**Tech Note:**

11/13/14 (JM)

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**Playback Performance: Encoding, Layers, Content and Collage**

The Axon HD Pro server is a flexible piece of video server equipment, this tech note is meant to suggest best practices in selecting and creating content for usage on the server.

**Encoding Format Performance**

The Axon HD series of servers can playback multiple layers of content, in various formats. Each format has its own performance characteristics and tradeoffs. These trade-offs impact performance in various ways. For example loading 5 layers of HD content, that is encoded with MPEG2 will require less decoding resources than playing back 5 layers of HD content that is encoded as an MP4 with the h.264 codec. The reason for this stems from the design of the h.264 codec – in broad terms, it requires more power to decode on CPU, but requires less disk space for storage and transmission. MPEG2 requires more disk space for storage, but requires less power to decode and playback. There are many, many formats that exist, all have specific performance trade-offs, it is suggested that if possible, use the HES supplied encoding templates. The specifications for the Axon HD line of servers are written with MPEG2 encoding in mind, as this has been historically the most tested, understood format and strictly adhered to encoding specification.

**Layer Count**

The Axon HD Pro supports 4 outputs, 10 layers per output with the result of 40 total layers. This number of layers is meant to allow flexibility in programming using masks, still image, video content and live inputs in any combination. This is not to infer that 40 layers of HD content will play back at an acceptable frame-rate. Current servers are specific in number of programming layers, and total number of movie playback. These specifications are exclusive to one another. There are a vast number of combinations that the server will playback correctly, when programming increment in a systematic manner, watching the On-Screen-Stats for performance impacts. Find the acceptable limit for your specific need.
Content Pixel Size

During the design phase of the Axon HD line there was a determination to allow the server to be a very flexible piece of video equipment. This decision allowed a wide range of pixel resolutions; this simply means the content is not locked to a specific size. This allows the graphics engine to properly ingest process and output a video file without applying any scale factors in the graphics pipe-line.

With this flexibility, it should be known that all testing and specifications for the Axon HD series were written with 1920x1080 @30fps MPEG2 encoded content, driving 4 - 1920x1080p @ 60hz computer monitors using the an AMD approved Display Port to DVI Active adapter. Total number of HD layers that were played back was 12 (4 outputs, x 3 layers each). Although we strive to always meet this performance metric, this performance specification is subject to change as the technical requirements of the system as a whole is constantly evolving, we make design decision based on a typical use case and optimize compute resources as needed with total system advancement in mind.

To prepare for future display device inclusion, testing was completed with a display device marketed as 4k. The 4k device tested is defined as 3840 x 2160 @ 30hz. Content was selected to match this display device. The Axon HD Pro server supports 1 output and 2 layers of 4k content.

With flexibility and performance in mind, all other pixel sizes, and format mixes should be tested beforehand, and if needed contact HES support for technical assistance.

Collage and Content selection

When building a collage it must be understood how the system uses the selected content. In a basic 4x1 collage for example, using 1920x1080p content, the resolution of the content being sent to the display device is [1920 divided by 4 plus the ½ the variable blend region]. When using variable edge blend, the Axon HD line of servers will select the correct portion of content and supply it to the display device. It should be clearly noted, that 4 instances of the content are loaded at this time on the server (one for each output connected.) To use another example, a 10x1 collage across multiple servers would only have approx. 192 pixels to each output, this would not be visually acceptable. If a higher resolution piece of content were to be produced, say, 19200 x 1080 this would not be usable as the pixel dimension is far too high. To achieve the best result, a segmented collage would need to be programmed and content produced to match. Please contact HES for more technical assistance in producing content resolutions for high resolution segmented collages.
Technical Assistance

As always High End Systems strives to provide the best service and support for its products. Please do not hesitate to contact support when working with odd content or resolutions. Below are common links to support pages for the Axon HD Line, and Encoding information.

Support Pages.

https://www2.highend.com/support/digital_lighting/axon.asp

Content Encoding Templates

http://www2.highend.com/support/digital_lighting/CreatingCustomContent.asp