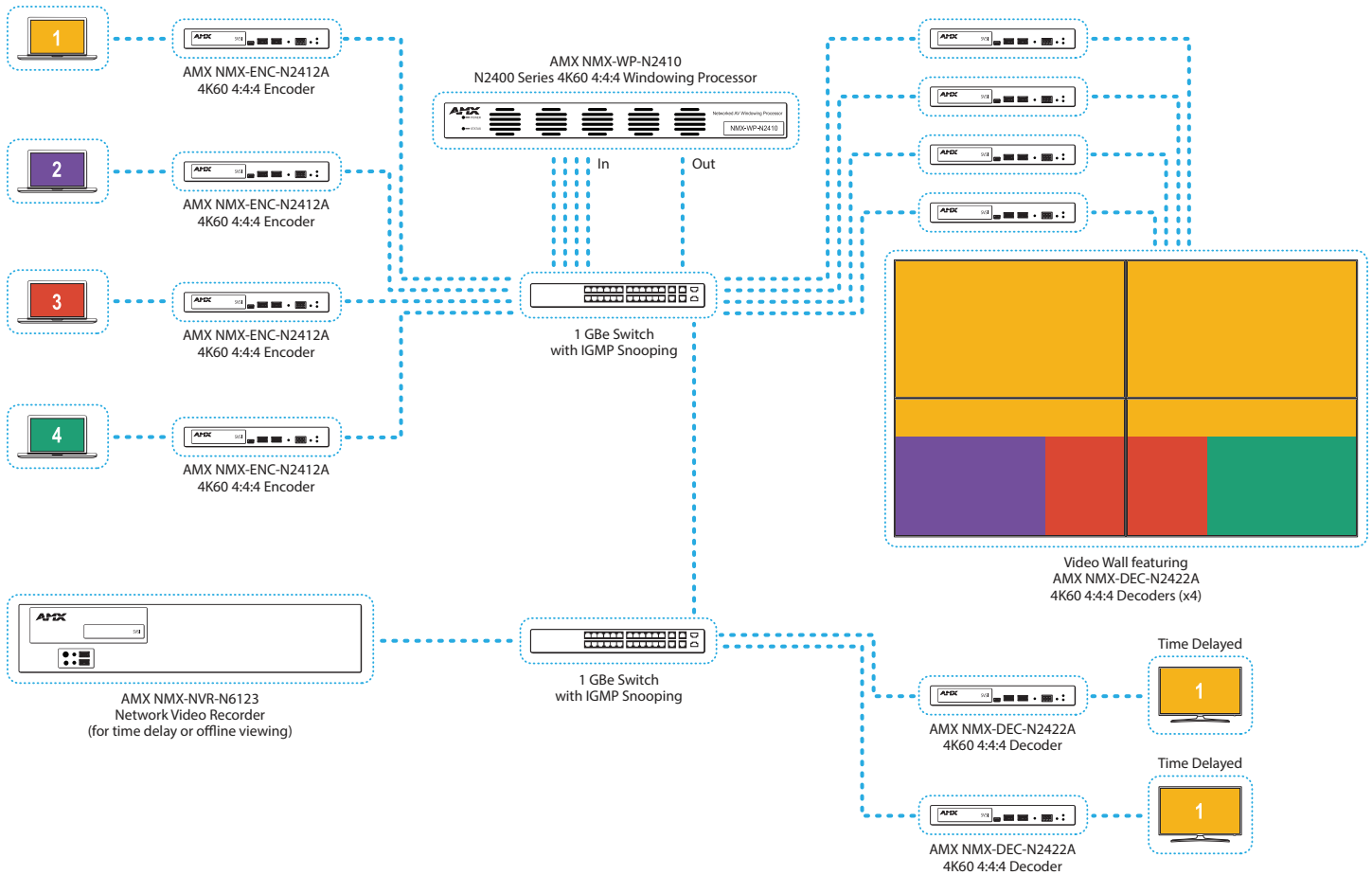
Resolution	Pixel Count	Frame Rate	Color Sampling	Bandwith*
1080p60	1920 x 1080	60 fps	4:4:4	3 Gbps
1080p60	1920 x 1080	60 fps	4:2:2	2 Gbps
1080p60	1920 x 1080	60 fps	4:2:0	1.5 Gbps
1080p30	1920 x 1080	30 fps	4:4:4	1.5 Gbps
1080p30	1920 x 1080	30 fps	4:2:2	1 Gbps
2160p60	3840 x 2160	60 fps	4:4:4	12 Gbps
2160p60	3840 x 2160	60 fps	4:2:2	8 Gbps
2160p30	3840 x 2160	30 fps	4:2:2	4 Gbps

*These are the raw bandwidth values calculated as (vertical pixels) x (horizontal pixels) x 8 bits/pixel x 3 colors/pixel x (frame rate). These bandwidths do not include blanking intervals or 8b/10b encoding as those do not apply to the encoded data and will be lower than HDMI (TMDS) bandwidths.

HARMAN
A SAMSUNG COMPANY

AKG   AMX   BSS   crown   dbx   JBL PROFESSIONAL   lexicon   Martin   Soundcraft   STUDER

SOLUTION

By using an AMX N2400 Series video over IP solution, bandwidth can be significantly reduced, allowing video to be transmitted over a standard 1 GbE network with bandwidth of less than 800 Mbps and a latency of less than two frames. Using the low-latency, high-fidelity JPEG2000 codec within the N2400 Series, it becomes a much more standard and cost effective solution, because it can use standard 1 Gigabit Ethernet switches without a visible loss in quality. It also becomes feasible to transport and switch video using an existing enterprise IP network, further reducing total system cost while also simplifying installation and allowing for easy system expansion. By combining the advantages of low-bandwidth transmission with the use of a high-quality codec, professional-quality video can be distributed throughout a campus in a cost-effective manner.

1 AMX NMX-ENC-N2412A 4K60 4:4:4 Encoder

2 AMX NMX-ENC-N2412A 4K60 4:4:4 Encoder

3 AMX NMX-ENC-N2412A 4K60 4:4:4 Encoder

4 AMX NMX-ENC-N2412A 4K60 4:4:4 Encoder

AMX NMX-WP-N2410 N2400 Series 4K60 4:4:4 Windowing Processor

In   Out

1 GBe Switch with IGMP Snooping

Video Wall featuring AMX NMX-DEC-N2422A 4K60 4:4:4 Decoders (x4)

AMX NMX-NVR-N6123 Network Video Recorder (for time delay or offline viewing)

1 GBe Switch with IGMP Snooping

Time Delayed **1**

AMX NMX-DEC-N2422A 4K60 4:4:4 Decoder

Time Delayed **1**

AMX NMX-DEC-N2422A 4K60 4:4:4 Decoder

AMX N2400 Series 4K60 4:4:4 Networked AV Solution

This low-latency video over IP solution allows users to distribute video at resolutions up to 4K60 4:4:4 over Gigabit Ethernet networks. Utilizing JPEG2000 encoding, AMX N2400 Series encoders and decoders deliver cinema quality video with just two frames of latency. The N2400 Series features advanced security, including Active Directory, 802.1x, SSL/TLS and HTTPS, and is PoE+ powered, simplifying installation and reducing installation costs.

HARMAN
A SAMSUNG COMPANY