ACANO SOLUTION

MICROSOFT SKYPE FOR BUSINESS/LYNC INTEGRATION ARCHITECTURE

A White Paper by Mark Blake, Acano CTO

June 2015, Applies to Acano SW 1.8

acano

CONTENTS

acano

Note: Acano integrates with Microsoft's Skype for Business and previous versions Lync 2013 and Lync 2010. This document uses the term "Lync" as succinct to refer to all three versions, and sometimes "S4B" to specifically refer to the Skype for Business release.

INTRODUCTION

The Acano solution integrates with Microsoft Lync to extend the reach of Lync to the non-Lync world, while preserving the user experience for Lync participants.

Acano's approach to integration is based on our belief that technology should be invisible to end users. People should not need to know which systems their meeting participants are using, or worry whether they will be able to connect to them. Rather, they should be able to reach anyone they want, whether they are using Lync or not, and receive the full feature set and user experience they expect.

This white paper outlines the architecture for Acano Lync integration and describes features of the Lync integration available in the Acano 1.8 release. It also explains how this Lync integration can be extended to cover integration with Skype. Note: This document is forward-looking, and, **where** noted, some features described are not yet shipping in software.

KEY FEATURES OF THE ACANO SKYPE FOR BUSINESS/LYNC INTEGRATION

Acano's native support for Lync includes:

▸ Integration with Skype for Business, Lync 2013 and Lync 2010 deployments.

▸ Support for multiple deployment models, including both on-premise and direct federation to remote Lync setups.

▸ Lync Edge server support in order to call "external" Lync clients.

▸ Traversal of Lync media and signaling in Acano's provided Edge component to allow federation to remote Lync deployments without the need for any local Lync set up.

▸ Integration with consumer Skype.

▸ The ability to facilitate point-to-point calls between Lync deployments and non-Lync systems.

▸ The ability for any combination of Lync and non-Lync systems to participate in multipoint conference calls (more than two participants).

acano

- Active Directory integration and dial plan, allowing users to find each other and meetings rooms via directory search, whether those systems are Lync or non-Lync.

- Support for multiple native user experiences for placing calls, including: selecting a user from a directory or favourites, selecting and calling multiple users at once to start a multipoint call, and "drag and drop" call escalation.

- Integration of non-Lync devices and WebRTC with scheduled meeting workflow by providing an IVR URI and WebRTC join link for scheduled Lync meetings.

- Bi-directional content sharing, including support for BFCP/H.264 (SIP) and RDP (Lync) with transcoding. RDP media is supported in both transmit and receive directions.

- Support for Non-Lync systems, including SIP voice, desktop video, room, multi-screen telepresence systems, WebRTC and Acano's native clients. Vendors supported include Cisco, Polycom and Avaya.

- Full support of major audio and video coding standards, with automatic on-demand transcoding, including between H.264UC (Lync 2013), RTVideo (Lync 2010), H.264 High and Baseline profiles (SIP video systems), VP8 (WebRTC), with demonstrated support for H.265 and VP9.

- Features for in-call media quality, including support for Lync 2010 and 2013/S4B FEC (forward error correction), multi-layered SVC encoding (UCConfig mode 1), automatic bandwidth estimation and down speeding.

- Instant Messaging/Chat support between Lync and non-Lync systems.

- Presence for both meeting rooms and clients.

- Security: Encryption support on all call legs, FIPS certification and JITC certification.

- High capacity and scalable software solution: a fully distributed, fault tolerant, and scalable architecture, including geographic distribution with hundreds of fully-transcoded concurrent video calls or thousands of audio calls supported per server.

- "Dual homing" technology that supports a single conference split between a component running on Acano to manage the non-Lync participants and a component running on Lync seamlessly joined together to maintain the full user experience for both types of user.
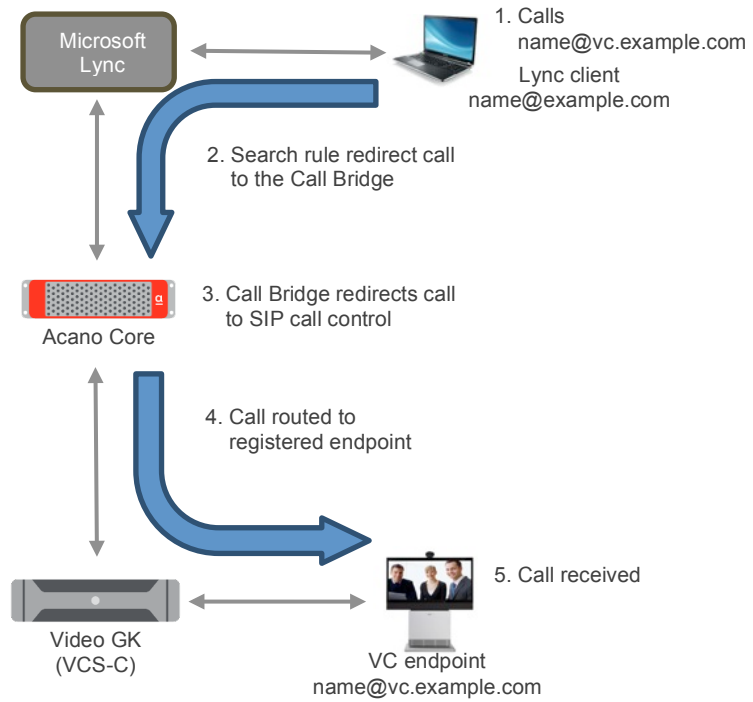
acano

HOW IT WORKS

BASIC ARCHITECTURE

At its core, the Acano solution can act as a fully-transcoding gateway and conferencing bridge that can establish SIP trunks to Lync and non-Lync systems. In the example below, deployment between a Cisco TelePresence Video Communication Server (VCS) and an on-premise Lync solution is depicted.
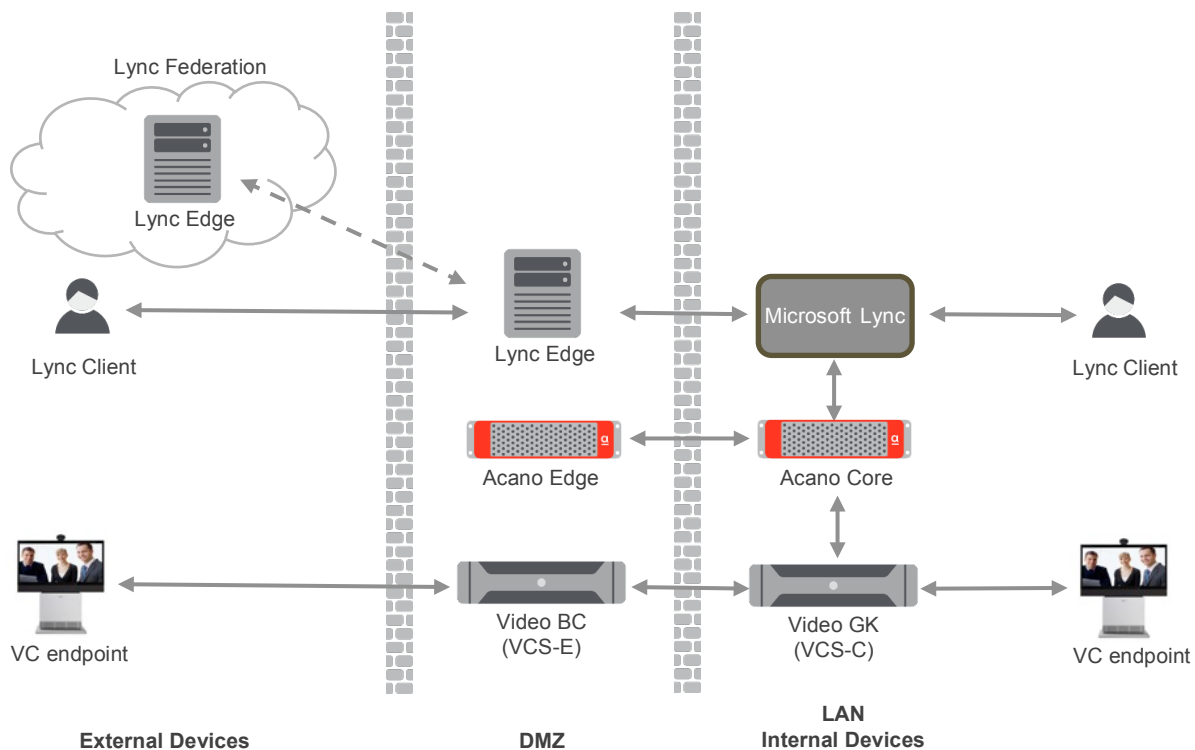
STARTING SIMPLE: TRANSPARENT GATEWAY FOR POINT-TO-POINT CALLS TO SIP
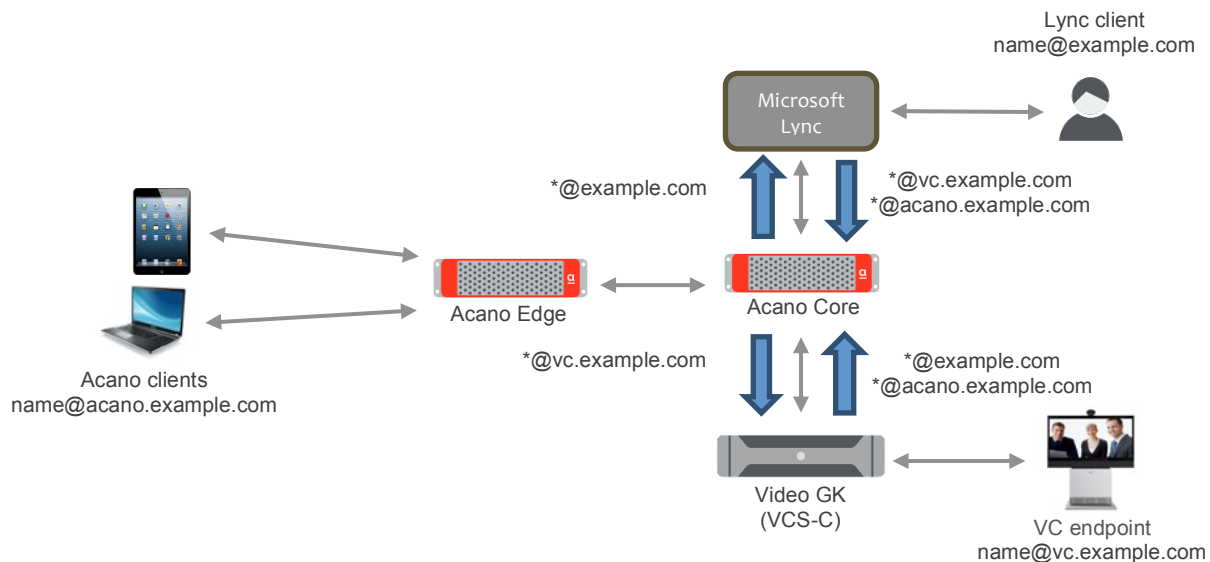
The Acano solution facilitates calls between Lync deployments and non-Lync systems via simple static routes and a dial plan configuration. Lync calls are routed into the Call Bridge component located on the Acano Core unit and corresponding outbound calls are then placed to the SIP call control device. Calls from a SIP deployment are routed back to the Lync environment.

The Acano Call Bridge software component ties the call legs together and handles all necessary protocol and media conversions. Calls simply "work", with any user being able to call any other user without having to know the type of system that they are using.

POINT-TO-POINT CALLS TO AN ACANO CLIENT OR WEBRTC

Acano supplies fully-featured software clients for platforms including Windows, Mac OSX, and iOS, as well as a WebRTC solution for users that connect via a browser. Point-to-point calls can be set up to and from these clients, with the dial plan on Lync, Acano and SIP solutions working to provide any-to-any connectivity.

Lync client
name@example.com

Microsoft Lync

*@example.com

*@vc.example.com
*@acano.example.com

Acano Edge

Acano Core

Acano clients
name@acano.example.com

*@vc.example.com

*@example.com
*@acano.example.com

Video GK
(VCS-C)

VC endpoint
name@vc.example.com

DEALING WITH MEDIA

Many Lync gateway solutions either transcode media or pass it through. The Acano solution does both. It integrates best-in-class, high-density media transcoding functionality with the ability to pass through a video stream. It makes dynamic decisions about whether the media needs to be transcoded or simply passed through, and it can switch between the two modes on a frame-by-frame basis.

The Acano solution currently supports all major video and audio standards, and has demonstrated capability for software upgrades to future standards such as H.265 and VP9. This allows it to establish the very highest call quality by allowing each call leg to connect using its preferred native standard, with any necessary conversion being handled automatically by the Acano solution.

▸ The SIP call leg offers a broad range of media codec support, including high profile H.264 support with resolution up to 1080p, BFCP content support up to 1920x1200, and ultra wideband AAC-LD audio.

▸ The Lync call leg offers HD RTVideo and 1080p H264UC/SVC support, as well as application and screen sharing with Remote Desktop Protocol (RDP).

Other approaches to achieve a Lync-to-SIP gateway function with no media transcoding use a back-to-back user agent and header re-writing to mangle SIP H.264 to Lync H.264UC. This strategy does not support video or content with Lync 2010, or with Lync clients that only support RTVideo (e.g. Lync client on Mac OS X). Another challenge

acano

with this approach is that this is an inherently fragile solution that produces streams that are not interoperable with many SIP endpoints.
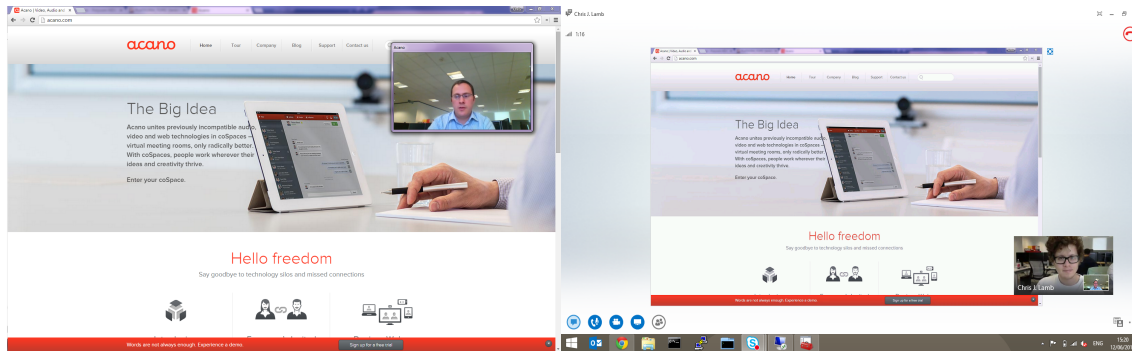

Image: Content and video from Acano client (left) shown on Skype for Business (right).

HOW A CALL IS MADE – DIRECTORY INTEGRATION

The basic gateway setup allows Lync users to call non-Lync users (and vice versa) via Uniform Resource Identifier (URI). It is possible to "enter" the URI into the client; however, this is not a particularly user-friendly approach.

On the Lync side, the URIs required to call SIP or Acano participants can be added to the contacts or favorites in the Lync client. At that point, a user can simply click to call. From a usability perspective, the fact that both Lync and Acano both use Active Directory (AD) means that it is possible to create contacts in the AD such that non-Lync users appear in the directory search on Lync, and vice versa. Simplicity and sophistication are delivered to the end user all in one.

DEALING WITH REAL NETWORK CONDITIONS

Lync and SIP have different ways of adapting media flows to network conditions. For example, even something as basic as establishing the call rate is different in the Lync and SIP worlds.

For SIP, this is usually a manual process with the speed determined by a setting at dial-time, or with statically configured maximum rates based on the dial plan. When the rate is set incorrectly, or there is packet loss or contention, a SIP device will usually attempt to improve the situation by lowering the call rate dynamically.

In the Lync world, the call rate is automatically determined on a per-call basis. Lync uses special bandwidth estimation algorithms to establish a good call rate. In addition, Lync automatically uses media resiliency techniques. Forward error correction (FEC) is used in the media stream to protect against packet loss. When H.264 UC (SVC) is used, layered encoding provides a packet loss-resilient encoding structure. WebRTC and Acano clients use other techniques for media resiliency.

Acano's approach is to support all of the native tools for each connecting participant to deliver the best possible experience. For each client, the Acano solution performs the necessary negotiations and uses the tools available to optimize the media streams sent to each participant.

ACCESS FOR ANY LYNC USER – LYNC EDGE SUPPORT

Up to this point, this white paper has explored scenarios assuming the Lync participant is within the local network. With Acano, external Lync participants can also join a call. When the Lync client is not directly reachable from the Acano Call Bridge, the Acano solution makes use of the Lync Edge server. It does so using standard STUN/TURN/ICE mechanisms to optionally route media through the Lync Edge. The result is that any Lync user who could make a Lync call can also make a call to the Acano solution. Similarly, any client reachable from Lync can also be reached from the Acano solution.
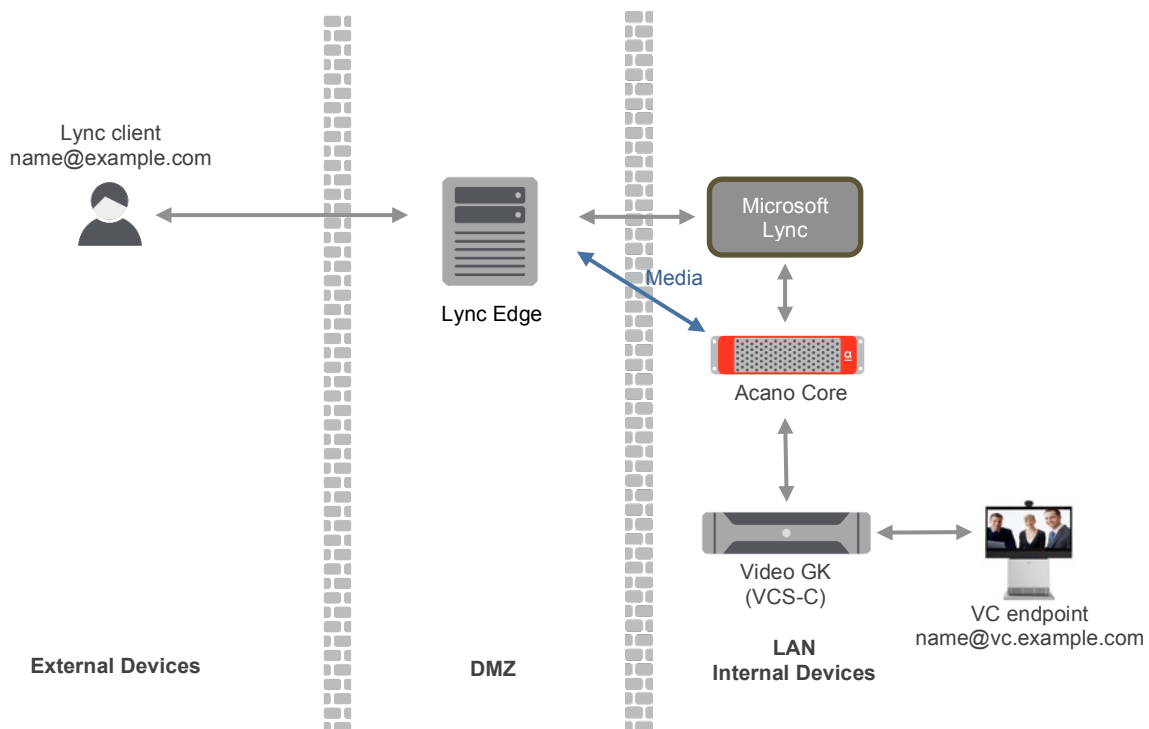
DIRECT FEDERATION WITH LYNC

The deployment described above involves integration with an on-premise Lync setup. It is also possible to integrate directly with remote Lync environments. This is achieved using Lync's federation capabilities. From software release 1.8 Acano's supplied Edge component is able to perform NAT traversal for Lync signaling and media enabling an Acano core behind NAT to be able to directly federate with remote Lync environments with no local Lync deployment needed.

It is necessary to configure Lync federation DNS records. This allows the remote Lync environment to find and route calls to Acano, and vice versa.
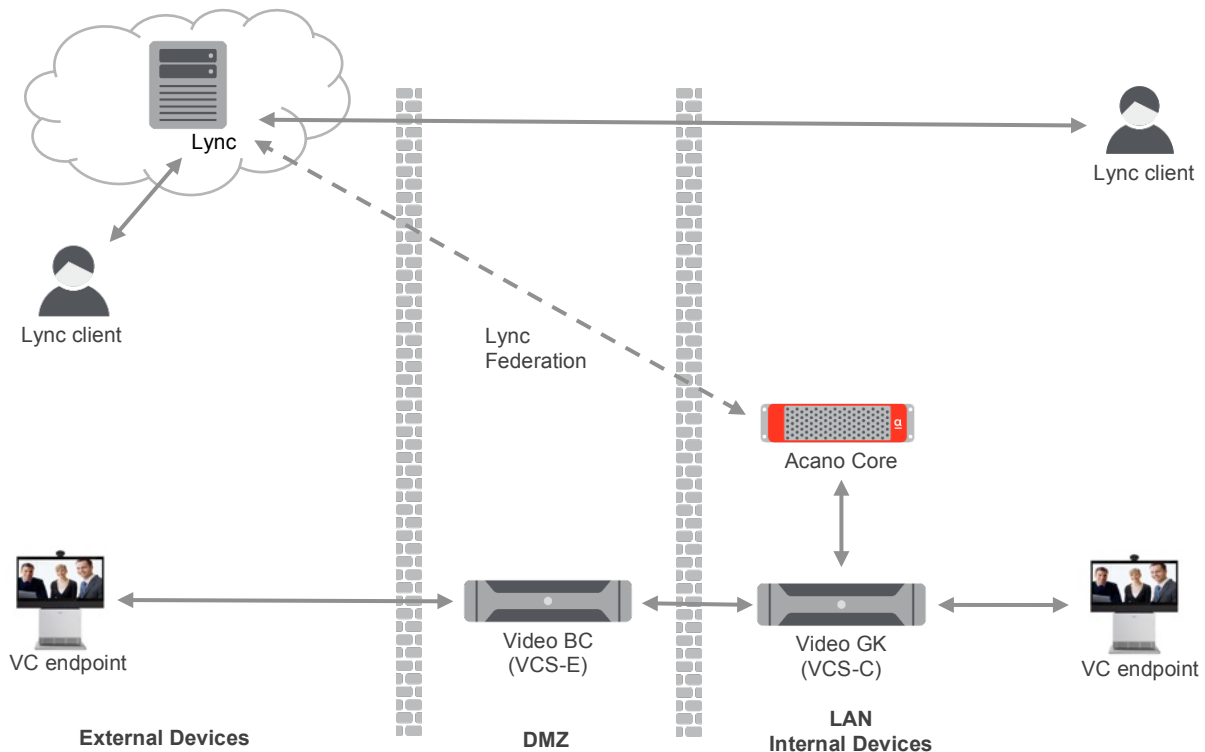
INTEGRATION WITH SKYPE

Skype (consumer version, not to be confused with Skype for Business!) continues to be used for both business and consumer communications on a global basis. Given this, the Acano solution was developed to also support integration with Skype. It provides the ability to make and receive gateway calls between Skype and any Acano or SIP client, and also allows Skype users to call into Acano coSpaces (virtual meeting rooms). Any device or coSpace can be added as a contact within Skype and a Skype user can be added as a contact in other systems.
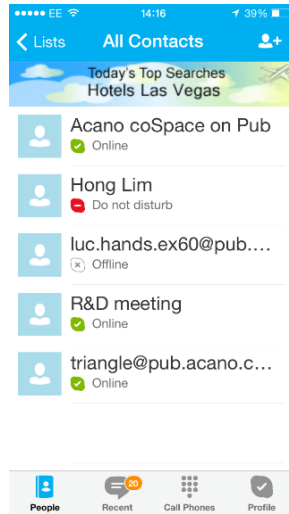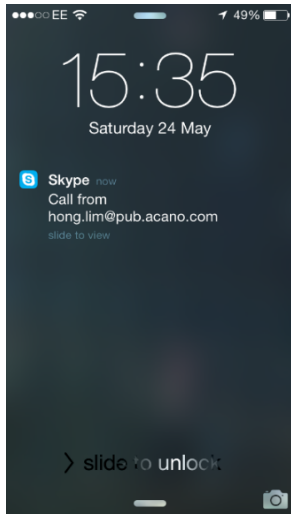
Image: An incoming call to Skype from Acano (left). Acano users, SIP endpoints and coSpaces shown as contacts in Skype (right).
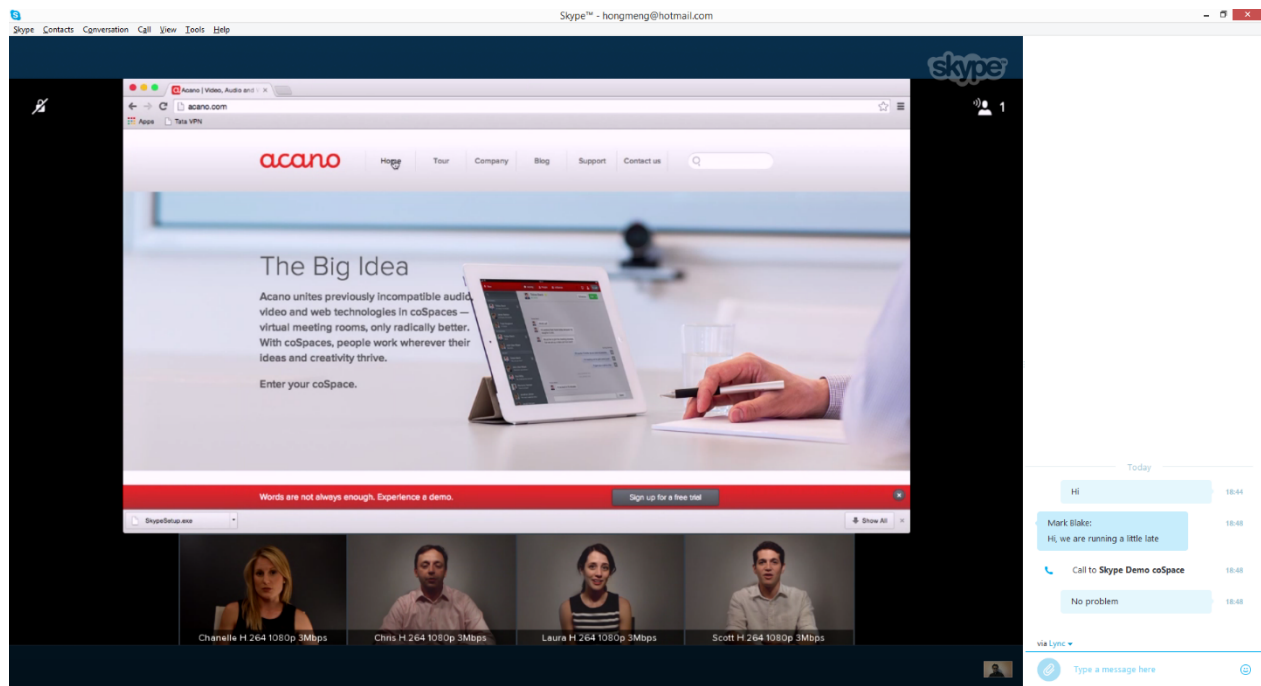

Image: Content, video and chat from Acano and SIP users shown on Skype.

The architecture of this integration is similar to Lync federation, with connections to Skype being made to and from the Lync Edge Server. The connection to Skype utilizes the Microsoft Skype to Lync connectivity. This implementation currently supports presence, IM, audio and video.

When configured, the federation of the systems allows calls to be placed in either direction and this behaves in a similar manner to Lync federation.
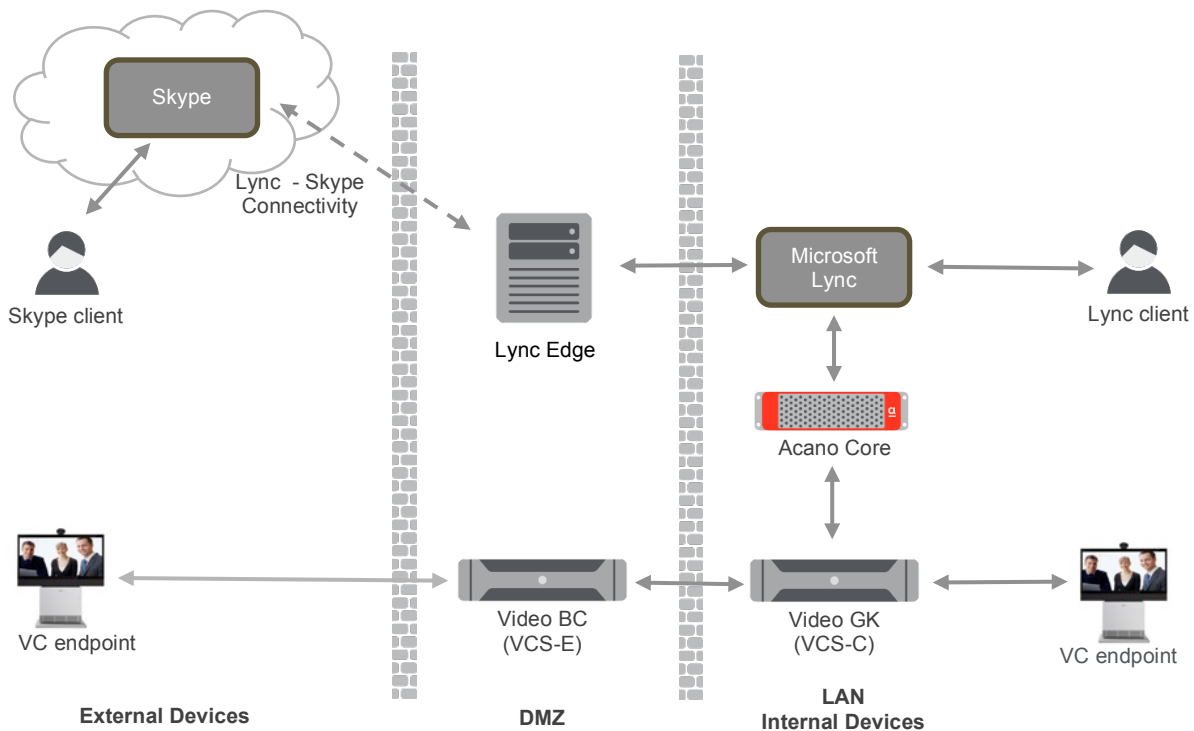
To configure Skype integration, one must provision details of the Lync Edge Server and an organization's domains on Microsoft's systems. Click here for more details.

CALL ESCALATION

Escalation is a general term for adding new communication path(s) between users to an existing single path. Common examples are:

▸ Users are in an IM chat and decide to "escalate" the chat to an audio or video call. It is very common for a call to start as just an IM chat (ex: to establish if it is a good time to make the potentially more involved audio or video call).

▸ Two users are in an audio call and decide to add video.

- ▸ Two users are in a video call and decide to add in a third participant, which extends the call from point-to-point to a multi-party conference.

Although escalation is a concept relevant to both the Lync and non-Lync worlds, it is a particularly common way of doing things for Lync. The Lync client user interface is geared around starting conversations with chat, then establishing ad hoc multi-party calls via an intuitive "drag and drop" mechanism. With escalation, an individual calls one participant then adds in others simply by dragging their names out of the contact list or directory into the call window.

Acano supports all of these escalation paths, regardless of whether the person called is native Lync or non-Lync, which is a very important aspect of preserving the native user experience for Lync users. With most alternative Lync interoperability solutions, if a Lync user were to attempt to escalate a call to a non-Lync user in the way they typically do with fellow Lync users, the call would fail. Users would be confused, the call would be interrupted, and most likely multiple individuals would then call technical support!

SCHEDULED MEETING WORKFLOW – ACANO OPEN

The Lync Outlook plugin is commonly used in Lync-centric organizations to create scheduled meetings. With the Lync Outlook plugin, each meeting invitee receives an e-mail with instructions on how to join that meeting from their Lync client or through PSTN audio. For invitees using the Lync client, a link is provided to click through to join the meeting. For invitees joining via PSTN audio, dial-in number and conference ID are provided, which are entered at the IVR (interactive voice response).

The Acano platform is able to extend this to deliver the capability to dial into the scheduled meeting from non-Lync devices such as SIP, H.323 or Acano clients, or even from a web browser using WebRTC.

The Lync administrator configures the Lync-Acano integration and also configures an Acano IVR. This IVR provides a URI that non-Lync users can dial to join Lync meetings, and a web page to join by WebRTC. On the Lync side, a one-time operation is needed to modify the Lync meeting invite text template to include instructions for SIP/H.323 and WebRTC.

Now, with no change of behavior required by the person scheduling the meeting, every Lync meeting becomes enabled for non-Lync and WebRTC. The invitee just needs to dial the simple URI given in the invite and type the meeting ID (for SIP) or click the link (for WebRTC). These are natural flows that exactly mirror the existing flows for joining via audio and the Lync client, respectively.

acano
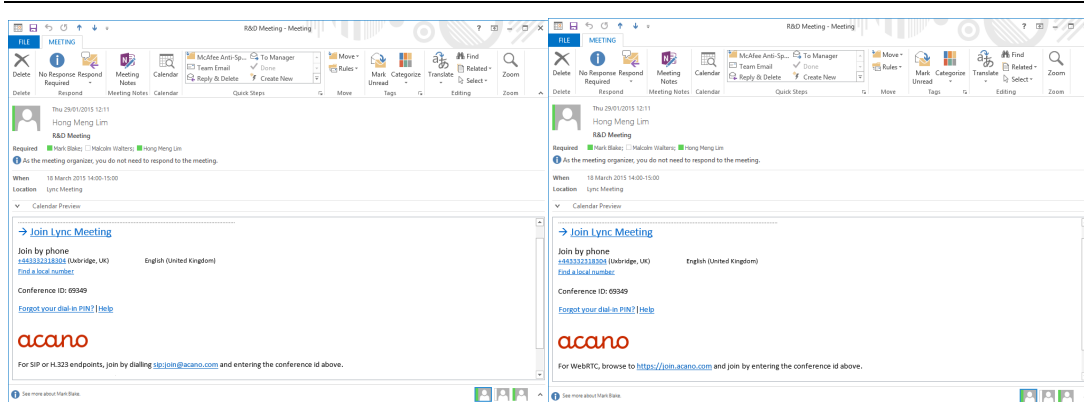
Images: Lync invite email showing SIP/H.323 invite text (left). WebRTC join link (right).
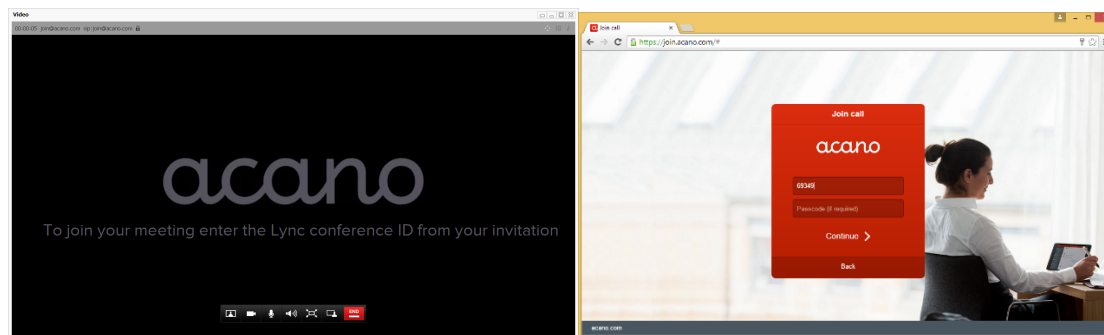
Images: Customizable IVR screen for joining Lync call from SIP endpoint (left). Customizable web page for joining Lync call from WebRTC (right).

GETTING INTERESTING – MULTIPOINT CALLS

Typically, multipoint calls in the Lync and SIP worlds offer quite different user experiences. This is even true when users are on different versions of Lync. For example, there are very different user experiences between Lync 2010 and Lync 2013.

Using Lync 2010, the experience is limited. Lync 2010 participants can use video at up to HD 720p resolution in a point-to-point call; however in a multipoint call, the Lync conferencing component (AVMCU) restricts the video to only VGA (640x480) and a "voice-switched" layout in which only the current active speaker is visible.

Lync 2013 uses H264 scalable video (SVC) and multi-stream technologies to provide a very different experience. With Lync 2013, up to five participants' video is visible at any one time in a "gallery layout" in which all participants have equal prominence.
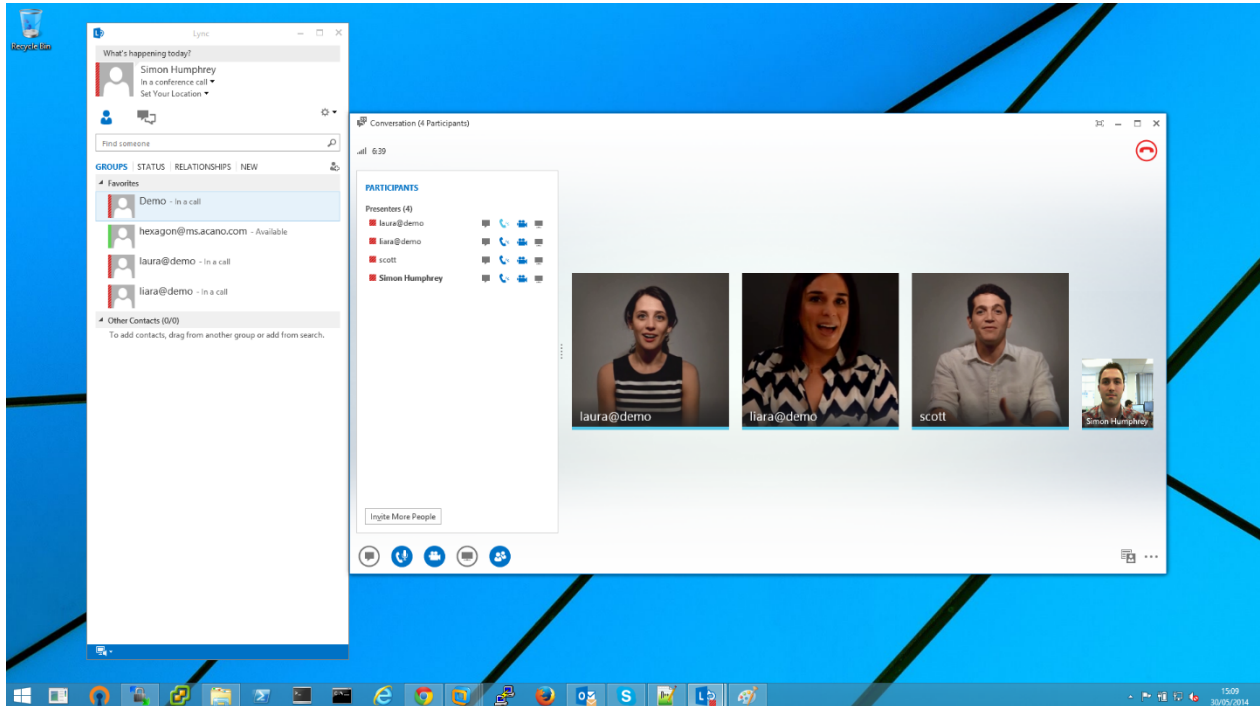

Image: A Lync multipoint call showing "gallery view", participant list and conference controls.

In SIP calls, the user would expect so see a high quality/resolution "continuous presence" layout, in which multiple meeting participants are visible on screen simultaneously. With a modern Multipoint Control Unit (MCU), it is standard to offer a choice of layouts at high definition resolution.

The Acano solution has unrivalled integrated multipoint capabilities. In the pure non-Lync case, the Acano solution uses a combination of switching and transcoding techniques to give full continuous presence at up to 1080p resolution at 60 frames per second. Support for all major video and audio standards allows any SIP device, WebRTC, desktop and mobile clients to participate in a multipoint call, each receiving optimal video and audio streams individually tailored to the device's capabilities: resolution, bandwidth, and size of screen, as well as the current network conditions.
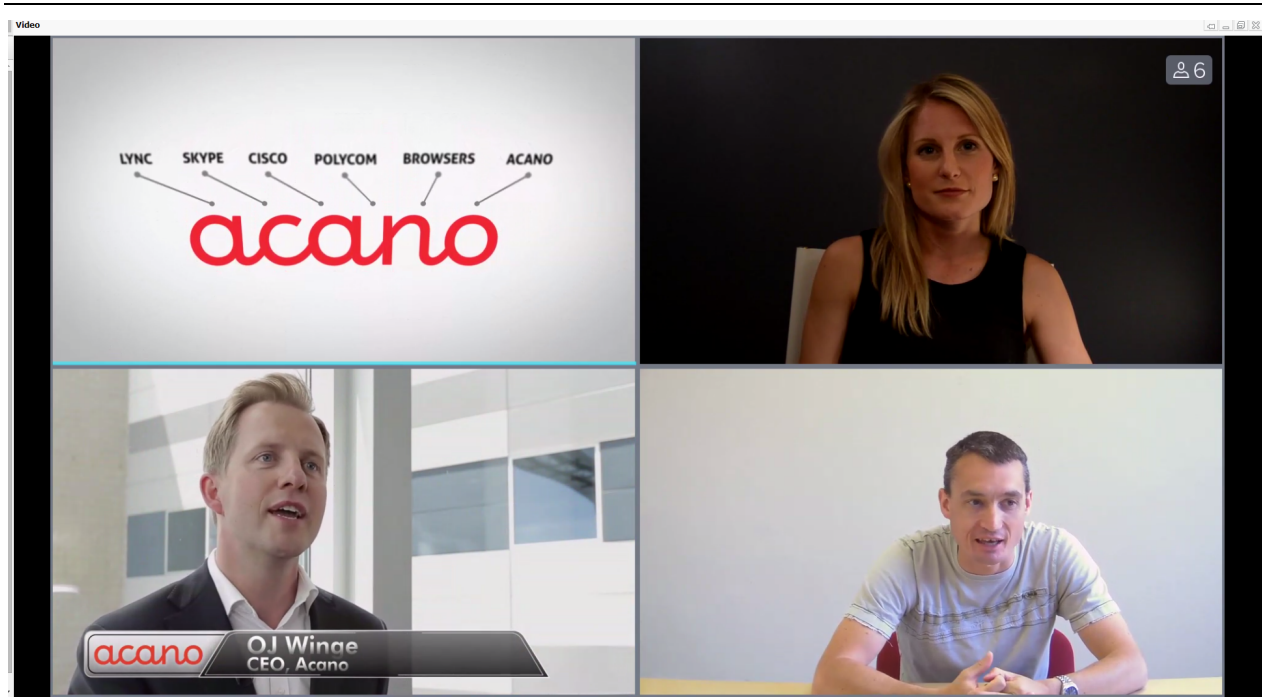
Image: A typical SIP multipoint call.

In addition to high quality video, other key features of a multipoint call that are important to preserve are:

▸ Participant list, which shows the name of all parties in the call regardless of how they joined.

▸ Correct presentation sharing behavior.

▸ In-call controls such as muting, spotlight feature, etc.

▸ Escalation.

MIXED MULTIPOINT CALLS – WHO HOSTS THE CONFERENCING?

In the case of a multipoint call that includes both Lync and non-Lync participants, Acano offers alternate approaches based upon how a particular call/meeting is created. Both the Lync and non-Lync worlds are each capable of managing the conferencing aspect of the meeting. Here are three approaches supported by Acano:

CONFERENCING IN THE SIP ENVIRONMENT

If you take a "SIP world" view, then one answer is to gateway all of the Lync calls into SIP calls and connect everything to a SIP conferencing bridge. This is the solution you would get, for example, with a Cisco B2BUA and bridge. While this works and provides a good user experience for SIP users, it offers a poor user experience on the Lync side.

▸ Good: SIP participant sees all participants and the correct participant list.

▸ Bad: Lync participant sees one participant. Even if the video supplied is continuous presence, this is NOT the gallery view they expect. The participant list shows just one person in the call. Escalation does not work from Lync.
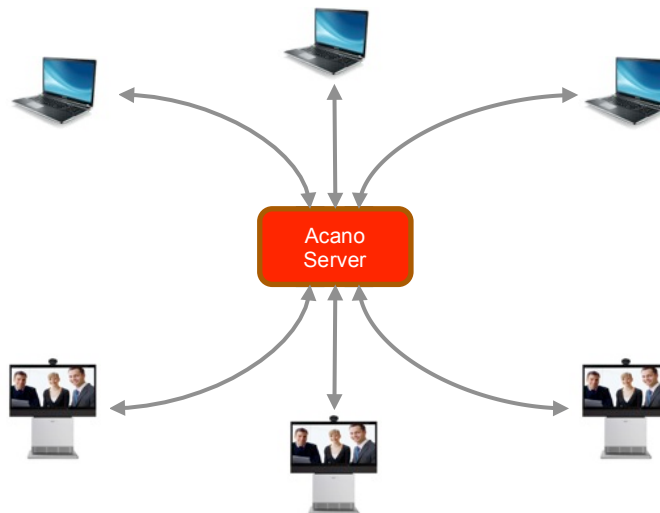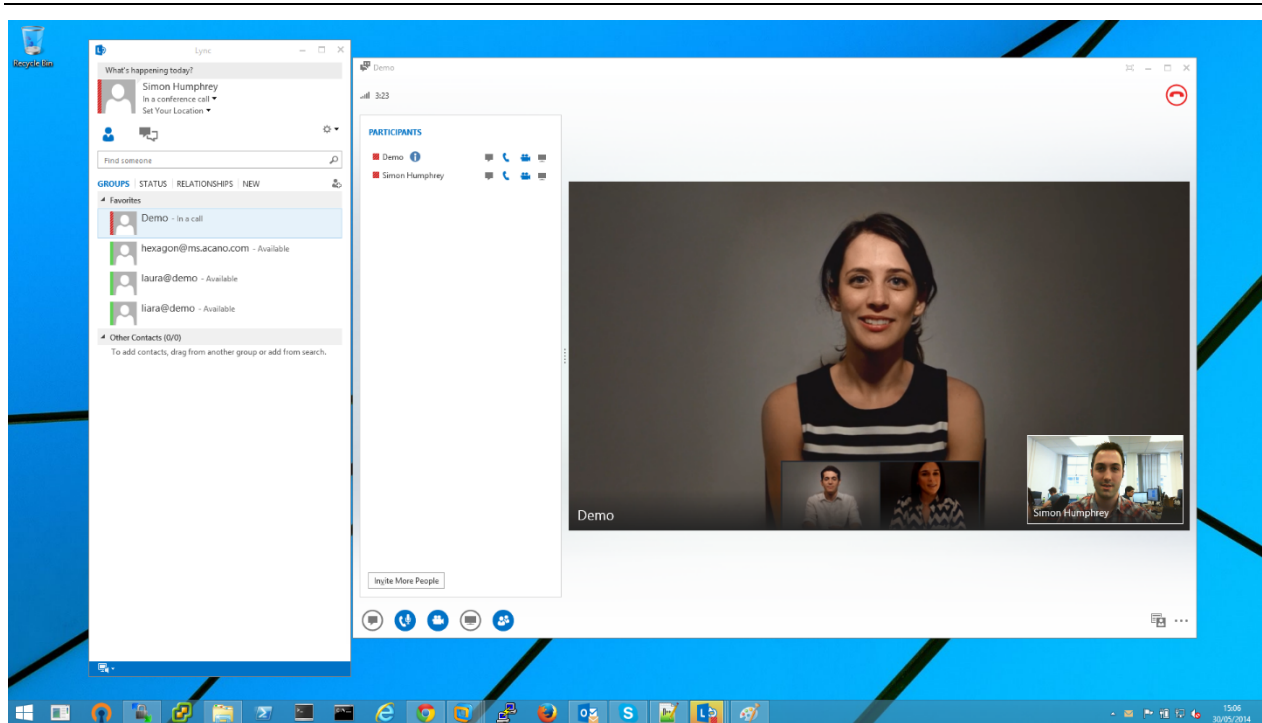
Image: Poor Lync user experience when a multipoint call is "hosted on the SIP side". This is not the Lync-style gallery view a user would expect. The Lync client thinks that there is only one participant in the call and in-call controls, such as the spotlight feature, are lost.

CONFERENCING IN THE LYNC ENVIRONMENT

With conferencing utilizing a Lync-centric approach, the multipoint call is established as a Lync conference. In this case, the SIP participants appear to Lync as additional Lync participants connected via the gateway functionality. For this to work, the gateway needs to provide additional Lync conferencing functionality and provide the necessary media streams to Lync. This functionality is not the same as that required to make point-to-point calls.

▸ Good: Lync participants see the correct gallery view and the correct participant list Escalation works correctly.

▸ Bad: Non-Lync experience is poor; only a voice-switched layout is seen.
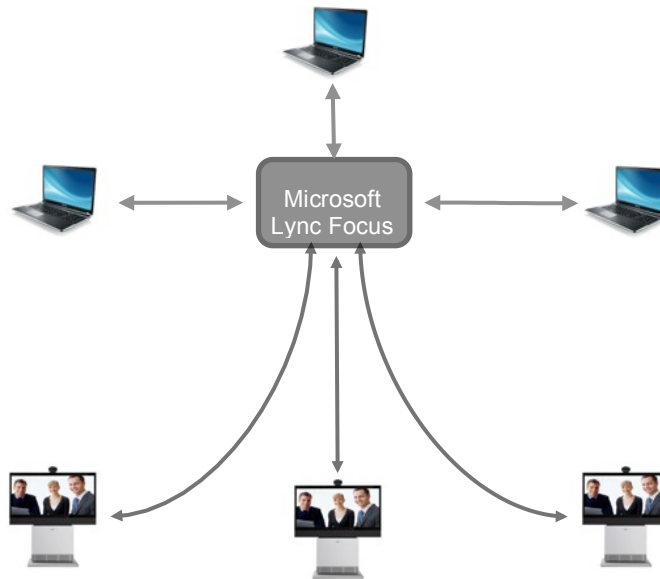
THE ACANO SOLUTION – BEST OF BOTH WORLDS

The Acano solution can deliver both the SIP- and Lync-centric solutions, and uniquely it can also run a single conference using both at the same time using "Dual Homed Conferencing" technology. This offers flexibility and user experience that other competitors cannot deliver. The solution is automatically chosen depending on how the call is established. If the multipoint call is set up on the non-Lync side (for example, by calling out to Lync), then the users get the SIP-style conference. If the call is established initially as a Lync multipoint call (e.g. by drag and drop escalation) then the users end up with a Lync-style conference with the Acano solution providing all of the Lync conferencing functionality on behalf of the SIP participants.

DUAL HOMED CONFERENCING

In software release 1.8, Acano deliver something really innovative and unique – the ability to do the conferencing for the Lync participants on the Lync side and for the non-Lync participants on Acano "at the same time".

When a non-Lync user joins a scheduled Lync meeting via Acano Open a conference is automatically created on the Acano server. As more non-Lync users join, they are placed within this same Acano conference and multiple video and audio streams are exchanged with the Lync meeting.

An identical situation exists when a Lync user drags and drops multiple non-Lync users into the same meeting. Each of the non-Lync users is placed into an Acano conference with all of the Lync users placed into the Lync conference.

This approach uses the Acano solution's ability to be both a switching Scalable Video Coding (SVC) bridge <u>and</u> a transcoding bridge. The Acano solution receives (and transmits) multiple individual SVC streams from the Lync conference and transcodes these into the SIP side of the conference.

Both sides will enjoy the native user experience and all in-call features will work as expected from both sides.

▸ All users can join from a standard Skype for Business meeting invite including SIP, H.323 and even WebRTC.

▸ Full features for all users including bi-directional RDP content, correct participant lists and pane labels.

▸ Native HD video and audio experience for all users, including gallery view for Skype for business users and a choice of "continuous presence" layout for the others.
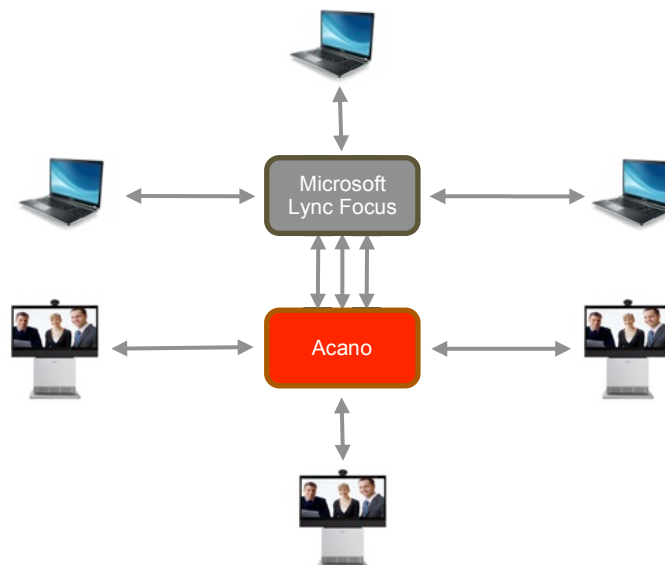
IS ANYBODY THERE? PRESENCE SUPPORT

With Acano Lync integration, it is possible to see presence information for Acano users from within Lync. Presence shows whether a user is online, and his/her availability. The

status of an Acano coSpace is also provided to Lync users via the same mechanism. This enables a Lync user to see whether there are any participants already within a coSpace prior to joining.

The Skype integration provides equivalent functionality for Skype users for both Acano users and coSpaces.
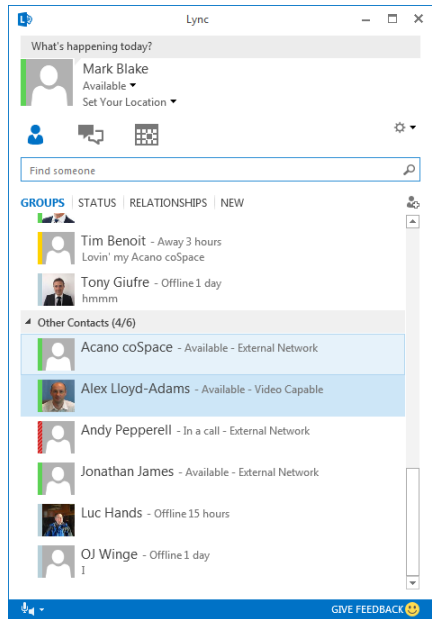

Image: Presence shown on Lync client for Lync participants (e.g. Alex Lloyd-Adams), as well as non-Lync users via Acano (e.g. Jonathan James, Andy Pepperell) and for an Acano coSpace.

UNIFIED COMMUNICATIONS – INSTANT MESSAGING

Unified Communications is not just about audio and video. The Acano solution allows instant messages to be exchanged directly between the Lync and non-Lync worlds. A message can be posted from a Lync client to a coSpace. Any message posted to the coSpace is sent to all connected Lync clients and is also persistently stored within the coSpace.

The same functionality exists for Skype users, with the ability to send messages to a coSpace from Skype, and to receive messages from the coSpace within the client.
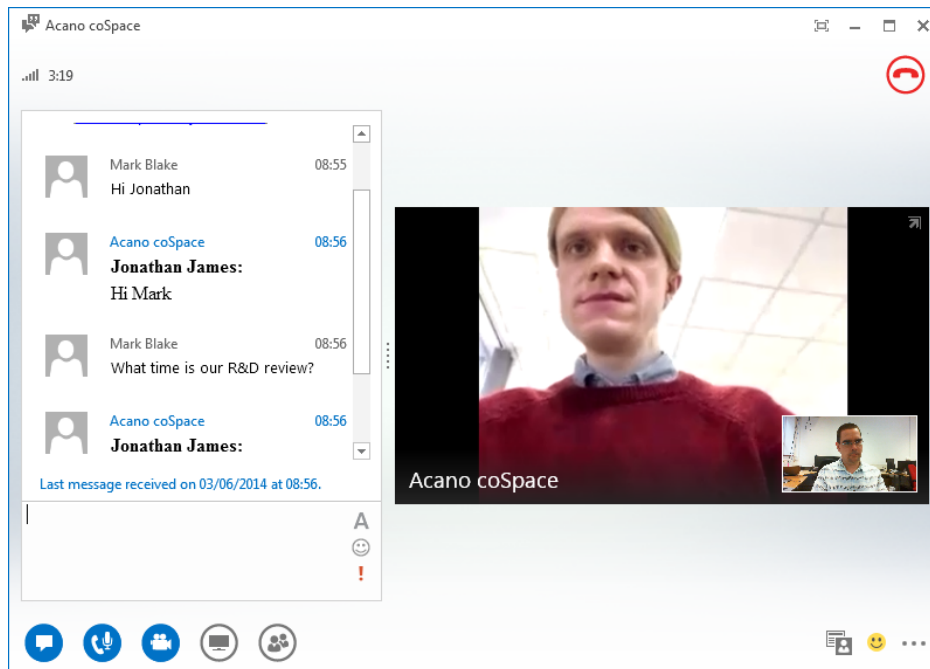
Image: Showing chat between a Lync user and a coSpace

SCALE AND RESILIENCE

The Acano solution comprises standard x86 software that can be deployed on a choice of platforms, including an Acano-supplied server, or as a virtualized deployment on standard hypervisors. Even a single Acano instance is highly scalable and resilient, supporting hundreds of simultaneous fully-transcoded Lync to non-Lync calls or meetings.

Additionally, the Acano solution is fully distributed, allowing additional scale and resilience by deploying multiple Acano instances. Capacity grows in proportion to the number of deployed instances and resiliency comes through installing excess capacity. For example, if an instance were to fail, the calls that are on that failed server will be moved to an alternate server. Finally, for geographically distributed systems, individual Acano servers/server clusters can be co-located with each Lync front-end pool. Using resilient trunking between the co-located Acano and Lync clusters provides a resilient, distributed solution – at scale.

CONCLUSION

Acano's native Lync integration preserves the Lync experience for Lync users, while extending their reach to the non-Lync world. Participants communicate across and between organizations without worrying about the underlying technology.

Every company can customize and optimize their UC environment with flexible deployment options (appliance, virtual server, or cloud) and a rich and tightly packaged set of multimedia collaboration features. Users benefit from a common dial plan, federated IM and presence, native conferencing integration, expanded client and endpoint support, increased capacity and more, allowing individuals to collaborate with anyone they choose.