



Digital Media Capabilities of the Modero X Series Touch Panels

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INTRODUCTION

The Modero X Series Touch Panels are capable of hosting a wide variety of video content. This paper discusses the various methods of displaying digital media on the Modero X Series.

VIDEO STREAMING VERSUS VIDEO PREVIEW

The Modero X Series can host two types of video content: video streaming and video image previewing. Video streaming is full motion audio/video data delivered from an IP-network source while video previewing is a method of displaying snapshots from an upstream video source that update every few seconds. Note: Unlike video streaming, video previews do not contain an audio component.

SUPPORTED VIDEO PREVIEW FORMATS

The Modero X Series Touch Panels support the JPEG image standard and can retrieve and display JPEG images from either local storage or remotely over the network using the HTTP protocol. Remote image retrieval enables video preview from a web server, however to view image snapshots from streaming media sources such as a Blu-ray player, an additional media accessory such as the AMX Multi Preview or AMX Multi Preview Live is required. The Multi Preview and Multi Preview Live convert up to 10 analog or digital video streams into JPEG images for retrieval by the touch panel.

SUPPORTED VIDEO STREAMING FORMATS

The following video codecs are supported in the Modero X Series Touch Panels:

- Motion JPEG (M-JPEG): Motion JPEG is a method of delivering video whereby each frame of digital video is separately compressed into a JPEG image. The Modero X Series will decode M-JPEG up to 720p resolution and 25 fps. A limitation of M-JPEG: it does not support audio.
- MPEG-2: MPEG-2 is a lossy compression method used for DVDs and widely used in digital television and satellite broadcast systems (Tudor, 1995). The Modero X Series will decode MPEG-2 audio/video up to 720p resolution and 25 fps.
- H.264: Also known as MPEG-4 Part 10 or Advanced Video Coding (AVC), H.264 is widely used for compressing high definition video and is the codec used for Blu-ray discs. H.264 requires less bandwidth than MPEG-2 (approximately half the bitrate), however H.264 requires more computational resources to implement than MPEG-2 (ThomasWiegand, 2003). The Modero X Series supports H.264 encoding of the 720p camera input and decodes up to 720p resolution and 25 fps¹. H.264 must be streamed inside an MPEG-2 transport stream.
- Virtual Network Computing (VNC): While not technically a streaming format, VNC allows the sharing of a touch panel or PC screen remotely. The Modero X Series has a built-in VNC client and server.

Details on implementing each of these supported video streaming formats are available in the “EXAMPLES OF VIDEO STREAMING SYSTEMS” section below.

¹ H.264 on the Modero X Series will be supported in August 2012

EXAMPLES OF VIDEO IMAGE PREVIEWING



There are many instances when having the ability to preview single video snapshots is preferable over motion video streaming. For example, a user giving a presentation using multiple device sources would normally have to remember which media source is associated with which input. With *Video Preview*, the user can view snapshots of all attached media sources and then select the correct input by simply touching the desired snapshot.

AMX supports a unique method of video preview that allows up to 10 different media streams to be previewed at one time using either the AMX Multi Preview (MP) or Multi Preview Live (MPL) features in conjunction with an Enova DGX or DVX switcher. The video sources are connected to the DVX or DGX and then MP/MPL instructs the switcher to cycle through each video input while taking snapshots of the video output. The video snapshots are retrieved by the touch panel for displaying to the end user.

Multi Preview supports HDMI-connected sources at 480p resolution while Multi Preview Live supports both analog and digital video inputs at up to 720p resolution. Both Multi Preview and Multi Preview Live support EDID and will automatically switch to the correct resolution if that resolution is supported. Fig. 1 shows a network setup for video preview image support.

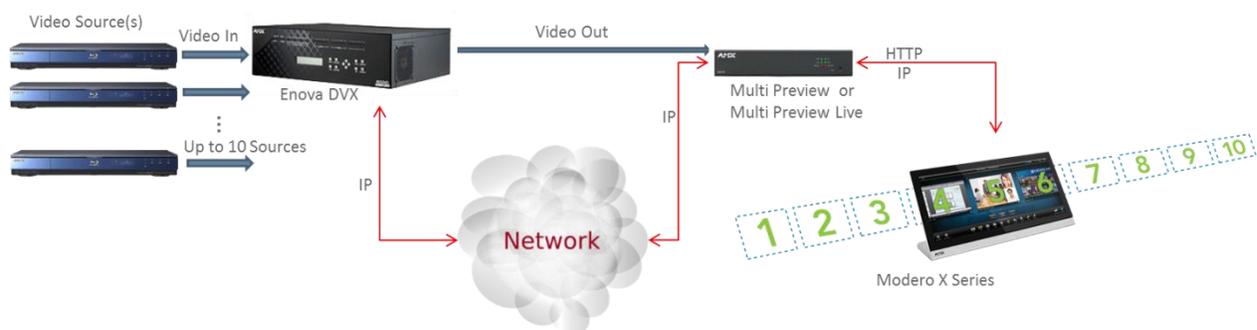


Fig. 1 Example of an application displaying preview images of up to 10 separate video sources

EXAMPLES OF VIDEO STREAMING SYSTEMS

The following examples show how to deploy and configure video streaming to Modero X Series Touch Panels using the M-JPEG, MPEG-2 and H.264 codecs.

MOTION JPEG VIDEO STREAMING

Fig. 2 shows a typical network deployment using M-JPEG. In this example, the M-JPEG video retrieved from the web server is from a security camera. No additional media accessories are required for M-JPEG support. It is important to note that M-JPEG streaming does not support audio. Modero X Series touch panels support up to 10 M-JPEG streams at one time, however this limit assumes that no other CPU-intensive processes, such as an MPEG-2 stream for example, are concurrently active.

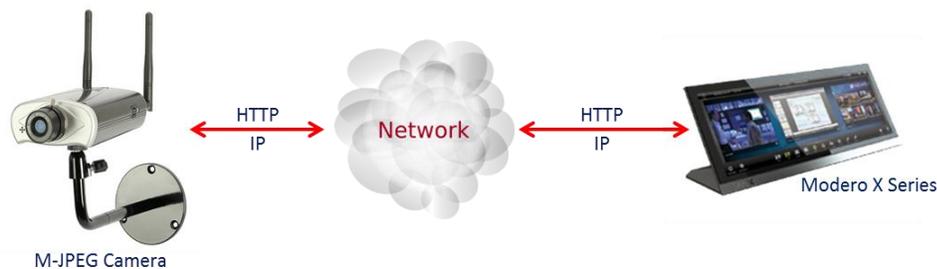


Fig. 2 Example of networked M-JPEG video streaming to the Modero X Series

MPEG-2 VIDEO STREAMING

While the Modero X Series natively supports MPEG-2 decoding, it is often necessary to use an MPEG-2 encoder to convert an incoming video source to an MPEG-2 stream. AMX offers several products that support MPEG-2 encoding including the MAX-CSE Encoder and the Vision² solution. Modero X Series touch panels can decode one MPEG-2 stream at a time. The settings for MPEG-2 encoding for the MAX-CSE and Vision² are also shown below.



Fig. 3 Example of networked MPEG-2 video streaming to a Modero X Series touch panel

MPEG-2 video streaming Settings:

- High quality preset profile (6Mbps/ MPEG2 CBR D1 Resolution)
- MP2/MP3 audio < 192Kbps @ 48KHz
- MPEG2 video 720p max < 30fps max bitrate of 8Mbps
- UDP Transport protocol only (RTP not supported)
- Multicast and/or unicast addresses
- SAP disabled

H.264 VIDEO STREAMING

Most MPEG-2 encoders only accept analog video inputs. For true digital video streaming, an HDMI-equipped streaming device is required. Multi Preview Live provides the ability to stream digital content from video sources such as Blu-ray players. Multi Preview Live also supports analog inputs as well. The Modero X Series can decode one H.264 stream at a time. Note: H.264 must be carried in an MPEG-2 transport stream in order to be properly decoded by the touch panel. Other AMX products like the Vision² all serve H.264 over MPEG-2 TS.

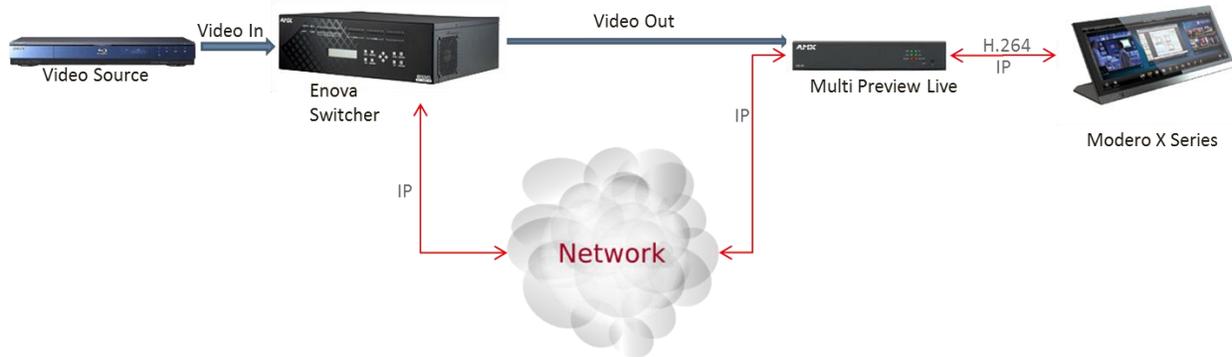


Fig. 4 Example of networked H.264 video streaming to a Modero X Series touch panel

Multi Preview Live also supports programmed switching of video input sources on AMX Enova DVX or Enova DGX switchers, allowing streaming of up to 10 video sources to a touch panel, however only one video stream can be active at a time. Any preview windows active before the video stream will stop updating and will display the last previewed image until video streaming has stopped, at which time, the preview images can begin to update again.

VNC

With a built-in VNC client and server, Modero X Series touch panels can view the “desktop” view of connected PCs on the same network or share its “desktop” or a combination of both. To enable the touch panel as a VNC server, the user enables the G4 Web Control application in the Modero X Series “Settings” page. To use the VNC client functionality, the user creates VNC UI elements in their TPDesign touch panel files. Up to 10 different VNC windows can be running at the same time, however this limit assumes that no other CPU-intensive processes are concurrently active.

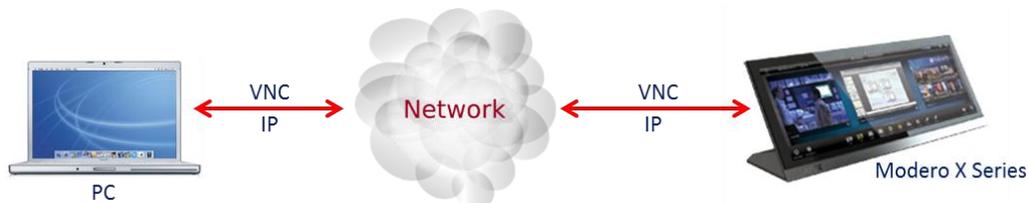


Fig. 5 Example of networked VNC desktop sharing

PUTTING IT ALL TOGETHER

Using the unique features of Multi Preview Live combined with an Enova switcher such as the DVX-3150HD, an integrated video streaming and video previewing system can be implemented for Modero X Series touch panels. In this application, the end user can see video snapshots of up to 10 different video sources. When the user selects an image, the snapshot converts to full streaming video while suspending video preview temporarily for the other images. The end user can dynamically switch between snapshots and video streaming as needed. Fig. 6 shows a room system diagram which uses combined video streaming and video previewing. In this layout, the video sources are a camera, DVD player and Blu-ray player.

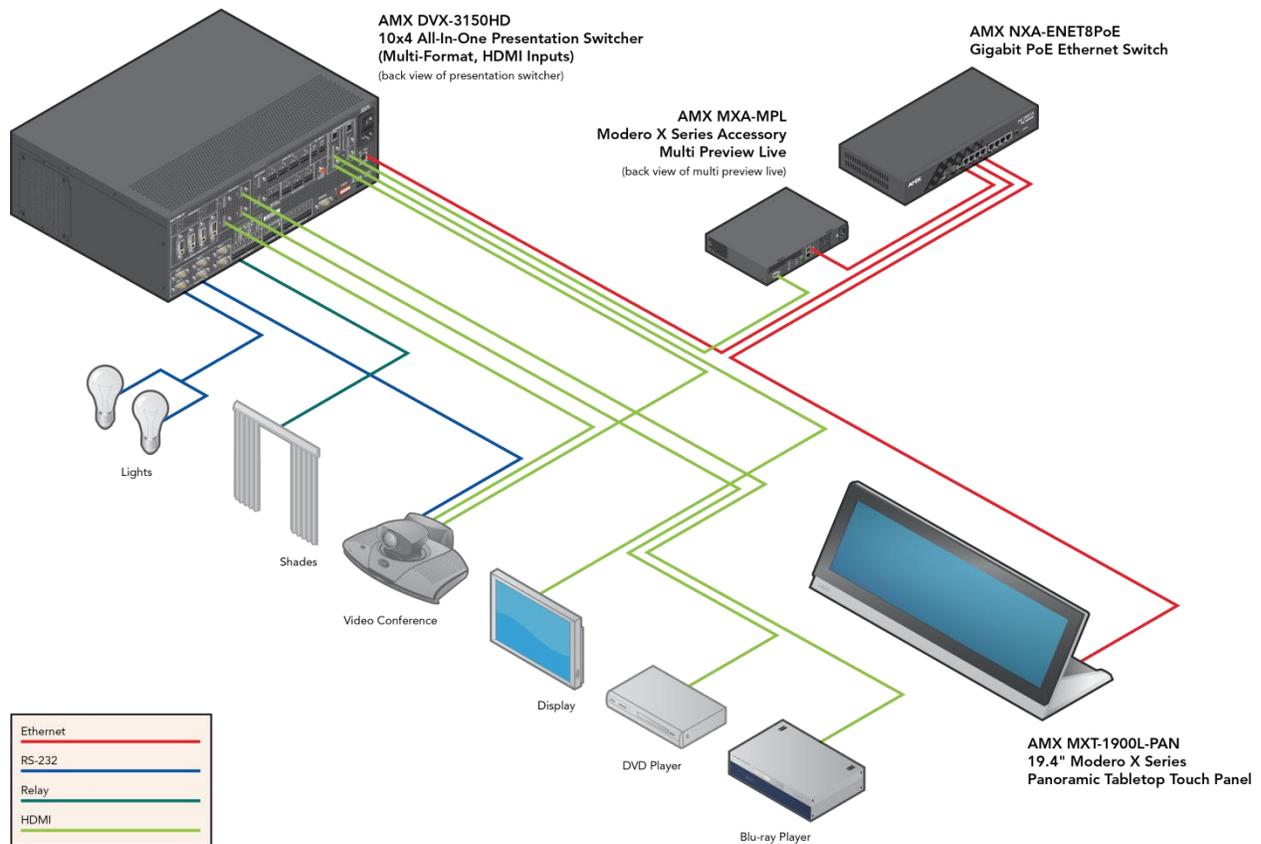


Fig. 6 Typical meeting room deployment using a video conference camera, DVD player and Blu-ray player

CONCLUSION

Modero X Series Touch Panels offer a wealth of options for displaying digital media. When used in conjunction with an Enova switcher and the Multi Preview media accessory, an exciting world of dynamic media content is enabled for the end user. For more information on Modero X Series touch panels, Enova switchers or Multi Preview media accessories, contact your AMX Representative or visit www.amx.com.

APPENDIX A – MATRIX OF SUPPORTED MODERO X VIDEO STREAMING PROTOCOLS AND RECOMMENDED SETTINGS

The following matrix gives an overview of supported video streaming protocols by the Modero X Series Touch Panels and recommended settings and guidelines for each codec.

Video Performance					
Device	Typical A/V Sync (offset/hr)	Typical A/V Sync Restart Rate	Expected Latency - Typical	Expected Latency - Max	Notes:
MXA-MPL					
H.264	<100ms	~ every 3hrs	750ms (Video) 1s (Audio + Video)	2s or more, depending on network	Recommend maintaining aspect ratio of source and following usage guidelines regarding window/button placement. Network congestion can cause video glitches. AMX recommends the Multi-Preview Live and Modero X touch panel be installed behind a smart ethernet switch to filter multicast packets reaching the panel and consuming panel resources. The MXA-UENET video accelerator cable (FG5968-74/75/76) may also improve performance in cases of network congestion.
MPEG2	N/A	N/A	N/A	N/A	N/A

Video Performance (Cont.)					
Device	Typical A/V Sync (offset/hr)	Typical A/V Sync Restart Rate	Expected Latency - Typical	Expected Latency - Max	Notes:
Vision2					
H.264	<100ms	~ every 1-2hrs	1.5s	3s or more, depending on network	<p>The MXA-UENET video accelerator cable (FG5968-74/75/76) is strongly recommended for this application.</p> <p>Network congestion can cause video glitches. AMX recommends the Modero X touch panel be installed behind a smart ethernet switch to filter unintended multicast packets reaching the panel and consuming panel resources.</p> <p>Recommend maintaining aspect ratio of source and following usage guidelines regarding window/button placement.</p> <ul style="list-style-type: none"> • AAC <= 192Kbps @ 48KHz • H.264 video 720p max (D1 for best results), < 30fps max and a 4Mbps bitrate • UDP Transport protocol only (RTP not supported) • Multicast and/or unicast addresses • SAP disabled <p>May require transcoding to H.264 baseline profile and reducing resolution/ frame rate/bit rate per recommendations above.</p> <p>Recommend transcoding source material to MPEG2 if Audio/Video sync issues still occur after following above guidelines.</p>
MPEG2	<100ms	~ every 1-2hrs	1.5s	3s or more, depending on network	<p>The MXA-UENET video accelerator cable (FG5968-74/75/76) is recommended for this application, especially HD streams.</p> <p>Network congestion can cause video glitches. We recommend the panel be installed behind a smart ethernet switch to filter unintended multicast packets reaching the panel and consuming panel resources.</p> <p>Recommend maintaining aspect ratio of source and following usage guidelines regarding window/button placement. Best results are obtained with standard definition (NTSC or PAL) sources.</p> <p>Minor audio/video irregularities may be noticed depending on network performance, video source content, and window size. Note: Video frame rate can be affected by network performance.</p> <p>MPEG-2 video streaming Settings:</p> <ul style="list-style-type: none"> • MP2/MP3 audio <= 192Kbps @ 48KHz • MPEG2 video 720p max < 30fps max bitrate of 8Mbps • UDP Transport protocol only (RTP not supported) • Multicast and/or unicast addresses • SAP disabled

Video Performance (Cont.)					
Device	Typical A/V Sync (offset/hr)	Typical A/V Sync Restart Rate	Expected Latency - Typical	Expected Latency - Max	Notes:
3rd Party Solutions					
H.264	N/A	N/A	N/A	N/A	<p><i>NOTE: Third-party encoders and digital television devices have not been tested with Modero X Series touch panels, and are not supported by AMX.</i></p> <p>The MXA-UENET video accelerator cable (FG5968-74/75/76) is recommended for this application, especially HD streams.</p> <p>Network congestion can cause video glitches. We recommend the panel be installed behind a smart ethernet switch to filter unintended multicast packets reaching the panel and consuming panel resources.</p> <p>We recommend maintaining aspect ratio of source and following usage guidelines regarding window/button placement.</p>
MPEG2	N/A	N/A	N/A	N/A	<p><i>NOTE: Third-party encoders and digital television devices have not been tested with Modero X Series touch panels, and are not supported by AMX.</i></p> <p>The MXA-UENET video accelerator cable (FG5968-74/75/76) is recommended for this application, especially HD streams.</p> <p>Network congestion can cause video glitches. We recommend the panel be installed behind a smart ethernet switch to filter unintended multicast packets reaching the panel and consuming panel resources.</p> <p>We recommend maintaining aspect ratio of source and following usage guidelines regarding window/button placement.</p>

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