



Enterprise Collaboration

A webcast that integrates a high definition video stream with a user interface that enables participation is a powerful collaboration tool with no practical limit to the number of participants or their location.

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Table of Contents

Enterprise Collaboration	1
The Business Case for a Streaming Technology Platform	1
What are the current barriers to deploying video streaming technology for Enterprise Collaboration?	1
Our Objective	1
Our Collaborate.Video Platform	2
Streaming for the Enterprise Scenarios	3
Scenario #1 – Small Enterprise	3
Scenario #2 – Large Enterprise	3
Scenario #3 – Add Internet-based Participants	4
Our Qualifications	4
Conclusion	4
Appendix A: The Toolset	5
Encoder	5
Video Distribution Hub	6
The User Interface	7
Appendix B – The <i>MAXPlayer</i> User Interface.....	8
User Selectable Settings	8
Navigation Options	8
Registration.....	8
Access Control	8
Reporting	8

Enterprise Collaboration

The Business Case for a Streaming Technology Platform

Enterprise collaboration has been described by one subject matter expert as “the fundamental starting point for transformation, without which, organizations will be unable to evolve their employees or processes”¹. It is clearly an important success factor in today’s knowledge-based economy.



Of the Fortune 500 companies, there would be very few, if any, that are not using collaboration products today. However, most are having limited success. The majority of these products do not scale well and become increasingly expensive as the number of participants grow. They do work well for ‘project team’ collaboration but, when the objective is fostering engagement by the executive management team or delivering professional development opportunities to all employees, they do not.

A webcast that integrates a high definition video stream with a user interface that enables participation is a powerful collaboration tool, with no practical limit to the number of participants or their location.

What are the current barriers to deploying video streaming technology for Enterprise Collaboration?

There is a major issue relating to network congestion that applies to video streaming services and popular collaboration services. When the audience is within an enterprise framework, each user connects to the collaboration feed through an Internet gateway. As more and more users connect, the bandwidth requirements accumulate and can exceed the gateway capacity. All connections to the Internet suffer. Yet, each connection hosts the exact same content.

The solution to the gateway congestion issue is actually quite simple: bring a single stream through the gateway and then redistribute it internally. The problem then becomes: connect an enterprise-based participant to their local video stream source. Our *Collaborate.Video Platform* ensures this happens.

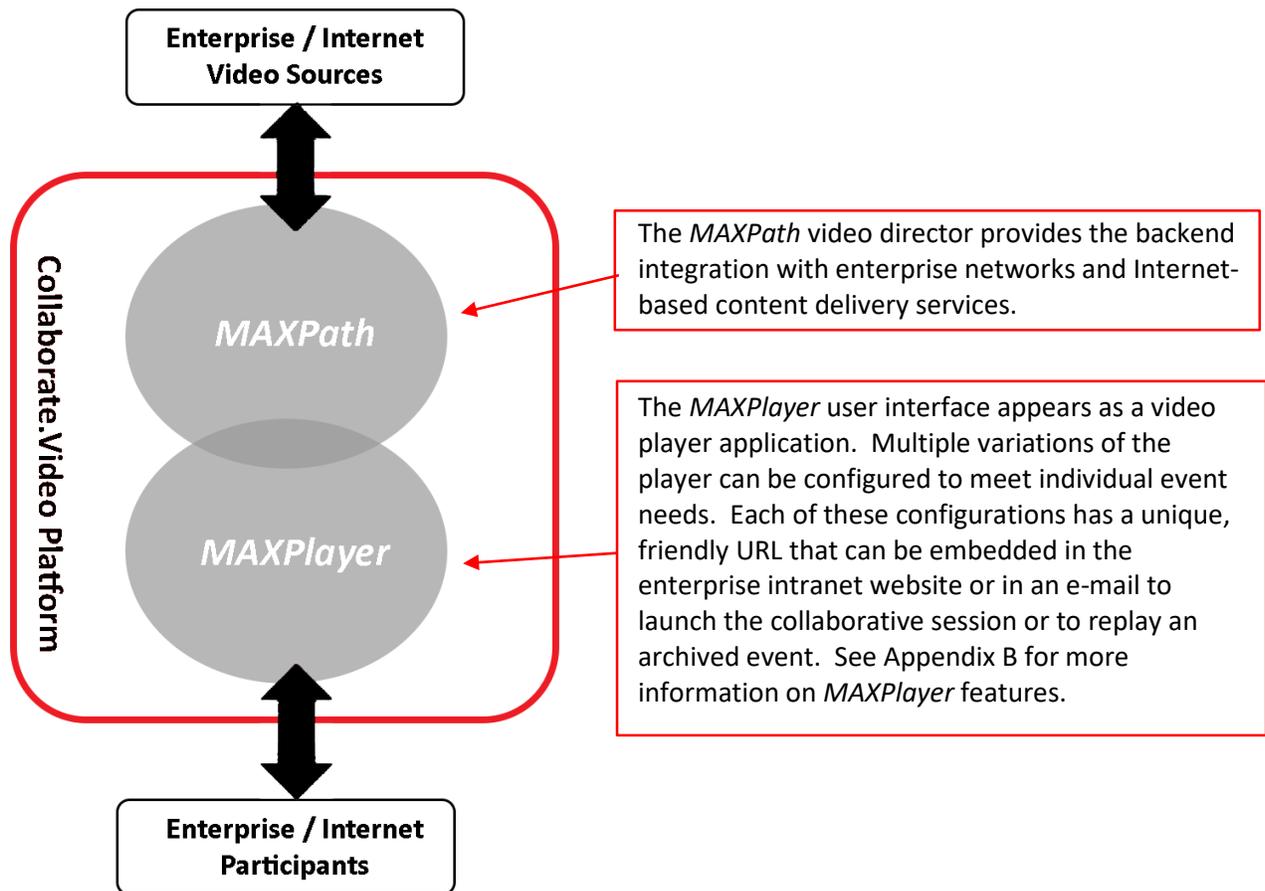
Our Objective

This document provides insight into successfully implementing secure enterprise collaboration. Our *Collaborate.Video* platform is introduced and applied in three enterprise scenarios. The first is for a small enterprise where all participants are connected to the local network. The second is for a large enterprise with wide area network links to remote offices. The third adds participants that are Internet-based and reveals how our solution can be used to control the secure distribution of any external video source across the enterprise. Included in appendices is an outline of the toolset used and a list of the key features of our *MAXPlayer* user interface.

¹ Giga Information Group (now Forrester Research), Dan Rasmus

Our Collaborate.Video Platform

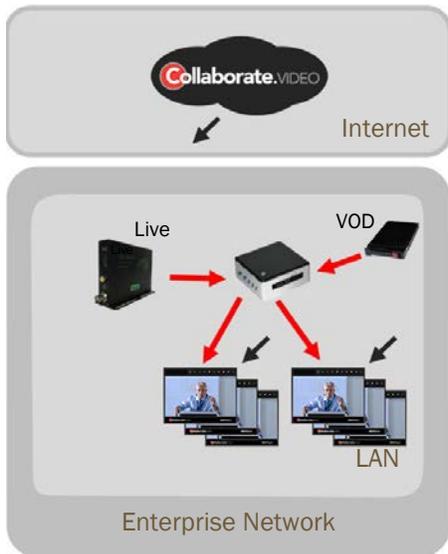
Our solution to the critical congestion problem replicates source video streams within the enterprise network. There are two elements to our solution. The first is the installation of video distribution “hubs”. These are inexpensive appliances that can support up to 1000 video connections each. The second is our *Collaborate.Video* platform. The participant launches our *MAXPlayer* user interface on any type of desktop or mobile device. This accesses our *MAXPath* director and connects the participant’s player to one these local hubs eliminating the network congestion problem. *Collaborate.Video* is a software-as-a-service available by subscription.



Streaming for the Enterprise Scenarios

Scenario #1 – Small Enterprise

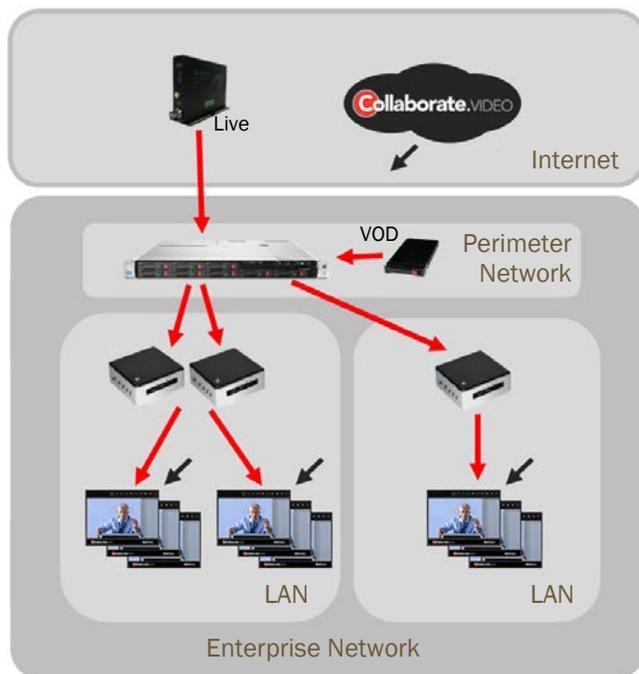
In this scenario, we are considering an enterprise that has up to one thousand participants on a single local area network. The approach here is to keep all video connections in-house and not use an external content delivery service. This eliminates the use of the Internet gateway, the prime point of network congestion.



The audio/video encoder pushes the stream to a video distribution hub on the local area network where all the participants source the video feed. If the event venue is remote, the encoder could push a single stream through the enterprise firewall to the hub or the hub could initiate the connection and pull the stream. Our *Collaborate.Video* platform simply supplies the participant's user interface and access control security. For on-demand archived events, the video distribution hub hosts the video library.

Scenario #2 – Large Enterprise

This enterprise has more than one thousand participants that are accessing the event from several local networks including remote locations that have wide area network links back to the main network. The strategy is to have the encoder push the stream to a main 'Origin Server' hub.

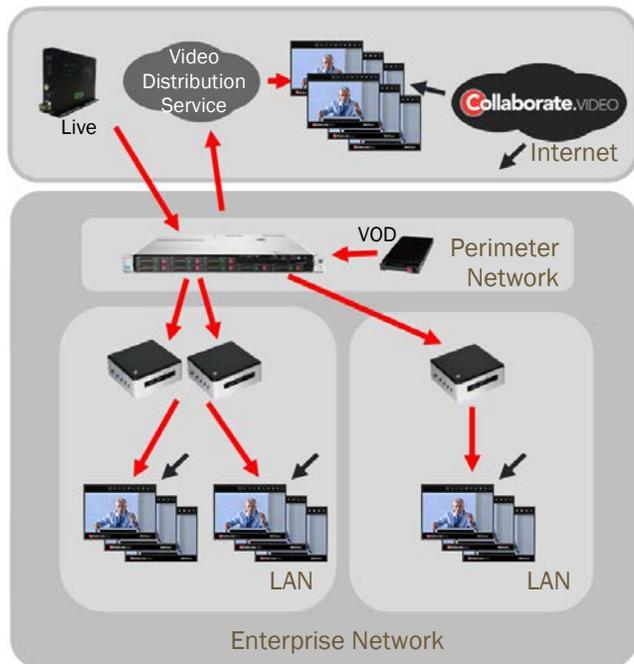


The strategy is to have the encoder push the stream to a main 'Origin Server' hub. This becomes the source of the stream for other video distribution appliances that are installed on each of the LANs. For a single sub-network with more than one thousand viewers, multiple hub appliances can be employed. The *Collaborate.Video* platform provides a hub request order to automatically cycle through the local candidates to find a hub that is not at a predefined capacity. Using this approach, there is no limit to the number of participants. Note that archived events and other video-on-demand content can be stored at the "Origin Server" level or distributed across all video distribution hubs.

Effective Collaboration at the Enterprise Level

Scenario #3 – Add Internet-based Participants

For support of Internet-based participants, the 'Origin Server' hub simply acts as an encoder pushing the stream into a commercial content delivery network where the *Collaborate.Video* platform directs these users to their stream sources.



Optionally, the encoder can push the stream directly to an Internet-based content delivery network. The perimeter hub reaches out and pulls the stream in for redistribution.

If you extrapolate on this capability of the perimeter hub to pull a video stream from any source, where the location is known, then most any stream can be rebroadcast throughout the enterprise. With the firewall blocking all other streams, this scenario represents secure control of all video streaming across the enterprise network. The access control feature of the *Collaborate.Video* platform can further secure access on an individual user, user group or location basis.

Our Qualifications

Our company has been pioneering streaming technology since 1997. While working on a special video project at the Communications Research Centre Canada, we were inspired by the profound impact the merger of television and the Internet would have in the future. We incorporated a new company and became a webcast producer. In support of this, we created a content distribution service and developed player software that could meet the harsh constraints of bandwidth availability.

Today, our video content delivery infrastructure can support tens of thousands of viewers worldwide plus concurrent distribution across enterprise LAN networks. Our *Collaborate.Video Platform* makes the network topology transparent. It is the same experience for everyone, no matter their location.

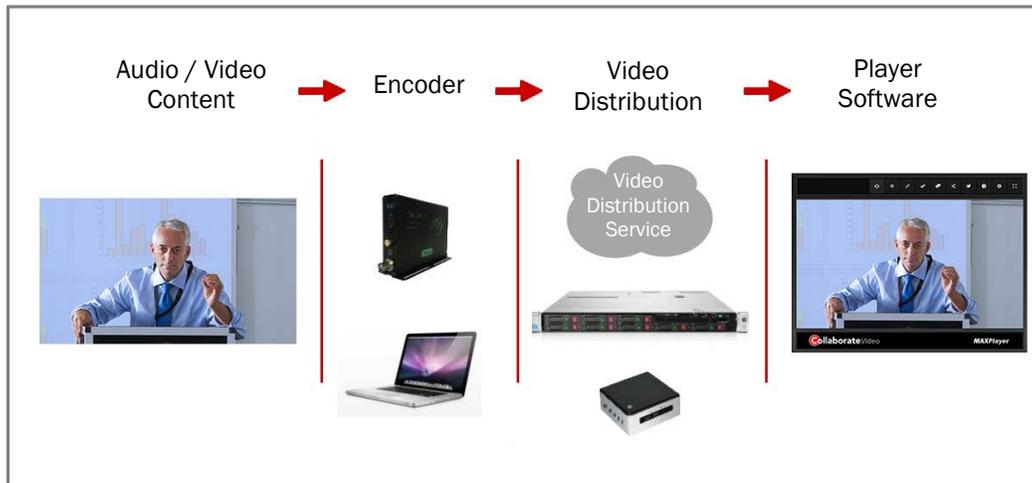
Conclusion

Streaming technology plus collaboration is disruptive at the enterprise level. We have demonstrated that solving the network congestion problem is not difficult and worth further investigation.

For more information on our *Collaborate.Video* platform or for assistance in designing and implementing streaming technology for Enterprise Collaboration.

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Appendix A: The Toolset



There are three major components to live streaming workflow. Starting with the audio and video content, the **encoder** uses these inputs and creates a video stream that can be transported across digital networks. The target of the encoder must be some form of a **video distribution hub**. This can be a local media server or cloud-based content delivery network service that the user will connect to with their **player software** to experience the content. For video-on-demand workflow, the encoder is replaced with the video library.

Encoder

There are both hardware and software based encoding platforms. The hardware encoder does not have to do much more than create a stream with the following characteristics:

- H.264 mp4 video with AAC audio encoding
- RTMP protocol
- 720P format
- HDMI, SDI and analog audio input

A good quality hardware encoder with this capability would be less than \$3,000. Switching of video sources would require addition hardware.

For a software based encoder, we highly recommend *Telestream's Wirecast*. This product, running on a notebook with a *BlackMagic* video interface, has exceptional capabilities. Switchable inputs include:



- SDI, HDMI and Analog audio/video feeds from cameras, video conferencing systems and many other video devices.
- Video files
- Slide images
- Screen image with audio from network connected PCs
- Existing streams

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Effective Collaboration at the Enterprise Level

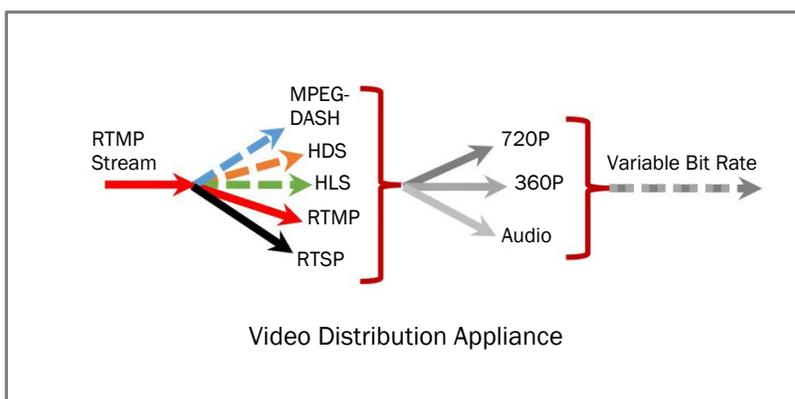
Video Distribution Hub

The options for video distribution fall into two categories. One is for Internet-based viewers and the other is for enterprise-based viewers. The two are not mutually exclusive when integrated with our *Collaborate.Video Platform*.

A cloud-based content delivery service is highly recommended for the Internet target as they provide massive bandwidth capacity at the source. There are many to choose from.

A local media distribution appliance is needed for the enterprise-based viewers. Our toolkit has significant key features relating to stream conversion and management that are noteworthy.

The following diagram illustrates that a single incoming stream can be repackaged into a wide variety of stream types. This is important for support of multiple devices including mobiles. The HLS version is proprietary to Apple and is essential for support of iPhones and iPads. HDS is an Adobe proprietary stream type and generally works on everything non-Apple. Note that Mpeg-Dash is a new, non-proprietary stream type that is growing in popularity and may evolve as being dominant in the next few years.



Given each of these stream types, the appliance can then transrate the streams. This means it can receive a 720P HD stream and create lesser formats from it, such as 480P, 360P, 240P or audio only. This is important since each of the formats in this progression require less bandwidth which may be desirable for some target audiences. Our *Collaborate.Video* platform can manage which format is available on a per location basis.

Finally, the transrated streams can then be packaged as a Variable Bit Rate stream. This type of stream enables the player to adapt to changes in bandwidth availability, switching from format to format as bandwidth availability fluctuates. This is important for participants in remote locations using a thin WAN link to connect to the main corporate network if a local video hub appliance is not available.



Our appliance is available as a virtual server image for main 'origin' type video hubs that would be employed in an enterprise's perimeter network.

Effective Collaboration at the Enterprise Level

Our 'edge' type hub is used as a video distribution appliance to increase capacity on local LANs and are ideal in remote locations. We have done considerable stress testing on our device. This is a very small device and, with just an i5 processor and 8GB of memory, the unit supports 1000 concurrent live streams at 360P (850Kbps). Using a 720P HD source the unit replicated 500 streams. In neither case was the CPU or memory taxed, it just ran out of bandwidth on the network interface (1Gbps).



The User Interface

The player software is a critical element. The player represents the difference between passively watching streaming television and actively participating in a collaborative event. With the *MAXPlayer* user interface of our *Collaborate.Video* platform, the video element is integrated with other browser based services and technologies. For example:

- Submission of questions / comments
- Voting
- Inclusion of downloadable documents or links to supporting website resources
- Choice of language, including support of simultaneous interpretation
- Twitter integration
- Helpdesk support
- Access control

A salient feature of *MAXPlayer* is its ability to manage multiple stream sources within the player itself. For example, the participant could choose language, selecting the English or French presentation with slides, select whether they wish to hear the speaker or a simultaneous interpretation and then choose whether they want a 720P, 360P or audio only format. In addition, the participant can choose from a list of sessions that might correspond to an event with multiple concurrent presentations happening in different venues. For archived content this can list all the presentations available associated with the event.

For a complete list of features see Appendix B – The *MAXPlayer* User Interface.

Appendix B – The *MAXPlayer* User Interface



User Selectable Settings

Language: English and French. The core player software is language independent. All textual information can be presented in any language.

Video Formats: 720P, 480P, 480S, 360P, 240p and audio only.

Audio Options: Speaker audio plus any number of simultaneous interpretation feeds.

Navigation Options

Sessions: For live events with multiple concurrent sessions, gives the participant choice of session to attend. For archived events this feature is used to list the presentations available for review.

Topics: For archived sessions, the user can go to a specific topic within a presentation.

Resources: List of resources available with URL's that can point to websites or documents for download.

Voting: Link to a commercially available Internet voting service.

Twitter: Link to twitter with a specific hashtag.

Participate: Forward questions or comments to the venue. This is implemented with a client-defined email address and enables quality assurance on content.

Share: Send a notification with event URL to a colleague.

Helpdesk: Submit helpdesk request to a client-defined email address.

Settings: Participant can switch languages, audio source and format within the *MAXPlayer*.

Registration

Information collected: User definable.

Fees: Custom e-transactions can be included.

Reports: Full reporting on registrants.

Access Control

Password: Any character string.

Referring Domain: Only participants that launch *MAXPlayer* from a designated website are permitted. This enables in-house access control implemented on these origin websites.

Network: Only participants coming from designated IP networks are permitted.

Reporting

Analytics: Access to extensive Google Analytics reports.

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