



*TOMORROW
starts here.*

Cisco *live!*



Cisco Unified Communications and Microsoft Integrations

BRKCOL-2020

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Technical Solutions Architect

#clmel

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Cisco Interoperability with Microsoft

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Cisco Interoperability with Microsoft

Part 1 – Telephony, IM and Presence, Applications

Abstract

- This intermediate-level session provides attendees with a detailed understanding of the Cisco Collaboration solution when integrating and interoperating with Microsoft. It includes a review of Cisco Collaboration products and how they're related and/or interfaced with Microsoft products. With detailed explanations of migration and multi vendor deployment scenarios and things to keep in mind before deployment.
- Technologies covered
 - **Call Control**
 - **Instant Messaging & Presence (coexistence and migration)**
 - **Unified Communications**
 - **Security**
 - **Application integration and rich media applications (Microsoft Office, Sharepoint, Office 365, Exchange, Sharepoint)**
 - **Video Interoperability**
- This session is for people involved with the planning and implementation of collaboration solutions and those involved in strategic decision making for selecting a collaboration solution.
- Attendees should have a good understanding of the Cisco Unified Communications high-level architecture and a basic understanding of the Microsoft product set.

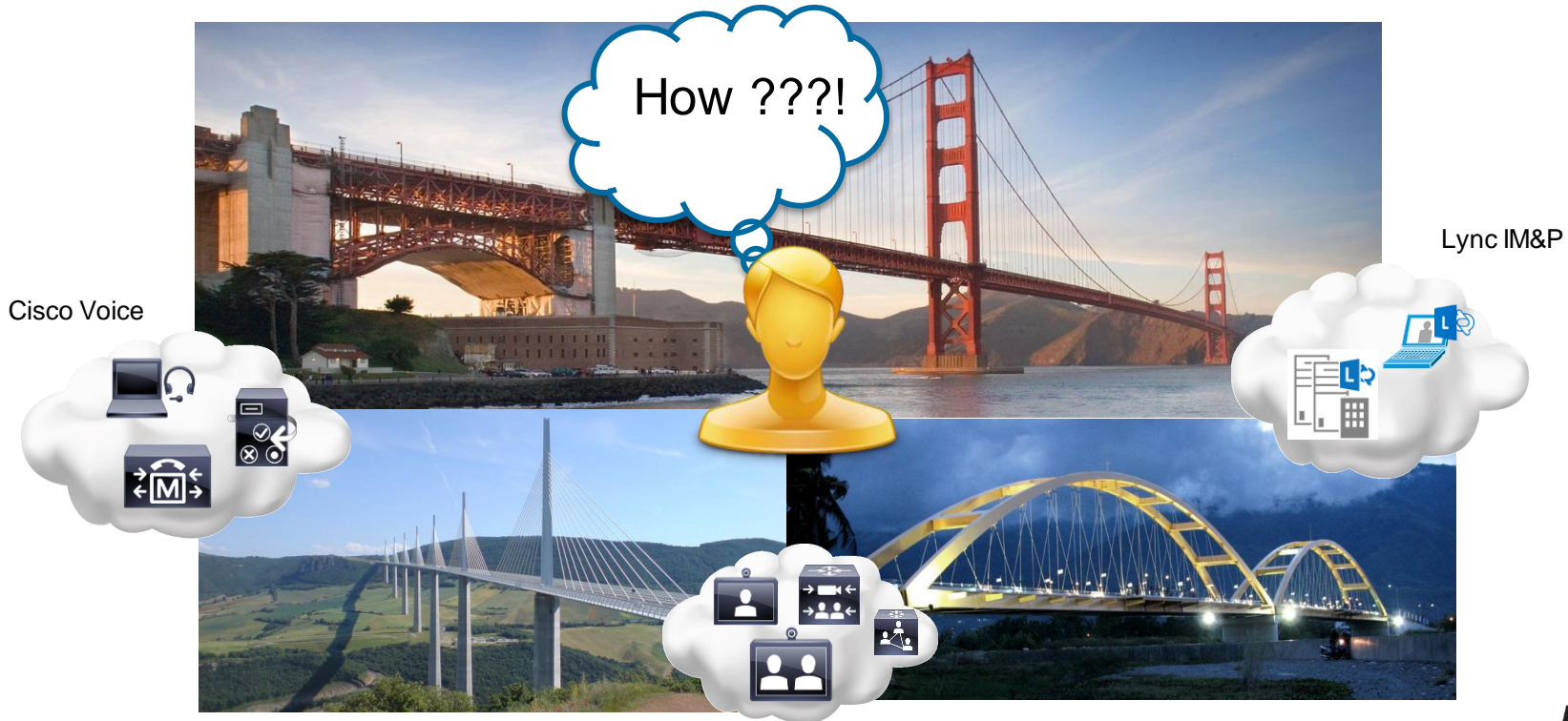
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Agenda

- Introduction – What customers are faced with today...
- Architectural Considerations
- Instant Messaging and Presence
- Federation
- Enterprise Voice Interoperability
- Application Level Interoperability
- Video Interoperability
- Migration
- Single Call Control
- Office 365



Typical Customers Situation...One Year Ago.



Typical Customer Situation....Today!

Two main independent “Silos” for collaboration



**TelePresence/Video/Phones
Instant Messaging and Presence**



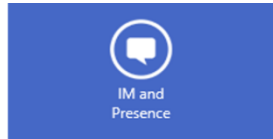
IMP and P2P Audio/Video

A long-exposure photograph of a city street at night. The foreground is dominated by vibrant, multi-colored light trails from moving vehicles, creating a sense of motion and energy. In the middle ground, a modern pedestrian bridge with a glass railing spans across the street. The background features several tall, illuminated buildings, some with distinctive architectural features like balconies and windows. The overall scene is a blend of urban architecture and dynamic light patterns.

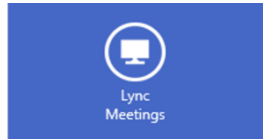
Architectural Considerations

Microsoft Lync

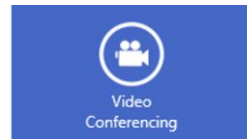
Architecture Overview – on-premise



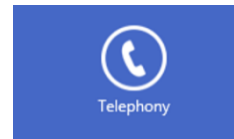
IM and
Presence



Lync
Meetings



Video
Conferencing



Telephony

Communication
Modalities



Many moving
parts



Additional 3rd
party components



Microsoft Lync

Interoperability and specifics Lync 2010 / Lync 2013

- Audio:
 - Mediation Server (Enterprise Voice)
 - Remote Call Control (RCC)
- Instant Messaging and Presence:
 - SIP/SIMPLE Federation
 - XMPP Federation

For Microsoft Lync 2010 and Office Communication Server 2007 via a separate OCS 2007 R2 XMPP Gateway.

For Microsoft Lync 2013 via the XMPP Proxy (Edge), XMPP Gateway (Front-End)

Microsoft Lync

Video interoperability with Lync 2010

- Point to Point video call:
 - Uses the RTVideo codec as default
 - Single codec supported for interoperability with standard VC is **H263** (Max resolution is **CIF@15fps**)
- Multipoint video call using Internal A/V MCU:
 - Support only RTVideo codec
 - Support CIF and VGA as resolutions (No HD)
 - Support only Voice Activated Switching (no Continuous Presence)
 - Utilise **Microsoft CCCP** as proprietary protocol to create, extend and manage the Multi Party Video Conference.

Microsoft Lync

Video interoperability with Lync 2013

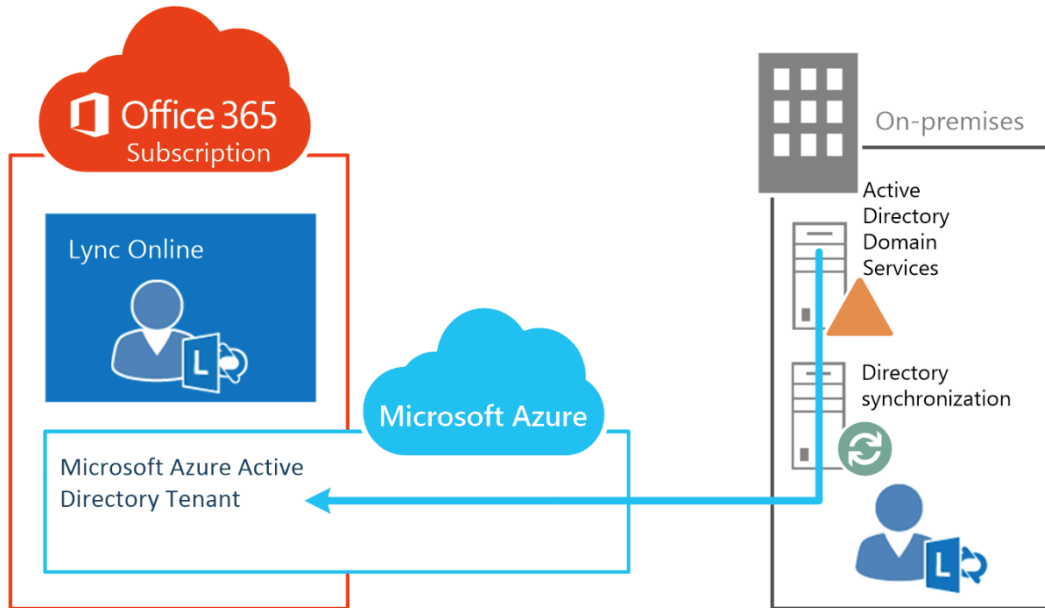
- Microsoft/Polycom **H.264 UC SVC (UCIF)** and RTvideo supported as Video Codec
- **Support for H.263 discontinued**
- Still utilise **Microsoft CCCP** as proprietary protocol to create, extend and manage the Multi Party Video Conference
- Up to 5 users **continuous presence** layout – HD Pictures for the others...

H.264 SVC Introduction

- SVC = Scalable Video Coding
 - Encodes the video source with multiple streams, each one providing incremental information and details.
- H.264 SVC Modalities
 - **Temporal**: Frame rate scalability
 - **Spatial**: Resolution scalability
 - **SNR/Quality/Fidelity**: Single spatial resolution but different qualities (Bitrate)
- Reasonably loose standard today (still maturing)
 - Each vendor that has adopted SVC has implemented it differently
 - No interoperability can be assumed between SVC implementations

Microsoft Lync Online – Office 365

Architecture Overview - SaaS



- Communication capabilities of Lync Server 2013 as a cloud-based service
- Lync presence, instant messaging, audio and video calling, rich online meetings web conferencing capabilities
- PSTN connectivity through third-party providers (where available)
- Closed community – no standards based interoperability

Call Routing with Lync 2010/2013

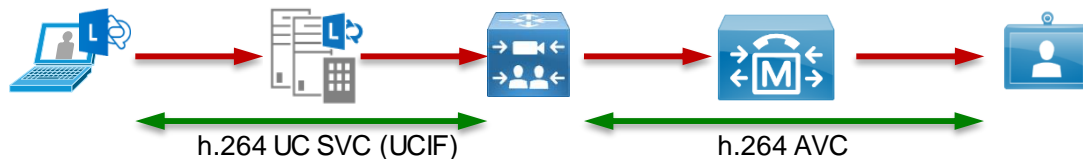
OPTION 1 - User Enabled for Enterprise Voice (“Plus CAL”)



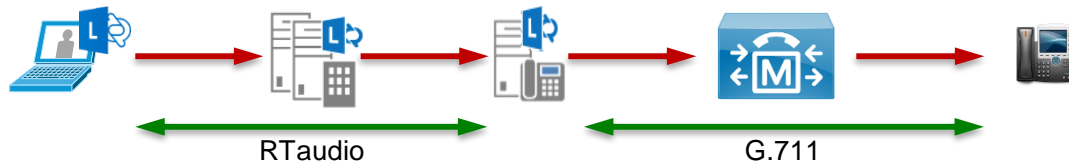
if ((SIP URI) or (“number”) match one of Lync User) then route locally /* Reverse Number Lookup



elseif ((SIP URI) and (destination == remote domain)) /* SIP Trunk Routing (Video Call Scenario)



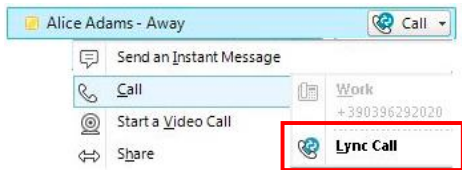
elseif ((“number”) and (destination == Voice Route)) /* Number based Enterprise Voice Routing



Two possible routing behaviours for Lync outgoing calls.

Call Routing with Lync 2010/2013

OPTION 2 - User Enabled for P2P calls only (no "Plus CAL")

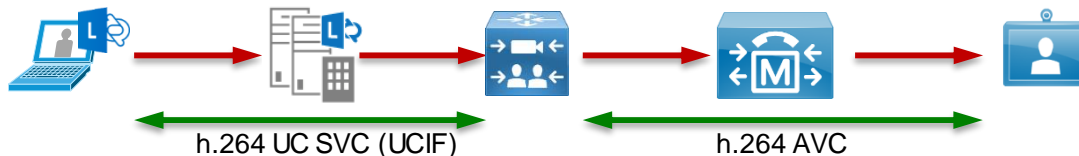


Only **one** possible routing behaviour for Lync outgoing calls.

if ((SIP URI) match one of Lync User) then route locally /* Reverse Number Lookup



elseif ((SIP URI) and (destination == remote domain)) /* SIP Trunk Routing (Video Call Scenario)

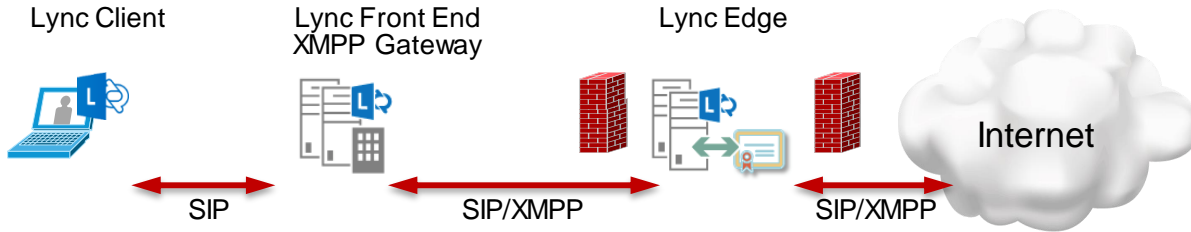




Instant Messaging and Presence

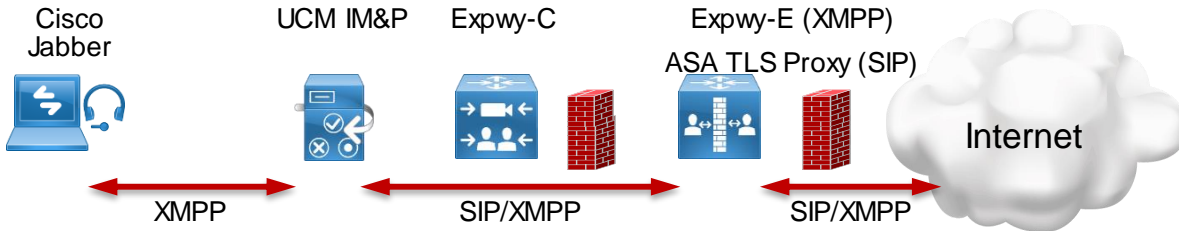
Instant Messaging and Presence

Capabilities

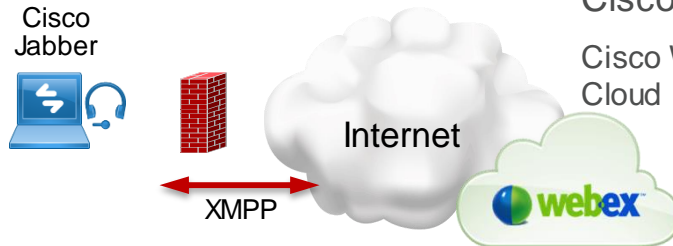


Microsoft Lync 2013

(SIP/XMPP, Microsoft Lync 2010 – XMPP only available via OCS XMPP Gateway)



Cisco Collaboration on premise (SIP/XMPP)



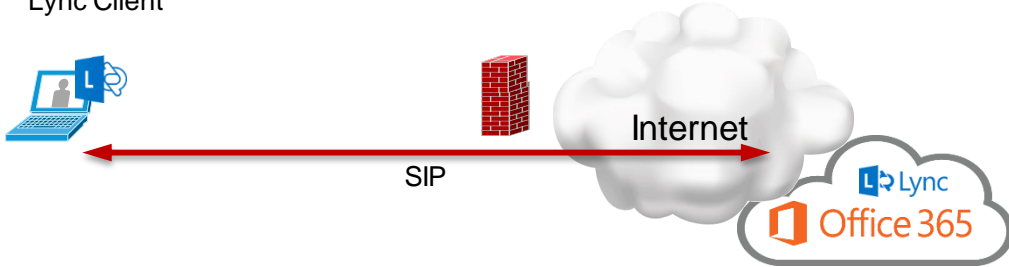
Cisco Collaboration Cloud

Cisco Webex Messenger IM&P
Cloud Service (XMPP)

Instant Messaging and Presence

Capabilities

Lync Client



Interoperability **only** supported with **Lync** or **OCS** systems

Available trunking solutions (i.e. VC) based on analysis of Lync 2013 on-premise to cloud communication

No standards based federation interface supported by Microsoft

The term "Lync federation" is specific to Lync and should not be confused with the requirements and capabilities

Following are the federation relationships that are supported by Lync Online and the available modalities:

- **Lync Server 2013** IM, Presence, Audio, Video, Conferencing
- **Lync Server 2010** IM, Presence, Audio, Video, Conferencing
- **Office Communications Server 2007 R2** IM, Presence, Audio, Video, Conferencing

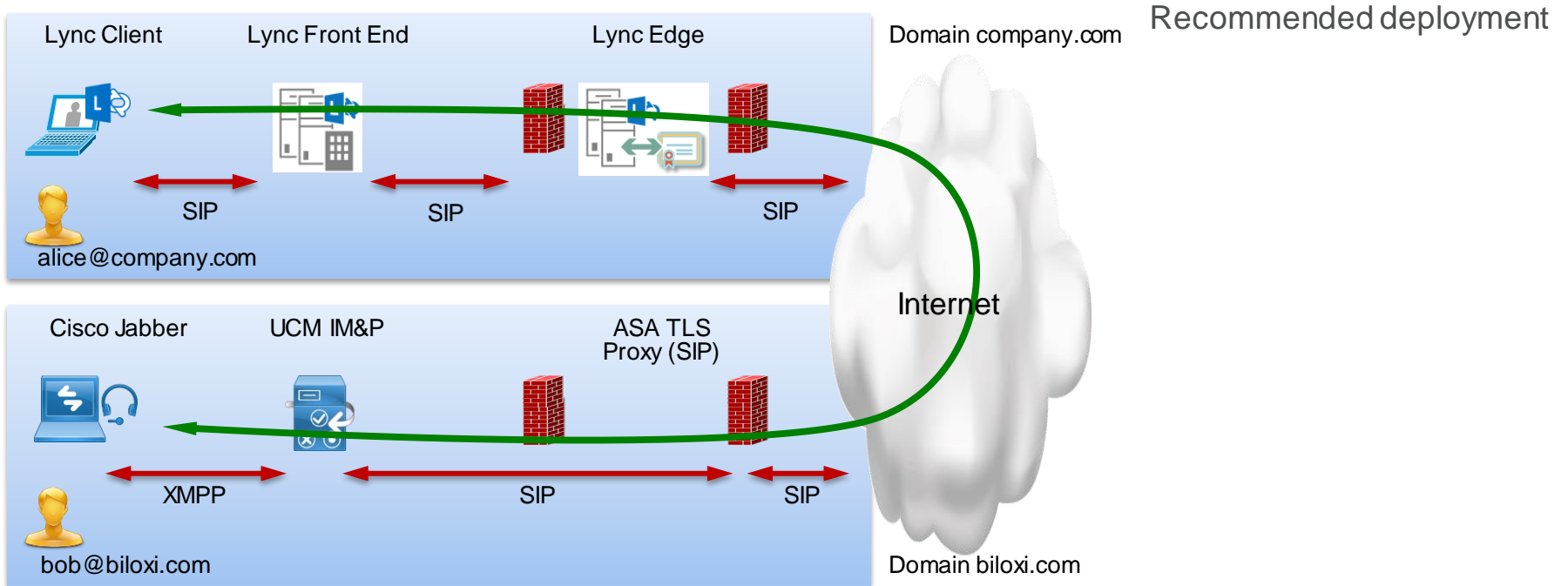
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A nighttime photograph of a city street. In the foreground, there are long, curved light trails from cars, primarily in shades of yellow and orange. In the middle ground, a pedestrian bridge with a glass railing spans across the street. The background features several modern buildings with lit windows and some flags on poles. The overall scene is illuminated by city lights, creating a vibrant urban atmosphere.

Instant Messaging and Presence Federation - Interdomain

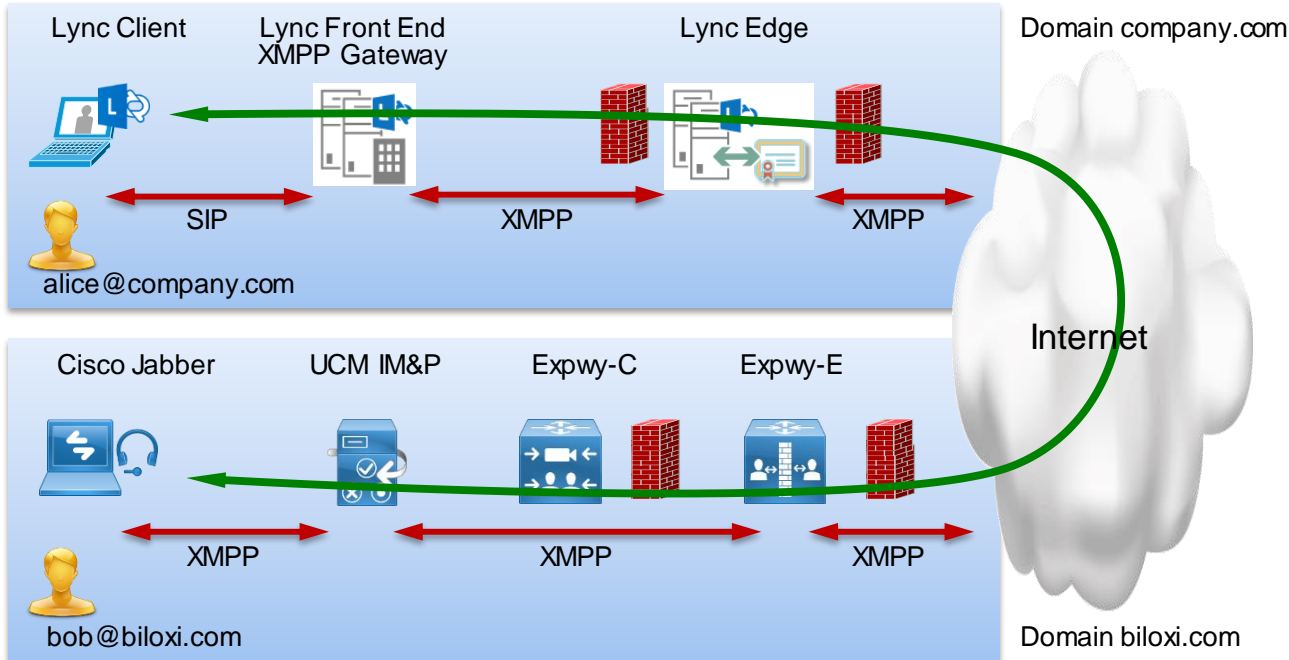
Instant Messaging and Presence

Business to Business (Interdomain Federation) – SIP-SIMPLE



Instant Messaging and Presence

Business to Business (Interdomain Federation) – XMPP

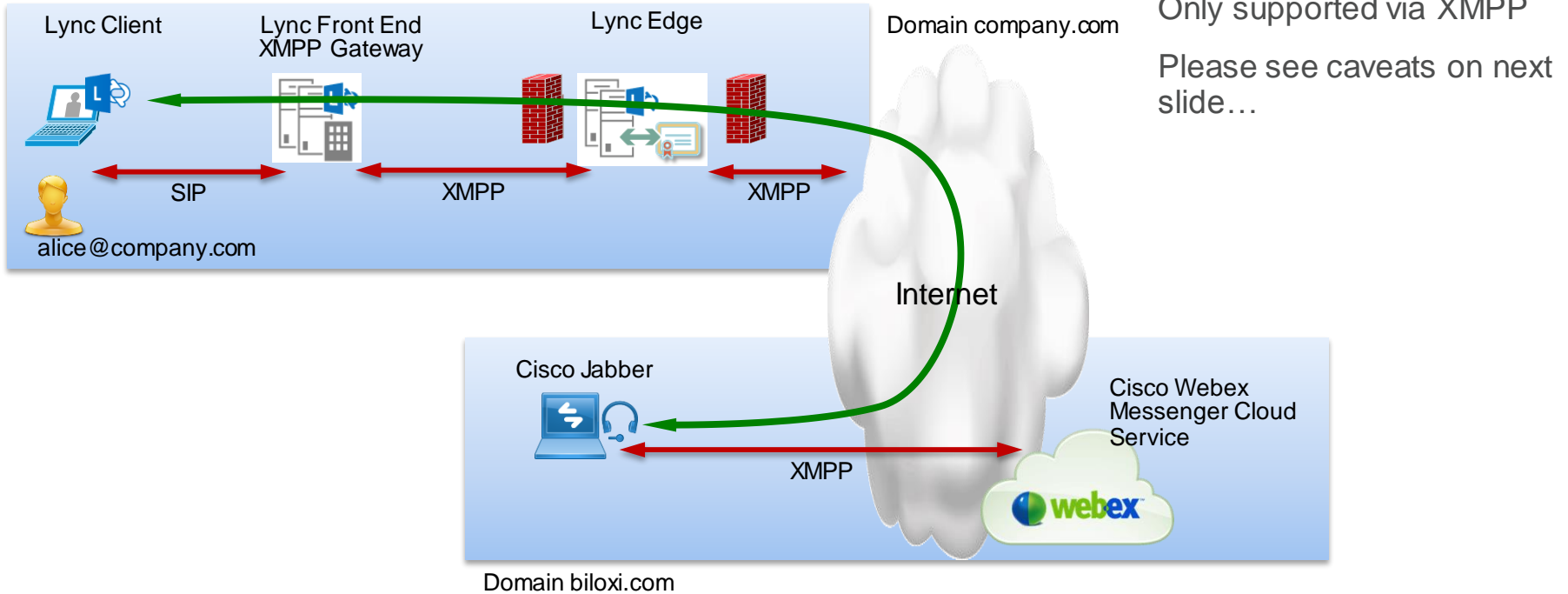


Not recommended for Cisco on-premise deployment

Standard XMPP federation

Instant Messaging and Presence

Business to Business (Interdomain Federation) – XMPP Cloud

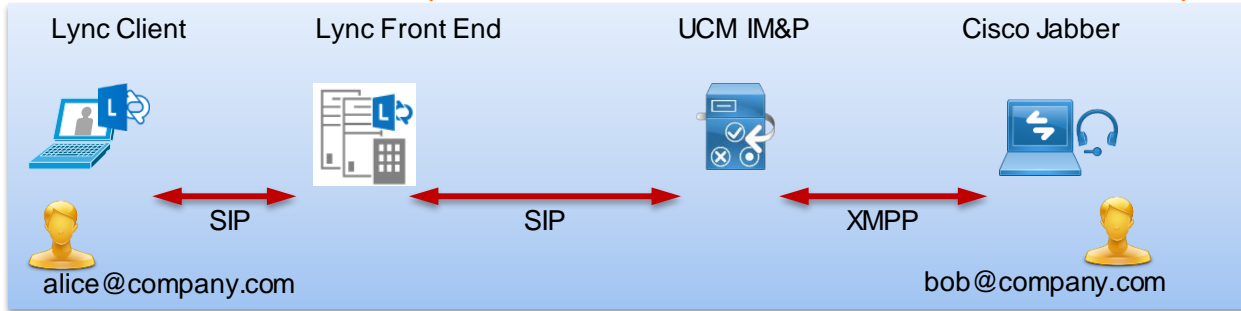




Instant Messaging and Presence Federation - Intradomain

Instant Messaging and Presence

Within a Business (Partitioned Intradomain Federation)



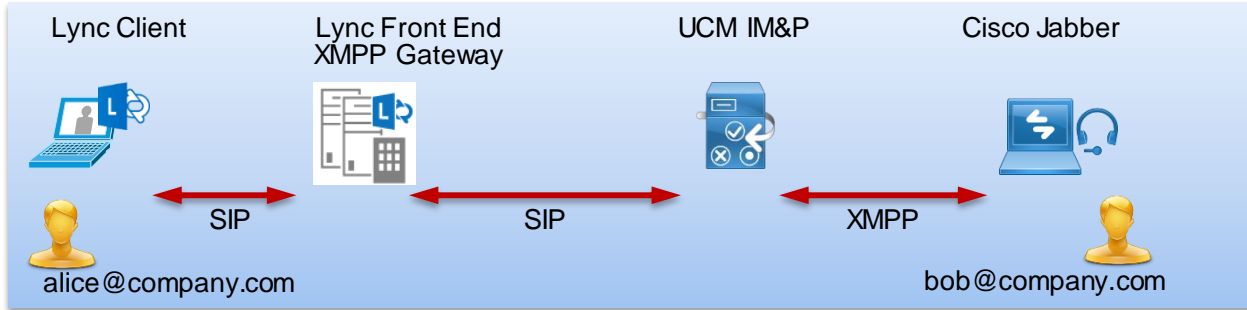
Domain company.com

Single domain for both systems

- Partitioned Intra Domain Federation allows for migration or long term coexistence
- Only available for Cisco UCM IM&P on premise deployments
- Uses standard SIP routing mechanism
- Topology can be extended to include audio and video interoperability

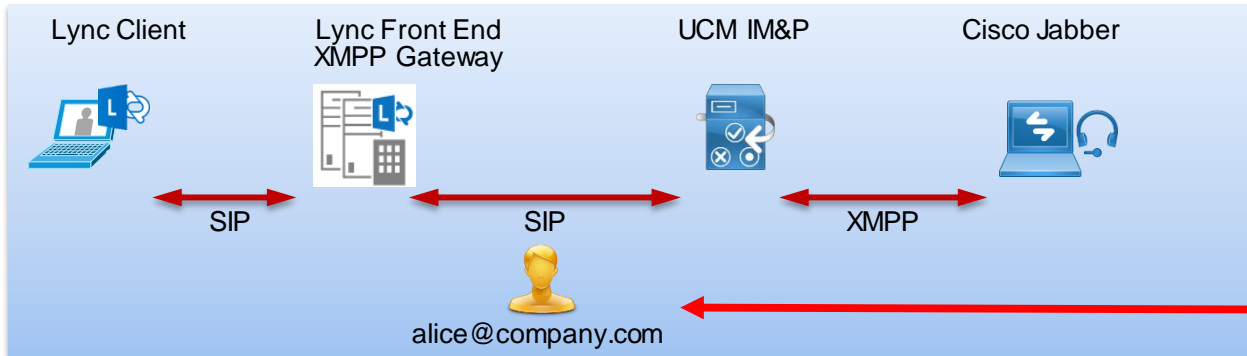
Instant Messaging and Presence

Definition of Partitioned Intradomain Federation



Partitioned Intradomain Federation

User only exists in one system – **either** Microsoft Lync **or** Cisco UCM



Union Federation

User entity exists in **both** system – Microsoft Lync **and** Cisco UCM



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Call Routing - Enterprise Voice vs. URI

Multiple Call Control Agents Call Routing

Topics to consider

- Multiple independent call agents cause problems in a number of areas
- Agents using different routing logic (i.e. number based routing vs. URI routing)
- Call Routing
 - Location of called identities, “Who knows how to reach X?”
- Call Admission Control
 - Common CAC model?
 - Authoritative call admission decision, “What state exists for managed CAC objects and how would the different agents know?”

Call Agent Routing Logic

Cisco UCM routing logic

User Alice
+49 1234 56489
alice@compay.com

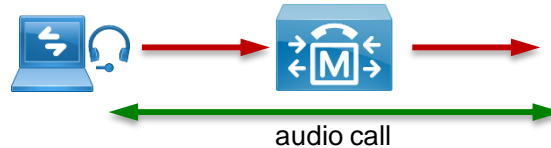


Call extended to destination device using either SIP URI or number

```
/* Standard SIP Media Negotiation
If (destination == VIDEO CAPABLE) then
Negotiate best video from SDP
```



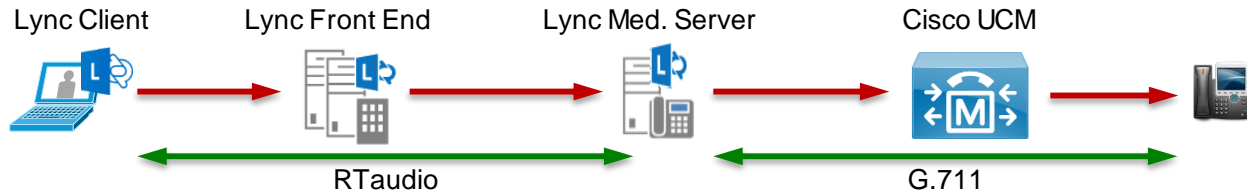
```
else /* Destination not video capable
Negotiate best audio from SDP
```



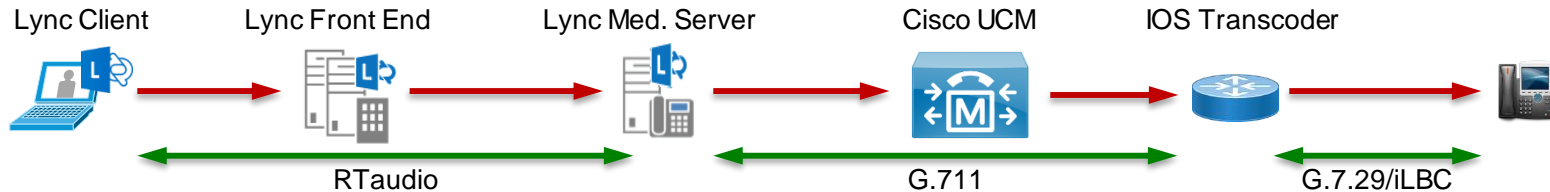
Enterprise Voice Call Routing

SIP Trunk / Direct SIP Options 1/2

OCS 2007 / Lync 2010 & 2013 (no media bypass)



OCS 2007 / Lync 2010 & 2013 (no media bypass), none G.711 on IP-PBX



Flows show the SIP signalling and media paths in a SIP-trunk interoperability scenario

Lync Mediation Server only supports G.711, requires additional transcoding resources if any other codec is used by devices connected through SIP-trunk

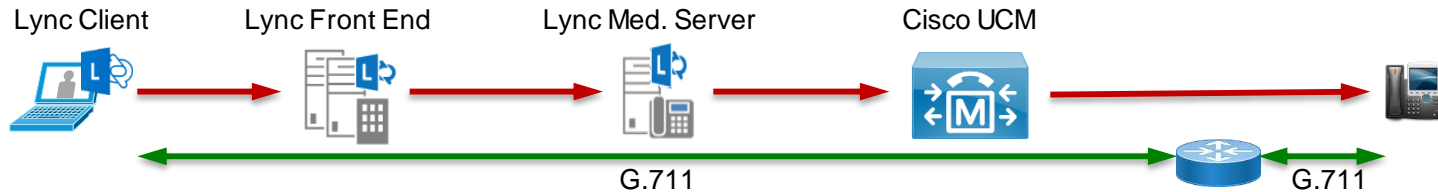
Scenarios shown do not require the usage of a Media Termination Point (MTP)

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Enterprise Voice Call Routing

SIP Trunk / Direct SIP Options 2/2

Lync 2010 & 2013 (with media bypass)



With the introduction of Media Bypass in Lync 2010 the Lync client can initiate direct G.711 media streams. Media paths is not hair pinned through the Lync Mediation Server, no transcoding. Signalling still has to flow via the Mediation Server.

Review Microsoft guidance regarding Media Bypass <http://technet.microsoft.com/en-us/library/gg412740.aspx>

Straight forward in a centralised (single site) topology without WAN links.

More complicated in a distributed topology with one or more branch - check the following:

Media Bypass shall only be utilised between WAN sites without bandwidth constrains

Media Bypass and Call Admission Control (CAC) are mutually exclusive

Media Bypass mandatorily requires all media to be represented by a single IP address – the reason why in the above example a Media Termination Point (MTP) has to be inserted.

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Enterprise Voice Call Routing

Lync Media Bypass and CAC



Media bypass and CAC both based on same site and region information

For media bypass and CAC to “work” media bypass has to be set to “Use Site and Region Information”

Media Bypass	CAC	Result
Use Site and Region Information	On/Off	Bypass decision based on bypass ID. CAC only for calls that are not bypassed b/c media bypass assumes “LAN like” connection to peer. CAC only applied if CAC is enabled AND bypass IDs do not match
Always Bypass	On	Invalid
Always Bypass	Off	All calls bypass (single bypass ID), no CAC applied
Off	On	Mediation server always employed; CAC applied

Enterprise Voice Call Routing

Cisco UCM SIP trunk characteristics for Direct SIP

Lync requires Early Offer inbound/outbound

Although UCM now can do early offer w/o relying on an MTP

SIP profile setting: Early Offer support for voice and video calls (insert MTP if needed)

Media resource still has to be allocated (single media address in Lync GW definition)

Trunk setting: "MTP required"

For every trunk a dedicated MRGL/MRG and single media resource required

On UCM SIP trunk configure IP addresses of possible mediation server peer addresses

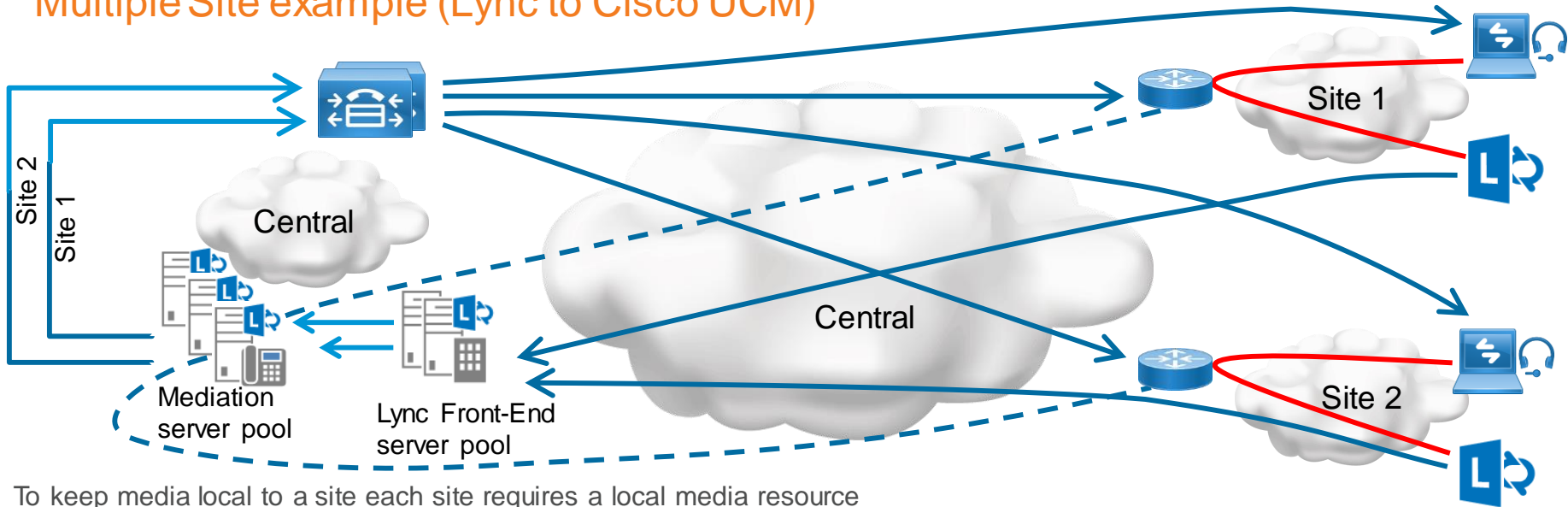
Multiple inbound SIP trunk with the same peer IP required different local signalling ports

Inbound trunk selection on UCM based on remote peer and local signalling port

Local signalling port defined in SIP trunk security profile

Enterprise Voice Call Routing

Multiple Site example (Lync to Cisco UCM)



To keep media local to a site each site requires a local media resource

Alternate media IP definition in Lync trunk configured matches IP address of single media resource in MRGL/MRG of the trunk on Cisco UCM side

Multiple sites require multiple trunks

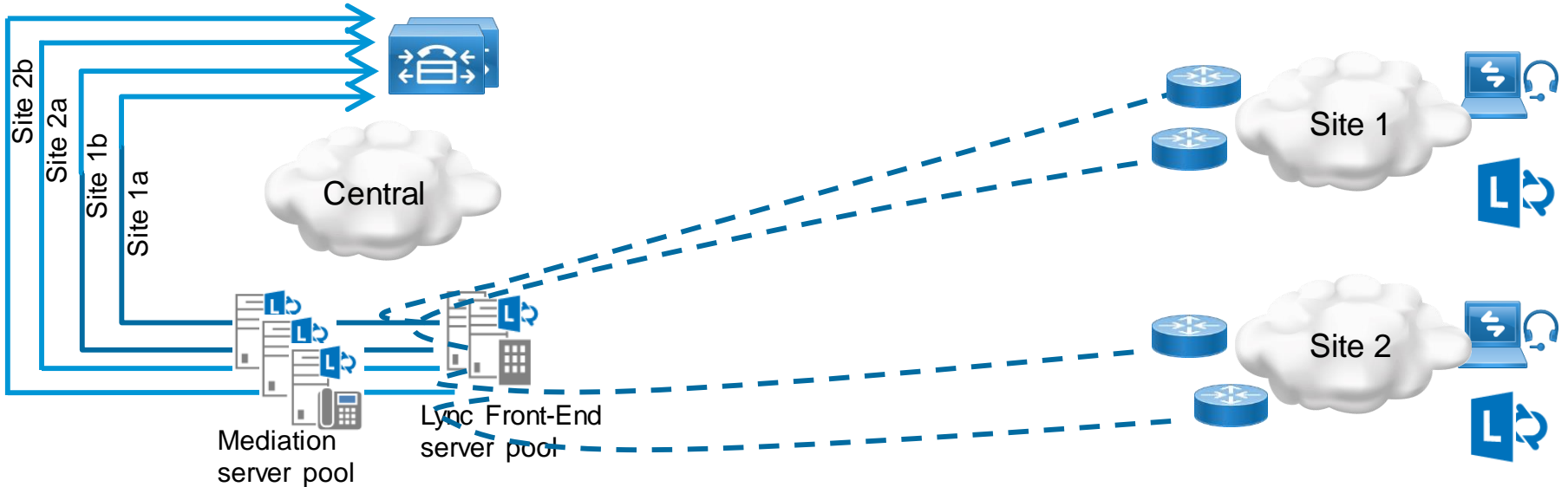
... and multiple MRGs, MRGLs and media resources

... and multiple SIP security profiles, because unique identification of each trunk on Cisco UCM based on the signalling port (UCM side trunk identification based on peer IP address and local signalling port)

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Enterprise Voice Call Routing

Multiple Site example (Lync to Cisco UCM) with redundancy



Two sites with Lync to Unified CM SIP trunk redundancy already require:

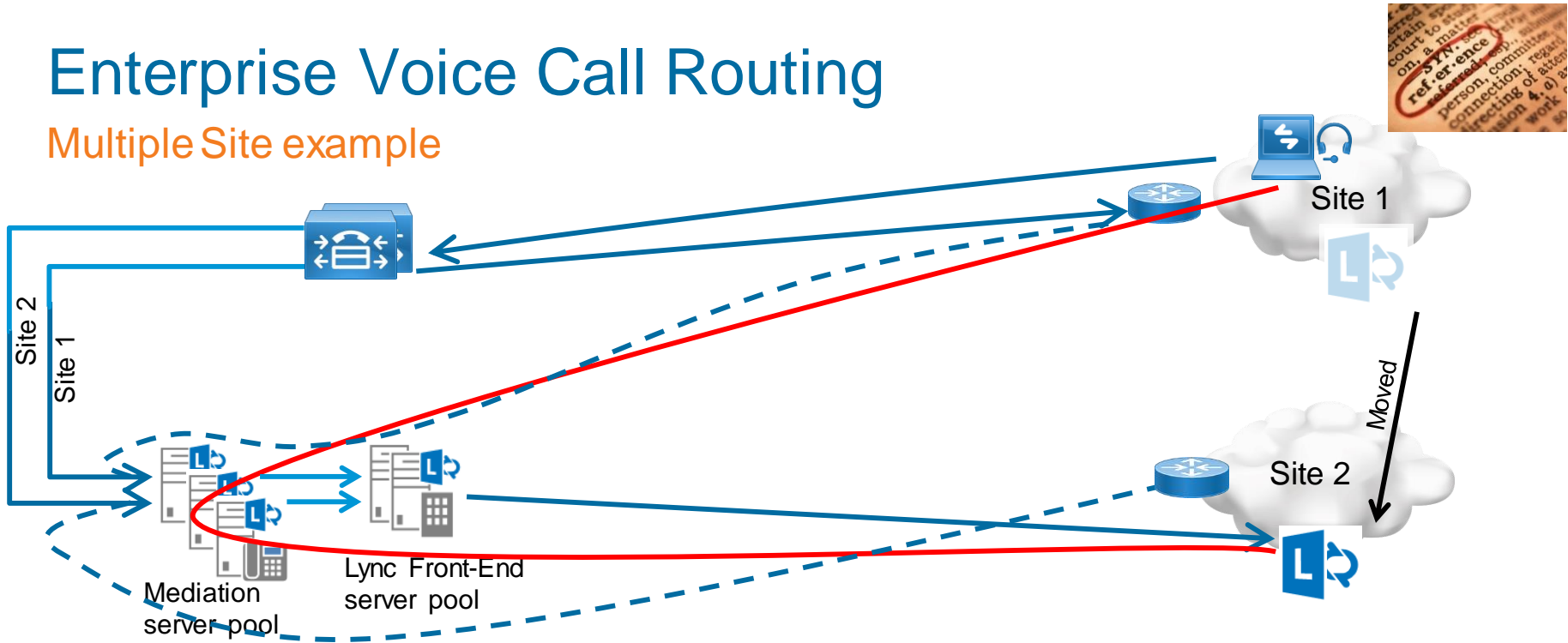
4 trunks, 4 MTPs/TRPs

4 MRGS, 4 MRGLs

2 SIP trunk security profiles

Enterprise Voice Call Routing

Multiple Site example



Unified selects trunk to Lync based on called destination (+E.164 prefix), but Lync client moved to other site

MTP (assumed) local to Lync client selected

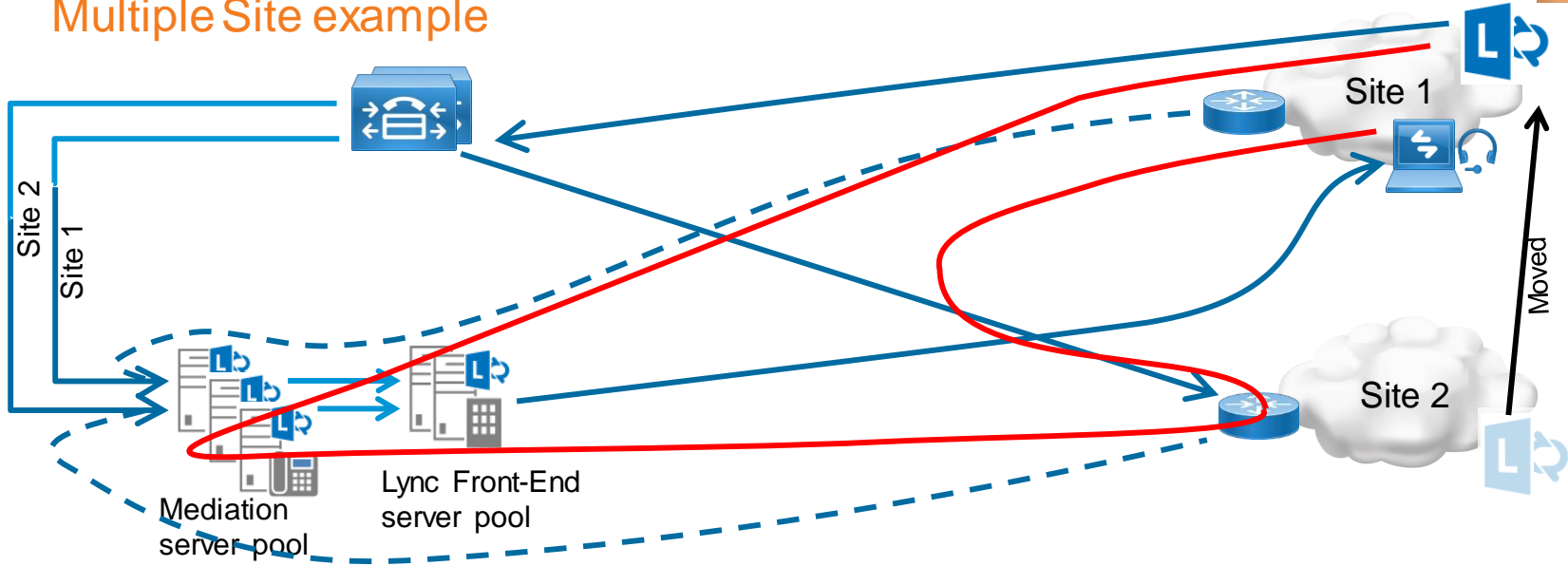
Alternate media IP definition in Lync trunk configured not in same site as Lync client -> no media bypass

Mediation server in media path

Media hairpins through central site

Enterprise Voice Call Routing

Multiple Site example



False assumption about Lync client location could lead to even worse media path:

- Unified CM selects trunk with MTP local to (assumed) location of Lync client: Site 2

- Lync rejects media bypass, because MTP not local to IP address of Lync client

- Mediation server in media path

- Media hairpins through remote **and** central site

Enterprise Voice Call Routing

Media hairpinning: Root Cause Analysis

MSFT Lync trunk architectural limitations

- MTP required to enable media bypass

- MTP needs to be “local” to Lync client

Only call control authoritative for endpoint is aware of client location

- Source call control aware of source client location

- Destination call control aware of destination client location

Problem: what if destination client (Lync) locations determines required MTP location, but source call control (Unified CM) is not aware of the location?

Fundamental limitation of Lync that can not be solved by Unified CM

... or any other call control

... unless “Always bypass” is configured which prohibits MSFT CAC (and still requires MTPs)

Enterprise Voice Call Routing

Dial Plan considerations

Dialed numbers of Lync normalised to +E.164 (client and server side normalisation)

Exception: “global” numbers (+E.164) are never normalised

lineURIs of enterprise voice enabled users are tel URIs (RFC 3966)

Reverse Number Lookup (RNL) against lineURIs of existing users

Only destinations not matching RNL are subject to be routed to trunks/GWs

Calling and called identities on SIP trunk in globalised (+E.164 format)

Minimises transformation requirements

When combined with globalised dial plan approach using +E.164 DN on UCM only calling/called transformations required are on the PSTN links

Enterprise Voice Call Routing

Call Forking w/dual call controls

Simultaneous ring Lync client and IP Phone sharing same number

... for all possible call flows

Any call to enterprise DID should always ring all devices

Enable Cisco Unified Mobility for Lync client users and/or

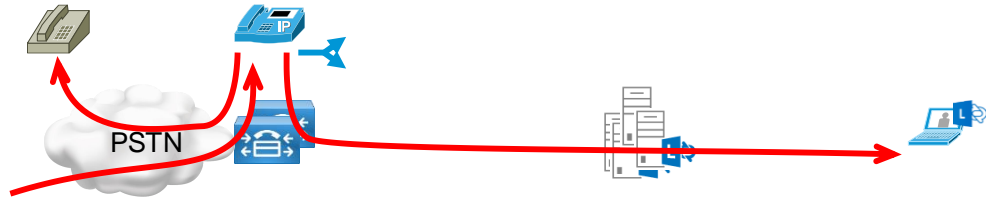
... enable Lync SimRing

Enterprise Voice Call Routing

Call Forking w/dual call controls – where to implement forking?

On Communications Manager

PSTN destination and Lync destination



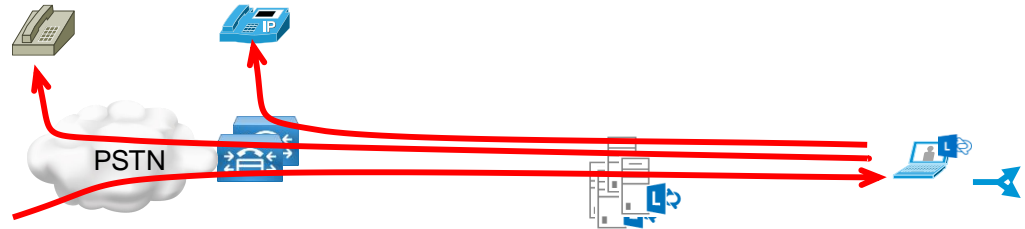
On Lync (SimRing)

PSTN destination and IP Phone destination

Inbound call from PSTN has to go to Lync

No call anchoring on UCM

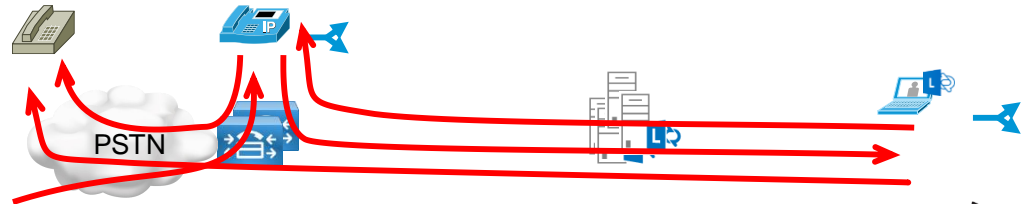
All inbound calls hairpinned/forked through Lync



Both Sides (UCM SNR & Lync SimRing)

Loops!

Multiple call legs to same destinations!



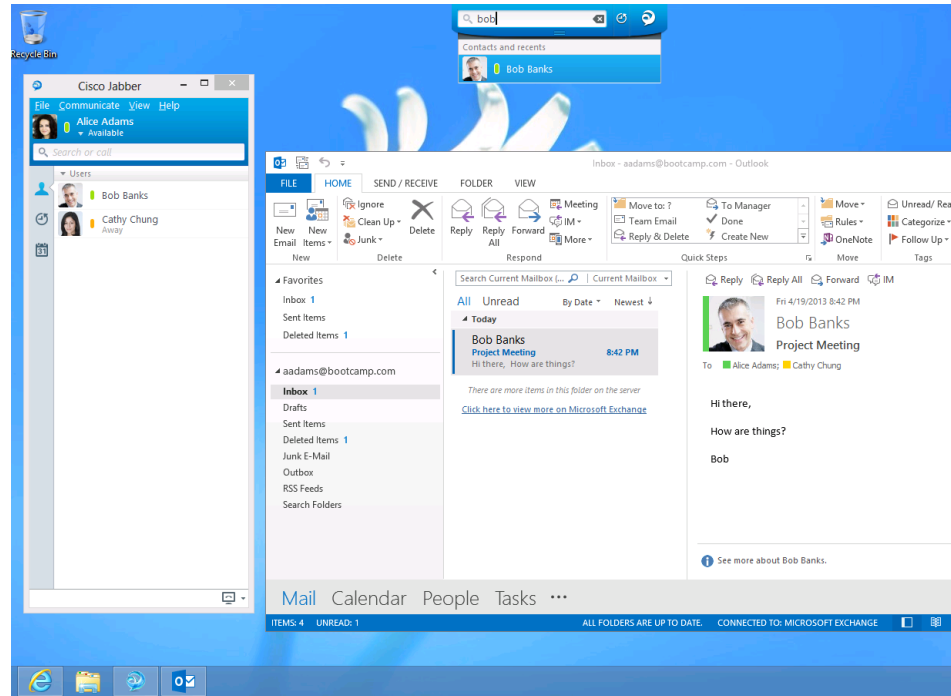
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Application Interoperability

Application Interoperability

Microsoft Office client and server side interoperability



Cisco Jabber Collaboration Solution

Fully integrated into Microsoft Office, on-premise or Office 365(*)

(*) Check Release Notes for supported Office 365 deployment models

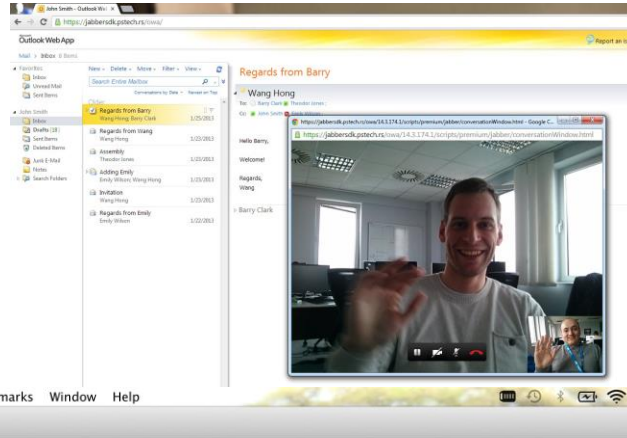
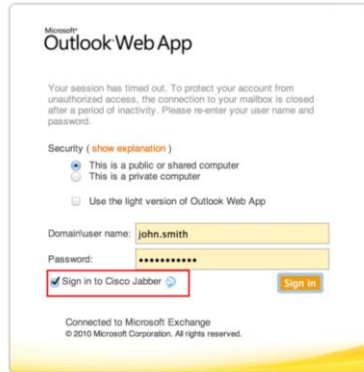
Application Interoperability

Functionality available at the application level

- Cisco Jabber can integrate with the Microsoft Office suite
 - Click-to-X (click-to-call, click-to-IM, click-to-conference)
 - Presence light up of Microsoft Contact card
 - Store Instant Messaging conversation history in Outlook/Exchange
- Microsoft Exchange integration (Exchange on-premise and Exchange online)
 - Calendar integration (client or server side)
 - Unified Messaging integration – Cisco Unity Connection
- Microsoft SharePoint integration (SharePoint on-premise and SharePoint online)
 - Click-to-X (click-to-call, click-to-IM, click-to-conference)
 - Presence light up of Microsoft Contact card

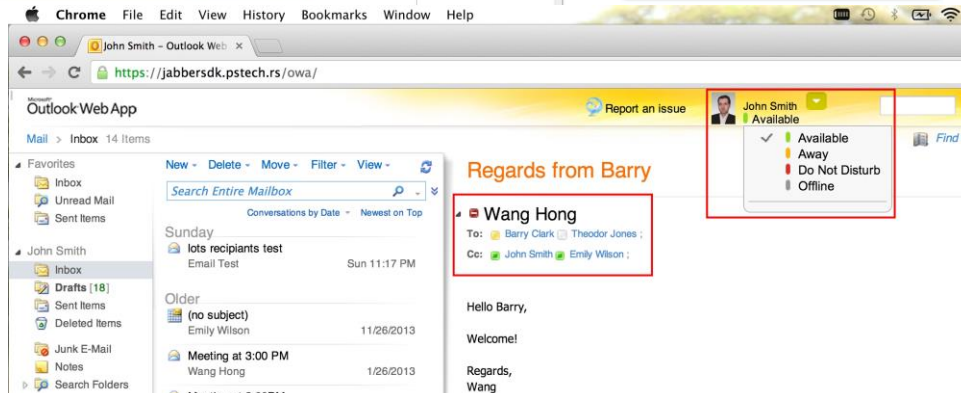
Application Interoperability

Additional integrations powered by Cisco Jabber...



Outlook Web Access (OWA) integration with Cisco Jabber Web SDK

<http://www.pstech.rs/business-solutions/connectors/cisco-jabber-microsoft-owa/>

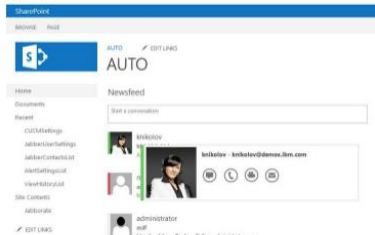


Application Interoperability

Additional integrations powered by Cisco Jabber...



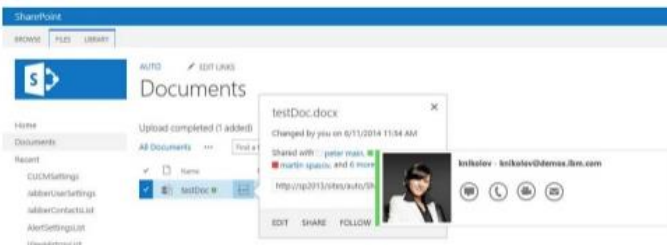
jabborate View Contacts



jabborate Start a video call



jabborate Contextual communication options



Jabborate integrations with Cisco Jabber Web SDK

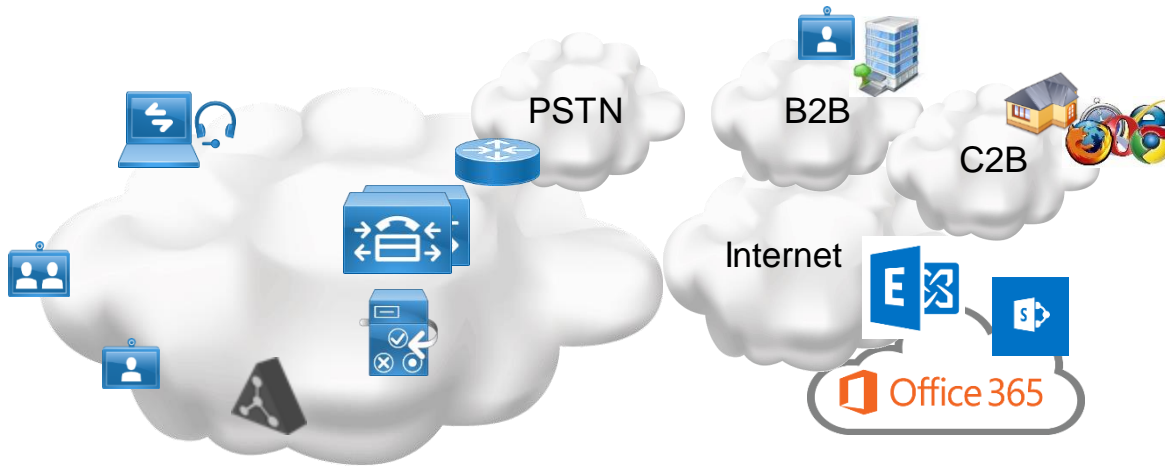
Web based user experience cross multiple platforms

- Microsoft SharePoint
- IBM Connections
- SAP

www.jabborate.com

Application Interoperability

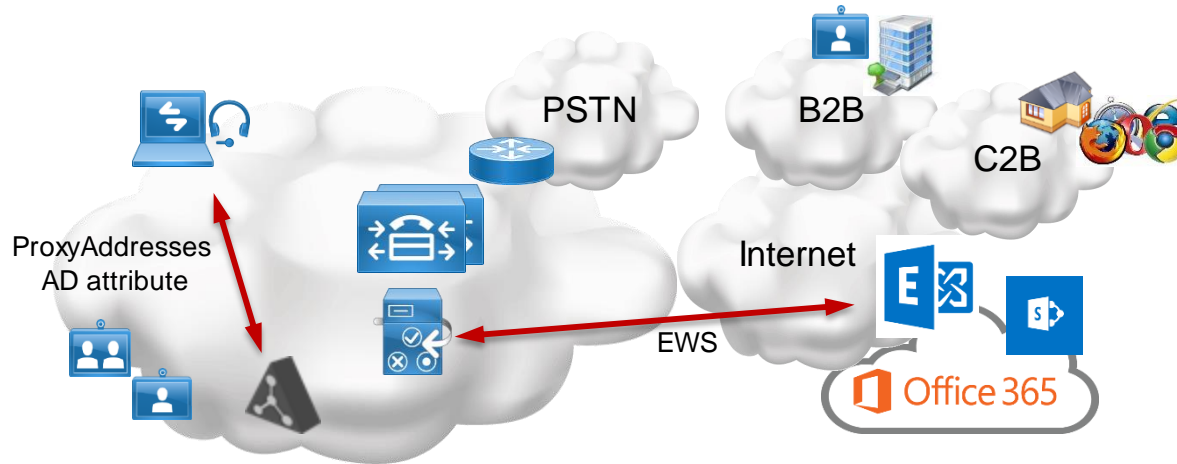
Organisations moving commodity workloads to the cloud



Collaboration services integrated with cloud based applications (i.e. Exchange, SharePoint)
...while maintaining today's required telephony functionality and PSTN access
...while enhancing communication services with standards based interoperable business to
business and consumer functionality

Application Interoperability

Organisations moving commodity workloads to the cloud



- Active Directory proxyAddresses attribute required for Office integration and light up
- Cisco Unity Connection messaging integration with Exchange Online via Exchange Web Services (EWS)

A nighttime photograph of a city street. In the foreground, there are long, curved light trails from cars, primarily in shades of yellow and orange. In the middle ground, a pedestrian bridge with blue lighting spans across the street. In the background, there are several tall buildings with lit windows and some flags on poles. The overall scene is illuminated by city lights.

Interoperability Using The Expressway/VCS Lync Gateway

VCS X8.x Product Line Options

X8.x



VCS



“VCS Control”
No Change

“VCS Expressway”
No Change



- Specialised video applications for video-only customer and advanced video requirements
- VCS is the call control
- No changes to existing licensing model

Expressway



“Expressway C”
Or Core

“Expressway E”
Or Edge



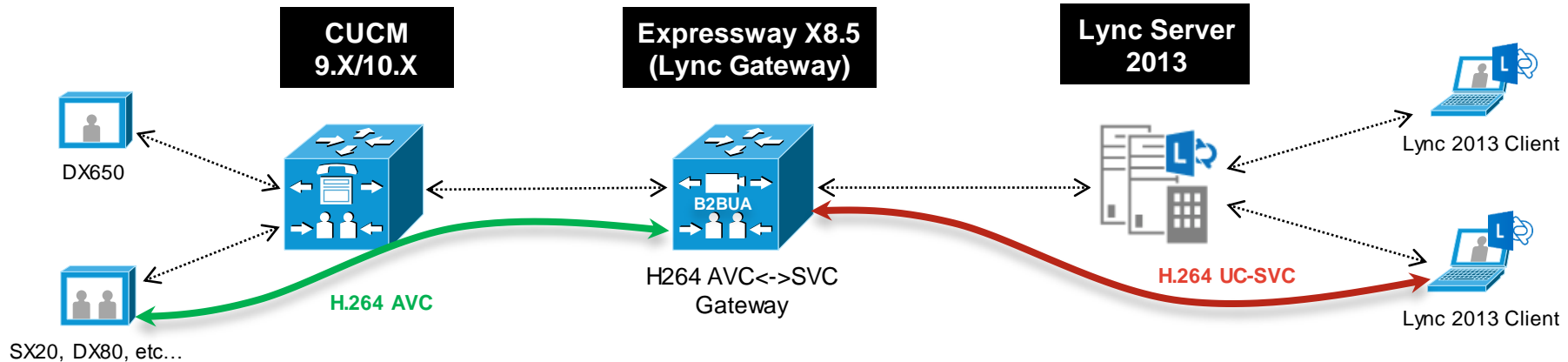
- Solution designed for and sold exclusively with CUCM 9.1 and above
- No additional cost for server software licenses
- New simplified licensing for call sessions (RMS)

Cisco *live!*

VCS and Cisco Expressway Feature Comparison

Feature Comparison	Cisco Expressway Series	Cisco VCS Family
Mobile and Remote Access	Y	Y
Business to Business Video (B2B)	Y	Y
Business to Consumer with Jabber Guest	Y	Y
Video Interworking (H.323<>SIP, MSFT H.264 UC-SVC <> H.264 AVC)	Y	Y
Video Device Registration & Provisioning (Cisco and Standards-based 3rd Party Video endpoints)	N	Y
WebEx Enabled TelePresence	Y	Y
FindMe capability	N	Y

Video Interoperability Through Expressway X8.5



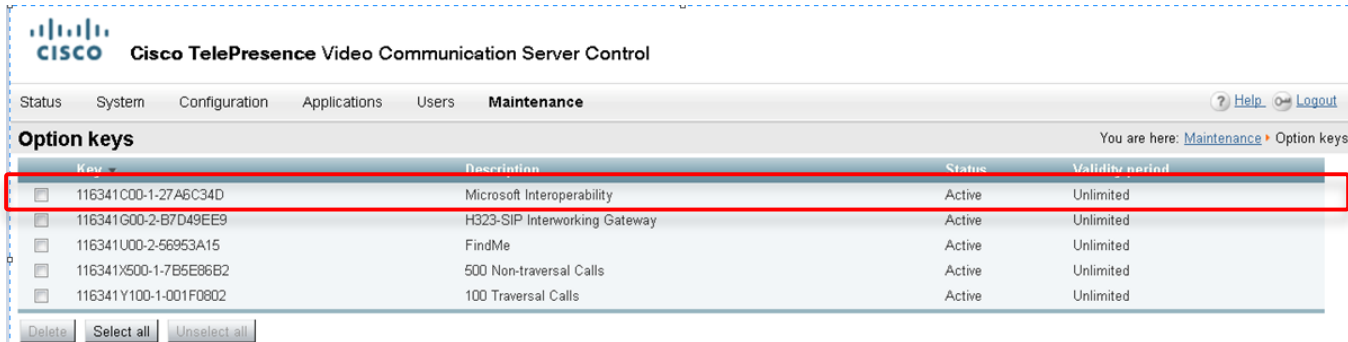
Main Features:

- Interworked calls between standard **H.264 AVC** and Lync 2013 **H.264 UC-SVC**, up to 720p@30fps
- Both CUCM and VCS supported as Call Control
- Cisco and 3rd party endpoint supported (VCS only)
- End to End Encryption for media and signalling
- Lync Client Remote Access through Edge supported
- Lync 2010 supported with the same capabilities as before

The “B2BUA” – What is that?

Back to Back User Agent (B2BUA) :

- Process running only on the “Lync Gateway” Expressway
- Translate between Standard based and Lync specific SIP signalling
- Media (RTP) **always passes through Expressway**, also with Lync 2013
- Legacy configuration without B2BUA has been **removed in X8.1**
- The **Microsoft Interoperability option key** is required for SVC<->AVC, Encryption and Lync Edge support



The screenshot shows the Cisco TelePresence Video Communication Server Control interface. The 'Maintenance' tab is selected, and the 'Option keys' section is active. A table lists several option keys, with the first row highlighted by a red box. The table has columns for Key, Description, Status, and Validity period.

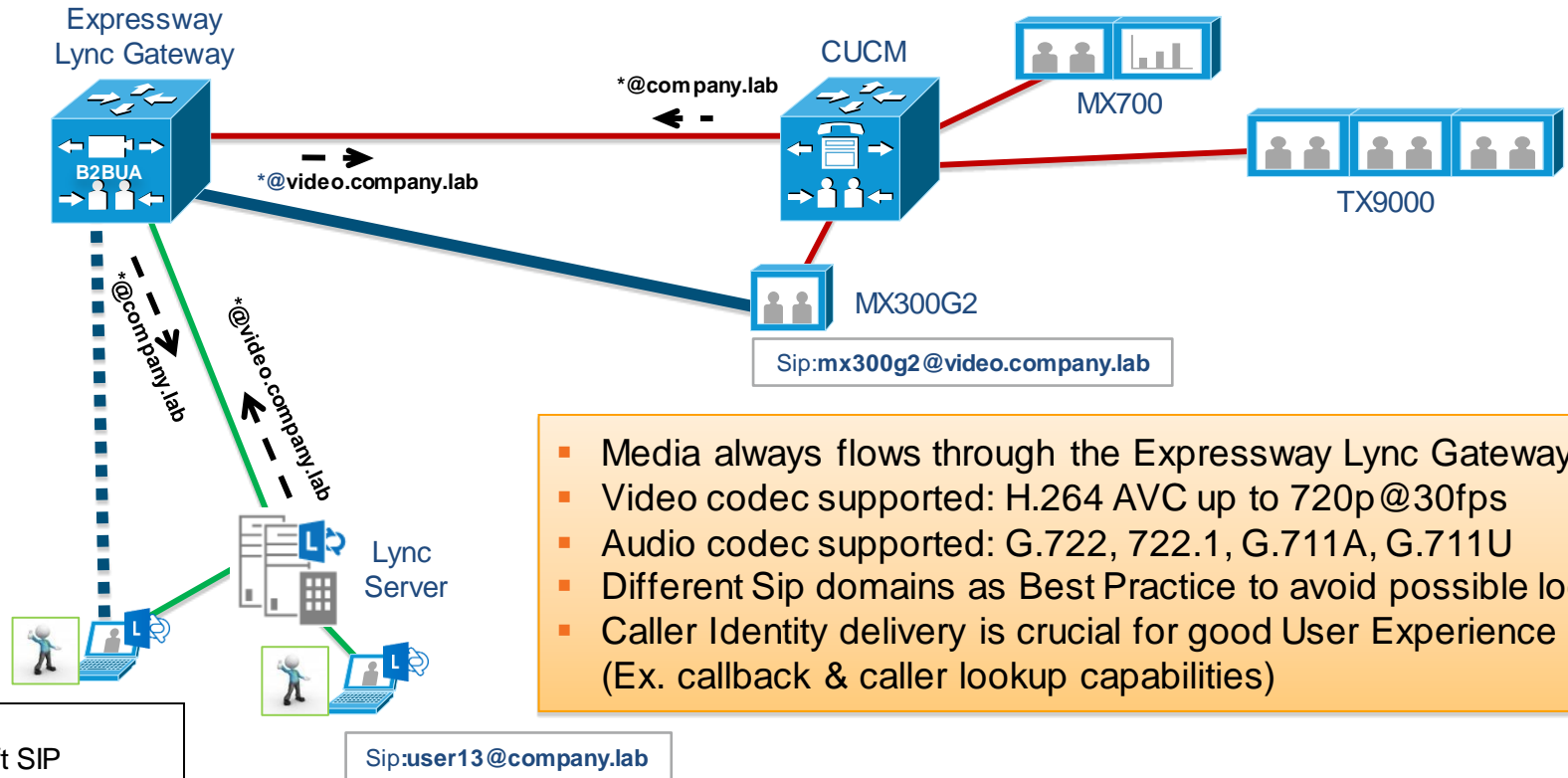
Key	Description	Status	Validity period
<input type="checkbox"/> 116341C00-1-27A6C34D	Microsoft Interoperability	Active	Unlimited
<input type="checkbox"/> 116341G00-2-B7D49EE9	H323-SIP Interworking Gateway	Active	Unlimited
<input type="checkbox"/> 116341U00-2-56953A15	FindMe	Active	Unlimited
<input type="checkbox"/> 116341X500-1-7B5E86B2	500 Non-traversal Calls	Active	Unlimited
<input type="checkbox"/> 116341Y100-1-001F0802	100 Traversal Calls	Active	Unlimited

Buttons: Delete, Select all, Unselect all

A nighttime photograph of a city street. In the background, there are modern buildings with lit windows and a pedestrian bridge with blue lighting. The middle ground shows a road with traffic lights and light trails from cars. The foreground is dominated by long, curved light trails in yellow, orange, and red, suggesting a long-exposure shot of light trails from a moving light source.

Cisco – Lync Video Point To Point Use Case

Shared Video Endpoint on CUCM – The Solution



- Media always flows through the Expressway Lync Gateway
- Video codec supported: H.264 AVC up to 720p@30fps
- Audio codec supported: G.722, 722.1, G.711A, G.711U
- Different Sip domains as Best Practice to avoid possible loops
- Caller Identity delivery is crucial for good User Experience (Ex. callback & caller lookup capabilities)

— SIP
— Microsoft SIP
— Media H264 AVC
- - Media H264 UC-SVC



Assigning Alpha URIs to a CUCM Endpoint (Manually)

- All endpoints still register with a DN (numeric address) as unique identity
- Up to 5 alpha URIs can be associated with any DN
- One alpha URI is marked as primary and is sent together with DN as caller Identity
- Some legacy endpoints might not support URI dialing but they can be called and can provide the Alpha URI as caller identity
- For Additional info on Dial Plan:
 - **BRKUCC-2008** (Enterprise Dial Plan Fundamentals)
 - **BRKUCC-3000** (Advanced Dial Plan Design for Unified Communications Networks)



Directory Number Information

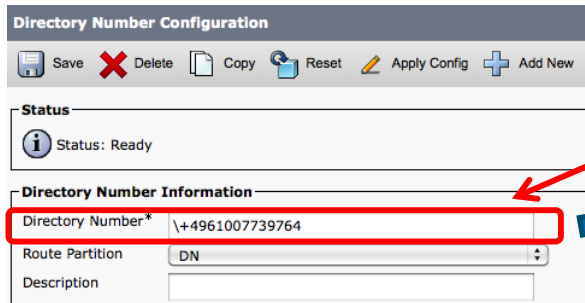
Directory Number*	\+390396291034
Route Partition	< None >
Description	
Alerting Name	Fabio Chiesa
ASCII Alerting Name	Fabio Chiesa
<input checked="" type="checkbox"/> Active	

Directory URIs

Primary	URI
<input checked="" type="radio"/>	fchiesa@video.company.lab
<input type="radio"/>	
<input type="radio"/>	
<input type="radio"/>	
<input type="radio"/>	

Alpha URI Automatic Provisioning on CUCM

- “Directory URI” field can be defined on end-user page
- “Directory URI” field can also be synced from AD/LDAP directory (see slides in the Appendix for more info)
- If the Primary extension of the user is set, the Directory URI value is automatically assigned to the DN as **Primary URI**
- Partition “Directory URI”; can not be changed/deleted (see slides in the Appendix for more info)



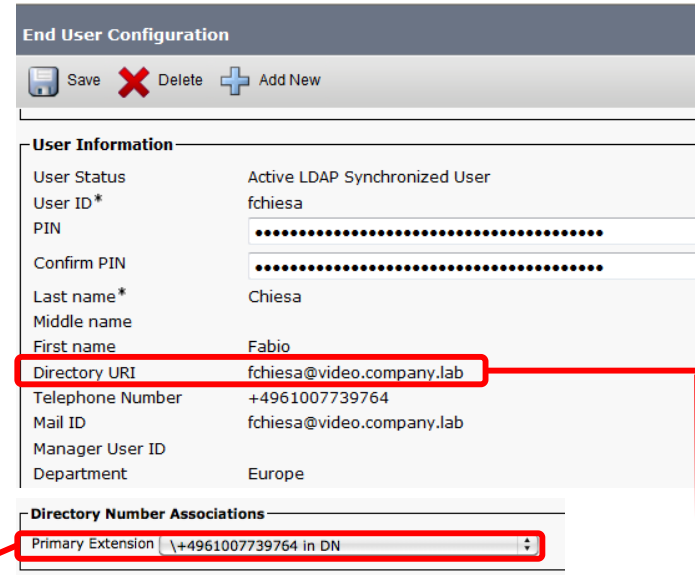
Directory Number Configuration

Save Delete Copy Reset Apply Config Add New

Status: Ready

Directory Number Information

Directory Number*	\+4961007739764
Route Partition	DN
Description	



End User Configuration

Save Delete Add New

User Information

User Status	Active LDAP Synchronized User
User ID*	fchiesa
PIN
Confirm PIN
Last name*	Chiesa
Middle name	
First name	Fabio
Directory URI	fchiesa@video.company.lab
Telephone Number	+4961007739764
Mail ID	fchiesa@video.company.lab
Manager User ID	
Department	Europe

Directory Number Associations

Primary Extension	\+4961007739764 in DN
-------------------	-----------------------



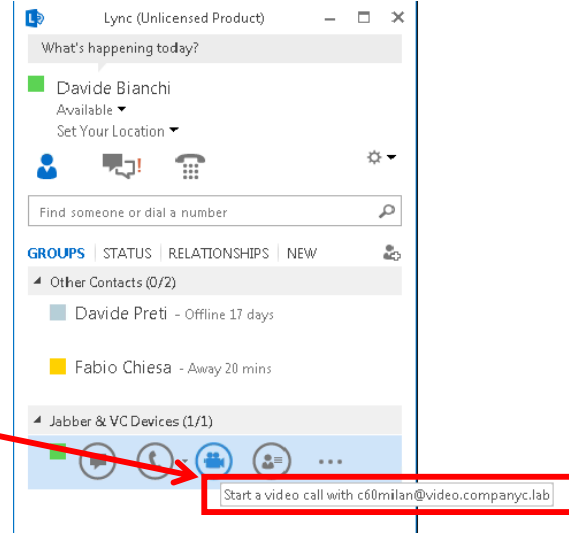
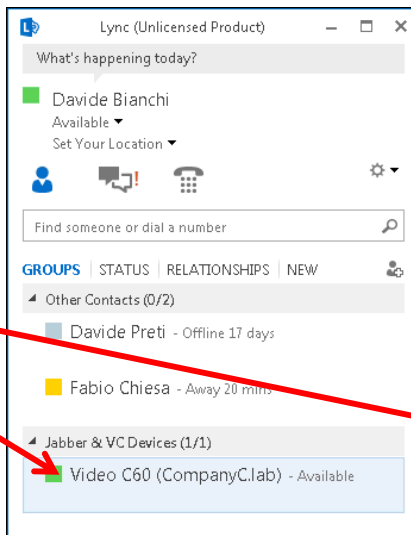
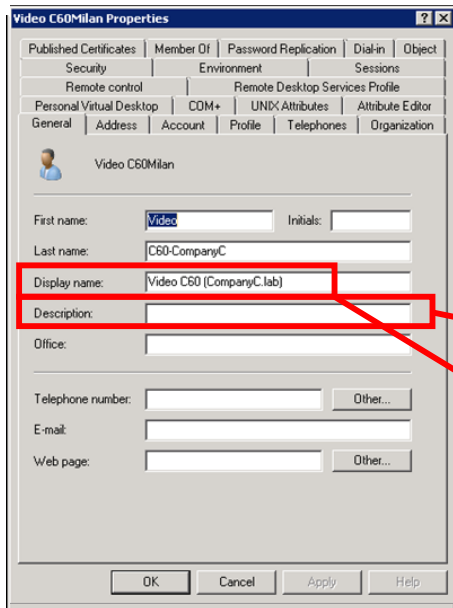
Directory URIs

Primary	URI	Partition
<input checked="" type="checkbox"/>	fchiesa@video.company.lab	Directory URI

< None >

Calling Video Devices from the Lync Client UI

- For each “shared” Video Room a contact can be created in AD to permit Lync users to search for and call this resource
- A specific AD attribute must be populated with the Video Device’s Sip URI

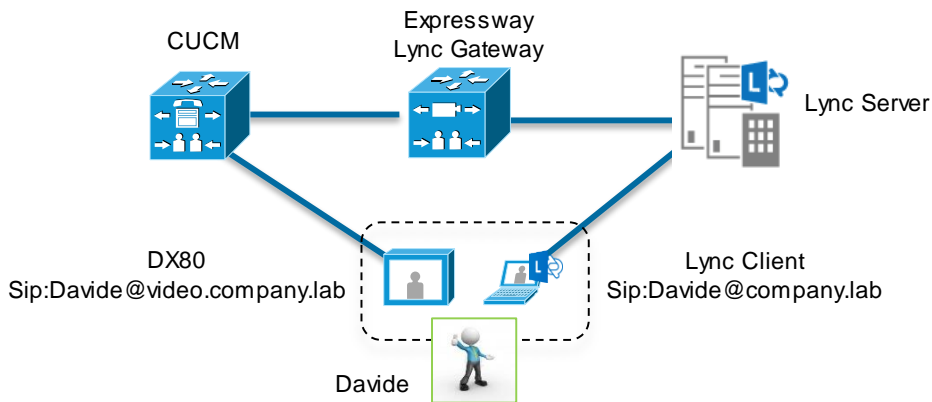


Calling Lync Users from the CUCM Devices

- The “Directory URI” field is used by new phones and video devices registered to CUCM
- it is possible to call a Lync User after searching him/her on the CUCM Directory

The screenshot displays the Lync 'Call Control' window. At the top, there are controls for the microphone (labeled 'Microphone: On') and a volume slider. Below this, two video source windows are visible: 'Main Source' showing a live video feed of a modern office interior, and 'Presentation Source' which is currently blacked out. A 'Start Presentation' button is located at the bottom right of the Presentation Source window. In the bottom left corner, the 'Contacts' list is open, showing a search bar with 'davide b' entered. Below the search bar are tabs for 'Favorites', 'Directory', and 'History'. The 'Directory' tab is selected, and a search result for 'Davide Bianchi' is highlighted with a red box. A red circle with the number '1' points to the search bar, a red circle with the number '2' points to the search result, and a red circle with the number '3' points to the 'Call' button in the contact's detail pane.

Personal Video Endpoint on CUCM – Best Practice

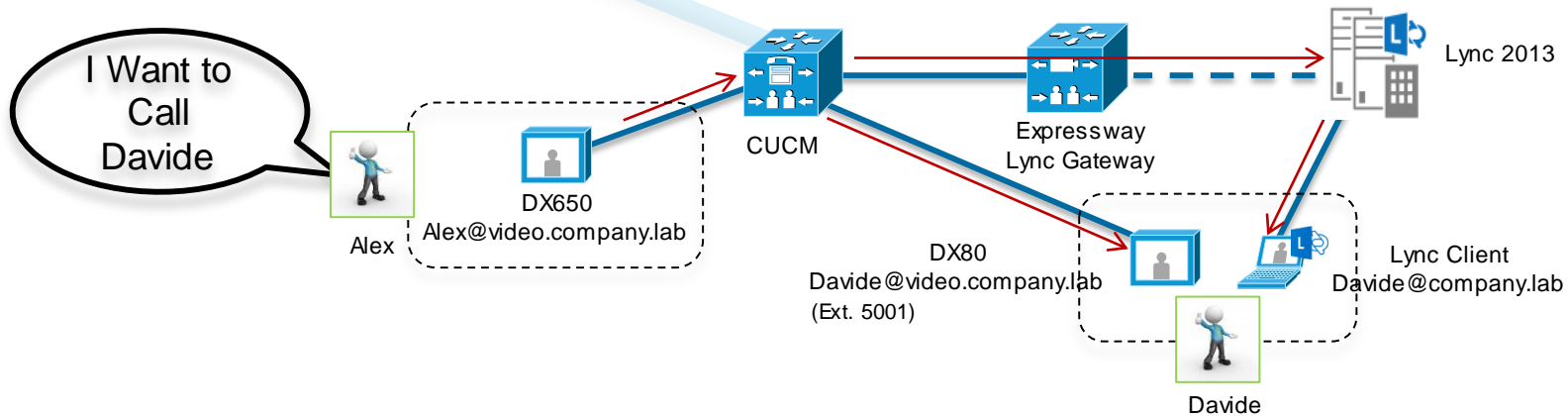


“Keep It simple”

- Solution based on the **Single Number Reach (SNR)** capability available with CUCM
- **Call Forking on CUCM side only** - Any Call to the CUCM Identity Alias (or Extension Number) will ring also the Lync Client
- Advanced Feature available for calls extended via SNR:
 - Lync’s “in a call” status tracked by CUCM as “Busy” for the user’s line
 - Possibility to move the call back to the CUCM’s device after being answered on Lync
- Current caveats:
 - CUCM Video Endpoint status **is not reflected** into Lync User’s Presence
 - Lync to Lync P2P calls **will not ring** user’s CUCM devices

Personal Video Endpoint on CUCM – Using SNR with Lync

SNR Identity/Line	Remote Destination
Davide@video.company.lab (Ext. 5001)	Davide@company.lab (-> Lync ClientURI)

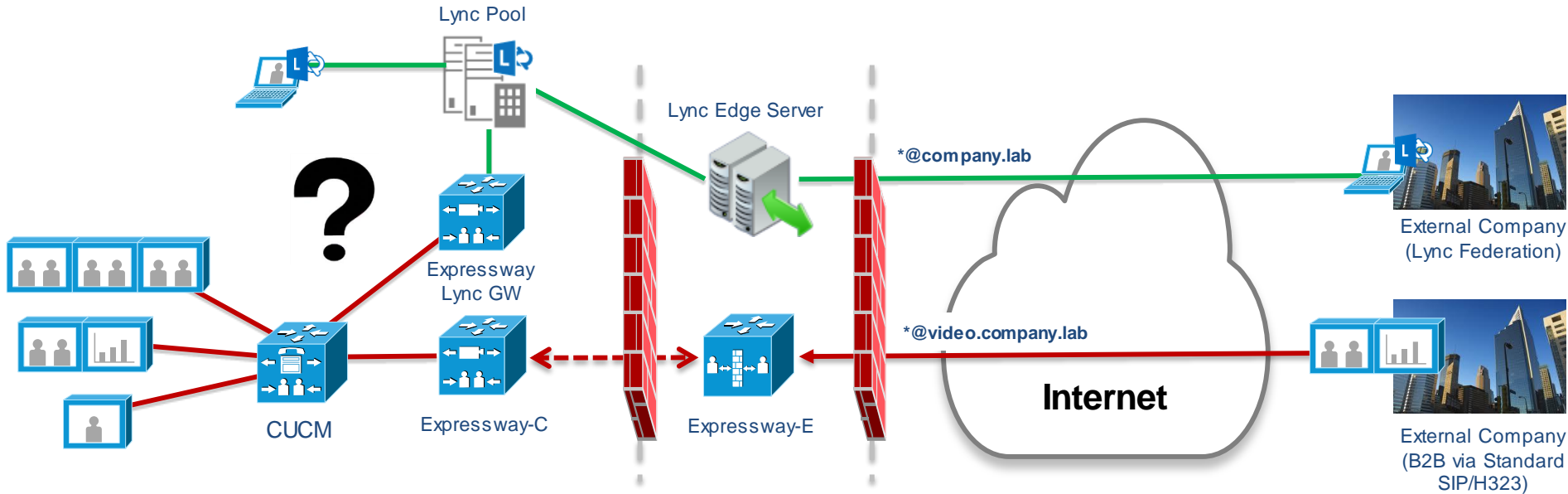


1. Alex calls Davide on his CUCM identity alias ([Davide@video.company.lab](mailto: Davide@video.company.lab)) or Ext. Number (5001)
2. The call is routed first to Davide's CUCM device
3. The call is forked from CUCM side also towards Lync using SNR definition
4. Davide's DX80 and Lync client ring at the same time (or with a delay)
5. Once the call is answered on Lync the DX80 will stop ringing



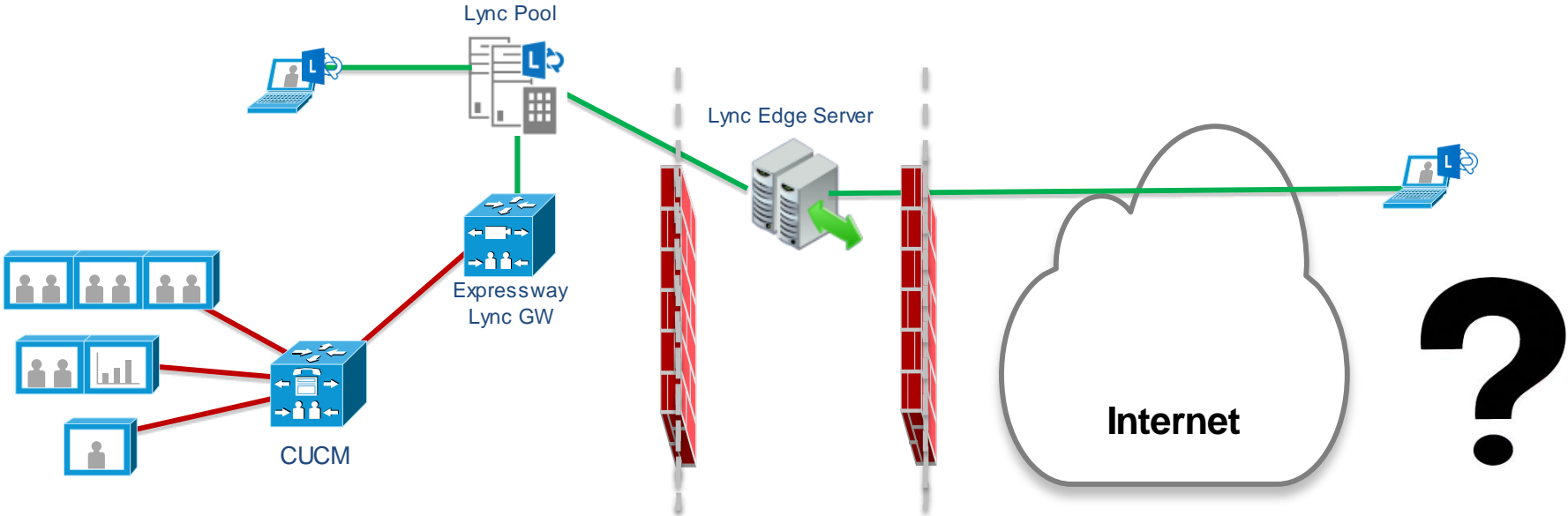
Extended Architecture

Extended Architecture - CUCM with Expressway for B2B

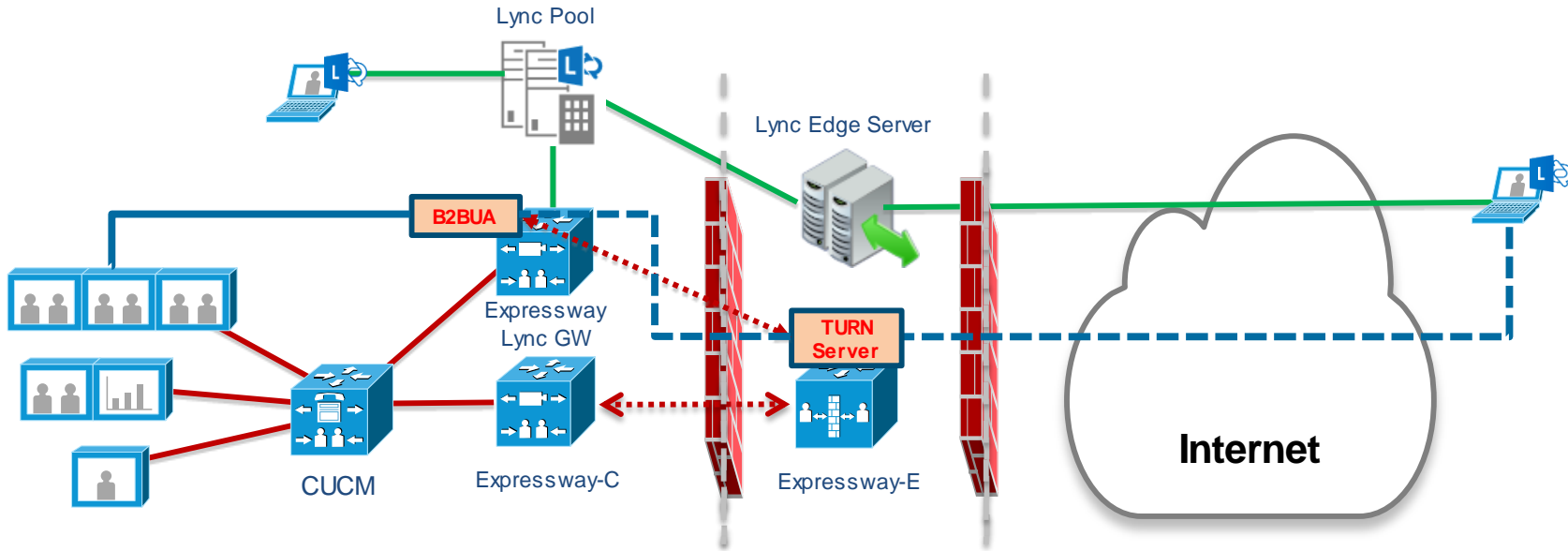


- Best Practice is to trunk the Expressway Lync Gateway directly with the CUCM
- The same Sip Domain **could** be used on both systems because the SRV records are different:
 - `_sip._tls.<domain>` and `_sipfederationtls._tcp.<domain>` for Lync
 - `_sips._tcp.<domain>`, `_sip._tcp.<domain>` and `_sip._udp.<domain>` for Cisco Solution

Extended Architecture – Lync Remote Access Support

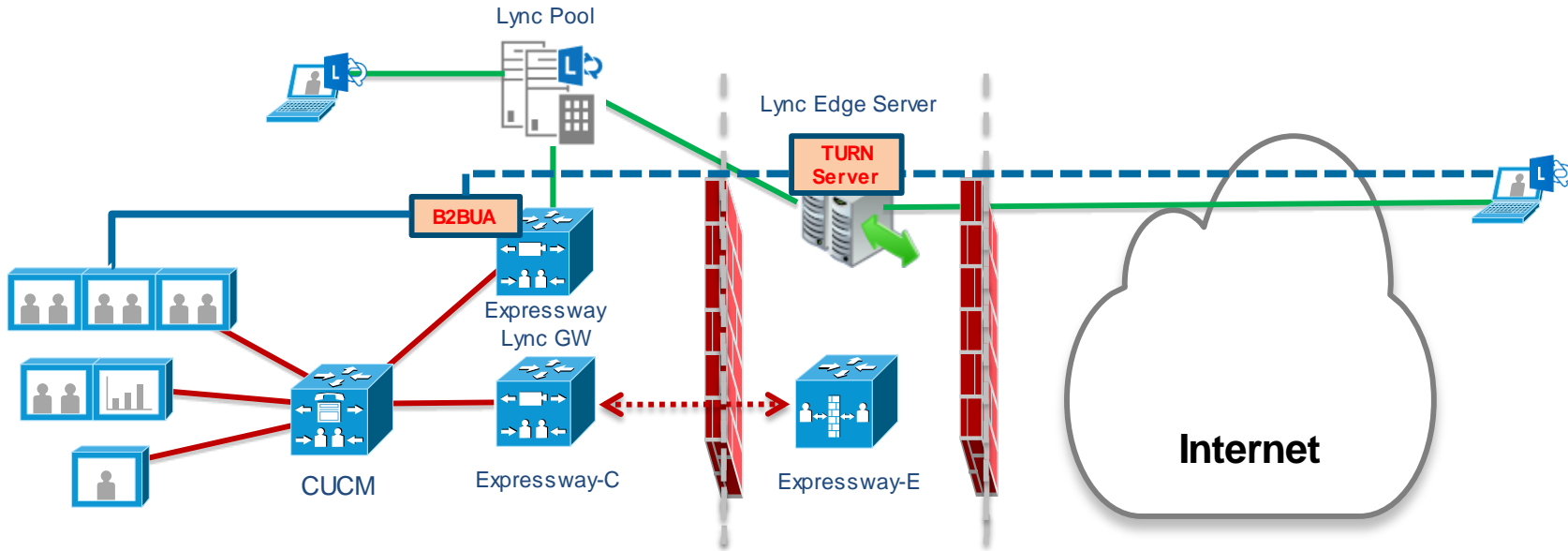


Lync Remote Access Support - Media Flow Negotiation (1)



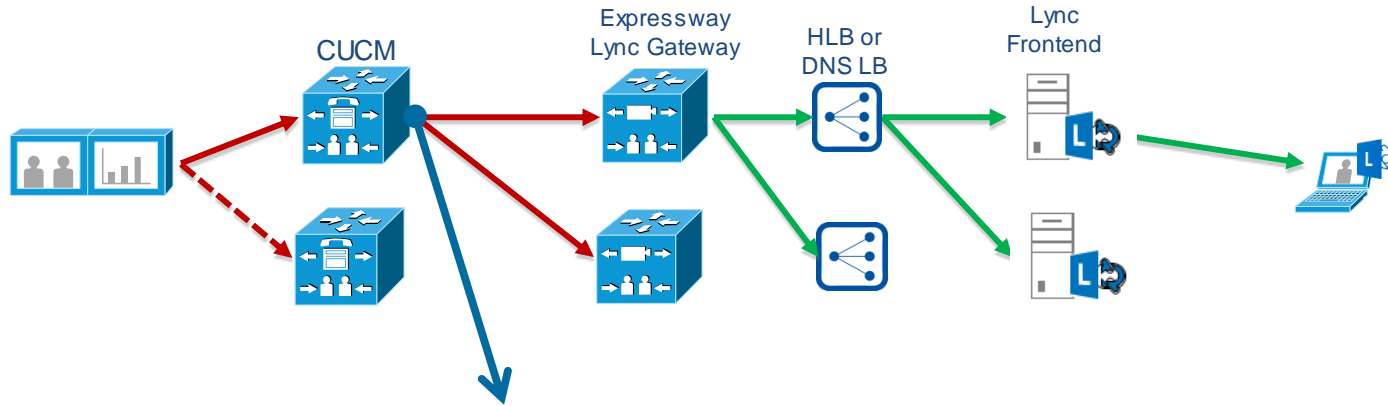
- B2BUA process interworks between Microsoft ICE and Standard ICE
- TURN Service on Expressway-E provides support for NAT scenario on client side
- Two possible media flows could happen depending on ICE negotiation
- The Microsoft Interoperability option key is required for Edge support

Lync Remote Access Support - Media Flow Negotiation (2)



- The TURN service available on Lync Edge Server could also be used depending on ICE negotiation

Extended Architecture – Redundancy and Load Balancing



- On the CUCM to Expressway trunk definition specify **multiple** entries as Destination Address
- The CUCM will statistically **load balance** in automatic the outgoing traffic between the two Expressway nodes

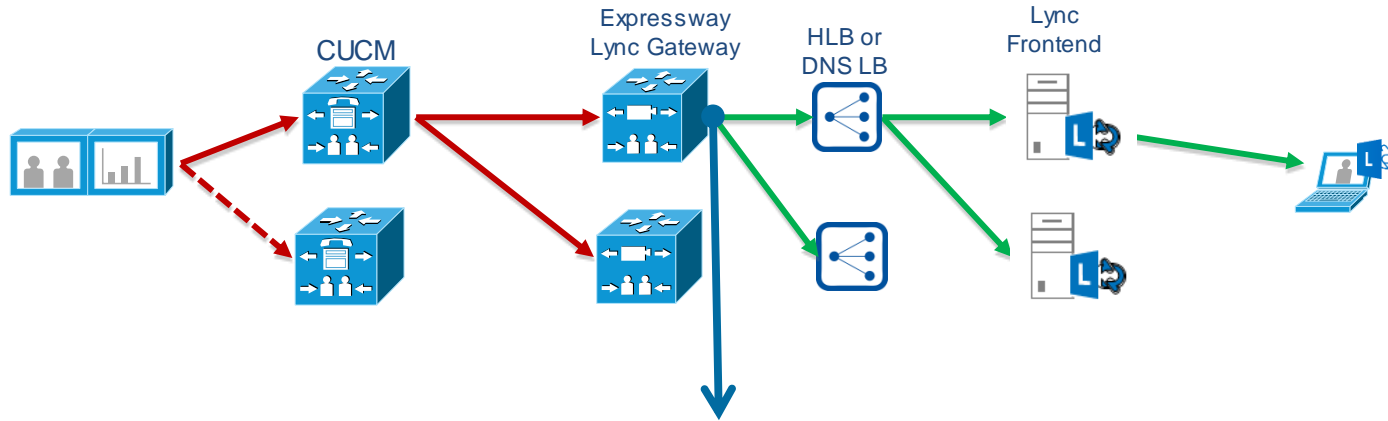
SIP Information

Destination

Destination Address is an SRV

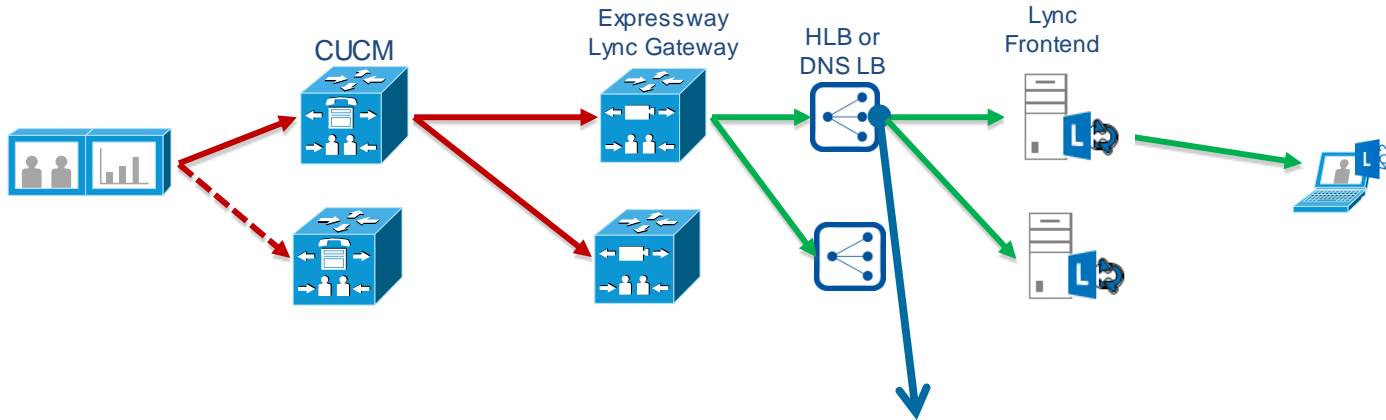
	Destination Address	Destination Address IPv6	Destination Port		
1*	lync-gw-1.company.lab		5061	<input type="button" value="+"/>	<input type="button" value="-"/>
2	lync-gw-2.company.lab		5061	<input type="button" value="+"/>	<input type="button" value="-"/>

Extended Architecture – Redundancy and Load Balancing



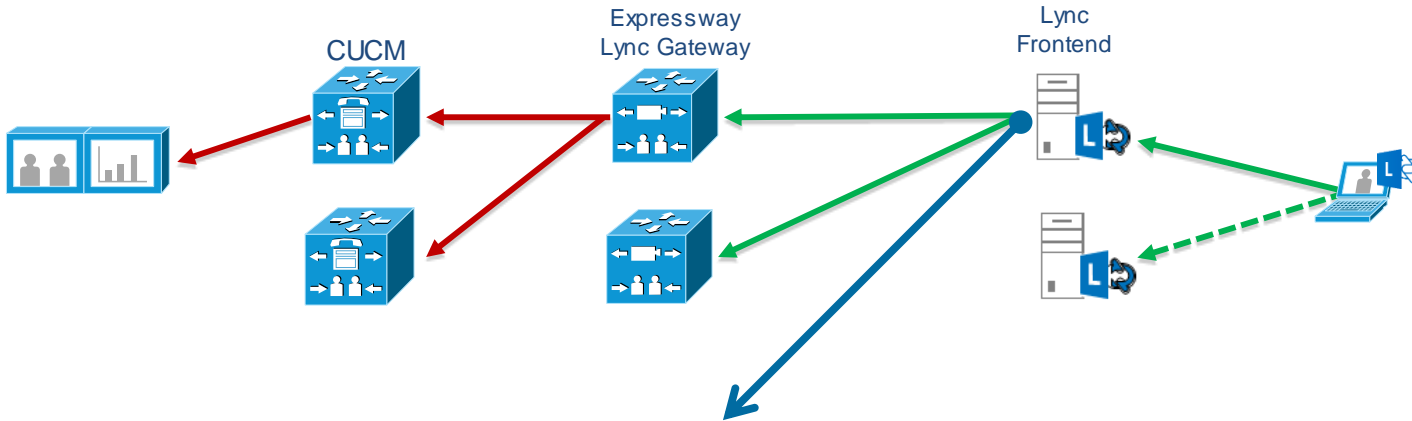
- On the Expressway to Lync trunk definition always specify the Lync Pool's FQDN
- Two possible scenarios could be implemented to resolve Lync's Pool FQDN:
 - **HLB** – Redundancy/Balancing based on HLB capabilities (VIP address management)
 - **DNS LB** – Each Expressway box will use the first DNS Server defined in the configuration, unless it fails. Load Balancing of the DNS servers is not implemented.

Extended Architecture – Redundancy and Load Balancing



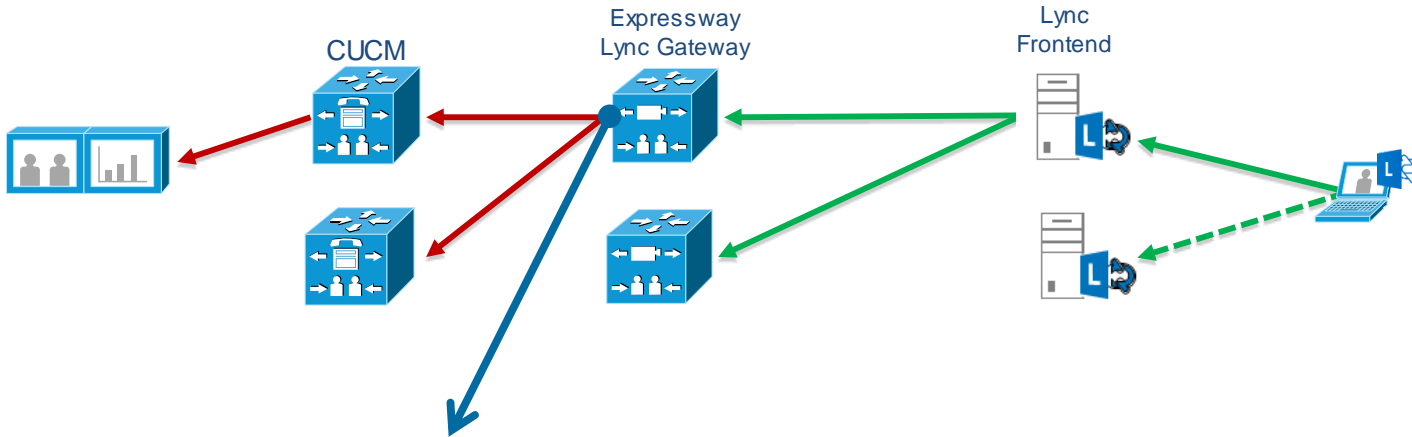
- On the Expressway to Lync trunk definition always specify the Lync Pool's FQDN
- Two possible balancing scenario could be achieved for the Lync Servers:
 - **HLB** - load balancing based on algorithm configured on the HLB itself
 - **DNS LB** – Each Expressway box will use the first DNS entry received in the answer unless It fails or the DNS cache expires → Load Balancing is achievable, also if less accurate than with HLB.

Extended Architecture – Redundancy and Load Balancing



- The Lync to Expressway trunk definition permit only to specify **one FQDN** as next hop
- Suggested approach is to use the Expressway's **cluster FQDN** and use DNS LB
- The Lync Server selects **one** IP address to use, based on its own logic, and use it unless It fails or the DNS cache expires
- Load Balancing is achievable, also if accuracy depends on the number of servers in the pool and DNS timer.

Extended Architecture – Redundancy and Load Balancing



- Multiple options available but the Best Practice is to have a single neighbor zone in Expressway with the **CUCM nodes listed as peer addresses**
- Expressway will use an internal algorithm to **Load Balance** between the different nodes



Multipoint Use Case

Multiparty Call Use Case (Cisco CMR)

CMR Premises



TelePresence infrastructure @
Customer Data centre

CMR Hybrid



TelePresence on Premises plus
Cisco WebEx

CMR Cloud



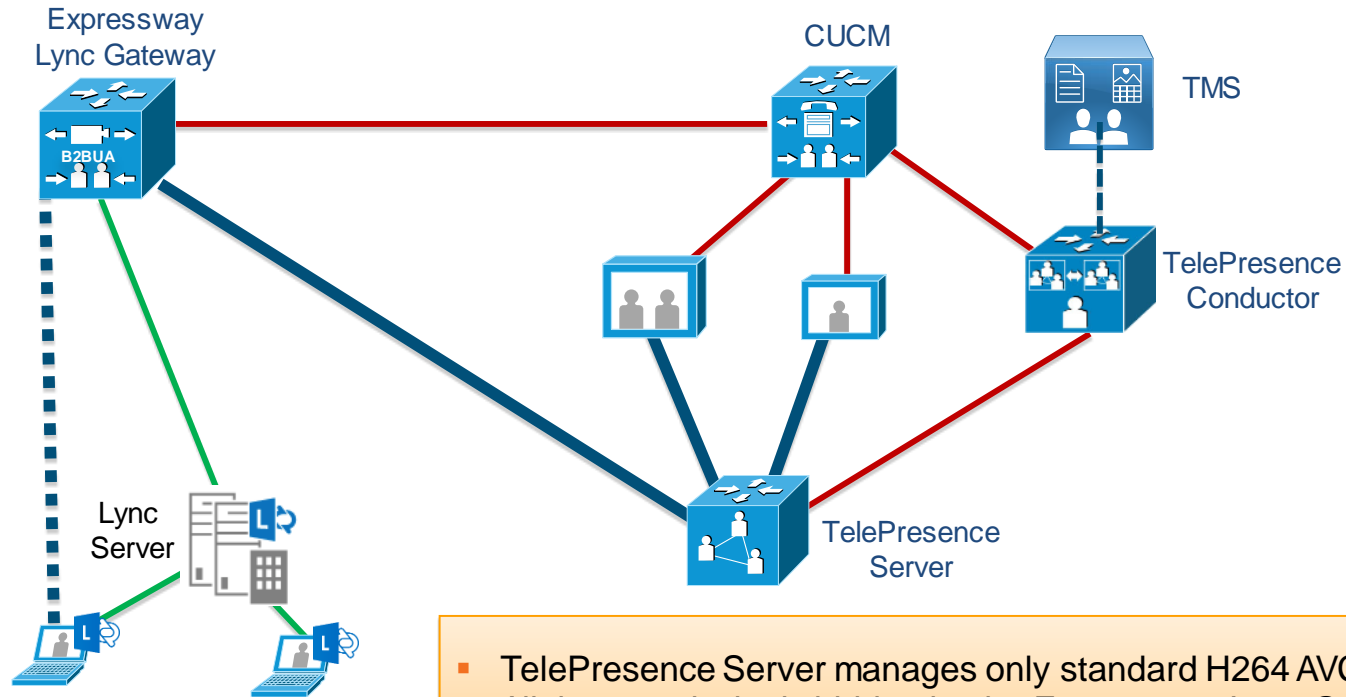
Hosted by Cisco WebEx

◀ BROWSER |



| BOARDROOM ▶

Lync and CMR Premise/Hybrid Interoperability - Architecture



- TelePresence Server manages only standard H264 AVC stream
- All the complexity is hidden by the Expressway Lync Gateway
- Multiple Layout available based on TPS firmware release

Lync and CMR Interoperability – End User Experience

- Lync users can join a Cisco TPS conference by just clicking on the hyperlink in the meeting invite (the protocol handler «sip:» is included in the associated URL)
- Users can schedule a meeting by:
 - Using the TMS Smart Scheduler web GUI
 - Using the Webex Productivity Tools Outlook plugin (only for CMR Hybrid)
- A user without the email from TMS can just copy/type the meeting URI in its Lync client to join the meeting
- For more info on CMR Premise -> BRKEVT-2803 Designing and deploying multipoint conferencing for TelePresence video
- For more info on CMR Hybrid -> BRKCOL-2612 Understanding WebEx Collaboration Meeting Room (CMR) Hybrid and Cloud

Scheduled Conference Using TMS Smart Scheduler (CMR Premise and CMR Hybrid)

Book Meeting

Meeting Details

Title: Lync Interop

Start: 18.12.2013 00:06

End: 18.12.2013 00:36

Telepresence Rooms

WebEx: Off

Call-in Participants: 5/10

Recurrence: Off

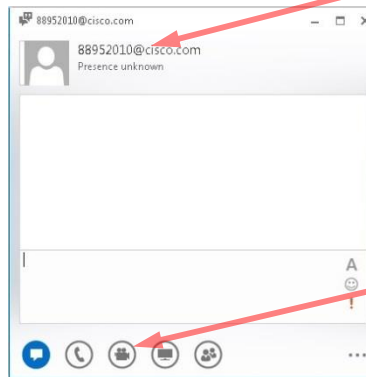
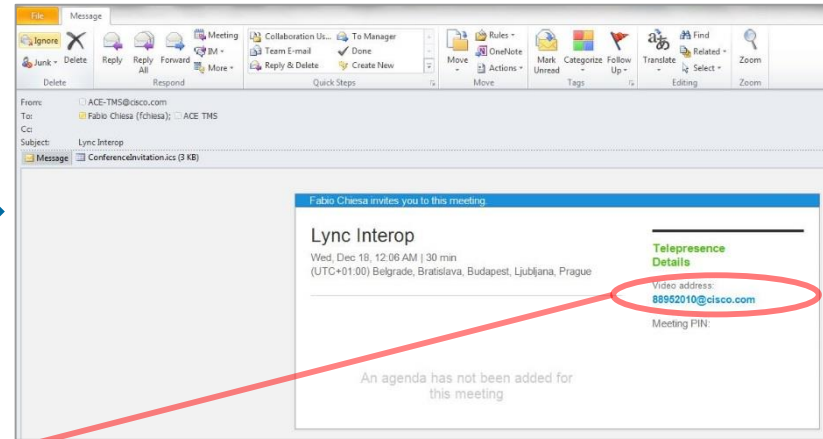
Additional Settings: On

Add Call-in Participants

Calling in on video: 5

Calling in on audio: 0

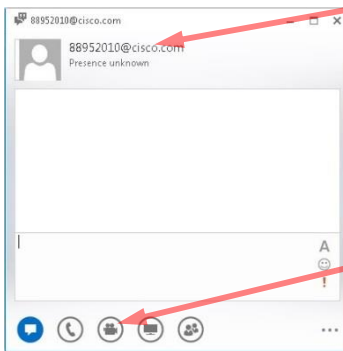
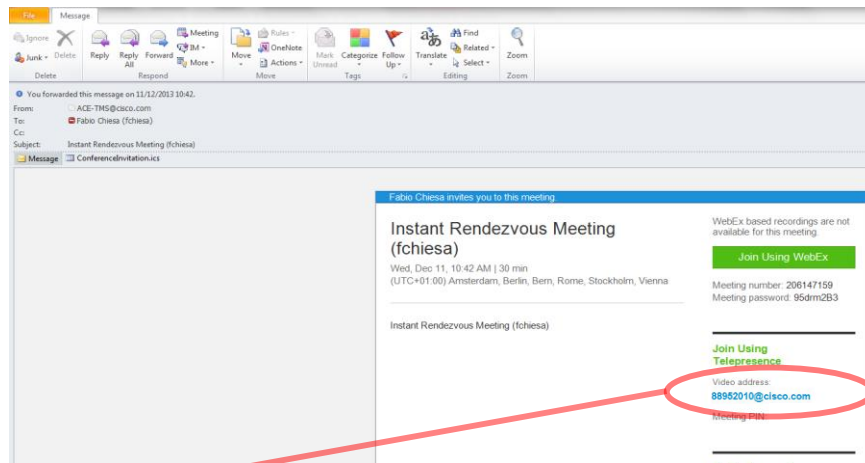
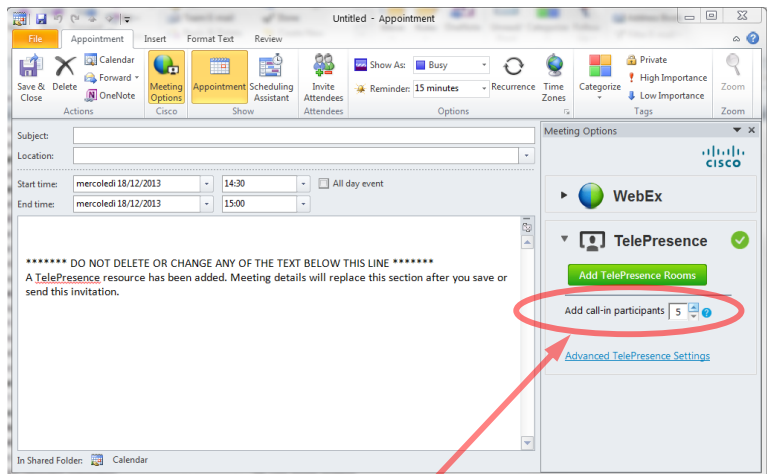
Save Cancel



Define here how many «Video» Devices will join (Lync is just one of them...)

Click here to start the call

Scheduled conference using Webex Productivity Tool (CMR Hybrid)



Define here how many Video Devices will join (Lync is just one of them...)

Click here to start the call

Multiparty Call Use Case (Cisco CMR)

CMR Premises



TelePresence infrastructure @
Customer Data centre

CMR Hybrid



TelePresence on Premises plus
Cisco WebEx

CMR Cloud



Hosted by Cisco WebEx

◀ BROWSER |



| BOARDROOM ▶

Collaboration Meeting Rooms (CMR) Cloud

- **One Meeting –**
Converged video and web conferencing meeting experience from the WebEx Cloud
- **Join From Anywhere –**
From the pocket to the boardroom with true platform independence including SIP, H.323 and Lync*
- **Superior Scale –**
Up to 25 video endpoints & additional 500 video-enabled WebEx users + 500 audio only WebEx users (1025 users/meeting)
- **For further details -> BRKCOL-2612**
Understanding WebEx Collaboration Meeting Room (CMR) Hybrid and Cloud

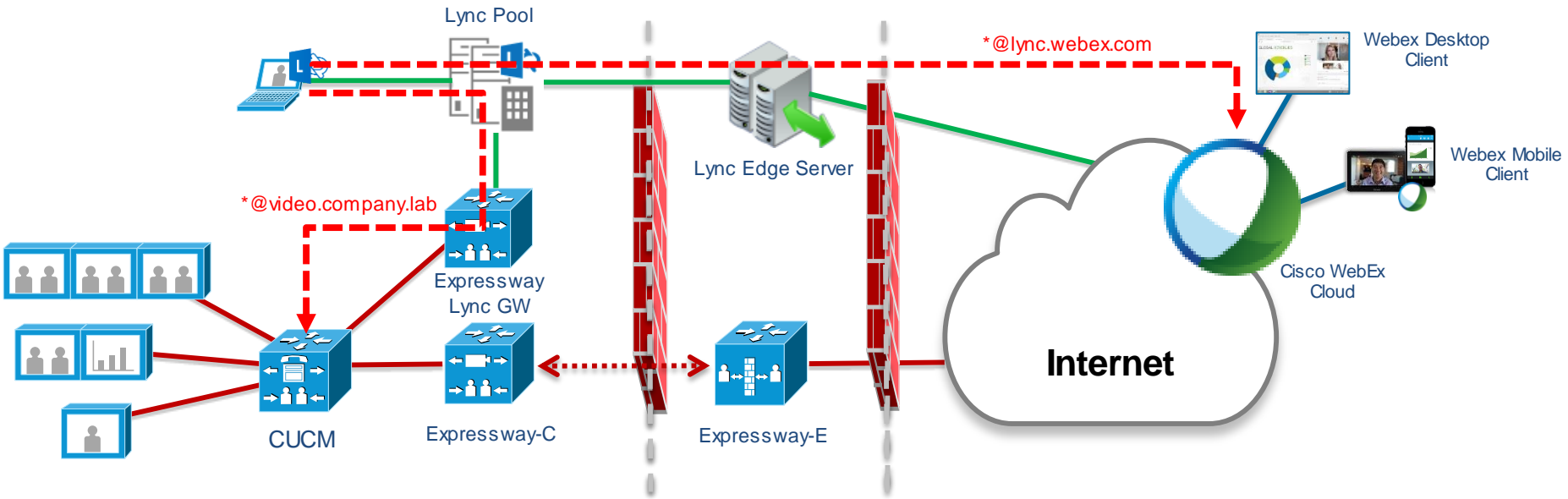


*Lync support planned for a future release after FCS

Cisco *live!*

CMR Cloud – Architecture for Lync Interoperability

(Future Release, Subject to Change)



- The same customer can have both Cisco and MSFT, but each solution must use his own Firewall Traversal technology to reach CMR
- They **should not** route Lync through their Expressway Lync Gateway when joining CMR cloud:
 - Create a route to *@video.company.lab via the Expressway Lync Gateway
 - Create a route to *@lync.webex.com through the Lync Edge (as a Federated domain)

Lync Joining a CMR Cloud Meeting – More Details

(Future Release, Subject to Change)

- Microsoft Lync 2010/2013 and Office 365 will be supported
- Lync Mobile client for Apple iPhone/iPad and Android supported @FCS, Windows Phone in future release
- Lync client for Mac can join with audio only (no video), due to the RTVideo codec
- Lync users must dial a Lync-specific URI. Example: [meetingID.site@lync.webex.com](#) or [userID.site@lync.webex.com](#)
- Desktop Share from CMR Cloud to Lync client available @FCS
- Desktop Share from Lync to CMR Cloud planned for future release

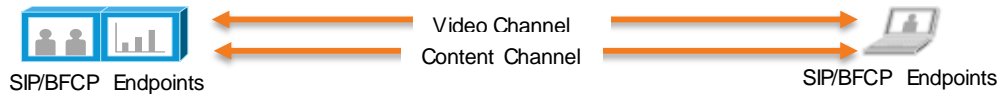


Desktop Sharing (DS) Interoperability

Video Content Sharing - Background

Content can be shared with a remote party in two ways:

- In a separate channel (BFCP) – so the receiver can control size, place and negotiate different resolutions for the content



- As part of the main video channel – so the receiver has no control over how the content is presented



If video systems can't "agree" on a separate channel, they will embed content in the main video channel.

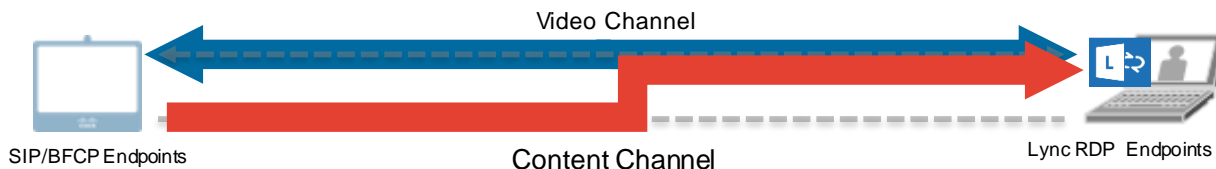
Two versions of the «Content in Main Video» available depending on the device:

- Sendind Content instead of the Main Video stream (Ex. MXP devices, TX-Series, Third Party VC)
- Merging Content and Video flows inside the main video stream (EX, MX, C-codec, TelePresence® Server)

Desktop Sharing (DS) - Cisco & Microsoft RDP Interoperability

(Today's status)

- Cisco uses BFCP – the Standard Protocol for Desktop Sharing in the video world
- MSFT uses RDP for Desktop Sharing between Lync devices
- Some kind of «Gateway» would therefore be needed today for full interoperability
- Today's status - **Lync can receive content** embedded in video from standards-based endpoints and MCU



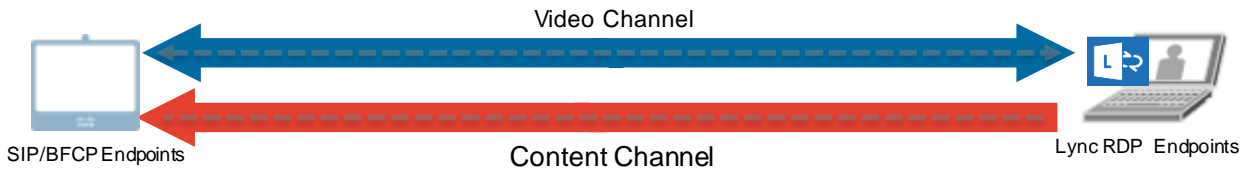
Two way HD video
One way content share (content in main video channel)

Desktop Sharing (DS) - Cisco & Microsoft RDP Interoperability

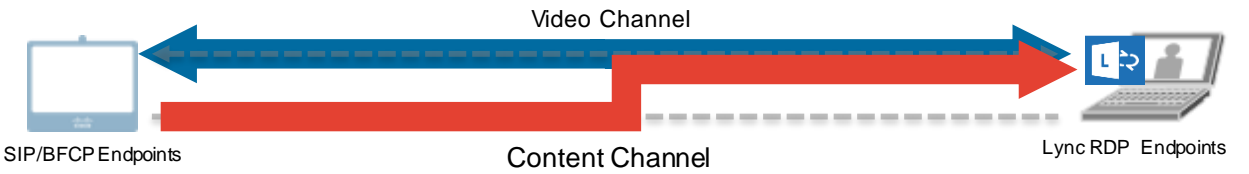
(Future Release, Subject to Change)

What did we Publicly announce on Cisco Blog?

“Cisco has decided to expand our industry leading interoperability to include two way content sharing with Microsoft Lync”



Content Share
from Lync



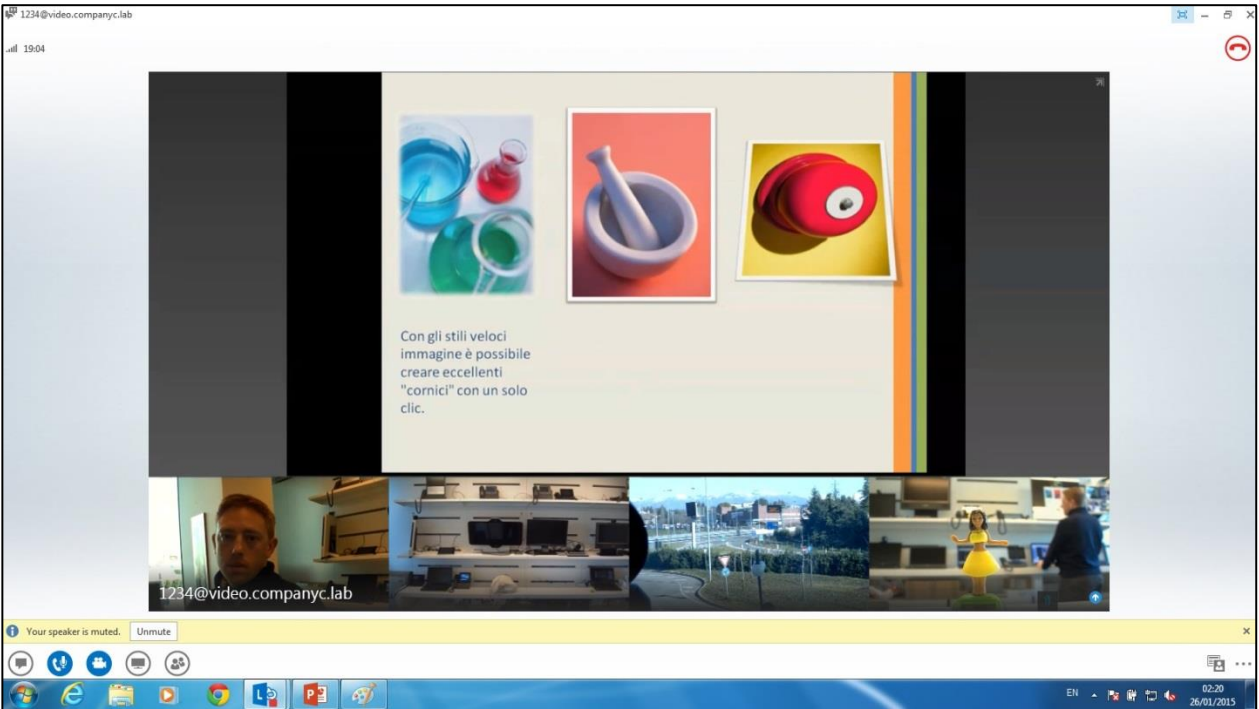
Content Share
to Lync

Two way HD video
Two way content share

Important note: Simplified diagrams to explain capability only. This is not the detailed architecture.



User Experience – One way Desktop Sharing (Available Today)



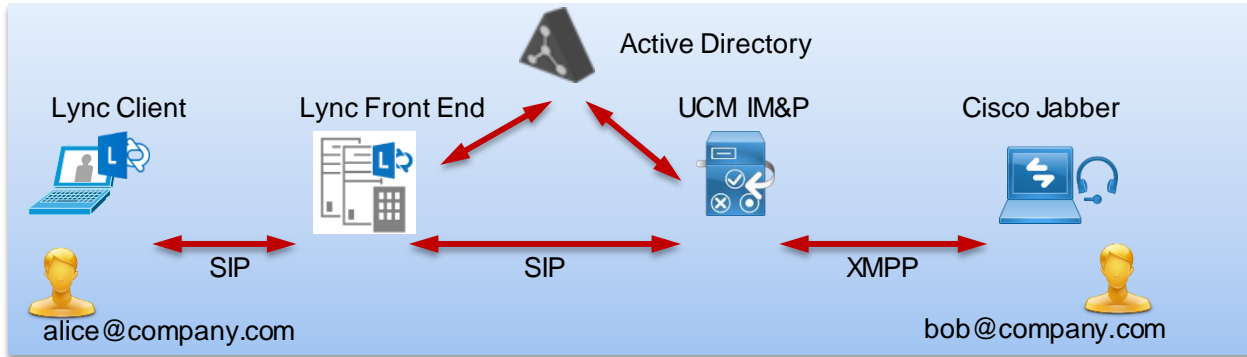
Desktop Sharing from a Video Endpoint towards Lync 2013 in a CMR session («Content in Main Video»)



Migration

Instant Messaging and Presence - Migration

Within a Business (Partitioned Intradomain Federation)



Domain company.com

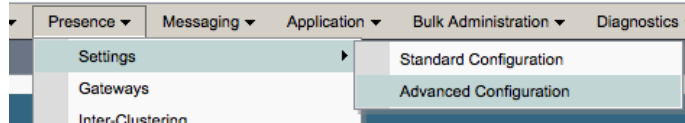
Single domain for both systems

- Full Contact Search available to each end-user regardless of whether they exist on Cisco or Microsoft
- The end-user is not aware what back end the buddy resides on
- **Temporary Presence subscription's not working** in both directions (during search the user's presence is "not available") unless user is added to the buddy list
- Once added to the buddy list, users can exchange presence and instant messaging
- Recommended to utilise "msRTCSIP-primaryuseraddress" attribute as IM contact address
- LDS support for complex AD scenario

Instant Messaging and Presence - Migration

New functionality in Cisco UCM 10.x

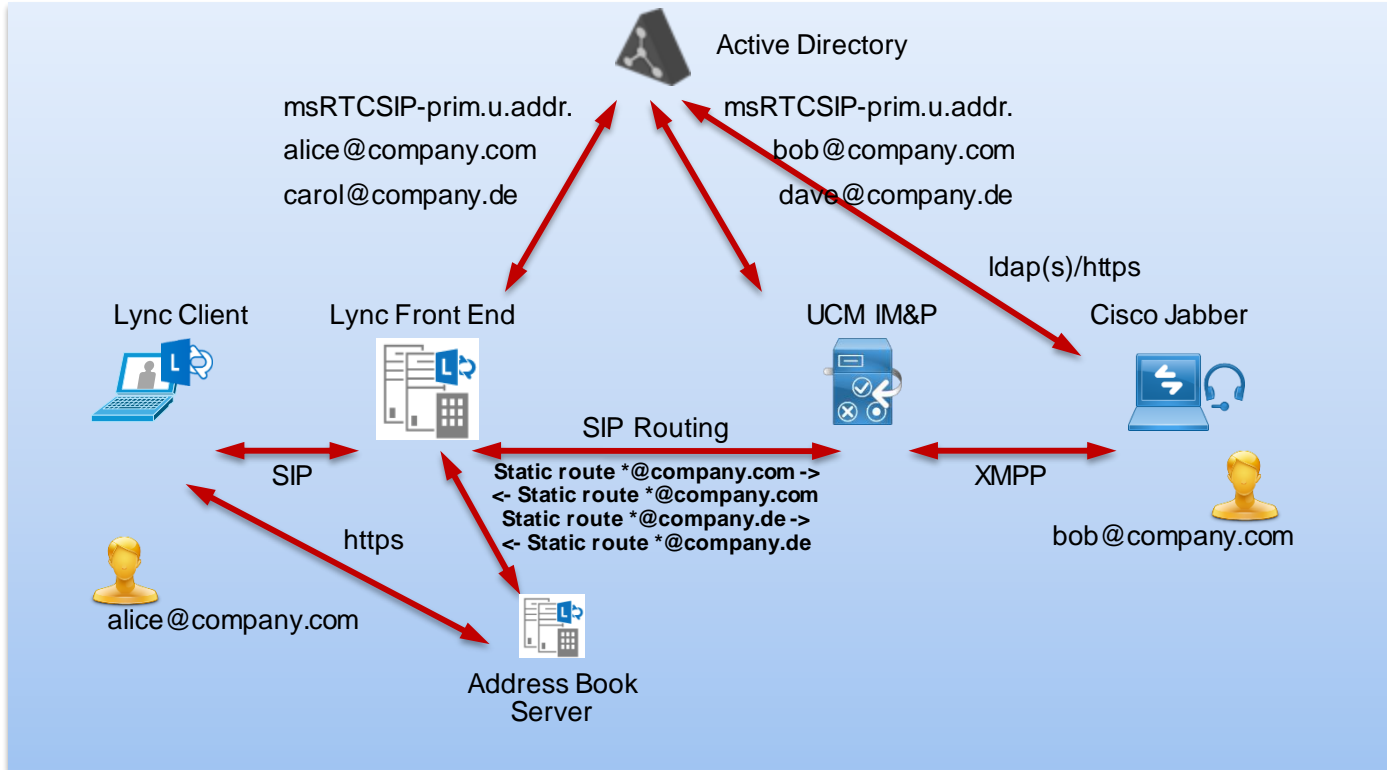
- msRTCSIP-primaryuseraddress or mail directory attribute supported as JabberID
- Multiple domains supported on single UCM IM&P system
Single or multi server environment
- Pre 10.x default URI format sAMAccountName@domain
- Post 10.x advanced configuration allows for selecting either msRTCSIP-primary useraddress or mail as URI



- Multiple domains supported including for partitioned intra domain federation
- Security Certificates enhanced to reflect multi domain operations
- Cisco Jabber 10.6 versions of clients required

Instant Messaging and Presence - Migration

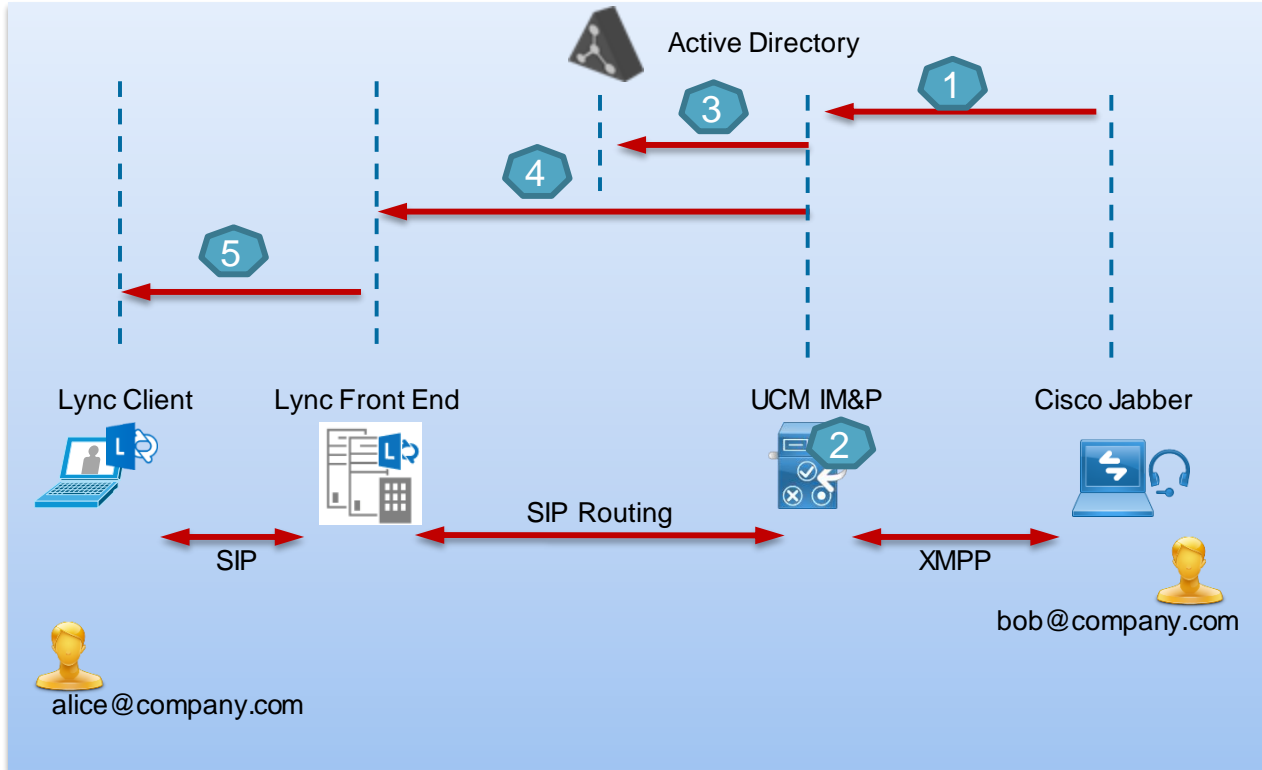
Partitioned Intradomain Federation – configuration details



Domain company.com
Single domain for both systems

Instant Messaging and Presence - Migration

Partitioned Intradomain Federation – message routing UCM (advanced routing)

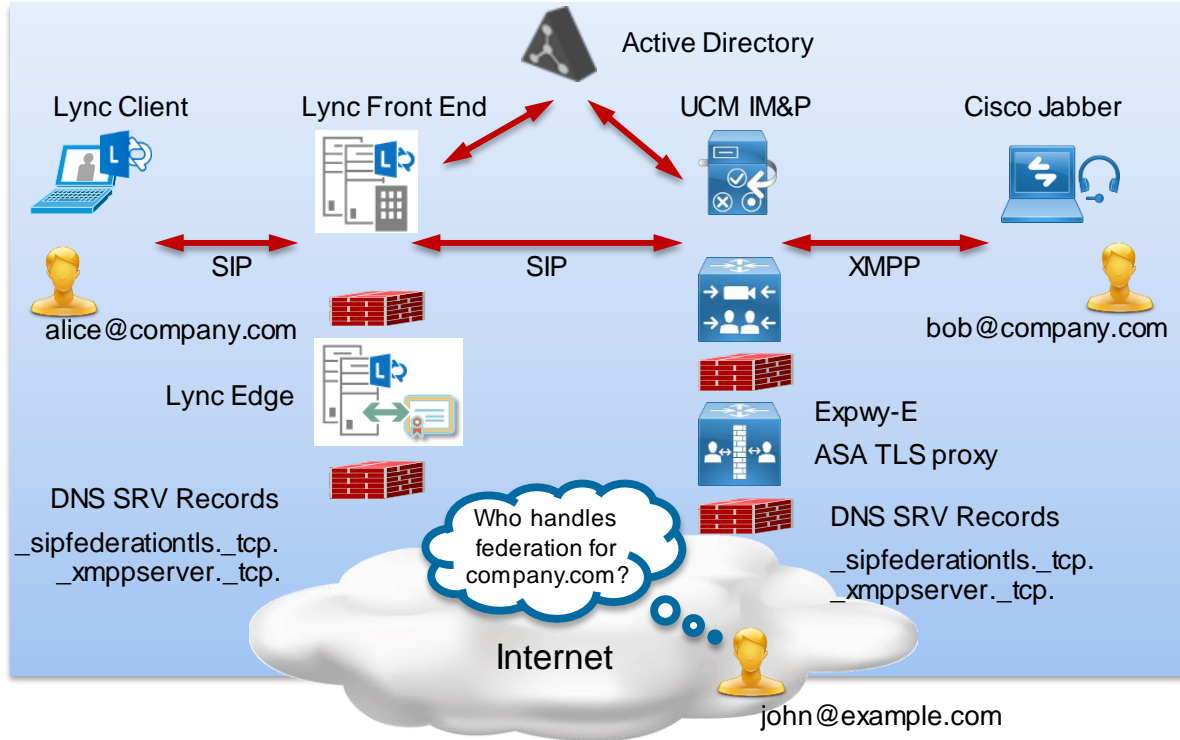


- ① Client requests to initiate communication with alice@company.com
- ② UCM IM&P identifies user as not local from user database
- ③ With advanced routing UCM IM&P queries existence of users from directory – reducing unnecessary traffic (mistyped URI etc.)
- ④ Upon positive response from directory UCM IM&P routes SIP messages to Lync front-end
- ⑤ Lync Front-End delivery message to Lync client

Cisco *live!*

Instant Messaging and Presence - Migration

Partitioned Intradomain Federation – external federation



Domain `company.com`

Single domain for both systems

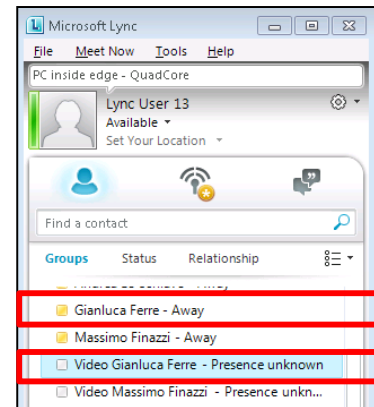
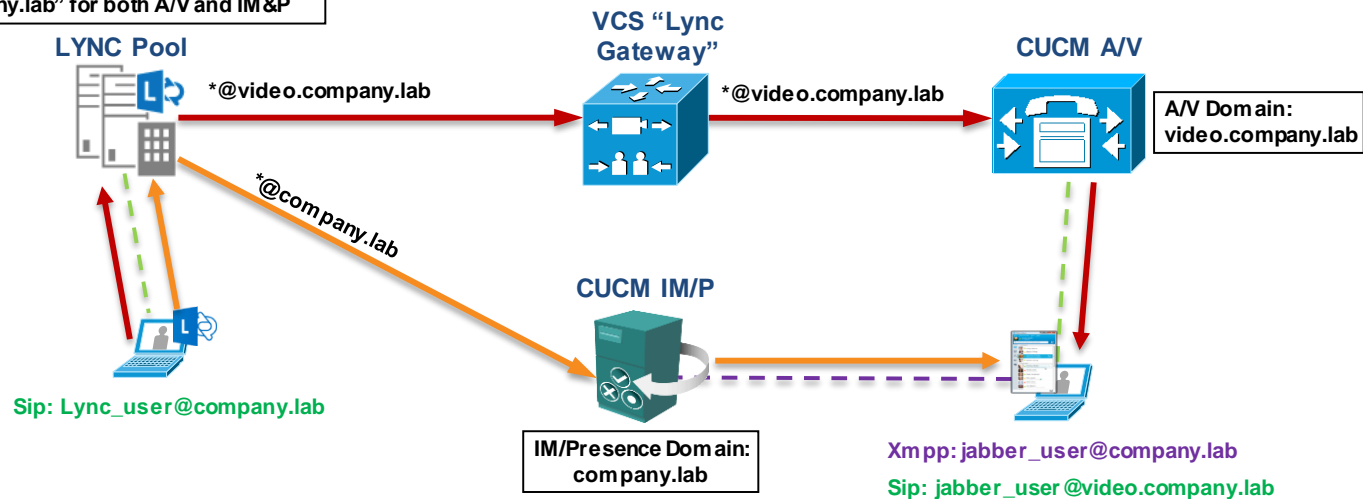
- Both systems are using the same DNS SRV records for external federation
- Required protocol based records have to be owned by a single system
- User experience impacted when split by protocol

A nighttime photograph of a city street. In the foreground, there are long, curved light trails from cars, primarily in shades of yellow and orange. In the middle ground, a pedestrian bridge with a glass railing spans across the street. The background features several modern buildings with lit windows and some flags on poles. The overall scene is illuminated by city lights, creating a vibrant urban atmosphere.

Cisco Jabber and Lync Interop Partitioned Intra Domain and Audio/Video

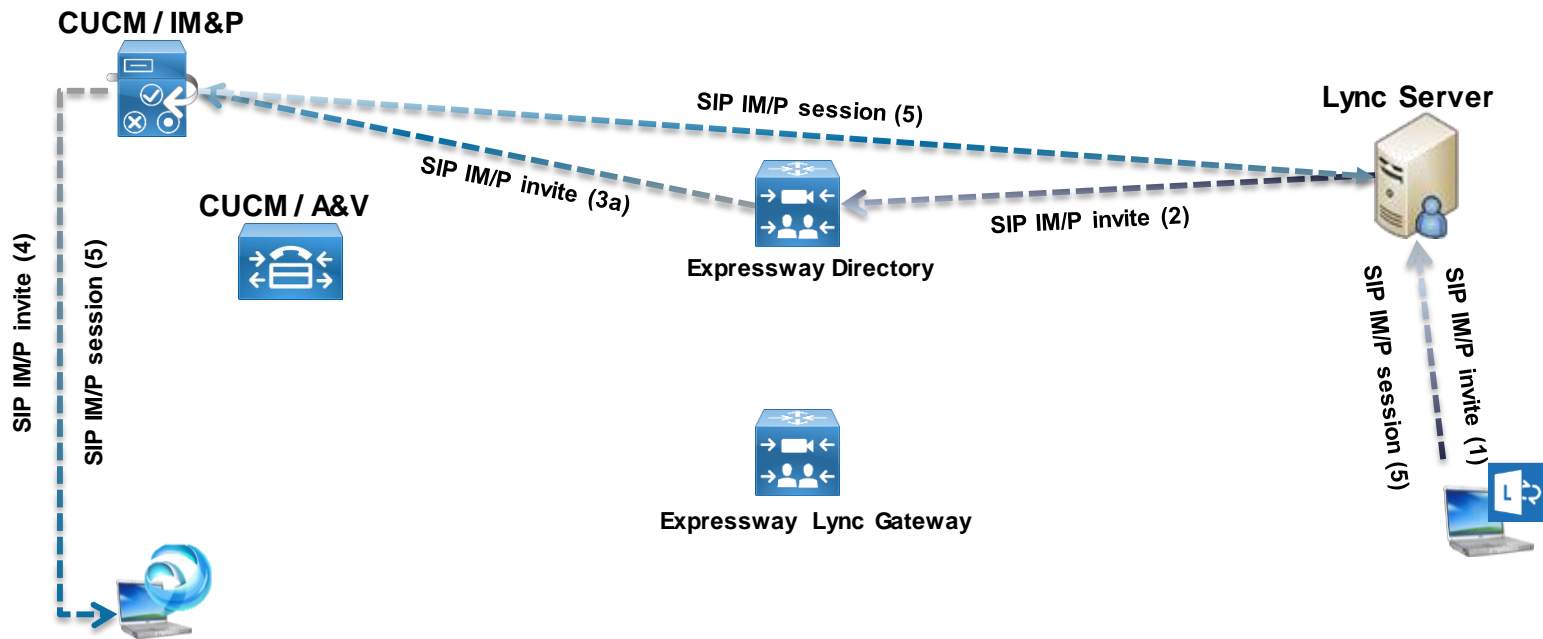
IM/P and A/V Interoperability with Jabber – Background

Lync shares the same domain "company.lab" for both A/V and IM&P



- Lync can't split a route for a single domain to two separate addresses for IM/P and A/V
- Jabber needs therefore two different addresses:
 - one for IMP (Jabber_user@company.lab)
 - one for A/V (Jabber_user@video.company.lab)
- Two different contacts for one Jabber user are needed in the Lync's buddy list

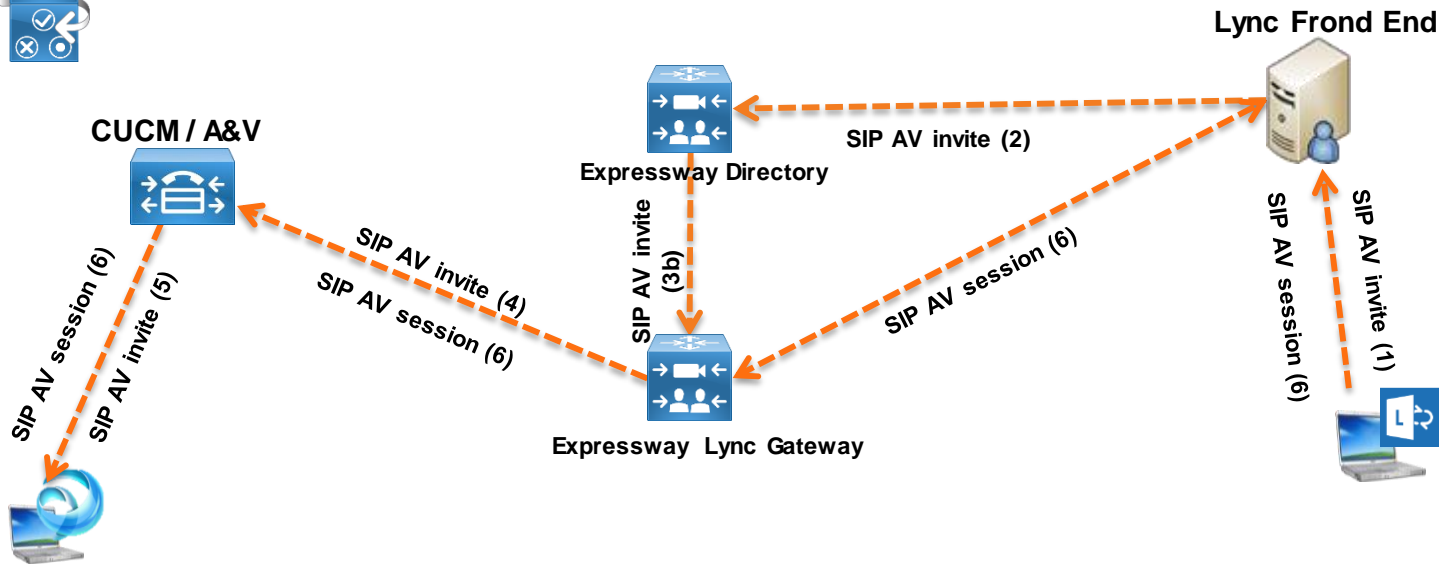
IM/P and A/V Interoperability with Jabber – The Solution (1)



- Expressway “Directory” with a dedicated CPL script splits the Sip traffic between IM/P and A/V
- Jabber and Lync can now share the same domain for IM/P and A/V
- One single contact for each user in the buddy list on both side
- Plan routing carefully to avoid loops

IM/P and A/V Interoperability with Jabber – The Solution (2)

CUCM / IM&P

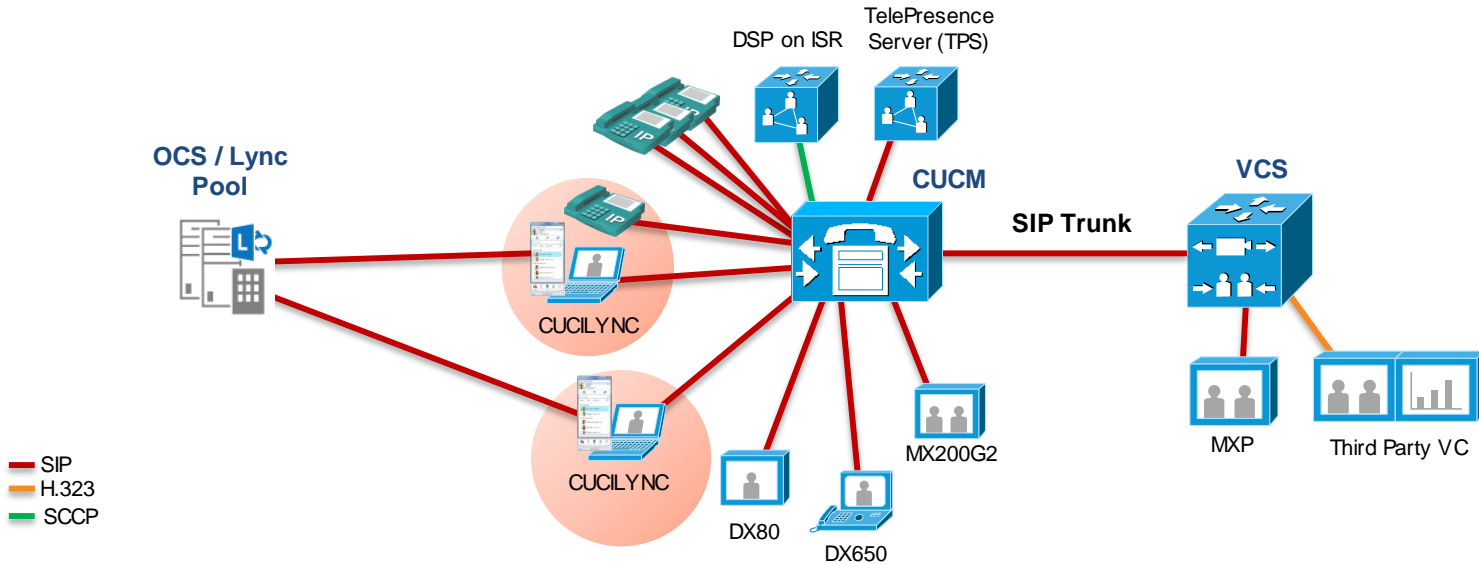


- This is currently in a **Pilot Stage** today
- Scalability testing still ongoing
- Application note on Cisco website: [Lync Server 2013 via Expressway to Cisco Unified Communications Manager Release 10.5 IM&P](#)



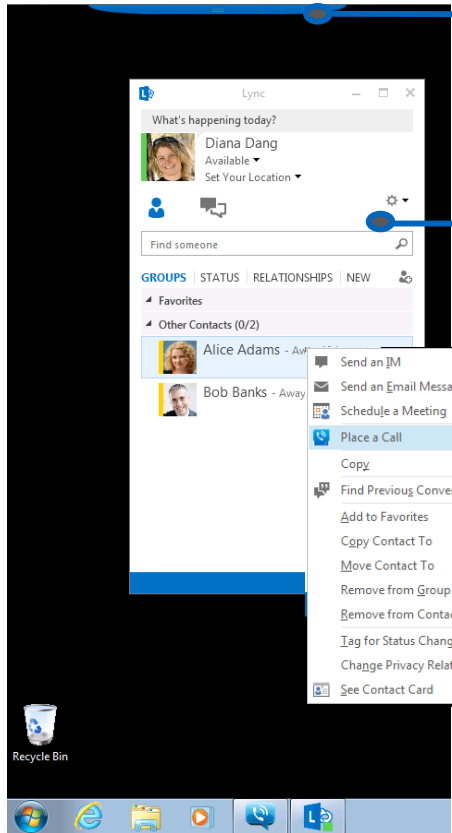
Single Call Control Scenario

Single Call Control (Voice & Video) using CuciLync



- Lync Client used only for IM & Presence
- CuciLync client behaves like any other endpoint registered to CUCM
- Standard based call control for Audio and Video (No Hairpinning or Transcoding)
- Single Dial Plan (no routing between Lync & CUCM)

Cisco UC Integration for Lync (CuciLync)



Cisco UC Integration

Voice mail, Communications History,
Soft phone / Desk phone control
Options & Dial pad

Microsoft Lync 2010
Microsoft Lync 2013 (shown)

Initiate Call from Context Menu

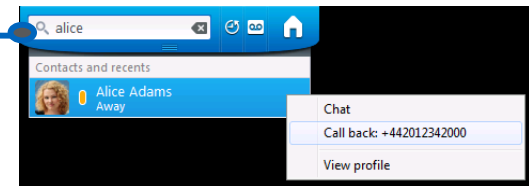
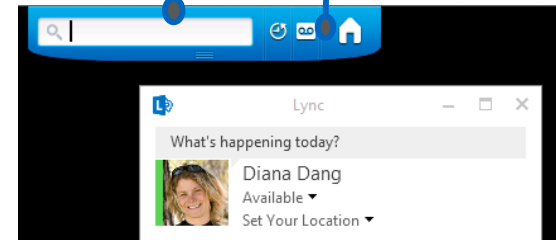
Initiate Call from Dock

Toolbar docks at the top, auto hides

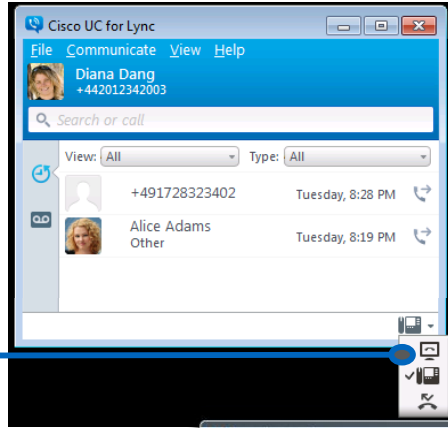
Maximise Screen Real-estate

Active at all times

History, Visual Voicemail



Cisco UC Integration for Lync (CuciLync)



Softphone Mode



Deskphone Mode (CTI)
Including Deskphone Video

Integrated Conversation Window



Webex Conferencing
Video Desktop Share (BFCP)

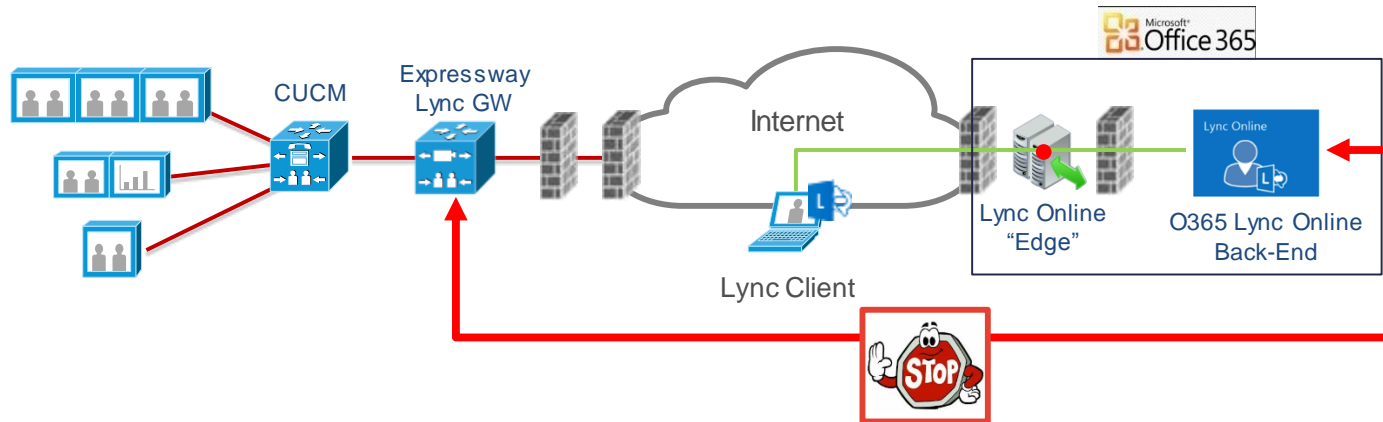
In call features

Mute, Hold, Transfer, Conference



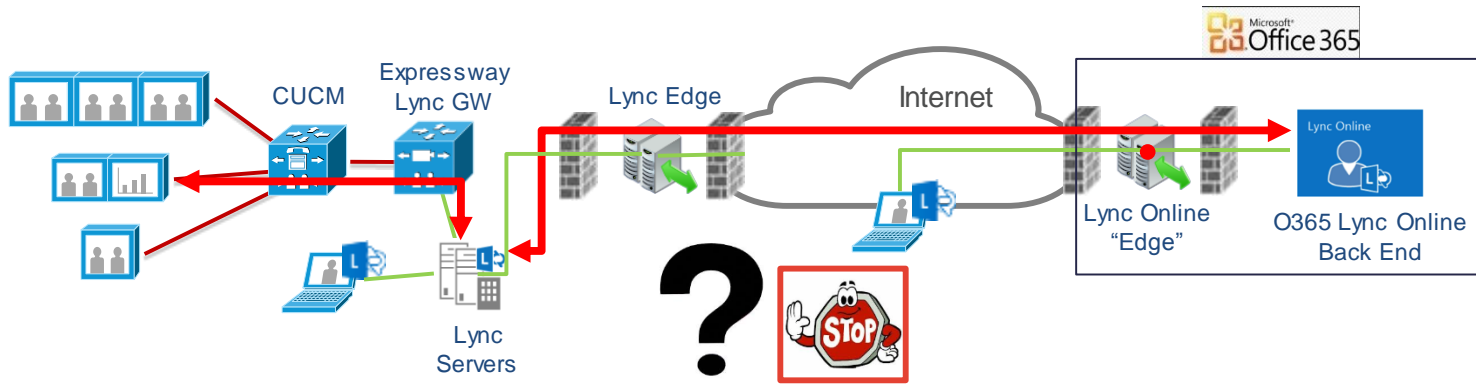
Office 365 Interoperability

O365 and A/V Interoperability – What about Direct Sip Trunk?



- No official support for Standard Video Interoperability in Office 365
- There is not a SIP interface available for «direct» trunking to the backend as for Lync 2013
- Also for O365 dedicated environment the Microsoft position is not 100% clear regarding Third Party interoperability and Back-End connectivity

O365 and A/V Interoperability – What about the Hybrid «Split Domain» scenario?



- Lync features delivered through a combination of On-premises and Online deployment.
- Lync Online and On Premise users share the same “Presence Domain”
- All workloads for a given user handled in one environment
- An option could be to use the Lync On-Premise deployment as a “gateway” towards Lync Online
- This scenario **has Not been tested** and **is not officially supported** from Cisco

O365 and A/V Interoperability – What about «Federation»? ?

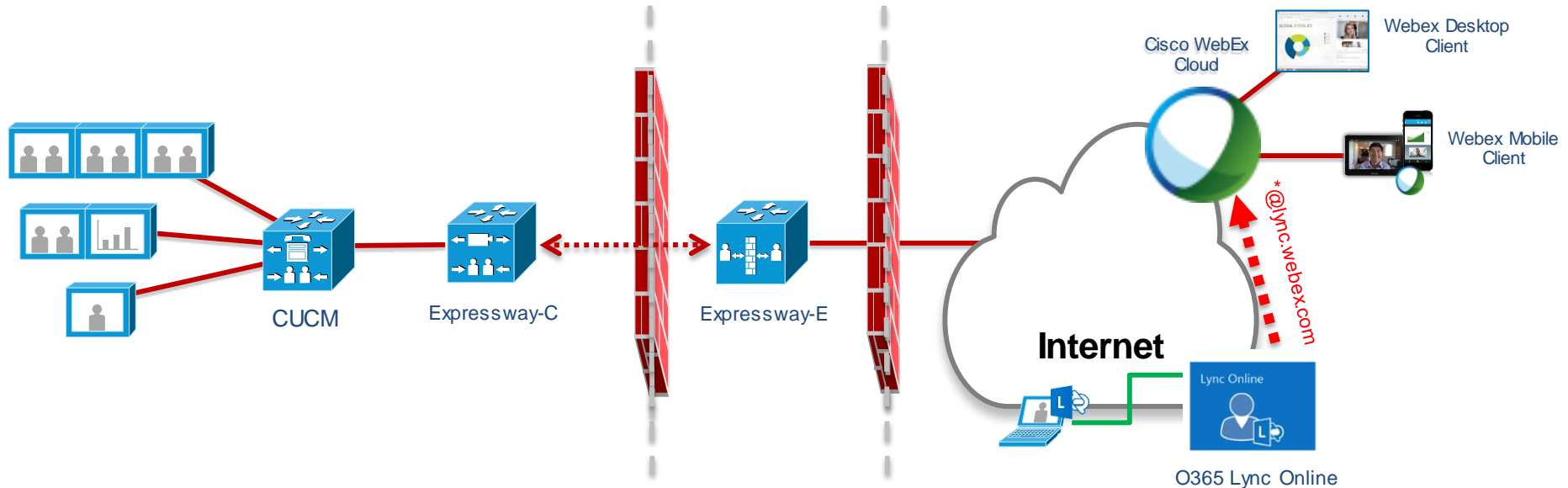
Following are the federation relationships that are supported by Lync Online and the available modalities:

- **Lync Server 2013** IM, Presence, Audio, Video, Conferencing
- **Lync Server 2010** IM, Presence, Audio, Video, Conferencing
- **Office Communications Server 2007 R2** IM, Presence, Audio, Video, Conferencing

- [Reference: Federation and Public IM Connectivity \(Microsoft Technet\)](#)
- Only other Lync and OCS systems are officially supported from Microsoft
- Other vendors have released basic interoperability appearing to O365 as another Lync on-prem system.
- Work in progress to support **Office 365** joining **Cisco CMR cloud** (see next slide)

CMR Cloud – Architecture for O365 Lync Online Interoperability

(Future Release, Subject to Change)



- The Lync Online deployment must be enabled for External Federation
- The specific domain [“lync.webex.com”](https://lync.webex.com) must be allowed as a Federated Domain



Summary

Cisco Interoperability with Microsoft

Many options to interoperate

- Identify your requirements and select the right scenario for your environment
 - ◆ User experience
 - ◆ Technical feasibility
 - ◆ Complexity
 - ◆ Operational implications
- Understand the pros and cons of the selected scenario
- “Mileage” of certain functionalities might vary when applied to a real life environment
 - ...Media Bypass in multi site deployment
- Thoroughly evaluate (PoC)
- Cisco remains committed to support interoperability scenarios

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