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Goal of this White Paper

This paper uses the services provided by Microsoft’s Lync Server 2010 (formerly the Office Communications Server, OCS) and SharePoint to offer a feature-rich example of the benefits that can be delivered by integrating Unified Communications (UC) and streaming video. Since Microsoft’s UC solution interfaces to a number of other enterprise platforms, (e.g., Active Directory, Exchange Server and enterprise voice), it also illustrates the depth of integration available and the full value of UC and streaming video in one user experience.

Unified Communications: a Business Imperative

Unified Communications (UC) offers a rich suite of services such as presence, email, text messaging, voice and video that integrate and enhance all aspects of business communications. As mainstream enterprises and businesses recognize the value of this technology, corporate IT departments are increasingly moving from phased adoption to full-scale deployments.

According to the research firm Unified Communications Strategies, UC-related revenues are up by 67% from those reported in 2007, and the global market for UC products and services will reach $15.9B in 2012. The march towards comprehensive UC architectures and system solutions has been led by a number of prominent, well-established vendors including Microsoft, Avaya, HP, IBM and Cisco. Although the architecture and technical details behind different UC systems may vary, the goals and business benefits of these solutions remain essentially the same.

Ironically, the economic downturn of 2008 proved to be a major driver for full-scale UC deployment as it focused enterprises on travel expenses and the cost-saving benefits of virtual collaboration. Managers, forced to cut costs to the bone, turned to UC clients and video to stay connected to increasingly dispersed team members. Having used video collaboration tools in their personal life to connect with family and friends, users were more than willing to embrace these same kinds of tools to connect with business colleagues.

Cost savings may have spurred accelerated interest in video-enabled UC clients, but it would be a mistake to suggest that ROI is now the exclusive driver for UC deployments. Employees entering the workforce today didn’t grow up on MTV; they grew up on YouTube, Skype and Facebook. They see video as an integral part of communications. Video, like voice conferencing and e-mail before it, is simply becoming a regular part of how business is conducted. No one questions the ROI of e-mail; the same is becoming true for video. As collaboration tools become readily available on smartphones and tablets, the barriers to universal access to UC-based video continue to fall.

Three Types of Business Video

How video, both live and stored, is being used in business environments can vary significantly. The three primary forms of live business video include:

- Video conferencing
- Web conferencing
- Streaming video

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1 UCStrategies.com market study, “Unified Communications Market 2007-2012,” Blair Pleasant
While all three can be used to deliver some form of business video and share some common technical features such as video compression and IP network transport, each has been optimized to meet specific needs. Typical network topologies for these different technologies are shown in the following diagram:

**Figure 1** Videoconferencing, web conferencing and video streaming topologies

Video conferencing, even with the use of multipoint conference bridges, remains best suited for two-way communications within closed user groups (six participants/rooms or less). A video conferencing session typically requires considerable bandwidth and a dedicated client to deliver a compelling multiparty experience. Scale in video conferencing is typically measured in terms of a dozen users – not hundreds or thousands of participants. Most users will be using specialized equipment or a PC inside their firewall. And businesses often have not invested in solutions to capture, store, distribute and manage the sessions for subsequent broadcast.
Web conferences offer excellent scale and reduce the “bulk” of a video conferencing session, but typically do so at the cost of functionality. Web conferences are best at delivering unidirectional graphical content (typically PowerPoint) to large audiences over the public Internet and private networks. If video is incorporated, it is typically in the form of a low resolution “talking head”.

Streaming video, like video conferencing, delivers a compelling high definition (HD) quality experience to all participants. Like web conferencing, it is effective at reaching very large audiences (hundreds to tens of thousands), even those with limited access to bandwidth. Streaming is primarily focused on a broadcast model where interactions are limited to text or audio questions. Since streaming video typically only requires a browser as a player, it is easy to get a new user connected.

In the enterprise, some of the most popular uses for this technology include live meeting and event broadcasts, on-demand content management & distribution, TV distribution, digital signage, and surveillance & monitoring. Streaming’s ability to readily extend beyond the firewall also makes it easy to reach customers, partners, and Internet-connected clients with webinars, investor briefings and marketing campaigns that incorporate both live video and presentation material. The highly-efficient use of network bandwidth available with streaming makes it the ideal vehicle for reaching large or small audiences in real time and delivering “always-on” video services.

Figure 2 summarizes some of the more popular streaming applications used within corporate, education, government and healthcare environments:

Figure 2  Enterprise Streaming Applications

Over the past decade, streaming video in the enterprise has evolved from dedicated Point A to Point B video links, to a universal enterprise service where any employee can be a video source and the number of viewers can range from one to thousands. Both the reach and video quality of streaming sessions have improved dramatically, making the viewing experience vivid and easy to use. Streaming video extends low cost, universal video connectivity to every desktop and is responsible for a new generation of productivity-enhancing applications.
Whereas video conferencing and web conferencing tend to focus on one-time events, streaming video delivers a robust set of services to store and manage content. Video portals have emerged as the tool of choice to search for content. If you have used YouTube then you have used a video portal. Enterprise portals deliver the same ease of use while adding capabilities like per-user access control, community features (i.e., featured, recommended or required videos), scheduling tools and sophisticated reporting.

Table 1 summarizes the main attributes of video conferencing, webcasting and streaming:

**Table 1** Comparison of Video Technologies

<table>
<thead>
<tr>
<th>ITEM</th>
<th>VIDEO CONFERENCING</th>
<th>WEB CONFERENCING</th>
<th>STREAMING VIDEO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>Few</td>
<td>Few to many</td>
<td>Few to many</td>
</tr>
<tr>
<td>Reach and distribution</td>
<td>Low to moderate</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Distribution options</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Multiple transport protocols</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Directionality</td>
<td>Two-way</td>
<td>One-way</td>
<td>One-way</td>
</tr>
<tr>
<td>Cost-per-connection</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Bandwidth-per-connection</td>
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<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Total bandwidth usage</td>
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<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Video quality</td>
<td>High</td>
<td>Low to medium</td>
<td>High</td>
</tr>
<tr>
<td>Network type</td>
<td>Dedicated</td>
<td>Dedicated or public</td>
<td>Dedicated or public</td>
</tr>
<tr>
<td>Internet clients</td>
<td>Not supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Mobile clients</td>
<td>Not supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Reliability</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Staffing requirements</td>
<td>Medium to high</td>
<td>Low to medium</td>
<td>Low to medium</td>
</tr>
</tbody>
</table>

**The Role of Streaming Video within Unified Communications**

Table 2 depicts a Unified Communications Framework that integrates multiple communications media, delivery approaches and time modalities. In addition, it provides examples of the applications and services that exist within each of the interconnection points:

**Table 2** Unified Communications Framework
Integrating Live and On-Demand Streaming Video with Microsoft Unified Communications

The rows show a continuum of communications vehicles – from basic text, to full video-enabled rich media. The columns are divided into synchronous (real time) communications and asynchronous (time shifted) communications. Moving from left to right, you progress from 2-party, to multi-party, to broadcast delivery approaches. And then to the equivalent asynchronous methods: messaging, collaboration and publishing.

Streaming’s role within UC (highlighted in green) is to enable live and on-demand video communications among 10s to 1000s of simultaneous participants. The arrows in the diagram indicate that streaming is increasingly being combined with video conferencing and/or webcasting technology to enable an integrated “collaborative broadcasting” experience.

**Integrating Streaming Video within Microsoft OCS/Lync**

Microsoft OCS and its successor Lync (hereafter referred to as “Lync”), is a desktop client that unites voice communications, instant messaging, audio, video conferencing, and Web conferencing into a rich, contextual offering. It essentially provides the asynchronous elements outlined in Table 2, minus video broadcasting. Many organizations are now exploring how to combine streaming video with Lync’s presence and collaboration capabilities. They see it as an ideal method of giving users or groups access to always-on channels that carry, for example, TV news (e.g., to a financial trader’s desktop), educational lectures (in a virtual academic campus environment), executive broadcasts (across the enterprise), or surveillance video. The goal is to enable collaborative broadcasting of video content, improving the timeliness and accuracy of communications, and making meetings clearer and more informative. Figure 3 provides an example of integrating streaming video into Lync:

*Figure 3 Example of Lync + Streaming Video*

The ability to stream Lync-based video conferencing sessions overcomes a major limitation found with video conferencing; specifically, the restrictions on reaching desktops computers and meeting rooms not equipped with VC endpoint software or hardware. Presenters are able to take an external video conference feed as an input and stream it to a virtually unlimited number of Lync clients as well as any number of other fixed and mobile devices. This approach has been shown to be more scalable and cost effective than competing solutions offered by traditional video conferencing vendors.
In evaluating approaches towards “stream-enabling” Lync, you need to consider the user experience you wish to create, as well as the ease of implementation and maintenance.

**User Experience: Presence Integration**
- The names of both live and stored video channels should be capable of being added to the Lync client’s named contacts list. Video channels should appear just like a co-workers’ status with “on-line” and “off-line” states. VBrick refers to these contacts as Video Buddies™. TV channels, for example, should provide a description of the program currently being broadcasted.
- Once the Video Buddies are added, using the application should simply involve one click on the video contact name. A video player then launches, and the video starts playing.
- Searchable information and keywords should also be associated with the video content.
- There should be no restrictions on how many participants can watch the stream from Lync clients, or any limits on the users’ geographic location.

**User Experience: Collaboration**
- During any real-time chat or instant messaging session, streaming video content should be capable of being viewed and discussed by everyone just by dragging the video title into the chat, VoIP or video conferencing session.
- Examples of this collaborative broadcasting are numerous:
  - During a live corporate-wide web broadcast, participants chat questions directly back to the presenter in real-time.
  - Two doctors remotely watching a live medical procedure in progress can exchange ideas and comments between each other using VoIP.
  - A geographically dispersed team of civil engineers reviewing progress on a construction site can use this same collaboration process to help clarify problems, reach consensus and drive decisions. As an added benefit of using presence, the real-time status of key decision makers is immediately available, making them easier to reach if needed.
  - Participants in a video conference all watch a surveillance feed and make real-time decisions based on the information conveyed.

**Ease of Deployment and Manageability**
- Users should be able to access live streaming channels through the same familiar Lync user interface. They should not need to access and learn a new web interface or separate application.
- The streaming video system infrastructure, such as VBrick’s VEMS Mystro™, should remain in the background, transparently performing functions such as:
  - User authentication
  - Video file management
  - Video format conversion
  - Efficient network routing
- There should also be no requirement to incorporate new software onto the Lync server, eliminating a potential deployment and maintenance headache.
Stored Video Content - Microsoft SharePoint Integration

UC clients are well suited for sharing live video content, but what about managing video content after an event, or video that is created from the start as an on-demand asset? Users have readily adopted UC clients for video because they are already familiar with the basic experience. It should come as no surprise that many users want that same familiarity for all their stored content. Enter SharePoint 2010, a web-based server and one of the most widely used collaboration portals. It functions to essentially provide the asynchronous communications elements depicted in Table 2.

The SharePoint portal was originally designed to act as a repository for documents, spreadsheets and other Microsoft Office related content. For internal communications, SharePoint is particularly valuable as it can be logically partitioned by workgroup, department, or business organization, making it the first place to go for all company information. Within the Lync UC ecosystem, presence information is available directly within SharePoint, making it extremely easy to initiate conversations with content owners.

As the popularity of business video has increased, customers have naturally looked for a means of adding live and recorded video into SharePoint. They wanted to repurpose business and training content, add search functions, and make the video content more readily available to larger, company-wide, audiences. Unfortunately, SharePoint was conceived as a general-purpose content repository; it was never designed to meet the storage, search and playback needs inherent with video including:

- Very large file sizes
- Searchable metadata and tags
- Secondary trick files for fast forward and rewind
- Streaming bandwidth management
- Storage capacity and redundancy
- High server throughput
- Content distribution
- Access and permission management

Only recently has it become possible to combine SharePoint’s access and management tools with the specialized capabilities of a video portal and backend Video on Demand (VoD) server – combined as elements of an enterprise media system to overcome these limitations.

One successful example of this integrated approach is a software-based SharePoint gateway function that works with a video portal and VoD servers. Using standard ASP.NET Web Parts, content from the video portal can be viewed inside the corporate or departmental SharePoint site. Federated search capabilities and an embedded player make it easy to locate and play the video from right within SharePoint. Video content can be directly added through the SharePoint interface, but still managed by the back-end streaming portal. Content access can also be highly controlled based on user permissions, keywords, or private folders. While playback occurs normally from SharePoint, the complete set of video management, distribution and reporting tools are available from within the video portal. A sample video-enabled SharePoint site is shown in Figure 4 (see page 10).
Given SharePoint’s inherent limits relative to video content, this integration helps enterprises make broadcasts, video training materials, presentations and compliance videos readily available to a corporate-wide audience, with all access managed through well-known SharePoint access controls. Employee-generated video content sourced from a desktop web camera or recorded video conference sessions can also be easily added to SharePoint. Content can be offered in Windows Media, and standards-based H.264 players. Support for H.264 content opens SharePoint up to a larger audience that includes smartphone and tablet devices. With this solution, issues of scalability and reach disappear, as enterprise-wide and even extranet distribution can be handled efficiently in the background. Detailed viewer reports and usage analytics are still available through the backend portal and enterprise media system.

**UC-integrated Live Streaming Video and Stored Content: Putting the Pieces Together**

Once a business decision has been made to add streaming video to a UC deployment, system designers can choose from a wide selection of enterprise-grade streaming elements system to meet scale and reach aspirations. These elements handle the complete video workflow from content creation to distribution and playback. With an enterprise-class streaming video system, component options include:

- An Enterprise Media Management System, including a video portal, to handle content management, search, user access controls and more
- Capture elements – including appliance-based video encoders supporting either H.264 or Windows Media codecs
- Multimedia capture elements – designed for synchronizing video, audio, and slide presentations
- Network Video Recorders to record multiple live video streams, including video conferences
- Video-on-Demand Servers with external storage to store and playback recorded content
- Media redistribution and video format conversion elements to efficiently distribute video streams anywhere in the enterprise network, to any video-enabled device
Integrating Live and On-Demand Streaming Video with Microsoft Unified Communications

- A Lync gateway to interface between the media management system and the UC environment
- Software to integrate the media management system with SharePoint

A conceptual view of an integrated streaming and Lync UC ecosystem is shown below in Figure 5. Other system configurations and topologies are possible.

Figure 5 Integrated streaming and UC ecosystem

The Lync streaming gateway interworks between the Streaming Ecosystem and Lync UC Ecosystem. Implemented correctly, no changes to the Lync UC Ecosystem are required – for example, the complete set of Lync user and group permissions are retained. Lync users can be given complete access to live and stored streaming video content simply by using their regular Lync Communicator application. No additional training or knowledge of streaming interfaces or applications is required. Resources available from within the streaming ecosystem (shown on the left side of Figure 5.) automatically appear in Lync Communicator application without any client involvement.

The Media Management Portal directly interfaces with Lync (through the Lync Gateway) and with SharePoint to serve out, manage access to, and efficiently distributes live and on demand video content across an organization’s LAN/WAN and the Internet. As the “brain” in the Streaming Ecosystem, it manages all access to streaming resources.

Conclusion

Streaming video is a powerful and effective tool for business communications that has emerged as an important new component of any corporate IT investment. Within an enterprise, popular video applications such as corporate communications, training, TV distribution and product introductions help companies improve productivity, reduce travel and communicate more effectively. In comparison with other video technologies such as video conferencing and webcasting, streaming video offers a number of important new use cases and applications.

The integration of streaming with Microsoft’s Lync UC and SharePoint platforms is no longer a mere possibility; products are now available that can deliver this capability today. Ubiquitous desktop client support, low-cost enterprise-wide reach, and greater retention of information are but three of the important business benefits of this new streaming video integration. While Microsoft’s Lync 2010 Server and SharePoint products are prime candidates for this integration, the concepts discussed here can potentially be applied to any UC environment.
About VBrick Systems, Inc.

VBrick is the leader in Enterprise On-line Streaming IP Video, with over 9,000 corporate, education, government and healthcare customers worldwide. VBrick solutions work over standard IP networks and the Internet to enable the creation, publishing and distribution of rich media content. Our comprehensive streaming solutions are used in a wide range of live and on-demand applications including meeting and event broadcasts, video-based sales and marketing programs, employee collaboration, distributed learning, digital signage and TV distribution. Headquartered in Wallingford, CT, VBrick’s products and services are available through industry-leading value-added resellers.

For more information, visit www.vbrick.com