

Avaya Solution & Interoperability Test Lab

Application Notes for Configuring Microsoft Office Communications Server 2007 R2 and Avaya IP Office PSTN Call Routing - Issue 1.0

Abstract

These Application Notes describe the procedures for configuring Microsoft Office Communications Server (OCS) 2007 R2 with Avaya IP Office. The Avaya infrastructure is used by OCS as a gateway for voice telephone calls to the Public Switched Telephone Network (PSTN). The steps described herein focus on how Microsoft Office Communicator 2007 R2 clients configured for Enterprise Voice mode can utilize the Avaya infrastructure to place and receive telephone calls to and from the PSTN.

1. Introduction

These Application Notes describe the procedures for configuring Microsoft Office Communications Server (OCS) 2007 R2 with Avaya IP Office. The Avaya infrastructure is used by OCS as a gateway for voice telephone calls to the Public Switched Telephone Network (PSTN). The steps described herein focus on how Microsoft Office Communicator 2007 R2 clients configured for Enterprise Voice mode can utilize the Avaya infrastructure to place and receive telephone calls to and from the PSTN.

Microsoft OCS is comprised of several component servers that, in some cases, may run collocated on the same physical Microsoft Windows server or, in other cases, require separate physical servers, depending on the desired capacity, topology, and security. Consult references [2] through [5] for further details on Microsoft OCS architecture and deployment options. Please consult reference [8] for important considerations for Enterprise Voice as it contains relevant information regarding 911 (US) or 999 (UK) emergency calls and emergency services.

2. Configuration

The sample configuration described throughout these Application Notes is shown in **Figure 1.** An ISDN/PRI trunk provides inbound and outbound voice call access to the PSTN. Avaya IP Office sends and receives SIP Invites to and from the Microsoft Mediation Server. The Microsoft Mediation Server converts call signaling between standard SIP and Microsoft signaling protocol (MTLS) when routing voice calls to and from Microsoft OCS. The Microsoft Mediation Server also converts call media between G.711 and a proprietary Microsoft codec. The Microsoft Office Communicator (MOC) clients are registered with Microsoft OCS via a front end server pool. The pool can consist of more than one server. However, in the tested configuration, the pool consisted of one front end server. The Microsoft OCS server and Mediation servers are supported by a Microsoft SQL 2005 database server, as well as another Microsoft Windows Server running Active Directory (AD), Domain Name System (DNS) server, and Certificate Authority (CA) roles.



Figure 1: Network Configuration

These Application Notes describe one possible approach to configuring PSTN inbound and outbound call routing. The following user experience goals were considered in formulating the approach:

• An Enterprise Voice (EV) client should be able to call an E.164-formatted number. To address this, Microsoft OCS can be configured with one or more "normalization rules¹" that match the dialed number. For example, a 7-digit dialed number can be converted into an E.164-formatted 11-digit number. On Avaya IP Office, Short Codes can be configured

¹ Normalization rules define matching criteria for various number strings and translations for converting the strings into E.164-formatted numbers.

to delete digits as necessary of the called party numbers in order to obtain the number to be sent to the PSTN.

• An EV client should be able to call to the PSTN from the MOC client Recent Contacts list. Again, "normalization rules" also apply to incoming calling party numbers, thereby generating E.164 numbers in the Recent Contacts list.

The flow for an outbound call from an EV client is as follows. When an EV client dials a number, Microsoft OCS applies normalization rules to the dialed number. If there is a match, Microsoft OCS checks whether the called party number (now converted to E.164 format by the normalization rule) is assigned to another MOC user. If so, Microsoft OCS sends the call to the called user's MOC client. If not, Microsoft OCS looks up a call routing table for a match of the E.164-formatted called party number. If there is a match, Microsoft OCS routes the call to the Microsoft Mediation Server specified in the matching route. The Microsoft Mediation Server then routes the call to the configured next hop destination, which in the sample configuration, is IP Office. IP Office then routes the call to the PSTN.

For inbound calls from the PSTN, Avaya IP Office receives the incoming call. Based on the called party number, Avaya IP Office looks up the corresponding Short Code and routes the call to the Microsoft Mediation Server.

In the test scenario +35312078XXX E.164 phone numbers were mapped to IP Office extensions 8XXX. 7-digit phone numbers received from the ISDN/PRI E1 trunk or an IP Office extension dial pad matching pattern 656XXXX corresponding to E.164 numbers +3531656XXXX were routed to Microsoft Mediation Server.

3. Equipment and Software Validated

The following equipment and software were used for the sample configuration provided.

Equipment	Software Version
Avaya IP Office 500	IP Office 5.0 beta (build 011041)
Avaya 1616 IP Telephone (H.323)	Release 1.1 (ha1616ua1_100.bin)
Avaya 2420 Digital Telephone	-
Microsoft Active Directory, DNS Server,	Version 5.2 R2
and Certification Authority on Microsoft	(Build 3790.srv03_sp2_gdr.090319-1204: Service
Windows Server 2003 R2 Standard	Pack 2)
Edition Service Pack 2	
Microsoft Enterprise Edition Office	OCS 2007 R2: 3.5.6907.0 (Volume)
Communications Server 2007 R2 on	w/ KB 972041
Windows Server 2003 R2 Enterprise	
Edition x64 Edition Service Pack 2	Windows OS : Version 5.2 R2 (Build
	3790.srv03_sp2_rtm.070216-1710 : Service Pack 2)
Microsoft SQL 2005 SP2 Server on	2005.090.3042.00
Microsoft Windows Server 2003 R2	
Standard Edition Service Pack 2	Windows OS : Version 5.2 R2
	(Build 3790.srv03_sp2_gdr.090319-1204: Service
	Pack 2)
Microsoft Mediation Server on Microsoft	OCS 2007 R2: 3.5.6907.0 (Volume)
Windows Server 2003 R2 Enterprise	
Edition x64 Edition Service Pack 2	
Microsoft Office Communicator 2007 R2	R2: 3.5.6907.0 w/ KB 972042
on Microsoft Windows XP Professional	
Version SP3	Windows OS: 2600.xpsp_sp3_gdr.090206-1234 :
	Service Pack 3
Microsoft Office Communications Server	1.0.6907.0
2007 R2 Attendant	

Table 1: Equipment/Software List

4. Configure Avaya IP Office

This section describes the steps for configuring call routing on Avaya IP Office. The steps are performed from the IP Office Manager interface. These Application Notes assume that basic Avaya IP Office administration has already been performed, ISDN/PRI E1 line is already configured according to the parameters given by the service provider, and user extensions are administered in the range 8XXX. See reference [1].

The configuration procedures include the following areas:

- Verify Avaya IP Office License
- Administer SIP Trunk
- Administer Incoming Call Route
- Administer ARS
- Administer Short Codes

IP Office is configured via the **IP Office Manager** program. Log in the IP Office Manager PC and select **Start** \rightarrow **Programs** \rightarrow **IP Office** \rightarrow **Manager** to launch the **Manager** application. Log in to the **Manager** application using the appropriate credentials.

4.1. Verify Avaya IP Office License

Step		Description
1.	Verify that there is a SIP Trunk C panel. Check that there is a SIP Tr licenses exist for the ISDN/PRI E1 Channels), IP500 Voice Networki	Channels license. Double-click on License in the left runk Channels entry. Verify that the following trunk: IP500 Universal PRI (Additional sing Channels and Wave User. If a required feature is connecting content on outborized Average sales
	In ot enabled or there is insufficient of representative or Business Partner t Avage IP Office R5 Manager 005007038660 [5:0]11041 Dis Edit Yew Toris Bills I Control I Contro	capacity, contact an authorized Avaya sales to make the appropriate changes. 1) [Administrator (Administrator)] Licence SIP Trunk Channels SIP Trunk Channels Licence SIP Trunk Channels
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	C Logical LAN (0) III & Low Rights (3) III Y ARS (4)	Error List
	Ready	

4.2. Administer SIP Trunk

		Desc	cription				
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In the	Network Config	uration section set	lect the follo	wing.			
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•	For Send Port	use 5060					
•	For Listen Port	· use 5060					
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	Create a primary SIP Outgoing Group fiel Use defaults for all of	URI. Enter a unique number for the Incoming Group ds. Enter * for the Local URI , Contact and Display ther field. Press the OK button.	and Name fields.
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Step		Description	
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4.3. Administer Incoming Call Route

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4.4. Administer ARS

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•	Create the second caller ID from the Enter a unique id use defaults for a	dary Alternate e PSTN. Select lentifier for the ll other field of	Route Selection et ARS in the left e route in the R for the ARS tab	on (ARS) f eft panel. I coute Nam . Click on	For routing Right-click ne field (e.g Add buttor	calls wit and sele g. SIP-u n.	th withheld ect New . nknown) an
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Step		Description	
2.	The New Short Code pop-unumbers in the Code field, sprefix>N"@ <microsoft m<br="">+3531656N"@10.10.10.43 down list, created for calls r the OK button. Press the Ob</microsoft>	Ip window appears. Entropy select Dial in the Feature diation Server IP add ". Select Outgoing Gro eceived from the PSTN K button on the ARS ta	ter a code matching OCS phone re field and enter +< E.164 dress>" i.e. Dup from the Line Group Id drop I with withheld caller ID field. Click ib.
	New Short Code		
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)	Description						
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Step			De	scriptio	n				
4.	Scroll down to the bottom of the ARS tab. Select the secondary ARS created in the								
	previous step from	n the Addition	al Route	e field (e	e.g. SI	P-unknown). Set th	e Alterna	ite
	Route Wait Tim	e field to Off. (Jse defau	ilts for a	all oth	er fields on	the AR	S tab. Ch	ck on
	the Add button.								
					10.00			A111	-
	Ma Aveya IP Office R5 Manager	006003038660 [5:0[110	(†)) [Administra	dər (Administr	atar)]				
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	e)				Error	List			N
	Ready								14

Step		Description	
5.	The New Short Code pop-u numbers in the Code field, s prefix>N"@ <microsoft me<br="">from the Line Group Id dro above. Click the OK button.</microsoft>	p window appears. En elect Dial in the Featu ediation Server IP ad op down list. Matching Press the OK button o	ter a code matching OCS phone are field and enter +< E.164 dress>". Select Outgoing Group the configuration in section 4.3 on the ARS tab.
	Code Feature Telephone Number Line Group Id Locale Force Account Code	656>>>>> Dial +3531656N"@10.10.10.43" 8	Cancel

4.5. Administer Short Codes

p			Des	cription		
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	Footuro Select f	he primary	ARS created r	reviously from	the Line (Troup Id drop
	down list Enter "	" for the T	alonhono Nu	mbor field Use	default va	lues for all other
	fields Press the ()K button	elephone Rul	inder neid. Osc		inces for all other
	🕼 Avaya IP Office R5 Manager	006007038640 [5	O(11041)] [Administrate	r(Administrator)]		
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	(± ↓ RAS (1) ⊕ ⊕ Incoming CallRoute (3)					
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Step			Des	cription		
2.	Create a short coor Right-click and se for any number as Feature . Select th down list. Enter " fields. Press the C	le to route of elect New . s a last reso ne ISDN/PI ." for the T DK button.	calls to the PS Enter "?" in the ort if no other s RI E1 line Out Selephone Nu	TN. Select Sho ne Code field. T short code is ma tgoing Group Id mber field. Use	rt Code in This short controled. Selection from the Letter the default value of the selection of the selecti	the left panel. ode will be matched oct Dial for the Line Group Id drop lues for all other
	K Aveve IP Office R5 Menager	00509703866015	Or1104111 FAdministrate	eriAdministrator)]		
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	Ready					1

Step			Des	cription		
3.	Create a short coor Right-click and set for any number as Feature . Select th down list. Enter " fields. Press the C	le to route c elect New . I s a last reson ne ISDN/PR ." for the T OK button.	calls to the PS Enter "?" in the rt if no other s CI E1 line Out elephone Nu	TN. Select Sho ne Code field. short code is m going Group I mber field. Us	ort Code in This short contracted. Sele d from the I se default va	the left panel. ode will be matched ect Dial for the Line Group Id drop lues for all other
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		Descripti	on	
Create a short code Short Code in the l Code field. Select I field. Use default va	to route call eft panel. R Dial Extn fo alues for all	Is received on the ight-click and selfor the Feature . Entother fields. Pres	e SIP line to IP Of lect New. Enter 3 nter 8N for the Te ss the OK button.	ffice extensions. Select 5312078XXX in the elephone Number
IP Offices	006007039	660 Short Code	2 95912078ktk	8)
9% *50. **********************************	Short Code Code Paulum Telephone Humber Lins Group Id Locale Porce Account Code	325312078900X DewlExtm 64 0		

5. Configure Microsoft Office Communications Server

This section highlights the Microsoft Office Communications Server (OCS) 2007 R2 configuration for routing calls to and from Avaya IP Office. These Application Notes assume that basic Microsoft OCS server and Mediation Server installation and configuration have already been performed according to the guidelines provided in references [2] through [4]. These Application Notes further assume that user accounts have been created in Microsoft Active Directory and enabled for OCS.

Step		Description				
1.	On the Microsoft OCS server, launch the Microsoft Office Communications Server 2007 R2 Microsoft Management Console (MMC) snap-in. In the left pane, expand the Forest node down to the Users level (Forest \rightarrow Enterprise pools \rightarrow <name of="" pool=""> \rightarrow Users). In the right pane, right-click on a user (one that is to be configured as an Enterprise Voice (EV) user) and select Properties.</name>					
	File Action Yiew Favorites Window Help ← → € ●	tions Server	2007 B2\ Forest -	avava-sil com\Enternrise r	nols) po	
	Console Root Console Root Microsoft Office Communications Server 20 Console Root Console Root C	Enabled Enabled Enabled	Display name User A User B	SIP URI sip:user1@avaya-sil.com sip:user2@avaya-sil.com	Type User User	Configure users Delete users Move users Properties Help

Step	Description
2.	In the selected user's Properties dialog box, click on Configure .
	User User A Properties
	Communications
	Enable user for Office Communications Server
	Sign-in name:
	sip:user1 @ avaya-sil.com
	Server or pool:
	pool.avaya-sil.com
	Meeting settings:
	Telephony settings:
	Other settings:
	OK Cancel Apply Help

Step	Description
3.	In the Telephony Options dialog box, select Enable Enterprise Voice and enter an E.164 Tel URI for Line URI . In the sample configuration, users were configured with Line URIs in the form of Tel:+3531656xxxx , where +3531656xxxx is the E.164 11-digit number assigned to the user. Click OK .
	Telephony Options
	Select a telephony option. These settings affect only those calls that are routed through IP-PSTN or remote call control gateways.
	 Enable <u>P</u>C-to-PC communication only Enable <u>R</u>emote call control Enable Enterprise Voice Enable PB<u>X</u> integration Note: To enable both remote call control and PBX integration, you must specify a Server URI below.
	Policy:
	Server URI:
	Line URI: Tel:+35316567706
	Location profile: defaultdialplan View
	OK Cancel Help
4.	Back in the selected user's Properties dialog box, click on OK .
5.	Repeat Steps $1 - 4$ for other Microsoft OCS users to be configured as EV users.



Step	Description
7.	In the Office Communications Server Voice Properties dialog box verify that a
	location profile exists in the Location Profiles tab. Click on Add or Edit as appropriate.
	Office Communications Server Voice Properties
	Location Profiles phase Universal Parking Province
	Cocodorn Fronces Phone Usages Policy Routes
	Location profiles define how numbers are to be translated when dialed from a defined location. Each profile has a set of normalization rules.
	Location Profiles:
	Name Description
	defaultdialplan default dial plan
	Add Edit Demove
	OK Cancel Apply Help

Step	Description					
8.	Microsoft OCS location profiles define how OCS entities, such as OCS servers,					
	enterprise pools and mediation servers, interpret and modify phone numbers. Each					
	location profile contains an ordered set of normalization rules that translates phone					
	numbers expressed in various formats into E.164-formatted numbers. The normalization					
	to E.164 format provides a consistent reference for reverse number lookup (retrieving					
	the SIP-URI associated with a user's number; see Steps 2-3) and call routing purposes.					
	In the sample configuration, normalization rules are used to match and convert the					
	dialed number to E.164-formatted numbers.					
	Verify that a normalization rule exists or add one as appropriate. In the Normalization					
	Rules section, click on Add or Edit as appropriate.					
	Edit Location Profile					
	Massar					
	Mame:					
	Display text:					
	default dial plan					
	C Optimize device dialing					
	External access prefix:					
	Normalization Rules					
	Normalization rules are processed in the order listed. Use the up and down buttons to adjust the order.					
	7 diait plan					
	00					
	extensions					
	Down					
	Add Edit Berrove					

Step	Description
9.	In the Translation section of the normalization rule, enter a Phone pattern regular
	expression that matches the PSTN number, and a Translation pattern regular
	expression that converts the matched extensions to E.164-formatted 11-digit numbers.
	In the example below, the normalization rule matches any /-digit number, and prefixes
	enter a number in the Sample dialed number field and confirm that the number in the
	Translated number field is correct. Other values can be left at their defaults. Click on
	OK.
	Edit Phone Number Normalization Rule
	Name: 7 digit plan
	Contractor
	Description:
	dial plan for 7 digit number
	Translation
	Phone pattern regular expression:
	^(\d{7})\$
	Iranslation pattern regular expression:
	+3531\$1
	Valid translation characters are +, numbers, and \$. Example: +1425\$1.
	Internal enterprise extension
	☑ Use translation when dialing from device
	Guide to creating common phone number translations:
	Test translation
	To test the translation, enter a sample dialed number. If it matches the phone pattern, the translation will be shown.
	Sample dialed number:
	1234567
	Translated number:
	+35311234567
	OK Cancel Help

Step	Description					
10.	In the Office Communications Server Voice Properties dialog box, select the Routes					
	tab, and click on Add or Edit as appropriate.					
	Office Communications Server Voice Properties					
	Location Profiles Phone Usages Policy Routes					
	Please use the buttons below to modify, add, view, or remove a route. To					
	see the entire routing table, please see the Status Pane.					
	Routes:					
	Name Description GlobalOutbound					
	Add <u>Edit</u> <u>R</u> emove					
	OK Cancel <u>Apply</u> Help					

Step	Description
11.	Verify that an outbound route exists. If not, configure as shown below. Enter a suitable Name and Description . In the Target regular expression use ^.* as a catch all entry. In the Gateways section, select Add , then from the drop down list select the entry for the OCS Mediation server. Click OK .
	Edit Route
	Name: GlobalOutbound
	Description:
	GlobalOutbound
	A route requires a target phone number regular expression, one or more gateways, and one or more phone usages.
	Target phone numbers:
	Larget regular expression
	Helper
	Gateways
	Address
	Add
	Phone usages
	Default Usage
	OK Cancel Help

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Step	Description
13.	In the Mediation Server Properties dialog box, verify the settings as shown below.
	mediator.avaya-sil.com Properties
	General Next Hop Connections Certificate QoE
	Mediation Server
	EQDN: mediator.avaya-sil.com
	Communications Server listening IP address:
	10.10.43
	Gateway listening IP address:
	10.10.10.43 Port: 5060
	A/V Edge Server:
	(None)
	Default location profile:
	defaultdialplan View
	Media port range: 60000 to 64000
	OK Cancel Apply Help

Step	Description
14.	Select the Next Hop Connections tab. In the PSTN Gateway next hop section, enter the IP address of the Avaya IP Office and 5060 in the Port field. In this sample configuration TCP was used; TLS was not supported. Click on OK.
	mediator.avaya-sil.com Properties
	General Next Hop Connections Certificate QoE
	Office Communications Server next hop
	Specify the Office Communications Server used for routing inbound PSTN calls.
	EQDN:
	pool.avaya-sil.com
	Port: 5061
	PSTN Gateway next hop
	Specify the PSTN gateway connected to this server.
	Address: 10.10.10.50
	Pgrt: 5060
	Iransport: TCP
	Encryption level: Do not support encryption
	OK Cancel Apply Help

6. Verification Steps

The following steps may be used to verify the configuration:

- Place a call from a PSTN phone to a Microsoft EV client using the EV client's full telephone number. Verify that the call is established with two-way audio and that the calling party number displayed on the EV client is an E.164-formatted 11-digit number
- From the EV client, place a call back to the PSTN phone by double-clicking on the PSTN phone number in the MOC client Recent Contacts list. Verify that the call is established with two-way audio

7. Conclusion

These Application Notes described the procedures for configuring call routing between Avaya IP Office and Microsoft Office Communications Server (OCS). The call routing configuration enabled voice communications between Enterprise Voice mode MOC clients and PSTN telephones.

The following issues were observed from sanity testing of basic telephony functionality:

- Calls routed to the PSTN do not show the real caller ID of the MOC client.
- Calls cannot be muted or put on hold by MOC clients
- Calls from the PSTN with withheld caller ID display a caller ID which was created in the SIP URI configuration in Section 4.2
- E.164 numbers may clash with existing IP Office extension numbers

8. Additional References

This section references the product documentation relevant to these Application Notes.

The following documentation may be obtained from <u>http://support.avaya.com/</u>.

[1] "Avaya IP Office 5.0 Manager 7.0", Document 15-601011, Issue 23h, 16 July 2009

The following documentation may be obtained from http://www.microsoft.com/.

- [2] "Microsoft Office Communications Server 2007 R2 Technical Overview".
- [3] "Microsoft Office Communications Server 2007 R2 Planning and Architecture".
- [4] "Microsoft Office Communications Server 2007 R2 Deploying Enterprise Voice".
- [5] "Microsoft Office Communications Server 2007 R2 Planning for Voice".
- [6] "Microsoft Office Communications Server 2007 R2 Administering Office Communications Server 2007 R2".
- [7] "Integrating Enterprise Telephony with Office Communications Server 2007 R2", March 2009.
- [8] "Microsoft Office Communications Server 2007 R2 Important Considerations for Enterprise Voice: Please Read".

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