AudioCodes One Voice for Microsoft[®] Skype for Business

Microsoft Office 365 X-UM with IP PBXs using AudioCodes CloudBond X-UM Standard

Version 0.1





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Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used.

Related Documentation

Document	Name
----------	------

X-UM Configuration Guide

Document Revision Record

LTRT	Description
40725	Initial document release for Version 0.1
40726	Updates to sections Skype for Business Pre-preparation; Exchange UM Online Feature List; Call Flows; Adding Users to X-UM Connector and HA and DR.
40727	Updates to Installation Steps; Preparing New Machine with Windows 2012 R2/2016; Adding Machine to Domain; Updating Windows with Latest Microsoft Update; Creating Virtual Machine on Hyper-V for X-UM Connector
40728	Update for Version 0.1.39: Added Software Revision Record below. Updates to Section Installing Unified Communications Managed API with UCMA Version table. Replaced references to X-UM Connector Wizard with X-UM Application.
40729	Update for Version 0.1.40: Fixed bug of restarting user even if it was moved to another server. Added support for Windows 2019.

Documentation Feedback

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Software Revision Record

The following table lists the software versions released in Version 0.1.

Table	1-1:	Software	Revision	Record
-------	------	----------	----------	--------

Software Version	Date
0.1.22	Feb 2018
0.1.30	Mar 2018
0.1.31	Mar 2018
0.1.36	Jun 2018
0.1.38	Sep 2018
0.1.39	Dec 2018
0.1.40	Feb 2019

Note: The latest software versions can be downloaded from



https://s3.eu-central-1.amazonaws.com/downloadsaudiocodes/Download/AC_XUM_Install.html

Ensure you download the correct X-UM platform version (Skype, Lync 2013 or Lync 2010). Unzip the file to a temporary directory.



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1 Introduction

Office 365[™] Microsoft Exchange Online Unified Messaging (UM) provides voice mail for Exchange mailboxes "in the cloud". To allow telephony equipment to communicate securely with the Office 365 network, customers are required to deploy AudioCodes' Mediant Session Border Controllers (SBCs) or some other SBC or gateway which have been tested for interoperability with Unified Messaging (UM).

As of July 2018, Office 365 Microsoft Exchange Online Unified Messaging (UM) no longer supports direct connectivity of third-party PBXs and IP PBXs using Session Border Controller (SBC). This document describes the AudioCodes X-UM Connector, a software product that enables voice mail connectivity from third-party PBXs and IP PBXs to Office 365 Microsoft Exchange Online Unified Messaging (UM) using the customer's existing Skype for Business Server infrastructure while supporting existing features such as "Message Waiting Indication" and "Play Voicemail on Phone".

The X-UM solution is available in two main configurations:

X-UM Standard based on CloudBond Standard Plus

In this configuration, the X-UM Connector is installed in the CloudBond environment (Mediant 800) as an additional Virtual Machine (VM). It is activated in the CloudBond Skype for Business server environment.

The customer needs to connect this CloudBond server to the company's environment (Skype / PBX / exchange).

X-UM Connector as a standalone server

In this configuration, the customer needs to dedicate a machine for the X-UM Connector, and install and activate it, as described below, on an existing Skype for Business\Lync 2013\Lync 2010 server topology configured to work with Office 365 Microsoft Exchange Online Unified Messaging.

This document details the installation procedure for X-UM Connector as a standalone server. For X-UM Standard based on CloudBond Standard Plus installation refer to *LTRT-26790 AudioCodes X-UM Configuration Ver. 3.0.*



Note: "Skype" or "Skype for Business" is is used interchangeably to refer to Skype for Business or Lync 2013/Lync 2010, unless specifically indicated.



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2 Installation Steps

This section summarizes the steps required for setting up and activating the X-UM Connector machine:

- 1. Prepare the new machine with Windows 2012 R2/2016/2019 see Chapter 3 on page 15.
- 2. Add the machine to the domain see Chapter 5 on page 25.
- 3. Update Windows with the latest Microsoft update see Chapter 6 on page 29.
- 4. Install UCMA see Chapter 7 on page 31.
- 5. Install the Skype for Business Components see Chapter 8 on page 33.
- 6. Install the X-UM Connector Application see Chapter 9 on page 37.
- 7. Activate X-UM Connector see Chapter 10 on page 41.
- 8. Configure the X-UM Connector see Chapter 11 on page 45.
- 9. Obtain the License see Chapter 12 on page 49.
- **10.** Configure the SBC in the X-UM Solution Chapter 13 on page 53.
- **11.** Use X-UM Connector Debugging Tools see Chapter 14 on page 55.
- **12.** Create Virtual Machine on Hyper-V for X-UM Connector see Appendix A on page 57.
- **13.** *Ini* file example see Appendix C on page 69.



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3 Planning X-UM Architecture

Skype for Business topology is built from sites, pools, servers and more. Exchange Unified Messaging Connector (X-UM) is based on the Skype trusted application end point and user end points.

The Trusted application end point belongs to one Trusted application pool. Every trusted application pool is associated with one registrar pool.

Every X-UM can handle 5000 users. To be able to support more than 5000 users, you need to use several X-UM servers that work in Active-Active mode. In this case, when one X-UM is down, the other active X-UM reallocates the users.

For more information regarding HA refer to Appendix A on page 59

Notes:



- X-UM can provide service to users that are homed to different pools on different sites. If the associated registrar pool is down, the X-UM that is associated with this pool is not able to provide full service. This why need to have at least two X-UM servers (in case the topology has multi-registrar pools) which are associated with different registrar pools.
- The X-UM registers every user on the Registrar Pool for receiving calls and MWI. This registration is calculated as for a regular Skype client that Registrars every user by default from one of eight devices (where one of these devices is designated as the X-UM).

3.1 Skype for Business Pre-preparation

- The Skype for Business user must be UM enabled and set to Enterprise Voice.
- Configure Skype for Business to work with Exchange UM check that the Skype client can connect with Exchange UM to leave a message and retrieve it.
- Configure PSTN access for the users –some of the X-UM flows need to go via the PSTN access for Skype for Business.

3.2 Exchange UM Online Feature List

From: https://technet.microsoft.com/en-us/library/jj938142(v=exchg.150).aspx

The feature names marked in red are relevant and can be handled by the X-UM.

When you configure UM for your organization, users can access voice mail, email, personal Contacts and calendar information that's located in their mailbox from an email client. For example, Microsoft Outlook or Outlook Web App, from a mobile phone with Microsoft Exchange ActiveSync set up, such as a Windows Phone, or from a telephone. Additionally, users can use the following features:

- Access to their Exchange mailbox: Users can access a full set of voice mail features from Internet-capable mobile phones, Outlook 2007 or later versions, and Outlook Web App. These features include many voice mail configuration options and the ability to play a voice message from either the reading pane, using an integrated Windows Media Player, or the message list, using computer speakers.
- Play-on-Phone: The Play-on-Phone feature lets users play voice messages through the handset. If the user works in an office cubicle, and is using a public computer or a computer that isn't enabled for multimedia, or is listening to a voice message that's confidential, that user may not want to or be able to listen to a voice message through computer speakers. The user can play the voice message using any telephone, including a home, office, or mobile telephone.

Voice Mail Form: The voice mail form resembles the default email form. It gives users an interface for performing actions such as playing, stopping, or pausing voice messages, playing voice messages on a telephone, and adding and editing notes.

The voice mail form includes the embedded Windows Media Player and an Audio notes field. The embedded Windows Media Player and notes field are displayed either in the reading pane when users preview a voice message or in a separate window when they open the voice message. If users aren't enabled for UM, or if a supported email client hasn't been installed on the client computer, they view voice messages as email attachments, and the voice mail form isn't available.

- User Configuration: Users can configure several voice mail options for UM using Outlook Web App. For example, the user can record personal greetings, configure missed call and text message notifications and a voice mail Play on Phone number, and reset a voice mail access PIN.
- Call Answering: Call answering includes answering incoming calls on behalf of users, playing their personal greetings, recording messages, and then sending the voice mail to their Inbox as an email message.
- Call Answering Rules: The Call Answering Rules feature lets users who are enabled for voice mail determine how their incoming call answering calls should be handled. The way call answering rules are applied to incoming calls is similar to the way Inbox rules are applied to incoming email messages. By default, no call answering rules are configured. If an incoming call is answered, the caller is prompted to leave a voice message for the person being called. By using call answering rules, a caller can:
 - Leave a voice message for the user.
 - Transfer to an alternate contact of the user.
 - Transfer to the alternate contact's voice mail.
 - Transfer to other phone numbers that the user has configured.
 - Use the Find Me feature or locate the user through a transfer from an operator.
- Voice Mail Preview: Unified Messaging uses Automatic Speech Recognition (ASR) on newly created voice mail messages. When users receive voice messages, the messages contain both a recording and text that's been created from the voice recording. Users see the voice message text displayed in an email message from within Outlook Web App or another supported email client.
- Message Waiting Indicator: Message Waiting Indicator is a feature found in most legacy voice mail systems and can refer to any mechanism that indicates the existence of a new message. Enabling or disabling Message Waiting Indicator is done on the user's mailbox or on a UM mailbox policy.
- Missed Call and Voice Mail Notifications using SMS: When users are part of a hybrid or Office 365 deployment, and they configure their voice mail settings with their mobile phone number and configure call forwarding, they can receive notifications about missed calls and new voice messages on their mobile phones in a text message through the Short Messaging Service (SMS). However, to receive these types of notifications, the users must first configure text messaging and enable notifications on their account.
- Protected Voice Mail: Protected Voice Mail is a feature that enables users to send private mail. This voice mail is protected and users are restricted from forwarding, copying, or extracting the voice file from email. Protected Voice Mail increases the confidentiality of voice mail messages, and lets users limit the audience for voice messages.

- Outlook Voice Access: There are two UM user interfaces available to users: the telephone user interface (TUI) and the voice user interface (VUI). These two interfaces together are called Outlook Voice Access. Outlook Voice Access users can use Outlook Voice Access when they access the voice mail system from an external or internal telephone. Users who dial in to the voice mail system can access their mailbox using Outlook Voice Access. However, when a user is searching the directory for your organization, they must use the key pad on their phone to search for a user. Using their voice to search the directory isn't available.
- Using a telephone, a UM-enabled user can:
 - Access voice mail.
 - Listen to, forward, or reply to email messages.
 - Listen to calendar information.
 - Access or dial contacts who are stored in the organization's directory or a single contact or contact group located in their personal Contacts.
 - Accept or cancel meeting requests.
 - Set a voice message to let callers know the called party is away.
 - Set user security preferences and personal options.
 - Search for users in the directory of the organization.
- Group Addressing using Outlook Voice Access: Users can send a single email message to a single user in their personal Contacts, to multiple recipients from the directory by adding each recipient individually, or by adding the name of a distribution list from the directory for your organization. In UM in Office 365, when a user signs in to their mailbox using Outlook Voice Access, they can also send email and voice messages to users in a group stored in their personal Contacts.

3.3 Call Flows

3.3.1 Call Answering – Leave Voicemail Message to User – Direct Call to X-UM

Figure 3-1: Call Answering – Leave Voicemail Message to User – Direct Call to X-UM



- 1. Party A calls party B and the call is forward to the SBC.
- 2. The SBC forwards the call to X-UM and adds the prefix (*55) to indicate that the call is deposit to voicemail.
- **3.** X-UM validates that the mailbox is managed by the users file 0 and then forwards the call to the Front End as a direct deposit to the voicemail call.
- 4. The call is sent to Office 365 Exchange UM.



Note: Another option for this flow – the call can be forwarded to the Mediation server instead of X-UM for direct deposit by converting to SIP URI via Active Directory, or if forwarding to a Phone URI, the X-UM can reject the call so that it is instead directed to the Exchange UM.

3.3.2 Call Answering – Leave Voicemail Message to User – Call from Lync Client

Figure 3-2: Call Answering – Leave Voicemail Message to User – Call from Lync Client



- 1. The Front End forwards incoming calls to the user and then to X-UM.
- 2. By default, X-UM rejects all incoming calls to the user, except for calls from the Exchange UM (see below). If other user devices are registered then they'll keep ringing, otherwise the call is terminated (or forwarded to Exchange UM).



Note: X-UM can be configured to accept incoming calls from the Skype side. In this case, X-UM forwards the call to the SBC, and ultimately the call reaches the PBX user's phone.

3.3.3 Message Waiting Indication (Unsolicited)



Figure 3-3: Message Waiting Indication (Unsolicited)

- 1. X-UM Application subscribes for Exchange MWI via the Front End (FE) and Edge.
- 2. Due to voicemail status changes, Office 365 sends a MWI message to the X-UM via the FE and Edge.
- **3.** X-UM replaces the SIP URI with the phone extension and sends the MWI to the PBX via the SBC.
- 4. The PBX sends the MWI to the phone.

3.3.4 Message Waiting Indication (SIP Subscription)



Figure 3-4: Message Waiting Indication (SIP Subscription)

- 1. X-UM Application subscribes for Exchange MWI via the FE and Edge.
- 2. The phone subscribes to MWI notifications. The Subscription is forwarded by PBX and SBC to X-UM.
- 3. Due to voicemail status changes, Office 365 sends a MWI message to the X-UM via the FE and Edge.
- 4. X-UM replaces the SIP URI with Phone extension and sends the MWI notification in the SIP subscription dialog to the PBX using the SBC.
- **5.** PBX send the MWI to the phone.

3.3.5 Outlook Voice Access– User Access to Mailbox using Telephone



Figure 3-5: Outlook Voice Access– User Access to Mailbox using Telephone

Access from an Extension:

- 1. Party A calls a Special number (Voice Mail key on the phone).
- 2. The PBX forwards the call to the SBC.
- The SBC forwards the call to X-UM DN must be the number which was set on X-UM for subscribed login.
- 4. X-UM validates that the caller is managed by the user's file and then forwards the call to the FE as a direct subscriber login to voicemail.
- 5. The call is sent to the Office 365 Exchange UM using the Edge server.



Note: By default, in this flow, the Exchange UM does not ask for a password. It can be changed on the XU-M Setup.

Access from an External phone:

- 1. Party A calls from the PSTN to the Special ATT number.
- **2.** PBX forwards the call to the SBC.
- **3.** SBC forwards the call to the Mediation server.
- 4. The Mediation forwards the call to the FE.
- 5. FE forwards to Exchange UM using the Edge.
- 6. Exchange UM asks for the mailbox number and password.

3.3.6 Play on Phone





"Play On Phone" and "Phone" is a User SIP URI/or user Extension:

For example in Outlook, User A requests to play the message on User A's phone:

- **1.** Exchange UM dials to User A using Edge and FE.
- 2. X-UM receives the call because it registers as User A.
- 3. X-UM forwards the call to SBC replacing the SIP URI user extension.
- 4. SBC calls user extension on the PBX
- 5. PBX calls user phone.

"Play On Phone" and "Phone" is an External number:

For example in Outlook, User A requests to play the message on User A's mobile phone:

- 1. Exchange UM dials to User A's mobile phone using Edge and FE.
- 2. FE dials to the Mediation server.
- **3.** The Mediation server calls the SBC.
- 4. The SBC calls the user extension on the PBX.
- 5. The PBX calls User A's phone.

3.3.7 Outlook Voice Access Call Out – User Access to Mailbox using Telephone and Call Out

Figure 3-7: Outlook Voice Access call out – User Access to Mailbox using Telephone and Call Out



User A accesses the mailbox from an internal phone or external according to the flow: "Outlook Voice Access – User access to mailbox via telephone".

User A selects to dial out to a contact:

- **1.** Exchange UM sends a Refer message.
- 2. FE sends the Refer message to the X-UM.
- 3. X-UM sends a self REFER + REPLACES to SBC.
- 4. SBC sends new Invite + REPLACES to X-UM.
- 5. X-UM sends the Invite (to the contact) to the FE.
- 6. FE calls the Mediation server for external numbers and to Lync clients (and X-UM too) for internal users.
- 7. Mediation server sends the call to the SBC.
- 8. SBC calls to the PBX and the PBX calls out.



Note: If the contact is a Lync user registered on the X-UM, then the X-UM accepts the call and forwards it to the SBC, PBX and user phone.

4 Preparing New Machine with Windows 2012 R2/2016/2019

The X-UM Connector runs on Windows 2012 R2/2016/2019 (Desktop Experience) – on both virtual and physical machines.

The paragraphs below describe how to prepare Windows 2012 R2/2016/2019 for the X-UM Connector.

4.1 X-UM Connector System Requirements

The X-UM Connector's minimum requirements are listed below:

Table	4-1:	System	Reg	wirements
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System Requirements	
Operation System	Windows 2012 R2/2016/2019 standard (Desktop Experience)
Processor	4 Core
Memory	6 GB
Disk size	Minimum 50 Gb. We recommend 80 Gb.



Note: In Appendix A, you can find a step-by-step example that shows how to create a virtual machine for the X-UM Connector, using the Hyper-V Manager.

4.1 Latest Software Version to Download

The latest X-UM Connector software can be downloaded from

https://s3.eu-central-1.amazonaws.com/downloadsaudiocodes/Download/AC XUM Install.html

Ensure that you download the correct X-UM platform version (Skype, Lync2013 or Lync 2010)

Copy the downloaded file to the C:\xUM_InstallationFiles folder on the X-UM Connector machine.

4.2 Windows 2012 R2/2016/2019 Server Roles & Features

Make sure that the following Server Roles and Features are enabled using the Server Manager.

- Server Roles to enable:
 - File and Storage Services File and iSCSI Services File Server
 - File and Storage Services Storage Services
- Features to enable:
 - .Net Framework 3.5 Feature .Net Framework 3.5
 - .Net Framework 4.5 Feature .Net Framework 4.5 (Windows 2012 R2 Only)
 - .Net Framework 4.5 Feature WCF Service TCP Port Sharing (Windows 2012 R2 Only)
 - .Net Framework 4.6 Feature .Net Framework 4.6 (Windows 2016 Only)
 - .Net Framework 4.6 Feature WCF Service TCP Port Sharing (Windows 2016 Only)
 - .Net Framework 4.7 Feature .Net Framework 4.7 (Windows 2019 Only)
 - .Net Framework 4.7 Feature WCF Service TCP Port Sharing (Windows 2019 Only)
 - Media Foundation
 - User Interface and Infrastructure Graphical Management Tools and Infrastructure (Windows 2012 R2 Only)
 - User Interface and Infrastructure Server Graphical Shell (Windows 2012 R2 Only)
 - Windows PowerShell Windows PowerShell 4.0 (Windows 2012 R2 Only)
 - Windows PowerShell Windows PowerShell 5.1 (Windows 2016/2019 Only)
 - Windows PowerShell Windows PowerShell 2.0 Engine (Windows 2012 R2 Only)
 - Windows PowerShell Windows PowerShell ISE
 - WoW64 Support

4.3 Setting the Network Interface

Set the X-UM Connector network interface with the correct IP address, subnet, default gateway and DNS.

The X-UM needs to be able to resolve Skype pools, and vice versa. The Skype servers need to be able to resolve the X-UM pool on the DNS as well.

5 Adding Machine to Domain

The procedure below describes how to add the machine to the domain.

- > To add a machine to the domain
- **1.** Log in to the machine as a local user.
- 2. From the File Explorer, select the **This PC** icon and right-click on it to view the settings.
- 3. Select Properties.



Figure 5-1:My Computer - Properties

- 4. On the Windows Server 2012 R2/2016 screen, click Change settings.
 - Figure 5-2: Change Settings Link

🛞 🛞 – 🕆 📳 Kontrol I	Panel + System and Security + Sy	/stem		
Control Panel Home	View basic information	about your computer		0
🚱 Device Manager	Windows edition			
🚱 Remote settings	Windows Server 2012 R2 St	andard		
😵 Advanced system settings	© 2013 Microsoft Corpora	tion. All rights reserved.	Windows	Server [®] 2012 R2
	System			
	Processor:	Intel(R) Core(TM) i7-5850EQ CI	PU @ 2.70GHz 2.69 GH	z
	Installed memory (RAM):	6.00 GB		
	System type:	64-bit Operating System, x64-b	ased processor	
	Pen and Touch:	No Pen or Touch Input is avail	able for this Display	
	Computer name, domain, and	workgroup settings		
	Computer name:	EXUM		Change settings
	Full computer name:	EXUM.cloudbond365.local		0
	Computer description:	EXUM		
	Domain:	cloudbond365.local		
	Windows activation			
	Windows is not activated.	Read the Microsoft Software Lic	ense Terms	
See also	Product ID: 00252-40260-3	3000-AAOEM		Activate Windows
Action Center				
Windows Update				Activate Windows
				Go to System in Control

5. On the System Properties screen, click **Change**.

	System Properties
Computer Name Ha	ardware Advanced Remote
Windows on the ne	uses the following information to identify your computer stwork.
Computer description	n: EXUM
	For example: "IIS Production Server" or "Accounting Server".
Full computer name	EXUM.cloudbond365.local
Domain:	cloudbond365.local
To rename this com workgroup, click Ch	iputer or change its domain or Charge
	OK Cancel Apply

Figure 5-3:System Properties

6. Change the Computer Name and Domain, and then click OK.

Figure 5-4:System Properties - Change

	System Proper	ties	L
Computer Na	me/Domain C	hanges 💌	
You can change the name computer. Changes might a	and the membershi affect access to net	p of this work resources.	omputer
iomputer name:			
EXUM			
ull computer name: XUM cloudbond365.loca	1		
		More	-
Memberat		191005	nge
Domain:			
cloudbond365.loca	I I		
O Workgroup:			
	OK	Cancel	
	ОК	Cancel	

7. Insert the user name and password of your domain, and then click **OK**.

		This P	c	
	System Properties			~ 😮 🛄
Computer Name Hardwa	are Advanced Remote	System		_ 🗆 X
Windows user on the network	s the following information to identify your computer k.	System and Security System	~ ¢	Search Control Panel 🔎
Computer description:	For example: "IIS Production Server" or "Accounting Server".	ew basic information about your con	nputer	0
Full computer name:	WIN-0J9GA7GL9SB	Computer Name/Domain Chan	des X	
Workgroup:	WORKGROUP	You can change the name and the membership of	Wi	ndows Security X
To rename this compute workgroup, click Change	or change its domain or Change	Computer name: XUMV2 Full computer name: XUMV2	Computer Name/Dom Enter the name and password domain.	ain Changes of an account with permission to join the
		Member of Domain:	Password Domain: clou	dbond365.local
	UK Cancel Apply	Workgroup:	Connect a	smart card
	9 item See also	ОК		OK Cancel

Figure 5-5:Windows Security

8. Restart the X-UM machine.



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6 Updating Windows with Latest Microsoft Update

In this step, we assume that the machine is ready with Windows 2012 R2/2016 in the customer domain, and configured with the system requirements as detailed in Section 4.1 on page 23.

The procedure below describes how to update Windows with the latest Microsoft operating system update.

- **To perform a Windows update:**
- 1. For Windows 2012 R2: Open the Windows Update screen (Control Panel > System and Security > Windows Update).

For Windows 2016: Open the Settings application – Select **Updates and Security** down the bottom.

2. Update Windows with the latest update.



Figure 6-1: Windows Update for Windows 2012R2

÷	Settings	– 🗆 X
ŝ	Home	Update status
Fin	d a setting $ ho$	No updates are available. We'll continue to check daily for newer updates.
Upda	ate & security	
C	Windows Update	Check for updates
\$	Windows Defender	Update history
0	Recovery	Update settings
\oslash	Activation	Available updates will be downloaded and installed automatically, except over metered connections (where charges
Îŧ	For developers	may apply).
		Change active hours
		Restart options
		Advanced options
		Looking for info on the latest updates?
		Learn more

Figure 6-2: Windows Update for Windows 2016

- **3.** We recommend you disable automatic updates at the end of the process (turn off Automatic Updates), so the X-UM machine does not update itself while in production.
- **4.** The customer can perform Windows updates anytime according to the standards used by the organization for servers.

7

Installing Unified Communications Managed API (UCMA)

The procedure below describes how to install Unified Communications Managed API (UCMA)

You need to use the correct UCMA version according to the table below:

Table 7-1: UCMA Versions

Platform	UCMA Version
Skype For Business	UCMA 5.0
Lync 2013	UCMA 4.0
Lync 2010	UCMA 3.0

To install UCMA:

- 1. Log on to the X-UM Connector as Domain/Skype Administrator and install UCMA.
- Download and install the right UCMA version according to the platform of your system. The step by step installation below was taken from the UCMA 5.0 installation (for Skype) but other UCMA version installation is similar.

Download UCMA 5 from either:

AudioCodes:<u>https://s3.eu-central-1.amazonaws.com/downloads-</u> audiocodes/XUM/UcmaRuntimeSetup.exe

or

Microsoft: https://www.microsoft.com/en-us/download/details.aspx?id=47344

Download UCMA 4 from either:

AudioCodes:<u>https://downloads-</u>

audiocodes.s3.amazonaws.com/XUM/Lync2013/UcmaRuntimeSetup.exe or

Microsoft: https://www.microsoft.com/en-us/download/details.aspx?id=34992

Download UCMA 3 from either:

AudioCodes:https://downloads-

audiocodes.s3.amazonaws.com/XUM/Lync2010/UcmaRuntimeSetup.exe

Microsoft: https://www.microsoft.com/en-us/download/details.aspx?id=10566

3. Run the UCMA UcmaRuntimeSetup.exe setup file as the Administrator.



Figure 7-1: UCMA 5.0 Setup

4. When the installation has completed, the following appears:



Figure 7-2:Installation Complete

5. Click Finish.

8 Installing Skype for Business Component

The procedure below describes how to install the Skype for Business (Local Configuration Store) component using the Skype for Business Deployment wizard, and the Skype for Business Cumulative Update (CU).

> To install Skype for Business Local Configuration Store:

- 1. Log in to the X-UM Connector with domain credentials.
- 2. Run the Microsoft Skype for Business Deployment wizard.



Note: If the installation is running in the customer hardware environment, the customer needs to provide the Skype for Business Deployment_wizard.

Skype for Business Server 2015			
Skype for Business Server			
To install Skype for Business Server 2015, Core Components and start the Deployment Wizard, click Install			
Check for Updates?			
 Connect to the internet to check for updates 			
O Don't check for updates right now			
Specify the location for the installation files. Any additional Skype for Business Server components that you install will also go to this folder Installation Location:			
C:\Program Files\Skype for Business Server 2015 Browse			
Help Install Cancel			

Figure 8-1:Skype for Business Server – Check Updates

3. Click the **Connect to the internet to check for updates** option, and then click **Install**.



a	End User License Agreement	x
	License Agreement	
Please rea	d the following license terms carefully	
MICROS	OFT SOFTWARE LICENSE TERMS	^
SKYPE FO	OR BUSINESS SERVER 2015 STANDARD AND ENTERPRISE EDITIONS R RESALE)	
If you lice MSDN Pro applicable acquired a	ensed Skype for Business Server 2015 through Microsoft's Volume Licensing or ograms, your use of this software is subject to the terms and conditions of the Program agreements. You may not use this software if you have not validly a license for the software from Microsoft or its licensed distributors.	
These lice where yo	ense terms are an agreement between Microsoft Corporation (or based on u live, one of its affiliates) and you. Please read them. They apply to the	~
✓ Laccep	ot the terms in the license agreement	
	OK Cancel	

4. Accept the terms in the license agreement, and then click **OK**; the following appears:

	rigure o-o.Deployment	WIZal a	
1	Skype for Business Server 2015 - Deploy	/ment Wizard	x
Welco	me to Skype for Business Server 2015 deployment		
Deploy			2
	Prepare Active Directory Prepares the Active Directory schema, forest, and domain for Skype for Business Server. Help ▶	Prepare first Standard Edition server Prepares a single Standard Edition server to host Central Management Service. Note: This task requires local administrator rights. This task does not apply to Standard	^
	Install or Update Skype for Business Server System Install or update a Skype for Business Server Server deployment	Edition Servers that are not planned to host the Central Management Service, or for deployments that include Enterprise Edition.	
	member system. This option installs Skype for Business Server core components, and a local replica configuration store. Note: Before installing a server, you need to have a valid topology created and published.	Install Administrative Tools Installs the Administrative Tools to the current system. Your deployment requires at least one installation of the Topology Builder.	Ξ
	nep •	Deploy Monitoring Reports Deploy Monitoring Reports to selected SQL Server Reporting Services (SSRS) instances.	
		Call Quality Dashboard Skype for Business Server 2015, Call Quality Dashboard is a portal that provides OLAP reports to Skype for Business Server administrators to help troubleshoot Call Quality issues.	
		First Run <u>V</u> ideos Click to view aettina started videos.	~
		<u>B</u> ack E <u>x</u> it	

Figure 8-3:Deployment Wizard

5. Click Install or Update Skype for Business Server System; the following appears:

eploy > Install or update		3
Step 1: Install Local Configurat	ation Store ion store and populates with data from Central Management Store.	·
Prerequisites >	_	
Help 🕨		Run
Prerequisites Help Step 3: Request, Install or Ass This step starts the Cert	Determining deployment state	Run
for this system based o	n the topology definition.	
Help >		Run
Step 4: Start Services Manual After you've installed S You can start the servic To start the services in the servers in the pool To ctart the services in	kype for Business Server on all of the servers in the pool, you'll need to start i es in a pool with the Skype for Business Server cmdlets. a user pool, connect to one of the servers in the pool and run the Start-CsPo should be running Skype for Business Server before you use the Start-CsPo a poncuser pool run the Start-CsPindowsSenice cmdlet an even server in t	the services. ol cmdlet. All I cmdlet.

Figure 8-4: Determining Deployment State

6. Click Step 1: Install Local Configuration Store; the installation runs and then the following appears:

Figure 8-5: Executing Commands

ā	Install Local Configuration Store	x
S	Executing Commands	
Enable re Creating CSReplic "Enable- Detailed \Enable- > Replicat \Replicat	eplica service for the Skype for Business Server computer. new log file "C:\Users\administrator.cloudbond365\AppData\Local\Temp\2\Enable- :a-[2017_10_16][15_59_05].html". CSReplica" processing has completed successfully. results can be found at "C:\Users\administrator.cloudbond365\AppData\Local\Temp\2 CSReplica-[2017_10_16][15_59_05].html". ate-CsCmsCertificates status to: C:\Users\administrator.cloudbond365\AppData\Local\Temp\2 teCMSCertificates-[2017_10_16][15_59_05].html	
Task statu Bootstrap	is: Completed.	og
Help	<u>B</u> ack <u>Finish</u> Cance	:1

7. Click Finish.

- > To install Skype for Business Cumulative Update (CU):
- 1. Open PowerShell and stop Skype Services: *Stop-CsWindowsService*
- **2.** Copy the same CU used on the Skype for Business system to the X-UM and run it as the Administrator.
- **3.** Follow the instructions to update Skype for Business components.
- 4. Start Skype Services: Start-CsWindowsService
9 Installing X-UM Connector Application

The procedure below describes how to install the X-UM Connector application using the X-UM Connector wizard setup file.

- > To install the X-UM Connector Application:
- 1. Run the X-UM setup file from C:\xUM_InstalltionFiles\XUMConnector-x.x.x.msi.

Figure 9-1: Run XUMConnector File



The following screen appears:



Figure 9-2: XUMConnector File Setup

2. Click Next.

낭	Audiocodes XUMConnector 0.1.8.0 Setup
Destina Click Ne	tion Folder ext to install to the default folder or dick Change to choose another.
Install A	udiocodes XUMConnector 0.1.8.0 to:
C:\Prog	ram Files\Audiocodes\XUMConnector\ je
	Back Nyxt Cancel

Figure 9-3: Setup Destination Folder

3. Confirm the Destination Folder, and then click **Next**.

Figure 9-4: Ready to Install

netall Audiocod	las VIIMConnacto	-0100		5
	les xomconnecto	10.1.8.0		C
l to begin the instal settings. Click Can	lation. Click Back to re cel to exit the wizard.	view or change any	of your	
	Back	Insta	C	iancel
	nstall Audiocod	I to begin the installation. Click Back to restings. Click Cancel to exit the wizard.	I to begin the installation. Click Back to review or change any settings. Click Cancel to exit the wizard.	I to begin the installation. Click Back to review or change any of your settings. Click Cancel to exit the wizard.



Figure 9-5: Setup Complete

5. Click Finish.



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10 Activating X-UM Connector

The procedure below describes how to activate X-UM Connector on the Skype for Business environment (Trusted application).

- **To activate X-UM Connector:**
- 1. From the Windows menu, right-click on **Search** pane.
- 2. Enter "activate".
- 3. Right-click on activate XUMConnector.

Figure 10-1: Search						
Sea	Search					
Every	where 🗸					
activ	vate XUMConnector	۶				
<u>.</u>	Activate XUMConnector					
14	Pin to Start					
Y**	Pin to Taskbar					
	Uninstall					
_	Open in new window	<u></u>				
acti	Run as administrator					
	Open file location					

Figure 10-1: Search

4. Click **Run as administrator**; the following appears:

Figure 10-2: Activate X-UM Connector



- 5. Follow the script messages. In case of multi-sites, the script prompts you to select a site for the trusted application pool. In case there are several pools on the site, the script prompts you to select the trusted application endpoint registrar.
- 6. Continue to the next sub-section.

10.1 Adding DNS 'A Record'

The procedure below describes which DNS 'A record' needs to be added.

To add a DNS A Record:

1. During the X-UM Connector Activate process (as shown above), a message appears advising you to add a DNS A record to the DNS server.

<u>.a.</u>	Administrator: Activate XUMCon	nector	-		x		
Please wait Skype for Bu	while loading lync module winess Server 2015 identified				^		
Enable-CsRe Enable-C	plica SRenlica					-	
Activate						d	Туре
						25 PM	Text Docu Applicatio
		XUMConnector I	Pool D	NS	Resolv	/e Error	X
		For full XUMConne you must add a DN 'XUMConnector-pr with value of '10.21 Press Retry to valid	ector fui IS A rec ool-s4b .26.11' ate new	nctio ord f 15-1. / DNS	nality, or cloudbo S record	ond365.lo	cal'
	Videos		C	Ret	ry R	Ca	ncel

Figure 10-3: Activate X-UM Connector

2. When the message shown above appears, add the DNS record manually on the DNS server, used by the X-UM Connector, and then click **Retry** to re-check it.

Figure 10-4: Activate X-UM Connector - OK

.a.		Administra	ator: Activa	ate XUMC	onnector		-		x	
Please wait Skype for B	while load usiness Ser	ing lync mod ver 2015 ide	lule entified						^	
Enable-CsR Enable-	eplica CsReplica								-	-
Activat	e al l'anna									d
										25 PM
										23 PM
										×
					XU	MConnector po	ol D	NS re	solve Oł	(
								-	OK	_
		📔 Videos							12	

3. Click OK.

Figure 10-5: Activate X-UM Connector – Activation Successful

Administrator: Activate XUMConnector
Verifying local replication is up to date Waiting for local replication update 0 seconds (up to 10 minutes) Waiting for local replication update 10 seconds (up to 10 minutes) Waiting for local replication update 10 seconds (up to 10 minutes) Waiting for local replication update 20 seconds (up to 10 minutes) Waiting for local replication update 20 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication update 25 seconds (up to 10 minutes) Waiting for local replication endpoint 'sip:XUMConnector-s4b15-10xum.com' for 'XUMConnector' on 'XUMConnector-pool-s4b15-1.cloudbond365.local' Application endpoint 'sip:XUMConnector-s4b15-10xum.com' for 'XUMConnector' on 'X UMConnector-pool-s4b15-1.cloudbond365.local' created successfully Verifying local replication is up to date Replication is up to date
XUMConnector application activated successfully You can safely close this windows
KUNADAJAJA
PS C:\Program Files\Audiocodes\XUMConnector\Activation>

- 4. The screen displays a message that the activation was successfully completed.
- 5. Validate that the X-UM Connector service is running:
 - Service name: XUMConnector
 - Service display name: AudioCodes XUMConnector



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11 Configuring X-UM Connector

This section describes how to configure the X-UM Connector by doing the following:

- Setting the X-UM Connector configuration for customer environment
- Creating users in CloudBond 365 using the CloudBond 365 GUI, or using the lifecycle management capability to create the users automatically.
- Adding users manually to X-UM Connector.

11.1 Setting X-UM Connector Configuration

The procedure below describes how to set the X-UM Connector configuration.

- > To set the X-UM Connector configuration:
- 1. Connect to the X-UM Connector server using Remote Desktop.
- 2. Edit the C:\Program Files\AudioCodes\XUMConnector\Config\System.config file.

The following important parameters' default values need to be changed according to your environment:

outboundHost	Defines the host or IP address for outbound connections – SBC/Gateway IP.
outboundPort	Defines the port for outbound connections.
proxyListenPort	Defines the X-UM Connector listening port. You must open this port for incoming traffic on the X-UM Firewall.
exchUmNumber	Defines the number to dial to log to your Exchange UM mailbox (no need to enter the mailbox number when dialing via this number via the X-UM Connector).
exchUmNoPin	If true, then no user PIN is required when dialing to Exchange UM.

Table 11-1: UM Connector Configuration



Note: For more information about the System Configuration file, read *C:\Program Files\AudioCodes\XUMConnector\Config\XUMConnectorConfiguration.rtf*



Note: Make sure you restart the XM service after changing the config file.

11.2 Adding Users to X-UM Connector

The procedure below describes how to add users to the X-UM server. The users must be enabled for Skype Enterprise Voice.

You have three options for managing the users:

- Manual procedure using a *csv* file
- Active Directory Sync schedule script
- REST API
- To add users to the X-UM Connector using a CSV file:
- 1. Connect to the X-UM Connector server using Remote Desktop.
- 2. Edit the C:\Program Files\AudioCodes\XUMConnector \Users\users.csv file.

Note:



- Changes made to the file are immediately applied. There is no need to restart the service.
- For X-UM HA, the users file must be a network storage, accessible for all X-UM servers.

#

```
# This file contains the list of users for the application
# The file must be in CSV format with a header line containing
field 'SipUri' and 'Extension'
# SipUri must be the full SIP URI of the user to register, for
example 'sip:userl@example.org'
#
# The Extension field is used to map a phone extension
registration and its SIP URI.
# Multiple extensions per user are supported by separating
them with '|'. For example '4001 | 4002'.
# Sample file contents:
#
# SipUri,Extension
# sip:userl@example.net , 4001
#
# Empty lines, and lines beginning with '#' are ignored
#
SipUri,Extension
```

> To add users to the X-UM Connector using the Active Directory Sync script:

- 1. Connect to the X-UM Connector server using Remote Desktop.
- 2. Under C:\Program Files\AudioCodes\XUMConnector\UsersSync folder you can find the Active Directory (AD) sync files:
 - ReadMe.txt This defines how to set the AD sync.
 - XumUsersSync.ps1 This is the main PowerShell script.



Note: The PowerShell script should not be modified.

- Config.ps1.DIST This is the default distribution configuration file.
- XumUsersSync.bat This is a batch file convenience wrapper for running the synchronization script.

By default, synchronization is disabled (because it doesn't know the custom AD group name).

To enable synchronization:

- Save Config.ps1.DIST as Config.ps1 and edit it as follows:
 - Change Enabled to \$true (Enabled = \$true).
 - Set GroupName to the AD group containing X-UM users.
 - Optional, set ExtensionAttribute to the attribute name containing the user extension. In PowerShell, run 'Get-ADUser <user> -Properties *' to view all user property names and values.
 - Optional, Change CsvFilePath to the CSV file path. By default, it is the users.csv file in the user's folder in the Installation directory, and usually there is no need for it to be modified.
 - If using X-UM HA, you must change it to the network shared CSV user's file.
 - Optional, change X-UM Windows task scheduler schedule as needed. By default, it runs every night. The entry is under the "AudioCodes" folder in the task scheduler.

3. Testing Synchronization:

It is possible to run the synchronization task immediately from the task scheduler (under the "AudioCodes" folder).

This should generate a "log" directory and a log file in this directory with details of the last synchronization results. Verify that the user's CSV file is updated accordingly.

> To add users to the X-UM Connector using REST API

- **1.** Using the REST API, you can manage users with the basic operation of Add, Delete, and Edit user information.
- 2. The REST API format can be seen using the Swagger Web interface, where you can see the API calls, parameters per API and the format of the result.
- **3.** By default, the REST API is blocked from the external, to allow the REST API from the remote need to change it on the X-UM configuration file.



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12 Obtaining the License

The procedure below describes how to obtain the license from AudioCodes. The system works with a maximum of three users without a license. To obtain a license, you need to get the X-UM machine ID first by doing the following:

- To get the X-UM machine ID:
- 1. Connect to the X-UM server using Remote Desktop.
- 2. Browse from a local browser to http://localhost:9999/swagger.
- 3. Open the License link and click on the <u>/license/machineld</u> link.

ligure 12-1: Residenter AFT					
💮 swagger	http://localhost:9999/swagger/docs/v1				
RestServer API					
AppConfig					
License					
Mwi					
Sysinfo					
Token					
Users					
BASE URL , API VERSION	v1]				

Figure 12-1: RestServer API

The following appears:



💮 swagger		http://localhost:9999/swagger/docs/v1
Rest	Server API	
AppC	onfig	
Licen	se	
GET	/license/machineld	
GET	/license	
POST	/license	
GET	/license/usage	

4. Click GET license/machinelD; the following appears:



5. Click **Try it out!**; the following appears:

Figure 12-4: License Response Body

License	Show/Hide	List Operations	Expand Operations
GET //icense/machineld	Get mac	hine ID that is used	for creating a license
Response Class (Status 200) string			
Response Content Type [application/json 🗸] Try it out] Hide Response			
Curl			
<pre>curl -X GETheader 'Accept: application/json' 'http://localhost:9999/license/machine</pre>	Id'		
Request URL			
http://localhost:9999/license/machineId			
Response Body			
"90a52b2b27c24f11ad3ac2d30e5bf333"			
Response Code			
200			

- 6. Under the 'Response Body' heading, the Machine ID appears within quotes (" ").
- 7. Supply the Machine ID, <u>without</u> quotes, to AudioCodes.
- 8. Activate the license after receiving the license from AudioCodes by doing the following:
 - a. On the License screen, click POST.
 - **b.** Insert the license string that you received from AudioCodes, in the **Value** field under the **Parameters** heading.



Note: Make sure you enter the license string WITH quotes (" ").

Figure 12-5: Inserting License String

icens	se				Show/Hide L	ist Oper
GET	/license	/machineld			Get machine	ID that
GET	/license					
POST	/license				App	olies nev
Param	ieters					
Parame	eter	Value		Description	Parameter Type	Data
licenseString		UInawxCD5GTUJASIXNC QlNURFN5c1BhaXIiOjA wLCJDQ1Byb1N5c1BhaX 1z1jowLCJDQkVOVFN5c 2hpbmVJRCI6Ij2jN2I4 YmNiMjFiMTQ3YmUwZmQ azpAEZzjr28KwjirUzw	01RE031Z1JOWLCJD sIkNCUHJVU31ZIJO Ii0JASIkNCRU5UU3 IBAXII0JASIK1hY YTViNTZKNDRkMZRh 3In0. NrnT31yo0a 29vhQ7sHbqbMc"	License string (Add quotes in swagger)	body	string
		Parameter content type:				
		application/json	~			
Respo	nse Mes	sages				
HTTP S	Status Cod	e Reason	Response Model			
204		No Content		ß		
Try it o	outl Hide	Response				

9. Click Try it out!.



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13 Configuring the SBC in X-UM Solution

The telephony connection between the IP-PBX, PBX or PSTN to Skype and X-UM Connector is performed using the SBC/Gateway.

The IP-PBX, PBX or PSTN is referred to as IP-PBX. 'A' refers to the IP-PBX extension or external number while 'B' refers to the IP-PBX extension.

For detailed flows see Section 3.3 Call Flows on page 17.

The SBC participates in the following X-UM scenarios:

'A' calls 'B' on the IP-PBX, and the call is forwarded to the Exchange UM to leave a voice message

In this scenario, the SBC routes the call to the Mediation server running on the Front End Server. The SBC has to manipulate the numbers to match the user's numbers format.

'A' calls to log in to the Exchange UM

In this scenario, the SBC routes the call to the X-UM Connector, which converts 'A's phone number to an 'A' SIP URI and uses it to log in to the mailbox. The SBC has to manipulate the number to match the user's numbers on the X-UM Connector user file. In this flow, by default, use the direct login without entering the mailbox number and PIN.



Note: This scenario can be routed to the Mediation server using the special Exchange Login number. In this case, the Exchange asks you to enter mailbox 'A' and the PIN number.

MWI Interrogate (MWI Subscribe)

In this scenario, the IP-PBX checks the Message Waiting Indicator (MWI) state per extension (It is used most of the time after phone/IP-PBX has been reset).

The SBC routes these messages to the X-UM Connector. The SBC has to manipulate the number to match the user's numbers on the X-UM Connector user file.

MWI Notify

In this scenario, the X-UM Connector sends a MWI SIP Notify to the IP-PBX. The SBC routes these messages from the X-UM Connector to the IP-PBX. The SBC has to manipulate the number to match IP PBX extensions. The X-UM Connector supports solicited MWI and unsolicited MWI.

Play on Phone

In this scenario, the user uses the Play on Phone feature on the Exchange UM. When the user opens a Voice message, it can be played on the phone instead of the computer.

If the user enters the SIP URI user or Tel URI user as the destination, the call is routed using the X-UM Connector, to the SBC and IP-PBX.

If the user enters a non-user number, the call is routed to the SBC and IP PBX, using the Mediation server. The SBC have has to route these calls correctly.

Callback

In this scenario, the user logs in to the mailbox and dials out from it, back to the caller who left the voice message.

If the user is calling a SIP URI user or Tel URI user, the call is routed using the X-UM Connector, to the SBC and IP-PBX.

If the user enters a non-user number, the call is routed using the Mediation server to the SBC and IP-PBX.

13.1 X-UM Connector SIP Interface

The X-UM SIP interface supports TCP only. The default listening port is '5070'. However, it can be changed using the Configuration file. The X-UM Connector answers SIP Option messages. The SBC can check that the X-UM connector is running, using SIP Option messages.

13.2 SBC Configuration Fundamentals

The SBC must be set to work with Skype for Business according to the SBC documentation (for example, Handle Refer Locally, Security Settings). According to the above scenarios you need to set the routing between the IP PBX, X-UM Connector and Mediation server.

Number manipulation should be done according to the Skype for Business Tel URI and according to the X-UM user's file that holds phone numbers for mapping between SIP URI and IP PBX phone numbers.

Notes:

- The SBC must be set to work in Skype for Business according to SBC documentation.
- You need to set the routing between the IP-PBX and the X-UM Connector and Mediation server, according to the above scenarios.
- Number manipulation should be done according to the Skype Tel URI X-UM user's files that hold phone numbers for mapping between SIP URI and IP PBX phone numbers.

For an ini file example, see Appendix C on page 69.

14 Using X-UM Connector Debugging Tools

This section describes the following X-UM Connector debugging tools.

- X-UM Log
- X-UM Connector Running in Console Mode
- Syslog
- OCS Logger and Wireshark

14.1 X-UM Log

The X-UM Connector writes logs to C:\Program Files\AudioCodes\XUMConnector\log.

14.2 X-UM Connector Running in Console Mode

When you run the X-UM Connector in Console mode, it provides an online console with the log messages in it.

> To run the X-UM Connector in console mode:

- 1. Stop the AudioCodes X-UM Connector service.
- 2. Search for 'Run XUMConnector' in Console mode and run it as the Administrator.
- 3. When you finish the debug, stop the console by pressing "q" and run the service again.

14.3 Syslog

The X-UM Connector supports Syslog.

- To configure Syslog:
- 1. Connect to X-UM server using Remote Desktop.
- 2. Edit the C:\Program Files\AudioCodes\XUMConnector\Config\System.config file.
- **3.** Add and configure the following parameters:
 - **syslogEnabled** Enables logging to the Syslog server. The default value is 'False'.
 - **syslogServer** Defines the Syslog server IP address.



Note: The *syslogServer* value must be an IPv4 address. Names are not allowed because IPv6 is not supported. The default value is "127.0.0.1".

• **syslogPort** - Syslog server port DefaultValue = "514"

14.4 OCS Logger and Wireshark

OCS Logger and Wireshark can be used to take traces of the SIP messages. The tools can be found under C:\Program Files\AudioCodes\XUMConnector\Tools.



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A HA and DR

There are several different levels of High Availability / DR in a X-UM environment:

- HA/DR at the Skype level for example, enterprise users pool, pool pairing, etc.
- HA between X-UM servers the ability to provide X-UM services if a X-UM server fails.

A.1 HA/DR On Skype level

X-UM works with Skype pools, pools with multi FE are "transparent" for X-UM that work with the pool like other Skype components. If the FE is down, the X-UM connects to another FE from the pool, like it does for other Skype components.

If pool pairing is used, the X-UM is activated towards one pool.

While both pools are up, the X-UM provides full functionality for users from all pools.

When the pool is down and it's the pool that holds the local store, then first fail over the local store to the active pool.

To supply full service for users from the fail pool, **pool fail over** needs to be performed.

If pool failover is not done, only partial functionality is provided: Deposit Voice message/Missed call and access to the mailbox still work.

A.2 HA On X-UM level

X-UM provides **automatic** HA for users by distributing the users between X-UM servers.

Each user is automatically assigned a unique X-UM server. If one server fails, then another server takes over responsibility for this user.

X-UM HA is implemented without any manual configuration.

There is no limit to the number of X-UM servers that can be configured in the HA setup. All servers in the HA configuration are active (there is no standby server), and users load are distributed evenly between them.

Each X-UM sends and listens to 'ImAlive' messages using a <u>UDP multicast address</u>. By using this multicast address, each server automatically discovers all servers, and there is no need to configure the list of servers.

A.2.1 Conditions for HA

Each X-UM server is configured with a path to a CSV file containing the list of users.

By default, this CSV file is a local file, located at 'Users\users.csv' relative to the X-UM installation location.

X-UM HA is only activated if the users file is located at a shared network location. Therefore, HA is disabled by default until a shared network path is defined for the users file.

Specifically, HA is activated only if the users file starts with "\\".

A.2.2 Incoming Messages Redirection

In a HA environment, incoming messages from the proxy side (SBC/gateway) should reach the HA user owner server. This is relevant for the following example scenarios:

- User MWI subscribe session
- User extension dial (if enabled)



Note: VM access calls (*151) are not redirected, because an impersonated application endpoint is used in an outgoing call to Lync.

Also, note that VM direct deposit prefix (*55) calls are also not redirected, because they are not necessarily the HA owner for the call. They can be from any PSTN number.

Since the proxy server is not aware of the current user owner server, X-UM replies with a **SIP redirect** response to the HA user owner server. The redirect address is taken from the ExtraData field sent by each server.



Important: The redirect messages destination is the server FQDN, not the IP address. This means that the proxy (SBC) must configured to use a DNS that can resolve the X-UM host names.

An example contact header of a redirect message is:

```
CONTACT: <sip:ron-devel-02.lync2013.net:5070;transport=Tcp>
```

Below is a sample redirect call flow by a user to access their voicemail:

- 1. Proxy server 10.13.2.141 sends an Invite to X-UM1 at 10.21.0.19.
- 2. X-UM1 receives the Invite from user. It finds that the user is not managed locally, however it is on X-UM2 at 10.21.0.219.
- 3. X-UM1 sends the proxy a 303 redirect to 10.21.0.219.
- 4. The Proxy sends a new invite to 10.21.0.219, and the call continues normally,

Local Area Connection (po	rt 5070) - Graph Analysis	
Time	10.13.2.141 10.21.0.219 10.21.0.19	Comment
15:42:22.977843000	INVITE SDP (g722	SIP From: "4004" <sip:4001@10.21.0.19:5070 td="" to:<sip:*151@1(<=""></sip:4001@10.21.0.19:5070>
15:42:23.002928000	(57778) 100 Trying	SIP Status
15:42:23.203174000	303 Proxy Should	SIP Status
15:42:23.204412000	(57778) ACK	SIP Request
15:42:23.207532000	INVITE SDP (g722 g711A opus g711.	SIP From: "4004" < sip:4001@10.21.0.19:5070 To: < sip:*151@1(
15:42:23.209121000	(57779) 100 Trying	SIP Status
15:42:23.408055000	101 Progress Report	SIP Status
15:42:23.408055000	183 Session Progress	SIP Status
15:42:23.607993000	(57779) 101 Diagnostics	SIP Status
15:42:23.607993000	101 Diagnostics	SIP Status
15:42:23.808172000	(5070)	SIP Status
15:42:23.808172000	101 Diagnostics	SIP Status
15:42:24.008078000	200 OK SDP (g722 g711A g711U tele!	SIP Status
15:42:24.034559000	(57779) ACK	SIP Request
15:42:34.281905000	(57779) BYE (5070)	SIP Request
15:42:34.284037000	(57779)1 200 OK (5070)	SIP Status
	۰ III III III	
	Save <u>A</u> s	<u>C</u> lose

Figure A-1: Incoming Messages Redirection

A.2.2.1 Proxy Configuration

Ideally, the proxy (SBC) should be configured to distribute load evenly between all HA servers, while periodically checking that all servers are alive.

The list of servers that can be configured manually, or resolved using the common X-UM DNS pool address, that should be configured in DNS to all X-UM servers, as part of the activation.

In any case, the proxy should periodically verify that the server is still alive, possibly using a SIP options request.

A.2.3 Web GUI Swagger

The Web GUI using Swagger is available for:

- Retrieving HA status including a list of all HA servers and their uptime
- Retrieving the user's owner the calculated owner of each user.



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B Creating Virtual Machine on Hyper-V for X-UM Connector

This appendix describes how you can create a Virtual Machine on the Hyper-V for the X-UM Connector, when you have a Hyper-V virtual hard disk (VHDX) with Windows Server.

B.1 Creating the X-UM Connector Virtual Machine

The procedure below describes how to create the X-UM Connector virtual machine.

- > To create the X-UM Connector virtual machine:
- 1. Open the Hyper-V Manager.
- 2. Right-click on your physical server name (tree item); the following appears:

11			
File Action	view Help		
(* =) 🖄			
Hyper-V I	Manager		
UC-N	New	Nitual Machine	
	Import Virtual Machine	Hard Disk	PUI
	Hyper-V Settings	Floppy Disk	
	Virtual Switch Manager	Running	1%

Figure B-1: Hyper-V Manager

3. Click New; and then select Virtual Machine; the following appears:

Figure B-2: Before You Begin

	New Virtual Machine Wizard
Before You	Begin
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	 This wizard helps you create a virtual machine. You can use virtual machines in place of phys computers for a variety of uses. You can use this wizard to configure the virtual machine nor you can change the configuration later using Hyper-V Manager. To create a virtual machine, do one of the following: Click Finish to create a virtual machine that is configured with default values. Click Next to create a virtual machine with a custom configuration.
	Do not show this page again Constructions Finish

4. Click **Next**; the following appears:

Figure B-3: Specify Name and Location

b.	New Virtual Machine Wizard			
Specify Nat	me and Location			
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Installation Options Summary	Choose a name and location for this virtual machine. The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload. Name: xLM You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server. Control C: (ProgramData Microsoft) Windows (Hyper-V) Figure a large amount of space. The output take checkpoints of this virtual machine, select a location that has enough the space. Checkpoints include virtual machine data and may require a large amount of space.			
	< Previous Next > Finish Cancel			

- 5. In the 'Name' field, enter "XUM".
- 6. Select the 'Store the virtual machine in a different location' check box.
- 7. Click Browse.
- 8. In the 'Location' field, enter the storage path to hold the VM.
- 9. Click Next.

Figure B-4: Specify Name and Location – Updated Location

ð.	New Virtual Machine Wizard
Specify Name	e and Location
Before You Begin Specify Name and Location Specify Generation Assign Memory Configure Networking Connect Virtual Hard Disk Summary	Choose a name and location for this virtual machine. The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload. Name: XUM You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server. ✓ Store the virtual machine in a different location Location: D:\Hyper-V\/ Erowse If you plan to take checkpoints of this virtual machine, select a location that has enough free space. Checkpoints include virtual machine data and may require a large amount of space.
	< <u>P</u> revious <u>N</u> ext > ⊟inish Cancel

10. Click **Next**; the following appears:

Figure B-5: Specify Generation



11. Select the correct **Generation** option according to your VHDX, and then click **Next**; the following appears:



Figure B-6: Assign Memory

12. In the 'Startup memory' box, allocate **6144 MB** to the machine, and then click **Next**; the following appears:

*	New Virtual Machine Wizaru
Configure N	letworking
Before You Begin Specify Name and Location Specify Generation	Each new virtual machine includes a network adapter. You can config virtual switch, or it can remain disconnected. Connection: Not Connected
Assign Memory	Not Connected DMZ
Configure Networking	AN WDS K
Connect Virtual Hard Disk Installation Options	
Summary	
	< Previous Next >

Figure B-7: Configure Networking

13. From the 'Connection' drop-down list, select the correct network card; and then click **Next**.





14. Click the Use an existing virtual hard disk option.

- **15.** In the 'Location' field, browse to the location of your VHDX.
- 16. Click Next.

•	New Virtual Machine Wizard			
Completing	the New Virtual Machine Wizard			
Before You Begin Specify Name and Location Specify Generation	You have successfully completed the New Virtual Machine Wizard. You are about to cre following virtual machine. Description:			
Assign Memory Configure Networking Connect Virtual Hard Disk Summary	Name: xUM Generation: Generation 1 Memory: 6144 MB Network: LAN Hard Disk: D:\Hyper-V\Virtual Hard Disks\xUM.vhdx (VHDX, dynamically expanding			
	To create the virtual machine and close the wizard, click Finish.			
	< Previous Next > Finite			

17. Click Finish.

B.2 Configuring X-UM Connector Virtual Machine

The procedure below describes how to configure the Virtual Machine.

- > To configure the X-UM Connector Virtual Machine:
- 1. Start the Hyper-V Manager.

Figure B-10: Hyper-V Manager

				Hyper-	V Manager
<u>F</u> ile <u>A</u> ction <u>V</u> iew <u>H</u> elp					
🗢 🄿 🙍 🖬					
Hyper-V Manager	Virtual Machines				
	Name	State	CPU Usage	Assigned Memory	Uptime
	Edge	Running	0%	8192 MB	2.21:02:58
	EXUM-Connector	Running	0%	6144 MB	2.21:06:41
	Front-End	Running	23%	12288 MB	2.21:04:01
	XUM	Off			
	XUM-Scratch	Off			

2. Right-click **xUM**, and then select **Settings**.

Figure B-11: Virtual Machines

	1000000	1.		
Name	State	CPU Usage	Assigned Memory	
Edge	Running	0%	8192 MB	
EXUM-Connector	Running	0%	6144 MB	
Front-End	Running	18%	12288 MB	
xUM		-	1	
XUM-Scratch	Connect			
	Settings			

3. From the 'Settings' drop-down list, select **Processor**.

Figure B-12: Processor Settings



4. From the 'Hardware' drop-down list, modify the number of virtual processors to "4".

Figure B-13: Number of Virtual Processors



5. From the 'XUM' drop-down list, select Automatic Start Action.



Figure B-14: XUM - Automatic Start Action

6. Select the Always start this virtual machine automatically option, and then click OK.



Figure B-15: X-UM - Automatic Start Action – Startup Delay

C INI File Example

In reference to Section 13.2 on page 54, an *ini* file example is shown below:

```
***********
;** Ini File **
;*********
;Board: M800B
;HW Board Type: 69 FK Board Type: 72
;Serial Number: 7559363
;Slot Number: 1
;Software Version: 7.20A.152.009
;DSP Software Version: 5014AE3 R => 721.09
;Board IP Address: 172.17.240.102
;Board Subnet Mask: 255.255.255.240
;Board Default Gateway: 172.17.240.97
;Ram size: 512M Flash size: 64M Core speed: 500Mhz
;Num of DSP Cores: 3 Num DSP Channels: 30
;Num of physical LAN ports: 4
; Profile: NONE
;;;Key features:;Board Type: M800B ;Security: IPSEC
MediaEncryption StrongEncryption EncryptControlProtocol ; IP Media:
VXML ;Channel Type: DspCh=30 ;HA ;DSP Voice features: IpmDetector
RTCP-XR ;E1Trunks=1 ;T1Trunks=1 ;FXSPorts=4 ;FXOPorts=0 ;Coders:
G723 G729 G728 NETCODER GSM-FR GSM-EFR AMR EVRC-QCELP G727 ILBC
EVRC-B AMR-WB G722 EG711 MS RTA NB MS RTA WB SILK NB SILK WB
SPEEX NB SPEEX WB OPUS NB OPUS WB ; QOE features:
VoiceQualityMonitoring MediaEnhancement ;DATA features: ;Control
Protocols: MSFT FEU=100 TestCall=100 MGCP SIP SASurvivability
SBC=50 ;Default features:;Coders: G711 G726;
;----- HW components-----
;
; Slot # : Module type : # of ports
;-----
     1 : FALC56 : 1
;
      2 : FALC56
                     : 1
;
      3 : FXS
                    : 4
[SYSTEM Params]
SyslogServerIP = 172.17.240.100
EnableSyslog = 1
DebugRecordingDestIP = 10.31.2.47
;VpFileLastUpdateTime is hidden but has non-default value
TR069ACSPASSWORD = '$1$qQ=='
TR069CONNECTIONREQUESTPASSWORD = '$1$gQ=='
NTPServerIP = '0.0.0.0'
;AUPDNETWORKSOURCE is hidden but has non-default value
;LastConfigChangeTime is hidden but has non-default value
```

Caudiocodes

```
;BarrierFilename is hidden but has non-default value
;PM gwINVITEDialogs is hidden but has non-default value
;PM gwSUBSCRIBEDialogs is hidden but has non-default value
;PM gwSBCRegisteredUsers is hidden but has non-default value
;PM gwSBCMediaLegs is hidden but has non-default value
;PM gwSBCTranscodingSessions is hidden but has non-default value
[BSP Params]
PCMLawSelect = 3
UdpPortSpacing = 10
EnterCpuOverloadPercent = 99
ExitCpuOverloadPercent = 95
[Analog Params]
[ControlProtocols Params]
AdminStateLockControl = 0
[MGCP Params]
[MEGACO Params]
[PSTN Params]
[SS7 Params]
[Voice Engine Params]
CallProgressTonesFilename = 'usa tones 13.dat'
[WEB Params]
LogoWidth = '145'
HTTPSCipherString = 'RC4:EXP'
;HTTPSPkeyFileName is hidden but has non-default value
;HTTPSCertFileName is hidden but has non-default value
[SIP Params]
PLAYRBTONE2IP = 1
ISREGISTERNEEDED = 1
GWDEBUGLEVEL = 5
ENABLEEARLYMEDIA = 1
TCPLOCALSIPPORT = 5067
```

```
ENABLEUSERINFOUSAGE = 1
USERINFOFILENAME = 'UserInfo-Numbers.txt'
ENABLESBCAPPLICATION = 1
MSLDAPPRIMARYKEY = 'telephoneNumber'
TESTCALLID = '1013'
TESTCALLDTMFSTRING = '11'
ENERGYDETECTORCMD = 587202560
ANSWERDETECTORCMD = 10486144
:GWAPPCONFIGURATIONVERSION is hidden but has non-default value
[IPsec Params]
[SNMP Params]
[ PhysicalPortsTable ]
FORMAT PhysicalPortsTable Index = PhysicalPortsTable Port,
PhysicalPortsTable Mode, PhysicalPortsTable SpeedDuplex,
PhysicalPortsTable PortDescription,
PhysicalPortsTable GroupMember, PhysicalPortsTable GroupStatus;
PhysicalPortsTable 0 = "GE 4 1", 1, 4, "User Port #0", "GROUP 1",
"Active";
PhysicalPortsTable 1 = "GE 4 2", 1, 4, "User Port #1", "GROUP 1",
"Redundant";
PhysicalPortsTable 2 = "GE 4 3", 1, 4, "User Port #2", "GROUP 2",
"Active";
PhysicalPortsTable 3 = "GE 4 4", 1, 4, "User Port #3", "GROUP 2",
"Redundant";
[ \PhysicalPortsTable ]
[ EtherGroupTable ]
FORMAT EtherGroupTable Index = EtherGroupTable Group,
EtherGroupTable Mode, EtherGroupTable Member1,
EtherGroupTable Member2;
EtherGroupTable 0 = "GROUP_1", 2, "GE_4_1", "GE_4_2";
EtherGroupTable 1 = "GROUP 2", 2, "GE 4 3", "GE 4 4";
EtherGroupTable 2 = "GROUP 3", 0, "", "";
EtherGroupTable 3 = "GROUP 4", 0, "", "";
[ \EtherGroupTable ]
[ DeviceTable ]
FORMAT DeviceTable Index = DeviceTable VlanID,
DeviceTable UnderlyingInterface, DeviceTable DeviceName,
DeviceTable_Tagging, DeviceTable_MTU;
DeviceTable 0 = 1, "GROUP 1", "vlan 1", 0, 1500;
```

Caudiocodes

```
DeviceTable 1 = 180, "GROUP 1", "vlan 2", 1, 1500;
[ \DeviceTable ]
[ InterfaceTable ]
FORMAT InterfaceTable Index = InterfaceTable ApplicationTypes,
InterfaceTable InterfaceMode, InterfaceTable IPAddress,
InterfaceTable PrefixLength, InterfaceTable Gateway,
InterfaceTable InterfaceName,
InterfaceTable PrimaryDNSServerIPAddress,
InterfaceTable SecondaryDNSServerIPAddress,
InterfaceTable UnderlyingDevice;
InterfaceTable 0 = 6, 10, 172.17.240.102, 28, 172.17.240.97,
"O+M+C", 0.0.0.0, 0.0.0.0, "vlan 1";
InterfaceTable 1 = 5, 10, 195.189.192.90, 28, 195.189.192.81,
"DMZ", 0.0.0.0, 0.0.0.0, "vlan 2";
[ \InterfaceTable ]
[ WebUsers ]
FORMAT WebUsers Index = WebUsers Username, WebUsers Password,
WebUsers Status, WebUsers PwAgeInterval, WebUsers SessionLimit,
WebUsers CliSessionLimit, WebUsers SessionTimeout,
WebUsers BlockTime, WebUsers UserLevel, WebUsers PwNonce,
WebUsers SSHPublicKey;
WebUsers 0 = "Admin",
"$1$dUJFFEBPTE5PSx1G47jhure3seHu67y4v+y/7vOk96TwoKOm+qGur6ip+/qUw8
TCwJCfkJjLm8jOmcybiNeE0dc=", 1, 0, 2, -1, 15, 60, 200,
"08a41bffc130c4219ea6b7597801f572", "";
WebUsers 1 = "User",
"$1$fRt0S0S4u+bg5+S3uu+ys7y+77ajoaKj8PDwo6+go675/62gxMKbxp0On5Gdy5
/NlJ2aloKD040EgYeDgYuL39k=", 1, 0, 2, -1, 15, 60, 50,
"2a9cce31b8ac674d6c92103c21916281", "";
[ \WebUsers ]
[ TLSContexts ]
FORMAT TLSContexts Index = TLSContexts Name,
TLSContexts TLSVersion, TLSContexts DTLSVersion,
TLSContexts ServerCipherString, TLSContexts ClientCipherString,
TLSContexts_RequireStrictCert, TLSContexts_OcspEnable,
TLSContexts_OcspServerPrimary, TLSContexts_OcspServerSecondary,
TLSContexts_OcspServerPort, TLSContexts OcspDefaultResponse,
TLSContexts DHKeySize;
TLSContexts 0 = "default", 0, 0, "RC4:AES128", "DEFAULT", 0, 0,
0.0.0.0, 0.0.0.0, 2560, 0, 1024;
[ \TLSContexts ]
```
```
[ AudioCodersGroups ]
FORMAT AudioCodersGroups Index = AudioCodersGroups Name;
AudioCodersGroups 0 = "AudioCodersGroups 0";
[ \AudioCodersGroups ]
[ IpProfile ]
FORMAT IpProfile Index = IpProfile ProfileName,
IpProfile IpPreference, IpProfile CodersGroupName,
IpProfile IsFaxUsed, IpProfile JitterBufMinDelay,
IpProfile JitterBufOptFactor, IpProfile IPDiffServ,
IpProfile SigIPDiffServ, IpProfile RTPRedundancyDepth,
IpProfile CNGmode, IpProfile VxxTransportType, IpProfile NSEMode,
IpProfile IsDTMFUsed, IpProfile PlayRBTone2IP,
IpProfile EnableEarlyMedia, IpProfile ProgressIndicator2IP,
IpProfile EnableEchoCanceller, IpProfile CopyDest2RedirectNumber,
IpProfile MediaSecurityBehaviour, IpProfile CallLimit,
IpProfile DisconnectOnBrokenConnection,
IpProfile FirstTxDtmfOption, IpProfile SecondTxDtmfOption,
IpProfile_RxDTMFOption, IpProfile_EnableHold, IpProfile_InputGain,
IpProfile VoiceVolume, IpProfile AddIEInSetup,
IpProfile SBCExtensionCodersGroupName,
IpProfile MediaIPVersionPreference, IpProfile TranscodingMode,
IpProfile SBCAllowedMediaTypes,
IpProfile_SBCAllowedAudioCodersGroupName,
IpProfile SBCAllowedVideoCodersGroupName,
IpProfile SBCAllowedCodersMode,
IpProfile SBCMediaSecurityBehaviour, IpProfile SBCRFC2833Behavior,
IpProfile SBCAlternativeDTMFMethod, IpProfile SBCAssertIdentity,
IpProfile AMDSensitivityParameterSuit,
IpProfile AMDSensitivityLevel, IpProfile AMDMaxGreetingTime,
IpProfile AMDMaxPostSilenceGreetingTime,
IpProfile SBCDiversionMode, IpProfile SBCHistoryInfoMode,
IpProfile_EnableQSIGTunneling, IpProfile_SBCFaxCodersGroupName,
IpProfile SBCFaxBehavior, IpProfile SBCFaxOfferMode,
IpProfile SBCFaxAnswerMode, IpProfile SbcPrackMode,
IpProfile SBCSessionExpiresMode, IpProfile SBCRemoteUpdateSupport,
IpProfile SBCRemoteReinviteSupport,
IpProfile SBCRemoteDelayedOfferSupport,
IpProfile SBCRemoteReferBehavior, IpProfile SBCRemote3xxBehavior,
IpProfile SBCRemoteMultiple18xSupport,
IpProfile SBCRemoteEarlyMediaResponseType,
IpProfile SBCRemoteEarlyMediaSupport,
IpProfile EnableSymmetricMKI, IpProfile MKISize,
IpProfile SBCEnforceMKISize, IpProfile SBCRemoteEarlyMediaRTP,
IpProfile SBCRemoteSupportsRFC3960,
IpProfile SBCRemoteCanPlayRingback, IpProfile EnableEarly183,
IpProfile EarlyAnswerTimeout, IpProfile SBC2833DTMFPayloadType,
IpProfile SBCUserRegistrationTime,
IpProfile ResetSRTPStateUponRekey, IpProfile AmdMode,
IpProfile SBCReliableHeldToneSource, IpProfile GenerateSRTPKeys,
IpProfile_SBCPlayHeldTone, IpProfile SBCRemoteHoldFormat,
IpProfile_SBCRemoteReplacesBehavior, IpProfile SBCSDPPtimeAnswer,
IpProfile SBCPreferredPTime, IpProfile SBCUseSilenceSupp,
IpProfile SBCRTPRedundancyBehavior,
```

```
IpProfile SBCPlayRBTToTransferee, IpProfile SBCRTCPMode,
IpProfile SBCJitterCompensation,
IpProfile SBCRemoteRenegotiateOnFaxDetection,
IpProfile JitterBufMaxDelay,
IpProfile SBCUserBehindUdpNATRegistrationTime,
IpProfile SBCUserBehindTcpNATRegistrationTime,
IpProfile SBCSDPHandleRTCPAttribute,
IpProfile SBCRemoveCryptoLifetimeInSDP, IpProfile SBCIceMode,
IpProfile_SBCRTCPMux, IpProfile SBCMediaSecurityMethod,
IpProfile SBCHandleXDetect, IpProfile SBCRTCPFeedback,
IpProfile SBCRemoteRepresentationMode,
IpProfile SBCKeepVIAHeaders, IpProfile SBCKeepRoutingHeaders,
IpProfile SBCKeepUserAgentHeader,
IpProfile SBCRemoteMultipleEarlyDialogs,
IpProfile SBCRemoteMultipleAnswersMode,
IpProfile SBCDirectMediaTag,
IpProfile SBCAdaptRFC2833BWToVoiceCoderBW,
IpProfile CreatedByRoutingServer, IpProfile SBCFaxReroutingMode,
IpProfile SBCMaxCallDuration, IpProfile SBCGenerateRTP,
IpProfile SBCISUPBodyHandling, IpProfile SBCISUPVariant,
IpProfile SBCVoiceQualityEnhancement, IpProfile SBCMaxOpusBW,
IpProfile LocalRingbackTone, IpProfile LocalHeldTone;
IpProfile 1 = "CloudBond", 1, "AudioCodersGroups 0", 0, 10, 10,
46, 40, 0, 0, 2, 0, 0, 0, 0, -1, 1, 0, 0, -1, 1, 4, -1, 1, 1, 0, 0, "", "", 0, 0, "", "", 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 8, 300, 400, 0, 0, 0, "", 0, 0, 1, 3, 0, 1, 1, 1, 3, 2, 1, 0, 1, 0, 0, 1, 1, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 0, 0, 1, -1, -1,
0, 0, 0, 0, 0, 0, 0, -1, -1, -1, -1, -1, 0, "", 0, 0, 0, 0, 0, 0, 0,
0, 0, 0, -1, -1;
[ \IpProfile ]
[ CpMediaRealm ]
FORMAT CpMediaRealm Index = CpMediaRealm MediaRealmName,
CpMediaRealm IPv4IF, CpMediaRealm IPv6IF,
CpMediaRealm PortRangeStart, CpMediaRealm MediaSessionLeg,
CpMediaRealm PortRangeEnd, CpMediaRealm IsDefault,
CpMediaRealm QoeProfile, CpMediaRealm BWProfile,
CpMediaRealm TopologyLocation;
CpMediaRealm 0 = "DefaultRealm", "O+M+C", "", 50000, 999, 59989,
1, "", "", 0;
[ \CpMediaRealm ]
[ SBCRoutingPolicy ]
FORMAT SBCRoutingPolicy Index = SBCRoutingPolicy Name,
SBCRoutingPolicy LCREnable, SBCRoutingPolicy LCRAverageCallLength,
SBCRoutingPolicy LCRDefaultCost,
SBCRoutingPolicy LdapServerGroupName;
SBCRoutingPolicy 0 = "Default SBCRoutingPolicy", 0, 0, 1, "";
[ \SBCRoutingPolicy ]
```

```
[ SRD ]
FORMAT SRD Index = SRD Name, SRD BlockUnRegUsers,
SRD MaxNumOfRegUsers, SRD EnableUnAuthenticatedRegistrations,
SRD SharingPolicy, SRD UsedByRoutingServer, SRD SBCOperationMode,
SRD SBCRoutingPolicyName, SRD SBCDialPlanName;
SRD 0 = "DefaultSRD", 1, -1, 1, 0, 0, 0,
"Default SBCRoutingPolicy", "";
[\SRD]
[ MessagePolicy ]
FORMAT MessagePolicy Index = MessagePolicy Name,
MessagePolicy MaxMessageLength, MessagePolicy MaxHeaderLength,
MessagePolicy MaxBodyLength, MessagePolicy MaxNumHeaders,
MessagePolicy MaxNumBodies, MessagePolicy SendRejection,
MessagePolicy MethodList, MessagePolicy MethodListType,
MessagePolicy BodyList, MessagePolicy BodyListType,
MessagePolicy UseMaliciousSignatureDB;
MessagePolicy 0 = "Malicious Signature DB Protection", -1, -1, -1,
-1, -1, 1, "", 0, "", 0, 1;
[ \MessagePolicy ]
[ SIPInterface ]
FORMAT SIPInterface Index = SIPInterface InterfaceName,
SIPInterface NetworkInterface, SIPInterface ApplicationType,
SIPInterface_UDPPort, SIPInterface_TCPPort, SIPInterface_TLSPort, SIPInterface_SRDName, SIPInterface_MessagePolicyName,
SIPInterface_TLSContext, SIPInterface_TLSMutualAuthentication,
SIPInterface TCPKeepaliveEnable,
SIPInterface ClassificationFailureResponseType,
SIPInterface PreClassificationManSet,
SIPInterface EncapsulatingProtocol, SIPInterface MediaRealm,
SIPInterface SBCDirectMedia, SIPInterface BlockUnRegUsers,
SIPInterface MaxNumOfRegUsers,
SIPInterface EnableUnAuthenticatedRegistrations,
SIPInterface UsedByRoutingServer, SIPInterface TopologyLocation,
SIPInterface PreParsingManSetName;
SIPInterface 0 = "CloudBond", "O+M+C", 2, 5060, 5068, 5067,
"DefaultSRD", "", "default", -1, 0, 500, 2, 0, "DefaultRealm", 0,
-1, -1, -1, 0, 0, "";
[ \SIPInterface ]
[ ProxySet ]
FORMAT ProxySet Index = ProxySet ProxyName,
ProxySet EnableProxyKeepAlive, ProxySet ProxyKeepAliveTime,
ProxySet ProxyLoadBalancingMethod, ProxySet IsProxyHotSwap,
```

```
ProxySet SRDName, ProxySet ClassificationInput,
ProxySet TLSContextName, ProxySet ProxyRedundancyMode,
ProxySet DNSResolveMethod, ProxySet KeepAliveFailureResp,
ProxySet_GWIPv4SIPInterfaceName, ProxySet_SBCIPv4SIPInterfaceName,
ProxySet GWIPv6SIPInterfaceName, ProxySet SBCIPv6SIPInterfaceName,
ProxySet MinActiveServersLB, ProxySet SuccessDetectionRetries,
ProxySet_SuccessDetectionInterval,
ProxySet FailureDetectionRetransmissions;
ProxySet 1 = "CloudBond", 1, 360, 0, 0, "DefaultSRD", 0, "", -1, -
1, "", "", "CloudBond", "", "", 1, 1, 10, -1;
ProxySet 2 = "xUM", 1, 360, 0, 0, "DefaultSRD", 0, "", -1, -1, "",
"", "CloudBond", "", "", 1, 1, 10, -1;
ProxySet 3 = "IP-PBX", 0, 60, 0, 0, "DefaultSRD", 0, "", -1, -1,
"", "", "CloudBond", "", 1, 1, 10, -1;
[ \ProxySet ]
[ IPGroup ]
FORMAT IPGroup Index = IPGroup Type, IPGroup Name,
IPGroup ProxySetName, IPGroup SIPGroupName, IPGroup ContactUser,
IPGroup SipReRoutingMode, IPGroup AlwaysUseRouteTable,
IPGroup SRDName, IPGroup MediaRealm, IPGroup ClassifyByProxySet,
IPGroup ProfileName, IPGroup MaxNumOfRegUsers,
IPGroup InboundManSet, IPGroup OutboundManSet,
IPGroup RegistrationMode, IPGroup AuthenticationMode,
IPGroup MethodList, IPGroup EnableSBCClientForking,
IPGroup_SourceUriInput, IPGroup DestUriInput, IPGroup ContactName,
IPGroup Username, IPGroup Password, IPGroup UUIFormat,
IPGroup QOEProfile, IPGroup BWProfile,
IPGroup AlwaysUseSourceAddr, IPGroup MsgManUserDef1,
IPGroup MsgManUserDef2, IPGroup SIPConnect, IPGroup SBCPSAPMode,
IPGroup DTLSContext, IPGroup CreatedByRoutingServer,
IPGroup UsedByRoutingServer, IPGroup SBCOperationMode,
IPGroup SBCRouteUsingRequestURIPort,
IPGroup SBCKeepOriginalCallID, IPGroup TopologyLocation,
IPGroup SBCDialPlanName, IPGroup CallSetupRulesSetId,
IPGroup Tags, IPGroup SBCUserStickiness;
IPGroup 0 = 2, "Default", "", "", -1, 0, "DefaultSRD", "", 1,
"", -1, -1, -1, 0, 0, "", 0, -1, -1, "", ", "$1$gQ==", 0, "", ",
0, "", "", 0, 0, "", 0, 0, -1, 0, 0, 1, "", -1, "", 0;
IPGroup 1 = 0, "CloudBond", "CloudBond", "", "", -1, 0,
"DefaultSRD", "DefaultRealm", 1, "CloudBond", -1, -1, -1, 0, 0,
"", 0, -1, -1, "", "", "$1$gQ==", 0, "", "", 0, "", "", 0, 0, "",
0, 0, -1, 0, 0, 0, "", -1, "", 0;
IPGroup 2 = 0, "xUM", "xUM", "", "", -1, 0, "DefaultSRD",
"DefaultRealm", 1, "", -1, -1, 2, 0, 0, "", 0, -1, -1, "", "",
"$1$qQ==", 0, "", "", 0, "", "", 0, 0, "", 0, 0, -1, 0, 0, 0, "",
-1, "", 0;
IPGroup 3 = 0, "IP-PBX", "IP-PBX", "", "", -1, 0, "DefaultSRD",
"DefaultRealm", 1, "CloudBond", -1, -1, 1, 0, 0, "", 0, -1, -1,
"", "", "$1$gQ==", 0, "", "", 0, "", "", 0, 0, "", 0, 0, -1, 0, 0,
0, "", -1, "", 0;
[ \IPGroup ]
```

```
[ ProxyIp ]
FORMAT ProxyIp Index = ProxyIp ProxySetId, ProxyIp ProxyIpIndex,
ProxyIp IpAddress, ProxyIp TransportType;
ProxyIp 0 = "1", 0, "172.17.240.101:5060", 1;
ProxvIp 1 = "2", 0, "172.17.240.107:5070", 1;
ProxyIp 2 = "3", 0, "10.13.2.16", 0;
ProxyIp 3 = "3", 1, "172.17.240.100", 0;
ProxyIp 4 = "3", 2, "10.7.2.55", 0;
ProxyIp 5 = "3", 3, "172.17.240.106:5060", 0;
ProxyIp 6 = "3", 4, "10.16.2.73", 0;
[ \ProxyIp ]
[ IP2IPRouting ]
FORMAT IP2IPRouting Index = IP2IPRouting RouteName,
IP2IPRouting RoutingPolicyName, IP2IPRouting SrcIPGroupName,
IP2IPRouting SrcUsernamePrefix, IP2IPRouting SrcHost,
IP2IPRouting DestUsernamePrefix, IP2IPRouting DestHost,
IP2IPRouting RequestType, IP2IPRouting MessageConditionName,
IP2IPRouting ReRouteIPGroupName, IP2IPRouting Trigger,
IP2IPRouting CallSetupRulesSetId, IP2IPRouting DestType,
IP2IPRouting DestIPGroupName, IP2IPRouting DestSIPInterfaceName,
IP2IPRouting DestAddress, IP2IPRouting DestPort,
IP2IPRouting DestTransportType, IP2IPRouting AltRouteOptions,
IP2IPRouting GroupPolicy, IP2IPRouting CostGroup,
IP2IPRouting DestTags, IP2IPRouting SrcTags,
IP2IPRouting IPGroupSetName, IP2IPRouting RoutingTagName,
IP2IPRouting InternalAction;
IP2IPRouting 0 = "option Ternination", "Default SBCRoutingPolicy",
"Any", "*", "*", "*", 6, "", "Any", 0, -1, 1, "", "",
"internal", 0, -1, 0, 0, "", "", "", "", "default", "";
IP2IPRouting 2 = "send subscribe to XUM",
"Default_SBCRoutingPolicy", "IP-PBX", "*", "*", "*", "*", 3, "",
"Any", 0, -1, 0, "xUM", "", "", 0, -1, 0, 0, "", "", "", "",
"default", "";
IP2IPRouting 3 = "VMLogin", "Default SBCRoutingPolicy", "IP-PBX",
"*", "*", "7777", "*", 0, "", "Any", 0, -1, 0, "xUM", "", "", 0, -1, 0, 0, "", "", ", ", "default", "";
IP2IPRouting 4 = "IP-PBX to CloudBond",
"Default_SBCRoutingPolicy", "IP-PBX", "*", "*", "*", "*", 0, "",
"Any", 0, -1, 0, "CloudBond", "", "", 0, -1, 0, 0, "", "", "", "",
"default", "";
IP2IPRouting 5 = "Calls from CloudBond and XUM to IP-PBX",
"Default_SBCRoutingPolicy", "Any", "*", "*", "*", "*", 0, "",
"Any", 0, -1, 0, "IP-PBX", "", "", 0, -1, 0, 0, "", "", "", "",
"default", "";
[ \IP2IPRouting ]
[ IPOutboundManipulation ]
```

```
FORMAT IPOutboundManipulation Index =
IPOutboundManipulation ManipulationName,
IPOutboundManipulation RoutingPolicyName,
{\tt IPOutboundManipulation\_IsAdditionalManipulation,}
IPOutboundManipulation_SrcIPGroupName,
IPOutboundManipulation_DestIPGroupName,
IPOutboundManipulation_SrcUsernamePrefix,
IPOutboundManipulation_SrcHost,
IPOutboundManipulation_DestUsernamePrefix,
IPOutboundManipulation DestHost,
IPOutboundManipulation CallingNamePrefix,
IPOutboundManipulation MessageConditionName,
IPOutboundManipulation RequestType,
IPOutboundManipulation ReRouteIPGroupName,
IPOutboundManipulation Trigger,
IPOutboundManipulation ManipulatedURI,
IPOutboundManipulation RemoveFromLeft,
IPOutboundManipulation RemoveFromRight,
IPOutboundManipulation LeaveFromRight,
IPOutboundManipulation Prefix2Add,
IPOutboundManipulation Suffix2Add,
IPOutboundManipulation PrivacyRestrictionMode,
IPOutboundManipulation DestTags, IPOutboundManipulation SrcTags;
IPOutboundManipulation 1 = "Check +", "Default SBCRoutingPolicy",
0, "Any", "CloudBond", "*", "*", "+", "*", "*", ", 0, "Any", 0,
1, 0, 0, 255, "", "", 0, "", "";
IPOutboundManipulation 2 = "Full Number",
"Default_SBCRoutingPolicy", 0, "IP-PBX", "CloudBond", "*", "*",
"10", "*", "*", ", 0, "Any", 0, 1, 0, 0, 255, "+9723976", "", 0,
"", "";
IPOutboundManipulation 3 = "SPS to MP-11x",
"Default SBCRoutingPolicy", 0, "xUM", "IP-PBX", "*", "*",
"972397610", "*", "*", "", 0, "Any", 0, 1, 7, 0, 255, "", "", 0,
"", "";
IPOutboundManipulation 4 = "Add +", "Default SBCRoutingPolicy", 0,
"Any", "CloudBond", "*", "*", "*", "*", "*", ", 0, "Any", 0, 1,
0, 0, 255, "+", "", 0, "", "";
[ \IPOutboundManipulation ]
[ MessageManipulations ]
FORMAT MessageManipulations Index =
MessageManipulations ManipulationName,
MessageManipulations ManSetID, MessageManipulations MessageType,
MessageManipulations Condition,
MessageManipulations ActionSubject,
MessageManipulations ActionType, MessageManipulations ActionValue,
MessageManipulations RowRole;
MessageManipulations 0 = "NOTIFY", 1, "NOTIFY", "body.mwi regex
(.*)(sip:)(.*)(.{4})(@)(.*)", "body.mwi", 2, "$1+$2+$4+$5+$6", 0;
MessageManipulations 1 = "", 3, "info.response", "",
"header.cseq.type", 2, "'SUBSCRIBE'", 0;
MessageManipulations 2 = "Subscribe to INFO", 4,
"subscribe.request", "", "header.request-uri.methodtype", 2,
"'12'", 0;
```

```
MessageManipulations 3 = "", 4, "", "", "header.cseq.type", 2,
"'INFO'", 1;
[ \MessageManipulations ]
[ GwRoutingPolicy ]
FORMAT GwRoutingPolicy Index = GwRoutingPolicy Name,
GwRoutingPolicy LCREnable, GwRoutingPolicy LCRAverageCallLength,
GwRoutingPolicy LCRDefaultCost,
GwRoutingPolicy LdapServerGroupName;
GwRoutingPolicy 0 = "GwRoutingPolicy", 0, 0, 1, "";
[ \GwRoutingPolicy ]
[ LoggingFilters ]
FORMAT LoggingFilters Index = LoggingFilters FilterType,
LoggingFilters Value, LoggingFilters LogDestination,
LoggingFilters CaptureType, LoggingFilters Mode;
LoggingFilters 0 = 1, "", 0, 1, 1;
LoggingFilters 1 = 1, "", 1, 1, 1;
[ \LoggingFilters ]
[ ResourcePriorityNetworkDomains ]
FORMAT ResourcePriorityNetworkDomains Index =
ResourcePriorityNetworkDomains Name,
ResourcePriorityNetworkDomains Ip2TelInterworking;
ResourcePriorityNetworkDomains 1 = "dsn", 0;
ResourcePriorityNetworkDomains 2 = "dod", 0;
ResourcePriorityNetworkDomains 3 = "drsn", 0;
ResourcePriorityNetworkDomains 5 = "uc", 1;
ResourcePriorityNetworkDomains 7 = "cuc", 0;
[ \ResourcePriorityNetworkDomains ]
[ MaliciousSignatureDB ]
FORMAT MaliciousSignatureDB Index = MaliciousSignatureDB Name,
MaliciousSignatureDB Pattern;
MaliciousSignatureDB 0 = "SIPVicious", "Header.User-Agent.content
prefix 'friendly-scanner'";
MaliciousSignatureDB 1 = "SIPScan", "Header.User-Agent.content
prefix 'sip-scan'";
MaliciousSignatureDB 2 = "Smap", "Header.User-Agent.content prefix
'smap'";
```

```
MaliciousSignatureDB 3 = "Sipsak", "Header.User-Agent.content
prefix 'sipsak'";
MaliciousSignatureDB 4 = "Sipcli", "Header.User-Agent.content
prefix 'sipcli'";
MaliciousSignatureDB 5 = "Sivus", "Header.User-Agent.content
prefix 'SIVuS'";
MaliciousSignatureDB 6 = "Gulp", "Header.User-Agent.content prefix
'Gulp'";
MaliciousSignatureDB 7 = "Sipv", "Header.User-Agent.content prefix
'sipv'";
MaliciousSignatureDB 8 = "Sundayddr Worm", "Header.User-
Agent.content prefix 'sundayddr'";
MaliciousSignatureDB 9 = "VaxIPUserAgent", "Header.User-
Agent.content prefix 'VaxIPUserAgent'";
MaliciousSignatureDB 10 = "VaxSIPUserAgent", "Header.User-
Agent.content prefix 'VaxSIPUserAgent'";
MaliciousSignatureDB 11 = "SipArmyKnife", "Header.User-
Agent.content prefix 'siparmyknife'";
[ \MaliciousSignatureDB ]
[ AudioCoders ]
FORMAT AudioCoders Index = AudioCoders AudioCodersGroupId,
AudioCoders AudioCodersIndex, AudioCoders Name, AudioCoders pTime,
AudioCoders rate, AudioCoders PayloadType, AudioCoders_Sce,
AudioCoders CoderSpecific;
AudioCoders 0 = "AudioCodersGroups 0", 0, 1, 2, 90, -1, 0, "";
AudioCoders 4 = "AudioCodersGroups 0", 1, 2, 2, 90, -1, 0, "";
```

```
[ \AudioCoders ]
```

D Limitations

The following is a list of X-UM limitations:

- Every X-UM can work with one Primary SBC and one Backup SBC.
- Up to ~5K users are supported per X-UM.
- Only use the Google Chrome browser to work with Swagger.
- X-UM has no SNMP or other monitoring capabilities. Monitoring of the service status can only be done using a third-party tool.
- If the SBC is down, new MWI messages are lost. On the next mailbox change or SIP Subscribe, the PBX is synchronized with the MWI status.



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E Known Issues

E.1 Working with Internet Explorer

When working with the Swagger management interface, it is mandatory to work with Google Chrome (instead of Internet Explorer IE) for full Swagger support.

E.2 Replication Fails

If the replication fails while performing the activation or during normal operation:

- Validate that the X-UM can resolve Skype pools, and vice versa, that the Skype Servers can resolve the X-UM pool on the DNS.
- Validate that all Server Times/Dates are synchronized
- Validate that a Firewall does not block communication between the X-UM and Skype servers and the AD.

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