WHITE PAPER

Remote Production: Synchronizing Video Sources Over the Internet

Stream Sync with the Makito X Video Encoder/Decoder Series for Live Event Coverage

Haivision

VIDEO AT WORK

Remote Production: Synchronizing Video Sources Over the Internet

STREAM SYNC WITH THE MAKITO X VIDEO ENCODER/DECODER SERIES FOR LIVE EVENT COVERAGE

INTRODUCTION

Nothing engages viewers like live video. Whether it's for television or corporate communications, live video can make people, no matter where they are watching from, feel as if they are truly taking part in the event. While major sports stadiums and corporate convention centers may have production resources on site, most remote venues are not fully equipped for live video production.

For producers with tight budget constraints, planning for a live event involves tough choices between deploying remote production staff and the cost of transmitting video. Traditionally, live production of remote events requires an on-site crew of camera operators, sound engineers, and a technical director. Though costs can be reduced by managing live production workflows from a main studio, sometimes referred to as remote integration or REMI, the additional bandwidth required for transmitting multiple contribution video feeds over satellite or a dedicated network can negate the savings of having a centralized live production facility.

In this white paper, we will explore how broadcasters can leverage the latest video streaming technologies to satisfy the demands of remote production workflows without the traditional costs and logistical challenges.

THE CHALLENGE OF SYNCHRONIZING MULTIPLE CAMERAS - COSTLY SATELLITE UPLINKS VERSUS UNRELIABLE INTERNET STREAMING

While broadcasting live events, the use of multiple cameras allows for a more engaging and dynamic viewer experience. For remote locations such as sports stadiums or concert venues, a producer needs to be able to seamlessly switch between live video feeds depending on what angle is most suitable at a given time. Typically, a single audio stream is used, as sudden changes in audio are very noticeable and can be distracting. If the video is not synchronized, switching between cameras can result in issues such as input lag and lip sync delay.

At the live production facility, decoders receiving the live feeds need to be kept in sync so that a producer can immediately include any of the sources within their live playout workflow. One way to prevent multi-camera and audio sync issues is by using a satellite uplink, though it comes at a high cost. Another option is to use a dedicated private network that can provide a stable level of latency and therefore the ability to manually sync video and audio feeds, though this is not always an option from remote locations.

Streaming over the Internet is a more cost-effective and flexible approach, however bandwidth availability is difficult to predict and can change at any given moment. Being able to synchronise remote contribution streams over the Internet resolves the dilemma between managing costs and ensuring broadcast quality.

HOW TO SYNCHRONIZE STREAMS

Keeping live video streams – referred to by broadcasters as contribution video – in sync requires synchronization of all production workflow elements including cameras, encoders, and decoders. Cameras are kept in sync with each other using a Genlock device while encoders are tied to an NTP server. Genlock and NTP can either be separate equipment or combined in a single device. Whatever the case, it is important for all encoders to share the same NTP server.

On the receiving end at production, decoders also need to be synchronized to an NTP server. This can be the same server as the encoder, or located within the production facilities, as long as all decoders are sharing the same NTP server. To ensure accurate timing across a global network, it often makes sense for decoders to use an NTP server located in the remote site region while the decoders rely on a server within the region of production.

By embedding timestamps into a video stream, encoders can then relay precise timing information to decoders at the production side. When streaming over a managed network, frames can then be manually aligned to ensure proper synchronization between multiple video and audio sources. However, when streaming over the public Internet, frames need to be continually re-aligned to make up for real-time changes in bandwidth availability and IP latency.

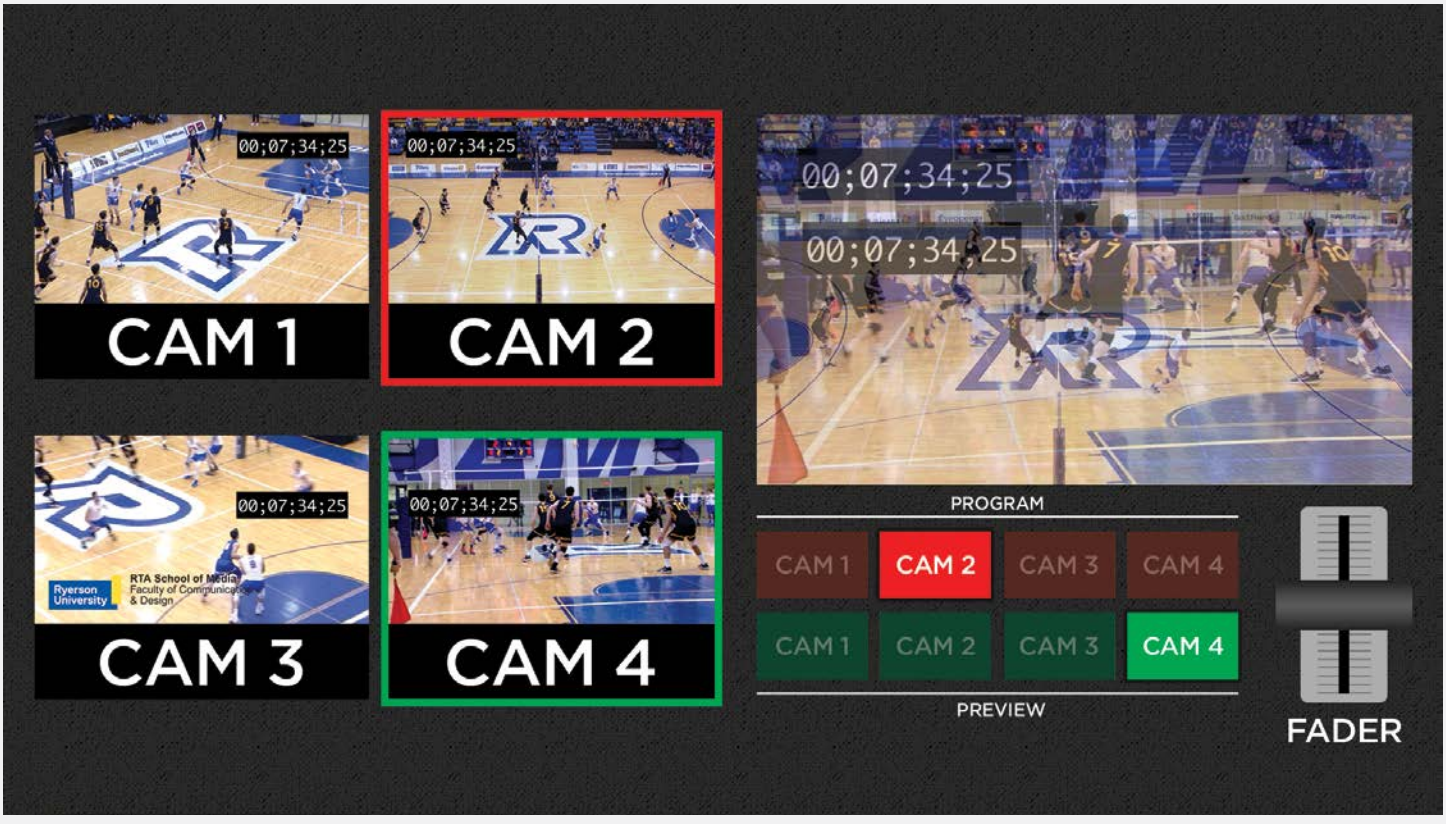

Figure 1: *Remote production workflow with synchronized video streams.*

THE STREAM SYNC SOLUTION

Haivision's Stream Sync solution automates and simplifies real-time frame alignment. Stream Sync is supported by Makito X Encoders and Makito X Decoders configured to stream multiple channels of live event video and kept in sync within a single frame. Stream Sync works by continuously monitoring the end-to-end transit time, and dynamically adjusting the internal decoder buffers to compensate.

Stream Sync enables broadcast engineers and producers to capture multiple live video and audio streams from a remote venue and keep it all in sync for immediate use. Makito X Decoders support the Stream Buffer feature which ensures that live feeds are synchronized to within one frame so that downstream production equipment will not experience issues when switching between video and audio sources. Stream Buffer applies a variable delay within Makito X Decoders at the production facility to continually compensate and realign frames in real-time based on the timecode embedded in each stream from the remote Makito X Encoders. For live production, this means that any camera can be used with any audio track, with no noticeable video glitches or loss of lip-sync.

For Stream Sync to work, cameras need to be Genlocked and Makito X Encoders synchronized to an NTP server designed for broadcast applications. This can be easily configured through the Makito X Encoder GUI which provides a way to specify the NTP server used and ensure that all outgoing streams are time-stamped in sync.

Stream Sync not only benefits broadcasters, but also provides companies, non-profits, and government agencies a way to deliver broadcast-quality live event coverage. Corporate training, executive communications, and webcasts can be more engaging through the use of multiple cameras with none of the distractions of out of sync video and audio streams.

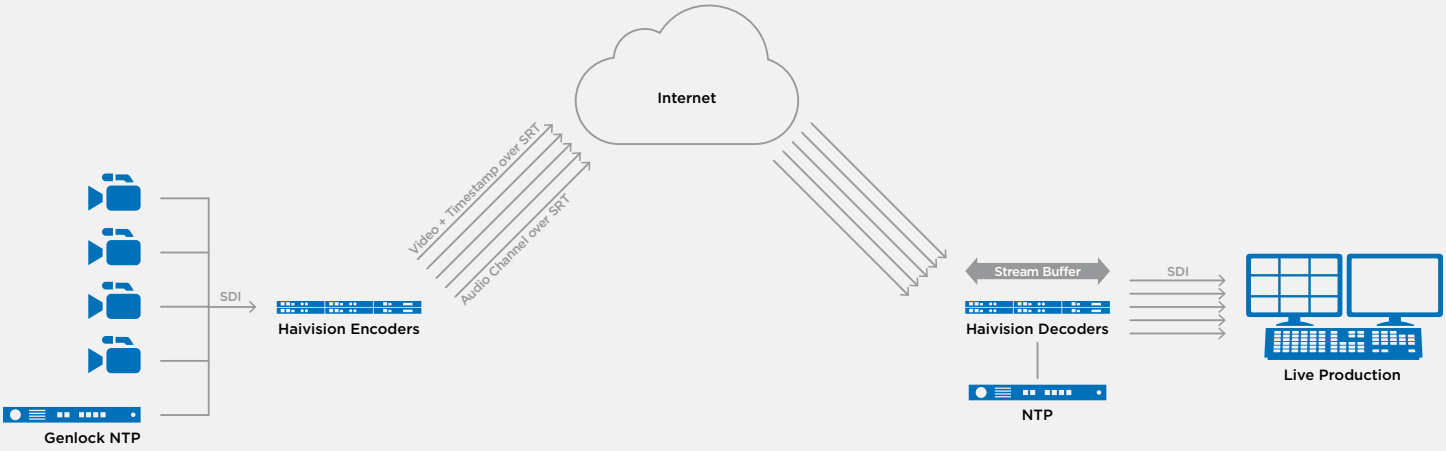

Figure 2: *How Stream Sync works in a remote production workflow.*

CONCLUSION

New technologies for remote production workflows over the internet – such as Haivision's Stream Sync – are allowing broadcasters to cover a wider range of live events, including sports and news gathering, without the costly overhead of deploying production teams and OB trucks to each site, or transporting video over satellite or dedicated networks.

Being able to sync remote video streams over the public internet is more cost effective and flexible than using satellite or private managed networks. It enables any type of broadcaster to live stream events with multiple camera angles from any location with broadband internet access.

BENEFITS OF HAIVISION'S STREAM SYNC WITH MAKITO X ENCODERS AND DECODERS FOR REMOTE PRODUCTION

Makito X Encoders and Decoders can be configured to achieve playout of multiple channels of live event video with single frame accuracy. The Stream Sync feature works by continuously monitoring the end-to-end transit time, and dynamically adjusting the internal decoder buffers to compensate. When used in conjunction with the SRT open source protocol, developed by Haivision, Stream Sync optimizes available bandwidth to ensure that high quality video streams are kept in sync for live broadcast production.

EASY DEPLOYMENT

Reduce costs, resource needs and logistical complexity of covering live events.

COVER MORE EVENTS

Satisfy customer appetite for specialty live event content, leveraging cost-effective IT networking and public internet.

SYNCHRONIZED AV

Switch between any video and audio channel with frame-accurate precision to ensure audio sync.

FAST SETUP OF STREAMS

Simple configuration process eliminates trial and error and minimizes amount of time needed to get up and running.

Want more information about Haivision's Makito X HEVC and H.264 video encoders and decoders, contact us.

info@haivision.com | 1-514-334-5445