

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 1 of 17

Overview

This document outlines the configuration steps to integrate the Mutare Communication Server (MCS) using SIP with the Avaya Aura Communication Manager.

Document *145-MCS Specifications*, should be reviewed before attempting to complete this document. We recommend downloading the most recent version from <http://www.mutare.com/techdocs.asp>.

Site Configuration

For this document, the configuration was as follows:

- SIP Enablement Server (SES).
- Avaya S8300 running Communication Manager (CM) in a G450 Gateway.
- The MCS is running on a Windows 2003 Server and communicates to the Avaya SIP infrastructure (Communication Manager and SIP Enablement Services) via SIP trunks.
- On the Avaya G450 Gateway, the signaling and media resources needed to support SIP and H.323 trunks are integrated directly on the media gateway processor.

Outbound calls originating from Mutare applications on the MCS are sent to the SIP Enablement Services server first, then from the SIP Enablement Services to the Communication Manager via the configured SIP trunks. Inbound calls terminating on the Mutare applications on the MCS are first received by the Communication Manager, then are directed to the Mutare applications on the MCS through the configured SIP trunks.

For the purposes of the configuration examples below, the following IP configuration was used:

- Mutare MCS – 192.168.1.81
- Avaya CM / SES – 192.168.1.71

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 2 of 17

Configure Avaya Aura Communication Manager

Communication Manager License

Use the **display system-parameters customer-options** command to verify that the Communication Manager license has sufficient remaining capacity for SIP trunks by comparing the **Maximum Administered SIP Trunks** field value with the corresponding value in the **USED** column.

```
display system-parameters customer-options                               Page 2 of 10
                                OPTIONAL FEATURES

IP PORT CAPACITIES                                                    USED
    Maximum Administered H.323 Trunks: 12                            11
    Maximum Concurrently Registered IP Stations: 450                 16
    Maximum Administered Remote Office Trunks: 450                   0
Maximum Concurrently Registered Remote Office Stations: 450         0
    Maximum Concurrently Registered IP eCons: 0                      0
    Max Concur Registered Unauthenticated H.323 Stations: 0         0
    Maximum Video Capable H.323 Stations: 0                        0
    Maximum Video Capable IP Softphones: 0                          0
    Maximum Administered SIP Trunks: 450 37
    Maximum Administered Ad-hoc Video Conferencing Ports: 0        0
    Maximum Number of DS1 Boards with Echo Cancellation: 80        0
        Maximum TN2501 VAL Boards: 0                                0
        Maximum Media Gateway VAL Sources: 50                       1
    Maximum TN2602 Boards with 80 VoIP Channels: 0                  0
    Maximum TN2602 Boards with 320 VoIP Channels: 0                 0
    Maximum Number of Expanded Meet-me Conference Ports: 0         0
```

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 3 of 17

IP Interfaces

Use the list ip-interface all command to identify which IP interfaces are located in which network region.

```
list ip-interface all
```

IP INTERFACES

ON	Type	Slot	Code/Sfx	Node Name/ IP-Address	Mask	Gateway Node	Net Rgn	VLAN
---	---	---	---	-----	---	-----	---	---
y	PROCR			192.168.1.71	/24	192.168.1.1	1	

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 4 of 17

IP Network Region

The configuration of the IP network regions is assumed to be already in place and is included here for clarity. Use **display ip-network-region** command to view these settings. Important fields:

- The **Authoritative Domain** field is configured to match the domain name configured on the Avaya SES. This name appears in the "From" header of SIP messages originating from this IP region.
- **IP-IP Direct Audio** (media shuffling) was enabled to allow audio traffic to be sent directly between IP endpoints without using media resources in the Avaya Media Gateway.
- The **Codec Set** field was set to the IP codec set to be used for calls within this IP network region.

```
display ip-network-region 1                                     Page 1 of 19
                                                                IP NETWORK REGION
Region: 1
Location: 1           Authoritative Domain: mutaresip.com
Name: main
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: 3029
DIFFSERV/TOS PARAMETERS                                   RTCP Reporting Enabled? y
Call Control PHB Value: 34                                RTCP MONITOR SERVER PARAMETERS
Audio PHB Value: 46                                       Use Default Server Parameters? y
Video PHB Value: 26
802.1P/Q PARAMETERS
Call Control 802.1p Priority: 7
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
Keep-Alive Count: 5
```

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 5 of 17

IP Node Names

Use the **change node-names ip** command to create a node name that maps to the Mutare MCS IP address.

```
change node-names ip                                     Page 1 of 2
                                                         IP NODE NAMES
Name           IP Address
cmm            192.168.1.73
default        0.0.0.0
ivr          192.168.1.81
msgserver     192.168.1.38
msgserver2    192.168.1.36
procr         192.168.1.71
sip-proxy     192.168.1.71
```

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 6 of 17

IP Network Map

Use the **change ip-network map** command to ensure that the proper Network Region is assigned to the Mutare MCS IP address.

```
change ip-network-map                                     Page 1 of 63
                                                         IP ADDRESS MAPPING

IP Address                                               Subnet Network      Emergency
                                                         Bits   Region VLAN Location Ext
-----
FROM: 10.10.1.0                                         /24    5      n
  TO: 10.10.1.255
FROM: 172.16.10.0                                       /24    5      n
  TO: 172.16.10.255
FROM: 192.168.1.81                                    /       1      n
TO: 192.168.1.81
```

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 7 of 17

Codecs

Use the **change ip-codec-set** to verify that the codec is configured to G.711MU.

```
display ip-codec-set 1
```

Page 1 of 2

IP Codec Set

Codec Set: 1

Audio	Silence	Frames	Packet
Codec	Suppression	Per Pkt	Size (ms)
1: G.711MU	n	2	20
2:			

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 8 of 17

Signaling Group

The signaling group and the associated SIP trunk group are used for routing calls to/from the Mutare MCS. Important fields:

- **Group Type:** sip.
- **Transport Method:** tls (Transport Layer Security)
- **Co-Resident SES:** Set to **y** for this system. May not apply in your configuration.
- **Near-end Node Name:** This will be either **procr** if co-resident SES or use the node name that maps to the IP address of the CLAN circuit pack used to connect to the MCS.
- **Far-end Node Name:** This will be either **procr** if co-resident SES or use the node name maps to the IP address of the SES.
- **Near-end Listen Port:** This will default to **5061** unless co-resident SES, then use **6001**.
- **Far-end Listen Port:** This will default to **5061**.
- **Far-end Network Region:** This should be set to the network region which contains the MCS.
- **Far-end Domain:** This is set to the IP address assigned to the MCS. This domain is sent in the headers of the SIP INVITE messages for calls originating from and terminating to the MCS using this signaling group.
- **DTMF over IP:** Set to the default value of **rtp-payload**, which allows the CM to send DTMF using RFC 2833.
- **Direct IP-IP Audio Connections:** Set to **y** to enable media shuffling on the trunk level.

```
display signaling-group 4
                                SIGNALING GROUP

Group Number: 4                 Group Type: sip
                                Transport Method: tls
IMS Enabled? n                 Co-Resident SES? y

Near-end Node Name: procr       Far-end Node Name: procr
Near-end Listen Port: 6001      Far-end Listen Port: 5061
                                Far-end Network Region: 1
Far-end Domain: 192.168.1.81

                                Bypass If IP Threshold Exceeded? n

DTMF over IP: rtp-payload      Direct IP-IP Audio Connections? y
Session Establishment Timer(min): 3 IP Audio Hairpinning? n
Enable Layer 3 Test? n         Direct IP-IP Early Media? n
H.323 Station Outgoing Direct Media? n Alternate Route Timer(sec): 6
```

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 9 of 17

Trunk Group

The trunk group should be configured as follows. Important fields:

- **Group Type:** sip
- **Group Name:** Use a descriptive name.
- **Direction:** two-way
- **Service Type:** tie
- **Signaling Group:** Use the signaling group configured in the previous step.
- **Number of Members:** Enter the number of trunks desired for the application.

```
display trunk-group 4                                     Page 1 of 21
                                                         TRUNK GROUP
Group Number: 4                                         Group Type: sip          CDR Reports: y
Group Name: CoRes SIP Trunk                            COR: 6                  TN: 1          TAC: 187
Direction: two-way                                     Outgoing Display? n
Dial Access? n                                         Night Service:
Queue Length: 0
Service Type: tie                                       Auth Code? n
                                                         Signaling Group: 4
                                                         Number of Members: 20
```

- **Numbering Format:** public. This field specifies the format of the calling party number seen to the far-end.

```
display trunk-group 4                                     Page 3 of 21
TRUNK FEATURES
ACA Assignment? n                                       Measured: none
                                                         Maintenance Tests? y
                                                         Numbering Format: public
                                                         UII Treatment: service-provider
                                                         Replace Restricted Numbers? n
                                                         Replace Unavailable Numbers? n
Show ANSWERED BY on Display? y
```

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 10 of 17

Routing Calls to the MCS

Use the following commands to configure the CM to route calls to the MCS:

- **change public-unknown-numbering** – Create an entry that will be used by the trunk group defined earlier.
- **change route-pattern X** – Create a route pattern that will route calls to the SIP trunk that connects to the MCS.
- **change aar analysis X** – Create an entry in the AAR Digit Analysis Table for routing calls to the MCS

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

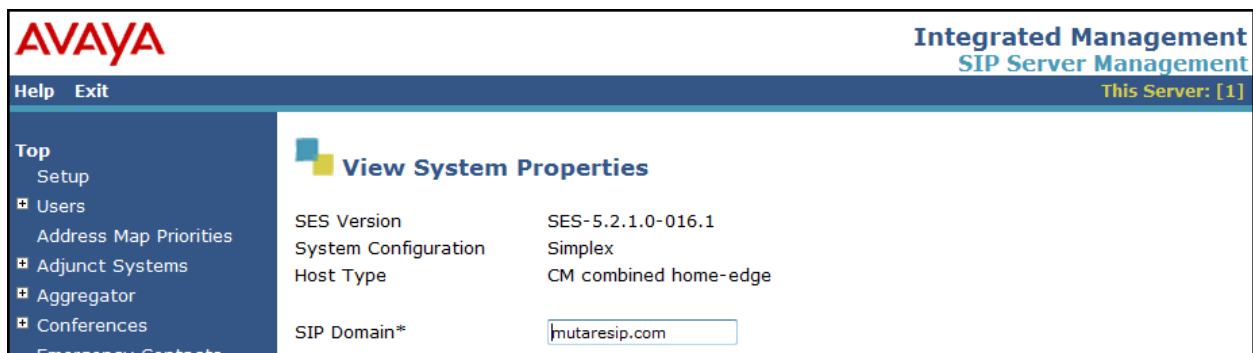
Page: 11 of 17

Configure Avaya Aura SIP Enablement Services

Installation and configuration of the Avaya SES are out of the scope of this document. Some of the data on these screens are for reference.

System Properties

- **SIP Domain:** mutaresip.com (just an example)

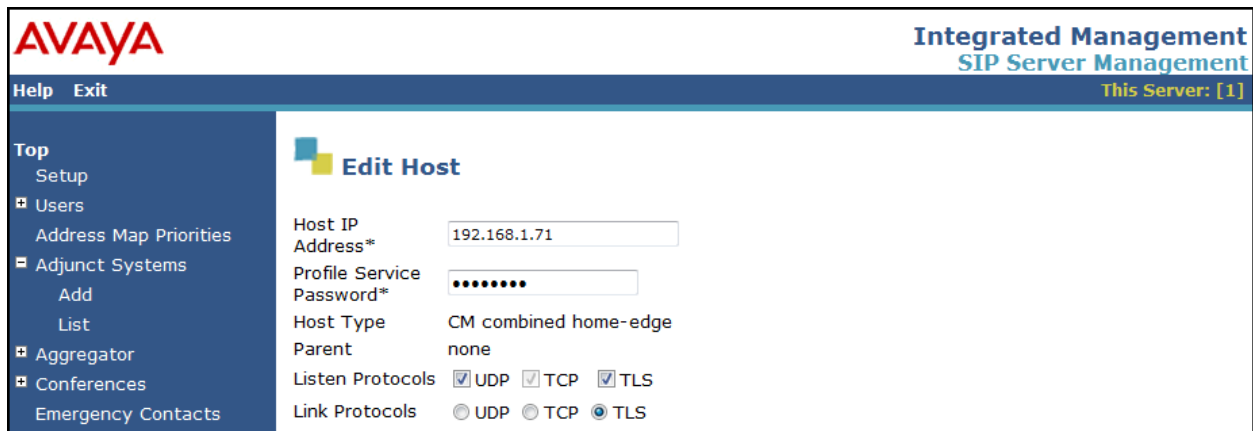


The screenshot shows the Avaya Integrated Management SIP Server Management interface. The title bar includes the Avaya logo, the text "Integrated Management SIP Server Management", and "This Server: [1]". A navigation menu on the left lists "Top", "Setup", "Users", "Address Map Priorities", "Adjunct Systems", "Aggregator", "Conferences", and "Emergency Contacts". The main content area is titled "View System Properties" and displays the following configuration details:

SES Version	SES-5.2.1.0-016.1
System Configuration	Simplex
Host Type	CM combined home-edge
SIP Domain*	<input type="text" value="mutaresip.com"/>

Host Configuration

- **Host IP Address (SES IP Address):** 192.168.1.71
- **Link Protocols:** TLS



The screenshot shows the Avaya Integrated Management SIP Server Management interface for editing a host. The title bar includes the Avaya logo, the text "Integrated Management SIP Server Management", and "This Server: [1]". A navigation menu on the left lists "Top", "Setup", "Users", "Address Map Priorities", "Adjunct Systems", "Add", "List", "Aggregator", "Conferences", and "Emergency Contacts". The main content area is titled "Edit Host" and displays the following configuration details:

Host IP Address*	<input type="text" value="192.168.1.71"/>
Profile Service Password*	<input type="password" value="....."/>
Host Type	CM combined home-edge
Parent	none
Listen Protocols	<input checked="" type="checkbox"/> UDP <input checked="" type="checkbox"/> TCP <input checked="" type="checkbox"/> TLS
Link Protocols	<input type="radio"/> UDP <input type="radio"/> TCP <input checked="" type="radio"/> TLS

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 12 of 17

Communication Manager Interface

- **Host:** 192.168.1.71
- **SIP Trunk IP Address:** 192.168.1.71
- **SIP Trunk Port:** 6001

The screenshot shows the Avaya Integrated Management SIP Server Management interface. The top left features the Avaya logo and navigation links for 'Help' and 'Exit'. The top right displays 'Integrated Management SIP Server Management' and 'This Server: [1]'. A left-hand navigation menu includes 'Top', 'Setup', 'Users', 'Address Map Priorities', 'Adjunct Systems', 'Aggregator', 'Conferences', 'Emergency Contacts', 'Export/Import to ProVision', and 'Hosts'. The main content area is titled 'Edit Communication Manager Server Interface' and contains the following configuration details:

Communication Manager Server Interface Name*	192.168.1.71CM
Host	192.168.1.71
SIP Trunk IP Address*	192.168.1.71
SIP Trunk Port*	<input type="text" value="6001"/>

Below this, a section titled 'Communication Manager Server' shows:

Communication Manager Server Admin Address*	192.168.1.71
---	--------------

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 13 of 17

Communication Manager Server Address Map

A Communication Manager Server Address Map is needed to route calls to/from the MCS. This is because neither the caller nor the called party is a registered user on the local Avaya SES. Thus, Avaya SES does not know how to route this call to the Avaya CM.

Configured Maps:

- **ivr-external-out** – Used for mapping calls from the MCS out to external phone numbers.
- **ivr-internal-out** – Used for mapping calls from the MCS out to internal extensions.

Both maps are associated to a Contact that directs the calls to the IP address of the CLAN (CM) over port 6001 using TLS. The user portion in the original request URI is substituted for **\$(user)** in the Contact expression shown below and in the screenshot:

```
sip:$(user)@192.168.1.71:6001;transport=tls
```

The screenshot shows the Avaya web interface for managing Communication Manager Server Address Maps. The main content area is titled "List Communication Manager Server Address Map". It features a table with the following data:

Commands	Name	Commands	Contact
Edit Delete	ivr-external-out		
Edit Delete	ivr-internal-out		
		Edit Delete	sip:\$(user)@192.168.1.71:6001;transport=tls

Below the table, there are buttons for "Add Another Map", "Add Another Contact", and "Delete Group". There is also a link for "Add Map In New Group". The left sidebar contains a navigation menu with options like "Top", "Setup", "Users", "Address Map Priorities", "Adjunct Systems", "Aggregator", "Conferences", "Emergency Contacts", "Export/Import to ProVision", "Hosts", "List", "IM logs", "Communication Manager Servers", and "List".

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 14 of 17

To view or edit the call matchin criteria of the map, click the Edit link next to the map name.

- **Name:** ivr-external-out
- **Pattern:** Contains an expression to define the matching criteria for calls to be routed to this Avaya CM. The example below will match any URI that begins with [sip:91](#) followed by any digit between 0 and 9 for the next 10 digits (outside call).

The screenshot shows the Avaya web interface. At the top left is the Avaya logo. Below it is a navigation menu with 'Help' and 'Exit' links. The main content area is titled 'Edit Communication Manager Map Entry'. It contains two input fields: 'Name*' with the value 'ivr-external-out' and 'Pattern*' with the value '^sip:91[0-9]{10}'. Below the fields is a note: 'Fields marked * are required.' and an 'Update' button.

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 15 of 17

- **Name:** ivr-external-out
- **Pattern:** Contains an expression to define the matching criteria for calls to be routed to this Avaya CM. The example below will match any URI that begins with [sip:6](#) followed by any digit between 0 and 9 for the next 4 digits (internal 5-digit call).

The screenshot shows the Avaya web interface. At the top left is the Avaya logo. Below it is a navigation menu with 'Help' and 'Exit' links. The main content area is titled 'Edit Communication Manager Map Entry'. It contains two input fields: 'Name*' with the value 'ivr-internal-out' and 'Pattern*' with the value '^sip:6[0-9]{4}'. Below the fields is a note: 'Fields marked * are required.' and an 'Update' button.

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 16 of 17

Trusted Host

The MCS must be added as a Trusted Host to the SES.

- **IP Address:** 192.168.1.81 (IP address of the MCS)
- **Host:** Select the IP address of the Avaya SES.
- **Comment:** Enter some descriptive text (IVR / MCS)

The screenshot shows the Avaya web interface. At the top left is the Avaya logo. Below it is a navigation menu with 'Help' and 'Exit' at the top, and a list of menu items including 'Top', 'Setup', 'Users', 'Address Map Priorities', 'Adjunct Systems', 'Aggregator', 'Conferences', and 'Emergency Contacts'. The main content area is titled 'List Trusted Hosts' and contains a table with the following data:

<u>Commands</u>		<u>IP Address</u>	<u>Trusted by Host</u>	<u>Comment</u>
Edit	Delete	192.168.1.81	192.168.1.71	IVR

Below the table is a link: [Add Another Trusted Host](#)

MCS SIP Integration with Avaya Communication Manager

Document #: 228

Last Update: 04/22/2010

Page: 17 of 17

Configure MCS

Mutare will configure the MCS for interfacing to the CM and SES. The following section is for informational purposes only.

VBVConfig

[VoIP]

AcceptReinvite=1

SipDefaultTransportProtocol=TCP

SipTCPEnabled=1

Outbound ANI

DID@<IP Address of MCS>

Outbound Calls

S<phone number>@<IP Address of SES>

Site Configuration

Fill out the form below and return to your Mutare Project Manager.

Avaya CM Information	
IP Address of the MCS	
IP Address of the SES	
Codec	G.711MU or G.711A (Circle one)