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# Extending Room Video Conferencing with Microsoft Lync

**Approaches to and Benefits of  
Integrating Microsoft Lync  
with Room Video Conferencing  
Systems**

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## Introduction

Having transitioned to IP networking and high definition video, today's enterprise video conferencing industry is undergoing a metamorphosis that is even more significant than any in its history as customers begin to 1) embed visual communications into the everyday workflow; 2) find new and innovative applications that are video-enabled; and 3) free video from the constraints of the conference room and extend video capabilities to a wide range of personal and mobile devices. Much of this change is tied to widespread interest in Unified Communications (UC).

The concept behind UC is simple: give users a single user interface to all modes of communication - voice, video, messaging and presence. The fundamental paradigm is "click to call" or "click to collaborate," making any mode of communications simple for the end user. With its ease-of-use and ability to integrate communications with other applications, UC is considered by many organizations to be a fundamental part of their video conferencing deployment future.

While many vendors have introduced enterprise UC platforms, Microsoft has attained a leading market position. Since the original introduction of Microsoft Live Communications Server 2003 and continuing with Microsoft Office Communications Server R1 and R2, and now more recently with Lync Server 2010, Microsoft has simplified its UC architecture while enhancing the features and functions of its offering. Lync provides a single user interface based on identity and presence that unites voice communications, IM, and audio, video and web conferencing into a rich contextual offering.

Microsoft has already tipped its hand on Lync 2013, due out at the end of 2012. Lync 2013 promises many new features and functions, including full IPv6 support, Skype IM and voice federation and a new and important video codec, H.264 SVC. Mobile devices will also get a full featured Lync 2013 client with audio-video capabilities. These enhancements promise to maintain Lync's market leadership and to solidify Lync's role at the center of enterprise communications, making interoperability with the installed base of high definition room conferencing systems even more imperative.

## The Strengths and Limitations of Lync 2010 Video

Microsoft has developed its own audio and video compression algorithms for video conferencing and these are the "favored" codecs in calls between Lync 2010 clients. However, as detailed below, the proprietary nature of the codecs presents obstacles to communicating with the world of industry-standard room and personal systems.

Microsoft's Real Time Audio (RTA) delivers pleasing wideband audio (7kHz). Microsoft's Real Time Video (RTV) supports HD (1280 x 720p30) and VGA (640x480) video resolution for peer-to-peer calls between users running Lync on high-end computers. The resolution viewed by each participant in a single conversation may differ, depending on the video capabilities of each user's respective hardware. For point-to-point Lync calls with an industry-standard SIP system<sup>1</sup>, Lync supports H.263 video with CIF

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<sup>1</sup> Most systems today from leading videoconferencing vendors support both H.323 and SIP, although not necessarily Microsoft's version of SIP, in which case a protocol transcoding gateway would be required.

resolution (352 x 288) and G.722 wideband audio unless that external system can also support RTV and RTA. For calls to H.323 systems, Lync 2010 must connect through a third-party MCU or gateway.

Commonly called the Lync AV MCU, Microsoft's AV Conferencing Server (a multipoint control unit that supports RTV and RTA only) enables multipoint calls between Lync users. However, the current solution is limited to VGA video quality and to voice activated switching (VAS) in which the image of only the active speaker is displayed. This contrasts with the more popular and computationally-demanding continuous presence (CP) display mode in which the images of multiple participants are displayed simultaneously (Hollywood squares fashion). Continuous presence conferencing with Lync requires a third-party multipoint control unit (MCU).

Lync to Lync Point to Point	Lync to Lync Multipoint	Lync to SIP Point to Point	Lync to SIP Multipoint	Lync to H.323 Point to Point	Lync to H.323 Multipoint
RTV with 720p high definition	RTV with VGA resolution (640x480) with Microsoft MCU	H.263 video with CIF resolution	Requires third party bridge, performance varies by vendor	Requires transcoding service, performance varies by vendor	Requires third party bridge with transcoding, performance varies by vendor

*Table 1 Summary of Lync 2010 video interoperability capabilities*

Lync 2010 gives IT departments the ability to manage video as a feature, enabling or disabling per user based on group policies. In addition, Lync includes capabilities for bandwidth monitoring and control as well as quality-of-experience reporting.

Lync 2013 signals a dramatic change in Lync's video capabilities. With internal support for H.264 SVC (scalable video coding), and with the expected adoption of H.264 SVC by many video conferencing vendors, Lync video will be positioned for compatibility with a wide variety of room, personal and mobile devices. Connecting Lync 2013 with older or legacy non-Lync systems will likely be accomplished by new vendor-specific solutions.

## **Integrating Lync Video with Industry Standard Systems: the benefits**

High definition (HD) video is a big factor in today's video conferencing world. HD delivers the quality of experience users have long wanted and is now expected in meeting rooms, conference facilities and when communicating with third parties. HD is one of the benefits of RTV (vs. H.263) and delivering HD over limited bandwidth connections is a major advantage of H.264 SVC in Lync 2013.

Establishing interoperability between Lync video users and industry-standard conference room and personal systems brings many benefits, including:

- Maintains the capability to call any of the 1.3 million meeting room systems deployed worldwide and to partners who are not Lync 2010 video users
- Enables HD calls between Lync 2010 users and H.323 and SIP room and personal systems, including mobile devices
- Reduces training and support problems associated with separate "islands of communication" and multiple applications

- Enables room systems to participate in more meetings, driving usage and additional cost savings

## **Integrating Lync Video with Industry Standard Room Systems: technology options**

For more than ten years, virtually 100% of the enterprise room video conferencing systems shipped by the major vendors (Cisco, Huawei, LifeSize, Polycom, Radvision, Sony, Tandberg) have adhered to industry standard protocols (ITU Recommendations), including H.320 for ISDN, H.323 and SIP for video over IP and H.263 and H.264 for video compression. Because Lync adheres to its own set of standards, protocols that are rapidly becoming de-facto standards as they are adopted by many vendors (much the way Microsoft Office has become a de-facto standard), integrating the world of Lync-based personal (and group) video systems to the world of standards-based systems has its own set of complexities. To date, different vendors have taken different technology approaches to this integration challenge.

### **Approach #1a: Direct Endpoint Integration**

With direct endpoint integration, an IP video system will appear to the Lync Server as just another standard Lync endpoint. From a technical perspective, in order for an endpoint to register to Lync it must support Microsoft's version of SIP; NTLM<sup>2</sup> to authenticate; and SRTP for media encryption. ICE and TURN for NAT/firewall traversal<sup>3</sup>, CCCP<sup>4</sup> for signaling, TLS for media encryption<sup>5</sup> and H.263 for video compatibility are optional and provide a more feature rich experience.

Direct integration has several advantages. Generally, direct integration enables a plug-and-play solution. To authenticate a device, a person simply uses his Lync user name and password. Directly registering devices to Lync allows administrators to use Lync's bandwidth management, directory management and NAT/firewall traversal capabilities. Direct integration also eliminates the costs associated with other approaches to Lync integration. However, unless the industry-standard video system also supports Microsoft's RTA and RTV algorithms (see Approach #1b), direct integration alone will limit calls to H.263 with CIF resolution and limited content sharing.

A major disadvantage of the direct endpoint integration approach is that typically only the latest products in a vendor's video conferencing portfolio can support the direct registration mode. A customer with a large installed base may find that many of their systems do not support direct registration. In addition, it generally takes time for a vendor to do the software integration which has to be tested across multiple hardware devices and software revisions, including new releases of Lync itself.

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<sup>2</sup> NTLM is NT LAN Manager, a suite of Microsoft security protocols that provides authentication, integrity, and confidentiality to users (source: Wikipedia).

<sup>3</sup> NAT is an abbreviation for Network Address Translation, a network security technique used to hide internal IP addresses as well as a way to extend the IPv4 network address space. ICE is an abbreviation for Interactive Connectivity Establishment, a technique used to help real-time media traverse a NAT. TURN is Traversal Using Relay NAT, a protocol that allows a device behind a NAT to receive unsolicited TCP or UDP network connections.

<sup>4</sup> CCCP is an abbreviation for Centralized Conference Control Protocol, a scheme used to control conferences.

<sup>5</sup> SRTP is Secure Real-time Protocol while TLS is Transport Layer Security, a cryptographic protocol used to provide communications security over the Internet.

Furthermore, Lync uses a proprietary protocol (RDP) for content sharing. RDP is not supported by industry-standard video conferencing systems; instead these use the ITU Recommendation H.239. Hence, when Lync clients share content, that content cannot be received by standards-based endpoints.

### **Approach #1b: Direct Endpoint Integration with Native Media Support**

Indeed, many video conferencing professionals associate direct integration with native support for Microsoft's RTA audio and RTV video, though these two are technically unrelated. Native media support requires that the endpoint vendor add RTA and RTV software support to the embedded algorithm stack. From a practical standpoint, the video system would then be able to answer a call and support H.263, H.264, or RTV video communications. As is the case with simple endpoint registration, a major disadvantage here is that only the latest products in a vendor's video conferencing portfolio are likely to have RTA and RTV support. Interest in the vendor community is limited because adding support is engineering intensive and the future of RTA and RTV is uncertain. In fact, with Lync 2013 Microsoft has announced support for H.264 SVC which is an ITU standard. Neither approach 1a nor 1b are likely to be of interest to a customer with a large installed base of legacy systems unless those systems are nearing end of life.

### **Approach #2: Integration via a Gateway**

A gateway is a generic device that connects users on one protocol island to users on another island that has different signaling and/or media protocols. Gateways provide the needed "translation" services. Hence, a Lync video gateway translates between systems using Microsoft SIP for signaling and H.263 and RTV for video on one hand and systems using H.323 and possibly a different variant of SIP for signaling and H.261 or H.264 for video on the other. Lync gateways on the market today fall into several categories.

#### **Signaling Gateways**

A signaling gateway handles differences between the Microsoft signaling protocols and the signaling protocols used by others such as SIP or H.323. A signaling gateway would be used to connect Lync to an H.323 system supporting H.263 video. This approach for Lync currently has no vendor support since video performance is limited to H.263.

#### **Media Transcoding Gateways**

A media gateway provides translation between different audio and video algorithms, but uses the native capabilities of the endpoint system itself to register to the Lync server. The translation process is known as transcoding. A media gateway would be used to connect an H.264 HD, SIP-based room system (that can register to Lync) to a Lync RTV user. Because the media gateway offloads the computationally demanding transcoding task, resources in the endpoint itself are preserved for other functions such as embedded multipoint or dual stream data sharing.

## Signaling and Media Gateways

A signal and media gateway does both signaling and media translation. These gateways make interoperable high definition video calling possible by connecting HD-RTV systems with HD-H.264 systems using either SIP or H.323.

The advantage of the gateway approach is that Lync users can connect to new and traditional industry-standard desktop video systems, room systems and even multi-codec telepresence systems using Lync's familiar user interface. A Lync gateway preserves ease of use by allowing any H.323 video endpoint or infrastructure resource (MCU) to be displayed in the Lync contact list with full status indicators. Users can search the Lync directory for any video conferencing device and place a call exactly the same way they would connect to any other Lync contact.

Unlike an MCU which is designed to handle multipoint conferencing connections, a gateway is based on logic specific to one-to-one connections. Gateways are measured by the number of simultaneous calls or sessions the device can support.

The disadvantage of the Lync gateway approach lies in cost and scalability issues. With a signaling and media gateway, the gateway can be a single point of failure. If the system goes down, connectivity between Lync and industry-standard systems goes down with it. For a media-transcoding gateway only, a device failure means that Lync-to-industry-standard systems communications falls back to H.263. Some vendors' gateway solutions involve multiple, expensive boxes supporting a limited number of simultaneous gateway calls. Newer solutions are based on software and standard servers which may be suitable for cloud deployments. Therefore, any enterprise with a large installed base of video systems should definitely consider the gateway approach – either as a standalone solution or as part of a mixed gateway/native integration solution.

## Approach #3: Integration via the Multipoint Control Unit

Using a multipoint control unit (MCU) to provide Lync connectivity is a combination of the above two approaches. The MCU vendor must support the Microsoft algorithms in the bridge along with the other signaling protocols needed to register to the Lync server and have the MCU appear in the Lync buddy list. The most common use case for this approach is the "meet-me bridge" whereby users call into a conference hosted on the MCU. The advantage here is that the bridge can connect callers using Lync desktop video clients with others using H.323, SIP, and/or PSTN and ISDN devices and each user can call into the bridge using his own familiar user interface (web, hand held remote, tablet, control panel, etc.) And of course the bridge, unlike a gateway, supports multiparty conferencing. The disadvantage is that if the enterprise does not already own a bridge, considerable expense may be involved, and scaling to support hundreds or thousands of users may be cost prohibitive. Video scheduling also can become complicated with MCU integration because many organizations include a separate scheduling process to procure room and bridge resources, while Lync's scheduling process focuses on an Outlook add-in that generates a click-to-join link that allows Lync users to join a desktop video call. Hence with the MCU approach, two separate processes are involved to set up the call, one for Lync and one for the MCU.

## Approach #4: Software Plug-ins (tabs)

With Lync, Microsoft altered the nature of plug-ins to its UC platform. Microsoft requires third party partners to adapt their Lync integration to the API now available in the Lync client. Using the API, the software plug in actually launches a separate video conferencing application. The advantage is that the user gains the presence capabilities of Lync with the full video capabilities of the third party application. The risk, of course, is that there is no guarantee of future compatibility as Microsoft and the plug-in vendor evolve their respective solutions. As Microsoft updates its client, the third party vendor must also update its add-in, which can result in delays or incompatibilities.

### Comparison Overview

Approach	Strengths	Weaknesses	Vendors
Direct Integration	<ul style="list-style-type: none"> <li>Requires no additional equipment</li> </ul>	<ul style="list-style-type: none"> <li>Applicable to only the latest hardware; does not enable legacy installed base</li> <li>Supports H.263 and CIF resolution only</li> </ul>	LifeSize Avaya Huawei
Direct Integration with Lync Native Media	<ul style="list-style-type: none"> <li>Requires no additional equipment</li> <li>Supports HD video</li> </ul>	<ul style="list-style-type: none"> <li>Applicable to only the latest hardware; does not enable legacy installed base</li> </ul>	Polycom
Signaling Gateway	<ul style="list-style-type: none"> <li>Requires little computational resources</li> </ul>	<ul style="list-style-type: none"> <li>Requires additional infrastructure investment</li> <li>Cannot support speed matching or resolution matching</li> </ul>	
Media Transcoding Gateway	<ul style="list-style-type: none"> <li>Cost-efficient solution when used with endpoints that can register directly to Lync</li> </ul>	<ul style="list-style-type: none"> <li>Does not work with all legacy room systems</li> <li>Requires additional infrastructure investment</li> </ul>	LifeSize
Signaling + Media Gateway	<ul style="list-style-type: none"> <li>Provides complete signaling and media translation services for Lync</li> <li>Works with all industry-standard legacy systems</li> </ul>	<ul style="list-style-type: none"> <li>Single point of failure for Lync-to-room systems</li> <li>Requires additional infrastructure investment</li> </ul>	Radvision, Cisco, Vidyo
MCU	<ul style="list-style-type: none"> <li>Provides complete signaling and media translation services for Lync</li> <li>Works with all industry-standard legacy systems</li> <li>Provides multipoint capabilities</li> </ul>	<ul style="list-style-type: none"> <li>Expensive</li> <li>Single point of failure</li> </ul>	Polycom, Radvision
Plug-in	<ul style="list-style-type: none"> <li>Low cost software-only</li> </ul>	<ul style="list-style-type: none"> <li>Susceptible to software revision changes</li> </ul>	Cisco, Vidyo

Table 2 Summary of technology options

## The Future

While Lync-2010 adheres to its own compression algorithms, Microsoft is moving to embrace industry standards with Lync 2013. Microsoft's support for H.264 SVC signals that the worlds of Lync and industry standards will finally converge. As other vendors also adopt H.264 SVC, many of the interoperability complexities described in this paper will disappear. Many vendors are already working hard to make this happen. One significant effort is the UCIF (Unified Communications Interoperability Forum), a non-profit group supported by Microsoft, LifeSize and a host of industry-leading players in the UC and videoconferencing hardware, software and services markets.

## **Solution Spotlight: LifeSize UVC Video Engine for Microsoft Lync**

LifeSize, a division of Logitech and the sponsor of this study, has recently introduced a new architecture for video infrastructure as well as a Lync gateway which is one application in this platform. The LifeSize UVC Platform is an integrated software platform that consolidates multiple products (applications) and makes them available from one common interface. UVC applications can be deployed as a virtual machine software running on a customer's own servers or as LifeSize UVC hardware with the UVC software pre-installed. One element in the UVC portfolio is the LifeSize UVC Video Engine for Microsoft Lync, a media-transcoding gateway.

UVC Video Engine for Microsoft Lync works together with LifeSize 220 Series and LifeSize Passport room-based video systems. These endpoints are fully interoperable with Microsoft Lync, including registration, presence and click-to-call functionality (based on registration with Lync Server and H.263 video quality.) LifeSize room systems connect to both PCs and Macs through Lync and push presence and contact lists for easy, click-to-call functionality. LifeSize video systems utilize Microsoft edge servers for firewall traversal, providing reliable calling and greater security. UVC Video Engine adds transcoding support for RTV video to deliver the HD-quality experience that customers expect today from high-end video conferencing systems, especially in their meeting rooms. UVC Video Engine also enables customers to use Microsoft's AV MCU for voice-activated-switching multipoint calls. In addition, by offloading the RTV-H.264 720p and VGA media transcoding from the endpoints, UVC Video Engine enables customers to maintain use of a LifeSize system's 4-way embedded continuous presence bridge.

## **Conclusion**

While UC promises to bring visual communications into the enterprise mainstream, customers should be evaluating how to integrate their room system deployments with the new world of personal, mobile, visual and social communications. Integrated deployments should focus on maintaining the high quality HD video and wideband audio that customers now demand from their conferencing and collaboration systems, especially in conference rooms. Interoperability between the "legacy" world of room video conferencing and the new age of ad-hoc video calling promises to bring added value to both investments by enabling information workers to find the right resource at the right time. Fortunately, the vendor community has developed a range of integration solutions for integrating dedicated video conferencing systems to UC deployments. Finding the most appropriate solution will depend on understanding a customer's specific installed base, anticipated needs and future acquisition plans.

## About Wainhouse Research

Wainhouse Research, [www.wainhouse.com](http://www.wainhouse.com), is an independent market research firm that focuses on critical issues in the Unified Communications and rich media conferencing fields, including applications like distance education and e-Learning. The company conducts multi-client and custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings. Wainhouse Research publishes a variety of reports that cover all aspects of rich media conferencing, and the free newsletter, *The Wainhouse Research Bulletin*.

## About LifeSize Communications

LifeSize is a pioneer and world leader in high-definition video collaboration. Designed to make video conferencing truly universal, LifeSize solutions are simple to buy, adopt, support and use. Offering video conferencing systems and software applications as well as a full line of video infrastructure, available on premise or in the cloud, LifeSize is committed to universal video collaboration. With LifeSize, customers can participate in large multi-party HD calls, live streaming and recording, collaboration on any mobile device, on any network, all at the highest level of quality. LifeSize was founded in 2003 and acquired by Logitech in 2009. For more information, visit [www.lifesize.com](http://www.lifesize.com).