

Avaya Solution & Interoperability Test Lab

## Application Notes for Configuring the CELLX Cellular Gateway with Avaya Aura® Telephony Infrastructure using a SIP Trunk – Issue 1.0

#### Abstract

These Application Notes describe a compliance-tested configuration comprised of Avaya Aura® Communication Manager, Avaya Aura® Session Manager and the CELLX cellular gateway. The CELLX cellular gateway is a gateway that can augment landline connectivity with wireless connectivity to the cellular network. In case of landline connectivity failure, the CELLX provides a backup solution to maintain voice communications. During compliance testing, outbound calls from Avaya Aura® Communication Manager and Avaya Aura® Session Manager were successfully routed over a SIP IP Trunk to the CELLX and in turn to the cellular network. Similarly, inbound calls from the cellular network to the CELLX were successfully forwarded to Aura® Communication Manager via Avaya Aura® Session Manager over the SIP Trunk.

Information in these Application Notes has been obtained through DevConnect compliance testing and additional technical discussions. Testing was conducted via the DevConnect Program at the Avaya Solution and Interoperability Test Lab.

## 1. Introduction

These Application Notes describe a solution that integrates the CELLX cellular gateway, with Avaya Aura® Session Manager, and Avaya Aura® Communication Manager. The CELLX cellular gateway can provide a backup solution to maintain voice communications in the event of a landline failure and provide a mechanism to place cellular to cellular calls from the Avaya Deskphone. The integration included SIP entity links connecting Avaya Aura® Session Manager to both Avaya Aura® Communication Manager and the CELLX cellular gateway.

# 2. General Test Approach and Test Results

DevConnect Compliance Testing is conducted jointly by Avaya and DevConnect members. The jointly-defined test plan focuses on exercising APIs and/or standards-based interfaces pertinent to the interoperability of the tested products and their functionalities. DevConnect Compliance Testing is not intended to substitute full product performance or feature testing performed by DevConnect members, nor is it to be construed as an endorsement by Avaya of the suitability or completeness of a DevConnect member's solution.

## 2.1. Interoperability Compliance Testing

The interoperability compliance testing focused on verifying the routing of outbound/inbound calls from/to the CELLX cellular gateway.

The high-level objectives of the solution described in these Application Notes are as follows:

- When the landline is out of service, Communication Manager will route all outbound calls to the CELLX cellular gateway.
- When the landline is out of service, inbound calls from the cellular network route through the CELLX cellular gateway and are routed to the Communication Manager.
- If the landline is operational, Communication Manager will re-route calls rejected by the CELLX cellular gateway to the landline.

The enterprise callers can enter a "CELLX gateway dial prefix" to use the CELLX cellular gateway to make calls. For example, enterprise callers place outbound calls via the CELLX cellular gateway to reach cellular endpoints and save on cellular minutes and costs.

## 2.2. Test Results

The test objectives listed in **Section 2.1** were verified. For serviceability testing, outbound and inbound calls routed through the CELLX completed successfully after recovering from failures such as Ethernet cable disconnects, and resets of Communication Manager and the CELLX gateway. Calls routed through the CELLX gateway via the H.323 trunk between the Avaya G450 Media Gateway and CELLX gateway during failover testing completed successfully.

During the compliance testing it was observed that media shuffling must be disabled for successful communication when forwarding calls from CELLX gateway to an H.323 IP telephone.

TELES CELLX cellular gateway successfully passed compliance testing.

#### 2.3. Support

For technical support on the TELES CELLX Cellular Gateway, consult the support pages at http://cellx.teles.com or contact TELES customer support at:

- Phone: 1-646-225-6598
- E-mail: <u>cellx@teles.com</u>
- Website: <u>http://cellx.teles.com</u> Support
- Website: <u>http://www.teles.com/cellx</u> Product Information

## 3. Reference Configuration

In case of landline connectivity failure, the CELLX cellular gateway provides a backup solution to maintain voice communications. When the landline is operational, outbound calls to the public network may be routed to either the landline or the CELLX cellular gateway, but when the landline is unavailable, outbound calls to the public network are routed to the CELLX cellular gateway only. The CELLX cellular gateway routes the outbound calls to the cellular network, but may also reject outbound calls under certain configurable conditions. The caller, however, may bypass such restrictions by dialing a pre-configured "CELLX gateway dial prefix" before dialing the external phone number.

**Figure 1** illustrates the configuration used for the compliance testing. The network consisted of Avaya Aura® Communication Manager running on an S8300D card that was installed in the G450 Media gateway, Avaya Aura® Session Manager, Avaya 9600 Series IP Telephones, along with a CELLX cellular gateway. Avaya Aura® Session Manager was connected to Avaya Aura® Communication Manager and the CELLX cellular gateway via a SIP Trunk. The CELLX in turn was connected to the cellular network via Subscriber Identity Module (SIM) cards that reside on boards inserted in the CELLX.

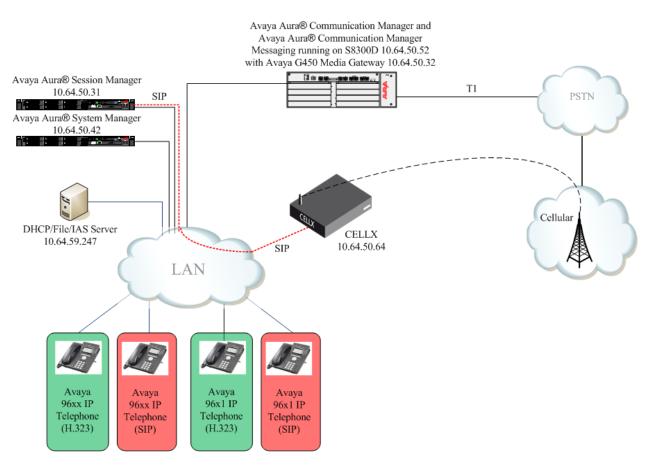


Figure 1: Network Configuration

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## 4. Equipment and Software Validated

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

Equipment	Software/Firmware
<b>*</b> *	BX Products
Avaya S8300D Server running Avaya Aura®	Avaya Aura® Communication Manager 6.0.1 with
Communication Manager	SP5.0.1(Patch 19303)
Avaya G450 Media gateway	
Mainboard	HW 2 FW 31.22.0(A)
MM710 T1 Module	HW 5 FW 22
MM712 DCP Media Module	HW 7 FW 14
MP80 VoIP-DSP	HW 6 FW 67
Avaya Aura®	Session Manager
Avaya Aura® Session Manager HP Proliant	6.1 with SP5
DL360 G7	0.1 with SI 5
Avaya Aura® System Manager HP Proliant	6.1 with SP5
DL360 G7	
· · · · · · · · · · · · · · · · · · ·	(Voice Mail) Products
Avaya Aura® Communication Manager	6.0
Messaging (CMM)	
Avaya Te	elephony Sets
Avaya 96xx Series IP Telephones	(SIP 3.1SP2), (SIP 2.6.6.0)
Avaya 96x1 Series IP Telephones	(SIP S6.010f), (SIP 6.0.3)
TELE	S Products
TELES CELLX cellular gateway	Software Version 17.0

## 5. Configure Avaya Aura® Communication Manager

This section describes the steps required for Communication Manager to support the configuration in **Figure 1**. The following pages provide step-by-step instructions on how to administer parameters specific to the CELLX cellular gateway solution only. The assumption is that the appropriate license and authentication files have been installed on the servers and that login and password credentials are available and that the reader has a basic understanding of the administration of Communication Manager and Session Manager. It is assumed that all other connections, e.g., to PSTN, to LAN, are configured and will not be covered in this document. The reader will need access to the System Administration Terminal screen (SAT). For detailed information on the installation, maintenance, and configuration of Communication Manager, please refer to **Section 10** ([1]).

#### 5.1. Configure Node-Names IP

In the **Node-Names IP** form, assign the name and IP address of Session Manager. This is used to terminate the SIP trunk with Session Manager. The names will be used in the signaling group configuration configured later.

Enter the **change node-names ip** command. Specify node names and management IP address for Session Manager.

```
change node-names ip
                                                              Page
                                                                     1 of
                                                                            2
                                 TP NODE NAMES
default
iql
                   IP Address
                   0.0.0.0
                   10.64.50.15
msgserver
                   10.64.50.52
                   10.64.50.52
procr
procr6
                   10.64.50.31
sm5031
( 7 of 7 administered node-names were displayed )
Use 'list node-names' command to see all the administered node-names
Use 'change node-names ip xxx' to change a node-name 'xxx' or add a node-name
```

#### 5.2. IP Codec Set and IP Network Region

Enter the **change ip-codec-set g** command, where "g" is a number between 1 and 7, inclusive, and enter "**G.711MU**" for **Audio Codec**. Note that the **Audio Codec** and **Packet Size** must match the corresponding configuration on the CELLX (see Default Configuration in **Section 7.1.3**). This IP codec set will be selected later in the IP Network Region form to define which codecs may be used within an IP network region.

cha	nge ip-codec-	-set 1			Page	1 of	2
		IP	Codec Set				
	Codec Set: 2	L					
1: 2: 3:		Silence Suppression <b>n</b>	Frames Per Pkt <b>2</b>	Packet Size(ms) 20			

cha	nge ip-codec	-set 1			Page	1 of	2
		IP	Codec Set				
	Codec Set:	1					
1: 2: 3:	Audio Codec <b>G.711MU</b>	Silence Suppression n		Packet Size(ms) 20			

In the **IP Network Region** form, the **Authoritative Domain** field is configured to match the domain name configured on Session Manager. In this configuration, the domain name is *lan50.d4f27.com*. By default, **IP-IP Direct Audio** (shuffling) is enabled to allow audio traffic to be sent directly between IP endpoints without using media resources in the Avaya G450 Media gateway. The **IP Network Region** form also specifies the **IP Codec Set** to be used for Desk Phone calls. This IP codec set is used when its corresponding network region (i.e., IP Network Region '1') is specified in the SIP signaling groups.

Enter the **change ip-network-region h** command, where "h" is a number between 1 and 250, inclusive. On page 1 of the **ip-network-region** form, set **Codec Set** to the number of the IP codec set configured in **Step 1**. Set the **Call Control PHB Value** to **46** and the **Audio PHB Value** to **46**. **Call Control 802.1p Priority** and **Audio 802.1p Priority** are set to **6**. Accept the default values for the other fields.

change ip-network-region 1 Page 1 of 20 IP NETWORK REGION Region: 1 Location: 1 Authoritative Domain: lan50.d4f27.com Name: MEDIA PARAMETERS Intra-region IP-IP Direct Audio: yes Codec Set: 1 Inter-region IP-IP Direct Audio: yes UDP Port Min: 2048 IP Audio Hairpinning? n UDP Port Max: 65535 DIFFSERV/TOS PARAMETERS Call Control PHB Value: 46 Audio PHB Value: 46 Video PHB Value: 26 802.1P/O PARAMETERS Call Control 802.1p Priority: 6 Audio 802.1p Priority: 6 Video 802.1p Priority: 5 AUDIO RESOURCE RESERVATION PARAMETERS H.323 IP ENDPOINTS RSVP Enabled? n H.323 Link Bounce Recovery? y Idle Traffic Interval (sec): 20 Keep-Alive Interval (sec): 5

#### 5.3. Configure Signaling and Trunk Groups

Add a signaling group for calls that need to be routed to the CELLX gateway. Prior to configuring a SIP trunk group for communication with Session Manager, a SIP signaling group must be configured. Configure the Signaling Group form as shown below:

- Set the **Group Type** field to *sip*.
- Specify the Communication Manager (procr) and the Session Manager as the two end-points of the signaling group in the **Near-end Node Name** field and the **Far-end Node Name** field, respectively. These field values were configured in the **IP Node Names** form shown in **Section 5.11**.
- Ensure that the recommended TLS port value of *5061* is configured in the **Near-end Listen Port** and the **Far-end Listen Port** fields. If the **Far-end Network Region** field is configured, the codec for the call will be selected from the IP codec set assigned to that network region.
- Enter the domain name in the **Far-end Domain** field. In this configuration, the domain name is *lan50.d4f27.com*.
- The **DTMF over IP** field is set to the default value of *rtp-payload*. Avaya Communication Manager supports DTMF transmission using RFC 2833.
- Direct IP-IP Audio Connections should be set to *n*.
- The default values for the other fields may be used.

add signaling-group 2 SIGNALI	Page 1 of 1 NG GROUP				
Group Number: 2 Group Typ IMS Enabled? n Transport Metho Q-SIP? n IP Video? n Peer Detection Enabled? y Peer Serve	d: tls SIP Enabled LSP? n Enforce SIPS URI for SRTP? y				
Near-end Node Name: procr Near-end Listen Port: 5061	Far-end Node Name: sm5031 Far-end Listen Port: 5061 Far-end Network Region: 1				
Far-end Domain: lan50.d4f27.com					
Far-end Domain: lan50.d4f27.com	Bypass If IP Threshold Exceeded? n				

Configure the **Trunk Group** form shown below for outgoing calls to be routed to the CELLX gateway.

- Set the Group Type field to "sip".
- Enter a meaningful name/description for Group Name.
- Enter a Trunk Access Code (TAC) that is valid under the provisioned dial plan
- Set the **Service Type** field to "tie".
- Specify the **Signaling Group** associated with this trunk group.
- Specify the Number of Members supported by this SIP trunk group
- The default values for the other fields may be used.

add trunk-grou	up 2	TRUNK GR	OUP		Page	e 1 of 21
Group Number:	2	Group	Type:	sip	CDR Rep	ports: y
Group Name:	To sm5031		COR:	1	TN: 1	TAC: *002
Direction:	two-way	Outgoing Di	splay?	n		
Dial Access?	n			Ni	ght Service:	
Queue Length:	0					
Service Type:	tie	Auth	Code?	n		
			1	Member	Assignment Metl Signaling Gro Number of Membe	oup: 2
H.323 Station Keep-Alive Cou	Outgoing Direc unt: 5	t Media? n		Al	ternate Route T:	imer(sec): 6

## 5.4. ARS Table, Route Patterns & Failover Configuration

Note: For compliance testing, the Communication Manager's connection to the PSTN used the ARS Feature Access Code digit "9" and route pattern 2.

#### 5.4.1. ARS Table configuration

Enter the **change ars analysis p** command, where "p" is any digit. Configure **Dialed String** entries according to customer requirements. In the example below, the entries match dialed numbers as follows:

- The "908" Dialed String matches 10-digit dialed numbers that begin with 908, and routes calls to Route Pattern 56. For example, a dialed number of 908-555-1212 would be matched by this entry.
- The "**190**" **Dialed String** matches 11-digit dialed numbers that begin with 190, and routes calls to **Route Pattern** 56. For example, a dialed number of 1-908-555-1212 would be matched by this entry.
- The first "23" **Dialed String** matches 12-digit dialed numbers that begin with 23, and routes calls to **Route Pattern 33**. This entry is intended to match dialed numbers that begin with the CELLX Dial Prefix (23 was used in the compliance-tested configuration). For example, a dialed number of 23-908-555-1212 would be matched by this entry.

The second "23" **Dialed String** matches 13-digit dialed numbers that begin with 23, and routes calls to **Route Pattern 33**. This entry is also intended to match dialed numbers that begin with the CELLX Dial Prefix (23 was used in the compliance-tested configuration). For example, a dialed number of 23-1-908-555-1212 would be matched by this entry.

change ars analysis XX	ARS DIGIT ANALYSI	S TABLE	Page 1 of 2
	Location:	all	Percent Full: 3
Dialed String 23 23 908 190	Min Max Pattern 12 12 33 13 13 33 10 10 56	Type Num hnpa hnpa hnpa	ANI Reqd n n n

#### 5.4.2. Route Pattern Configuration

Enter the **change route-pattern r** command, where "r" is the route pattern to the Session Manager. Route-pattern 3 was used for compliance testing.

Add a routing preference entry as follows:

- Grp No enter the trunk group created in Section 5.3, Step 2.
- **FRL** assign a Facility Restriction Level to this routing preference.

cha	nge i	cout	e-pat	tterr	n 3		Page	1 of	3
					Pattern N		: 3 Pattern Name: To sm5031		
						SCCAN	l? n Secure SIP? n		
	Grp	FRL	NPA	Pfx	Hop Toll	No.	Inserted	DCS/	IXC
	No			Mrk	Lmt List	Del	Digits	QSIG	, ,
						Dgts		Intw	Т
1:	2	0				Ō		n	user
2:								n	user
3:								n	user
4:								n	user
5:								n	user
6:								n	user
	BCC	C VA	LUE	TSC	CA-TSC	ITC	BCIE Service/Feature PARM No. Numb	bering	LAR
	0 1	2 M	4 W		Request		Dgts Form	nat	
							Subaddress		
1:	УУ	УУ	уn	n		rest			none
2:	УУ	УУ	уn	n		rest			none
3:	у у	у у	y n	n		rest			none
4:	у у	у у	уn	n		rest			none
5:	УУ	УУ	уn	n		rest			none
6:	УУ	УУ	y n	n		rest			none

#### 5.4.3. Failover Configuration

For compliance testing, the Primary route pattern out to the PSTN was 2. Enter the **change route-pattern r** command, where "r" is the route pattern out to the PSTN. Add the routing information for the route pattern used to reach the CELLX gateway via Session Manage. Configure the following:

- Grp No enter the trunk group created in Section 5.3. Step 2.
- **FRL** assign a Facility Restriction Level to this routing preference.

change route-pattern 2 Page 1 of 3 Pattern Number: 2 Pattern Name: To PSTN SCCAN? n Secure SIP? n Grp FRL NPA Pfx Hop Toll No. Inserted DCS/ IXC No Mrk Lmt List Del Digits QSIG Dgts Intw 1:1 0 09 n user 2:2 0 0 n user 3: n user 4: n user 5: n user 6: n user BCC VALUE TSC CA-TSC ITC BCIE Service/Feature PARM No. Numbering LAR 0 1 2 M 4 W Request Dgts Format Subaddress 1: yyyyyn n rest none 2: y y y y y n n rest none 3: yyyyyn n rest none 4: y y y y y n n rest none 5: yyyyyn n 6: yyyyyn n rest none rest none

Note: If group 1(PSTN) is unavailable calls will be routed to group 2 (Session Manager).

# 5.5. Called Party Number Adjustments for Incoming Calls through the CELLX cellular gateway

Outside callers may use the CELLX to reach Communication Manager extensions by first calling a SIM card number on the CELLX. The CELLX may be configured to directly route incoming calls from the SIM card to a specific extension on Communication Manager. If the extension is a Vector Directory Number (VDN), the vector associated with the VDN may then prompt and collect digits from the caller.

During compliance testing, the CELLX was configured to send all calls to an internal Avaya extension configured on Communication Manager.

## 6. Configure Avaya Aura® Session Manager

This section provides the procedures for configuring Session Manager. The procedures include adding the following items:

- SIP domain
- Logical/physical Locations that can be occupied by SIP Entities
- SIP Entities corresponding to Session Manager, Communication Manager, and CELLX cellular gateway
- Entity Links, which define the SIP trunk parameters used by Session Manager when routing calls to/from SIP Entities
- Routing Policies, which control call routing between the SIP Entities
- Dial Patterns, which govern to which SIP Entity a call is routed
- Session Manager, corresponding to the Session Manager Server to be managed by System Manager

Configuration is accomplished by accessing the browser-based GUI of System Manager using the URL "https://<*ip-address*>/SMGR", where <*ip-address*> is the IP address of System Manager. Log in with the appropriate credentials.

#### 6.1. Specify SIP Domain

Add the SIP domain for which the communications infrastructure will be authoritative. Do this by selecting **Domains** on the left and clicking the **New** button (not shown) on the right. The following screen will then be shown. Fill in the following:

- **Name:** The authoritative domain name (e.g., *lan50.d4f27.com*).
- **Type:** Select SIP
- Notes: Descriptive text (optional).

#### Click Commit.

AVAYA	Avaya Aura® Syster	n Manager	6.1	**	Log off admin	
				Routing *	Home	
Routing	Home / Elements / Routing / Domain	ns - Domain Manag	jement			
Domains					Help ?	
Locations	Domain Management			Commit	Cancel	
Adaptations						
SIP Entities						
Entity Links	1 Item   Refresh	1 Item   Refresh				
Time Ranges	Name	Туре	Default	Notes		
Routing Policies	* lan50.d4f27.com	sip 💌				
Dial Patterns						
Regular Expressions	* Input Required			Commit	Cancel	
	Input Kedun en			Comme	cancer	

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#### 6.2. Add Locations

Locations can be used to identify logical and/or physical locations where SIP Entities reside for purposes of bandwidth management. To add a location, select **Locations** on the left and click on the **New** button (not shown) on the right. The following screen will then be shown. Fill in the following:

Under General:

Name: A descriptive name.
Notes: Descriptive text (optional).

Under Location Pattern:

IP Address Pattern: A pattern used to logically identify the location.
Notes: Descriptive text (optional).

The screen below shows the addition of the *lan50* location, where Communication Manager and Session Manager reside. Click **Commit** to save the Location definition.

🚖 Favorites 🏾 🏉 Location Detail	\$	🏠 🔻 🛐 👻 🖃 🖶 👻 Page 🕶 Safety 🕶 Tools 🕶 🔞 💌 ≫
AVAYA	Avaya Aura® System Manager 6.1	Help   About   Change Password   Log off admin Routing × Home
Routing	Home / Elements / Routing / Locations - Location Details	
Domains		Help ?
Locations	Location Details	Commit Cancel
Adaptations		
SIP Entities	General	
Entity Links	* Name: lan50	
Time Ranges	Notes:	
Routing Policies		
Dial Patterns	Overall Managed Bandwidth	
Regular Expressions		E
Defaults	Managed Bandwidth Units: Kbit/sec 💌	
	Total Bandwidth:	
	Multimedia Bandwidth:	
	Audio Calls Can Take Multimedia <i></i> Bandwidth:	
	Per-Call Bandwidth Parameters	
	Maximum Multimedia Bandwidth (Intra1000 Kbit/Sec Location):1000	
	Maximum Multimedia Bandwidth (Inter1000 Kbit/Sec Location):1000	
	Minimum Multimedia Bandwidth: 64 Kbit/Sec	
	* Default Audio Bandwidth: 80 Kbit/sec	•
	Location Pattern Add Remove	
	1 Item   Refresh	Filter: Enable
		otes
	* 10.64.50.*	
	Select : All, None	
	* Input Required	Commit Cancel

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#### 6.3. Add SIP Entities

In the sample configuration, a SIP Entity is added for Communication Manager, and the CELLX cellular gateway.

#### 6.3.1. Avaya Aura® Communication Manager

A SIP Entity must be added for Communication Manager. To add a SIP Entity, select **SIP Entities** on the left and click on the **New** button (not shown) on the right. The following screen is displayed. Fill in the following:

Under General:

- Name: A descriptive name.
   FQDN or IP Address: IP address of the signaling interface (e.g., S8300D board) in the G450 telephony system.
   Type: Select *CM*.
   Location: Select one of the locations defined previously.
- **Time Zone:** Time zone for this location.

Defaults may be used for the remaining fields. Click Commit to save each SIP Entity definition.

SIP Entity Details - Windows Internet				
C 🗢 🗢 🖉 https://10.64.50.42/SI	MGR/	🔻 😵 Certificate Error	🗟 😽 🗙 🔁 Bing	<b>ب</b> م
🗙 🛄 Snagit 📃 📺				
👷 Favorites 🏾 🏉 SIP Entity Details				🖶 👻 Page 🕶 Safety 🕶 Tools 💌 🕡 👻
Αναγα	Avaya Aura® System M	anager 6.1	Help   About   Cł	Nange Password   Log off admin
Routing	Home / Elements / Routing / SIP Entities	- SIP Entity Details		
Domains				Help ?
Locations	SIP Entity Details			Commit Cancel
Adaptations	General			
SIP Entities	* Name:	cm5052		
Entity Links	* FQDN or IP Address:	10.64.50.52		
Time Ranges	Туре:			
Routing Policies				
Dial Patterns	Notes:	Evolution Server - S8300D		
Regular Expressions	Adaptation:			
Defaults				
	Location:			
		America/Denver		
	Override Port & Transport with DNS SRV:			
	* SIP Timer B/F (in seconds):	4		
	Credential name:			
	Call Detail Recording:	none 💌		
	SIP Link Monitoring SIP Link Monitoring:	Use Session Manager Configuration 💌	]	-

#### 6.3.2. CELLX Cellular Gateway

A SIP Entity must be added for the CELLX cellular gateway. To add a SIP Entity, select SIP Entities on the left and click on the New button (not shown) on the right. The following screen is displayed. Fill in the following:

Under *General*:

•	Name:	A descriptive name.
_	FODM ID A 11	

- CELLX cellular gateway IP address. FQDN or IP Address: Select SIP Trunk.
- Type:
- Location: Select one of the locations defined previously.
- Time Zone: Time zone for this location.

Defaults may be used for the remaining fields. Click Commit to save each SIP Entity definition.

<i> S</i> IP Entity Details - Windows Internet B	🖻 SIP Entity Details - Windows Internet Explorer provided by Avaya IT 👘 💷 📧					
🕞 🕞 🗢 🙋 https://10.64.50.42/SN	//GR/	👻 Certificate Error 🔯 🍫 🗙 🕞 Bing 🔎 🕈	,			
🗙 🛄 Snagit 🧮 🛃						
🚖 Favorites 🛛 🏉 SIP Entity Details		🟠 🕶 🖾 👻 🖃 👘 Page 🕶 Safety 🕶 Tools 🕶 🔞 🖛	•			
Αναγα	Avaya Aura® System M	1anager 6.1 Help   About   Change Password   Log off admin Routing * Home				
Routing	◀ Home / Elements / Routing / SIP Entities ·	- SIP Entity Details				
Domains		Help ?				
Locations	SIP Entity Details	Commit Cancel				
Adaptations	General					
SIP Entities	* Name:	CELLX				
Entity Links	* FQDN or IP Address:	10.64.50.64				
Time Ranges	-	SIP Trunk				
Routing Policies		Teles Cellular Gateway				
Dial Patterns	Notes.	Teles cellular Gateway				
Regular Expressions	Adaptation:					
Defaults	Location:					
		America/Denver				
	Override Port & Transport with DNS SRV:					
	* SIP Timer B/F (in seconds):	4				
	Credential name:					
	Call Detail Recording:	egress 💌				
	SIP Link Monitoring SIP Link Monitoring:	Use Session Manager Configuration 💌	,			

#### 6.4. Add Entity Links

The SIP trunk from Session Manager to Communication Manager and the CELLX cellular gateway are described by Entity Links. To add an Entity Link, select **Entity Links** on the left and click on the **New** button (not shown) on the right. Fill in the following fields in the new row that is displayed:

•	Name:	A descriptive name.
•	SIP Entity 1:	Select the Session Manager.
•	Protocol:	Select <i>TLS</i> as the transport protocol.
•	Port:	Port number to which the other system sends SIP
		Requests (e.g., 5061 for TLS).
•	SIP Entity 2:	Select the Communication Manager.
•	Port:	Port number to which the other system sends SIP
		Requests (e.g., 5061 for TLS).
•	<b>Connection Policy:</b>	Select Trusted.

Repeat configuration for Session Manager and the CELLX cellular gateway.

Note: The session between CELLX and Session Manager used UDP and Port 5060

The following screens display the configuration of each Entity Link. The first entity link is for the connection between Session Manager and Communication Manager and the second entity link is for the connection between Session Manager and the CELLX cellular gateway.

#### Session Manager $\leftarrow \rightarrow$ Communication Manager

	50.d4f27.com/SMGR/				🝷 😵 Certificate Error	🖹 🍫 🗙	🔁 Bing	
📳 Snagit 📰 💼 avorites 🏾 🌈 Entity Links						👌 - 🔊	• 🖃 🖶 •	Page ▼ Safety ▼ Tools ▼ 🌘
AVAYA	Avaya Au	ıra® Syste	em Mar	nager (	5.1	Help   Ab	oout   Change	Password   Log off admir
Routing	↓ Home / Elements	/ Routing / Entit	y Links - Er	tity Links				Routing * Home
Domains								Help
Locations	Entity Links							Commit Cance
Adaptations								
SIP Entities								
Entity Links	1 Item   Refresh				1			Filter: Enable
	Name	SIP Entity 1	Protocol	Port	SIP Entity 2	Port	Connectio Policy	n Notes
Time Ranges							Trusted	-
	* cm5052	* sm5031 💌	TLS 💌	* 5061	* cm5052 🔍	* 5061	Trusted	▼
Time Ranges		* sm5031 💌	TLS 💌	* 5061	* cm5052 💌	* 5061	Trusted	<b>Y</b>
Time Ranges Routing Policies	* cm5052	* sm5031 💌	TLS 💌	* 5061	* cm5052 💌	* 5061	Trusted	
Time Ranges Routing Policies Dial Patterns		* sm5031 💌	TLS 💌	* 5061	* cm5052 💌	* 5061	Trustea	Commit Cance
Time Ranges Routing Policies Dial Patterns Regular Expressions	* cm5052	* sm5031 💌	TLS 💌	* 5061	* cm5052 💽	* 5061	Trusted	
Time Ranges Routing Policies Dial Patterns Regular Expressions	* cm5052	* sm5031 💌	TLS 💌	* 5061	* cm5052 💌	* 5061	Irustea	
Time Ranges Routing Policies Dial Patterns Regular Expressions	* cm5052	* sm5031 💌	TLS	* 5061	* cm5052 💌	*  5061	Irustea	

#### Session Manager $\leftarrow \rightarrow$ CELLX cellular gateway

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Dial Patterns										
Regular Expressions	* Input Required								Com	mit Cancel
Defaults	Input Kequireu								Con	

#### 6.5. Add Routing Policies

Routing policies describe the conditions under which calls will be routed to the SIP Entities specified in **Section 6.3**. Two routing policies were added – one for Communication Manager, one for CELLX. To add a routing policy, select **Routing Policies** on the left and click on the **New** button (not shown) on the right. The following screen is displayed. Fill in the following:

Under *General*: Enter a descriptive name in **Name**.

Under SIP Entity as Destination:

Click Select, and then select the appropriate SIP entity to which this routing policy applies.

Defaults can be used for the remaining fields. Click **Commit** to save each Routing Policy definition. The following screen shows the Routing Policy for Communication Manager.

🔗 Routing Policy Details - Windows Inter	rnet Explorer provided by	Ауауа П				
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🗙 🛄 Snagit 🧮 💼						
🚖 Favorites 🛛 🏉 Routing Policy Det	tails				🛐 🔻 🔝 👻 🚍 🖶 👻 Page 🕶 Safety 🕶 Tools	• @• »
AVAYA	Avaya A	Aura® System Ma	anager 6.1		Help   About   Change Password   Log off ad	_
	11		- Deutine Deller	. Dataila	Routing Ho	E
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Domains						lp ?
Locations	Routing Policy De	ails			Commit	ncel
Adaptations						
SIP Entities	General					
Entity Links		* Name:	cm5052			
Time Ranges		Disabled:				
Routing Policies		Notes:				
Dial Patterns						
Regular Expressions	SIP Entity as I	estination				
Defaults						
	Select					
	Name	FQDN or IP Address		Туре	Notes	
	cm5052	10.64.50.52		СМ	Evolution Server - S8300D	
						+

The following screen shows the Routing Policy for the CELLX cellular gateway.

6 Routing Policy Details - Windows Inter	met Explorer provided by A	Avaya IT				
📀 🕞 🗢 🙋 https://10.64.50.42/SM	1GR/		-	🔹 😵 Certificate Error	🗟 🍫 🔀 📴 Bing	+ م
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🚖 Favorites 🏾 🌈 Routing Policy Det	tails				🏠 🔻 🔝 👻 🚍 🖶 🔻 Page 🕶 Safety	▪ Tools ▼ 🕢 ▼
Αναγα	Avaya A	ura® System Ma	nager 6.1		Help   About   Change Password   Log	
					Routing	* Home ≡
Routing	Home / Element	ts / Routing / Routing Policie	es - Routing Policy D	etails		
Domains						Help ?
Locations	Routing Policy Det	ails			Con	nmit Cancel
Adaptations						
SIP Entities	General					
Entity Links		* Name:	CELLX			
Time Ranges		Disabled:				
Routing Policies		Notes:	Teles Cellular Gatewa	v		
Dial Patterns						
Regular Expressions	SIP Entity as D	ectination				
Defaults	· .	esunation				
	Select					
	Name	FQDN or IP Address		Туре	Notes	
	CELLX	10.64.50.64		SIP Trunk	Teles Cellular Gateway	

#### 6.6. Add Dial Patterns

Dial patterns must be defined that will direct calls to the appropriate SIP Entity. In the sample configuration, 11-digit numbers beginning with "1" will be routed to the CELLX cellular gateway. To add a dial pattern, select **Dial Patterns** on the left and click on the **New** button (not shown) on the right. Fill in the following:

Under General:

- **Pattern:** Dialed number or prefix.
- Min Minimum length of dialed number.
- Max Maximum length of dialed number.
- **SIP Domain** SIP domain of dial pattern.
- Notes Comment on purpose of dial pattern.

Under Originating Locations and Routing Policies:

Click Add, and then select the appropriate location and routing policy from the list.

Default values can be used for the remaining fields. Click **Commit** to save this dial pattern. The following screen shows the dial pattern definitions for local extensions on Communication Manager.

🏉 Dial Pattern Details - Windows Intern	et Explorer provided by Avaya Π							×
🚱 🕞 🗢 🙋 https://10.64.50.42/S	MGR/			👻 😵 Certificat	e Error 🛛 🗟 🍫	🔀 🔁 Bing	ş	0 -
🗙 🛄 Snagit 🗾 📑								
🚖 Favorites 🛛 🌈 Dial Pattern Detai	ils				🟠 •	r 🗟 🕆 🖃 🖶 🔻 P	age 🕶 Safety 🕶 Tools 🕶 🔞	• **
AVAYA	Avaya Aura® Sys	em Manager (	6.1		Hel	p   About   Change Pa	ssword   Log off admin	*
Routing	Home / Elements / Routing / Dia	l Patterns - Dial Patteri	n Details					1
Domains							Help ?	
Locations	Dial Pattern Details						Commit Cancel	
Adaptations								
SIP Entities	General							
Entity Links		* Pattern: 1						
Time Ranges		* Min: 11						
Routing Policies		* Max: 11	7					
Dial Patterns		Emergency Call:	-					E
Regular Expressions		SIP Domain: -ALL-	•					
Defaults		Notes: CELLX			_			
	Originating Locations and Rou Add Remove 1 Item Refresh						Filter: Enable	
	Originating Location Name 1	Originating Location Notes	Routing Policy Name	Rank <sup>2</sup> 🛓	Routing Policy Disabled	Routing Policy Destination	Routing Policy Notes	
	-ALL-	Any Locations	CELLX	0		CELLX	Teles Cellular Gateway	
	Select : All, None							
	Denied Originating Locations							
	0 Items   Refresh						Filter: Enable	
	Originating Location					Notes		
	* Input Required						Commit Cancel	-

RDC; Reviewed: SPOC 7/19/2012

Solution & Interoperability Test Lab Application Notes ©2012 Avaya Inc. All Rights Reserved. 22 of 33 CELLX\_AA\_SIP The following screen shows the dial pattern definition for reaching the PSTN via Communication Manager.

🖗 Dial Pattern Details - Windows Intern	et Explorer provided by Avaya Π						
🕒 🕞 🗢 🙋 https://10.64.50.42/S	MGR/			👻 😵 Certificat	e Error 🔡 🔩	🗙 📴 Bing	م
🗴 🛄 Snagit 📃 📑							
🚖 Favorites 🛛 🌈 Dial Pattern Deta	ils				🟠 •	• 🔝 🔻 🖃 🖶 🕶 Pa	ge 🕶 Safety 🕶 Tools 🕶 🔞 🕶
Αναγα	Avaya Aura® Syst	em Manager (	5.1		Help	)   About   Change Pas	ssword   Log off admin
Routing		l Patterns - Dial Patterr	n Details				
Domains							Help ?
Locations	Dial Pattern Details						Commit Cancel
Adaptations							
SIP Entities	General						
Entity Links		* Pattern: 91					
Time Ranges		* Min: 12	]				
Routing Policies		* Max: 12	1				
Dial Patterns		Emergency Call:	1				
Regular Expressions		SIP Domain: -ALL-	•				
Defaults		Notes:			_		
	Originating Locations and Rou Add Remove 1 Item Refresh	Originating Location	Routing Policy	Rank 2	Routing Policy	Routing Policy	Filter: Enable Routing Policy
		Notes	Name		Disabled	Destination	Notes
	-ALL-	Any Locations	cm5052	0		cm5052	
	Select : All, None						
	Denied Originating Locations						
	Add Remove 0 Items Refresh						Filter: Enable
	Originating Location					Notes	ricer, criable
	* Input Required						Commit Cancel

# 7. Configure CELLX Cellular Gateway

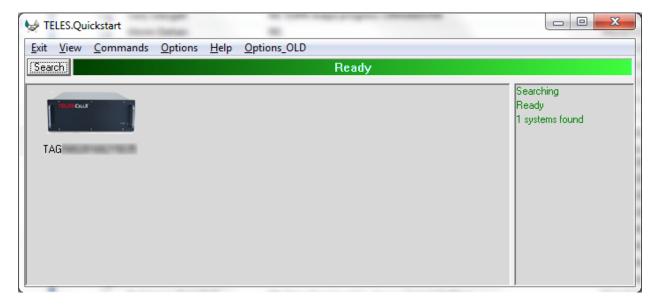
This section describes the steps for configuring the cellular boards, SIM cards, VoIP, and outbound/inbound routing policies on the CELLX cellular gateway. The steps are provided for illustration only; users should consult with CELLX cellular gateway documentation for specific instructions.

## 7.1. System Configuration

The configuration of the CELLX cellular gateway is a two-step process. Each step requires the use of its own tool, both of which are included on the CD that shipped with the gateway. Install both the "TELES Quickstart" application and the "TELES GATE Manager".

#### 7.1.1. Configure CELLX IP Address

Launch the "TELES Quickstart" application. Two prompts appear regarding the network setup of the PC. Depending on the network setup, follow the prompts and proceed to allow the tool to scan the network. Once, completed, **double** click on the gateway **icon** to continue.



The IP-Setting box will appear. Assign the appropriate network settings, as shown in **Figure 1** and click **Finish**.

IP Settings	-				x
	DHC	P			
IP Address	10	. 64	. 50	. 64	
Mask:	255	. 255	. 255	. 0	-
Default Gateway:	10	. 64	. 50	. 1	-
< <u>B</u> ack		Finish		Cancel	1

Wait while the TELES Quickstart application updates and reboots the CELLX. Then close the Quickstart application

Note: The gateway can take up to 5 minutes to reboot and apply settings.

#### 7.1.2. CELLX Cellular Gateway First Connection

Launch the TELES GATE Manager application.

The first time the GATE Manager is used, a Group must be added. Under **Groups**, right click on the left pane of the GATE Manager and choose **New Group**. Assign a name and click **OK** (not shown) to continue.

In the right pane, right-click on the new group that was just created, choose **New System**, the **Edit System** box appears. Assign the following values:

Note: the values used are based on this sample configuration.

- System Name: TELES CELLX (May be configured to match custom naming conventions)
- Remote Number: 10.64.50.64

🍓 GATE Manager	Edit System
GATE Manager File Edit View Commands Optiv Garoups Groups Groups System Name Company	idit System         Group:       Company         System name:       Teles CELLX         Bernote number:       10.64.50.64         Password:       ISDN         FTP User:       ISDN         FTP Password:       Use FTP File Transfer         Use Fast Mode       SIP Port:         Dest Mode       SIP Port:         Staten Port:       GED
	User defined:         Serial number:         System type:         Software version:         Licenses:         Licenses:         Last contact time:         OK       Connect         Cancel

Once completed, click the **OK** button.

#### 7.1.3. Configuring the CELLX

Launch the TELES GATE Manager application

Select the system name of the CELLX cellular gateway to be configured and click the **Connect** button at the top of the screen. When prompted for a password, enter the current password, and click **OK**. The default password is blank.

Once connected, select **Directory** from **System** tree on the left side. The following screen will appear if done correctly.

😼 GATE Manager								
jile <u>E</u> dit ⊻iew <u>⊂</u> omma	ands <u>O</u> ptions Co <u>n</u>	nect Disconnect	Info					TELES
5. S/ S   5, 5	/ 🕱 💡	Disconnect						
Connected with IP:	10.64.50.64 Cel⊠ Ga	teway (aGATE (S2N	4, VolP) )	Local System Time: Th	ursday, June 07, 2012	5:31:20 PM		
System				4				
🖉 🙀 General	Mask: 🔛		<b>_</b>	Reload (F5)				
Versions	Name (CFG,	▼ Ext	Size	Modified	Name (LOG, 🔻	Ext	Size	Modified
	💇 ip	cfg	166	28.03.2012 16	🥶 asr	log	5938	04.06.2012
Port Status	🖓 naby	cfg	3239	05.06.2012.06	🞯 cdr1204190	log	3506	19.04.2012
Directory	route	cfg	1019	05.06.2012 09	🞯 failed1204190	log	2136	19.04.2012
🖉 Online Trace					🎯 msg1204190	log	5508	19.04.2012
					💇 msg1204260	log	354	26.04.2012
					protocol1205020	log	1857	03.05.2012
					protocol1205070	log	424	08.05.2012
	<			>	<			
	Name (0, Z,	▼ Ext	Size	Modified	Name 🔻	Ext	Size	Modified
	🛋 igate	tz1	5450602	28.03.2012 14	app_umtst_load	xxx	411668	28.01.2011
					💌 boot	rc	326	25.01.2008
					🛋 cdmatelit	XXX	295740	28.01.2011
					🗟 cdmatelit_lab	×	295688	28.01.2011
					Currpos	pbx	3372	05.06.2012
					🖻 gps		10223	28.01.2011
					MEIs	lst	853	27.01.2011
					🛋 ipv4	vnd	777728	20.10.2010
					icense	key	530	27.01.2011
					🛋 netbsdfs	gz	3365376	20.10.2010
	<			>				>
	,					READY		

From the GATE Manager window (not shown), right click on **SIP\_route cfg** and choose **Copy**. In the **Rename/Copy** dialog that is presented, rename **SIP\_route.cfg** to **route.cfg** and click **OK**. Confirm any prompts received to overwrite the current **route.cfg** file.

Right click on **route cfg** and choose **Receive.** This will download the file to the PC to be edited. These files are standard Windows text files, normally ending in .txt. Open the file in a text editor like **Wordpad**. **Do NOT** use **Microsoft Word**. Below is a copy of the configuration present when the CELLX ships from the factory. The contents of this configuration file determine how the CELLX processes calls between the cellular network and the Avaya PBX by way of an SIP trunk. In this context, "**inbound**" means calls coming into the Avaya PBX from the cellular network, routed via SIP. "**Outbound**" refers to calls going out of the PBX, via SIP, to the CELLX and progressing out to the cellular network.

: Default configuration for SIP connections [System] ;-----; write incoming USSD and SMS in msglog file restrict20=@FILE 06 restrict20=@FILE 05 ; outbound calls Restrict40=out ; calls from VoIP are labelled as "out" MapAllout911=20911 MapAllout01=|201 << 13|; collect digits and forward calls to cellular MapAllout0=|201<<13 MapAllout=20 DTMFWaitDial=3 ; timeout for digit collection ; inbound calls Restrict20=in 01 MapAllin=40PBX:1234 ; forward inbound calls to extension 1234 via VoIP [Voip:PBX] VoipDirection=IO VoipPeerAddress=1.2.3.4 ; Replace with the IP address of your PBX VoipIpMask=0xfffffff VoipCompression=g711u VoipSilenceSuppression=No VoipSignalling=1 VoipMaxChan=64 VoipTxM=2 VoipDtmfTransport=2

VoipIPLogging=Yes

VoipRFC2833PayloadType=101 VoipIgnoreDADType=Yes VoipMediaWaitForConnect=No The SIP connection to the Avaya PBX is defined with the following lines in the route.cfg configuration file, called a "profile":

In most applications, these parameters will remain unchanged except the "VoipPeerAddress" parameter. Replace "**1.2.3.4**" with the IP address of Session Manager.

The "**Restrict**" commands, found near the top of the route.cfg file, associate the relevant class of CELLX call handling hardware with an identifier, in this case "*out*" for outbound calls and "*in*" for inbound calls (as defined above). These identifiers are inserted in the B party number as a prefix to the actual received dialled digits. Full syntax and semantics for the Restrict command can be found on the documentation CD in the "*CELLX User Manual*", version 16.2; see **Section 5.3.1.1** "The Restrict Command".

The "MapAll" commands evaluate the B party number, and "MapAllin" and "MapAllout" refer respectively to the "in" or "out" labels that have been inserted with the "Restrict" command. For outbound calls, depending on the format of the B party number that is sent by the PBX (i.e., the type of number, with or without a leading "1"), one of the following lines for outbound calls will match:

```
MapAllout01=|201<<13
MapAllout0=|201<<13
MapAllout=20</pre>
```

These three lines will create three routing rules. Calls that start with "01" will be wait until enough digits have been collected (last 10 digits + the "1" + the "20" representing the cellular channels). Similarly, calls that start with "0", but don't have a "1". Then lastly, a catch-all rule that sends calls as received by the CELLX.

Inbound calls (calls coming from the cellular network) will be forwarded by the CELLX to an extension on the Avaya PBX as specified by the following line

MapAllin=40PBX:1234

Here "40:PBX" indicates the address on the CELLX of the SIP interface connected to the profile "PBX", while "1234" is an example of an extension on the PBX that should be changed as appropriate for the implementation. Change the "1234" extension to match where the calls FROM the cellular will be sent on the PBX system, e.g. an operator, voicemail, or auto-attendant. For example, if the inbound calls are forwarded to an operator that has the extension "00", then change the line to

MapAllin=40PBX:00

Full syntax and semantics for the MapAll command can be found on the documentation CD in the "*CELLX User Manual*", version 16.2; see section 5.3.1.2, "The MapAll Command".

Save changes and exit the text editor. This will save the document locally on the PC.

Right click on the GATE Manager window and choose **Send** from the context menu. Select the new (edited) version of **route.cfg** and send it. This will upload the new changes to the CELLX.

Right click on pabx cfg and choose Copy. In the Rename/Copy dialog that is presented (not shown), rename pabx.cfg to pabx\_orig.cfg and click OK. Confirm any prompts received to overwrite the current pabx\_orig.cfg file

Right click on SIP\_pabx cfg and choose Copy. In the Rename/Copy dialog that is presented, rename SIP\_pabx.cfg to pabx.cfg and click OK. Confirm any prompts received to overwrite the current pabx.cfg file.

The default SIP\_pabx.cfg file will work unmodified for nearly every application, so it is not covered in this document.

Please view the detailed manual for the CELLX or contact support if with additional questions. Please contact support before changing the preconfigured pabx.cfg files included with the gateway.

Go to the Commands menu and select Restart System

## 8. Verification Steps

The following steps may be used to verify the configuration:

- From the SAT, enter the command status signaling-group s, where s is the number of a signaling group configured in Section 5.3, and verify that the Group State is "in service".
- From the SAT, enter the command **status trunk-group t**, where t is the number of a trunk group configured in Section 5.3, and verify that the Service States of all trunks are "in-service/idle" or "in-service/active".
- While the landline is operational, place several outbound calls, and verify successful routing to the landline and CELLX and successful call completion.
- While the landline is out of service, place several outbound calls, and verify successful routing to the CELLX and successful call completion.
- Place inbound calls to the CELLX and verify successful forwarding to an extension registered to Communication Manager.
- Place outbound calls using the CELLX Dial Prefix, and verify successful routing to the CELLX and successful call completion

## 9. Conclusion

These Application Notes describe a compliance-tested configuration comprised of Avava Aura® Communication Manager, Avaya Aura® Session Manager, and the CELLX cellular gateway. The CELLX is a cellular gateway that can augment landline connectivity with wireless connectivity to the cellular network. In case of landline connectivity failure, CELLX provides a backup solution to maintain voice communications. During compliance testing, outbound calls from Avaya Aura® Communication Manager and Avaya Aura® Session Manager were successfully routed over a SIP trunk to the CELLX and in turn to the cellular network. Similarly, inbound calls from the cellular network to the CELLX were successfully forwarded to Avaya Aura® Communication Manager over the SIP trunk.

The TELES CELLX cellular gateway successfully completed the compliance testing. Refer to Section 2.2 for more details and listed observations.

## 10. Additional References

The documents referenced below were used for additional support and configuration information.

The following Avaya product documentation can be found at http://support.avaya.com.

- [1] Administering Avaya Aura® Communication Manager, June 2010, Release 6.0, Issue 6.0, Document Number 03-300509, available at http://support.avaya.com.
- [2] Administering Avaya Aura® Session Manager, October 2010, Issue 1.1, Release 6.1, Document Number 03-603324, available at http://support.avaya.com.
- [3] Avaya one-X Deskphone Edition for 9600 Series IP Telephones Administrator Guide Release 3.1, November 2009, Document Number 16-300698.

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SPOC 7/19/2012	©2012 Avaya Inc. All Rights Reserved.	CELLX_AA_SIP

[4] *Implementing Avaya Aura*® *Communication Manager Messaging*, May 2011, Document Number 18-603644.

Product information for the CELLX cellular gateway may be found at <u>http://www.teles.com/cellx</u>

[5] TELES CELLX User Manual, Revision 16.2, September 2011.

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