Administering Avaya Aura® Application Enablement Services

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Contents

Chapter 1: Introduction

Purpose

This document describes administrative tasks you will need to perform on Communication Manager as well as the AE Services server.

This document is intended for people who perform AE Services administration tasks such as backing up, restoring, and managing users.

Change history

Issue	Date	Summary of changes
9	February 2021	Added the section: Supported browsers on page 55 Updated the section: Administering Communication Manager for Application Enablement Services on page 19
8	December 2020	Added the following sections: • timedatectl on page 256 • Changing the date, time or the NTP server settings on page 70 • Date Time/NTP Server field descriptions on page 71
7	November 2020	Updated the following sections: • Changing the server IP address – Software-Only server on page 252 • Configuring network interface settings on page 72 • Configuring an external LDAP server — Windows on page 197

Table continues…

Issue	Date	Summary of changes
6	October 2020	For Release 8.1.3, added the following sections: • Changing the default password for a single user mode login using CLI on page 178 • Creating a failure message for an unsuccessful login attempt on the AE Services console interface on page 184 • Login Failure Message field descriptions on page 185 For Release 8.1.3, updated the following sections: • Add Server Certificate field descriptions on page 114 • Adding a switch connection on page 77 • Administering the PAM Password Manager on page 179 • Configuring remote logging without a certificate revocation check on page 134 • Configuring the WebLM server for AE Services on page 242 • Connection Details - connection name field descriptions on page 79 • Creating a Certificate Signing Request (CSR) and key for each of your AE Services server on page 371 • Creating a server certificate signing request for the AE Services server on page 112 • Licensing configurations on page 237 • setWeblm on page 153 • System Logging field descriptions on page 135 • WebLM Server Address field descriptions on page 244 • Administering the Geo Redundant High Availability (GRHA) on page 278
5	April 2020	Updated the following section: • Configuring the WebLM server for AE Services on page 242

Table continues…

Issue	Date	Summary of changes
4	January 2020	Added the following sections: • Log and trace file retention on page 137 • Retaining log and trace files on page 138 • Retaining logs by using the command line interface on page 140 • Retaining traces by using the command line interface on page 140 • Deleting log files on page 139 • Deleting trace files on page 140 • Clearing logs by using the command line interface on page 141 • Clearing traces by using the command line interface on page 141 • Data Encryption on page 205 • Remote Key Server on page 206 • Data Encryption password policy on page 206 • encryptionPassphrase command on page 207 • Adding encryption passphrase on page 207 • Changing encryption passphrase on page 207 • Displaying encryption passphrase and slot assignment on page 208 • Removing encryption passphrase on page 208 • encryptionRemoteKey command on page 209 • Adding remote key server on page 209 • Removing remote key server on page 210 • Displaying remote key server and slot assignment on page 210 • encryptionLocalKey command on page 211 • Enabling local key store on page 211 • Disabling local key store on page 211 • Viewing data encryption status on page 212 Updated the following sections: • Administering the Geo Redundant High Availability (GRHA) on page 278

Table continues…

Issue	Date	Summary of changes
		• AEServicesSNMPtrapsAlarmCodesAndMessages_Part2 on page 269 • AEServicesSNMPtrapsAlarmCodesAndMessages_Part4 on page 274 • User roles on page 198 • Default accounts and AE Services Management Console access privileges on page 332 • Default AE Services accounts on page 335 • Restoring the server data by using the command line interface on page 125
3	October 2019	Updated the following sections: • Using Tripwire on page 249 • Administering the Geo Redundant High Availability (GRHA) on page 278 • The AE Services default certificate on page 104 • Creating the certificate directory structure on page 367 • Default AE Services accounts on page 335
2	August 2019	Updated Restoring the server data by using the command line interface on page 125 section.
1	June 2019	Release 8.1 document.

Chapter 2: Administering Application Enablement Services

Administering Communication Manager for Application Enablement Services

This chapter describes tasks that must be performed on Avaya Aura® Communication Manager to ensure that Communication Manager can communicate with the services running on the Application Enablement Services Server (AE Services Server).

Note:

To perform the tasks in this chapter use System Access Terminal (SAT) commands.

Communication Manager administrative checklists

Checklist - Communication Manager administration for a Device, Media and Call Control (DMCC) configuration that uses Registration Services and Call Information Services

#	Description	Notes	✔
1	Check licensing	Use **`display system-parameters customer-options`** to browse through the Optional Features and ASAI Enhanced Features screens. Confirm that you have IP_STA and STA licenses (adding a station consumes these licenses). **Note:** If features are not enabled, contact your Avaya representative.	

Table continues…

#	Description	Notes	✔
2	Add CLAN (or CLANs) or Enable Processor Ethernet	If you use a media server that uses CLANs, you must add CLANs to the network. See Adding CLANs to the network on page 25. If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26	
4	Add stations	See DMCC station registration modes on page 31. If an application uses “non-main dependency mode”, you do not need to administer a station for the application.	
5	Set up a network region	Requires network planning. See Network regions for DMCC on page 35.	
6	Add DMCC softphones to the network region	See Methods for adding DMCC softphones to the network region on page 38.	
7	Add a media gateway to the network	See Guidelines for adding a media gateway to the network on page 39.	
8	Add a media processor	See Adding a media processor circuit pack to the network on page 39.	

Checklist - Communication Manager administration for a DMCC configuration that uses Call Control Services or 3rd party call control

#	Description	Notes	✔
1	Check licensing	Use `display system-parameters customer-options` to browse through the Optional Features and ASAI Enhanced Features screens. Confirm that you have Computer Telephony Adjunct Links and IP_STA and STA licenses. **Note:** If features are not enabled, contact your Avaya representative.	
2	Add CLAN (or CLANs) or Enable Processor Ethernet	• If you use a media server that uses CLANs, you must add CLANs to the network. See Adding CLANs to the network on page 25. • If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	

Table continues…

#	Description	Notes	✔
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26.	
4	Add a CTI Link	DMCC applications that use Call Control require a CTI Link. See Administering a CTI Link for TSAPI, JTAPI, DMCC with Call Control, Telephony Web Service, or an AE Services integration (Microsoft or IBM Sametime) on page 30.	
5	Set up a network region	Requires network planning. See Network regions for DMCC on page 35.	
6	Add DMCC softphones to the network region	See Methods for adding DMCC softphones to the network region on page 38.	
7	Add a media gateway to the network	See Guidelines for adding a media gateway to the network on page 39.	
8	Add a media processor	See Adding a media processor circuit pack to the network on page 39.	

Checklist - Communication Manager administration for Telephony Services Application Program Interface (TSAPI) and Java Telephony Application Programming Interface (JTAPI)

#	Description	Notes	✔
1	Check licensing	Use `display system-parameters customer-options` to browse through the Optional Features and ASAI Enhanced Features screens. Confirm that you have Computer Telephony Adjunct Links. **Note:** If features are not enabled, contact your Avaya representative.	
2	Add CLAN (or CLANs) or Enable Processor Ethernet	If you use a media server that uses CLANs you must add CLANs to the network. See Adding CLANs to the network on page 25. If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26.	

Table continues…

#	Description	Notes	✔
4	Administering UCIDs	TSAPI applications that use predictive dialing and JTAPI applications must complete the tasks described in Setting up UCIDs for TSAPI and JTAPI applications on page 41. **Note:** Administering UCIDs is also recommended when using AE Services in conjunction with the Avaya Aura® Contact Center (AACC) product.	
5	Add a CTI Link	See Administering a CTI Link for TSAPI, JTAPI, DMCC with Call Control, Telephony Web Service, or an AE Services integration (Microsoft or IBM Sametime) on page 30.	

Checklist - Communication Manager administration for Telephony Web Services

#	Notes	Description	✔
1	Check licensing	Use `display system-parameters customer-options` to browse through the Optional Features and ASAI Enhanced Features screens. Confirm that you have Computer Telephony Adjunct Links. **Note:** If features are not enabled, contact your Avaya representative.	
2	Add CLAN (or CLANs) or Enable Processor Ethernet	If you use a media server that uses CLANs you must add CLANs to the network. See Adding CLANs to the network on page 25. If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26.	
4	Add a CTI Link	See Administering a CTI Link for TSAPI, JTAPI, DMCC with Call Control, Telephony Web Service, or an AE Services integration (Microsoft or IBM Sametime) on page 30.	

Checklist - Communication Manager administration for Call Visor Local Area Network (CVLAN)

#	Notes	Description	✔
1	Check licensing	Use `display system-parameters customer-options` to browse through the Optional Features and ASAI Enhanced Features screens. ASAI Link Core Capabilities and/or Computer Telephony Adjust Links are required, depending on the CVLAN application(s). **Note:** If features are not enabled, contact your Avaya representative.	
2	Add CLAN (or CLANs) or Enable Processor Ethernet	If you use a media server that uses CLANs, you must add CLANs to the network. See Adding CLANs to the network on page 25. If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26.	
4	Add a CTI Link	See Administering a CTI Link for CVLAN on page 29 and Administering a CTI Link for CVLAN (internal applications) on page 29.	

Checklist - Communication Manager administration for Definity LAN Gateway (DLG)

#	Description	Notes	✔
1	Check licensing	Use `display system-parameters customer-options` to browse through the Optional Features and ASAI Enhanced Features screens. Confirm that you have ASAI Link Core Capabilities. **Note:** If features are not enabled, contact your Avaya representative.	

Table continues…

#	Description	Notes	✔
2	Add CLAN (or CLANs) or Enable Processor Ethernet	If you use a media server that uses CLANs, you must add CLANs to the network. See Adding CLANs to the network on page 25. If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26.	
4	Add a CTI Link	See Administering a CTI Link for DLG on page 30.	

Checklist - Communication Manager administration for AE Services Implementation with Microsoft Lync Server

#	Description	Notes	✔
1	Check licensing	Use **`display system-parameters customer-options`** to browse through the Optional Features and ASAI Enhanced Features screens. Confirm that you have Computer Telephony Adjunct Links. **Note:** If features are not enabled, contact your Avaya representative.	
2	Add CLAN (or CLANs) or Enable Processor Ethernet	If you use a media server that uses CLANs you must add CLANs to the network. See Adding CLANs to the network on page 25. If you use a media server that uses Processor Ethernet, see Enabling Processor Ethernet on page 28.	
3	Enable AE Services	Required for the transport layer. See Enabling AE Services on page 26.	
4	Add a CTI Link	See Administering a CTI Link for TSAPI, JTAPI, DMCC with Call Control, Telephony Web Service, or an AE Services integration (Microsoft or IBM Sametime) on page 30.	

Communication Manager administration for DMCC - network regions

When you administer a CLAN for AE Services, you must assign a network region based on your AE Services configuration. For example, if you are using DMCC, you might need to assign more than one network region. For more information about administering network regions, see the following documents.

- *Administering Network Connectivity on Avaya Aura® Communication Manager*
- *Administering Avaya Aura® Communication Manager*

Adding CLANs to the network

About this task

If you are using a media server that uses CLANs, you must add the CLANs to the Communication Manager network.

Important:

All CLANs dedicated to AE Services should be in a separate network region from those CLANs servicing endpoints. CLANs that provide connectivity for other endpoints should be in another network region.

CLAN used for ASAI should not be used for DMCC registrations or SMS traffic even if the CLAN originates from same AE Services server.

Note:

This example assumes a simple configuration with one network region. Some configurations will require more network regions, see Communication Manager administration for DMCC - network regions.

Procedure

1. Type `change node-names ip`.

   Communication Manager displays the IP NODE NAMES form. For an example, see Figure 18: Adding a CLAN - change node-names ip.

2. Complete the following fields on the IP NODE NAMES form.

   a. In the **Name** field, type the name you want to assign to this CLAN, for example `CLAN1`.

   b. In the **IP Address** field, type the IP address you want to assign to this CLAN.

3. Type `add ip-interface` *<board location>* (where *<board location>* is the board location for the CLAN, for example `1A06`).

   Communication Manager displays the IP INTERFACES form. For an example, see Figure 19: Adding a CLAN IP interface.

4. Complete the following fields on the IP INTERFACES form.

   a. In the **Node Name** field, type *<CLAN name>*, for example `CLAN1`.

   b. In the **IP Address** field, accept the default.

   c. In the **Subnet Mask** field, type the appropriate subnet mask for your network configuration.

   d. In the **Gateway Node Name** field, type the name of the gateway node for your network configuration.
   e. In the **Enable Interface** field, type `y`.
   f. In the **Network Region** field, type `1`.
   g. In the **VLAN** field, accept the default.
   h. In the **Target socket load and Warning level** field, accept the default.
   i. In the **Auto** field, type `y` .

5. Type `add data-module next`.

   Communication Manager displays the DATA MODULE form. For an example, see Figure 17: Adding a CLAN - add data-module.

6. Complete the following fields on the DATA MODULE form.
   a. In the **Data Extension** field, accept the default value.
   b. (Required) In the **Type** field, type `ethernet`.
   c. (Required) In the **Port** field, type the board location and port 17, for example `1D07017`.
   d. In the **Name** field, type the name you want to assign to the data module, for example `CLAN1DATA`. This name is not used for further administration. It is a name you use to help you identify the data module.
   e. In the **Network uses 1's for Broadcast Addresses** field, type `y`.

Related links

Adding a CLAN on page 49
Communication Manager administration for DMCC - network regions on page 24

Enabling AE Services

About this task

Enabling AE Services refers to administering the transport link between Communication Manager and AE Services. You need to enable AE Services if any of the following AE Services features are to be employed.

- Device, Media, and Call Control (DMCC) applications that use Registration Services or Call Information Services (1st party call control)
- DMCC applications that use Call Control Services (3rd party call control)
- Telephony Web Service
- JTAPI
- TSAPI
- CVLAN

- DLG (ASAI applications)

Procedure

1. Type `change ip-services`.

   Communication Manager displays the IP SERVICES form. For an example, see Figure 8: Configuring IP services in Configuring IP services - administering the transport link.

2. Complete Page 1 of the IP SERVICES form as follows:

   a. In the **Service Type** field, type `AESVCS`.

   b. In the **Local Node** field, type the appropriate entry based on whether you are using a Processor Ethernet interface or a CLAN interface:

   - For Communication Manager S8300D, S8300E, and duplicated servers that use a processor ethernet interface, type `procr`.

     ✱ **Note:**

     On the S8300D and S8300E Communication Manager media servers, Processor Ethernet support is enabled by default. On duplicated Communication Manager media servers, Processor Ethernet support is not enabled by default. To enable AE Services Processor Ethernet support, see “Enabling Processor Ethernet”.

   - For Communication Manager duplicated systems that use a CLAN interface, type <*nodename*>. Where <*nodename*> is the name of the CLAN.

     You can locate node names by typing `display node-names ip` and checking the **Local Node** field on the IP NODE NAMES form.

   c. In the **Local Port** field, accept the default value **8765**.

   If you are adding more than one CLAN for AE Services, repeat Step 2 for each CLAN you add.

3. Complete Page 3 of the IP SERVICES form as follows. For an example, see Figure 9: Configuring IP services - AE Services Administration in Configuring IP services - administering the transport link.

   a. In the **AE Services Server** field, type the name of the AE Services server.

   For example, `aeserver1`

   ✱ **Note:**

   On the AE Services server you can obtain this name by typing uname -n at the command prompt. The name you use on Communication Manager must match the AE Services server name exactly.

   b. In the **Password** field, create a password that consists of 12 to 16 alphanumeric characters, for example `aespassword1`.

Important:

This is the password that the AE Services administrator must set on the AE Services server on **Communication Manager Interface > Switch Connections > Edit Connection > Switch Password**. The passwords must exactly match on both Communication Manager and the AE Services server.

c. Set the **Enabled** field to `y`.

Related links

[Enabling Processor Ethernet](#) on page 28

[Configuring IP services - administering the transport link](#) on page 44

Enabling Processor Ethernet

About this task

Processor Ethernet support on the duplicated Communication Manager media servers requires Communication Manager 3.1 or later. Use this procedure to enable Processor Ethernet on duplicated Communication Manager media servers.

Note:

On the S8300D and S8300E Communication Manager media servers, Processor Ethernet support is enabled by default.

Procedure

1. Type `display system-parameters customer-options`.
2. Verify that Processor Ethernet is enabled. You must perform this verification step before proceeding with the next step.
3. Type `add ip-interface procr`.

   Note:

   The Processor Ethernet interface provides a message rate of 1000 messages per second, full duplex, for duplicated media servers. For S8300D and S8300E media servers, the Processor Ethernet interface provides a message rate of 240 messages per second, full duplex.

Administering UCIDs in Communication Manager (TSAPI and JTAPI applications)

About this task

TSAPI applications that use predictive dialing and all JTAPI applications must be administered to use UCIDs. There is no charge to use these features, and they do not require any Avaya Product

Licensing and Delivery System (PLDS) changes. For more information about administering UCIDs, see *Administering Avaya Aura® Communication Manager*, 03-300509.

For examples of administrative screens used to administer UCIDs, see the following figures:

- Figure 1: Setting up UCIDs for TSAPI and JTAPI applications - create a UCID and assign a Node ID in Setting up UCIDs for TSAPI and JTAPI applications.
- Figure 2: Setting up UCIDs for TSAPI and JTAPI applications - send UCID to ASAI must be enabled in Setting up UCIDs for TSAPI and JTAPI applications.

Procedure

1. Type `change system-parameters features` .
2. Complete the following fields on the FEATURE-RELATED SYSTEM PARAMETERS form:
    a. In the **Create Universal Call ID (UCID)** field , type `y`.
    b. In the **UCID Network Node ID** field, type a node number that is unique to this switch in a network of switches.
    c. In the **Send UCID to ASAI** field, type `y`.
3. Submit the changes.

Related links

Setting up UCIDs for TSAPI and JTAPI applications on page 41

Administering a CTI Link for CVLAN

About this task

Follow these steps from a Communication Manager SAT to administer a CTI link type ASAI-IP (CVLAN Link) for a CVLAN application.

Procedure

1. Type `add cti-link` <*link number*>, for example `add cti-link 3`.
2. Complete the CTI LINK form as follows:
    a. In the **Extension** field, type <*station extension*>, for example `20007`.
    b. In the **Type** field, type `ASAI-IP`.
    c. In the **Name** field, type <*name of AE Services server*>, for example `aeserver1`.

Administering a CTI Link for CVLAN (internal applications)

About this task

This procedure applies to Avaya Interaction Center (IC).

Follow these steps from a Communication Manager SAT to administer a CTI link type ADJ-IP (Proprietary CVLAN Link) for internal Avaya CVLAN applications.

Procedure

1. Type `add cti-link` <*link number*>, for example `add cti-link 3` .
2. Complete the CTI LINK form as follows:
    a. In the **Extension** field, type <*station extension*>, for example `30009`.
    b. In the **Type** field, type `ADJ-IP`.
    c. In the **Name** field, type <*name of AE Server*>, for example `aeserver1`.

Administering a CTI Link for DLG

About this task

Follow these steps from a Communication Manager SAT to administer a CTI link type ASAI-IP (DLG Link) for the DLG Service. The DLG service is for applications that are written to the ASAI communications interface.

Note:

If you enable 12–party conference on AE Services, the DLG CTI application will not work.

Procedure

1. Type `add cti-link` <*link number*>, for example `add cti-lik 4`.
2. Complete the CTI LINK form as follows:
    a. In the **Extension** field, type <*station extension*>, for example `40001`.
    b. In the **Type** field, type `ASAI-IP`.
    c. In the **Name** field, type <*name of AE Server*>, for example `aeserver1`.

Administering a CTI Link for TSAPI, JTAPI, DMCC with Call Control, Telephony Web Service, or an AE Services integration

About this task

If you are administering the AE Server for TSAPI, JTAPI, DMCC with Call Control, Telephony Web Service, or an AE Services integration (Microsoft), you must administer a CTI link from Communication Manager to AE Services. Keep in mind that all clients will share the same CTI link.

Follow these steps from a Communication Manager SAT to administer a CTI link type ADJ-IP.

Procedure

1. Type `add cti-link` <*link number*>, for example `add cti-link 5`.
2. Complete the CTI LINK form as follows:
    a. In the **Extension** field, type an unassigned station extension.

b. In the **Type** field, type `ADJ-IP`.

c. In the **Name** field, type <*name of AE Server*>, for example `aeserver1`.

Checking the status of a switch connection -- from Communication Manager to the AE Services server

About this task

Once you have added a switch connection on the AE Services server, you validate the switch connection by checking its status on both the AE Services server and on Communication Manager.

For information about checking the status of a switch connection from the AE Services server, see Checking the status of a switch connection -- from the AE Services to Communication Manager.

Procedure

To check the status of a switch connection on Communication Manager, type `status aesvcs link`.

Related links

Checking the status of a switch connection from the AE Services server to Communication Manager on page 84

DMCC settings

This information applies if you are administering Communication Manager to work with DMCC applications. If you are administering Communication Manager to work with TSAPI, CVLAN, or DLG clients, you can skip this section.

DMCC station registration modes

Communication Manager and AE Services allow up to ten endpoints to register to an extension. The endpoints can register in any of the permutations of dependency and media mode depicted in the following table.

If you are administering a release of Communication Manager that is prior to Release 5.0, only the permutations marked as “old” are allowed.

Media Mode	Client	Telecommuter	Server	None
Dependency Mode				
• Main	(Old) Exclusive Control	(Old) Exclusive Control	(Old) Exclusive Control	New

Table continues…

Media Mode	Client	Telecommuter	Server	None
• Dependent	New	Not allowed	New	(Old) Shared Control
• Independent	New	Not allowed	New	New

Note:

Only applications that use DMCC Registration Services need to administer these stations on Communication Manager.

Caution:

If the DMCC station is busyout in Communication Manager, AE Services might not send any notification or event message to the client application. This might cause potential loss of recording.

When the station is in release state in Communication Manager, Communication Manager will send a URQ unregister terminal notification to AE Services.

Main dependency mode

When in main dependency mode, a DMCC application has full control of the extension number associated with the application. Main dependency mode must be used for any application that records and plays messages or detects DTMF digits. All the modes under main dependency mode are as follows. (Also see DMCC station registration modes on page 31.)

- client media mode
- server media mode
- telecommuter mode
- no media (media mode: none)

For more information about the types of media control, see the document *Avaya Aura® Application Enablement Services*, 02-300369.

Administering an extension exclusively for the DMCC softphone

About this task

Follow these steps from a Communication Manager SAT to administer an extension exclusively for the DMCC softphone. For an example of the form, see Adding stations on page 42.

Procedure

1. Type `add station next` to add a station. Add as many stations as you need for your application.

2. Complete the STATION form as follows:

    a. In the **Type** field (for station type), choose an IP set type or a DCP set type, as appropriate.

    b. If you chose a DCP set type, in the **Port** field, do one of the following:

        - If it is an actual physical set, type <*port number*>.
        - If it is not an actual physical set, type `x`.

        ✱ **Note:**

        If you chose an IP set type, the port automatically becomes `IP`.

    c. In the **Security Code** field, type a <*numeric security code*>.

        The security code can consist of four to eight digits. AE Services recommends that you use an eight digit code for maximum security. Additionally, AE Services recommends that you use a unique security code for each DMCC station. Whenever you provide a security code, make sure you maintain a secure record of it so you can use it again. You will need to use this security code when your application is registering with the DMCC softphone.

    d. In the **IP SoftPhone** field, type `y`.

    e. Administer any buttons necessary for your application. For example, to administer the share-talk feature, administer **share-talk** as one of the buttons.

Dependent and Independent dependency modes

The Dependent and Independent dependency modes (also referred to as non-main Dependency mode) allow the following media modes. (Also see DMCC station registration modes on page 31.)

- client
- server
- no media (media mode: none)

✱ **Note:**

Telecommuter mode is not allowed.

Non-main Dependency mode control of a DMCC extension number allows a DMCC application to monitor and control a physical digital phone or a physical/soft IP phone. All updates sent to the physical phone, such as lamp, ringer, or display updates, are also sent to the DMCC application. Additionally, either the DMCC application or the physical phone can perform actions on the physical phone such as go off-hook, go on-hook, and press buttons.

If the application uses non-main Dependency mode control, you do not need to administer any other extension number for the application other than that already administered for the main.

Each registration (whether for Main, Dependent, or Independent) requires a license. The license required is either a DMCC license from WebLM (if one is available) or an IP_API_A license from Communication Manager.

When you administer a station for an application that uses non-main Dependency Mode control, you must enable the IP_Softphone setting. When you administer a station for an application that uses the Dependent dependency mode (or Main mode) a physical phone is required. See Administering an extension number for the station that an application monitors on page 34.

Administering an extension number for the station that an application monitors

About this task

Follow these steps from a Communication Manager SAT to administer an extension number for the physical station the application is monitoring.

Note:

Do not add stations.

Procedure

1. Type `change station` *nnnnn* (where *nnnn* is the extension number of the physical station the application is monitoring or controlling).
2. Check the settings on the STATION form. If the STATION form is not already administered this way, follow these steps:
   a. In the **IP Softphone** field, type `y`.
   b. In the **Security Code** field, type a <*numeric security code*>.

      The security code can consist of four to eight digits. AE Services recommends that you use an eight digit code for maximum security. Additionally, AE Services recommends that you use a unique security code for each DMCC station. Whenever you provide a security code, make sure you maintain a secure record of it so you can use it again. You will need to use this security code when your application is registering with the DMCC softphone.

   In non-main Dependency mode, the DMCC extension will be registered as long as the physical phone is connected to or registered with Communication Manager.

Media Content and Media Tone Announcement for DMCC

To support split stream recording for DMCC recorders, two new parameters are added in `LoginInfo` of Register Terminal Request. Find below the details of these parameters.

Media Content

Media Content is used to specify from which specific parties terminal should receive the media content.

- When `MediaContent` is set to FULL, all parties present in the call provides a fully summed conference stream to the DMCC device. This is the default value for Media Content unless otherwise specified.
- When `MediaContent` is set to MAIN_STATION_ONLY, the media stream contains media from only the shared extension device with the current role of talker. This is usually the main station or the agent.
- When `MediaContent` is set to ALL_BUT_MAIN_STATION, the media stream excludes media from the shared extension device with the current role of talker. This is usually the main station or the agent. The media stream includes all other talking parties and any parties subsequently added to the call.

Media Tones Announcement

Media Tones Announcement specifies whether terminal should receive Communication Manager generated tones and announcements in media stream or not.

About Share Talk

Share Talk enables multiple DCP or H323 IP endpoints that are registered to the same extension to share talk capability. Normally, when more than one endpoint requests RTP (Real Time Transport Protocol) media, only one of the endpoints (Base Set) is capable of talking and listening, while the other endpoints are connected in listen-only mode. This button allows all the endpoints that are associated with the extension to share the talk capability. Note that in Communication Manager 5.0, only AE Server DMCC (Device, Media, and Call Control) endpoints are capable of requesting RTP while they are sharing control of the extension. For more information about enabling this feature, see the following documents:

- *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359
- *Avaya Aura®Application Enablement Services Device, Media, and Call Control XML Programmer's Guide*, 02-300358

Network regions for DMCC

If any of the ten clients are using client or server media mode (see DMCC station registration modes on page 31), you must administer the network region for that extension.

If there is only one client application registered in telecommuter mode, or none of the client applications require media for this extension, you do not have to administer a codec set for that extension.

Setting up a network region requires some network planning. For a list of documents that contain information to assist you in planning see Communication Manager administration for DMCC - network regions on page 24.

You must set up DMCC softphones in an IP network region that supports the set of Audio Codecs that your application supports. For example, the IP network region must support one of the following codec sets:

- G.722
- G.711A
- G.711MU
- G.729
- G.729A
- G.723
- G.726A

Applications can specify preferences for both the Audio Codec and the Media Encryption options that they use. The Audio Codec settings and Media Encryption settings that you administer in Communication Manager must be consistent with what your application supports

- If your application supports media encryption, administer the **Media Encryption** setting on the IP Codec Set form with `aes` as the first preference and `none` as the second preference or `srtp` as the first preference, `aes` as the second preference, and `none` as the third preference.
- If your application does not support media encryption, administer the **Media Encryption** setting on the IP Codec Set form as `none`.

Additionally, there must be a media gateway or a media processor resource in the same network region or in an interconnected network region. Otherwise, there will be problems with the talkpath.

Note:

Using media encryption in server media mode can reduce capacity by 15%. Using media encryption in client media mode or no media mode will not impact server capacity.

Creating the DMCC codec set

About this task

Use the **`change ip-codec-set`** <*codec set number*> command to create a codec set.

Procedure

1. Ensure that G.722, G.711A, G.711MU, G.729, G.729A, G.723, or G.726A are the only codecs administered.

   Note:

   - G.723 and G.726A codecs can only be used for DMCC applications, which use Client Media mode.

  - DMCC applications in Client Media mode can use the G.722 codec to record end-to-end High Definition Media Stream.

2. Verify that the **Silence Suppression** field is set to `n`.
3. It is recommended that you accept the default packet size.

   For an example of how to complete the form, see Setting up a codec set on page 45.

Administering a region with a specific codec set

About this task

Use the **`change ip-network-region`** *<region number>* command to administer a network region with the codec set.

Procedure

Specify the codec set and the UDP port range (minimum and maximum) for the network region you assigned to the DMCC softphones and to the media processor.

The **Codec Set** field reflects the codec set that must be used for connections between phones within this region or between phones and media processor boards within this region.

About signaling encryption

If you do not enable signaling encryption, you increase the risk of exposing sensitive information (such as credit card or other identification numbers) to the public in TCP/IP communications. For example, if you do not use signaling encryption, and your DMCC applications rely on button presses (to convey a credit card number, for example), these button presses are exposed, because DTMF digits are passed in the signaling channel.

Important:

AE Services strongly recommends that you enable signaling encryption, which is described in the next topic, Administering security profiles for signaling encryption on page 37.

Administering security profiles for signaling encryption

About this task

Use the **`ip-network-region`** *<region number>* command to administer signaling encryption. Communication Manager handles signaling encryption on a per ip network region basis. Choose from the following values when you administer the Allowed Security Profiles for an ip network region (see Figure 14: Administering a network region, IP NETWORK REGION screen, page 2 on page 47).

- **challenge (default)** — provides no H.232 signaling link encryption

  If a DMCC endpoint is registered to an ip network region that has challenge security profile selected, it means that no H.323 signaling link encryption is provided. The challenge setting is the default for all ip-network regions in Communication Manager.

- **pin-eke** — provides H.323 signaling link encryption
- **any-auth** — provides either pin-eke or challenge

  If a DMCC endpoint is registered to an ip network region that has any-auth or pin-eke selected, it means that H.323 signaling link encryption is provided.

  The AE Server does not provide an administrative capability for either enabling or disabling encryption for DMCC Service endpoints. The only administrative interface for enabling or disabling signaling encryption is Communication Manager ip-network region administration.

  Note:

  Using encryption can reduce the H.323 signaling capacity by 15%.

Checking for media encryption

About this task

The AE Server provides media encryption for DMCC applications that use Main Dependency Mode (see DMCC station registration modes on page 31 for a listing of registration modes). In this mode, the DMCC application is responsible for decrypting incoming media and encrypting outgoing media. The Media Encryption setting on the Communication Manager IP Codec Set form applies to both Client media mode and Server media mode.

- In the case of Server media mode, media is terminated on the AE Server. The AE Server encrypts and decrypts media.
- In the case of Client media mode, media is terminated on the application machine. The application is responsible for encrypting and decrypting media. AE Services also provides a media stack in the DMCC Java Client SDK that encrypts and decrypts media. The media stack can be used by applications that rely on client media mode.

To verify that media encryption is enabled on Communication Manager, use the following procedure.

Procedure

1. Type `change ip-codec-set` *<codec set number>*.
2. On the IP Codec Set form, verify that Media Encryption is set to `aes`.

   See Figure 11: Setting up a codec set - media encryption set to aes on page 46.

Methods for adding DMCC softphones to the network region

There are two ways to administer a network region for DMCC extensions. Use the method that you prefer.

- Let DMCC extensions get the network region for the CLAN (or Processor Ethernet) to which they are registering.
- Use the **`change ip-network-map`** command. On the IP ADDRESS MAPPING form, specify the IP address of the AE Server and assign a network region.

Guidelines for adding a media gateway to the network

If you are using a media server with a media gateway, you must add the media gateway to the Communication Manager network.

For information about adding a media gateway, see Consulting the Communication Manager documentation on page 39. Following are some general guidelines about adding a media gateway.

- Use the **`add media-gateway`** command to add the media gateway to the Communication Manager network.
- If you are adding this media gateway to the network region you created for DMCC, you must type that network region number in the **NetRgn** field.

  For an example, see Adding a media gateway on page 48.

Consulting the Communication Manager documentation

For more information about adding a media gateway, see the following documents.

- *Administering Network Connectivity on Avaya Aura® Communication Manager*
- *Installing and Upgrading the Avaya S8300 Server*.

  Note:

  If you need to add a CLAN to the network, see Adding CLANs to the network on page 25.

Adding a media processor circuit pack to the network

About this task

If you are using a media server that uses a media processor (MEDPRO) circuit pack, you must add the media processor circuit pack to the Communication Manager network.

Follow these steps to add a media processor to the network:

Procedure

1. Type `change node-names ip`.

   For an example, see Adding a CLAN - change node-names ip on page 49.

   For a screen reference, see “IP Node Names” in the “Screen Reference” chapter of *Administering Avaya Aura®Communication Manager*, 03-300509.

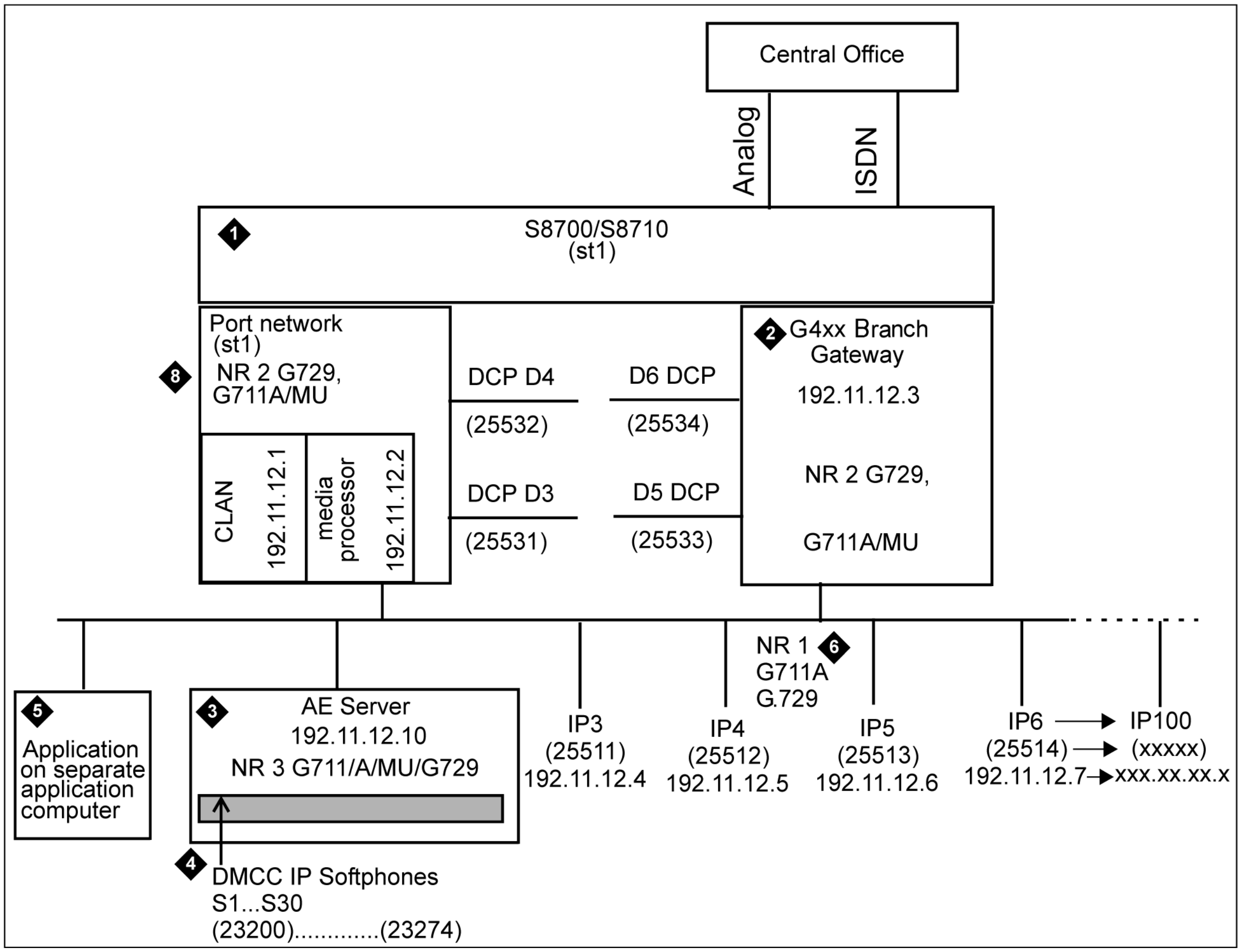
2. Type `change ip-interface` <*board location*> (where <*board location*> is the board location for the media processor, for example, `1A05`).

   If you are adding this media processor to the network region you created for DMCC, you must type that network region number in the **NetRgn** field.

   For an example, see Adding a media processor on page 49.

Sample Communication Manager and DMCC configuration

To get an idea of how to administer Communication Manager to support this sample configuration, refer to the sample Communication Manager administration screens Figure 3: Checking for IP_API_A licenses on page 42 through Figure 22: Listing IP interfaces on page 52.



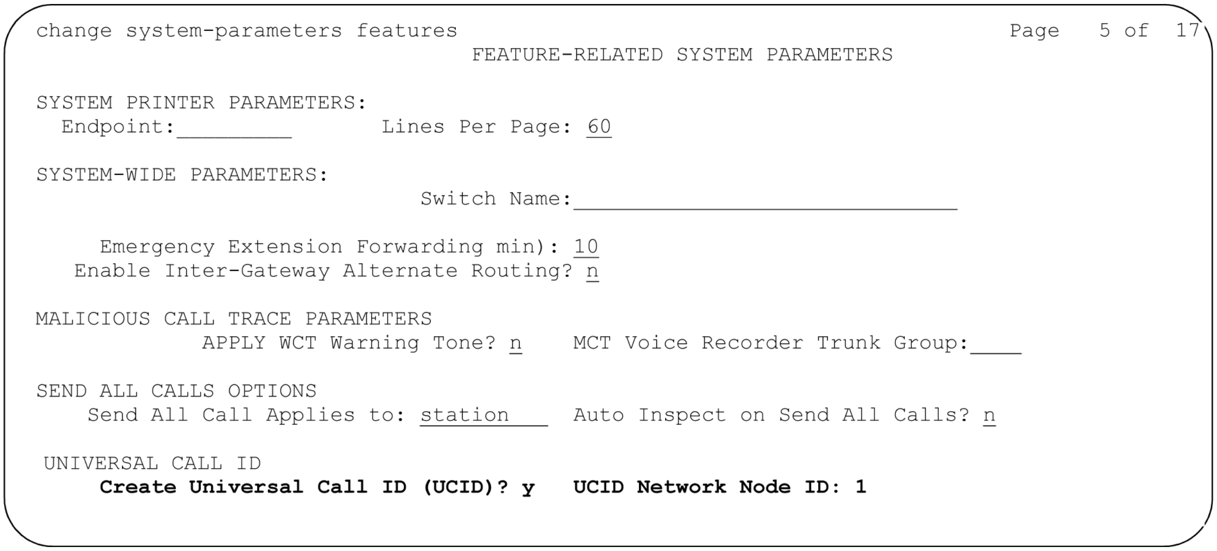
1. Communication Manager - Supported media server with a CLAN circuit card and a media processor circuit card
2. Communication Manager - G700 media gateway
3. AE Server
4. One or more DMCC softphones
5. DMCC application on separate computer
6. Network Region 1 (includes IP phones; supports code set, G.711A/MU and G.729)
7. Network Region 2 (Includes G700 media gateway, CLAN, media processor; supports codec sets G.711A/MU and G.729)

8. Network Region 3 (Includes Communication Manager API softphones; supports G.711A/MU and G.729)

Sample Communication Manager administration screens

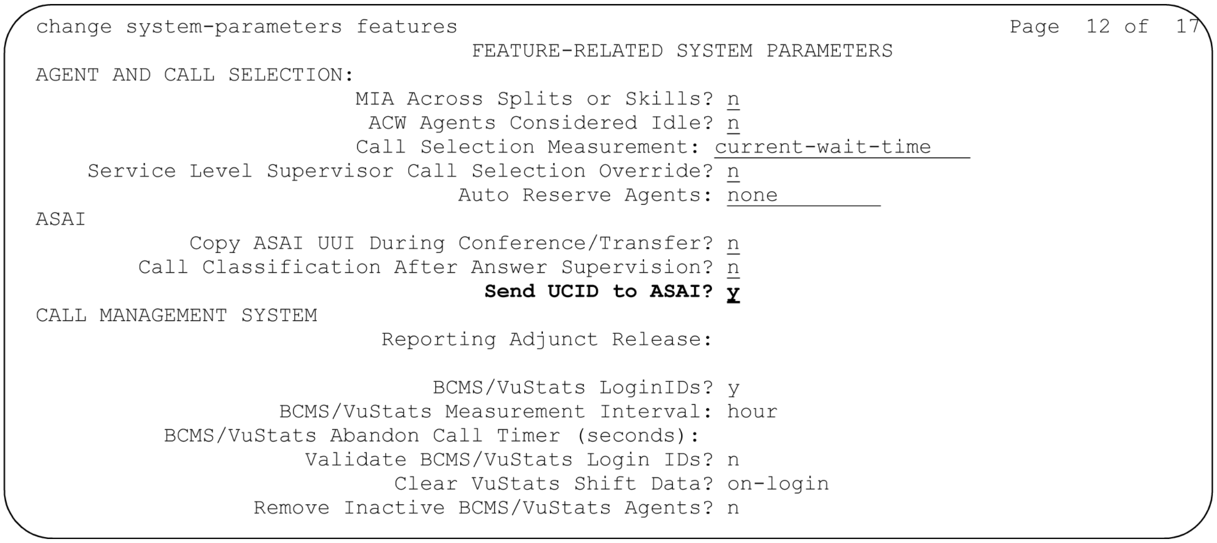
Setting up UCIDs for TSAPI and JTAPI applications

TSAPI applications that use predictive dialing and JTAPI applications must enable the setting for creating UCIDs. Select a unique node number for the switch (see Figure 1), and enable the setting for Send UCID to ASAI (see Figure 2).



```
change system-parameters features                                   Page   5 of  17
                                  FEATURE-RELATED SYSTEM PARAMETERS

SYSTEM PRINTER PARAMETERS:
  Endpoint:_________        Lines Per Page: 60

SYSTEM-WIDE PARAMETERS:
                              Switch Name:______________________________

     Emergency Extension Forwarding min): 10
   Enable Inter-Gateway Alternate Routing? n

MALICIOUS CALL TRACE PARAMETERS
             APPLY WCT Warning Tone? n    MCT Voice Recorder Trunk Group:____

SEND ALL CALLS OPTIONS
    Send All Call Applies to: station     Auto Inspect on Send All Calls? n

 UNIVERSAL CALL ID
     Create Universal Call ID (UCID)? y   UCID Network Node ID: 1
```

Figure 1: Setting up UCIDs for TSAPI and JTAPI applications - create a UCID and assign a Node ID

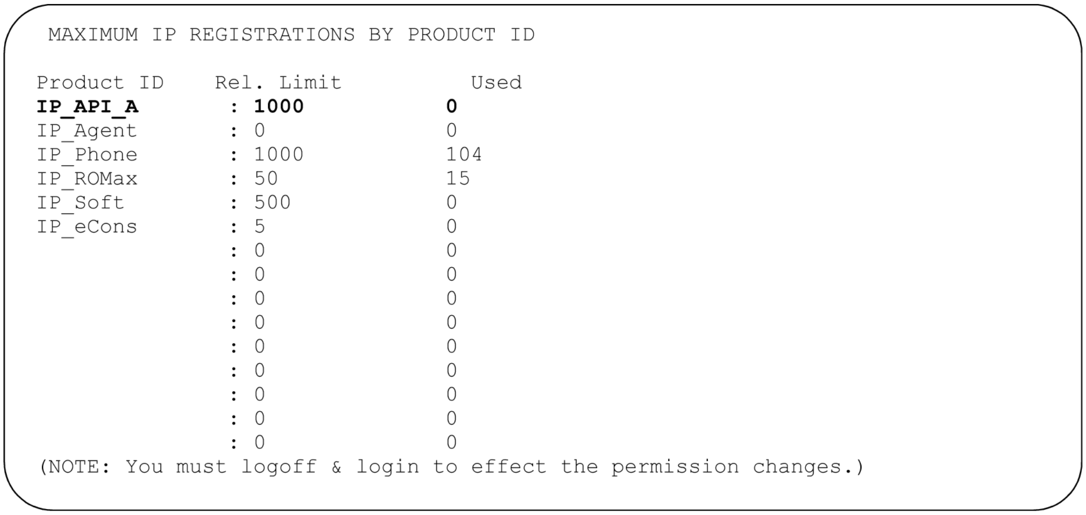


```
change system-parameters features                                   Page  12 of  17
                                  FEATURE-RELATED SYSTEM PARAMETERS
AGENT AND CALL SELECTION:
                         MIA Across Splits or Skills? n
                          ACW Agents Considered Idle? n
                         Call Selection Measurement: current-wait-time
    Service Level Supervisor Call Selection Override? n
                                 Auto Reserve Agents: none
ASAI
            Copy ASAI UUI During Conference/Transfer? n
        Call Classification After Answer Supervision? n
                                   Send UCID to ASAI? y
CALL MANAGEMENT SYSTEM
                           Reporting Adjunct Release:

                               BCMS/VuStats LoginIDs? y
                   BCMS/VuStats Measurement Interval: hour
          BCMS/VuStats Abandon Call Timer (seconds):
                     Validate BCMS/VuStats Login IDs? n
                            Clear VuStats Shift Data? on-login
                Remove Inactive BCMS/VuStats Agents? n
```

Figure 2: Setting up UCIDs for TSAPI and JTAPI applications - send UCID to ASAI must be enabled

Checking for IP_API_A licenses

If your DMCC application uses DMCC to register one or more station endpoints, then you need licenses. The preferred license type for this is the DMCC_DMC license available on the Application Enablement Services WebLM server. However, if no DMCC_DMC licenses are available, then you can use the IP_API_A licenses of the Communication Manager. To verify that you have a sufficient number of licenses, type **`display system-parameters customer-options`**. Go to the MAXIMUM IP REGISTRATIONS BY PRODUCT ID screen and check the `IP_API_A` field. See Figure 3 on page 42.



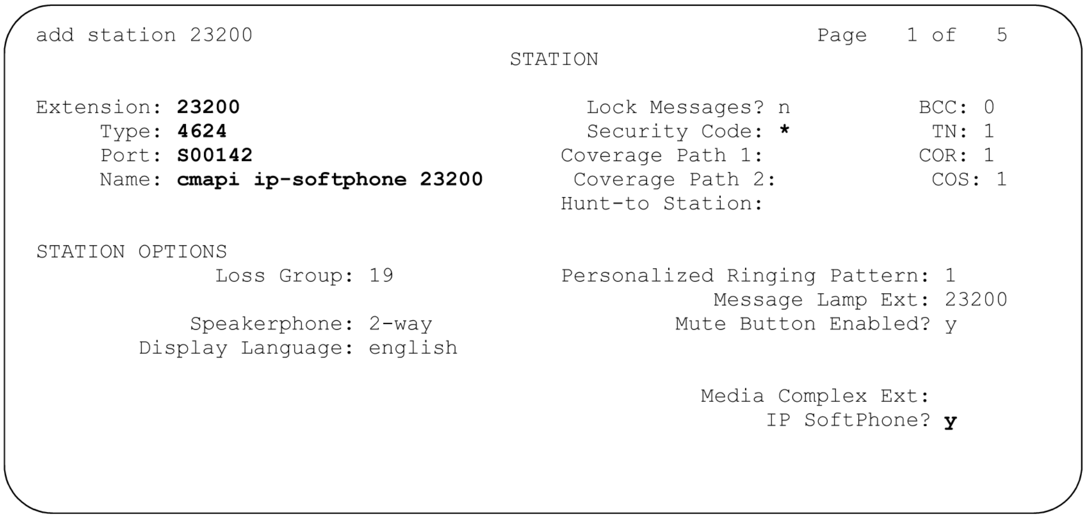
```
 MAXIMUM IP REGISTRATIONS BY PRODUCT ID

Product ID    Rel. Limit         Used
IP_API_A       : 1000          0
IP_Agent       : 0             0
IP_Phone       : 1000          104
IP_ROMax       : 50            15
IP_Soft        : 500           0
IP_eCons       : 5             0
               : 0             0
               : 0             0
               : 0             0
               : 0             0
               : 0             0
               : 0             0
               : 0             0
               : 0             0
               : 0             0
(NOTE: You must logoff & login to effect the permission changes.)
```

Figure 3: Checking for IP_API_A licenses

Adding stations

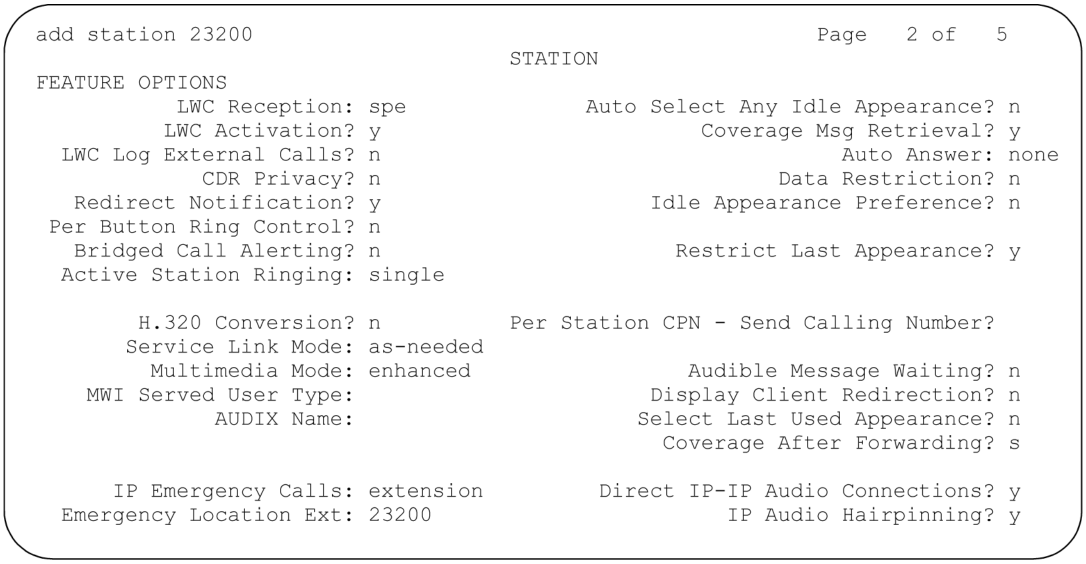
Add as many stations as you need for your DMCC based application. See the following:

- Figure 4: Adding a station, Page 1 of the STATION screen
- Figure 5: Adding a station, Page 2 of the STATION screen
- Figure 6: Adding a station, Page 3 of the STATION screen
- Figure 7: Adding a station, Page 4 of the STATION screen



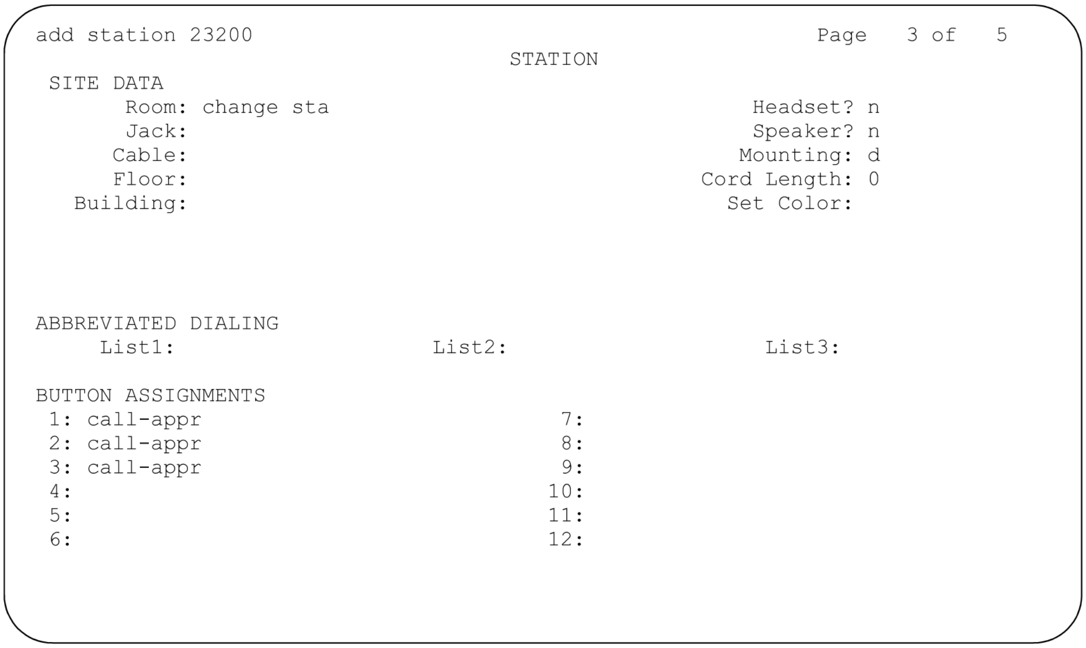
```
add station 23200                                            Page   1 of   5
                                     STATION

Extension: 23200                           Lock Messages? n          BCC: 0
     Type: 4624                            Security Code: *           TN: 1
     Port: S00142                        Coverage Path 1:            COR: 1
     Name: cmapi ip-softphone 23200       Coverage Path 2:            COS: 1
                                         Hunt-to Station:

STATION OPTIONS
              Loss Group: 19             Personalized Ringing Pattern: 1
                                                     Message Lamp Ext: 23200
            Speakerphone: 2-way                   Mute Button Enabled? y
        Display Language: english

                                                    Media Complex Ext:
                                                         IP SoftPhone? y
```

Figure 4: Adding a station, Page 1 of the STATION screen



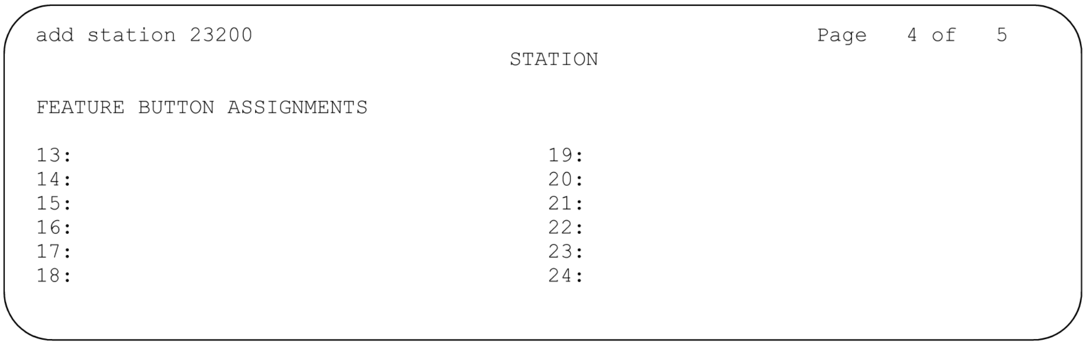
```
add station 23200                                            Page   2 of   5
                                     STATION
FEATURE OPTIONS
           LWC Reception: spe              Auto Select Any Idle Appearance? n
          LWC Activation? y                         Coverage Msg Retrieval? y
  LWC Log External Calls? n                                    Auto Answer: none
             CDR Privacy? n                               Data Restriction? n
   Redirect Notification? y                     Idle Appearance Preference? n
 Per Button Ring Control? n
   Bridged Call Alerting? n                       Restrict Last Appearance? y
  Active Station Ringing: single

        H.320 Conversion? n          Per Station CPN - Send Calling Number?
       Service Link Mode: as-needed
         Multimedia Mode: enhanced                 Audible Message Waiting? n
    MWI Served User Type:                       Display Client Redirection? n
              AUDIX Name:                      Select Last Used Appearance? n
                                                 Coverage After Forwarding? s

      IP Emergency Calls: extension         Direct IP-IP Audio Connections? y
  Emergency Location Ext: 23200                       IP Audio Hairpinning? y
```

Figure 5: Adding a station, Page 2 of the STATION screen



```
add station 23200                                           Page   3 of   5
                                       STATION
 SITE DATA
       Room: change sta                                  Headset? n
       Jack:                                             Speaker? n
      Cable:                                            Mounting: d
      Floor:                                         Cord Length: 0
   Building:                                           Set Color:




ABBREVIATED DIALING
     List1:                   List2:                    List3:

BUTTON ASSIGNMENTS
 1: call-appr                         7:
 2: call-appr                         8:
 3: call-appr                         9:
 4:                                  10:
 5:                                  11:
 6:                                  12:
```

Figure 6: Adding a station, Page 3 of the STATION screen

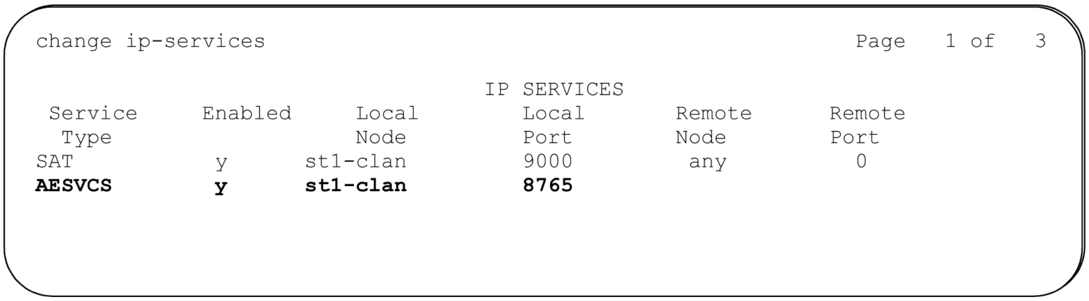


```
add station 23200                                           Page   4 of   5
                                       STATION

FEATURE BUTTON ASSIGNMENTS

13:                                  19:
14:                                  20:
15:                                  21:
16:                                  22:
17:                                  23:
18:                                  24:
```

Figure 7: Adding a station, Page 4 of the STATION screen

Configuring IP services - administering the transport link

Configuring IP services administers the transport link between Communication Manager and AE Services. Use the **`change ip-services`** command , and administer settings on the IP SERVICES screen (figure 8) and the AE Services Administration screen (figure 9).

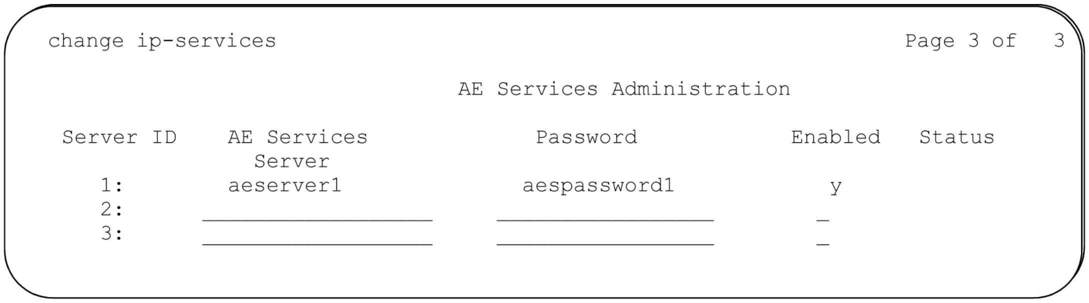


```
change ip-services                                             Page   1 of   3

                                     IP SERVICES
 Service     Enabled     Local        Local       Remote      Remote
  Type                   Node         Port        Node        Port
SAT             y      st1-clan       9000         any          0
AESVCS          y      st1-clan       8765
```

Figure 8: Configuring IP services

Note:

For transport connections using CLANs, type the CLAN name as the Local Node. For transport connections using Processor Ethernet, type `procr` as the Local Node.

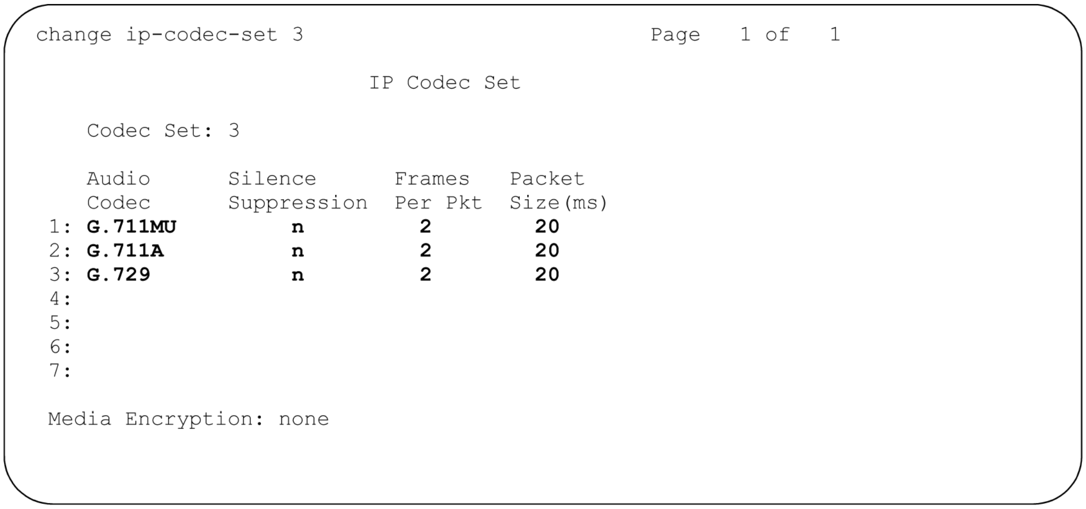


```
change ip-services                                                 Page 3 of   3

                                AE Services Administration

 Server ID    AE Services              Password              Enabled    Status
                Server
    1:        aeserver1              aespassword1               y
    2:      __________________     _________________           _
    3:      __________________     _________________           _
```

Figure 9: Configuring IP services - AE Services Administration

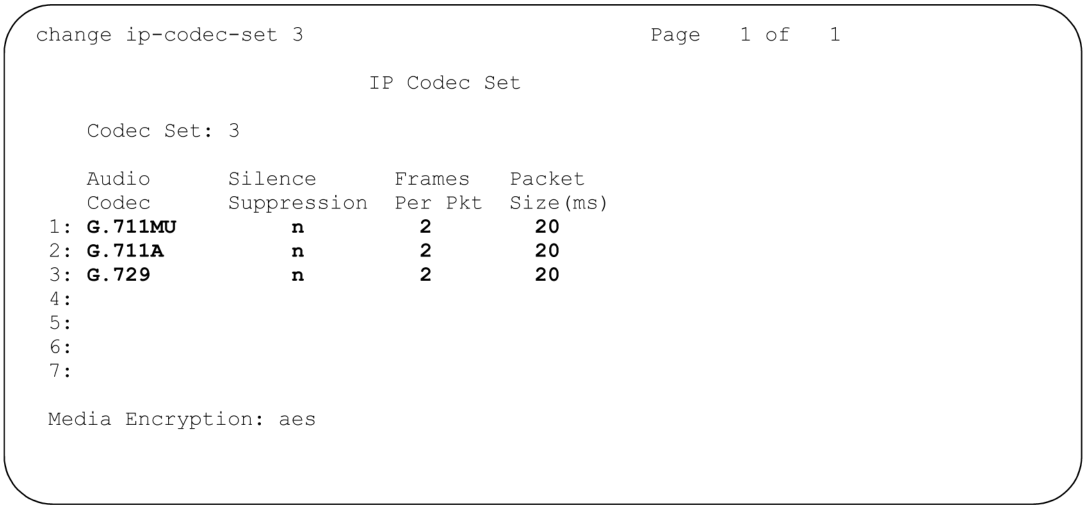
Setting up a codec set

Use the **`change ip-codec set`** *<codec set number>* command to set up a codec set that uses G.711A, G.711MU and/or G.729. See the figure on page 45.



```
change ip-codec-set 3                                 Page   1 of   1

                              IP Codec Set

    Codec Set: 3

    Audio      Silence      Frames   Packet
    Codec      Suppression  Per Pkt  Size(ms)
 1: G.711MU        n           2       20
 2: G.711A         n           2       20
 3: G.729          n           2       20
 4:
 5:
 6:
 7:

 Media Encryption: none
```

Figure 10: Setting up a codec set - media encryption set to none



```
change ip-codec-set 3                           Page   1 of   1

                          IP Codec Set

    Codec Set: 3

    Audio      Silence      Frames   Packet
    Codec      Suppression  Per Pkt  Size(ms)
 1: G.711MU         n         2        20
 2: G.711A          n         2        20
 3: G.729           n         2        20
 4:
 5:
 6:
 7:

 Media Encryption: aes
```

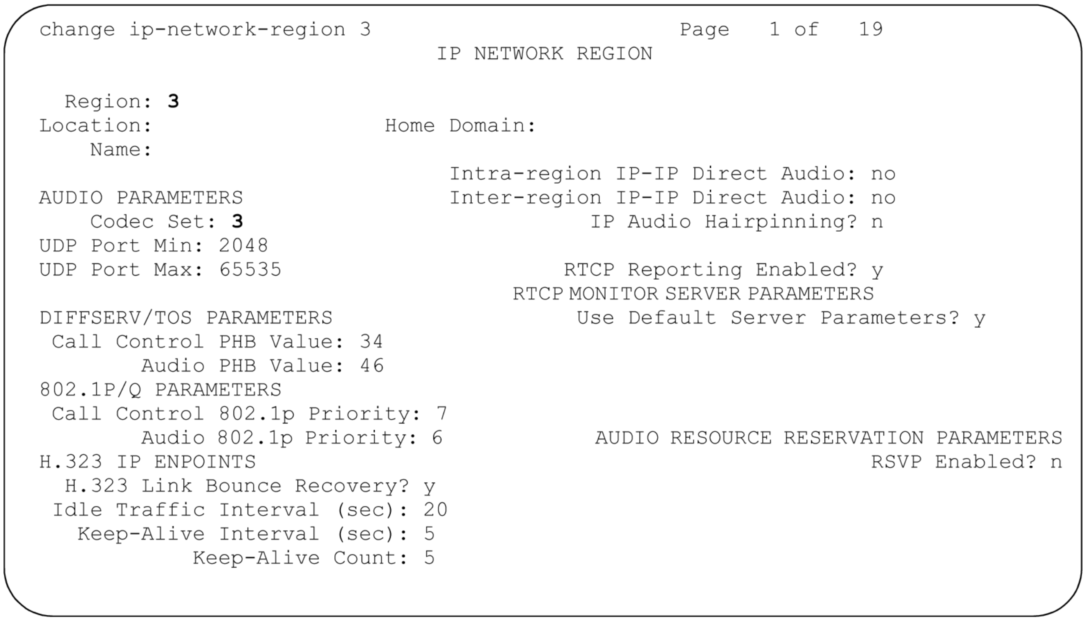
Figure 11: Setting up a codec set - media encryption set to aes

Administering a network region

For this example network, you will administer the following codec connectivity within each network region and between network regions:

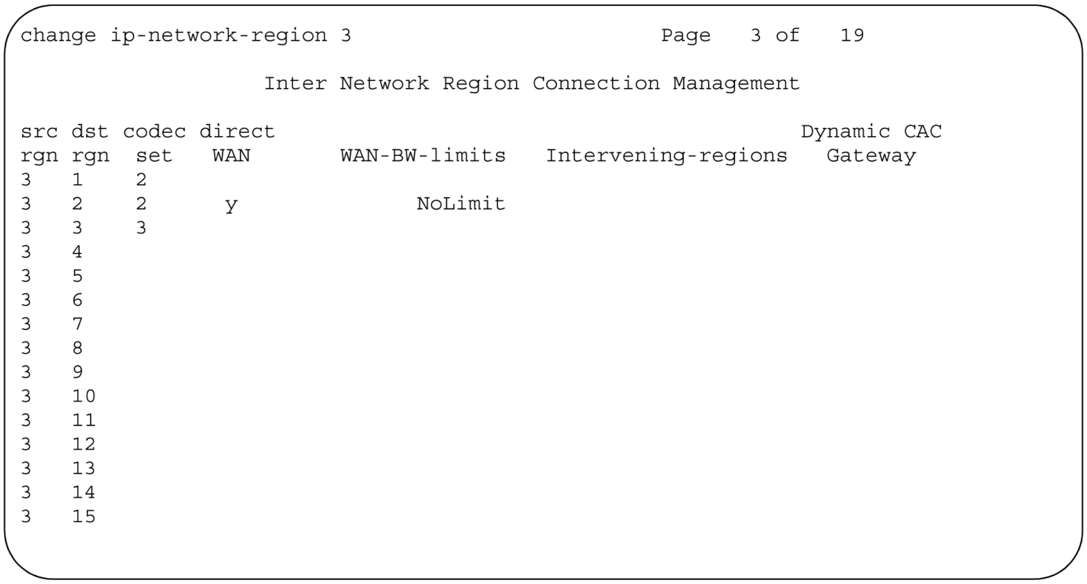
- network region 3 -> network region 1: codec 2
- network region 3 -> network region 2: codec 2
- network region 3 <-> network region 3: codec 3

See the figure on page 46 and the figure on page 47.



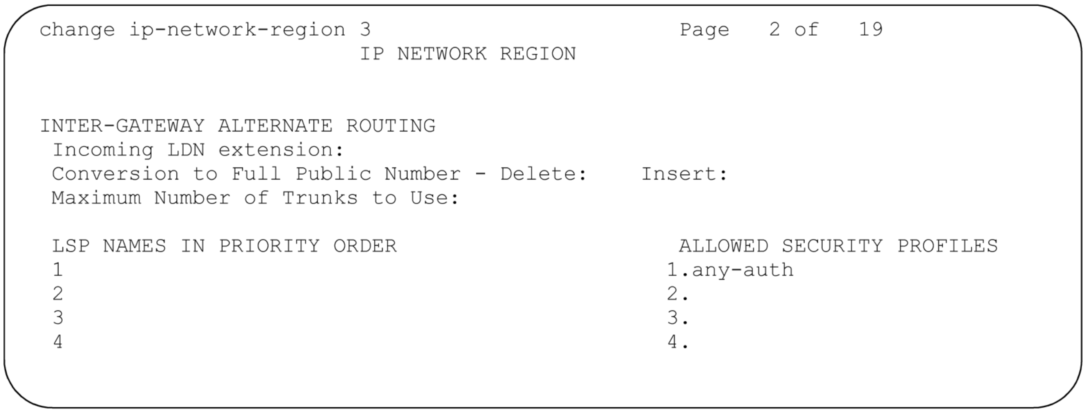
```
change ip-network-region 3                        Page   1 of   19
                               IP NETWORK REGION

  Region: 3
Location:                  Home Domain:
    Name:
                                Intra-region IP-IP Direct Audio: no
AUDIO PARAMETERS                Inter-region IP-IP Direct Audio: no
    Codec Set: 3                           IP Audio Hairpinning? n
UDP Port Min: 2048
UDP Port Max: 65535                      RTCP Reporting Enabled? y
                                     RTCP MONITOR SERVER PARAMETERS
DIFFSERV/TOS PARAMETERS                   Use Default Server Parameters? y
 Call Control PHB Value: 34
        Audio PHB Value: 46
802.1P/Q PARAMETERS
 Call Control 802.1p Priority: 7
        Audio 802.1p Priority: 6           AUDIO RESOURCE RESERVATION PARAMETERS
H.323 IP ENPOINTS                                                 RSVP Enabled? n
  H.323 Link Bounce Recovery? y
 Idle Traffic Interval (sec): 20
   Keep-Alive Interval (sec): 5
            Keep-Alive Count: 5
```

Figure 12: Administering a network region, IP NETWORK REGION screen, page 1



```
change ip-network-region 3                        Page   3 of   19

                   Inter Network Region Connection Management

src dst codec direct                                         Dynamic CAC
rgn rgn  set   WAN       WAN-BW-limits   Intervening-regions   Gateway
3   1    2
3   2    2      y              NoLimit
3   3    3
3   4
3   5
3   6
3   7
3   8
3   9
3   10
3   11
3   12
3   13
3   14
3   15
```

Figure 13: Administering a network region, IP NETWORK REGION screen, page 3

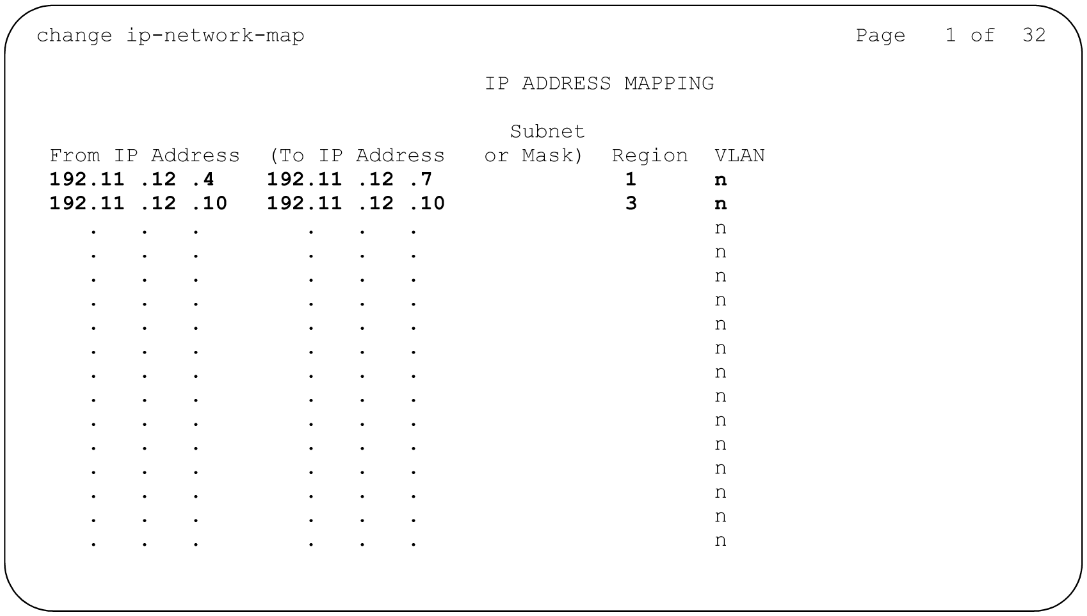


```
change ip-network-region 3                        Page   2 of   19
                         IP NETWORK REGION


INTER-GATEWAY ALTERNATE ROUTING
 Incoming LDN extension:
 Conversion to Full Public Number - Delete:    Insert:
 Maximum Number of Trunks to Use:

 LSP NAMES IN PRIORITY ORDER                      ALLOWED SECURITY PROFILES
 1                                               1.any-auth
 2                                               2.
 3                                               3.
 4                                               4.
```

Figure 14: Administering a network region, IP NETWORK REGION screen, page 2

Mapping IP addresses (for API softphones)

Use the **change ip-network-map** command, and specify the IP address of the AE Server and assign a network region. See the figure on page 48.



```
change ip-network-map                                          Page   1 of  32
                                  IP ADDRESS MAPPING

                                     Subnet
 From IP Address  (To IP Address   or Mask)  Region  VLAN
 192.11 .12 .4    192.11 .12 .7               1      n
 192.11 .12 .10   192.11 .12 .10              3      n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
    .   .   .        .   .   .                       n
```

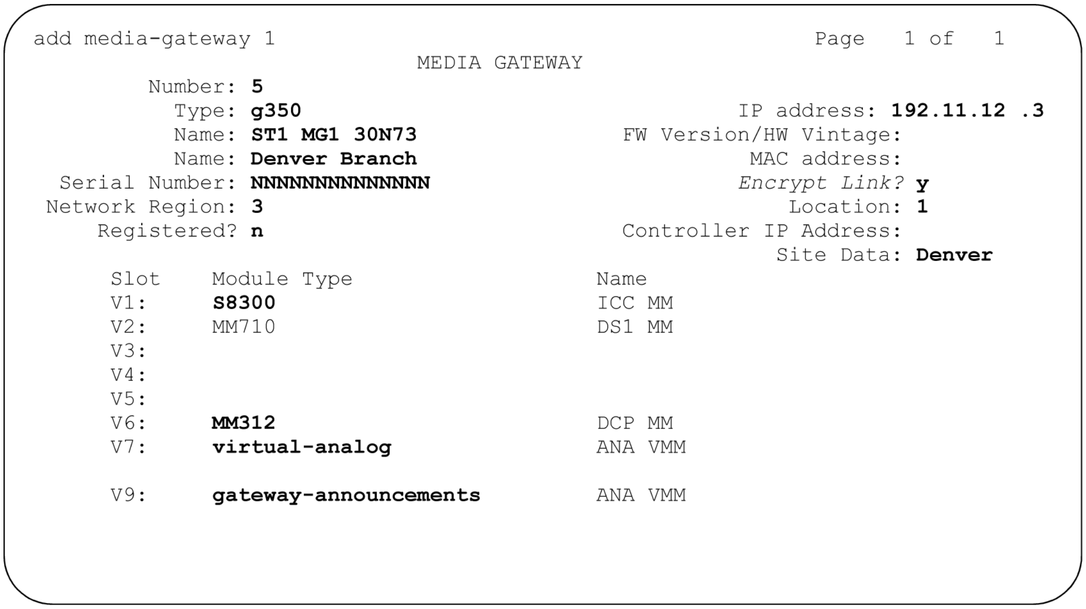
Figure 15: Mapping IP addresses (for API softphones)

Adding a media gateway

If you are using a media server with a media gateway, you must add the media gateway to the Communication Manager network. For information about adding a media gateway, see Consulting the Communication Manager documentation on page 39.

Note:

If you are using a media gateway, and your application needs media encryption, you must set **Encrypt Link?** to `y`. If you do not enable this setting, your application will not get a talk-path.



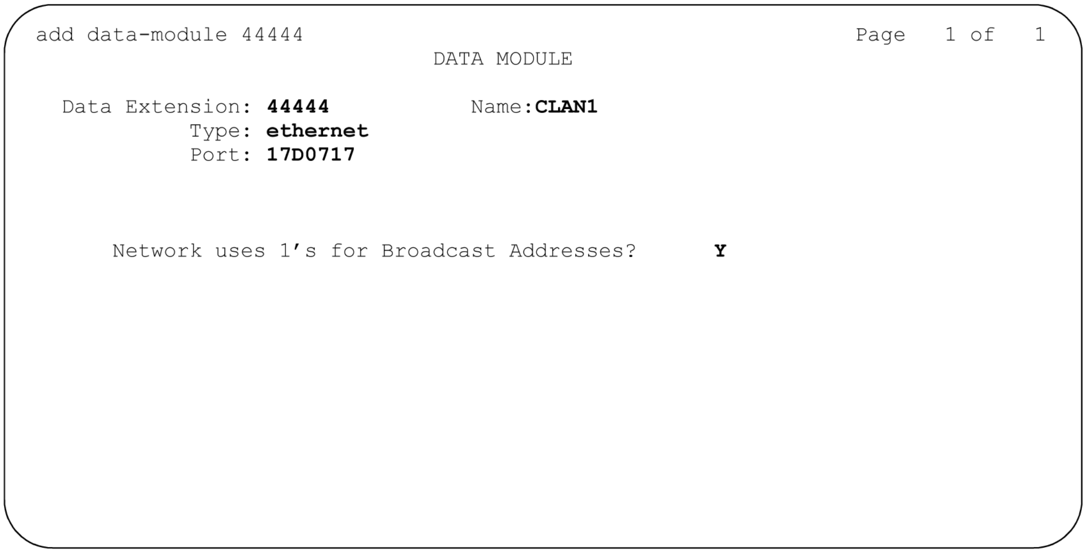
```
add media-gateway 1                                       Page   1 of   1
                              MEDIA GATEWAY
         Number: 5
           Type: g350                                IP address: 192.11.12 .3
           Name: ST1 MG1 30N73                 FW Version/HW Vintage:
           Name: Denver Branch                           MAC address:
  Serial Number: NNNNNNNNNNNNNN                        Encrypt Link? y
 Network Region: 3                                         Location: 1
    Registered? n                              Controller IP Address:
                                                           Site Data: Denver

      Slot     Module Type                  Name
      V1:      S8300                        ICC MM
      V2:      MM710                        DS1 MM
      V3:
      V4:
      V5:
      V6:      MM312                        DCP MM
      V7:      virtual-analog               ANA VMM

      V9:      gateway-announcements        ANA VMM
```

Figure 16: Adding a media gateway

Adding a CLAN

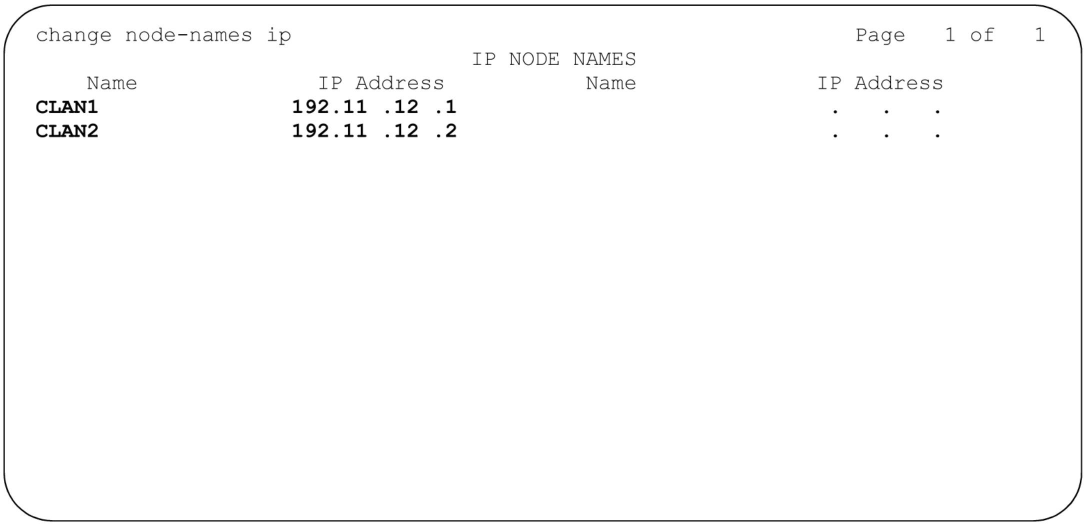
When you are using a media server that uses CLANs, you must add the CLANs to the Communication Manager network. The procedure for adding a CLAN uses the following commands.

- **`add data-module`** see Figure 17
- **`change node-names ip`** see Figure 18
- **`change ip-interface`** - to add the following:
  - a CLAN see Figure 19
  - a MEDPRO circuit pack see Figure 20
  - a PROCR see Figure 21



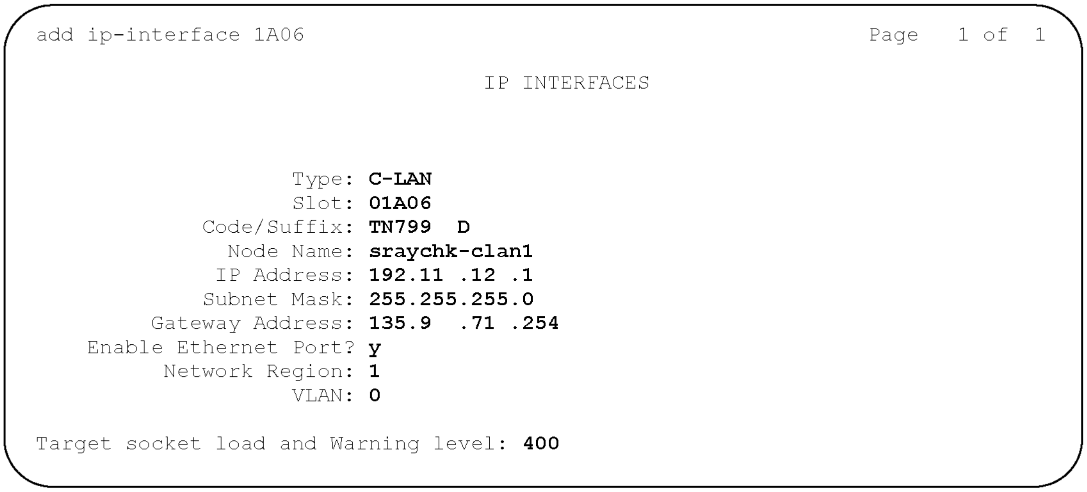
```
add data-module 44444                                            Page   1 of    1
                                DATA MODULE

  Data Extension: 44444             Name:CLAN1
            Type: ethernet
            Port: 17D0717



      Network uses 1’s for Broadcast Addresses?      Y
```

Figure 17: Adding a CLAN - add data-module



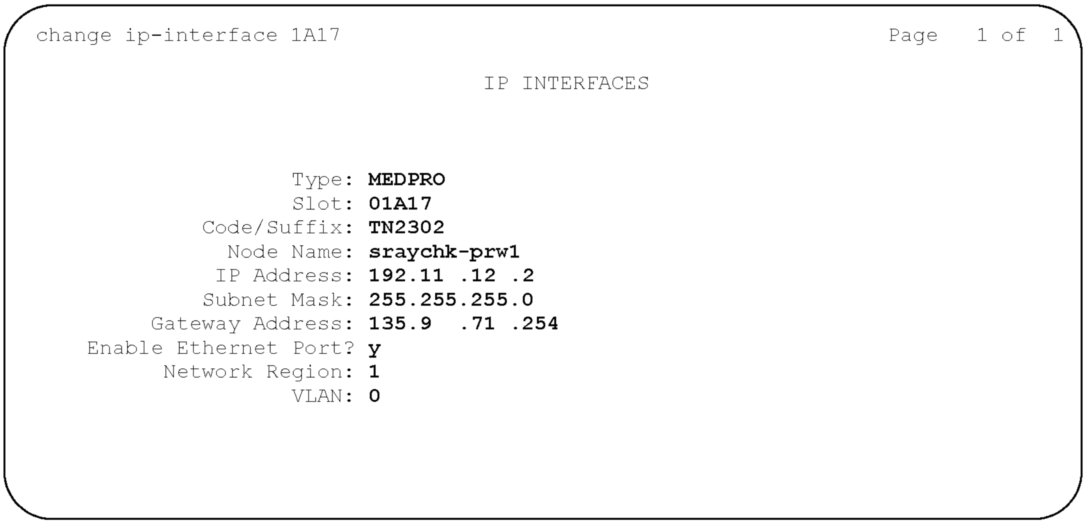
```
change node-names ip                                              Page   1 of   1
                                  IP NODE NAMES
    Name              IP Address            Name              IP Address
CLAN1               192.11 .12 .1                               .   .   .
CLAN2               192.11 .12 .2                               .   .   .
```

Figure 18: Adding a CLAN - change node-names ip



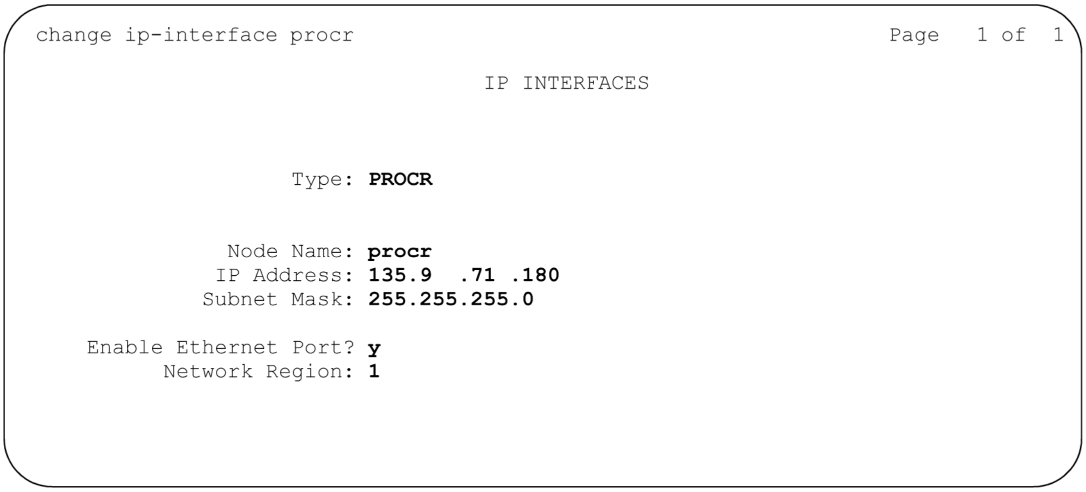
```
add ip-interface 1A06                                             Page   1 of  1

                                  IP INTERFACES



                    Type: C-LAN
                    Slot: 01A06
             Code/Suffix: TN799  D
               Node Name: sraychk-clan1
              IP Address: 192.11 .12 .1
             Subnet Mask: 255.255.255.0
         Gateway Address: 135.9  .71 .254
   Enable Ethernet Port? y
          Network Region: 1
                    VLAN: 0

Target socket load and Warning level: 400
```

Figure 19: Adding a CLAN IP interface



```
change ip-interface 1A17                                          Page   1 of   1
                                   IP INTERFACES


                    Type: MEDPRO
                    Slot: 01A17
             Code/Suffix: TN2302
               Node Name: sraychk-prw1
              IP Address: 192.11 .12 .2
             Subnet Mask: 255.255.255.0
         Gateway Address: 135.9  .71 .254
    Enable Ethernet Port? y
          Network Region: 1
                    VLAN: 0
```

Figure 20: Adding a media processor

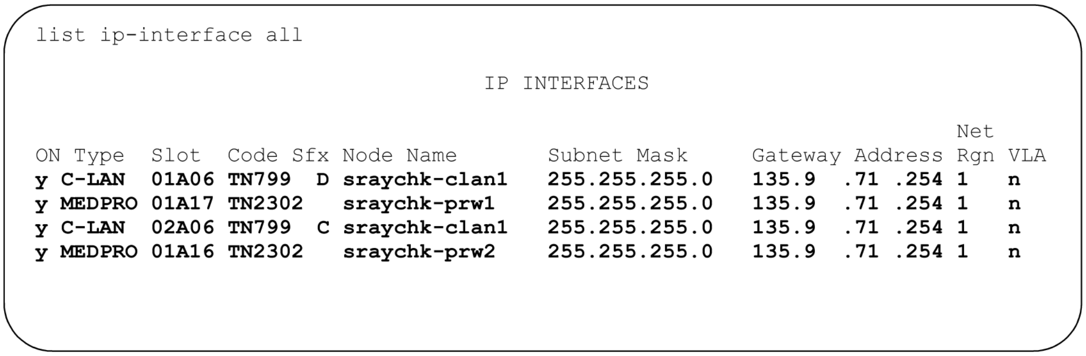


```
change ip-interface procr                                         Page   1 of   1
                                   IP INTERFACES


                    Type: PROCR


               Node Name: procr
              IP Address: 135.9  .71 .180
             Subnet Mask: 255.255.255.0

    Enable Ethernet Port? y
          Network Region: 1
```

Figure 21: Adding a processor CLAN (procr)

Listing IP interfaces

Use the **`list ip-interface all`** command to view the IP interfaces you have administered, as illustrated in the figure on page 52.



```
list ip-interface all

                                   IP INTERFACES

                                                                          Net
ON Type   Slot  Code Sfx Node Name        Subnet Mask     Gateway Address Rgn VLA
y C-LAN  01A06 TN799  D sraychk-clan1   255.255.255.0   135.9  .71 .254 1   n
y MEDPRO 01A17 TN2302   sraychk-prw1    255.255.255.0   135.9  .71 .254 1   n
y C-LAN  02A06 TN799  C sraychk-clan1   255.255.255.0   135.9  .71 .254 1   n
y MEDPRO 01A16 TN2302   sraychk-prw2    255.255.255.0   135.9  .71 .254 1   n
```

Figure 22: Listing IP interfaces

Chapter 3: AE Services administration

The method you choose to access AE Services administration depends on the tasks you want to perform. Refer to Figure 23: AE Services and ssh authentication methods on page 54 and the figure on page 54 as you read the following descriptions of access methods.

Web browser: : You must use a Web browser to access the Application Enablement Services Management Console (AE Services Management Console). Use the AE Services Management Console to configure the AE Services server. AE Services uses role-based access control (RBAC) to determine what tasks you are allowed to perform using the AE Services Management Console. For example, the default system administrator, cust, has read and write access to all of the administrative features in the AE Services Management Console. For more information about access privileges, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

Local or remote access to the Linux shell: : Administrators can access the AE Services Linux shell (command prompt) either locally using a system console or remotely using a secure shell (ssh) client. This access method applies primarily to AE Services Technicians (craft users) who perform specific tasks, such as viewing trace logs, installing patches, and so forth. If you plan to use the Linux shell for these kinds of maintenance tasks, see AE Services Administration from the Operating System Command Prompt on page 247.

❗ **Important:**

The AE Services offers do not provide a web browser. To administer AE Services, you need a computer running a browser with network access to the AE Server.

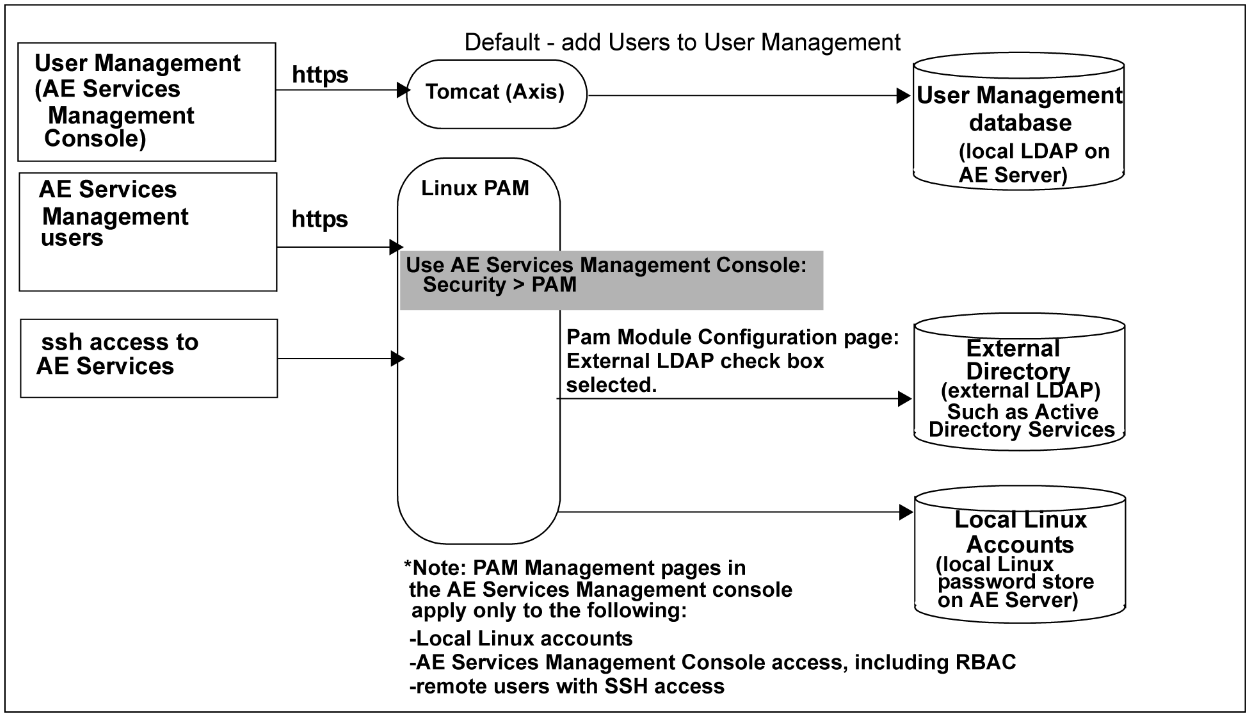

User Management (AE Services Management Console)
https
Tomcat (Axis)
Default - add Users to User Management
User Management database (local LDAP on AE Server)
AE Services Management users
https
Linux PAM
Use AE Services Management Console: Security > PAM
ssh access to AE Services
Pam Module Configuration page: External LDAP check box selected.
External Directory (external LDAP) Such as Active Directory Services
Local Linux Accounts (local Linux password store on AE Server)
*Note: PAM Management pages in the AE Services Management console apply only to the following:
-Local Linux accounts
-AE Services Management Console access, including RBAC
-remote users with SSH access

Figure 23: AE Services and ssh authentication methods

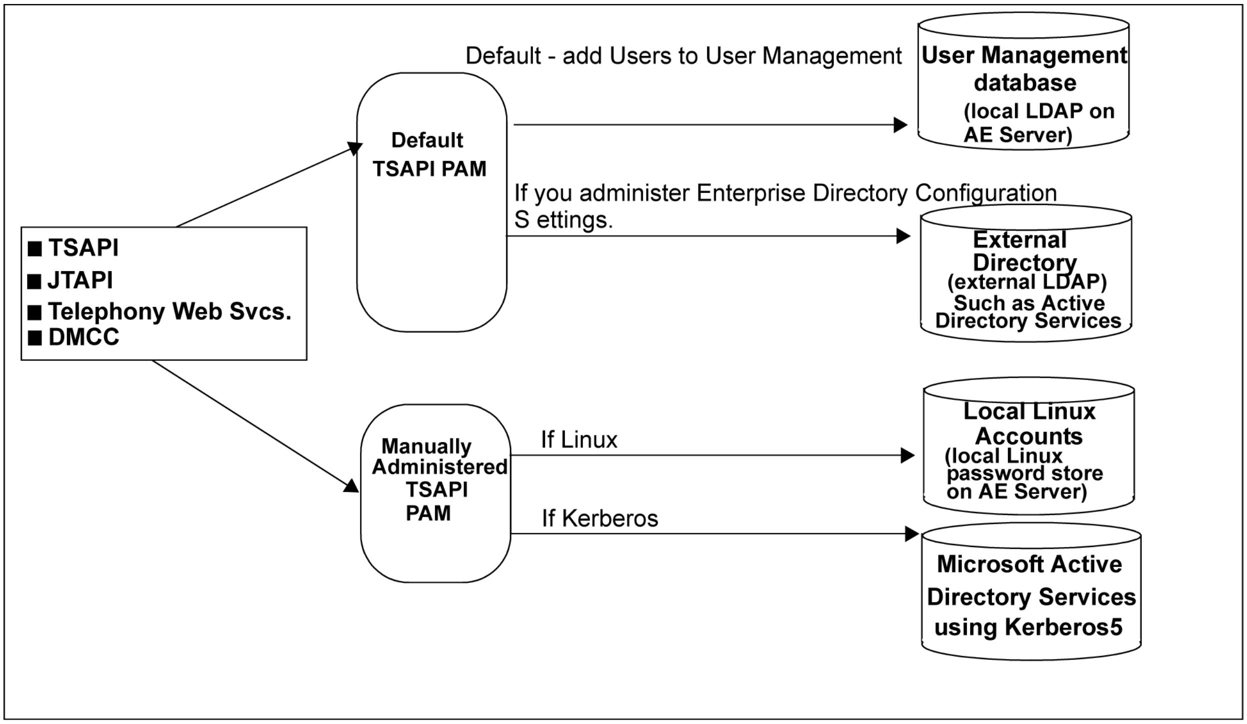

Default - add Users to User Management
User Management database (local LDAP on AE Server)
Default TSAPI PAM
If you administer Enterprise Directory Configuration S ettings.
External Directory (external LDAP) Such as Active Directory Services
■ TSAPI
■ JTAPI
■ Telephony Web Svcs.
■ DMCC
Local Linux Accounts (local Linux password store on AE Server)
Manually Administered TSAPI PAM
If Linux
If Kerberos
Microsoft Active Directory Services using Kerberos5

Figure 24: AE Services client authentication methods

Related links

Supported browsers on page 55

Logging in to AE Services as the system administrator on page 58
Checklists for administering the services that run on the AE Services server on page 59
Changing the date, time or the NTP server settings on page 70
Configuring network interface settings on page 72
Enabling DMCC server ports for DMCC applications developed prior to AE Services 3.1 on page 73
Administering the Local IP for a single NIC configuration on page 74
Administering the Local IP for a dual NIC configuration on page 74
Recommended AE Service IP (local IP) settings on page 76
Administering network interfaces with CVLAN - using the Any network setting on page 76
Adding a switch connection on page 77
Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses on page 80
Editing CLAN IPs on page 81
Editing a Processor Ethernet name or IP address on page 82
Adding Communication Manager High Availability information on page 83
Checking the status of a switch connection from the AE Services server to Communication Manager on page 84
Adding DLG Links on page 88
Adding TSAPI links on page 88
Setting Media Properties on page 90
Setting DMCC Station Properties on page 90
Administering Auto Hold on page 91
TCP or TLS Settings on page 91
Administering the TCP retransmission count on page 92

Supported browsers

Following are the minimum supported versions of the supported browsers:

- Internet Explorer 11
- Mozilla Firefox 83 and 84

Related links

AE Services administration on page 53

AE Services Management Console - certificates and security alerts

Use this section to understand the security alerts you might see when you attempt to access AE Services with your browser.

This section provides examples that are specific to Microsoft Internet Explorer (IE). Although the procedures might not be the same for other browsers, the same basic concepts apply.

The types of security alerts you receive and how to handle them, depend on whether you use the default AE Services server certificate CA, or if you use certificates issued by a trusted in-house or third-party certificate authority.

Using certificates issued by a trusted in-house or third-party certificate authority is also referred to as using your own certificates.

Note:

Some versions of IE has the Enhanced Security Configuration security feature enabled by default. In order to display the AE Services Management Console, you can add the AE Services Management Console URL to the Trusted Sites zone of the Windows Server Internet Explorer browser. Otherwise, you can disable the Enhanced Security Configuration security feature on the Internet Explorer browser.

For additional information about this feature, please see the Microsoft TechNet site HTTP://TECHNET.MICROSOFT.COM/.

Browser security

If you use the default server certificate, your browser will issue two alerts. The first alert indicates that the certificate was issued by an invalid CA. The second alert indicates that the CN is invalid because the server name in the URL does not match the CN in the certificate. If you add the Avaya CA into your browser's trust store the CN error will continue to occur.

If you are using the default server certificate, you cannot avoid this security alert. You will see this message each time you log in to AE Services, click **Yes** to use AE Services.

Note:

Do not use the default server certificates in a production environment. Avaya recommends that you must replace all the default installed certificates with new certificates.

Using own Certificate Authority

About this task

If you use your own certificates, note that your browser and the AE Server need to use the same trusted certificate. If your browser does not refer to the same trusted certificate as the AE Server, your browser will issue a security alert when you attempt to access AE Services. You can eliminate this security alert by following these steps.

Procedure

1. Obtain and install the CA certificate for the AE Server.

   For specific instructions, see Obtaining a trusted certificate for the AE Server on page 109.
2. Import the trusted certificate into AE Services.

   For specific instructions, see Importing the trusted certificate into AE Services on page 111.
3. Import the CA certificate in your browser's certificate store.

   For specific instructions, see Importing the CA certificate into your browser's certificate store on page 57.

Importing the CA certificate into your browser's certificate store

About this task

Use this procedure to import the CA certificate into your browser's certificate store. This procedure provides tasks specific to Microsoft Internet Explorer. Although the procedures might not be the same for other browsers, the same basic concepts apply.

Procedure

1. On your browser, click **Tools** > **Internet Options**.
2. In the Internet Options dialog box, click **Content** > **Certificates**.
3. In the Certificates dialog box, click the **Trusted Root Certification Authorities** tab.
4. In the list of Trusted Root Certification Authorities, click **Import** to start the Certificate Import Wizard.
5. In the File to Import dialog box, click **Browse**, and locate the certificate.
6. Click **Next**.
7. In the Certificate Store dialog box, click **Browse**.
8. In the Select Certificate Store dialog box, click **Trusted Root Certification Authorities**, and click **OK**.
9. Click **Next**.
10. In the Completing the Certificate Import Wizard dialog box, click **Finish**.
11. In the Import was successful dialog box, click **OK** to close the message.
12. Click **Close** to close the Certificates dialog box.
13. Click **OK** to close the Internet Options dialog box.

When you restart your browser and access AE Services, your browser will not display the security alert for an invalid CA.

Logging in to AE Services as the system administrator

About this task

Follow this procedure to log in to the AE Server as the default administrator (**cust**). Bear in mind that you can not log in to the AE Services Management Console as root.

✱ **Note:**

For information about setting up administrative and user accounts, see AE Services administrative roles and access privileges (role based access control - RBAC).

Procedure

1. From your Web browser, type the address of the AE Server.

   You must use either the fully qualified domain name or the IP address of the AE Services Server. For example:

   `aserver.example.com`

   `135.8.17.123` (An example of an IPv4 address)

   `[2002:d5fe::1]` (An example of an IPv6 address

   ✱ **Note:**

   If you use an IPv6 address to connect to the AE Server, you must enclose the IPv6 address within square brackets (`[ ]`) in the web browser (for example, `https://[2002:d5fe::1]`).

   The first time you try to access the AE Server, your browser presents a Security Alert for an SSL certificate.

2. Click **Yes** to accept the SSL certificate.

   ✱ **Note:**

   If your browser does not display the SSL certificate, make sure that the URL begins with “https://” and the host name or IP address of the AE Services Server is correct.

3. On the Application Enablement Services welcome page, click **Continue to Login**.

   ✚ **Tip:**

   To change the message that appears on this Welcome screen, see Creating a PAM Issue (/etc/issue) message.

4. From the Application Enablement Services Management Console log in page, type the default login , and click **Login**.

Your browser displays the Application Enablement Services Management Console home page for the **cust** administrator. The **cust** administrator has access to all AE Services Management Console menus. For more information about the access privileges assigned to administrative users, see AE Services administrative roles and access privileges (role based access control - RBAC.

Related links

AE Services administration on page 53
Creating a PAM Issue (/etc/issue) message on page 181
Administering the PAM Password Manager on page 179
Changing the default password for the cust account in local Linux on page 337
AE Services administrative roles and access privileges (role based access control - RBAC) on page 329

Checklists for administering the services that run on the AE Services server

Use the checklists in this section to plan and monitor your progress as you administer the services that run on the AE Services server.

For a high-level illustration of the services that run on the AE Services server, see Schematic view of an AE Services configuration 3.

Related links

AE Services administration on page 53
CVLAN - checklist on page 59
DLG - checklist on page 60
DMCC with device and media control only - checklist on page 61
DMCC with device and media control only (using a switch name for CLANs) - checklist on page 62
DMCC with Call Information Services - checklist on page 63
DMCC with Call Control Services - checklist on page 65
TSAPI (including JTAPI) - checklist on page 66
Telephony Web Services - checklist on page 67
System Management Service - checklist on page 68
AE Services integration for Microsoft Lync Server 2010 and 2013 - checklist on page 69
Schematic view of an AE Services configuration on page 130

CVLAN - checklist

Use this checklist if you are administering AE Services for CVLAN.

#	Description	Notes	✔
1	**Networking > AE Service IP (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74 • Administering The Local IP for a dual NIC configuration on page 74	
2	**Networking > Ports**	Not required. You can use the default settings.	
3	**Communication Manager Interface > Switch Connections**	Required. See Adding a switch connection on page 77.	
4	**AE Services > CVLAN > CVLAN Links > Add CVLAN Link**	Required (CVLAN Link). See Adding CVLAN Clients on page 87.	
5	**Security > Certificate Management**	Optional. For more information, see Certificate management on page 101.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

DLG - checklist

Use this checklist if you are administering AE Services for the DLG service. ASAI applications rely on the DLG service for communications to Communication Manager.

Note:

AE Services assigns port 5678 for DLG. You do not administer ports for DLG.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72.	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Communication Manager Interface > Switch Connections**	Required. See Adding a switch connection on page 77.	
4	**AE Services > DLG > DLG Links > Add Link**	Required. See Administering DLG Links on page 88.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

DMCC with device and media control only - checklist

Use this checklist If you are administering the DMCC service for applications that use device and media control only (first party call control).

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Networking > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324. **Important:** If you have a Release 3.0 DMCC application, see Enabling DMCC server ports for DMCC applications developed prior to AE Services 3.1 on page 73.	
4	**AE Services > DMCC**	Optional. You can use the default media and station properties. See Setting DMCC Media Properties on page 90.	
5	**Security > Certificate Management**	Required if you are using link encryption. For more information, see Certificate management on page 101.	
6	**Communication Manager Interface > Dial Plan**	Optional. Dial plan administrating applies to DMCC clients using E164ConversionServices. See Dial plan administration in AE Services on page 289.	

Table continues…

#	Description	Notes	✔
7	**Security > Enterprise Directory**	Optional. If you are using an external LDAP server (Microsoft Active Directory or Open Source LDAP) you must use the Enterprise Directory Configuration page in the AE Services Management Console. For more information, see Enterprise Directory settings in the AE Services Management Console on page 194.	
8	**Security > Host AA**	Not applicable if you are not using encryption. It is optional if you are using link encryption. The DMCC service can be set up to provide far-end client authentication and authorization. For more information, see the *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

DMCC with device and media control only (using a switch name for CLANs) - checklist

Use this checklist if you are administering the DMCC service for applications that do not use Call Information Services or Call Control Services, but do use a switch name for round-robin assignment of H.323 Gatekeepers for administering AE Services.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74	

Table continues…

#	Description	Notes	✔
3	**Networking > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324. **Important:** If you have a Release 3.0 DMCC application, see Enabling DMCC server ports for DMCC applications developed prior to AE Services 3.1 on page 73.	
4	**AE Services > DMCC**	Optional. You can use the default media and station properties. See Setting DMCC Media Properties on page 90.	
5	**Communication Manager Interface > Switch Connections**	Required. The Switch Connection Name is used for round-robin assignment of H.323 Gatekeepers. You must edit the H.323 Gatekeeper. See Administering switch connections for DMCC applications that use device and media control only -- assigning H.323 IP addresses on page 80.	
6	**Security > Security Database**	Optional. See Chapter 6: The Security Database on page 216.	
7	**Security > Certificate Management**	Not required if you are not using encryption. For more information, see Certificate management on page 101.	
8	**Security > Enterprise Directory**	Optional. For more information, see Enterprise Directory settings in the AE Services Management Console on page 194.	
9	**Security > Host AA**	Not applicable if you are not using encryption. It is optional if you are using link encryption. The DMCC service can be set up to provide far-end client authentication and authorization. For more information, see the *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

DMCC with Call Information Services - checklist

Use this checklist if you are administering the DMCC service for applications that use Call Information Services.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Networking > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324. **Important:** If you have a Release 3.0 DMCC application, see Enabling DMCC server ports for DMCC applications developed prior to AE Services 3.1 on page 73.	
4	**Communication Manager Interface > Switch Connections**	Required. DMCC with Call Information Services uses the Transport Service. See Adding a switch connection on page 77. Optional. You have the option of using H.323 Gatekeepers when you administer a switch connection. See Administering switch connections for DMCC applications that use device and media control only -- assigning H.323 IP addresses on page 80.	
5	**Communication Manager Interface > Dial Plan**	Optional. You must administer a dial plan if your DMCC clients use E.164ConversionServices. See Chapter 10: Dial plan administration in AE Services on page 289.	
6	**AE Services > DMCC**	Optional. You can use the default media and station properties. See Setting DMCC Media Properties on page 90.	
7	**Security > Security Database**	Optional. See Chapter 6: The Security Database on page 216.	
8	**Security > Certificate Management**	Optional. if you are using link encryption, you must set up certificates. For more information, see Certificate management on page 101.	

Table continues…

#	Description	Notes	✔
9	**Security > Enterprise Directory**	Optional. If you are using an external LDAP Server (Microsoft Active Directory or Open Source LDAP), you must use the Enterprise Directory Configuration page in the AE Services Management Console. For more information, see Enterprise Directory settings in the AE Services Management Console on page 194.	
1 0	**Security > Host AA**	Not applicable if you are not using encryption. It is optional if you are using link encryption. The DMCC service can be set up to provide far-end client authentication and authorization. For more information, see the *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

DMCC with Call Control Services - checklist

Use this checklist if you are administering DMCC with Call Control Services.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72.	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Networking > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324. **Important:** If you have a Release 3.0 DMCC application, see Enabling DMCC server ports for DMCC applications developed prior to AE Services 3.1 on page 73.	

Table continues…

#	Description	Notes	✔
4	**Communication Manager Interface > Switch Connection**	Required. The Transport Layer is used. See Adding a switch connection on page 77.	
5	**CTI Link Admin**	Required (you must add a TSAPI Link). Applications that use DMCC with Call Control rely on the TSAPI Service. See Administering TSAPI Links on page 88.	
6	**AE Services > DMCC Configuration**	Optional. You can use the default media properties. See Setting DMCC Media Properties on page 90.	
7	**Security > Security Database**	Optional. If you are using the AE Service Security Database for controlling device access you must administer the TSAPI Configuration settings. See Chapter 6: The Security Database on page 216.	
8	**Security > Enterprise Directory**	Optional. If you are using an external LDAP directory you will need to use the Enterprise Directory Configuration page. For more information, see Enterprise Directory settings in the AE Services Management Console on page 194.	
9	**Security > Certificate Management**	Optional. if you are using link encryption, you must set up certificates. For more information, see Certificate management on page 101.	
10	**Security > Host AA**	Not applicable if you are not using encryption. It is optional if you are using link encryption. The DMCC service can be set up to provide far-end client authentication and authorization. For more information, see the *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

TSAPI (including JTAPI) - checklist

Use this checklist if you are administering AE Services for TSAPI or JTAPI applications. AE Services JTAPI is a client side interface to the TSAPI service, and, as such it provides third party call control.

Note:

AE Services provides the option of encrypted TSAPI links. If you are administering the TSAPI service for encrypted TSAPI links, you will need to administer the TSAPI links as encrypted. If you use encrypted links you will need to administer certificates.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72.	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Networking > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324.	
4	**Communication Manager Interface > Switch Connection**	Required. The Transport Layer is used. See Adding a switch connection on page 77.	
5	**CTI Link Administration**	Required (TSAPI Link). See Administering TSAPI Links on page 88.	
6	**TSAPI Configuration**	Optional. If you are using the AE Service Security Database for controlling device access you must administer the TSAPI Configuration settings. See Chapter 6: The Security Database on page 216.	
7	**Security > Security Database**	Optional. If you are using the AE Service Security Database for controlling device access you must administer the TSAPI Configuration settings. See Chapter 6: The Security Database on page 216.	
8	**Security > Enterprise Directory**	Optional. If you are using an external LDAP directory you will need to use the Enterprise Directory Configuration page. For more information, see Enterprise Directory settings in the AE Services Management Console on page 194.	
9	**Security > Certificate Management**	Optional. if you are using link encryption, you must set up certificates. For more information, see Certificate management on page 101.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

Telephony Web Services - checklist

When you administer AE Services for Telephony Web Services applications, you must add a TSAPI link. Use this checklist if you are administering AE Services for Telephony Web Services applications.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72.	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Networking > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324.	
4	**Communication Manager Interface > Switch Connection**	Required. See Adding a switch connection on page 77.	
5	**AE Services > TSAPI > TSAPI Link > Add TSAPI Links**	Required. You must add a TSAPI Link. See Administering TSAPI Links on page 88.	
6	**Security > Enterprise Directory**	Optional. For more information, see Enterprise Directory settings in the AE Services Management Console on page 194.	
7	**Security > Certificate Management**	Optional. if you are using link encryption, you must set up certificates. For more information, see Certificate management on page 101.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

System Management Service - checklist

When you administer AE Services for System Management Service applications, you must add a link to the Communication Manager host. Use this checklist if you are administering AE Services for System Management Service applications.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72.	

Table continues…

#	Description	Notes	✔
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74.	
3	**Network Configuration > Ports**	Optional. You can use the default settings. **Note:** If you have a firewall, you might need to change these settings. See TCP ports and firewall settings on page 324.	
4	**SMS Configuration**	Required. See SMS Configuration on page 306.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

AE Services integration for Microsoft Lync Server 2010 and 2013 - checklist

When you administer AE Services for Microsoft Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync Server 2010 and 2013, you must add a TSAPI link.

Use this checklist to plan and monitor your administrative tasks.

#	Description	Notes	✔
1	**Networking > Network Configure**	Required. See Configuring network interface settings on page 72.	
2	**Networking > AE Services (Local IP)**	Required. Based on your AE Services configuration, see either of the following topics: • Administering The Local IP for a single NIC configuration on page 74. • Administering The Local IP for a dual NIC configuration on page 74	
3	**Networking > Ports**	Required. You must enable the TR87 LCS Port (4723). By default this port is disabled in the AE Services Management Console.	

Table continues…

#	Description	Notes	✔
4	**AE Services > DMCC Configuration**	Not applicable.	
5	**Communication Manager Interface > Switch Connection**	Required. The Transport Layer is used. See Adding a switch connection on page 77.	
6	**CTI Link Administration**	Required (TSAPI Link). See Administering TSAPI Links on page 88.	
7	**Security > Certificate Management**	Required. See the *Avaya Aura® Application Enablement Services Implementation Guide for Microsoft® Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync® Server 2010 and 2013*, 02-601893.	
8	**Communication Manager Interface > Dial Plan**	Required. See the *Avaya Aura® Application Enablement Services Implementation Guide for Microsoft® Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync® Server 2010 and 2013*, 02-601893.	
9	**Security > Enterprise Directory**	Required. See the *Avaya Aura® Application Enablement Services Implementation Guide for Microsoft® Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync® Server 2010 and 2013*, 02-601893.	
10	**Security > Host AA**	Optional. TR/87 applies to Microsoft Office Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync Server 2010 and 2013. Setting to “Authenticate Client Cert with Trusted Certs” preset (activated). Enable “Enforce Host Authorization” to have the TR/87 service check the CN in the client certificate and verify that it matches one of the administered authorized hosts.	

Related links

Checklists for administering the services that run on the AE Services server on page 59

Changing the date, time or the NTP server settings

About this task

Use the following procedure to either change the date and time of the AE Services server manually or to apply the NTP server settings to the AE Services server.

Procedure

1. On the AE Services management console main menu, click **Maintenance** > **Date Time/NTP Server**.
2. On the Date Time/NTP Server page, do one of the following:
   - Select the **NTP** check box to add or delete the **NTP server** and apply the NTP server settings to the AE Services server.
   - Clear the **NTP** check box to manually configure the date and time for the AE Services server in the **Date** and **Time** fields respectively.
3. In the **Time Zone** field, select the time zone for the AE Services server.
4. Click **Apply Changes**.

Related links

AE Services administration on page 53
Date Time/NTP Server field descriptions on page 71

Date Time/NTP Server field descriptions

Name	Description
NTP	The option to enable the NTP server. • Bundled server: If the NTP server is enabled during the installation, the check box is selected by default on the Date Time/NTP Server page. • Software Only server: The option is disabled by default on the Date / Time NTP Server page. From Release 7.x and later, AE Services does not support System Platform and bundled server offers.
NTP Server	The option to add or delete an NTP server. Type the name or IP address of an NTP server (remote time server). The name can be a hostname in the `hostname.example.com` format or the name of one of the default servers that RHEL uses on the Public NTP Server project for example, `0.rhel.pool.org`. You must use an explicit IPv4 address or an IPv6 address. Do not use an address that is in the combined IPv4 and IPv6 format. The field is available only when the **NTP** check box is selected.
Date	The current date in the MM DD YYYY format.

Table continues…

Name	Description
Time	The current time for the server. You can set the following value: • Hour [HH]: The current hour in the [HH] format based on the 24–hour clock. • Minute [MM]: The current minute of the hour.
Time Zone	The time zone in the Country/City format for the AE Services server.

Button	Description
Add	To add the name or IP address to the list of NTP servers. The field is available only when the **NTP** check box is selected.
Delete	To remove an NTP server. The field is available only when the **NTP** check box is selected.
Apply Changes	To apply the changes.
Cancel Changes	To cancel the changes.

Related links

Changing the date, time or the NTP server settings on page 70

Configuring network interface settings

About this task

Use this procedure to configure network interface settings. In this procedure, you must use an explicit IPv4 address or an IPv6 address. Do not use IPv4 mapped or a compatible IPv6 address that combines the IPv4 and IPv6 formats.

Procedure

1. On the AE Services Management Console main menu, click **Networking** > **Network Configure**.
2. In the **Physical IP Address** field, type or modify the IP address for each network interface.
3. In the **Netmask** field, type an appropriate netmask address for each network interface.
4. Select the **Enable** check box for each network interface.
5. Click **Apply Changes**.
6. On the **Apply Changes to Network Configure** page, click **Apply**.
7. Log in to the AE Services Management Console by using the new IP address of the AE Services server.

8. On the AE Services Management Console main menu, click **Networking** > **AE Services IP (Local IP)** and set the new IP addresses for Client Connectivity, Switch Connectivity, and Media Connectivity.
9. On the AE Services Management Console main menu, click **Maintenance** > **Service Controller**.
10. On the **Service Controller** page, click **Restart AE Server**.
11. Ensure that all the services are in the **Running** state, and that the connection state to the switches is functional.

    If you cannot access the AE Services Management Console, check the status of the httpd and tomcat processes. If they are not running, start them. For example:

    ```
    systemctl status httpd
    systemctl start httpd
    systemctl status tomcat
    systemctl start tomcat
    ```

Related links

AE Services administration on page 53

Enabling DMCC server ports for DMCC applications developed prior to AE Services 3.1

About this task

DMCC applications connect to a secure, encrypted port (4722) on the AE Server. The encrypted port is enabled by default.

Important:

If you have a DMCC application that was developed prior to AE Services 3.1 and it uses an unencrypted port, you must enable the unencrypted port (4721).

Procedure

1. From the AE Services Management Console main menu, select **Networking > Ports**.
2. From the **Ports** page, in the DMCC Server Ports section, locate the **Unencrypted Port** field, and select the option button for **Enabled**.

Related links

AE Services administration on page 53

Administering the Local IP for a single NIC configuration

About this task

Administering a Local IP refers to choosing the network interfaces that the AE Server uses for connectivity. For a single NIC configuration, it means that you will use one network interface for connectivity to Communication Manager and your clients. For more information, see Single NIC configurations on page 321.

Note:

If you are using CVLAN in combination with other services, see Administering network interfaces with CVLAN - using the Any network setting on page 76.

Note:

The **eth***N:IP address* setting refers to a specific network interface on the server. If your AE Server uses four network interfaces, it can refer to eth0, eth2, or eth3 The **Any** setting uses the wild card IP address (`0.0.0.0` if you are using IPv4 or `::` if you are using IPv6), which means that all services on the AE Server will listen on all interfaces.

Procedure

1. From the AE Services Management Console main menu, select **Networking > AE Service IP (Local IP)**.
2. From the **AE Service IP (Local IP)** page, complete the connectivity settings as follows:
    a. In the **Client Connectivity** field, select **eth***N:IP address* or **Any**.
    b. In the **Switch Connectivity** field, select **eth***N:IP address* or **Any**.
    c. In the **Media Connectivity** field, select **eth***N:IP address* or **Any**.
    d. In the **OAM Connectivity** field, select **eth***N:IP address* or **Any**.

    Note:

    For a summary of these settings, see Recommended AE Service IP (local IP) settings on page 76.

Related links

AE Services administration on page 53

Administering the Local IP for a dual NIC configuration

About this task

Administering a Local IP refers to specifying the network interfaces that the AE Server uses for connectivity. For a dual NIC configuration, it means that you will use two network interfaces. For more information, see Dual NIC configurations on page 322.

Note:

The **eth***N:IP address* setting refers to a specific network interface on the server. If your AE Server uses four network interfaces, it can refer to eth0, eth2, or eth3. For dual NIC configuration, one NIC is designated for client connectivity, and the other NIC is designated for switch connectivity. The **Any** setting uses the wild card IP address (`0.0.0.0` if you are using IPv4 or `::` if you are using IPv6), which means that all services on the AE Server will listen on all interfaces.

Procedure

1. From the AE Services Management Console main menu, select **Networking > AE Service IP (Local IP)**.
2. From the **AE Service IP (Local IP)** page, complete the connectivity settings as follows:
    a. In the **Client Connectivity** field, select **eth***N:IP address*.

       For a dual NIC configuration **eth***N:IP address* refers to the network interface that connects to the client (also referred to as the production network connection).

    b. In the **Switch Connectivity** field, select **eth***N:IP address*.

       For a dual NIC configuration **eth***N:IP address* refers to the network interface that connects to Communication Manager (also referred to as the private network connection).

    c. In the **Media Connectivity** field, select one of the following:

       - Select **eth***N:IP address* if you are administering AE Services for DMCC applications with media connectivity.
       - Select **Any** if you are administering AE Services for all other applications.

       Note:

       For a summary of these settings, see Recommended AE Service IP (local IP) settings on page 76.

    d. In the **OAM Connectivity** field, select one of the following:

       - Select **eth** *N:IP address* to restrict the OAM connectivity to the selected IP network.
       - Select **Any** to access OAM from all the networks.

       Note:

       For a summary of these settings, see Recommended AE Service IP (local IP) settings on page 76.

Related links

AE Services administration on page 53

Recommended AE Service IP (local IP) settings

Use the following recommendations for the AE Service IP (local IP) settings in the AE Services Management Console.

Note:

The **Any** setting uses the wild card IP address (`0.0.0.0` if you are using IPv4 or `::` if you are using IPv6), which means that all services on the AE Services Server will listen on all interfaces, or in the case of a single NIC, one interface.

	Single NIC	Dual NIC
Client connectivity (production network)	**eth0:***IP address* or **Any**	**eth0:***IP address*
Switch connectivity (private network)	**eth0:***IP address* or **Any**	**eth2:***IP address* or **eth3:***IP address*
Media Connectivity	**eth0:***IP address* or **Any**	**eth0:***IP address* or **Any** • Use **eth0:***IP address* for DMCC applications with media connectivity. • Use **Any** for all other applications (TSAPI, JTAPI, DMCC with Call Control, Web Services, CVLAN, and DLG).
OAM Connectivity	**ethN:***IP address* or **Any**	**eth0:***IP address* or **Any** • Use **ethN:***IP address* to restrict the OAM connectivity to the selected IP network. • Use **Any**to access OAM from all the networks.

Related links

AE Services administration on page 53

Administering network interfaces with CVLAN - using the Any network setting

About this task

Use this procedure to use the **Any** setting for client connectivity.

The `/etc/hosts` file must contain the IP address of the host computer on which the CVLAN clients are on.

Procedure

1. Log in as root user.

2. On the command line interface run the following command:

   ```
   uname -n
   ```

   Linux displays the network node hostname which refers to the AE Server name, for example **aeserver1**. Make a note of the AE Server name.

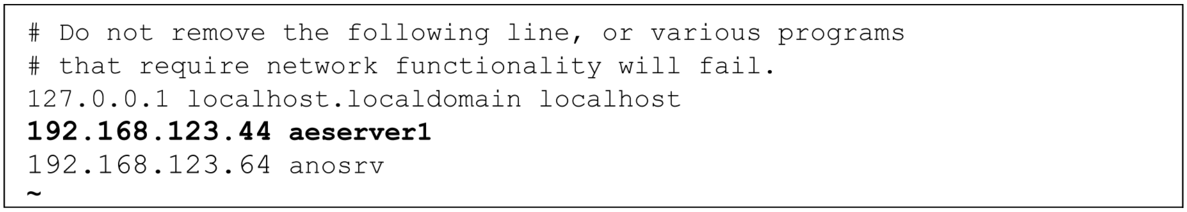
3. Type `ifconfig eth0` to get the IP address of the host (this assumes that you are using eth0 for client connectivity).

   Make a note of the IP address of the AE Server. For example, **inet addr: 192.168.123.44**.

4. Use a text editor to open the **/etc/hosts** file.

   Make sure that the **/etc/hosts** file contains the AE Server name along with its IP address (see the figure on page 77).

5. If the **/etc/hosts** file does not contain this AE Server name and IP address entry, add it to the file.



```
# Do not remove the following line, or various programs
# that require network functionality will fail.
127.0.0.1 localhost.localdomain localhost
192.168.123.44 aeserver1
192.168.123.64 anosrv
~
```

Figure 25: sample /etc/hosts file

Related links

AE Services administration on page 53

Adding a switch connection

About this task

You must administer a switch connection for all applications except DMCC applications that use device and media control.

If you have a DMCC application that uses device and media control, and you want to administer a switch connection to use the gatekeeper feature, see Administering switch connections for DMCC applications that use Registration Services -- assigning H.323 IP addresses.

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface > Switch Connections**.

2. On the **Switch Connections** page, in the **Add Connection** field, type a switch connection name (for example, `Switch1`).

   The switch connection name can be any name you want to use, but it must consist of alphanumeric characters.

3. Click **Add Connection**.
4. On the **Connections Details** page, do the following:
    a. In the **Switch Password** field, type the password that the Communication Manager administrator assigned when the node name of the AE Services Server on the IP-Services form was administered. For more information, see Enabling AE Services.

    b. In the **Confirm Switch Password** field, retype the password.

    c. In the **Msg Period** field, accept the default (30 minutes).

    d. For the **Provide AE Services certificate to switch** check box, do one of the following:

    - For Communication Manager Release 6.3.6 or later, accept the default (check box is checked).

      Ensure that the Communication Manager recognizes the Certificate Authority used by the AE Services certificate.
    - For any previous release of Communication Manager, clear the **Provide AE Services certificate to switch** check box.

    e. For the **Secure H323 Connection** check box, do one of the following:

    - For Communication Manager Release 6.3.6 or later and TLS for the H.323 Signaling Channel (generally associated with FIPS Mode), select the **Secure H323 Connection** check box.
    - For any previous release of Communication Manager without TLS for the H.323 Signaling Channel, clear the **Secure H323 Connection** check box.

      For information about Communication Manager media servers that support a Processor Ethernet connection, see Enabling AE Services.

    f. Select the **Processor Ethernet** check box, if you are using a processor Ethernet connection.

    g. Select **Enable TLS Certificate Hostname Validation** to enable the hostname validation between Communication Manager and AE Services for a CTI connection.

    The **Enable TLS Certificate Hostname Validation** field is accessible only if the **Processor Ethernet** field is selected.

    Note:

    Enable TLS Certificate Hostname Validation is available from Release 8.1.3 and later.

    From AE Services Release 8.1.3 onwards, support for Communication Manager hostname validation has been added to validate the Communication Manager hostname in a Communication Manager server identity certificate. Enabling Hostname Validation feature allows AE Services to validate the **Subject Alternate Name** or **Common Name** field of the Communication Manager identity certificate with the Communication Manager hostname during a TLS connection. If the validation fails, the TLS connection will be dropped.

Note:

Avaya recommends that you use **Subject Alternate Name(SAN)** in place **Common Name(CN)** while configuring certificates because the support for **Common Name(CN)** will be removed from the future releases.

h. Click **Apply**.

AE Services adds the switch connection and returns you to the **Switch Connections** page. The new switch connection name appears in the **Connection Name** column.

Related links

AE Services administration on page 53
Connection Details - connection name field descriptions on page 79
Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses on page 80
Enabling AE Services on page 26
Logs on page 126
Viewing log files on page 127
Downloading log files on page 127
About rsyslog on page 133

Connection Details - connection name field descriptions

Connection Name	Field Descriptions
Switch Password	The password for the switch connection. The password: • Can consist of 12 to 16 alphanumeric characters. • Cannot contain special characters.
Confirm Switch Password	The copy of the password.
Msg Period	The time interval in minutes for measuring message traffic. The **Msg Period** value range is 1 through 72.
Provide AE Services certificate to switch	Specifies whether the AE Services certificate is provided for the switch connection.
Secure H.323 Connection	The switch uses a secure H323 connection.
Processor Ethernet	The switch has a Processor Ethernet connection.

Table continues…

Connection Name	Field Descriptions
Enable TLS Certificate Hostname Validation	Enables the hostname validation between Communication Manager and AE Services for a CTI connection. The **Enable TLS Certificate Hostname Validation** field is accessible only if the **Processor Ethernet** field is selected. **Note:** **Enable TLS Certificate Hostname Validation** is available from Release 8.1.3 and later.

Button	Description
Apply	To apply the changes.

Related links

Adding a switch connection on page 77

Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses

About this task

When you are administering AE Services for DMCC applications that use Registration Services, you have the option of using H.323 Gatekeepers when you administer a switch connection.

If you want to use the round-robin assignment of IP addresses to softphones based on a Switch Connection name (highly recommended), then set up a Switch Connection and use the H.323 Gatekeeper feature to associate a list of H.323 Gatekeepers (GKs) with the Switch Connection name. Only the IP addresses of the CLANs in the appropriate network region should be included in the H.323 GK list. The Processor Ethernet (PE) IP address of the Main CM is automatically included as a gatekeeper if the address is entered in the **Edit Processor Ethernet IP** page.

Caution:

The Processor Ethernet IP addresses of any ESS or LSP servers must not be included in the GK list. The PE IPs of ESS or LSP servers should only be included in the Survivability Hierarchy list.

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface** > **Switch Connections**
2. From the **Switch Connections** page, select the connection name you want to associate with the H.323 Gatekeeper .
3. Click **Edit H.323 Gatekeeper**.

4. On the **Edit H.323 Gatekeeper** page, in the **Add Name or IP** field, type the host name or IP address of the TN799DP CLAN you want to use.

   Note:

   You must use either an explicit IPv4 address or an IPv6 address. Do not use an IPv4-mapped/compatible IPv6 address that combines the IPv4 and IPv6 formats.

   Do not add the Processor Ethernet IP addresses of any ESS or LSP servers to the H.323 Gatekeeper list. The PE IPs of the ESS or LSP servers should only be included in the Survivability Hierarchy list

5. If you are adding multiple H.323 Gatekeepers (TN799DP CLANs), repeat Step 4 for each H.323 Gatekeeper.

   When you add multiple H.323 Gatekeepers for a switch connection, each host name or IP address is added as the last item in the name or IP address list.

Related links

AE Services administration on page 53
Enabling AE Services on page 26
Logs on page 126
Viewing log files on page 127
Downloading log files on page 127
About rsyslog on page 133

Editing CLAN IPs

About this task

After you add a switch connection, you must associate the switch name with a CLAN host name or IP address. Use this procedure when you are setting up a switch connection with a Communication Manager media server that uses a CLAN connection to AE Services. If you are setting up a switch connection to a Communication Manager media server that uses a Processor Ethernet connection, see Editing a Processor Ethernet name or IP address on page 82.

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface > Switch Connections**.
2. On the **Switch Connections** page, select the connection name you just added (for example, **Switch1**).
3. Click **Edit PE/CLAN IPs**.

   Skip this step if you use Device, Media, and Call Control without Call Information Services.
4. In the **Add Name or IP** field, type the host name or IP address.

Note:

You must use either an explicit IPv4 address or an IPv6 address. Do not use an IPv4-mapped/compatible IPv6 address that combines the IPv4 and IPv6 formats.

5. Click **Add/Edit Name or IP** of the CLAN or the TN799DP CLAN.
6. For systems with multiple TN799DP CLANs, repeat Steps 4 and 5 for each TN799DP CLAN.

   When you add multiple TN799DP CLANs for a switch connection, each host name or IP address is added as the last item in the name or IP address list.

Related links

AE Services administration on page 53

Editing a Processor Ethernet name or IP address

About this task

After you add a switch connection, you must associate the switch connection name with the Processor Ethernet host name or IP address. Use this procedure to edit a Processor Ethernet name or IP address.

Procedure

1. On the AE Services Management Console, navigate to **Communication Manager Interface** > **Switch Connections** .
2. On the Switch Connections page, select the connection name that you want to edit.
3. Click **Edit PE/CLAN IPs**.
4. Choose a processor ethernet.
5. On the Add/Edit Processor Ethernet IP page, in the **Add/Edit Name or IP** field, type the host name or the IP address of the Processor Ethernet.

   You must use either an IPv4 address or an IPv6 address. Do not use an IPv4 mapped or compatible IPv6 address that combines the IPv4 and IPv6 formats.
6. Click **Add/Edit Name or IP**.

Related links

AE Services administration on page 53

Adding Communication Manager High Availability information

About this task

After you have associated a CLAN or Processor Ethernet host name or IP address with the switch connection, you may optionally populate the Survivability Hierarchy list. If your Communication Manager High Availability configuration employs the use of an Enterprise Survivable Server (ESS or survivable core server) or a Local Survivable Processor (LSP or survivable remote server), the ESS or the LSP should be added to the hierarchy. The Survivability Hierarchy list specifies the precedence of ESS or LSP nodes within the selected switch connection.

Procedure

1. From the AE Services **Management Console** main menu, select **Communication Manager Interface** >**Switch Connections**.
2. From the **Switch Connections** page, select the switch connection name you just added, for example, Switch2.
3. Click **Survivability Hierarchy**
4. On the **Survivability Hierarchy** page, if you want to allow the main Communication Manager server to take over as soon as it is online, uncheck the **Remain connected to current active ESS/LSP when Main comes back online** box. The **Remain connected to current active ESS/LSP when Main comes back online** box is checked by default.
5. In the **Cluster ID/MID** field, type the cluster ID/MID of the new survivable node that you want to add to the **Survivability Hierarchy** table
6. Click **Append** to add the new cluster ID/MID to the bottom of the hierarchy, or click **Insert** to add the new cluster ID/MID above the selected existing cluster ID/MID in the table.

   Note:

   Inserting the new cluster ID/MID implies that all nodes at and below the selected entry will have their priorities changed in the **Survivability Hierarchy** table. The priority of each node will be increased by 1.
7. Ensure that the correct cluster ID/MID is selected and click **Edit PE IP**.
8. In the provided field, add host name or IP address of the Processor Ethernet associated with the ESS or LSP.
9. Click **Add/Edit Name** or IP to save host name or IP address.
10. Click **Back** to return to the **Survivability Hierarchy** page.
11. Repeat steps 5-10 for each ESS or LSP to be added to the Survivability Hierarchy for this switch connection.
12. Once all of the ESS and LSP servers have been added, click **Back** to return to the **Switch Connections** page.

Related links

AE Services administration on page 53

Checking the status of a switch connection from the AE Services server to Communication Manager

About this task

Use this procedure to check the status of a switch connection from the AE Services server to Communication Manager.

Procedure

1. On the AE Services Management Console, navigate to **Status** > **Status and Control** > **Switch Connections Summary**.
2. On the Switch Connections Summary page, select the switch connection that you just added.
3. Click **Connection Details**.
4. Review the information on the Connection Details page.
5. Verify that the connection is in the **Talking** state and the online or offline status of the connection is **Online**.

   ❗ **Important:**

   After you complete this procedure, check the status of the switch connection from Communication Manager to the AE Services server. For more information see, Checking the status of a switch connection -- from Communication Manager to the AE Services server on page 31.

Related links

AE Services administration on page 53

CVLAN implementation guidelines

When you are setting up CVLAN with AE Services, use the following guidelines based on your application requirements.

CVLAN applications and link management

Applications use separate links to avoid conflicts and control load. For example, by using two separate links you can avoid problems with two applications that register as routing servers.

When setting up a link, either a CVLAN link or a proprietary CVLAN link, bear in mind that only one application at a time can register as either a heartbeat server or a routing server. For more information about heartbeat messages and route requests, see the *Application Enablement Services CVLAN Programmer's Reference*, 02-300546.

Guidelines for setting up CVLAN links

To set up a CVLAN link that allows multiple clients (up to 60) to share the same CVLAN link (signal), follow these guidelines.

- On Communication Manager, administer the CTI link as ASAI-IP, as described in Administering a CTI Link for CVLAN on page 29.
- In the AE Services Management Console, administer the CVLAN link with the Proprietary setting disabled, as described in Administering CVLAN Links on page 85.
- In the AE Services Management Console, administer the CVLAN clients (up to 60) for a specific CVLAN link, as described in Adding CVLAN Clients on page 87.

Guidelines for setting up proprietary CVLAN links

- On Communication Manager, administer the CTI link as ADJ-IP, as described in Administering a CTI Link for CVLAN (internal applications) on page 29.
- In the AE Services Management Console, administer the CVLAN link with the Proprietary setting enabled. See Administering CVLAN Links on page 85.
- In the AE Services Management Console, administer only one CVLAN client for each CVLAN link. See Adding CVLAN Clients on page 87.

  AE Services provides proprietary links for Avaya applications. As a result, AE Services limits the way that proprietary links can be used. For example, AE Services allows only one proprietary link to be opened for one CVLAN client IP address.

Adding CVLAN Links

About this task

CVLAN links are used by external and internal applications. For example, Avaya Interaction Center is an internal application that uses CVLAN links.

By default, the CVLAN service does not start on the AE Services server until you administer the first CVLAN link. After you administer the first CVLAN link, verify that the CVLAN service is running.

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **CVLAN** > **CVLAN Links**.
2. Click **Add Link**.
3. In the **Signal** field, select a signal number.

   The signal number used by the CVLAN link and the CVLAN application must match.

   Prior to CVLAN R9 and AE Services 3.0, the range of CVLAN links was 1 through 8 instead of 1 through 16. If you select 9 through 16, ensure that your application is not configured to use only the signals 1 through 8.
4. In the **Proprietary** check box, perform one of the following:
   - Clear the **Proprietary** check box if the CVLAN link is for an external application.
   - Select the **Proprietary** check box if the CVLAN link is for an internal application.

   By default, the **Proprietary** check box is clear.
5. In the **Switch Connection** field, select a switch connection value.
6. In the **Switch CTI Link Number** field, select the switch CTI link number administered on Communication Manager for this CVLAN link.
7. In the **ASAI Link Version** field, select the highest ASAI link version that the CVLAN application can support.

   CVLAN supports ASAI link version from 1 through 10.

   The default value is 4.
8. In the **Heartbeat State** check box, do one of the following:
   - Select **Heartbeat State** to enable the setting to designate the CVLAN service as an ASAI heartbeat server.
   - Clear **Heartbeat State** to disable the setting to designate the CVLAN application as an ASAI heartbeat server.
9. Click **Apply Changes**.

   ⚠ **Warning:**

   > If you change the ASAI link version, all active clients might be dropped when you apply the changes.
10. On the Apply Changes to Link page, click **Apply**.
11. Restart the CVLAN service.

Ensuring the CVLAN service is running

About this task

After you administer the first (or only) CVLAN link, follow this procedure to make sure that the CVLAN service is running.

Procedure

1. From the AE Services Management Console main menu, select **Status > Status and Control > Services Summary**.
2. On the **Services Summary** page, confirm that **ONLINE** appears as the CVLAN service status. If a status other than **ONLINE** appears, do one of the following:
   - If the status is **STOPPED**, follow these steps:
     a. From the AE Services Management Console main menu, select **Maintenance > Service Controller**.
     b. From the **Service Controller** page, check the **CVLAN Service** check box .
     c. Click **Restart Service**.
   - If the status is **NO LICENSE**, you will need to install the CVLAN license (assuming you have acquired one).

Testing a CVLAN link

Procedure

1. From the AE Services Management Console main menu, select **Utilities > Diagnostics > AE Service > ASAI Test**.
2. On the **ASAI Test** page, select a link number.
3. Click **Test**.

   The **ASAI Test Result** page indicates whether the test succeeded or failed

Adding CVLAN clients

Procedure

1. From the AE Services Management Console main menu, select **AE Services > CVLAN > CVLAN Links**.
2. On the **CVLAN Links** page, select the signal (link) that you want to administer.
3. Click **Edit Client**.
4. On the **Edit Clients** page, in the **Add Client** field, type the IP address or host name of the CVLAN client.

Note:

You must use either an explicit IPv4 address or an IPv6 address. Do not use an IPv4-mapped/compatible IPv6 address that combines the IPv4 and IPv6 formats.

5. Click **Add Client**.
6. Repeat steps 4 and 5 for each client you want to add.

Adding DLG Links

About this task

DLG links are used by ASAI applications.

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **DLG** > **DLG Links**.
2. Click **Add Link**.
3. In the **Switch Connection** field, select a switch connection value.
4. In the **Switch CTI Link Number** field, select the switch CTI link number administered on Communication Manager for this DLG link.
5. In the **Client Hostname or IP** field, type the host name or IP address of the client application.

   You must use either an explicit IPv4 address or an IPv6 address. Do not use an IPv4-mapped/compatible IPv6 address that combines the IPv4 and IPv6 formats.
6. In the **Client Link Number** field, select the link number of the client application.
7. Click **Apply Changes**.
8. On the Apply Changes to Link page, click **Apply**.
9. Restart the DLG service.

Related links

AE Services administration on page 53

Adding TSAPI links

About this task

TSAPI links are used by TSAPI, JTAPI, Telephony Web Service, DMCC applications that use Call Control, and DMCC applications running with Logical Device feature services. TSAPI links are also used for the AE Services integration with Microsoft Lync Server.

You can administer one TSAPI link for each switch connection.

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **TSAPI** > **TSAPI Links**.
2. Click **Add Link**.
3. In the **Link** field, select the link number.
4. In the **Switch Connection** field, select a switch connection value.
5. In the **Switch CTI Link Number** field, select the switch CTI link number administered on Communication Manager for this TSAPI link.
6. In the **ASAI Link Version** field, select **10**.

   Link version 10 is only supported for Communication Manager 8.1 or 7.1.3.4 and later and AE Services 8.1 and later.
7. In the **Security** field, select one of the following:
   - **Unencrypted**: To use unencrypted client connections.
   - **Encrypted**: To encrypt client connections for this TSAPI link.
   - **Both**: To use both encrypted and unencrypted client connections.

   If you select the **Both** option, all TSAPI clients using the Encrypted Advertised TLINK require AE Services 4.1 or later.

   Any TSAPI clients using the Unencrypted Advertised TLINK can work with AE Services 4.1 or earlier versions.

   For the AE Services integration with Microsoft Lync, you must administer TSAPI links as encrypted. If your AE Services server supports other TSAPI applications in addition to the integration with Microsoft Lync, and some of those applications use unencrypted TSAPI links, you must administer TSAPI links with the **Both** setting.
8. Click **Apply Changes**.
9. On the Apply Changes to Link page, click **Apply**.
10. Restart the TSAPI service.

Related links

AE Services administration on page 53

Checking the status of a switch connection -- from Communication Manager to the AE Services server on page 31

Checking the status of a switch connection from the AE Services server to Communication Manager on page 84

Checklists for administering the services that run on the AE Services server on page 59

Setting Media Properties

About this task

If you use the DMCC service for media control, use the Media Properties page in the AE Services management console to change the default media properties.

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **DMCC** > **Media Properties**.
2. On the Media Properties page, review the default settings and make the necessary changes.
3. Click **Apply Changes**.
4. On the Apply Changes to Media Properties page, click **Apply**.
5. **(Optional)** Click **Restore Defaults** to restore the default settings.
6. Restart the DMCC service.

Related links

AE Services administration on page 53

Setting DMCC Station Properties

About this task

If you are using the DMCC service for media control, go to the Station Properties page in the AE Services management console to change the default station properties.

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **DMCC** > **Station Properties**.
2. On the Station Properties page, review the default settings and make the necessary changes.
3. Click **Apply Changes**.
4. On the Station Properties page, click **Apply**.
5. **(Optional)** Click **Restore Defaults** to restore the default settings.
6. Restart the DMCC service.

Related links

AE Services administration on page 53

Administering Auto Hold

About this task

Use this procedure to enable or disable the Auto Hold feature for Microsoft Office Communicator and Microsoft Lync clients. When you enable the Auto Hold feature, a Microsoft Office Communicator or Microsoft Lync client that is on an active call receives a notification or a pop-up when a new call arrives.

Procedure

1. On the Application Enablement Services management console, go to **AE Service** > **DMCC** > **Auto Hold Configuration**.
2. Do one of the following:
   - To enable the Auto Hold feature, select the **Auto Hold** check box.
   - To disable the Auto Hold feature, clear the **Auto Hold** check box.
3. Perform one of the following:
   - If you want AE Services to reject holdCall requests from Microsoft Lync and Microsoft Office Communicator clients, select the **Prevent Lync and Office Communicator clients from holding calls** check box.
   - If you want AE Services to accept holdCall requests from Microsoft Lync and Microsoft Office Communicator clients, clear the **Prevent Lync and Office Communicator clients from holding calls** check box.

   When this feature is enabled, users can only place calls on hold using the device.
4. Click **Apply Changes**.
5. On the Apply Changes to Auto Hold Configuration page, click **Apply**.

Related links

AE Services administration on page 53

TCP or TLS Settings

Transport Layer Security (TLS) is a protocol that ensures privacy between communicating applications and their users on the Internet. When a server and client communicate, TLS ensures that no third party may eavesdrop or tamper with any message.

Under the TCP/TLS Settings options, TLSv1 Protocol Configuration options are presented. The options are as follows:

- Support TLSv1.0 Protocol.
- Support TLSv1.1 Protocol.
- Support TLSv1.2 Protocol.

Only the TSL1.2 options is checked by default. If you are upgrading to AE Services 7.x.x and have client applications that based on AE Services Release 6.3.x or older and using TLS, you will be unable to connect.

Enable TLS1.0 and/or TLS1.1, to avoid the potential risk associated with selecting a non-compatible option.

Related links

AE Services administration on page 53

Administering the TCP retransmission count

About this task

Use this procedure to set the TCP retransmission count.

Important:

The TCP retransmission count setting applies to all TCP and TLS sockets on the AE Server.

Procedure

1. From the AE Services Management Console main menu, select **Networking >TCP Settings**.
2. On the TCP Settings page, perform one of the following steps:
    - If you want to set the TCP retransmission count to 15, click **Standard Configuration**. (This is the default setting.)
    - If you want to set the TCP retransmission count to 6, click **TSAPI Routing Application Configuration**.
3. Click **Apply Changes**.
4. On the Apply changes to TCP Retransmission Count page, click **Apply** to confirm your changes.

Related links

AE Services administration on page 53

Chapter 4: AE Services Secure Mode

AE Services secure mode

Federal Information Processing Standard Publication (FIPS) is the United States government specification to cover the levels of security in vendor products that are used by the Department of Defense or other government agencies. AE Services is based on the Red Hat Enterprise Linux (RHEL) operating system, and provides support for some of the recommendations as specified in FIPS Publication 140-2 for Security Level 1, including Annex A.

Important:

- You must perform all database backup or restore operations before switching to AE Services secure mode.
- After switching over to secure mode, first login to the AE Services server using the management console before accessing the command line interface.
- Once secure mode is enabled, Avaya does not recommend switching over to non-secure mode as some of the services might not function correctly. Reinstall is the recommended action.
- In secure mode, AE Services supports the account management only through the command line interface and not through the management console.
- In secure mode, AE Services does not support diagnostic tests using the management console (**Utilities** > **Diagnostics**).
- In secure mode, before configuring GRHA, the new Linux users that have been created on the primary server, must be created manually on the secondary server as well.
- Backup taken in non secure mode can only be restored on the AE Services server in non secure mode. Backup taken in secure mode can only be restored on the AE Services server in secure mode.

When AE Services secure mode is enabled, the following changes occur.

- The RHEL kernel is configured for kernel FIPS mode. In this mode, the kernel only uses FIPS approved ciphers. This change take effect after the server is rebooted.
- SSH is configured to use only FIPS approved ciphers.
- The Apache web server presents a valid identity certificate through a connecting browser or a client. The Apache web server known trusted root CA signs the identity certificate before the access to AE Services Management Console or Web Services is granted.
- The AE Services DMCC, TSAPI, and CVLAN requires a connecting client to present a valid identity certificate signed by a trusted root CA known by the respective AE Services before a TLS connection is allowed for service.

- The AE Services, DLG, is stopped.
- Non secure ports that is FTP (21) or DMCC (4721) are blocked by the firewall.
- All configured switch connections are updated to use the **Secure H323 Connection** option located on the Management Console screen, **Communication Manager** > **Switch Connections** > **Add/Edit Connection** . This option is used by DMCC to set the TLS authentication flag in the Gatekeeper Request (GRQ) message during a device registration process. After a successful Gatekeeper Confirmation (GCF) response is received, a TLS connection to Communication Manager is used for the signaling channel.

  Note:

  If Secure Mode with FIPS is not enabled on Communication Manager or if Communication Manager does not support Secure Mode with FIPS (Communication Manager versions prior to 6.3.6 and Communication Manager version 6.3.6 and later that do not have the FIPS template installed). The DMCC H323 device registration request is rejected by Communication Manager. For each switch connection where Communication Manager is not in FIPS mode, the system administrator will need to disable the **Secure H323 Connection** option for DMCC registration to succeed.
- DMCC media encryption is configured to only support the SRTP ciphers based on AES128-HMAC32 and AES128-HMAC80 for authenticated and unauthenticated mode.
- All configured switch connections are updated to use the **Provide AE Services certificate to switch** option located on the Management Console screen, **Communication Manager Interface > Switch Connections > Add/Edit Connection**. When Secure Mode with FIPS is enabled for the AE Services, it is expected that Communication Manager is also functioning in FIPS mode. While in the FIPS mode, Communication Manager is expected to request an identity certificate from any connecting client requesting service. In this case the client is AE Services. The first installed AE Services identity certificate associated with the alias cmtls, aeservices or server, respectively, is used as the identity certificate and sent to Communication Manager when requested.

  Note:

  If the switch connection is unable to be established, please verify that the CA certificate used to sign the AE Services identity certificate is in the Communication Manager trust store. In addition, verify that the CA certificate used to sign the Communication Manager identity certificate is in the AE Services trust store.

  When AE Services secure mode is disabled, the following changes will occur. Any changes made during the enable phase that is not reverted back to its previous state will need to be changed by the system administrator.
- The RHEL kernel FIPS mode will be disabled. This change will take effect after the server is rebooted.
- The Apache web server will not require a connecting browser/client to present an identity certificate.
- DMCC will be configured to support all the available media encryption ciphers used by the DMCC SDK.

Related links

AE Services command line utilities for standard and secure mode on page 95

Enabling AE Services secure mode on page 96

Disabling AE Services secure mode on page 96
Multifactor authentication on page 97
Certificate revocation configuration on page 98
Certificate revocation for multifactor authentication on page 99
Enabling or disabling certificate revocation by using OCSP on page 99

AE Services command line utilities for standard and secure mode

AE Services does not support the following utilities for Software-Only deployment.

Security attribute	Description	Standard profile	Hardened profile	Command
Set TLS versions	To enable or disable TLS versions 1.0 1.1, and 1.2 You can also set the TLS versions using the AE Services management console.	Yes	Yes	`setTLSviaCLI [enable|disable] [1.0,1.1,1.2]`
SELinux	To set the SELinux mode of RHEL.	Disabled	Enforced	`setSELinux [enforce|permissive|disable|status]`
Kernel FIPS	To enable or disable FIPS mode for Kernel.	Disabled	Enabled	`kernelFIPSmode [on|off|status]`
Database Auditing	To enable or disable the auditing of database actions.	Manual Enablement	Manual Enablement	`DBAudit [enable|disable|status]`
Tripwire (File Tampering Prevention)	To reconfigure Tripwire properties. You can also configure Tripwire properties using the AE Services management console.	Manual Enablement	Manual Enablement	`setTripwire [reconfigure|status]`

Related links

AE Services secure mode on page 93

Enabling AE Services secure mode

About this task

Use this procedure to enable AE Services secure mode for FIPS.

The Apache web server requires a connecting browser or client to present a valid identity certificate. The identity certificate must be signed by a trusted root CA known by the Apache web server. Only after the identity certificate is signed you can access the AE Services Management Console or web services.

Before you begin

- Ensure that your browser is properly configured with an identity certificate.
- Ensure that The root CA certificate used to sign the identity certificate is imported into the AE Services server

Procedure

1. On the command line prompt, run the following command:

   ```
   /opt/mvap/bin/aesvcsSecureMode on
   ```

2. Enter relevant answers to the questions that follow.
3. After all the changes are successfully applied, reboot the server complete the process.

Related links

AE Services secure mode on page 93

Disabling AE Services secure mode

About this task

Use this procedure to disable AE Services secure mode for FIPS.

Procedure

1. On the command line interface, run the following command:

   ```
   /opt/mvap/bin/aesvcsSecureMode off
   ```

2. Enter relevant answers to the questions that follow.
3. After all the changes are successfully applied, the server is rebooted to complete the process.

Related links

AE Services secure mode on page 93

Multifactor authentication

The multifactor authentication is a two factor authentication process on the AE Services server. AE Services activates multifactor authentication when configured in the secure mode.

For AE Services management console, the required credentials are:

- Certificate authentication
- Password associated with the certified user

For AE Services command line interface, the required credentials are:

- Certificate authentication
- Username of the certified user

Related links

AE Services secure mode on page 93
Enabling multifactor authentication on page 97
Disabling multifactor authentication on page 98

Enabling multifactor authentication

About this task

Use this procedure to enable multifactor authentication. AE Services enables multifactor authentication when configured in a secure mode.

Before you begin

Before you enable multifactor authentication, ensure the following:

- Ensure that your web browser is configured with the identity certificate.
- Create Root CA certificate and client certificate. See, Using OpenSSL as a Certificate Authority (CA) to generate signed certificates on page 367.
- The root CA certificate used to sign the identity certificate is imported into the AE Services server using the Management Console screen.
- On the web browser, import the client certificate. Note that, if you do not install certificates, enabling secure mode fails.
- Using the command line interface, create another root user on the AE Services server with same user name as on the client certificate.

Procedure

1. On the AE Services server command line interface, run the following command:

   ```
   /opt/mvap/bin/enableMFA on
   ```

2. When the system prompts, enter the required parameters.

   After the completion of the process, the server reboots for changes to take effect.

3. In the secure mode, log in first using the management console before logging in to the command line interface.

Do not use the default user name created during the deployment process.

Related links

Multifactor authentication on page 97

Disabling multifactor authentication

About this task

Use this procedure to disable multifactor authentication. AE Services disables multifactor authentication when the secure mode is disabled.

Procedure

1. On the command prompt, run the following command:

   ```
   /opt/mvap/bin/enableMFA off
   ```

2. When the system prompts, enter the required parameters.

   After the completion of the process, the server reboots for changes to take effect.

Related links

Multifactor authentication on page 97

Certificate revocation configuration

The AE Services supports certificate revocation configuration. The certificate revocation configuration is applicable for DMCC, TSAPI, and CVLAN client provided certificate validation and revocation check occurring on AE Services server.

Related links

AE Services secure mode on page 93

Certificate revocation configuration field descriptions on page 98

Certificate revocation configuration field descriptions

Name	Description
Certificate Revocation Validation	Specifies the validation method for revocation check on the certificate. The options are: • NONE: No revocation check. • BEST_EFFORT: Revocation check will be performed. Fails revocation check only if the certificate is REVOKED. • MANDATORY: Revocation check will be performed. Allows revocation check only if the certificate is GOOD.
OCSP Local URI	Specifies local OCSP Responder URI. This field is mandatory if the **OCSP URI Preference** field is set to **Local**.

Table continues…

Name	Description
OCSP URI Preference	Specifies which OCSP Responder URL is used first for revocation check. • CERT: From the certificate AuthorityInfoAccess extension. • LOCAL: From OCSP Local URI.

Related links

Certificate revocation configuration on page 98

Certificate revocation for multifactor authentication

When AE Services is configured in secure mode, AE Services enables multifactor authentication and provides ability to enable certificate revocation check for client provided certificates.

When certificate revocation check is enabled, AE Services sever checks the revocation status of client provided certificates using Online Certificate Status Protocol (OCSP) responder either provided in Certificate Authority Information Access (AIA) Extension or OCSP responder URL provided during configuration.

If client certificate is REVOKED or OCSP responder URL is unreachable or incorrect, AE Services rejects the secure connection request to AE Services OAM and the user cannot connect to the OAM interface.

If client certificate if GOOD, AE Services allows the secure connection request to the OAM interface and the user can connect to the OAM interface. Revocation check on client certificate is performed every time when new session request is created with the OAM interface.

Related links

AE Services secure mode on page 93

Enabling or disabling certificate revocation by using OCSP

About this task

Use this procedure to enable or disable the certificate revocation check for multifactor authentication. When configured in secure mode, AE Services provides an ability to enable certificate revocation check for client certificates.

Before you begin

Ensure the following:

- The OCSP responder is available from which the certificate revocation status can be obtained.
- The OCSP responder URL is provided in the certificate AIA extension or during the certificate revocation check for MFA configuration.
- The OCSP responder is running on Port 80, when secure mode is configured on AE Services.

Procedure

1. To enable the certificate revocation check, run the following command on the command line interface:

   ```
   mfaOCSPCheck enable
   ```

2. To disable the certificate revocation check, run the following command on the command line interface:

   ```
   mfaOCSPCheck disable
   ```

3. To check the status of a certificate revocation check, run the following command on the command line interface:

   ```
   mfaOCSPCheck status
   ```

Related links

AE Services secure mode on page 93

Chapter 5: Certificate Management

Certificate management

Install your own certificates signed by either your own PKI infrastructure or a third party PKI vendor. If such resources are not available immediately, use the temporary AE Services server self-signed certificate. It should be noted that this self-signed certificate is valid for only 1 year. It is expected that you deploy your own certificates before this certificate expires.

Note:

Do not use the default server certificates in a production environment.

For an upgrade from a previous AE Services 5.x or 6.x release to AE Services 7.x and later, any customer application relying on the old, Avaya provided server certificate for TLS will not be able to connect to the AE Services Release 7.x and 8.x server. If you have been using these certificates in a production environment, we strongly recommend that you prepare and execute a rollout plan, as soon as possible, to update your client applications and AE Services server with your own certificates.

Avaya strongly encourages customers to create this certificate prior to upgrading to the AE Services 8.x.

AE Services supports only one AE Services server certificate. Do not upload multiple third party server certificate on AE Services server.

Note:

For any AE Services release, where the installed AE Services server certificate has been replaced with a customer provided certificate, the client/server TLS connection will not be affected by the aforementioned certificate expiration or replacement.

Possible customer options to create the new AE Services server certificate:

- Use your own Private Key Infrastructure (PKI).
- Use Avaya Aura's System Manager (SMGR) Trust Management PKI feature. See System Manager Trust Management in Appendix H.
- Use an Open Source PKI , for example EJBCA. Avaya does not endorse or require the use of this product or vendor. You may use any product or vendor of your choosing.
- Use a third party vendor , for example Verisign. Avaya does not endorse or require the use of this product or vendor. You may use any product or vendor of your choosing.
- Use OpenSSL to create your own Certificate Authority (CA). See the OpenSSL section in Appendix I.

If for some reason none of the above options fit your immediate need, please contact Avaya Services for additional assistance.

Note:

Avaya recommends that you use **Subject Alternate Name(SAN)** in place **Common Name(CN)** while configuring certificates because the support for **Common Name(CN)** will be removed from the future releases.

Overview of certificate management

This overview of certificate management is provided to help you understand the role of the AE Services administrator in terms of managing certificates and to explain some basic concepts about certificates. Two key concepts are server authentication and client authentication.

Server authentication

This section describes the server authentication process. This procedure is the same if you use certificates issued by a trusted in-house or third-party certificate authority — referred to as using your own certificates, or if you use the default certificate installed by AE Services.

1. The client sends a request to the server for a secure session
2. The server sends its server certificate to the client.
3. The client checks the server certificate to determine the following:
    a. If the server certificate is issued by a certificate authority that the client trusts. The client checks the name of the CA. To comply, the name of the certification authority (CA) on the certificate must match the name of the CA on the client’s trusted certificate.

    b. If the server certificate is within its validity window. The client checks to see if the current time falls between the Not Before and Not After dates in the server certificate.

    c. If the common name in the server certificate matches the name of the server to which the client is connected. If the names do not match, the client can not trust the certificate.

When all the security checks are satisfied the client and server can exchange secure messages.

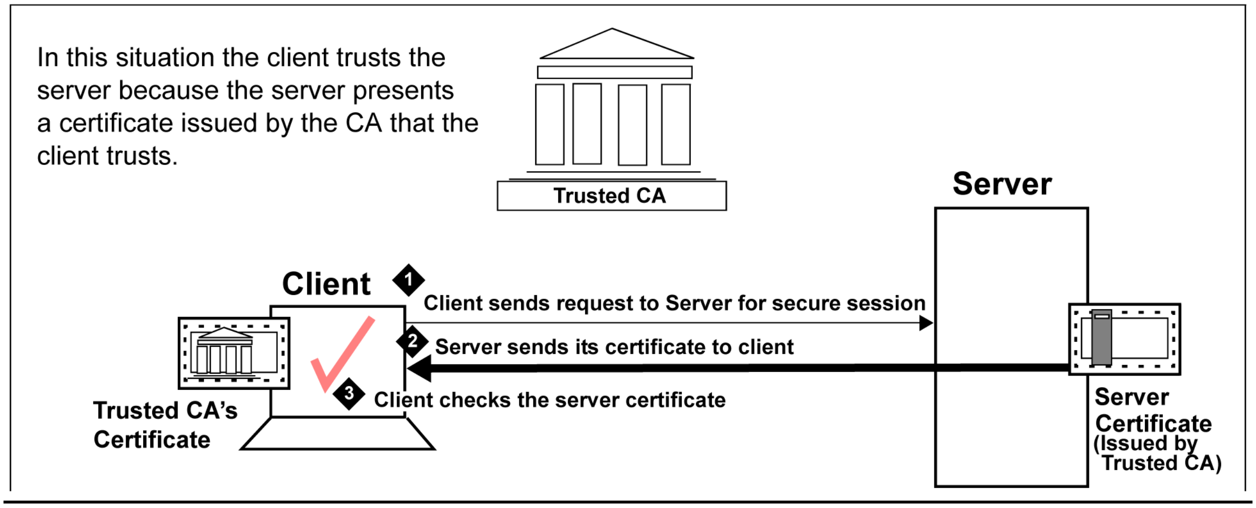

In this situation the client trusts the server because the server presents a certificate issued by the CA that the client trusts.
Trusted CA
Server
Client
1
Client sends request to Server for secure session
2
Server sends its certificate to client
3
Client checks the server certificate
Trusted CA's Certificate
Server Certificate (Issued by Trusted CA)

Figure 26: Server authentication

Client authentication

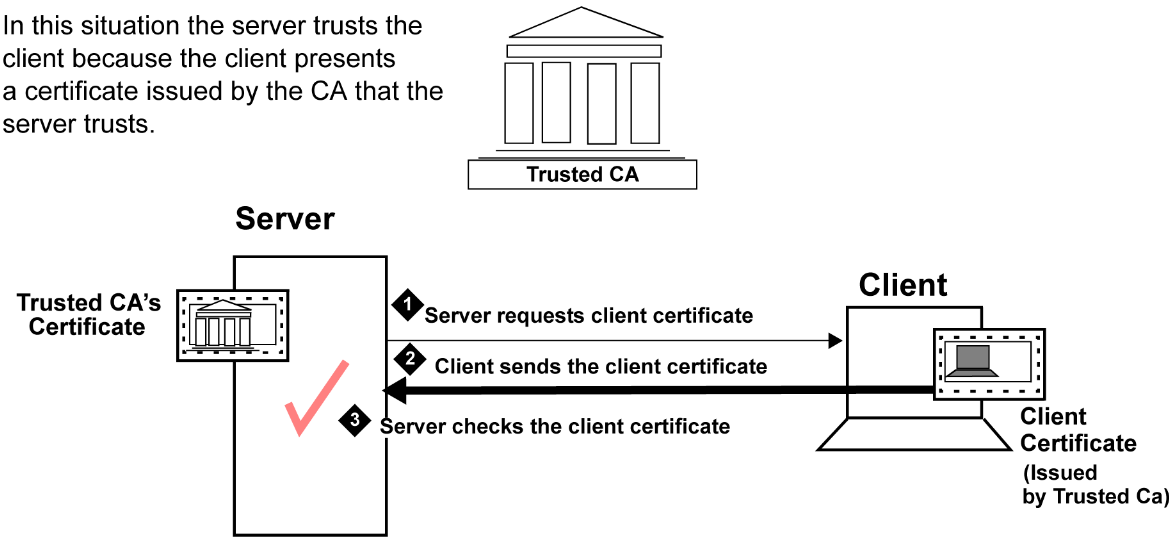
Client authentication is similar to server authentication, except that the roles are reversed. In the case of client authentication the server asks the client to provide the client certificate.

The process of client authentication occurs on the server, as follows:

1. The server sends a request to the client asking for the client certificate.
2. The client sends the client certificate to the server.
3. The server checks the client certificate to determine the following:
    a. If the client certificate is issued by a certificate authority that the server trusts. The server checks the name of the CA. To comply, the name of the certification authority (CA) on the certificate must match the name of the CA on the server's trusted certificate.

    b. If the client certificate is within its validity window. The server checks to see if the current time falls between the Not Before and Not After dates in the client certificate.

When all the security checks are satisfied the client and server can exchange secure messages.



In this situation the server trusts the client because the client presents a certificate issued by the CA that the server trusts.

Trusted CA
Server
Trusted CA's Certificate
1 Server requests client certificate
2 Client sends the client certificate
3 Server checks the client certificate
Client
Client Certificate
(Issued by Trusted Ca)

Figure 27: Client Authentication

The AE Services default certificate

You can use the default certificates installed by AE Services in your lab environment if you have not installed your own certificates.

Note:

- AE Services installs a default certificate. You can delete the default certificate. But please install a third party certificate for AE Services to be able to continue using secure links. If no certificates are present, you can use only non-secured links.
- The AE Services server comes pre-installed with a set of default server certificates for lab use. These default server certificates should not be used in a production environment. It is highly recommended to replace all default installed certificates. See Certificate enrollment and installation on page 105. See Certificate management on page 101 to understand the certificate change and expiration policies.

The default server certificate (serverCert.pem) is located as follows:

```
/etc/opt/avaya/certs/private/serverCert.pem
```

Also, by default the AE Services client installation programs for DMCC, TSAPI, JTAPI, and CVLAN install the Avaya Product CA certificate on the client computer. Information about managing certificates on the clients is provided in the following documents.

- *Avaya Aura® Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide*, 02-300543
- *Avaya Aura® Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359
- *Avaya Aura® Application Enablement Services — Device, Media and Call Control .NET API Programmer's Guide* 102-602658
- *Avaya Aura® Application Enablement Services JTAPI Programmer's Guide*, 02-603488

Note:

The default configuration for DMCC, TSAPI, JTAPI, and CVLAN, requires no AE Services Management Console administration. The AE Services Certificate Management pages apply only if you are using your own certificates.

AE Services Server authentication and the AE Services Management Console

The AE Services Management Console relies on two software programs, Apache and Tomcat, which require certificates. By default, Apache and Tomcat use a self-signed certificate, which is different from the AE Services server certificate.

Note:

For production environment, it is highly recommended to replace the Apache and Tomcat default installed lab server certificate. See Certificate enrollment and installation on page 105.

Using certificates issued by a certificate authority

If you use certificates issued by a trusted in-house or third-party certificate authority, the AE Services Certificate Management Web pages provide you information to manage these certificates.

Certificate enrollment and installation

If you use your own certificates, AE Services supports both manual and automatic enrollment of certificates.

Overview of manual enrollment

The manual process requires you to manually carry out steps for obtaining and installing certificates. You submit a request to a CA, handle the receipt of the certificates, and then install the certificates. User intervention is required for each task. The Manual method includes the steps described in Checklist for manual enrollment - server authentication on page 105.

Checklist for manual enrollment - server authentication

#	Description	Notes	✔
1	Install the Trusted CA's Certificate on client computer.	Browser - (not in the AE Services Management Console). The client user performs this procedure on the computer that the client is installed on.	

Table continues…

#	Description	Notes	✔
2	Create a server certificate request for AE Services	AE Services Management Console - See Creating a server certificate signing request for the AE Services server on page 112.	
3	Create an AE Services server certificate.	Browser - See Creating a server certificate for AE Services (generic procedure) on page 117.	
4	Import the server certificate into AE Services.	AE Services Management Console - See Importing the server certificate into AE Services on page 118.	

Overview of automatic enrollment

Automatic enrollment refers to using SCEP (Simple Certificate Enrollment Protocol) certificates. The automatic enrollment process does not require as much administrative intervention as manual enrollment.

With automatic enrollment, you complete the SCEP parameter information on the **Add Server Certificate** page. When you click **Apply** on the **Add Server Certificate** page, AE Services submits the request to the SCEP server. The AE Services Management Console tasks for the SCEP method are described in Checklist for automatic enrollment using SCEP on page 107.

Checklist for automatic enrollment using SCEP

#	Description	Notes	✔
1	Create a server certificate request (CSR) for AE Services	You are submitting the Certificate Request (CSR) to the CA's SCEP Server for signing. • On successful execution of the SCEP command, AE Services receives the signed server certificate from the SCEP server. AE Services saves the certificates repository automatically. • In addition to the server certificate, the CA's public certificate is also added to the Trusted Certs repository (if it does not exist already). • After successful completion of the SCEP command, the server certificate and its private key are bundled into PKCS#12 file. The java key store (JKS) is updated, and the CSR is deleted. **Note:** If for some reason, the SCEP command fails, then the CSR is still available and will be listed in the Pending Certificates page. You can choose automatic or manual enrollment for the pending certificates at a later time. See Creating a server certificate signing request for the AE Services server on page 112.	
2	Create an AE Services server certificate.	Browser - See Creating a server certificate for AE Services (generic procedure) on page 117.	
3	Import the server certificate into AE Services.	AE Services Management Console - See Importing the server certificate into AE Services on page 118.	

Checklist for installing your own certificates - server authentication

If you are installing your own certificates, and you use server authentication, make sure that the Trusted CA's certificate is installed on the client computer.

#	Description	Notes	✔
1	(Client) Install the Trusted CA's Certificate on client computer.	Browser - (Client web browser as opposed to the AE Services Management Console). The client user performs this procedure on the computer that the client is installed on.	

Table continues…

#	Description	Notes	✔
2	Create a server certificate request for AE Services	AE Services Management Console - See Creating a server certificate signing request for the AE Services server on page 112.	
3	Create an AE Services server certificate.	Browser - See Creating a server certificate for AE Services (generic procedure) on page 117.	
4	Import the server certificate into AE Services.	AE Services Management Console - See Importing the server certificate into AE Services on page 118.	

Checklist for installing your own certificates - client authentication

#	Description	Notes	✔
1	Install the Trusted CA's certificate on the AE server	AE Services Management Console. See the following topics: • Obtaining a trusted certificate for the AE Server on page 109 • Importing The trusted certificate into AE Services on page 111.	
2	Install the client computer's certificate (the client certificate)	Client Desktop - Client user perform this procedure on the computer that the client is installed on.	
3	Add a trusted host. In the AE Services Management Console (**Security > Host AA > Trusted Hosts > Add Trusted Host**).	AE Services Management Console. Only the application uses port 4723 (this is TR87, and the AAC client) for client authentication. (See Client authentication on page 103). By default, the DMCC client does not use client authentication.	

Enabling client authentication for DMCC Java clients

About this task

Optionally, for the DMCC Java API clients only, the AE Server can provide client authentication by using the Service Settings (**Security > Host AA > Service Settings**).

Procedure

1. From the AE Services Management Console main menu, select **Security > Host AA > Service Settings**.
2. From the **Service setting** page, select the check boxes for **Authenticate Client Cert with Trusted Certs** and **Require Trusted Host Entry**.

   For an explanation of these settings see Host AA Service settings on page 109.

3. Click **Apply Changes**.
4. From the **Apply Changes to Host AA service settings** page, click **Apply**.

Host AA Service settings

This section explains the Host AA service settings.

- **Authenticate Client Cert with Trusted Certs** — If this setting is enabled, AE Services issues a request for the client certificate and it rejects incoming connections if the client certificate is not signed by a trusted certificate authority (CA).
- **Enforce Host Authorization** — If this setting is enabled, AE Services checks the common name (CN) in the client certificate, and verifies that it matches one of the administered authorized hosts. If the CN matches one of the authorized hosts, the connection is permitted. If the CN does not match, the connection is rejected.

Enterprise server authentication (LDAP Server)

If your configuration uses an enterprise directory server (also referred to an external directory server), you will need to configure AE Services to access an enterprise directory and verify the enterprise directory server's certificate.

To this you will need to complete the Enterprise Directory Configuration page in the AE Services Management Console and enable the setting for LDAP-S. See Configuring AE Services to access an enterprise directory on page 196.

File conversion for DER and PKCS#12 files

If your CA provides you with a certificate in a format other than PEM, you must convert it to PEM format before importing it into the AE Services Management Console. The following sections describe how to convert files using openssl tools, which are on the AE Server in **`/usr/bin`**.

Converting a DER file to PEM

About this task

If your Certificate Authority provides you with a DER-encoded certificate, you must convert it to PEM format before you can import it into the AE Services Management Console.

Procedure

To convert a DER file to PEM, from the command line type the following command:

```
openssl x509 -in <input>.cer -inform DER -out <output>.pem -outform PEM
```

Obtaining a trusted certificate for the AE Services server

About this task

This information is for general reference only. Follow the instructions on your CA Web site.

Procedure

1. From your browser, go to your Web page for CA and download the certificate chain.

Important:

You must import the entire certificate chain all the way back to the root certificate.

- The trusted certificate or certificate chain must be in text format (PEM or Base-64). If you are importing a certificate chain, it must be a text-based PKCS#7 file. Think of a PKCS#7 file as an envelope containing all trusted certificates.
- It is acceptable to import certificates in the chain individually if they are not available in PKCS#7 format, but all certificates must be in the trusted certificates store.

2. The certificate authority processes your request and issues a trusted certificate (or certificate chain) for you to download.
3. Download the entire certificate to the AE Services administrative workstation, and save it with a unique name (for example, `C:\temp\aetrucert.cer`).
4. Using a text editor, verify the header and trailer of the trusted certificate file.
   - The header and trailer for a PEM or Base 64 file are as follows:

     ----BEGIN CERTIFICATE----- (header)

     -----END CERTIFICATE----- (trailer)
   - The header and trailer for a PKCS#7 file are as follows:

     -----BEGIN PKCS7 ----- (header)

     -----END PKCS7----- (trailer)

     Note:

     The header and trailer in the imported certificate file must read as follows before you import the contents of the file into the AE Services Management Console.

     -----BEGIN PKCS7-----

     -----END PKCS7-----

     or

     ----BEGIN CERTIFICATE-----

     -----END CERTIFICATE-----

   If the header and trailer of your PKCS#7 file do not match either of these two forms, you must edit the header and trailer before you import the file into the AE Services Management Console.

Next steps

Continue with the following procedures:

- Importing The CA certificate into your browser's certificate store on page 57.
- Importing the trusted certificate into AE Services on page 111.

Importing the trusted certificate into AE Services

Procedure

1. From the AE Services Management Console main menu, select **Security > Certificate Management > CA Trusted Certificates**.
2. From the **CA Trusted Certificates** page, click **Import**.
3. Complete the **Trusted Certificate Import** page, as follows:
   a. Click **Browse**.
   b. In the Choose File to Upload dialog box, select the certificate you want to import, and then click **Open**.
   c. In the **Certificate Alias** field, type an alias for the trusted certificate (for example `catrusted`).

      The trusted certificate alias can be arbitrary. It does not need to match any aliases for AE Services.
   d. Click **Apply**.

   AE Services recommends that you verify the installation of the certificate. See Verifying the installation of the trusted certificate in on page 111.

Verifying the installation of the trusted certificate in AE Services

About this task

Use this procedure to verify the installation of the entire certificate chain (all the way back to the root certificate) in AE Services.

Procedure

1. From the AE Services Management Console main menu, select **Security > Certificate Management > CA Trusted Certificate**.
2. From the **CA Trusted Certificates** page, select the trusted certificate (**catrusted** based on this sample scenario), and click **View**.
3. From the **Trusted Certificate Details** page, verify that the information for the trusted certificate is correct.
   a. Verify that the entire chain of certificates exists, all the way back to a self-signed certificate.
   b. Verify that the **Issued To** field displays the name of the organization that the trusted certificate is issued to.
   c. Verify that the **Issued By** field Indicates the name of the certificate authority that issued the trusted certificate (referred to as the issuer on the certificate).

      This issuer should be either the same issuer or an issuer in the same certificate chain.
   d. Verify that the **Expiration Date** Indicates the date that the trusted certificate expires.
   e. Verify the information in the Details display. Make sure the Certificate Status is valid.

4. Click **Close** to exit the **Trusted Certificate Details** page.

Creating a server certificate signing request for the AE Services server

About this task

Use this procedure to create a server certificate request (also referred to as a certificate signing request, or CSR) for the AE Services server. This procedure generates a certificate signing request which includes a private key.

Procedure

1. From the AE Services Management Console main menu, select **Security > Certificate Management > Server Certificates**.
2. On the **Server Certificates** page, click **Add**.
3. Complete the **Add Server Certificate** page, as follows:
    a. In the **Certificate Alias** field, select the appropriate alias for the certificate.
        - Select **cmtls** for the Transport Service certificate
        - Select **aeservices** for the CVLAN, DLG, DMCC and TSAPI certificates. If **cmtls** is not specified, and the switch connection Provide AE Services certificate to switch option is enabled, this certificate will be used for the Transport Service.
        - Select **web** for the Apache and Tomcat certificates.
        - Select **ldap** for the LDAP certificate.
        - Select **server** to include all certificates (cmtls, aeservices, web, and ldap).
        - Select **rsyslog** for remote logging.

    b. Leave the **Create Self-Signed Certificate** check box unchecked (the default).

    c. In the **Enrollment Method** field, select the appropriate setting.

    d. In the **Encryption Algorithm** field, select **3DES**.

    e. In the **Password** field, type the password of your choice.

    f. In the **Re-enter Password** field, type the password of your choice.

    g. In the **Key Size** field, accept the value **2048** or higher

    h. In the **Certificate Validity** field, accept the default **1825**.

    i. In the **Distinguished Name (DN)** field, type the LDAP entries required by your CA.

    These entries must be in LDAP format and they must match the values required by your CA. If you are not sure what the required entries are, contact your CA.

    The **Distinguished Name (DN)** field must not contain any wildcard character, that is an asterisk (*), double dots(..) or a question mark(?).

    Among the required entries will be the FQDN (fully qualified domain name) of the AE Server in LDAP format. Additionally you might need to provide your company name, your organization name and so on. Separate each LDAP entry with a comma, and do not use blank spaces, for example:

`cn=aeserver.example.com,ou=myOrganizationalUnit,o=Examplecorp,L=Springfield,ST=Illinois,C=US`

Note:

Currently the Add Server Certificate page in the AE Services Management Console does not support using commas within a DN attribute (for example `o=Examplecorp, Inc`).

j. In the **Challenge Password** field, type the challenge password of your choice.

k. In the **Re-enter Challenge Password** field, type the challenge password of your choice.

l. In the **SAN IP Address** field, type the IP address of the SAN parameter.

SAN IP Address field is available from Release 8.1.3 and later.

m. In the **SAN DNS Name** field, type the IP address or the hostname of the SAN parameter.

SAN DNS Name field is available from Release 8.1.3 and later.

Note:

Avaya recommends that you use **Subject Alternate Name(SAN)** in place **Common Name(CN)** while configuring certificates because the support for **Common Name(CN)** will be removed from the future releases.

n. (Optional) From the **Key Usage** list, select the setting that is appropriate for your certificate:

- Digital Signature
- Non-repudiation
- Key encipherment
- Data encipherment
- Key agreement
- Key certificate sign
- CRL sign
- Encipher Only
- Decipher Only

o. (Optional) From the **Extended Key Usage** list, select the setting appropriate for your certificate.

p. (Optional - applies to auto-enrollment) Complete the **SCEP Parameters** that apply to your certificate:

- **SCEP Server URL** — specify the CA URL.

  An example of a Microsoft CA URL is `http://ca.example.com/certsrv/mscep/mscep.dll`. An example of an Enterprise Java Beans Certificate Authority

(EJBCA) URL is `http://ca.example.com:8080/ejbca/publicweb/apply/scep/pkiclient.exe`.

- **CA Certificate Alias** — enter the CA Alias to be used.

  The CA Certificate Alias refers to the name used to identify the CA Certificate.
- **CA Identifier** — enter the CA ID to be used.

  The CA Identifier Used by CAs to identify which CA you are referring to in your SCEP request. Many CAs strictly match the CA Identifier string, while some ignore it. For example, with EJBCA you you need to match the CA Identifier string. This is used when the CA server acts as multiple CAs. This string is set by the CA Admin.

q. Click **Apply**.

AE Services displays the **Server Certificate Manual Enrollment Request** page, which displays the certificate alias and the certificate request itself in PEM (Privacy Enhanced Mail) format. The certificate request consists of all the text in the box, including the header (-----BEGIN CERTIFICATE REQUEST -----) and the trailer (-----END CERTIFICATE REQUEST-----).

4. Copy the entire contents of the server certificate, including the header and the trailer. Keep the contents available in the clipboard for the next procedure.

Add Server Certificate field descriptions

Add Server Certificate

Name	Description
Certificate Alias	The type of the certificate alias. The options are: • aeservices: Refers to the CVLAN, DLG, DMCC, and TSAPI AE Services. • cmtls: Refers to the CM transport layer security. • ldap: Refers to LDAP. • server: Refers to all AE Services, Apache, Tomcat, and LDAP. • web: Refers to Apache and Tomcat. • rsyslog: Refers to the TLS connection for remote logging.
Enrollment Method	The method of enrollment of the certificate. The options are: • **DES** • **3DES**

Certificate Key Parameters:

Name	Description
Encryption Algorithm	The data encryption standard (DES) used to encrypt the private key. The options are: • 3DES: The default setting. • DES: Less secure than 3DES and uses a 56-bit key size.
Password	Certificate key or private key password, which is used to lock the certificate key.
Re-enter Password	The certificate key password re-entered.
Key Size	The key length of the certificate key. The options are: • 1024: Specifies a key length of 1024 bits. • 1536: Specifies a key length of 1536 bits. • 2048: Specifies a key length of 2048 bits. • 4096: Specifies a key length of 4096 bits. The default setting is 2048.
Signature Algorithm	The appropriate signature algorithm. The default value is sha256.

Certificate Request Parameters:

Name	Description
Certificate validity	The number of days that indicate the lifetime of the certificate. The default value is 1825 days, which is equivalent to 5 years.

Distinguished Name (DN)	The LDAP entries required by your CA. You must enter these entries in the LDAP format, and they must match the values required by your CA. If you are not sure what the required entries are, contact your CA.
	You must enter the FQDN of the AE Services server in the DNS format. You might also need to provide details, such as your company and organization name. Separate each LDAP attribute with a comma and do not use blank spaces. For example:
	`cn=myaeserver.example.com,ou=myOrganizationalUnit,`
	`o=examplecorp,L=Springfield,ST=Illinois,C=US`
	If an LDAP name contains an attribute that has a comma within it, you must precede the comma with a backslash (\) when you enter the LDAP name in OAM.
	The **Distinguished Name (DN)** field must not contain any wildcard character, such as an asterisk (*), double dots (..), or a question mark (?).

Table continues…

Name	Description
Challenge Password	Certificate key or private key password, which is used to lock the certificate request.
Re-enter Challenge Password	The certificate key password re-entered for validation.

Name	Description
Key Usage	Key description contained in the certificate. The options are: • Digital Signature • Non-repudiation • Key encipherment • Data encipherment • Key agreement • Key certificate sign • CRL sign • Encipher only • Decipher only To deselect **Key Usage** options, use `Control+Click`.
Extended Key Usage	Purpose of the certificate. The options are: • SSL/TLS Web Server Authentication • SSL/TLS Web Client Authentication • Code signing • E-mail Protection (S/MIME) To deselect **Extended Key Usage** options, use `Control+Click`.

SCEP Parameters:

Name	Description
SCEP Server URL	The URL of the CA Simple Certificate Enrollment Protocol or server.
CA Certificate Alias	The unique and descriptive name for the CA certificate. CA certificate alias can be a name that you assign or a name that the CA assigns. By default, you must use the name assigned by your CA.
CA Identifier	The identification of the CA.

Button	Description
Apply	To apply the changes. A server certificate request (CSR) is generated in a pending state. AE Services permits only one server certificate at a time. If you install more than one server certificate and restart AE Services, the TR/87 service fails to initialize.
Cancel	To cancel the changes.

Creating a server certificate for AE Services (generic procedure)

About this task

If you are using a third-party certificate authority other than Microsoft Certificate Services, refer to this procedure. This procedure is provided as a guide only and should be used in conjunction with the instructions on your CA Web site.

Procedure

1. From your browser, go to your CA's Web page for requesting a server certificate.
2. Complete the required fields for enrollment.

   Usually you provide information such as your name, email address, the IP address of your server, your organizational unit (OU), and the type of server you have.
3. Paste the CSR into the appropriate field and submit or upload the request.

   (Paste the certificate request that you copied in the last step of the previous procedure Creating a server certificate signing request for the server on page 112.)

   The certificate authority processes your request and issues a server certificate for you to download.
4. Download the certificate to your AE Services administrative workstation, and save it with a unique name (for example C:\aescert.cer).

   Important:

   The certificate data you import into AE Services must be PEM-encoded (Base 64). If your CA issues certificates in DER format, you must convert it to PEM format before importing it into AE Services. See Converting a DER file to PEM on page 109 for more information.

Creating an AE Services server certificate (Microsoft-based procedure)

About this task

If you use Microsoft Certificate Services as the certificate authority, use this procedure as a guide for creating an AE Services server certificate.

Procedure

1. From your Web browser, type the URL of your certificate server. For example:

```
http://<certificate_server.com>/certsrv
```

where <*certificate_server.com*> is the domain name or IP address of your certificate server.

2. On the **Welcome** page of Microsoft Certificate Services, click **Request a certificate**.
3. On the **Request a Certificate** page, click **advanced certificate request**.
4. On the **Advanced Certificate Request** page, click **Submit a certificate request by using a base-64-encoded CMC or PKCS #10 file** or **Submit a renewal request by using a base-64-encoded PKCS #7 file**.

   (AE Services uses a base-64-encoded CMC).
5. On the **Submit a Request or Renewal Request** page, paste the certificate request into the **Saved Request** field, and click **Submit**.

   (Paste the certificate request that you copied in the last step of the procedure Creating a server certificate signing request for the server on page 112.)
6. From the **Certificate Issued** page, select **Base 64 encoded**, and click **Download certificate**.

   Note:

   Some CAs are not set up to automatically grant certificates. In this case, you might have to wait until your administrator issues the certificate. Once your administrator issues the certificate, return to the Welcome page of Microsoft Certificate Services, and click **View the status of a pending certificate request** to get to the **Issued Certificate** page.
7. From the **File download** dialog box, save the certificate to your computer.

Importing the server certificate to AE Services

About this task

Use this procedure to import the AE Services server certificate to the AE Services management console.

Before you begin

Ensure that the server certificate is in PEM format. If not, see File conversion for DER and PKCS#12 files on page 109.

Procedure

1. On the AE Services management console main menu, navigate to **Security** > **Certificate Management** > **Server Certificates**.
2. On the Server Certificates page, click **Import**.
3. On the Server Certificate Import page, do the following:
   a. Click **Browse**.

b. In the **Choose File to Upload** dialog box, select the server certificate that you want to import, and then click **Open**.

c. Select the **Establish Chain of Trust** check box. By default, the check box is selected.

d. In the **Certificate Alias** field, select the appropriate certificate alias, for example, aeservices, ldap, server, cmtls, rsyslog, or web.

e. Click **Apply**.

Server Certificate Import field descriptions

Name	Description
File Path	The location of the certificate file.
Certificate Alias	The alias of the certificate file to import. The options are: • aeservices: Refers to the CVLAN, DLG, DMCC, and TSAPI AE Services. • cmtls: Refers to the CM transport layer security. • ldap: Refers to LDAP. • server: Refers to all AE Services, Apache, Tomcat, and LDAP. • web: Refers to Apache and Tomcat. • rsyslog: Refers to the TLS connection for remote logging. The alias must match the alias that you specified when you created the Certificate Signing Request (CSR). By default, this field is empty.

Button	Description
Browse	To locate the certificate file.
Establish Chain of Trust	To establish a chain of trust when you import a signed server certificate. Includes all certificates in the chain of trust, including the root CA, when you import the signed server certificate. By default, this check box is selected. If your AE Services implementation for Microsoft Office Live Communications Server 2005 or Microsoft Office Communications Server 2007 does not use a CA hierarchy, you can clear this check box.
Apply	To import the server certificate to the AE Services certificate store. After importing a server certificate you must restart the web server.
Close	To go back to the Server Certificates page.

Verifying the installation of the server certificate in AE Services

Procedure

1. From the AE Services Management Console main menu, select **Security > Certificate Management > Server Certificates**.
2. From the **Server Certificates** page, select the alias of the server certificate (**aeservercert**, based on this sample scenario), and click **View**.
3. From the **Server Certificate Details** page, verify that the information for the server certificate is correct.
    a. Verify that the **Issued To** field displays the fully qualified domain name of the AE Server.
    b. Verify that the **Issued By** field Indicates fully-qualified domain name of the certificate authority that issued the server certificate.
    c. Verify that the **Expiration Date** indicates the date that the server certificate expires.
    d. Verify the information in the **Details** window. Make sure the Certificate Status is valid.
4. Click **Close** to exit the **Server Certificate Details** page.

About restarting the AE Services Server and the Web Server

About this task

Apache and Tomcat do not use the default server certificate. Instead they use self-signed certificates. If you install your own certificates, AE Services, Apache, and Tomcat must be restarted so that they all use the same certificate.

To restart these services, see Restarting the AE Server and the Web Server on page 132.

Backing up certificates

About this task

Use the AE Services Management Console Data Backup feature to back up the AE Services certificates. The data backup image includes the certificates that have been administered on the AE Server.

Procedure

To back up the AE Server data, which includes certificate files, see Backing up server data on page 124.

Restoring certificates

About this task

Use the AE Services Management Console Restore Data feature to restore the certificates. When you restore the AE Server data, the certificates are restored.

Procedure

To restore the AE Server data, which includes certificate files, see Restoring the server data on page 125.

Certificate renewal

Certificates are valid only for a certain period of time. To ensure that you have no service interruptions, you should request a certificate renewal from your certificate authority before the date that the certificate is set to expire. When you renew a certificate, you are replacing the expired certificate with a new certificate. The new certificate contains the same public key as the expired certificate.

The process for renewing a certificate involves the following activities.

- Select the certificate that is about to expire, and generate a certificate signing request (CSR) for the certificate. See Renewing certificates – creating the CSR on page 121.
- Submit the CSR to your certificate authority (CA). See Renewing certificates – submitting the CSR to certificate authority (Microsoft example) on page 122.
- Your certificate authority will processes the CSR and issue a new server certificate for you to download.
- Download the new certificate to your AE Services administrative workstation, and save it with a unique name (for example, C:\aescert.cer).

  Important:

  The certificate data you import into AE Services must be PEM-encoded (Base 64). If your CA issues certificates in DER format, you must convert it to PEM format before importing it into AE Services. See Converting a DER file to PEM on page 109.

- Replace the old certificate with the new certificate. See Renewing certificates – replacing the old certificate with the new certificate on page 122.

Renewing certificates – creating the CSR

Procedure

1. From the AE Services Management Console main menu, select **Security > Certificate Management > Server Certificates**.
2. From the **Server Certificates** page, select the check box next to the certificate you want to renew, and click **Renew**.

   Your browser displays the **Server Certificate Renew Continue** page, which contains a text box displaying the certificate signing request (CSR) for the certificate you requested.
3. Copy the CSR and paste it into a text editor. Be sure not to include any extra spaces or lines.
4. From the **Server Certificate Renew Continue** page, click **Close**.

   AE Services creates a Pending Server Certificate Request for the certificate you selected. Your next step is to submit the CSR to your certificate authority.

Renewing certificates – submitting the CSR to certificate authority (Microsoft example)

About this task

If you use Microsoft Certificate Services as the certificate authority, use this procedure as a guide for renewing an AE Services server certificate.

Procedure

1. From your Web browser, type the URL of your certificate server. For example:

   `http://<certificate_server.com>/certsrv`

   where <*certificate_server.com*> is the domain name or IP address of your certificate server.
2. On the **Welcome** page of Microsoft Certificate Services, click **Request a certificate**.
3. On the **Request a Certificate** page, click **advanced certificate request**.
4. On the **Advanced Certificate Request** page, click **Submit a certificate request by using a base-64-encoded CMC or PKCS #10 file** or **Submit a renewal request by using a base-64-encoded PKCS #7 file**. (AE Services uses a base-64-encoded CMC.)
5. On the **Submit a Request or Renewal Request** page, paste the certificate request into the **Saved Request** field, and click **Submit**. (Paste the certificate request that you copied when you completed the procedure Renewing certificates – creating the CSR on page 121.)
6. From the **Certificate Issued** page, select **Base 64 encoded**, and click **Download certificate**.

   Note:

   Some CAs are not set up to automatically grant certificates. In this case, you might have to wait until your administrator issues the certificate. Once your administrator issues the certificate, return to the Welcome page of Microsoft Certificate Services, and click **View the status of a pending certificate request** to get to the **Issued Certificate** page.
7. From the **File download** dialog box, save the certificate to your computer.

Renewing certificates – replacing the old certificate with the new certificate

Procedure

1. From the AE Services Management Console main menu, select **Security > Certificate Management > Server Certificates > Pending Requests**.
2. From the **Pending Server Certificate Requests** page, select the certificate you want to renew, and click **Manual Enroll**.
3. From the **Server Certificate Renew Continue** page, click **Renew**.
4. From the **Server Certificate Renew** page, click **Browse**.

5. From the **Choose file** dialog box, locate the server certificate you downloaded, and click **Open**.
6. From the **Server Certificate Renew** page, click **Apply**.

Certificate authentication between the AE Services server and Communication Manager

With AE Services 7.0, the AE Services Transport service will enforce validation of the Communication Manager identity certificate for all administered switch connections.

The connection to the Communication Manager is rejected if the AE Services server does not contain the CA certificate for Communication Manager. You can import the CA certificate used for Communication Manager by using the **Management Console** screen, **Security > Certificate Management > CA Trusted Certificates**. This new validation enforcement will affect all AE Services offer types regardless if secure mode with FIPS is enabled or disabled.

When in secure mode with FIPS, the AE Services server and Communication Manager exchange identity certificates and mutually authenticate the other side certificate.

If the AE Services server is not configured to send an identity certificate to Communication Manager and `y` option in the **TLS Mutual Authentication for H.323 stations** field is selected, Communication Manager will not accept the security profile, H323TLS, in the Gatekeeper Confirmation (GCF).

If AE Services attempts to set up a TLS connection, Communication Manager will reject the TLS request. If the AE Services server is not configured to send an identity certificate to Communication Manager and `n` option in the **TLS Mutual Authentication for H.323 stations** field is selected, Communication Manager will allow the TLS connection to AE Services for H.323 registrations to proceed without an identity certificate.

The **Provide AE Services certificate to switch** field is used to configure the AE Services Transport service. The AE Services Transport services respond with a valid identity certificate to a Certificate Request message during the TLS handshake with Communication Manager. The first installed AE Services identity certificate associated with the alias cmtls, aeservices, or server is used as the identity certificate.

Chapter 6: AE Services general maintenance

Backing up the server data

About this task

Use this procedure to back up the AE Services server data, which includes configuration data files, AE Services user database, certificates, and the license file.

Backup taken in the non secure mode can only be restored in the non secure mode. Backup taken in the secure mode can only be restored in the secure mode.

The average size of AE Services full backup is 10 MB, but it can increase up to 1 GB depending on the size of Historical Metric Data Collector (HDMC). For information about HMDC, see *Administering Avaya Aura® Application Enablement Services*.

Procedure

1. On the AE Services Management Console main menu, click **Maintenance** > **Server Data** > **Backup**.
2. To encrypt the backup file, do one of the following :
    a. Select the **Encrypt Backup File** check box, and click **Continue**.

    b. In the **Password** field, enter the password you want to use for the encrypted backup file.

    This password must contain 15 to 256 characters. This password should not contain: apostrophe (`'`), backslash (`\`), single quote (`'`), double quote (`"`), and percent (`%`).

    c. In the **Confirm Password** field, re-enter the password.

    d. Click **Continue**.
3. On the Database Backup Continue page, click the **here** link to download the log file.

Restoring the server data

About this task

Restoring the AE Services server data involves restoring a copy of the AE Services database and restarting AE Services. The AE Services database includes configuration data files, the AE Services user database, certificates, and the license file.

Backup taken in the non secure mode can only be restored in the non secure mode. Backup taken in the secure mode can only be restored in the secure mode.

If the size of a backup file is greater than 10 MB, restore the server data using the Command Line Interface (CLI).

Procedure

1. In the AE Services Management Console main menu, click **Maintenance** > **Server Data** > **Restore**.
2. On the Restore Database Configuration page, click **Browse** and locate the AE Services database backup file that you intend to use. For example, `<hostname>_<AES version>_aesvcsdb05052013.tar.gz.enc` if the file is encrypted or `<hostname>_<AES version>_aesvcsdb05052013.tar.gz` if the file is not encrypted.
3. Click **Restore**.
4. On the Restore Database Configuration page, click **Restart Services**.

   ⚠ **Caution:**

   If you make any changes in the AE Services Management Console in the interval between clicking **Restore** and **Restart Services**, the restore will not occur.

Restoring the server data by using the command line interface

About this task

You can restore the server data by using command line interface when the size of a backup file is greater than 10 MB.

Procedure

1. Log in to the AE Services as a root user.
2. Copy the backup file to the `/tmp` directory by using the following command:

   ```
   cp <backup file> to /tmp
   ```

3. Do the following:
   - Run the following command to restore with the GRHA configuration:
     ```
     /opt/mvap/bin/Restore.sh -L </path/to/LargeAESBackupFIle.tar.gz>
     ```
   - Run the following command to restore without the GRHA configuration:
     ```
     /opt/mvap/bin/Restore.sh -L -n </path/to/LargeAESBackupFIle.tar.gz>
     ```
4. Run the following commands to restart the services:
   ```
   systemctl restart DBService
   systemctl restart aesvcs
   systemctl restart iptables
   systemctl restart httpd
   systemctl restart tomcat
   systemctl restart snmpd
   systemctl restart subagent1
   systemctl restart subagent2
   ```

Logs

Use the Logs subtab to access the following types of AE Services log files:

Subtab name	Description
Audit Logs	To view administrative changes made through the AE Services web interface.
Error Logs	To view CRITICAL, WARNING, and FYI messages generated by Call Control services you are licensed to use.
Install Logs	To verify the success of an installation or upgrade, or to troubleshoot problems.
Security Logs	To access the following log files: • Client access log files: To view information about client activity. • Command log files: To view information about system activity and errors. • System reset log files: To view a record of when the AE Services server was stopped and started.
Syslog	To view system activity. Only the security administrator and system administrator can access system log files.
Tripwire Logs	To view the Tripwire service activities and errors. Tripwire log files are not available for the Software-only server.
User Management Service	To view the User Management service activities and errors.

Related links

Viewing log files on page 127
Downloading log files on page 127

[Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses](#) on page 80

[Enabling AE Services](#) on page 26

Viewing log files

Procedure

1. From the AE Services Management Console main menu, select **Status > Logs > *<log file>*** where *<log file>* can be:
   - Audit Logs
   - Error Logs
   - Install Logs
   - Security Logs > Client Access Logs
   - Security Logs > Command Logs
   - Security Logs > System Reset Logs
   - Syslog
   - Tripwire Logs
   - User Management Service Logs

   Note:

   Tripwire Logs are not available for the Software-Only server.
2. Click **View**.

Related links

[Logs](#) on page 126

[Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses](#) on page 80

[Enabling AE Services](#) on page 26

Downloading log files

Procedure

1. From the AE Services Management Console main menu, select **Status > Logs > *<log file>*** where *<log file>* can be:
   - Audit Logs
   - Error Logs
   - Install Logs

- Security Logs > Client Access Logs
- Security Logs > Command Logs
- Security Logs > System Reset Logs
- Syslog
- Tripwire Logs
- User Management Service Logs

Note:

Tripwire Logs are not available for the Software-Only server.

2. Select the check box(es) for the log file(s) you want to download.
3. Click **Download**.
4. On the **Download** page, click the **here** link to download the log file.

Related links

Logs on page 126
Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses on page 80
Enabling AE Services on page 26

Service Controller (start, stop, and restart services)

Use the Service Controller (**Maintenance > Service Controller**) to start, stop, and restart any of the following services:

- ASAI Link Manager
- DMCC Service (Device, Media, and Call Control)
- CVLAN Service
- DLG Service
- Transport Layer Service
- TSAPI Service

Additionally, the Service Controller provides the following capabilities:

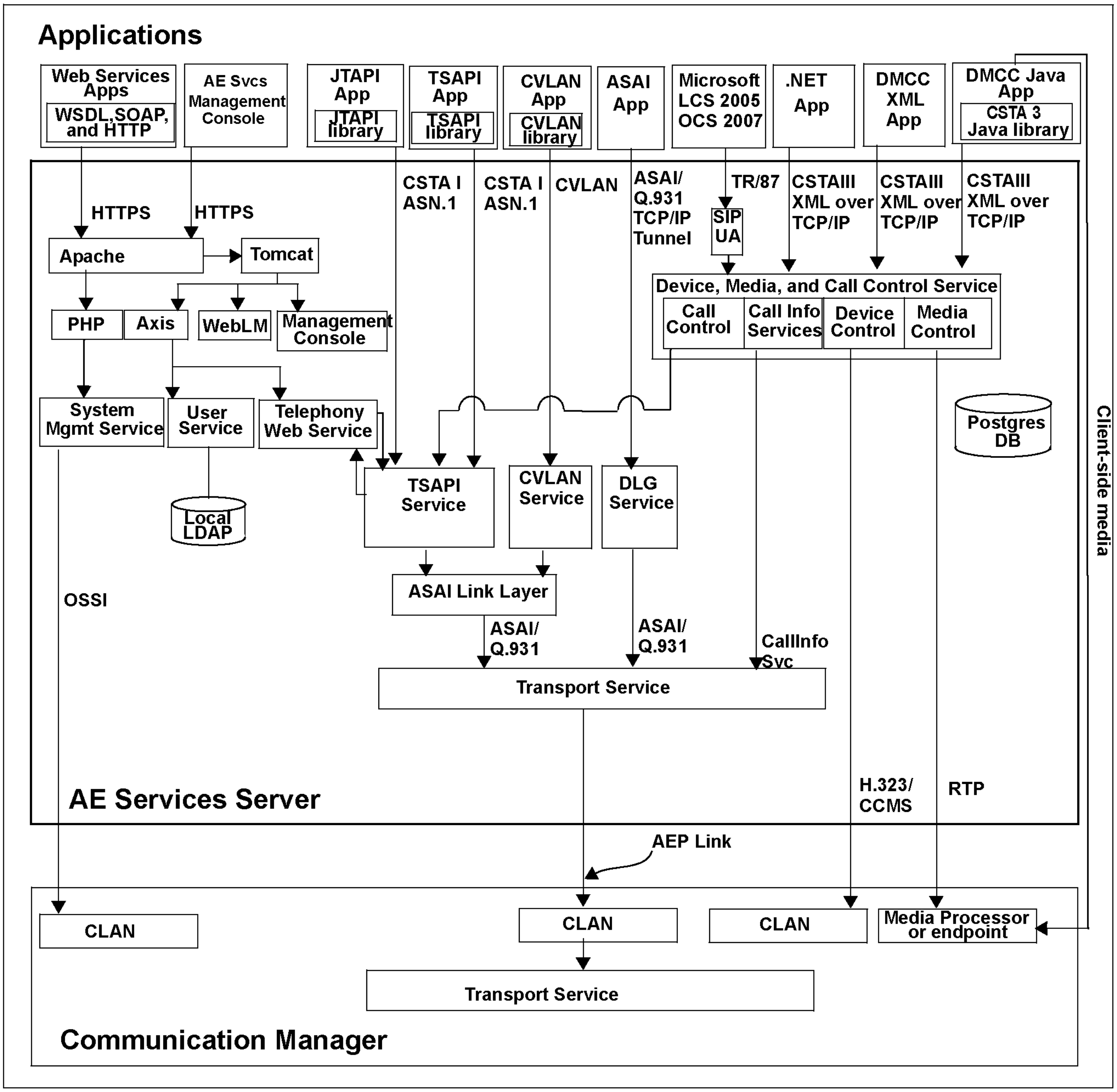
- Restart AE Server - stops and starts (restarts) all services listed on the Service Controller page. Restarting the AE Server does not start and stop the Web Server.
- Restart Linux - stops and starts (restarts) the Linux operating system, as well as the AE Server (all services listed on the Service Controller page) and the Web Server.
- Restart Web Server - Stops and starts (restarts) Apache and Tomcat.

⚠ **Warning:**

> It is generally understood that stopping and starting (or restarting) a service is potentially disruptive to applications. Doing so can result in dropped connections and lost associations.

For an illustration of service dependencies, see Schematic view of an configuration on page 130.

Schematic view of an AE Services configuration



About stopping services

The following table shows service dependencies and explains the effects of stopping the services listed on the **Service Controller** page.

Note:

A stopped AE Service will remain in a stopped state after a server reboot.

Service	Impact of stopping the service
DMCC Service (Device, Media, and Call Control)	If you stop the DMCC service, you lose functionality of the following: • All DMCC services • AE Services implementation of Microsoft Office Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync Server 2010 and 2013. All other AE Services continue to operate.
DLG Service	If you stop the DLG service, you lose DLG functionality, but all other AE Services continue to operate.
CVLAN Service	If you stop the CVLAN service, you lose CVLAN functionality, but all other AE Services continue to operate.
TSAPI Service	If you stop the TSAPI service, you lose TSAPI functionality and the following clients will not operate: • TSAPI • JTAPI • Telephony Web Service • DMCC with Call Control • Microsoft Office Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync Server 2010 and 2013 All other AE Services continue to operate.
ASAI Link Manager	• If you stop the ASAI Link Manager, you lose ASAI link level functionality. DMCC with Call Information Services continues to communicate with Communication Manager. The TSAPI service and the CVLAN service continue to run, but they can not communicate with the Transport Layer and Communication Manager. - DLG applications and Device, Media, and Call Control applications that only use device and media control can continue to communicate with Communication Manager. - DMCC with Call Control can not communicate with Communication Manager. • If you restart the ASAI Link Manager you do not have to restart the TSAPI service, the CVLAN service, Telephony Web service, or the Device, Media, and Call Control service. These services will recover. All of their clients, however, would need to reconnect.

Table continues…

Service	Impact of stopping the service
Transport Layer Service	• If you stop Transport Layer Services, the following services continue to run: the ASAI Link Manager, the TSAPI service, JTAPI, the CVLAN service, the DLG service, Device, Media, and Call Control with Call Information services, and Device, Media, and Call Control with Call Control services and Snapshot services, but they can not communicate with Communication Manager. • Device, Media, and Call Control applications that only use device and media control continue to operate and can communicate with Communication Manager. • If you restart the Transport Layer Service, you do not have to restart the ASAI Link Manager, the TSAPI service, the CVLAN service and the Device, Media, and Call Control service. These services will recover. You will, however, need to restart the DLG service. Also if you restart the Transport Layer service, clients of the following services would need to reconnect: TSAPI, Telephony Web service, Device, Media, and Call Control with Call Information services, Device, Media, and Call Control with Call Control services and Snapshot services, CVLAN, DLG.

Restarting the AE Services server and the web server

About this task

Use this procedure to restart the AE Services server and the web server after you install your own certificates.

Apache and Tomcat do not use the default server certificate. Instead, they use self-signed certificates. If you install your own certificates, AE Services, Apache, and Tomcat must be restarted so that they all use the same certificate.

Before you begin

Get system administration privileges to perform this task.

Procedure

1. On the AE Services Management Console main menu, click **Maintenance** > **Service Controller**.
2. On the Service Controller page, click **Restart AE Server**.

   The system restarts the ASAI Link Manager, the DMCC service, the CVLAN service, Transport Layer service, and the TSAPI service.
3. On the confirmation page, click **Restart** to restart the AE Services server.
4. On the AE Services Management Console main menu, click **Maintenance** > **Service Controller**.
5. On the Service Controller page, click **Restart Web Server**.

   The system restarts Apache and Tomcat.
6. On the Restart Web Server page, click **Restart** to restart the web server.

7. On the AE Services log in screen, log in to AE Services.

Restarting services

Procedure

1. On the Application Enablement Services management console, go to **Maintenance** > **Service Controller**.
2. On the Service Controller page, select one or several services.
3. Click **Restart**.
4. On the Restart Service page, click **Restart**.

About rsyslog

All AE Services logs are recorded using rsyslog. DMCC, LCM, HMDC, snmp subagent, Tomcat and the AE Services OAM web services deployed on Tomcat use the log4j syslog adaptor (UDP).

TSAPI, TRANSPORT, CVLAN, DLG, ASAILINK and HTTPD record logs using glibc's syslog (/dev/syslog).

The rsyslog configuration for all the above mentioned services is present in `/etc/rsyslog.d/`. The file names are as follows:

- mavp.conf (TSAPI/TRANSPORT/CVLAN/DLG/ASAILINK)
- aesvcs.conf (DMCC, LCM)
- catalinaRsyslog.conf (tomcat, OAM)
- httpdRsyslog.conf (httpd).

Note:

Watchdog and ossicm logs are not logged via rsyslog

With rsyslog, log messages conform to Avaya CEC requirements.

See System Logging to learn how to send log data to a remote server.

Related links

Administering switch connections for DMCC applications that use Registration Services - assigning H.323 IP addresses on page 80

Enabling AE Services on page 26

System Logging

On the System Logging subtab, you can enable remote logging, specify the remote log server destination and port to send the AE Services server log files. You can also configure trace and log levels using the Log Manager.

Note:

TSAPI log files are not sent to the remote server.

Configuring remote logging without a certificate revocation check

About this task

Use this procedure to send AE Services log files to a remote syslog server without the certificate revocation check.

Note:

TSAPI log files are not sent to the remote syslog server.

Before you begin

Configure a remote syslog server.

Procedure

1. On the Application Enablement Services management console, go to **Status** > **Log Manager** > **System Logging**.
2. On the System Logging page, select the **Enable Remote Logging** check box.
3. In the **Hostname(FQDN)/IP Address** field, type the IP address or domain name of the remote syslog server.
4. In the **Port** field, type the port number.
5. **(Optional)** To configure remote logging in secure mode, set **Enable TLS Remote Logging** to **YES**, and do the following:
    a. In the **Protocol** field, select **TCP**.
    b. In the **Common name of Remote Server Certificate** field, type the common name of the remote syslog server identification certificate.
    c. In the **Certificate Revocation Validation** field, select **NONE**.
6. In the **Facility** field, select the facility ID.
7. Click **Apply Changes**.
8. To apply the changes, click **Apply**.

9. Copy all files from the `/etc/rsyslog.d/` directory on the AE Services server to the `/etc/rsyslog.d` directory on the remote syslog server.
10. Restart the remote syslog server.

System Logging field descriptions

Name	Description
Enable Remote Logging	Enables or disables remote logging.
Hostname (FQDN)/IP Address	IP address or a fully qualified domain name. A blank value is not allowed.
Port	Value of the port. The value can either be 514, or in the range of 1024 through 65535.
Protocol	Protocol for sending log files to the remote server. The options are: • TCP • UDP
Enable TLS Remote Logging	Enables TLS remote logging for secure and non-secure connections between AE Services and the remote syslog server. You must install a client certificate with the certificate alias as a syslog server to enable TLS remote logging. The options are: • NO (Default): For a non-secure connection between AE Services and the remote syslog server. • YES: For a secure connection between AE Services and the remote syslog server.
Common name of Remote Server Certificate	Common name of the remote syslog server identity certificate. By default, this field is empty. If **Enable TLS Remote Logging** is set to **YES**, you must enter the common name of the remote syslog server identity certificate in this field.

Table continues…

Name	Description
Certificate Revocation Validation	Specifies the validation method for the certificate revocation check. The options are: • NONE: No revocation check is performed. • BEST_EFFORT: Revocation check is performed. Revocation check fails only if the certificate is revoked. • MANDATORY: Revocation check is performed. Allows revocation check only if the certificate is accepted. **Note:** The **Certificate Revocation Validation** field is available from Release 8.1.3 and later.
OCSP Local URI	Specifies a local OCSP responder URI. This field is required if the **OCSP URI Preference** field is set to **Local**. **Note:** The **OCSP URI Preference** field is available from Release 8.1.3 and later.
OCSP URI Preference	Specifies which OCSP responder URL is used first for revocation check. The options are: • CERT: From the certificate AuthorityInfoAccess extension. • LOCAL: From OCSP Local URI. **Note:** The **OCSP URI Preference** field is available from Release 8.1.3 and later.
Facility	The facility ID. The value range is local0 through local7.

Button	Description
Apply Changes	To apply the changes.
Restore Defaults	To restore the default values.
Cancel Changes	To cancel the changes.

Configuring the trace or logging levels

About this task

Use this procedure to configure the trace or logging levels by using the Log Manager for the following services:

- ASAI Link Manager

- CVLAN Service
- DLG Service
- Management Console
- Transport Layer Service
- TSAPI Service
- DMCC Service

The trace level setting might not correspond to any predefined choice on the Log Manager page. If so, the Log Manager page displays the exact string assigned to the service in the `tracemask` file. This entry is read only.

Important:

Do not change the trace logging levels without consulting an Avaya engineer. Keeping the trace logging levels always enabled or increasing logging levels might degrade the system performance as there is a chance that `/var/log` partition may run out of space. In this scenario AE Services server will not generate any alarm.

Procedure

1. On the AE Services Management Console main menu, click **Status** > **Log Manager** .
2. On the Log Manager page, make your changes to the appropriate settings.
3. Click **Apply Changes**.
4. On the Log Manager Confirmation page, click **Apply**.

Log and trace file retention

You can set the period for retaining logs and traces from 0 to 180 days. AE Services deletes the retained log and trace files after the retention period. The default retention period is 30 days. AE Services appends the timestamp to the file name in the following format: `yyyy-mm-dd-timestamp`.

You can retain the following log files:

- All log files in the `/var/log/sssd` folder
- `/var/log/httpd/error.log`
- `/var/log/avaya/aes/mvap.log`
- `var/log/messages`
- `/var/log/secure`
- `/var/log/tomcat/catalina.log`
- `/var/log/httpd/error.log`
- `/var/log/avaya/aes/oam-admin/audit.log`

- `/var/log/avaya/aes/oam-admin/login-auth.log`
- `/var/log/avaya/aes/sec.log`
- `/var/log/avaya/aes/dmcc-error.log`
- `/var/log/avaya/aes/ws-telsvc-error.log`
- `/var/log/avaya/aes/dmcc-jtapi-error.log`
- `/opt/mvap/lib/mgmt/logs/default.debug.log`
- `/var/log/avaya/aes/mgmt/logs/default.debug.log`
- `/var/log/tomcat/mgmt/logs/default.debug.log`

You can retain the following trace files:

- `/var/log/avaya/aes/dmcc-nist.log`
- `/var/log/avaya/aes/dmcc-trace.log`
- `/var/log/avaya/aes/DLG/trace.out`
- `/var/log/avaya/aes/TSAPI/csta-trace`
- `/var/log/avaya/aes/common/trace.out`
- `/var/log/avaya/aes/TSAPI/g3trace.out`
- `/var/log/avaya/aes/ws-telsvc-trace.log`
- `/var/log/avaya/aes/trans-serv/trace.out`
- `/var/log/avaya/aes/asailink/trace.out`
- `/var/log/avaya/aes/CVLAN/trace.out`
- `/var/log/avaya/aes/ossicm.log`

You cannot retain the `alarm.log` and `importsdb.log` log files. AE Services deletes the file contents within one day.

If the disk space is filled to more than 90%, AE Services deletes at least 25% log and trace files. Older files are deleted first.

Related links

Retaining log and trace files on page 138
Deleting log files on page 139
Deleting trace files on page 140
Retaining logs by using the command line interface on page 140

Retaining log and trace files

About this task

You can configure log and trace file retention using the Log Manager.

Procedure

1. On the Application Enablement Services management console, go to **Status** > **Log Manager** > **Log and Trace Retention**.
2. In the **Log Retention** field, type the log retention period.

   The default value is 30 days.
3. In the **Trace Retention** field, type the trace retention period.

   The default value is 30 days.
4. Click **Set Retention**.
5. Click **Apply**.

Log and Trace Retention field descriptions

Name	Description
Log Retention	Log retention period between 0 and 180 days. The default value is 30 days.
Trace Retention	Trace retention period between 0 and 180 days. The default value is 30 days.

Button	Description
Set Retention	To apply the retention period you specified. OAM displays the Log and Trace Retention Confirmation page.
Restore Defaults	To restore the default values. OAM displays the Restore Log and Trace Retention page.
Cancel Changes	To cancel the changes.

Deleting log files

About this task

Use this procedure to delete log files with the Log Manager.

When you are using High Availability, AE Services deletes log files only from the active server.

Procedure

1. On the Application Enablement Services management console, go to **Status** > **Log Manager** > **Clear Logs**.
2. In the **Clear Logs Period** field, type the retention period.
3. To delete log files older than the specified period, click **Clear Logs (days)**.
4. **(Optional)** To delete all log files, click **Clear All Logs**.
5. Click **Apply**.

Deleting trace files

About this task

Use this procedure to delete trace files with the Log Manager.

When you are using High Availability, AE Services deletes trace files only from the active server.

Procedure

1. On the Application Enablement Services management console, go to **Status** > **Log Manager** > **Clear Traces**.
2. In the **Clear Traces Period** field, type the retention period.
3. To delete trace files older than the specified period, click **Clear Traces (days)**.
4. **(Optional)** To delete all trace files, click **Clear All Traces**.
5. Click **Apply**.

Retaining logs by using the command line interface

Procedure

1. Log in to the AE Services as a Data Controller user.
2. Use the following command for log retention: `retention –l <0–180>`.

   Here, 0–180 is the number of days for which you can retain the logs.
3. Use the following command to display the current log retention period: `retention –l`.
4. Log out of AE Services.

Retaining traces by using the command line interface

Procedure

1. Log in to the AE Services as a Data Controller user.
2. Use the following command for trace retention: `retention –t <0–180>`.

   Here, 0–180 is the number of days for which you can retain the traces.
3. Use the following command to display the current trace retention period: `retention –t`.
4. Log out of AE Services.

Clearing logs by using the command line interface

Procedure

1. Log in to the AE Services as a Data Controller user.
2. Use the following command to clear the logs before the specified period: **`logClear -l <0-180>`**.

   The default value for clearing logs is 0. For the default value all logs except the currently written log will be cleared.
3. Log out of AE Services.

Clearing traces by using the command line interface

Procedure

1. Log in to the AE Services as a Data Controller user.
2. Use the following command to clear the traces before the specified period: **`logClear -t <0-180>`**.

   The default value for clearing traces is 0. For the default value all traces except the currently written trace will be cleared.
3. Log out of AE Services.

Chapter 7: User Administration

About this task

A Linux user or an Enterprise Directory User can access the AE Services Management Console. See Account Management - Linux user accounts on page 172.

To acquire the administrative role for User Management the user must have an administered account in the local LDAP data store with the Avaya role set to userservice.useradmin. (To set up the userservice.user administrative role, see Creating a new User Management administrator account and removing the default avaya account from User Management on page 342).

This chapter describes the capabilities provided by User Management. User Management refers to the local LDAP database on the AE Server. In the context of this chapter, local means located on the AE Services server.

AE Services users are authenticated by AE Services User Management (as opposed to Linux). AE Services users, as such, cannot log in to Linux. and they have limited access privileges in the AE Services Management Console.

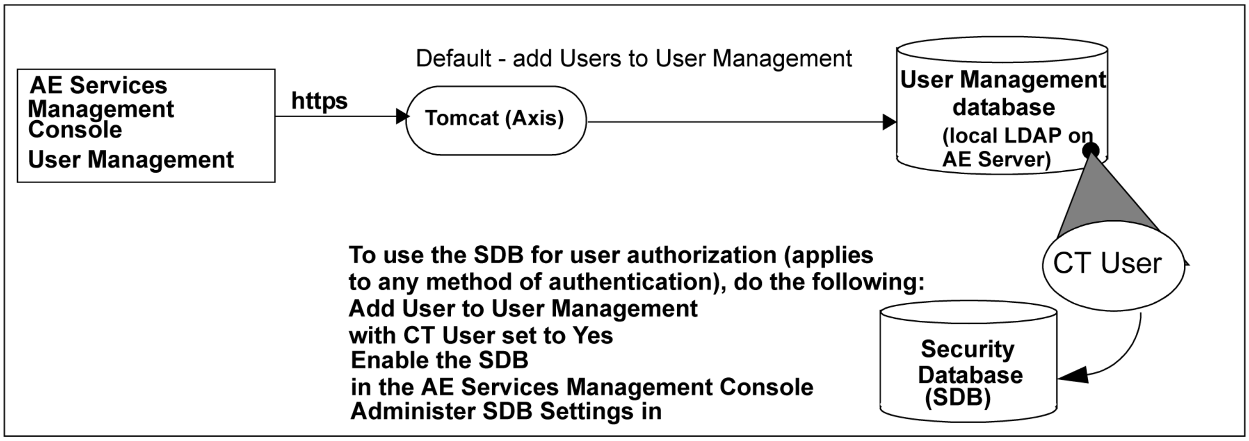

AE Services Management Console
User Management
https
Default - add Users to User Management
Tomcat (Axis)
User Management database (local LDAP on AE Server)
CT User
To use the SDB for user authorization (applies to any method of authentication), do the following:
Add User to User Management
with CT User set to Yes
Enable the SDB
in the AE Services Management Console
Administer SDB Settings in
Security Database (SDB)

Figure 28: AE Services User Management database

User management for authentication

User Management is the default user database that AE Services uses for user authentication (validating a user’s identity). If you use User Management as the user database for user authentication, all AE Services Management Console administrators are authenticated by User Management.

User Management service is the default authentication authority for TSAPI, JTAPI, DMCC, and Telephony Web Services users. You may also use any of the following authentication methods.

- Local Linux accounts
- External Directory service such as Active Directory Services or OpenLDAP
- Active Directory Services Using Kerberos (a specific implementation of an external directory)

  For more information about these additional authentication methods, see Additional PAM management capabilities on page 192.

If you use these methods of user authentication, all AE Services Management Console administrators are authenticated by the method you use.

DMCC AA policy administration and bypassing user authentication

DMCC AA policy administration allows an administrator to provision security policies that are unique to an individual machine. The machine is identified and authenticated using a certificate. It is possible to specify a security policy that makes it unnecessary to provision a user for the application. This is done by indicating that the machine can bypass user authentication, and by specifying an LDAP or unrestricted access authorization policy.

User Management for authorization

In addition to user authentication, the User Management database provides you with the ability to designate a user as a CT User and thereby control their access rights (user authorization). You can use the User Management to authorize users who are authenticated by any of the following methods:

- User Management
- Local Linux accounts
- External Directory service such as Active Directory Services or OpenLDAP
- Active Directory Services using Kerberos (a specific implementation of an external directory)

To use AE Services User Management for authorization, you must follow these basic steps:

- Add each user to User Management (**User Management > User Admin > Add User**) and set the **CT User** field to **Yes**. See Adding a user to User Management on page 145.
- Enable the Security Database (SDB). See APIs that use the Security Database on page 216.
- Administer the settings in the SDB. See Chapter 6: The Security Database on page 216.

Logging into User Management

About this task

Use this procedure to log in to the AE Servicesserver as the default administrator (cust). You can not log in to the AE Services management console as a root user.

Procedure

1. On your Web browser, type the fully qualified domain name or IP address of the AE Services server, for example, `https://aserver.example.com`.
2. On the Application Enablement Services welcome page, click **Continue To Login**.
3. In the **Username** field, type the default login ID.
4. Click **Continue**.
5. In the **Password** field, enter your password.

   If the Access Security Gateway (ASG) is present, your login ID is challenged by ASG. You must enter a proper response in the Response box to log in to the AE Services server.
6. Click **Login**.

   For more information about the access privileges assigned to administrative users, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

The cust account in User Management

For the Bundled Server and the Software-Only server set up with the Avaya Services Package (cs-service), AE Services installs the cust account in two places: in the local Linux password store and in User Management (local LDAP directory).

To change the password for the cust account in User Management, see Changing the default password for the cust account in User Management on page 341.

Viewing the list of all users in the User Management database

Procedure

From the AE Services Management Console main menu, select **User Management > User Admin > List All Users**.

Your browser displays the List All Users page, which contains a table displaying the User Id, Common Name, and Surname of each user in the User Management database.

Adding a user to User Management

About this task

Follow this procedure to add a user to the User Management (also referred to as the local LDAP database).

✱ **Note:**

This example depicts adding a user who will be a member of the TSAPI Service SDB.

Procedure

1. From the AE Services Management Console main menu, select **User Management > User Admin > Add User**.
2. On the Add User page, complete following fields for the user you are adding.

   ✱ **Note:**

   The required fields are marked with an asterisk.

   a. In the **User id** field, type the user id you are assigning to the user (for example `jdoe`).

   b. In the **Common Name** field, enter the name the user prefers to use (for example `Jane Doe`).

   c. In the **Surname** field, type the surname (for example `Doe`).

   d. In the **User Password** field, type the password you are assigning to the user.

   e. In the **Confirm Password** field, re-type the assigned password.

   f. In the **CT User** field, do one of the following:

   - Accept the default (**no**) if the user is not a member of the SDB.
   - Select **yes** if the user is a member of the SDB.

   For more information about CT Users, see **CT User** in the Glossary.
3. Click **Apply**.

   The user you added has read-write access to User Management features in the AE Services Management Console.

Editing a user in User Management

Procedure

1. From the AE Services Management Console main menu, select **User Management > User Admin > List All Users**.
2. From the **List All Users** page, select the user id you want to edit.

3. Click **Edit**.
4. Edit the fields as appropriate.
5. Click **Apply**.
6. From the **Edit User confirmation** page, click **Apply Changes**.

Deleting a user from User Management

Procedure

1. From the AE Services Management Console main menu, select **User Management > User Admin > List All Users**.
2. From the **List All Users** page, select the User Id you want to delete.
3. Click **Delete**.
4. From the **Delete User confirmation** page, click **Delete**.

Searching for users in User Management

Procedure

1. From the AE Services Management Console main menu, select **User Management > User Admin > Search Users**.
2. On the **Search Users** page, in the **Search Attribute** field, select one of the following:
   - User ID
   - Surname
   - Common Name
3. In the **Search value** field, type the search value, as follows:
   - If you selected User ID, type a user ID (for example `jdoe`).
   - If you selected Surname, type the user’s last name (for example `doe`).
   - If you selected Common Name, type the user’s first name and last name (for example `Jane Doe`).

   Your browser displays the Search Results page. If your search yields a match (or a list of matches), your browser displays the User ID, Common Name, and Surname of the user(s).

Search tips

Here are a few basic search tips.

- AE Services Management Console searches are not case sensitive. For example, you can use all lower case characters on a surname, such as doe, and get a successful result for Doe.
- Use the asterisk (or "wildcard") when you know only part of the first or last name or User ID Usually, wildcard searches result in multiple names.

Modifying the default user - sample

About this task

The Modify Default User feature is closely tied to the Add User Web feature. When you have large groups of people who share common attributes, you can use the Modify Default User feature to simplify the process of adding users. Keep in mind, however, that if you do plan to use Modify Default User feature in this way, you must manage the process carefully.

Here is a simple example that demonstrates how the Modify Default User feature can be used to administer 60 users for two different departments, sales and support. Each department consists of 30 people.

Procedure

1. From the AE Services Management Console main menu, select **User Management > User Admin > Modify Default User**.
2. On the **Modify Default User** page, in the **Business Category** field, type `Sales`.
3. In the **Department Number** field, type `30756032100` (the department number for sales), and click **Apply**.
4. From the User Management menu select **Add User**.
5. On the **Add User** page, for each user in the sales department you would need to enter specific information for the required fields (User ID, Common Name, Surname, User Password, and Confirm Password), but the following fields, which you administered on the Modify Default User page, would already be complete.
   - Business Category **Sales**
   - Department Number **30756032100**
6. Once you have completed the **Add User** page for each of the 30 users in the Sales group, select **Modify Default User**.
7. On the **Modify Default User** page, in the **Business Category** field, type `Support`.
8. In the **Department Number** field, type `30747912100` (the department number for Support), and click **Apply**.
9. From the User Management menu select **Add User**.

10. On the **Add User** page, for each user in the Support department, you would need to enter specific information for the required fields (User ID, Common Name, Surname, User Password, and Confirm Password), but the following fields, which you administered on the Modify Default User page, would already be complete.

    - Business Category **Support**
    - Department Number **3074791210**0

11. Once you have completed the **Add User** page for all 30 users in the Support group, select **Modify Default User**.
12. On the **Modify Default User** page, clear the **Business Category** and **Department Number** fields, and click **Apply**.

    Important:

    When you use the **Modify Default User** page to administer groups of users with common settings, be sure to clear the settings once you have completed the process of administering all groups.

Changing user passwords

About this task

Follow this procedure to change your User Management password.

Procedure

1. From the AE Services Management Console main menu, select **User Management > User Admin > Change User Password**.
2. On the **Change User Password** page, in the **User Id** field, type the user Id of the user you want to modify.
3. In the **New Password** field, type a new password.

   The default User Management password policy, which is based on a US standard keyboard, calls for a minimum of 8 characters, including a minimum of 1 upper-case, 1 lower-case, 1 alphanumeric, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.
4. In the **Confirm New Password** field, re-type the new password.
5. Click **Apply**.

Service Administration configuration files

Service Administration provides configuration files that enable you to control the local LDAP database. All configuration files contain parameters that are expressed as name-value pairs in the following format: `name=value`. For example, `cn=common name`.

⚠ **Caution:**

Unless you are an advanced administrator, do not change any settings in these files.

attributesmap.properties

This file is used to map raw (LDAP oriented) user attribute names to friendly display names. For example, the file maps the attribute named “uid” to “User ID”.

There is no need to re-initialize the User Management if this file is edited.

attributeacl.properties

This file allows fine tuning of the attribute level Access Control List (ACL) enforced by User Management. This file is generally only altered for customization purposes.

For changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

sdbdistributor.properties

This file is the configuration file for the SDB Distributor. This Distributor supports synchronization of the User Management with the Security Database.

For changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

genericldap1.properties, genericldap2.properties, replicator1.properties

These three files are for reference only. The genericldap property files demonstrate two examples of configuring an LDAP distributor and serve as models for setting up an LDAP Distributor, post-installation.

Changes to these files are unnecessary unless a like named Distributor is configured to run in the user.properties file (distributors section).

When a corresponding Distributor is being run, and changes are made to its property file, the changes will not take effect until the User Management is re-initialized. See Re-initializing service configuration files on page 151.

Note:

The replicator1.properties file is a place holder for a replication Distributor that is not available in the current release of the User Management.

rbac.properties

This file maps User Management operation names to a list of roles that give access to the specified operation. It would be very unusual to reconfigure this file post-installation.

For changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

ldapfilter.properties

This file configures the LDAP Authentication filter. When the User Management receives an operation request, the service validates the callers credentials against the LDAP service indicated in this file. The settings in this file should reflect the mode of authentication that the User Management is running in (see user.properties security section). For example, if the User Management is running with remote authentication, the ldapfilter.properties should be set to the same remote LDAP service. If the User Management is running with basic (local) authentication, then the properties should specify the User Management's underlying LDAP service.

For changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

log4j.properties

This file is used to configure logging for the User Service using log4j.

remoteldapauthenticator.properties

If the User Management is running with remote authentication then this file specifies the location of the remote LDAP service. If this file is in use, the settings will normally match those of the ldapfilter.properties file.

For changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

user.properties

This is the main configuration file for the User Management service. It controls:

- Primary LDAP interface settings
- Distributor settings
- Logging settings
- Supported attributes and their types
- The definition of “protected” users (from deletion during synchronizations)
- Security
- Advertising of internal user roles (for the AE Services Management Console)

For changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

ws_cus_bootstrap.properties

This file contains the essential bootstrap parameters for the service, and is not normally altered post-installation. If the file is altered, it must be manually copied to the <*TOMCAT_HOME*>/ webapps/axis/WEB-INF folder. Then, for changes to this file to take effect, the User Management must be re-initialized. See Re-initializing service configuration files on page 151.

Re-initializing service configuration files

About this task

After you edit the service configuration files, you need to reinitialize them to put your changes into effect. Re-initializing the service is a non-blocking feature. AE Services continues to operate when you use this feature.

Procedure

1. From the AE Services Management Console main menu, select **User Management > Service Admin > Re-initialize Services**.
2. On the **Reinitialize Service** page, click **Reinitialize** to re-initialize service configuration files.

Editing the default user values file

About this task

The default user values properties file `defaultuservalues.properties` determines which values appear as the default values on the Add User page in User Management. For more information on user management, see Adding a user to User Management on page 145.

All parameters in the `defaultuservalues.properties` file are expressed as name-value pairs in the following format: `name=value`, for example `cn=common name`.

Procedure

1. From the AE Services Management Console main menu, select **User Management > Service Admin > Edit Services**.
2. Select **defaultuservalues.properties** from the list of property files, and click **Edit**.
3. On the **Edit Service Configuration** page, add `preferredlanguage=English` as a user attribute, and click **Apply**.

   A message appears stating that if you edited service configuration, you may have to initialize the service for changes to be effective.

   Note:

   After you edit a service configuration file, you do not have to reinitialize the service.
4. To verify the default value for the preferred language is English, from the AE Services Management Console main menu, select **User Management > User Admin > Add User**.

   Your browser displays the **Add User** page which displays **English** in the **preferredlanguage** field.
5. To change the preferred language value (from English to Spanish, for example), from the AE Services Management Console main menu, select **User Management > User Admin > Modify Default User**.
6. From the **Modify Default User** page, change the value for the preferred language to **Spanish**.
7. Select **User Management > Service Admin > Reinitialize Service**.
8. Repeat Step 4 to verify the preferred language has change to Spanish.

Guidelines for synchronizing distributors

Distributors are components of User Management that propagate changes, such as additions, changes, or deletions, from an application to the AE Services User Service database. AE Services provides two distributors, the SDB distributor and the Generic LDAP distributor.

The Synchronize feature is used to trigger a synchronization of user data between the User Service database (LDAP based) and an application user space (for example, the TSAPI SDB) through a Distributor connection. The Synchronize feature on the **Distributor List** page allows you to trigger an on-demand synchronization.

Following are a few situations that require an on-demand synchronization:

- Recovery of AE Services after a User Management failure or a maintenance shutdown. For information about shutting down services, see Service Controller (start stop and restart services) on page 128.
- Recovery of AE Services after a client application failure or a maintenance shutdown
- After adding a new client application that relies on the User Management capabilities

Configuration using CLI

The following APIs allow you to configure AE Services by using the CLI. By using these APIs, you can configure AE Services without accessing the AE Services management console.

Common return codes:

Return code	Description
0	<No message> Success.
1	The api has not been used correctly. Please check respective documentation for more details.
2	Restart aesvcs service manually using "/usr/bin/systemctl restart aesvcs.service" for changes to take effect.
3	The database query failed to execute.

Note:

All the utilities when run with -h or - -help option will display the usage of the respective utility. All the utilities must run using “root” user.

setWeblm

setWeblm allows you to set the IP address of the WebLM server.

Syntax

```
setWeblm -pri IPaddress/FQDN:port -pssl [true|false] -sec IPaddress/
FQDN:port -sssl [true|false] -hostval [true|false]
```

where:

Argument	Description
-pri IPaddress/ FQDN:port	IP address or FQDN of the primary WebLM server and the port number.
-sec IPaddress/ FQDN:port	IP address or FQDN of the secondary WebLM server and the port number.
-pssl	The Secure Socket Layer connection to a primary WebLM server. By default this value is true.
-sssl	The Secure Socket Layer connection to a secondary WebLM server. By default this value is true.
-hostval	TLS hostname validation for the external WebLM server.

Note:

The **-hostval** argument and FQDN for primary and secondary WebLM server are available from Release 8.1.3 and later.

Return codes:

Return code	Description
4	Configuration of WebLM servers for GRHA failed.
6	The WebLM IP address/FQDN is invalid.
7	Cannot use the non-secure WebLM Ports 80 or 8080 as WebLM Port, when SSL is true.
8	Cannot use the secure WebLM Ports 443 or 8443 as WebLM Port, when SSL is false.
9	The WebLM Port must be numeric.
10	The WebLM Port must be a valid port value within 1024 to 65535 or 443 and 80.

reservedLicenses

Allows you to configure and display the number of reserved licenses on AE Services for TSAPI basic user licenses, unified desktop licenses, and DMCC licenses.

Syntax

```
reservedLicenses reserve [ tsapi | desktop | dmcc ] [ number of
licenses ]
```

```
reservedLicenses status [ tsapi | desktop | dmcc ]
```

For example, `reservedLicenses reserve tsapi 500`

where:

Argument	Description
reserve	Reserves the required number of licenses.

Table continues…

Argument	Description
status	Displays the current reserved licenses.
tsapi	This option corresponds to 'Reserved Tsapi Basic User Licenses' range of licenses that can be reserved: 1 - 25000.
desktop	This option corresponds to 'ReservedUnifiedDesktopLicenses' range of licenses that can be reserved: 1 – 25000.
dmcc	This option corresponds to 'Reserved DMCC Licenses' range of licenses that can be reserved: 1 – 1000.

Return codes:

Return code	Description
4	Invalid number of licenses entered.

importSDB

Allows you to import or upload an SDB backup file to AE Services server.

Syntax

`importSDB [path_to_file]`

For example, `importSDB /tmp/backupsdb.txt`

where:

Argument	Description
path_to_file	This is the path of the SDB backup file in txt format.

Return codes:

Return code	Description
4	The file to import does not exist.
5	The file to import is not in correct format.
6	The file to import is too large. Cannot import.
7	There was an error in creating the temporary tar file.
8	Error in converting the tar file to DOS format.
9	Error importing SDB file. Check `/var/log/avaya/aes/importsdb.log` for more details.

setSDB

This will enable and disable Security Database for DMCC service, TSAPI service, JTAPI service and TWS.

Syntax

`setSDB [ enable | disable ] [ dmcc | tsapi ]`

For example, `setSDB enable dmcc`

where:

Argument	Description
enable	Enables the SDB access for the respective services.
disable	Disables the SDB access for the respective services.
dmcc	This option implies the DMCC service.
tsapi	This option implies the TSAPI, JTAPI, and Telephony WebServices.

For return codes, see “Common return codes” in “Configuration using CLI” section.

hostAA

Allows you to set the service settings under HostAA properties.

Syntax

`hostAA set [service name] [client authentication] [trusted host entry]`

For example, `hostAA set dmcc true true`

where:

Argument	Description
set	Sets the authentication settings for respective services.
service name	This can be dmcc, tsapi, cvlan, or tr87.
client authentication	This is ‘true’ or ‘false’ for authenticating client with trusted CA certificate for respective servicename.
trusted host entry	This is ‘true’ or ‘false’ for enabling or disabling the “Require Trusted Host Entry” which checks the CN in the client certificate and verifies that it matches one of the administered authorized hosts.

Return codes:

Return code	Description
5	The DMCC client authentication must be true if DMCC host authorization is true.
6	The TR87 client authentication cannot be set to false.

trustedHosts

This will add a host as a trusted, authorized host under the HostAA configuration.

Syntax

```
trustedHosts add [certificateCN] [service type] [authentication policy]
[authorization policy]
```

```
trustedHosts del [certificateCN] [service type]
```

```
trustedHosts edit [old certificateCN] [old service type] -n [new
certificateCN] -s [new service type] -an [new authentication policy] -
auth [new authorization policy]
```

For example, `trustedHosts add aesclient dmcc yes sdb`

where:

Argument	Description
add	Add the trusted host entry.
del	Delete the trusted host entry.
edit	Edit the trusted host entry.
certificateCN	The name that appears in the Subject Name or Common Name (CN) field of the client cert.
service type	'all', 'dmcc' or 'tr87'.
authentication policy	yes' or 'no' to apply authentication policy for the service.
authorization policy	'sdb' for Security Database, 'ed' for Enterprise Directory, 'any' for Unrestricted host.

Return codes:

Return code	Description
4	The User Authentication Policy cannot be set to Required when the service type is TR/87.
5	Could not delete host. Possible reasons: The given combination of host and service type does not exist or the host was already deleted.
6	Possible duplication, CN already exists. Cannot add same CN for service type ALL.
7	Could not delete host. Possible reason: The host was already deleted. Not an error condition.
8	The specified host and/or service does not exist.

trustCACertMgmt

This API is used to manage trusted certificates.

Syntax

```
trustCACertMgmt list
```

```
trustCACertMgmt view [alias]
trustCACertMgmt import [alias] [uploadedfilename/path]
trustCACertMgmt export [alias]
trustCACertMgmt delete [alias]
```

For example, `trustCACertMgmt import DMCC /tmp/dmcc.txt`

where:

Argument	Description
list	Lists all trusted CA certificates present on the server.
view	View details of mentioned trusted CA Certificate.
import	Imports the mentioned trusted CA Certificate.
export	Exports or displays pem text of mentioned trusted CA Certificate. It can be redirected to a file in order to save it and can be used to import this certificate whenever and wherever required.
delete	Deletes the mentioned trusted CA Certificate.
alias	Suitable name for a trusted CA Certificate given by user.
uploadedfilename/path	File name or absolute path of the certificate user going to import.

Return codes:

Return code	Description
4	No certificate with this name is present.
5	Error reading trusted certificate repository to list certificates.
6	Certificate with alias does not exist.
7	Alias name format error. Allowed values: Alphanumeric chars, underscore (_), and hyphen (-). Max 31 chars.
8	The import file must be a PEM file.
9	The imported file does not exist.
10	Verification for the imported file failed.
11	Alias already exists.
12	Certificate already exists.
13	Switch to root user to execute the script
14	Deletion of default certificate is denied.
15	Keystore is not present.

serverCertificates

This API is used to manage server certificates.

Syntax

```
serverCertificates list
```

`serverCertificates view [alias]`

`serverCertificates import [alias] [uploadedfilename/path] [isChainOfTrust] [password]`

`serverCertificates delete [alias]`

For example, `serverCertificates import DMCC /tmp/dmcc.txt true ahvc1234`

where:

Argument	Description
list	Lists server certificates present on the server.
view	View details of mentioned server certificate.
import	Imports mentioned server Certificate.
delete	Deletes mentioned server certificate.
alias	Suitable name for a server certificate given by user.
uploadedfilename/path	File name or absolute path of the certificate user going to import.
isChainOfTrust	Allowed values are true or false.
password	Password is optional depending on the type of certificate.

Return codes:

Return code	Description
4	Switch to root user to execute the script.
5	Error reading server certificate respository to list certificates.
6	Certificate does not exist.
7	Import failed. Certificate request not found.
8	Alias name should be one of aeservices,server,rsyslog,ldap,cmtls,web.
9	Certificate directory does not exist.
10	Certificate with this alias already exists.
11	Import file must be PEM or pfx file.
12	Establish chain of trust is required for importing pkcs12 file.
13	Certificate file is empty or unavailable.
14	Error importing certificate.
15	Error extracting PEM file.
16	Wrong Password entered.
17	Exception in deleting certificate request while overriding.
18	Certificate deletion failed.

tsapiCti

This API is used to query and edit information for cti link information for tsapi

Syntax

`tsapiCti add [switchname] [ctilink] [security] [linkversion]`

`tsapiCti status [switchname]`

`tsapiCti remove [switchname]`

`tsapiCti edit [oldswitchname] -n [newswitchname] -c [ctilink] -v [linkversion] -s [security]`

Following are the examples:

- `tsapiCti add switchCM 4 both 9`
- `tsapiCti edit switchCM -s unencrypted`

where:

Argument	Description
add	Adds ctilink with given switch name.
status	Gets the status of the link.
remove	Removes the ctilink.
edit	Edit the information of link.
linkversion	Values range from 1 to 9 for Release 8.0.1 and 1 to 10 for Release 8.1.x.
ctilink	Values range from 1 to 64.
security	Can have the following values: encrypted, unencrypted, both.

Return codes:

Return code	Description
4	Switch does not exist in switch connections.
5	Invalid CTI link number.
6	Invalid Security mode/Encryption state.
7	TSAPI link already exists.
8	TSAPI link does not exist.

switchConnection

This API is used to add or edit Switch connections with Communication Manager.

Syntax

`switchConnection add [switchName] [switchPassword] [msgPeriod] [isPe] [h323tls] [aesCert] [isHostValidate]`

`switchConnection update [switchName] -pw switchPassword -pe isPe -h h323tls -c aesCert -hvisHostValidate`

`switchConnection editPEClan [switchName] [ip]`

```
switchConnection editH323 [switchName] [ip]
switchConnection deleteConnection [switchName]
switchConnection deletePEClan [switchName] [ip]
switchConnection deleteH323 [ip]
```

Following are the examples:

- `switchConnection add switchCM avaya12345avaya 30 true false false`
- `switchConnection deletePEClan switchCM 10.133.68.56`

where:

Argument	Description
add	Adds switch with corresponding switchname and other parameters.
update	Updates the parameters related to a particular switch.
editPEClan	Adds PE/CLAN IP for corresponding switch.
editH323	Adds H323 IP for switch.
deleteConnection	Deletes switch for given switch name.
deletePEClan	Deletes associated PE/CLAN IP.
deleteH323	Deletes associated H323 IP.
msgPeriod	Can have values from 1 to 72.
isPe, h323tls, aesCert, isHostValidate	Can have the following values: true or false. **Note:** AES supports Hostvalidate argument from Release 8.1.3 and later.

Return codes:

Return code	Description
4	Invalid msgPeriod.
5	Switch does not exist.
6	Max number of CLANs connections reached.
7	Cannot delete if there are active CLANs for the switch connection.
8	Cannot delete if there are links administered for the Switch Connection. Remove the CLANs first.
9	Cannot delete if CLAN is active.
10	H323 Gatekeeper does not exist.
11	Switch already exist.
12	Maximum number of Switch Connections reached.
13	Invalid switch name.
14	Invalid password.

stdResPorts

This API is used to enable or disable the standard ports.

Syntax

`stdResPorts -nm [service name] [enable|disable]`

`stdResPorts -no [port no] [enable|disable]`

For example, `stdResPorts -no 80 enable`

where:

Argument	Description
-nm [service name]	Accepts the name of service. It is case sensitive. All the values must be in lower case.
-no [port no]	Accepts the port number of service. If port number entered is 514, then the last argument should be [shell/syslog].

Return codes:

Return code	Description
4	Action is invalid. It should either be enable or disable.
5	Invalid service name.
6	Invalid port number.

enterpriseDirectory

This API is used to edit enterprise directory or view it.

Syntax to edit:

`enterpriseDirectory baseDN hostFQDN primaryPort [options]`

[options] are as follows:

- -udn (User DN for query authentication)
- -pw (Password)
- -sechost (Secondary hostname)
- -secport (Secondary port)
- -uid (User ID attribute name)
- -urole (User role attribute name)
- -cpwd (Change password URL)
- -devid (Device ID attribute)
- -filter (Search filter attribute)

Syntax to view:

```
enterpriseDirectory view
```

For example, `enterpriseDirectoy cn=Users,dc=aes,dc=rnd,dc=avaya,dc=com lcs-dc1.aes.rnd.avaya.com 389`

where:

The edit command will edit the enterprise directory.

The view command will display all the fields of enterprise directory.

Return codes:

Return code	Description
4	Could not change enterprise directory.
5	User DN for query authentication invalid
6	Base Search DN invalid
7	Primary/Secondary host should be in the form of FQDN.
8	Port value should be 389, 636, or within 1024 to 65535
9	User ID attribute name required except for TR/87 usage.
10	Password cannot contain backslash (\\)
11	Unable to locate Server Certificate.
12	Could not retrieve Enterprise directory Information.

networkingPorts

This API is used to set the range for AES networking ports, and enable or disable them.

Syntax

```
networkingPorts cvlan -uact [action] -eact [action] -e [portno]*

networkingPorts tsapi -spact [action] -umin [portno]* -umax [portno]* -
emin [portno]* -emax [portno]*

networkingPorts dmcc -uact [action] -u [portno]* -eact [action] -e
[portno]* -tact [action] -tr87 [portno]*

networkingPorts h323 -tmin [portno] -lumin [portno] -lumax [portno] -
smact [action] -rlumin [portno]* -rlumax [portno]*

networkingPorts sms -min [portno] -max [portno]
```

For example, `networkingPorts cvlan -eact enabled -e 9990`

where:

Argument	Sub-argument	Description
action	-	Allowed values are enabled or disabled.
portno	-	Can have values between 1024 and 65535.
(*)	-	Indicates that the editing of port value is permitted only if action before it is “enabled”.
cvlan	-uact	Unencrypted port action.
	-eact	Encrypted port action.
	-e	Encrypted port number.
tsapi	-spact	TSAPI service port action.
	-umin	Unencrypted TLINK port no. minimum value.
	-umax	Unencrypted TLINK port no. maximum value.
	-emin	Encrypted TLINK port no. minimum value.
	-emax	Encrypted TLINK port no. maximum value.
dmcc	-uact	Unencrypted port action.
	-u	Unencrypted port number.
	-eact	Encrypted port action.
	-e	Encrypted port number.
	-tact	Tr87 port action.
	-tr87	Tr87 port number.
h323	-tmin	TCP minimum port number.
	-lumin	TCP maximum port number.
	-lumax	Local UDP minimum port number.
	-smact	Local UDP maximum port number.
	-rlumin	RTP local UDP minimum port number.
	-rlumax	RTP local UDP maximum port number.
sms	-max	Minimum proxy port number.
	-min	Maximum proxy port number.

Return codes:

Return code	Description
4	Port number or port range value should be between 1024 and 65535.
5	The action value is invalid. It should be enabled or disabled.
6	To change port value the respective action should be enabled.

Table continues…

Return code	Description
7	Exception occurred while trying to save SMS proxy ports to the configuration file. Either the file could not be found or you do not have write permissions. SMS changes have not been saved. For return code 7, all other values except SMS are saved successfully. For debugging purposes, please check and confirm for the below value. ll /etc/sms.ini lrwxrwxrwx 1 root 25 Mar 13 12:00 /etc/sms.ini -> /opt/mvap/web/sms/saw.ini

ctiUser

This API will create, view, or edit ctiUsers.

Syntax

`ctiUser add [userid] [common-name] [surname] [password] [isCtiUser] -ar [avayaRole]`

`ctiUser modify [userid] -n [common-name] -s [surname] -pw [password] -c [isCtiUser] -ar [avayaRole]`

`ctiUser delete [userid]`

`ctiUser view [userid]`

`ctiUser unrestricted [userid] [true|false]`

For example, `ctiUser modify user01 -n aesuser -s aes -c no`

where:

Argument	Description
isCtiUser	Can have yes or no values.
avayaRole	Can have userservice, useradmin, or None values.
add	Adds user with given parameters.
modify	Modify the user with given userid.
delete	Delete the user with given userid.
view	Views information of the user with given userid.
unrestricted	Grants and rejects unrestricted access to a user, if it is a ctiUser

While viewing CTI user, if userid is not provided, list of all users are displayed.

The unrestricted option will enable or disable unrestricted SDB access for a given CTI user.

Return codes:

Return code	Description
4	Avaya Role is invalid.
5	Value of isCtiUser should be yes or no.
6	uid, cn or sn can contain [A-Z,a-z,0-9,_,-] and could be less than 32 characters.
7	Password should have at least one uppercase, one lowercase, one digit and one special character with minimum length of 8 characters.
8	User with this uid already exist.
9	User could not be <action> due to unknown reason.
10	The user with given uid does not exist.
11	The user is not a CTI user. Cannot modify unrestricted access.

snmpAgent

This API is used to view Product ID and configure snmp agent.

Syntax

`snmpAgent view-product-id`

```
snmpAgent add -syslocation [alphanumeric value] -contact [alphanumeric
value] -v1 [true | false] -communityname1 [alphanumeric value] -v2c
[true | false] -communityname2 [alphanumeric value] -v3 [true | false] -
username [alphanumeric value] -authProtocol [None | MD5 | SHA] -
authPassword [alphanumeric value] -privacyProtocol [None | AES | DES] -
privacyPassword [alphanumeric value] -ipaccess [noAccess |
specificAccess | allAccess] -multipleIPaddr ["ip1 ip2 ip3 ip4 ip5"]
```

Examples are as follows:

```
snmpAgent view-product-id
```

```
snmpAgent add -syslocation pune -contact 1234 -v1 true -communityname1
agent1 -v2c true -communityname2 agent1v2 -v3 true -username agent1v3 -
authProtocol MD5 -authPassword abcd12345 -privacyProtocol  AES -
privacyPassword abcd1234 -ipaccess specificAccess -multipleIPaddr
"1.0.0.1 1.2.3.4 1.0.9.6"
```

where:

Argument	Description
view-product-id	Displays the product ID.
add	Adds or updates an SNMP agent.
authProtocol	Allowed values are: None, MD5, and SHA.
authPassword	Password length need to be between 8-12 characters.
privacyProtocol	Allowed values – None, AES, and DES.

Table continues…

Argument	Description
privacyPassword	Password length to be exactly 8 characters.
ipaccess	Allowed values – noAccess, specificAccess, and allAccess.
multipleIPaddr	Maximum of 5 IPs are allowed. If more then 1 ip is entered, make sure to enter in “x.x.x.x y.y.y.y”(within double quotes separated by space).

Return codes:

Return code	Description
4	v1 , v2c, or v3 can either be true or false.
5	community name or user name can not be left empty, if v1 ,v2c v3 is selected.
6	Password is required if protocol is not none.
7	Syslocation/contact/communityname1/communityname2c/username/ipaddress format error. Allowed values: Alphanumeric chars, underscore (_), space, dot, coma, and hyphen (-). Maximum 255 characters are allowed.
8	Auth protocol can only be either 'None', 'MD5', 'SHA'.
9	Auth password length 8-12 characters and alphanumeric.
10	Privacy protocol can only be either 'None', 'DES', 'AES'.
11	Privacy password length exactly 8 characters and alphanumeric.
12	Authorization protocol and password are required.
13	Execute with root user.
14	Invalid IP address.
15	More than 5 IPs are not allowed.
16	If IPaccess is specificAccess, please mention IP addresses.
17	$STANDARD_PORTS file not found.
18	firewallStdPortUpdater ACCEPT/REJECT command failed to execute.
19	'noAccess' , 'allAccess', 'specificAccess' are only allowed values for ipaccess.
20	Failed to restart service <service name>.

snmpTrapReceiver

This API is used to configure SNMP Trap Receivers.

Syntax

```
snmpTrapReceiver list
```

```
snmpTrapReceiver add -enabled [true|false] -port [port number] -
snmpversion [2c|3] -securityname [name] -authProtocol [None|MD5|SHA] -
authPassword [password]-privacyProtocol [None|DES|AES] -privacyPassword
[password] -ipaddr [ipaddress]
```

`snmpTrapReceiver modify -id [id retrieved using list function] -enabled [true|false] -port [port no.] -snmpversion [2c|3] -securityname [name] -authProtocol [None|MD5|SHA] -authPassword [password]-privacyProtocol [None|DES|AES] -privacyPassword [password] -ipaddr [ipaddress]`

`snmpTrapReceiver delete -id [id retrieved using list function]`

`snmpTrapReceiver generate-agent-authfail-traps [true|false]`

For example, `snmpTrapReceiver add -enabled true -port 162 -snmpversion 3 -securityname snmpTrap1 -authProtocol SHA -authPassword abcd1234 -privacyProtocol AES -privacyPassword abcd1234 -ipaddr 127.0.0.1`

where:

Argument	Description
list	Lists all the configured snmp trap receivers.
add	Adds a new snmp trap receiver.
modify	Modifies an already configured snmp trap receiver.
delete	Deletes a snmp trap receiver.
generate-agent-authfail-traps	Generates agent authentication failure trap.

Return codes:

Return code	Description
4	SNMP version can either be 2c or 3.
5	Version 2c is selected. Authorization protocol or privacy protocol are not applicable.
6	Password is required if protocol is not none.
7	<Parameter name> invalid value .
8	Auth protocol can only be either 'None', 'MD5', or 'SHA'.
9	Password length cannot be less than 6 characters.
10	Privacy protocol can only be either 'None', 'DES' 'AES’.
11	Authorization protocol and password are required.
12	Switch to root user to execute the scrip.
13	Failed to restart service <service name>.
14	<Script name> script failed.

aesConnectivity

This API provides the ability to specify the NIC used for client, switch, or media connectivity.

Syntax

`aesConnectivity [-oam|switch|-media|-client] [ipaddress]` - If only one of the connectivity need to be changed or configured.

`aesConnectivity [-oam|-switch|-media|-client] [ipaddress] [-oam|-switch|-media|-client] [ipaddress]` - If only one or more of the connectivity need to be changed or configured.

`aesConnectivity -oam [ip address] -client [ip address] -switch [ip address] -media [ipaddress]` - If all of the connectivity need to be changed or configured.

Note:

To allow connectivity from any ipaddress, enter '0.0.0.0' or '::' as ipaddress.

For example, `aesConnectivity -oam 0.0.0.0 -client 10.133.84.223 -switch 10.133.84.230 -media 10.133.84.230`

where:

Argument	Description
oam	To set oam connectivity.
client	To set client connectivity.
switch	To set switch connectivity.
media	To set media connectivity.
ipaddress	AES IP, virtual IP (incase if HA is configured or any (0.0.0.0)).

Return codes:

Return code	Description
4	Make sure CVLAN Service is offline. If not, user should stop service before changing the client facing IP.
5	Either invalid or not permissible IP address.
6	Execute with root user.
7	The command failed to execute.
8	Failed to restart service <service name>.

Chapter 8: Security Administration and Additional PAM Management

About Security Administration and additional PAM management

This chapter covers two major sections:

- **Security administration**. Security administration refers to managing the local Linux accounts on the AE Server and includes the following:
  - Account management
  - Pluggable Authentication Module (PAM) management
  - Login reports
  - Login audit
- **Additional PAM management capabilities**. PAM management capabilities describes authentication methods that apply to DMCC, TSAPI, JTAPI, and Telephony Web Services users. The information in this section does not apply to AE Services Management Console users or remote users with SSH access. PAM management includes the following:
  - Linux (using pam_unix)
  - LDAP (using pam_ldap)
  - AE Services User Management (using pam_ldap)
  - Active Directory w/ Kerberos (using pam_krb5)

Note:

The information in this chapter is not applicable to users of the following applications: DLG, CVLAN, and the System Management Service (SMS).

Security administration

The Security administration features can be accessed by the user assigned to the Security_Administrator role. For information about role assignments, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

The Security Administration feature (Account Management and PAM administration) affects the AE Services Management Console and access to the Linux server.

- Account management
  - Add Login
  - Modify Login
  - Remove Login
  - Lock/Unlock Login
- PAM
  - PAM Issue
  - PAM Limits
  - PAM MOTD
  - PAM Password Manager
  - PAM Time
- Audit
  - Login Reports
  - Login Audit

For an illustration of this administrative domain, see the figure on page 171.

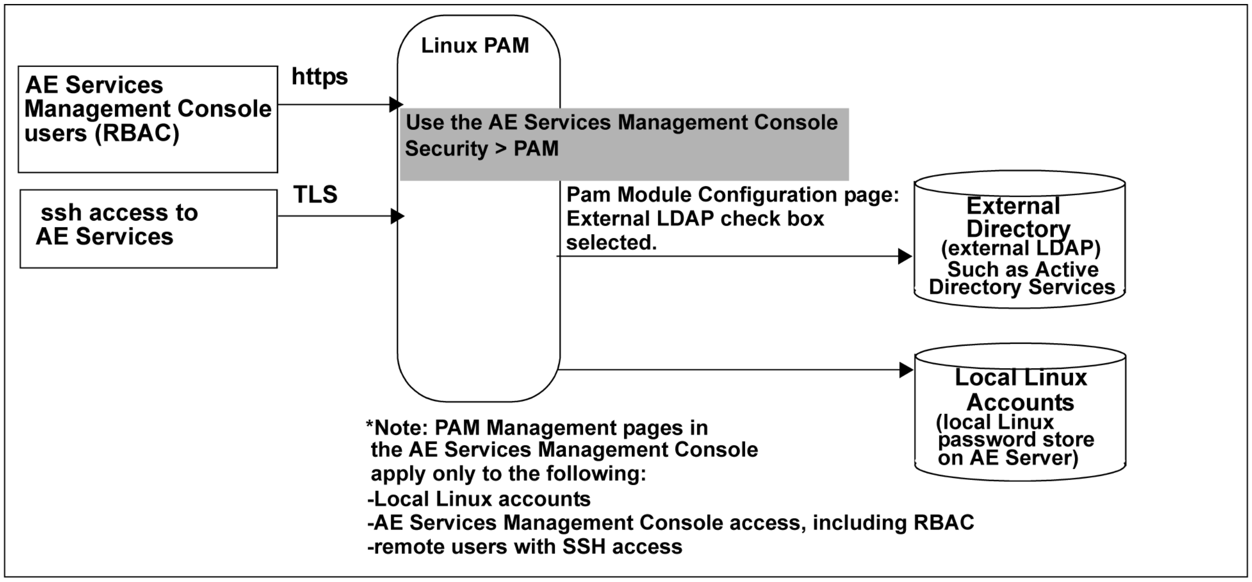

AE Services Management Console users (RBAC)
https
ssh access to AE Services
TLS
Linux PAM
Use the AE Services Management Console Security > PAM
Pam Module Configuration page: External LDAP check box selected.
External Directory (external LDAP) Such as Active Directory Services
Local Linux Accounts (local Linux password store on AE Server)
*Note: PAM Management pages in the AE Services Management Console apply only to the following:
-Local Linux accounts
-AE Services Management Console access, including RBAC
-remote users with SSH access

Figure 29: AE Services Security Administration and PAM management -- AE Services Management Console administrators

Account Management - Linux user accounts

Account Management provides the following features for managing administrator logins and login groups.

- **Add Login** — allows you to add a user account to Linux. For more information, see Adding a local Linux account for an administrator - sample on page 172.
- **Modify Login** — allows you to change the Linux account attributes for an administrator. For more information, see Changing the properties of a Linux administrative account -- Modify login on page 176.
- **Remove Login** — allows you to remove a Linux account. For more information, see Removing a Linux account - Remove Login on page 177.
- **Lock Unlock Login** — allows you to block or grant access to the AE Services Management Console and the AE Server. For more information, see Locking or unlocking a Linux account - Lock/Unlock Login on page 178.
- **Password protection for single user mode login** — allows you to secure the single user mode login using password protection. For more information, see Changing the default password for a single user mode login using CLI on page 178.

Adding a local Linux account for an administrator

About this task

Use this procedure to add a local Linux account for an administrator with the following roles:

- Auditor
- Backup_Restore
- Avaya_Maintenance

The following procedure is a sample scenario that depicts using a limited number of roles. AE Services also provides additional roles. For more information about roles and mapping to Linux groups, see AE Services administrative roles and access privileges (role based access control - RBAC) on page 329.

In Geo-Redundant High Availability configuration, you must create any user on the primary server on the secondary server by using the command-line interface.

Procedure

1. On the AE Services Management Console main menu, select **Security > Account Management > Add Login**.
2. On the Add Login page, in the **Login ID** field, enter a user name.

   A login ID can consist of up to 32 characters. The set of valid characters is: lowercase a through z; uppercase A-Z, the numbers 0 through 9, the dash (-), and the underscore (_).
3. Click **Continue**.

4. On the Add Login page, do the following:
    a. In the **Default Login Group** field, accept the default **users**.

       The Default Login Group **user** maps to the Auditor role. You can have only one group name in the **Default Login Group** field.
    b. In the **Additional Login Groups** field, type `backuprestore,avayamaint`.

       You can have more than one group name in this field. When you enter more than one group name, separate each group name with a comma. Valid group names are:
       - susers
       - securityadmin
       - backuprestore
       - users
       - avayamaint
       - easg
    c. In the **Allow Linux Shell Access** field, accept the default (unchecked) unless you want to provide Shell access to the user.
    d. In the **Lock Account** check box, accept the default (unchecked).
    e. In the **Date on which account is disabled** field, accept the default (blank) unless this is a temporary account that is disabled within a specific time frame.
    f. Under **Password Authentication**, in the **Enter Password** and **Re-enter password** fields, type the password based on the password policy.

       The default Linux password policy, which is based on a US standard keyboard and the default password limits for PAM Module Configuration, calls for a minimum of 8 characters, with at least 1 uppercase, 1 lowercase , 1 alphanumeric , and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.
    g. On the **Force password change on first login** dialog box, click **No**.
    h. In the **Maximum number of days a password may be used** (PASS_MAX_DAYS) field, accept the default (99999).
    i. In the **Minimum number of days allowed between password changes** (PASS_MIN_DAYS) field, accept the default (0).
    j. In the **Number of days warning given before a password expires** (PASS_WARN_AGE) field, accept the default (7).
    k. In the **Days after password expired to lock account** field, accept the default (0).
5. Re-enter the customer password and click **Apply**.

   See Results of adding a local Linux account for an administrator - sample on page 174 to see the access privileges administered for this user (aesadmin3).

Results of adding a local Linux account for an administrator - sample

The following table depicts the results of the sample scenario for adding the aesadmin3 user to the securityadmin and avayamaint groups. The aesadmin3 user now has privileges associated with the Security_Administrator role and the Avaya_Maintenance role in addition to the default privileges associated with the Auditor role. For more information about AE Services administrative roles, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

Role	Linux group	AE Services Management Console access privileges
Auditor	users	Read-only access to the following menus: • Security -- access is limited to: - Audit - Certificate Management - Security Database > CTI Users - Status - Alarm Viewer - Logs -- access is limited to: • Audit Logs • Error Logs • Install Logs • User Management Service - Status and Control - access is limited to: • CVLAN Service Summary • DLG Service Summary • DMCC Service Summary • Switch Conn Summary • TSAPI Service Summary • Help

Table continues…

Role	Linux group	AE Services Management Console access privileges
Security_Administrator	securityadmin	Read and write access to the following menus in the AE Services Management Console: • Security - Account Management - Audit - Certificate Management - PAM - Security Database - Tripwire Properties • Status - Alarm Viewer - Logs - Status and Control • Help
Avaya_Maintenance	avayamaint	Read and write access to the following menus in the AE Services Management Console: • Maintenance - Security Database - Service Controller - Server Data • Security - Audit - Certificate Management - Security Database • Status - Alarm Viewer - Logs • Utilities - Diagnostics

Changing the properties of a Linux administrative account -- modify login

About this task

Use the Modify Login feature to change the properties of a Linux administrative account. For example, assume that you want to restrict the administrative capabilities of the aesadmin3 account (created in Adding a local Linux account for an administrator - sample on page 172) to the Avaya Maintenance role only.

Procedure

1. From the AE Services Management Console main menu, select **Security > Account Management > Modify Login**.

   AE Services displays the initial Modify Login page, which contains the Login ID text box.
2. On the **Modify Login** page, enter a user name in the **Login ID** field (for example `aesadmin3`).
3. Click **Continue**.
4. Complete the **Modify Login** page as follows:
   a. In the **Default Login Group** field , replace `users` with `avayamaint`.
   b. In the **Additional login groups (optional)** field, delete all entries (leave the field blank).
   c. For the remaining fields, keep the administered settings.

      Note:

      If you modify any of the password settings (such as PASS_MAX_DAYS or PASS_MIN_DAYS), the settings that you administer on this page take precedence for the particular user you are administering. The default password settings are read in from the **PAM Management Global Password Aging** page. Any password settings you change on the **Modify Login** page for a particular user have no effect on the **PAM Management Global Password Aging** page.
5. Reenter the cust password and click **Apply**.

   See Results of changing role assignments for “aesadmin3” - sample on page 176 to see the modified access privileges for this user.

Results of changing role assignments for aesadmin3 - sample

The following table depicts the results of the sample scenario for changing aesamdin3 from the Auditor role to the Avaya_Maintenance role. For more information about AE Services administrative roles, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

Role	Linux group	AE Services Management Console access privileges
Avaya_Maintenance	avayamaint	Read and write access to the following menus in the AE Services Management Console: • Maintenance - Security Database - Service Controller - Server Data • Security - Audit - Certificate Management - Security Database • Status - Alarm Viewer - Logs • Utilities - Diagnostics

Removing a Linux account - Remove Login

About this task

Use this procedure to delete a Linux administrative account.

Note:

If an application such as DMCC, TSAPI, JTAPI, or Telephony Web Services uses local Linux for authentication, the Remove Login action affects the application.

Procedure

1. On the AE Services Management Console main menu, select **Security** > **Account Management** > **Remove Login**.
2. On the Remove Login page, in the **Login ID** field, type the login ID of the administrative account that you want to remove.
3. Click **Continue**.
4. On the **Remove Login** page, verify the correct account is displayed.
5. Reenter the cust password and click **Apply**.

Locking or unlocking a Linux account

About this task

Use this procedure to lock or unlock an existing Linux account. Locking an account means prohibiting access to the AE Services Management Console.

Note:

If an application such as DMCC, TSAPI, JTAPI, or Telephony Web Services uses local Linux for authentication, the application will also be affected by the Lock/Unlock action.

The Lock/Unlock Login feature acts as a toggle. If the account is locked, the Lock/Unlock feature lets you unlock the account; if the account is not locked, the Lock/Unlock feature lets you lock the account.

Procedure

1. On the AE Services Management Console main menu, select **Security > Account Management > Lock/Unlock Login**.
2. On the **Lock/Unlock Login** page, in the **Login ID** field, type the login ID of the administrative account whose access you want to change.
3. Click **Continue**.
4. On the Lock/Unlock Login page, verify that the correct account is displayed.
5. Reenter the cust password and click **Apply**.
6. Do one of the following:
   - If the account is currently locked, to unlock the account, click **Unlock**.
   - If the account is currently unlocked, to lock the account, click **Lock**.

Changing the default password for a single user mode login using CLI

About this task

Use the following procedure to set or change the password for single user mode.

Before you begin

Ensure that you are logged in as a root user.

Procedure

1. Log in to AE Services CLI interface and switch to root user.
2. Run the following command to secure the single user mode login:

   ```
   singleUserMode
   ```

   You will be prompted to enter a new password.

3. Enter and confirm the new password.

   The password should have at least one uppercase character, one lowercase character, one digit and one special character with minimum length of 8 characters.

   The new password is set for the single user mode login.

4. Log out of the AE Services CLI interface.

PAM Management

The AE Services Pluggable Authentication Module (PAM) Management Web pages enable you to set up the PAM authentication scheme for managing users who have access to the AE Services Management Console and the Linux server. PAM Management provides the following capabilities:

- The ability to define rules that require users to change their passwords periodically and how administrator accounts are authenticated and controlled. For more information, see Administering the PAM Password Manager on page 179.
- The ability to manage the login message. For more information, see Creating a PAM Issue (/etc/issue) message on page 181.
- The ability to display and change the message of the day (MOTD). For more information, see Creating a PAM MOTD (/etc/motd) message on page 182.
- The ability to limit the maximum number of simultaneous logins. For more information, see Adding PAM limits on page 183.
- The ability to restrict when (days of the week or times of day) a user can log in to AE Services. For more information see Administering PAM time on page 183.

Administering the PAM Password Manager

About this task

The PAM Password Manager allows you to define:

- rules that require users to change their passwords periodically. The settings on this page affect the settings in the `/etc/login.defs` file and are used by the Add Login and Modify Login pages.

  Note:

  Changes to the global password settings affect new users. Existing users are not be affected.

- how AE Services Management Console administrative accounts are authenticated and controlled.

Procedure

1. From the AE Services Management Console main menu, select **Security > PAM > PAM Password Manager**.
2. In the **New global password configuration (etc/login.defs)** section, perform the following steps:
    a. In the **Maximum number of days a password may be used** (PASS_MAX_DAYS) field, accept or change the default (**-1**). The value (-1) indicates that the password never expires.

    b. In the **Minimum number of days allowed between password changes** (PASS_MIN_DAYS) field, accept or change the default (**1**).

    c. In the **Number of days warning given before a password expires** (PASS_WARN_AGE) field, accept or change the default (**10**).
3. In the **Optional Additional Authentication Protocols** section, perform one of the following steps:
    - If you authenticate users to an external LDAP server, select the **External LDAP** check box.
    - If you do not authenticate users to an external LDAP server, accept the default. By default, this option is disabled (that is, a checkmark does not appear in the **External LDAP** check box). When this option is disabled, AE Services authenticates OAM administrative users to the local Linux password store on the AE Services server.
    - If you want to allow the Avaya Logins access to the server (Recommended), select the **Enable EASG user access** checkbox. This option also allows the ability to specify which of the Avaya Logins may or may not be granted access.

      Note:

      By enabling Avaya Logins, you are granting Avaya access to your system. Granting Avaya access to your system maximizes the performance and value of your Avaya support entitlements, allowing Avaya to resolve product issues on time. In addition to enabling the Avaya Logins, this product should be registered with Avaya and technically onboarded for remote connectivity and alarming. Please see the Avaya support site (support.avaya.com/registration) for additional information for registering products and establishing remote access and alarming.
    - If you want to block the Avaya Logins access to the server, select the **Enable EASG user access** checkbox.

      Note:

      By disabling Avaya Logins you are preventing Avaya access to your system that impacts Avaya's ability to provide support for the product. Unless the customer is well-versed in managing the product themselves, Avaya Logins should not be disabled.
4. In the **Password Limits** section, accept or change the default settings. **Enforce Password Limits** check box indicates whether password limits are in effect for the user.

This setting is enabled by default (the check box is selected), which, in turn, enables the following settings:

a. Number of times user is prompted for a new password (retry). The default is **3**.

b. Number of characters in new password that must be different from old password (difok). The default is **8**.

c. Minimum length of a new password (minlen). The default is **14**.

d. Minimum credit in meeting required password length for digits in a password (dcredit). The default is **0**.

e. Minimum credit in meeting required password length for upper case characters in a password (ucredit). The default is **0**.

f. Minimum credit in meeting required password length for lower case characters in a password (lcredit). The default is **0**.

g. Minimum credit in a meeting required password length for other characters in a password (ocredit). The default is **0**.

h. Number of previous passwords that cannot be reused. The default is **10**.

i. Maximum number of same consecutive characters in a password. The default is **2**.

j. Maximum consecutive characters from the same character class (maxclassrepeat). The default is **4**.

k. The algorithm used to encrypt the Linux password. The choices are **sha256** and **sha512**.

The following PAM rule is applicable only if you modify account using the command line interface:

- Number of previous passwords that cannot be reused

5. In the **Failed Login Response** section, accept or change the default settings. **Enable account lockout** with the following parameters check box. This check box is enabled by default, which, in turn, enables the following settings

   a. Lock out login after unsuccessful attempts to login (deny). The default is 5 attempts.

   b. Lock account for seconds (lock_time). The default is 600 seconds.

6. Click **Apply Changes**.

Creating a PAM Issue (/etc/issue) message

About this task

Use the PAM Issue feature to display a message before you log in to the AE Services Management Console. The PAM Issue screen also contains a **Continue to Login** link.

The PAM Issue text is stored in `/etc/issue`. If the `etc/issue` file does not exist, AE Services will not display a PAM Issue message.

Note:

If you access the AE Services Linux shell (command prompt) either locally using a system console or remotely using a secure shell (ssh) client, you will see the PAM Issue message.

Procedure

1. From the AE Services Management Console main menu, select **Security > PAM > PAM Issue**.
2. Follow these steps to complete the **PAM Issue** page.
    a. Accept the default, **Display a message prior to login**.
    b. Replace the default display (the Warning Notice) with the message of your choice.

    Tip:

    The text window on the page is 80 columns wide and 25 lines long. As you approach the 80 column limit, press Enter to force the start of the next line. If you do not force a new line, the text will extend beyond the 80 character boundary.
3. Click **Apply Changes**.

Creating a PAM MOTD (/etc/motd) message

About this task

Use the PAM Message of the Day (MOTD) feature to display a message of the day on the AE Services Management Console after the log-in screen is completed. The PAM MOTD screen also contains a **Continue** button.

The PAM MOTD text is stored in `/etc/motd`. If the `etc/motd` file does not exist, AE Services will not display a message of the day.

Note:

If you access the AE Services Linux shell (command prompt) either locally using a system console or remotely using a secure shell (ssh) client, you will see the PAM MOTD message.

Procedure

1. From the AE Services Management Console main menu, select **Security > PAM > PAM MOTD**.
2. Follow these steps to complete the PAM MOTD page.
    a. Select the check box for **Display a message of the day after login**.
    b. Type a message in the text box (for example, `Hello System Administrator`).
    c. Click **Apply Changes**.

Tip:

The text window on the page is 80 columns wide and 25 lines long. As you approach the 80 column limit, press Enter to force the start of the next line. If you do not force a new line, the text will extend beyond the 80 character boundary.

Adding PAM limits

About this task

Use the PAM Limits page to set the maximum number of simultaneous logins for a user. Keep in mind that the limit for the maximum number of simultaneous logins is a total of all access methods — AE Services Management Console access, shell access, and remote access.

Procedure

1. From the AE Services Management Console main menu, select **Security > PAM > PAM Limits**.
2. Follow these steps to complete the **PAM Limits** page.
   a. Accept the default to enable the setting, **Limit the number of simultaneous logins**.
   b. Accept the default setting (**10**) for **Default Global Pam Limits**.
   c. In the **New Configuration** section, click **Add**.
3. Follow these steps to complete the **Add PAM Limits** page.
   a. In the **Login ID** field, enter a currently administered login ID or user name (for example `aesadmin3`).
   b. In the **Value** field, enter the maximum number of logins for this user (for example `3`).
   c. Click **Apply Changes**.
   d. On the **Add PAM Limits warning** screen, click **Apply**.

Administering PAM time

About this task

Use the PAM Time page to restrict access based on time of day and day of week. If you elect to configure PAM time for a user, you must prohibit a user from logging in for at least one 5-minute interval per week. To meet this minimum requirement, on the PAM Time page, you would select 1 day (for example **Sunday**) and 1 time interval (for example **00:05 to 00:10**) for denying access.

Procedure

1. From the AE Services Management Console main menu, select **Security** > **PAM** > **PAM Time**.
2. Select the **Limit logins by time of day** check box.

> **Note:**
>
> The **Limit logins by time of day** check box must be checked for you to restrict access based on the day of the week or time of day.

3. If prompted to confirm that you want to limit logins by time of day, click **OK**.
4. On the **PAM Time** page, click **Add**.

   The Add PAM Time page appears.
5. In the **Login** field, enter the login ID or user name.
6. From the **Access Rule** drop-down menu, select **Deny**.
7. Select the check box(es) for the appropriate day(s) of the week.
8. Using the **From** box, select the appropriate hour and minutes for the beginning of the time interval.
9. Using the **To** box, select the appropriate hour and minutes for the end of the time interval.
10. Click **Apply Changes**.

Creating a failure message for an unsuccessful login attempt on the AE Services console interface

About this task

If you try to access AE Services Linux shell or command prompt using any of the following scenarios, then you will receive a failure message during the login attempt:

- Locally using a system console
- Remotely using a secure shell (ssh) client

The login failure message will be stored at `/etc/failureMessage` location.

Procedure

1. Log in to the AE Services Management Console as System/Security Administrator.
2. From the AE Services Management Console main menu, select **Security** > **PAM** > **Login Failure Message**.
3. On the Login Failure Message page, type the failure message in the text box.

   As an example, Login failed, please contact the administrator for details.

   The text window is 80 columns wide and 25 lines long. As you approach the 80 column limit, press **Enter** to start typing in the next line. If you do not force a new line, the text will extend beyond the 80 character boundary.
4. Click **Apply Changes** to save the changes.

Login Failure Message field descriptions

Name	Description
Text area	The area to type a failure message. The text window is 25 lines long. By default, the text area displays the message created in the `etc/failureMessage` file.

Button	Description
Apply Changes	To apply the changes.
Cancel Changes	To cancel the changes.

Support for Enhanced Access Security Gateway

Application Enablement Services supports Enhanced Access Security Gateway (EASG).

EASG provides a secure method for Avaya services personnel to access the Avaya Aura® AE Services remotely and onsite. Access is under the control of the customer and can be enabled or disabled at any time. EASG must be enabled for Avaya Services to perform tasks necessary for the ongoing support, management and optimization of the solution. EASG is also required to enable remote proactive support tools such as Avaya Expert Systems® and Avaya Healthcheck.

EASG can be enabled or disabled using the AE Services Management Console.

Related links

Enabling or disabling EASG through the CLI interface on page 185
Enabling or disabling EASG through the AE Services Management Console interface on page 186
Viewing the EASG certificate information on page 187
EASG product certificate expiration on page 187

Enabling or disabling EASG through the CLI interface

About this task

Avaya recommends enabling EASG. By enabling Avaya Logins you are granting Avaya access to your system. This is necessary to maximize the performance and value of your Avaya support entitlements, allowing Avaya to resolve product issues in a timely manner. In addition to enabling the Avaya Logins, this product should be registered with Avaya and technically onboarded for remote connectivity and alarming. Refer to the Avaya support site (support.avaya.com/registration) for additional information for registering products and establishing remote access and alarming.

By disabling Avaya Logins you are preventing Avaya access to your system. This is not recommended, as it impacts Avaya's ability to provide support for the product. Unless the customer is well versed in managing the product themselves, Avaya Logins should not be disabled.

Procedure

1. Log on to the AE Services Management Console as an administrator associated with the Linux group, easg.

   If you log in to the AE Services as a craft with more than three invalid responses, your account gets locked due to PAM configuration. Also, if you run the **`EASGManage --listUsers`** command on the command line interface, the system displays the following output:

   ```
   Locked = No
   ```

   Both the features are different and does not have any relation with each other.
2. To check the status of EASG, run the following command: `EASGStatus`.
3. To enable EASG (Recommended), run the following command: `EASGManage --enableEASG`.
4. To disable EASG, run the following command: `EASGManage --disableEASG`.

Related links

Support for Enhanced Access Security Gateway on page 185

Enabling or disabling EASG through the AE Services Management Console interface

About this task

Avaya recommends enabling EASG. By enabling Avaya Logins you are granting Avaya access to your system. This is necessary to maximize the performance and value of your Avaya support entitlements, allowing Avaya to resolve product issues in a timely manner. In addition to enabling the Avaya Logins, this product should be registered with Avaya and technically onboarded for remote connectivity and alarming. Please see the Avaya support site (support.avaya.com/registration) for additional information for registering products and establishing remote access and alarming.

By disabling Avaya Logins you are preventing Avaya access to your system. This is not recommended, as it impacts Avaya’s ability to provide support for the product. Unless the customer is well versed in managing the product themselves, Avaya Logins should not be disabled.

Note:

- If EASG is enabled during a fresh install, the Optional Additional Authentication Protocols section displays the **Enable EASG** check box as checked.
- Unchecking the **Enable EASG** checkbox disables access for the Avaya Logins craft and sroot.

Procedure

1. Log on to the Application Enablement Services OAM interface.
2. Go to **Security** > **PAM** > **PAM Password Manager**
3. In the Optional Additional Authentication Protocols section, check the **Enable EASG** box to enable EASG (Recommended). Additional settings are presented
4. Allow access for the Avaya Logins by checking the checkbox associated with the users craft and sroot.

Related links

Support for Enhanced Access Security Gateway on page 185

Viewing the EASG certificate information

About this task

Use this procedure to view information about the product certificate, which includes information about when the certificate expires.

Procedure

1. Log in to the Application Enablement Services CLI interface.
2. Run the following command: `EASGProductCert --certInfo`.

Related links

Support for Enhanced Access Security Gateway on page 185

EASG product certificate expiration

Application Enablement Services raises an alarm if the EASG product certificate has expired or is about to expire in 365 days, 180 days, or 30 days. To resolve this alarm, the customer must apply the patch for a new certificate or upgrade to the latest release. Else, the customer loses the ability for Avaya to provide remote access support.

If the EASG product certificate expires, EASG access is still possible through the installation of EASG site certificate.

Related links

Support for Enhanced Access Security Gateway on page 185

EASG site certificate

EASG site certificates are used by the onsite Avaya technicians who do not have access to the Avaya network to generate a response to the EASG challenge. The technician will generate and provide the EASG site certificate to the customer. The customer loads this EASG site certificate on each server to which the customer has granted the technician access. The EASG site certificate will only allow access to systems on which it has been installed, and will only allow access to the given Avaya technician and cannot be used by anyone else to access the system including other Avaya technicians. Once this is done, the technician logs in with the EASG challenge/response.

Managing site certificates

Before you begin

1. Obtain the site certificate from the Avaya support technician.
2. You must load this site certificate on each server that the technician needs to access. Use a file transfer tool, such as WinSCP to copy the site certificate to /home/*cust* directory, where *cust* is the login ID. The directory might vary depending on the file transfer tool used.
3. Note the location of this certificate and use in place of *installed_pkcs7_name* in the commands.
4. You must have the following before loading the site certificate:
   - Login ID and password
   - Secure file transfer tool, such as WinSCP
   - Site Authentication Factor

Procedure

1. Log in to the AE Services CLI interface as an administrator associated with the Linux group, easg.
2. To install the site certificate:
   a. Run the following command: `sudo EASGSiteCertManage --add <installed_pkcs7_name>`.

   b. Save the Site Authentication Factor to share with the technician once on site.
3. To view information about a particular certificate: run the following command:
   - `sudo EASGSiteCertManage --list`: To list all the site certificates that are currently installed on the system.
   - `sudo EASGSiteCertManage --show <installed_pkcs7_name>`: To display detailed information about the specified site certificate.
4. To delete the site certificate, run the following command:
   - `sudo EASGSiteCertManage --delete <installed_pkcs7_name>`: To delete the specified site certificate.
   - `sudo EASGSiteCertManage --delete all`: To delete all the site certificates that are currently installed on the system.

Login reports

AE Services provides two types of login reports:

- A login report for all Linux accounts — see Displaying a login report for all Linux accounts on page 189.
- A login report for a particular login ID — see Displaying a login report for a specific login ID on page 189.

Displaying a login report for all Linux accounts

Procedure

1. From the AE Services Management Console main menu, select **Security > Audit > Login Reports**.
2. On the **Login Reports** page, in the **List Local Host Logins** field, accept the default (**enabled**), and click **Continue**.

   AE Services displays the **Login Reports - List Local Host Logins** page. For a description of the fields on this page, see List Local Host Logins page field descriptions on page 189.

List Local Host Logins page field descriptions

Name	Description
Name	Lists the name of the Linux login.
Group	Indicates the group name to which the login name is assigned.
Roles	Indicates the administrative role for a user, such as System_Administrator. For a list of roles, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.
Lock	Yes or No to indicate if a lock exists for this account.
Shell Access	Yes or No to indicate whether the login name (account) has access to the Linux shell.

Displaying a login report for a specific login ID

Procedure

1. From the AE Services Management Console main menu, select **Security > Audit > Login Reports**.
2. On the **Login Reports** page, select **Display Information for Local Host Login**.

3. Enter the login ID for whom you want to generate a login report.
4. Click **Continue**.

   AE Services displays the Login Reports - Display Login Information page. For a description of the fields on this page, see Display Login Information page field descriptions on page 190.

Display Login Information page field descriptions

Field	Description
Information for Login:	Identifies the login name.
Group Name	Lists the Linux group name that the login ID is assigned to.
Other Groups	Lists other group names that the login ID is assigned to.
Roles	List the roles that are assigned to the login ID.
Shadow Locked	Indicates whether password shadowing is enabled or disabled. • Yes - Indicates that password shadowing is enabled. • No - Indicates that password shadowing is disabled.
Pam_Tally Locked	Indicates whether PAM tally limits are enabled or disabled. • Yes - Indicates that the PAM tally is enabled. • No - Indicates that the PAM tally is disabled.
Shell Access	Indicates whether the login name (account) has access to the Linux shell. • Yes indicates that the login name has access to the Linux shell. • No indicates that the login name does not have access to the Linux shell.
PW Min Days	Indicates the minimum number of days allowed between password changes, which is specified by the PASS_MIN_DAYS setting in the etc/login.defs file.
PW Max Days	Indicates the maximum number of days a password may be used, which is specified by the PASS_MAX_DAYS setting in the etc/login.defs file.

Table continues…

Field	Description
PW Warn Days	Indicates the number of days warning given before a password expires, which is specified by he PASS_WARN_AGE setting in the etc/login.defs file.
PW Last Changed	Indicates the date (MM DD YYYY) that the password was last changed.
PW Next Change Allowed	Indicates the first date that the next password change is permitted.
PW Expires	Indicates the date that the password expires.
Account Expires	Indicates the date that the login ID expires.

Enabling a login audit

About this task

Use the Login Audit feature to enable and configure an audit process for disabling an unused Linux account.

Procedure

1. From the AE Services Management Console main menu, select **Security > Audit > Login Audit**.
2. Use the settings on the **Unused Login Audit** page to enable the auditing process. (Alternatively, if you have an auditing process enabled, you can use this page to disable the audit.)

   For a description of the fields on the Unused Login Audit page, See Unused Login Audit page field descriptions on page 191.

Unused Login Audit page field descriptions

Field	Description
Enable the Audit	• Select **Yes** to start the auditing process. • Select **No** to stop the auditing process. **No** is the default setting.
Time to Begin Audit Each Day: (hour)	Select a start time to begin the audit, based on a 24-hour clock (select from 00 to 23).
Maximum Unused Time: (days, 3-365)	Enter a value from 3 to 365 to indicate the limit, in days, for maximum unused time. When the limit is reached the account is disabled.
Submit	Click **Submit** to start the audit process.

AE Services client applications additional authentication methods

User Management is the default user database that AE Services uses for user authentication (validating a user's identity). for TSAPI, JTAPI, DMCC, and Telephony Web Services users. If you select not to use the User Management service, you can use any of the following authentication methods:

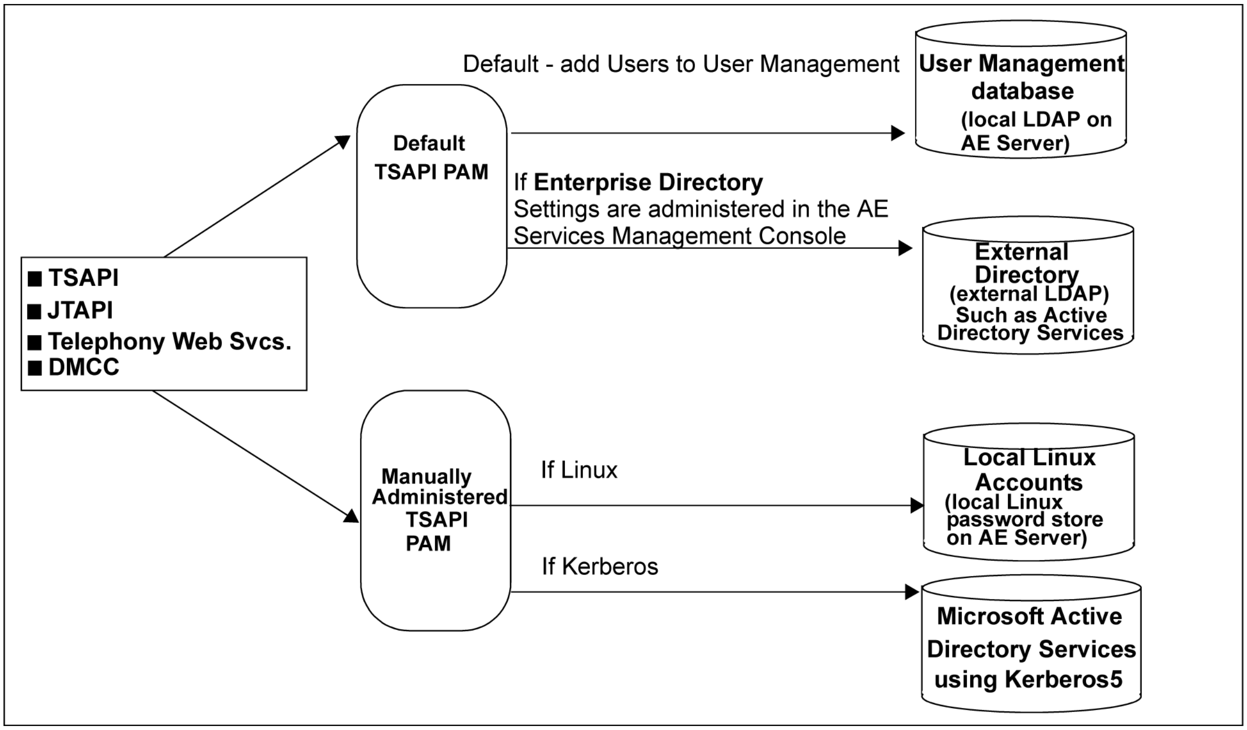

Default - add Users to User Management
User Management database (local LDAP on AE Server)
Default TSAPI PAM
If Enterprise Directory Settings are administered in the AE Services Management Console
External Directory (external LDAP) Such as Active Directory Services
■ TSAPI
■ JTAPI
■ Telephony Web Svcs.
■ DMCC
Manually Administered TSAPI PAM
If Linux
Local Linux Accounts (local Linux password store on AE Server)
If Kerberos
Microsoft Active Directory Services using Kerberos5

Figure 30: AE Services client authentication -- additional PAM management

Linux authentication

When Linux is the AE Services authentication authority, AE Services users are authenticated against the Linux accounts created on the AE Server.

⚠ **Caution:**

This means that AE Services users have access rights to the AE Services Management Console and can log into the AE Server.

- If you want to use Linux instead of the User Management for AE Services authentication, you will need to carry out the following procedures:
  - Instate the Linux PAM file instead of the User Management PAM file, see Instating the Linux PAM file on page 193.

    - Set up a Linux user account for each AE Services user, see Adding a Linux user on page 248.
    - Additionally, if you plan to use the Security Database, you will need to add each user to the User Management database. Although you are not using the User Management database for authentication, you must use it to populate the Security Database. See Adding a user to User Management on page 145.
- If you need to revert back to using User Management for authentication, you will need to re-instate the User Management PAM file, see Re-instating the User Management PAM file on page 193.

Changing to User Management Authentication for the AE Services client application

About this task

Use this procedure only if you are reverting back to the User Management.

Procedure

1. Log into AE Services and **su** to **root** or **sroot**.
2. From the Linux command line, type the following command:

   ```
   cp /opt/mvap/tsapi/tsapi_service.ldap /etc/pam.d/tsapi_service
   ```

Changing to Linux PAM Authentication for the AE Services client application

Procedure

1. Log into AE Services, and **su** to **root** or **sroot**.
2. From the Linux command line, type the following command:

   ```
   cp /opt/mvap/tsapi/tsapi_service.linux /etc/pam.d/tsapi_service
   ```

Changing to User Management Authentication for the AE Services client application

About this task

Use this procedure only if you are reverting back to the User Management.

Procedure

1. Log into AE Services and **su** to **root** or **sroot**.
2. From the Linux command line, type the following command:

   ```
   cp /opt/mvap/tsapi/tsapi_service.ldap /etc/pam.d/tsapi_service
   ```

Enterprise directory settings in the AE Services Management Console

An enterprise directory refers to an external LDAP directory server, such as OpenLDAP or Microsoft Active Directory Services. In AE Services, some form of a directory may be used by TSAPI, JTAPI, Telephony Web Services, and DMCC for authentication purposes only.

If you are planning to use an external LDAP directory for TSAPI, JTAPI, Telephony Web Services, and DMCC and you do not plan to use Microsoft Active Directory Services with Kerberos for authentication, you will need to administer the settings using the AE Services Management Console on the **Security > Enterprise Directory Configuration page**. For an illustration of this context, see Figure 30: AE Services client authentication -- additional PAM management on page 192.

Enterprise directory configuration settings for AE Services integrations

The enterprise directory configuration settings may apply to the AE Services implementation for Microsoft Lync Server 2010 and 2013. If you are administering AE Services for the integration of Microsoft Lync Server, see the *Avaya Aura®Application Enablement Services Implementation Guide for Microsoft® Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync® Server 2010 and 2013*, 02-601893.

Enterprise directory configuration settings with bridged appearance alert blocking

The enterprise directory is used in conjunction with the bridged appearance alert blocking feature. This feature applies to DMCC applications as well as the AE Services integrations with Microsoft Office Live Communications Server, Microsoft Office Communications Server, and Microsoft Lync Server 2010 and 2013. DMCC applications that have requested the desktop call control filtering mode can take advantage of the bridged appearance alert blocking feature. For more information about setting up a DMCC application to use the call filtering mode, see the following documents:

- *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359
- *Avaya Aura®Application Enablement Services Device, Media, and Call Control XML Programmer's Guide*, 02-300358

Enterprise directory user authorization policy for DMCC applications

The enterprise directory user authorization policy relies on the LDAP enterprise directory for user authorization. DMCC applications can take advantage of this capability.

To implement the enterprise directory authorization policy you must administer the settings on the Enterprise Directory page in the AE Services Management Console. The following settings on the Enterprise Directory page are critical to this authorization method:

- Search Filter Attribute Name — This indicates the attribute name in the user record that corresponds to username. DMCC will attempt to match a username to the contents of this attribute. An example is “SAM-Account-Name” in Windows Active Directory.
- Device ID Attribute — This indicates the attribute name in the user record that corresponds to the device ID to be authorized for the user. A primary example here is an attribute such as “Phone Number” that contains a provisioned E.164 number for users.

When this authorization mechanism is selected, DMCC uses LDAP to query the user record for the provisioned device ID (such as the phone number). DMCC then caches the retrieved device ID. When DMCC attempts to authorize a request, it verifies that the device ID retrieved from the user record is a substring of the device ID specified in the request. This allows per-user authorization without per-user provisioning in AE Services. The substring match accounts for a very common scenario where a Tel URI is specified in the request (tel:+13035381234) but the user record contains an E.164 number (+13035381234) or extension (5380112).

For more information about leveraging advanced authentication (AA) policies from DMCC applications, see the following documents:

- *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359
- *Avaya Aura®Application Enablement Services Device, Media, and Call Control XML Programmer's Guide*, 02-300358

Changing to Active Directory Authentication for the AE Services client application

About this task

This procedure is performed by an administrator on the AE Services Server.

Procedure

1. Log into the AE Services Server as **`root`** or **`sroot`**.
2. At the command prompt, type the following command:

```
cp /opt/mvap/tsapi/tsapi_service.ads /etc/pam.d/tsapi_service
```

For more information, see Re-instating the User Management PAM file on page 193.

Configuring AE Services to access an enterprise directory

About this task

Use this procedure to configure AE Services to access the enterprise directory for a TSAPI, JTAPI, Telephony Web Services, or DMCC application that authenticates to an external LDAP server.

Procedure

1. On the AE Services Management Console main menu, click **Security** > **Enterprise Directory**.
2. On the Enterprise Directory Configuration page, provide the following information:
   a. In the **User DN for Query Authentication** field, type the DN for the user object that AE Services uses for accessing an external or enterprise directory.

      Based on how users are set up in an enterprise directory, the user object could refer to a full name, a display name, a user login, an application name, or a server name, for example, **cn=John Doe,cn=Users,dc=mycompany,dc=example,dc=com**.

   b. In the **Password** field, type the password of the enterprise directory server.

   c. In the **Confirm Password** field, reenter the password.

   d. In the **Base Search DN** field, type the LDAP string that indicates where you want to start the search.

   e. In the **Host FQDN** field, type the FQDN of the enterprise directory server.

   f. In the **Secondary HostName/IP Address** field, type the IP address of the failover server if your configuration supports a failover server for the enterprise directory server.

   g. In the **User ID Attribute Name** field, accept the default, **uid**.

      You might need to change this setting to match your LDAP implementation. The default attribute names of some popular LDAP implementations are as follows:

      - AE Services User Management: **uid**
      - Microsoft Active Directory: **samaccountname**
      - IBM Lotus Domino: **uid**

   h. Ignore the **User Role Attribute Name** field. It does not apply to TSAPI, JTAPI, DMCC, and Telephony Web Services.

   i. In the **Port** field, type the port number used for enterprise directory access. The default port is 636.

  j. In the **Secondary Port** field, type the port number used for the failover server for the enterprise directory server.
  k. In the **Change Password URL** field, type the URL of your password change system.
  l. Ensure that the LDAP-S option is selected and is read-only.

  The CA certificates used to sign the Enterprise Directory server identity certificate must be imported into the AE Services Management Console CA trust store.

3. Click **Apply Changes**.

Configuring an external LDAP server — Windows

Procedure

1. Install the Identity Management for UNIX component on Windows 2003 R2. This can be found under Add/Remove Windows Components, then double click on Active Directory Services.
2. Follow these steps to create an AES group.
    a. Click **Start > Run**.
    b. Type `dsa.msc`.
    c. Click **OK**.
    d. In the **Active Directory Users and Computers** dialog box, right click **Builtin > New > Group**.
    e. In the **New Object — Group** dialog box, in the **Group name** field, type `AES`.
    f. Click **OK**.
    g. **(Optional)** Open the **AES** Group property, and click the **UNIX Attributes** tab.
    h. **(Optional)** From the **NIS Domain** drop-down box, select the NIS domain this group belongs to.
    i. **(Optional)** Click **OK**.
3. **(Optional)** Follow these steps to configure the user's UNIX attributes.
    a. Create a user or use an existing user.
    b. Open the **User Properties** dialog box.
    c. Click the **UNIX Attributes** tab.
    d. In the **NIS Domain** field, select the appropriate NIS domain.
    e. From the **Primary group name/GID** drop-down box, select **AES**.
    f. Click **OK**.

4. Follow these steps to set up user roles. See User roles on page 198 for a list of user roles and corresponding privileges.
    a. Create an attribute or use an existing attribute on LDAP with the value Security_administrator,Auditor.

        Note:

        If the user has multiple roles, use a comma for the delimiter. For example: Audit,System_Administrator,Security_Administrator,Backup_restore.

    b. In the ***<user>*****SecurityAdmin Properties** dialog box, in the **Description** field, type `Security_administrator,Auditor`.
    c. Click **OK**.
5. Follow these steps to configure Enterprise Directory.
    a. Log in to the AE Services Management Console as System Administrator.
    b. From the AE Services Management Console main menu, select **Security > Enterprise Directory**.
    c. On the **Enterprise Directory** page, in the **User Role Attribute Name** field, type `description`. This is the name of the user attribute, which contains the user's roles in LDAP.
6. Follow these steps to enable external LDAP.
    a. Log in to the AE Services Management Console as System/Security Administrator.
    b. From the AE Services Management Console main menu, select **Security > PAM > PAM Module**.
    c. On the **PAM Module Configuration** page, select the External LDAP check box.
    d. Click **Apply**.

User roles

Role	Privileges	Parameters
Auditor	• View/List users (CTI, user-management) • View logs • View certificates • View alarms • View status and control	Auditor

Table continues…

Role	Privileges	Parameters
Security_Administrator	• Key, certificate management • Role-based access control administration • View security logs	Security_Administrator
System_Administrator	Read/write access to all objects/ operations except User Management and Security Administrator	System_Administrator
Backup_Restore	Backup and Restore	Backup_Restore
Avaya_Maintenance	• Access to maintenance • View logs • Access to utilities	Avaya_Maintenance
User Management	• Manage user accounts • Configure user password policy	usrsvc_admin (or usrsvc_user)
EASG Administrator	Read and write access of the EASG option on the PAM Password Manager.	• Linux group: susers • Linux group ID: 510.
DataController	Execute all the functionalities related to log/trace retention and clearing	• Linux group: datacontroller • Linux group ID: 560

Authentication with Microsoft Active Directory Services and Kerberos

AE Services provides the ability to authenticate users using an external server such as Microsoft Active Directory Services (ADS) or OpenLDAP. If you use ADS, you can implement it with or without Kerberos. This section provides a sample scenario for integrating AE Services with ADS using Kerberos.

In a configuration with ADS and Kerberos, ADS is the AE Services authentication authority, and AE Services users are authenticated against a Domain Controller. This method of authentication requires integrating the AE Server into ADS as a Kerberos client (using Kerberos5).

- With this authentication method, AE Services users do not have access rights to the AE Services Management Console and cannot log into the AE Services Server (Linux).
- If the security database is enabled, the AE Services user must also have an account administered in User Management.
- The AE Services Server will authenticate using Kerberos5.

Note:

The time differential between the Domain Controller and the AE Services Server must be less than 2 minutes.

Sample procedures for integrating AE Services with ADS using Kerberos

The information in this section is provided as suggested practices. Although the procedures have been validated, they are simply recommendations. Additionally, the file locations, the commands, and the Kerberos related information are subject to change. Keep in mind that these examples assume that the Microsoft Active Directory Domain Controller supports Kerberos5. If you decide to use Kerberos, you must ensure the integrity of your system and maintain compliance with Kerberos on an ongoing basis.

The following tasks are performed by an AE Services administrator and a Windows Domain Controller administrator.

- Creating an account for The AE Server on the Domain Controller on page 200
- Generating a keytab file for The AE Server account on the Domain Controller on page 201
- Installing The Kerberos5 RPMs on the AE Server on page 202
- Editing The Kerberos 5 configuration file on the AE Server on page 202
- Importing The keytab file on the AE Server on page 203
- Changing from User Management Authentication to Active Directory Authentication on The AE Server on page 195

Creating an account for the AE Services server on the Domain Controller

About this task

On the Domain Controller, follow this procedure to create a user account where the AE Services server is designated as an Active Directory user.

Note:

To perform this procedure you must be a member of the Admin Group in Windows.

Procedure

1. From your desktop, select **Start > Settings > Control Panel**.
2. From the Control Panel, double-click **Administrative Tools**.

3. From Administrative Tools, double-click **Active Directory Users and Computers**.
4. Click **Users** in the left pane to display the list of users.
5. Move your cursor to the right pane, right-click, and select **New > User**.
6. Complete the New Object — User dialog box as follows:
    a. In the **First name** field, type a user name (for example `aeserver`).
    b. Skip the **Initials** and **Last Name** fields.
    c. In the **Full name** field, type `aeserver`.
    d. In the first part of the **User Logon name** field, type `aeserver`.
    e. In the next field, type the address of the Domain Controller (for example `@dcserver1.xyz.com`).
    f. In the **User logon name** field (pre Windows 2000), type `aeserver`.
7. Click **Next**.
8. In the New Object — User dialog box, in the **Password** field, type `aespassword`.
9. In the **Confirm password** field, retype `aespassword`.
10. Click **Next**.
11. Click **Finish**.

Generating a keytab file for the AE Server account on the Domain Controller

About this task

This procedure is performed by an administrator on the Windows Domain Controller.

After you create the AE Server account on the Windows Domain Controller, generate a keytab file for the AE Server account.

Note:

This example uses the aeserver user account name to generate a keytab file called aeserver.keytab.

Procedure

From the Windows command prompt type:

```
Ktpass -princ aeserver/aeserver@dcserver1.xyz.com -mapuser aeserver -
pass aespassword -out aeserver.keytab
```

Installing the Kerberos5 RPMs on the AE Server

About this task

This procedure is performed by an administrator on the AE Server.

Follow this procedure to determine if the pam_krb5 package and the krb5 workstation package are installed on the AE Server.

Procedure

1. Login as **`root`** or **`sroot`** and type the following command:

   ```
   rpm -qa | grep krb
   ```

   If the Kerberos5 RPMs are installed, you will see output similar to the following:

   ```
   krb5-devel-1.6.1-70.el5_9.2
   pam_krb5-2.2.14-22.el5
   krb5-libs-1.6.1-70.el5_9.2
   krb5-workstation-1.6.1-70.el5_9.2
   ```

2. Download and install any missing Kerberos5 RPMs.

Next steps

Continue with the next procedure Editing the Kerberos 5 configuration file on the AE Server on page 202.

Editing the Kerberos 5 configuration file on the AE Server

About this task

This procedure is performed by an administrator on the AE Server.

After the Kerberos RPMs are properly installed, follow this procedure to edit the Kerberos 5 configuration file on AE Server (Kerberos 5 client):

Procedure

1. Log in as **`root`** or **`sroot`**, and type `cd /etc`.
2. With a text editor, open the krb5.conf file, for example: `vi krb5.conf`.

   The system displays the contents of krb5.conf.

3. Change the fields that are depicted in bold:

   ```
   [libdefaults]
    default_realm = dcserver1.xyz.com
    dns_lookup_realm = true
    dns_lookup_kdc = true
    default_tkt_enctypes = des-cbc-md5
    default_tgs_enctypes = des-cbc-md5
    [realms]
   MNO.XYZ.COM= {
    kdc = dc-sername.dcserver1.xyz.com:88
    kpasswd_server = dc-sername.dcserver1.xyz.com:88 }
    [domain_realm]
   .xyz.com = MNO.XYZ.COM
   ```

4. Save your changes.

Next steps

Continue with the next procedure Importing the keytab file on the AE Server on page 203.

Importing the keytab file on the AE Server

About this task

This procedure is performed by an administrator on the AE Server.

After you configure the /etc/krb5.conf file, you must import the keytab file that was generated on the Windows Domain Controller (see Generating a keytab file for the AE Server account on the Domain Controller on page 201) to the AE Server.

Procedure

1. Log in as **`root or sroot`**.
2. From the command line, type `/usr/kerberos/sbin/ktutil`.
3. From the ktui prompt, type the following command to have the ktuility read in the keytab file.

   ```
   rkt aeserver.keytab
   ```

   The ktutility reads in the keytab file, and upon completion, displays the ktutil prompt.
4. Type the following command to merge the imported key into the /etc/krb5.keytab file.

   ```
   wkt /etc/krb5.keytab
   ```

5. Type `q` to exit ktutil.
6. From the command prompt, type `kinit`.

   This utility will obtain and cache the Kerberos ticket-granting ticket from the Domain Controller.

Next steps

Continue with the next procedure Changing from User Management Authentication to Active Directory Authentication on the AE Server on page 195.

Administering the time-out period for console and HTTP sessions

About this task

Use this procedure to specify the time-out period for the Linux console and HTTP sessions. When the time-out period is reached, the session expires.

Procedure

1. From the AE Services Management Console main menu, select **Security >Session Timeouts**.
2. In the Console Timeout field, enter the number of minutes at which the console session will expire. The range is 0 to 60 minutes. The default is 10 minutes. If you set this value to 0, the session will never expire.
3. In the HTTP Timeout field, enter the number of minutes at which the HTTP session will expire. The range is 0 to 60 minutes. The default is 10 minutes. If you set this value to 0, the session will never expire.
4. Click **Apply Changes**.
5. On the Apply changes to Session Timeouts page, click **Apply** to confirm your changes.

Chapter 9: Data Encryption

Note:

From Release 8.1.2, Application Enablement Services supports the file system data encryption feature with Release 8.1.2 OVA. The encryption can be enabled only at the time of deploying the AE Services 8.1.2 OVA. If you want to execute encryption commands, then you must deploy Release 8.1.2 OVA and then apply Release 8.1.2 or later patch.

From Release 8.1.2, you can enable or disable data encryption for Avaya Aura® applications at the time of deployment. Data Encryption is supported only for Appliance Virtualization Platform and VMware Virtualized Environment. Once you deploy the application with data encryption, you cannot disable data encryption after deployment.

By enabling Data Encryption, your Communication Product's certain Operational data and Log Files will be encrypted. You will be prompted to enter a passphrase that will be used to create or access an encryption key. You must remember the encryption passphrase, if not it can result in locking up the system. Secondly, you will be asked to configure the option for local key storage.

It is important to note that the encryption of the disk may have a performance impact. For further information, refer to the Avaya Product Administration guide(s). Before you select an encryption option, please read the Data Privacy Guideline so that you may better understand these options.

By disabling Data Encryption, your Communication Product's Operational data and Log Files will not be stored in encrypted partitions.

If encryption is enabled and the **Require Encryption Pass-Phrase at Boot-Time** check box is selected, you need to reenter the encryption passphrase whenever the application reboots.

During reboot, the application prompts you to enter the encryption passphrase on VM console at first boot and upon entering the correct encryption passphrase, the system mounts all the encrypted disks.

Note the following:

- If a common encryption passphrase is used for all the encrypted partitions, but an incorrect encryption passphrase is entered in first attempt, then you have to enter the correct encryption passphrase for every partition at least once.
- Multiple failures on encryption passphrase boots the system into the Maintenance/Emergency mode. To get the prompt again, you need to reboot the system.

If encryption is enabled and the **Require Encryption Pass-Phrase at Boot-Time** check box is not selected during OVA deployment, the application creates the Local Key Store and the system does not prompt you to type the encryption passphrase whenever the application reboots to mount the encrypted disks. You can also set up the remote key server by using the **`encryptionRemoteKey`** command after the deployment of the application.

Encryption of Application Enablement Services partitions

When you enable data encryption for Application Enablement Services, the system encrypts the following partitions that have personal data.

- `/var/mvap/database`
- `/var/log`
- `/var/log/audit`
- `/var/lib/ldap`

Remote Key Server

When you enable data encryption for an application, you can set up remote key server. You can add multiple remote key servers. When you add a remote key server for the first time, the application disables the local key store. You can enable the local key store again after adding a remote key server. However, it is not recommended to enable local key store when the remote key server configuration exists.

If there is only one empty slot, then you cannot add a new remote key server or a new passphrase. The last empty slot is a “reserved” slot and you can use that only for changing the passphrase.

Application checks for the remote key server accessibility every 15 minutes. If any of the remote key server goes down, the application generates a Warning alarm. If all remote key servers are not accessible, then the application generates a Minor alarm.

Data Encryption password policy

The encryption passphrase must meet the following requirements:

- Must contain at least eight characters.
- Must contain at least one of each: an uppercase letter, a lowercase letter, a numerical, and a special character.

Ensure that you keep the encryption passphrase safe. You need the encryption passphrase later.

Data encryption commands

The following CLI commands are available to make changes to the data encryption settings.

encryptionPassphrase command

Using the **encryptionPassphrase** command you can manage the encryption passphrase after deploying the application.

Syntax

```
encryptionPassphrase [add | change | remove | list]
```

add Displays the prompts to add the encryption passphrase.

change Displays the prompts to change the encryption passphrase.

remove Removes the encryption passphrase.

list Displays the encryption passphrase and slot assignment.

Considerations

You must deploy the application with data encryption.

Adding encryption passphrase

About this task

Use the **encryptionPassphrase add** command to add encryption passphrase.

You can add a maximum of seven encryption passphrases, if free slots are available.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.
2. Type **encryptionPassphrase add**.
3. In **Enter existing passphrase**, type the encryption passphrase.
4. In **Enter new Passphrase**, type the new encryption passphrase.
5. In **Retype Passphrase**, retype the encryption passphrase.

Changing encryption passphrase

About this task

Use the **encryptionPassphrase change** command to change the existing encryption passphrase.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.

2. Type **`encryptionPassphrase change`**.
3. At the prompt, in **Current Passphrase**, type the encryption passphrase.
4. In **Enter new Passphrase**, type the new encryption passphrase.
5. In **Retype Passphrase**, retype the encryption passphrase.

   The application displays the following message.

   ```
   Passphrase successfully changed.
   ```

Displaying encryption passphrase and slot assignment

About this task

Use the **`encryptionPassphrase list`** command to list the slots assignment, encryption passphrase, and remote server details.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.
2. Type **`encryptionPassphrase list`**.

   The application displays the details based on the system configuration.

   ```
   Slot         Status      Passphrase/Remote Server
   -------------------------------------------------
   Key Slot 0: ENABLED     Passphrase
   Key Slot 1: ENABLED     Passphrase
   Key Slot 2: ENABLED     Passphrase
   Key Slot 3: ENABLED     Passphrase
   Key Slot 4: ENABLED     Passphrase
   Key Slot 5: Disabled    empty
   Key Slot 6: Disabled    empty
   Key Slot 7: Disabled    empty
   ```

Removing encryption passphrase

About this task

Use the **`encryptionPassphrase remove`** command to remove the existing encryption passphrase. You cannot remove all encryption passphrases, the application retains minimum one encryption passphrase.

If you attempt to delete the last encryption passphrase, the system displays the following message:

```
The last passphrase cannot be removed!
```

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.
2. Type **`encryptionPassphrase remove`**.

3. At the prompt, in **Passphrase to remove**, type the existing encryption passphrase.

   The application displays the following message.

   ```
   Passphrase successfully removed.
   ```

encryptionRemoteKey command

Using the **`encryptionRemoteKey`** command you can manage the remote key server after deploying the application.

Syntax

```
encryptionRemoteKey [add | remove | list]
```

add	Displays the prompts to add the remote key server.
remove	Removes the remote key server.
list	Displays the remote key server and slot assignment.

Considerations

You must deploy the application with data encryption.

Adding remote key server

Before you begin

Ensure that the remote key server is configured and accessible.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.

2. Type **`encryptionRemoteKey add`** `<Address> <Port>`.

   Where:

   Address is the IP address or FQDN of the remote key server.

   Port is the port number of the remote key server. If you do not enter the port number the application uses the value of default port as 80.

3. In **Enter existing passphrase**, type the existing encryption passphrase.

   If the remote key server is not configured, the application displays the following message.

   ```
   Remote key server not found
   ```

   If the remote key server is configured, the application adds the remote key server. When you add a remote key server for the first time, the application disables the local key store.

Removing remote key server

About this task

Use the **`encryptionRemoteKey remove`** command to remove the existing remote key server.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.

2. Type **`encryptionRemoteKey remove`** `<Address>`.

   Where:

   Address is the IP address or FQDN of the remote key server.

   You must use the same IP address or FQDN value that you used to add the remote key server.

3. In **Passphrase**, type the existing encryption passphrase.

   The application removes the remote key server and displays the following message:

   `RemoteKey successfully removed.`

Displaying remote key server and slot assignment

About this task

Use the **`encryptionRemoteKey list`** command to list the slots assignment, encryption passphrase, and remote server details.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.

2. Type **`encryptionRemoteKey list`**.

   The application displays the details based on the system configuration.

```
Slot        Status      Passphrase/Remote Server
-------------------------------------------------
Key Slot 0: ENABLED     Passphrase
Key Slot 1: ENABLED     <IP Address of Remote Key Server>
Key Slot 2: ENABLED     Passphrase
Key Slot 3: DISABLED    empty
Key Slot 4: DISABLED    empty
Key Slot 5: DISABLED    empty
Key Slot 6: DISABLED    empty
Key Slot 7: DISABLED    empty
```

encryptionLocalKey command

Using the **`encryptionLocalKey`** command you can enable or disable the local key store after deploying the application with data encryption.

Syntax

```
encryptionLocalKey [enable | disable]
```

enable	Enables the local key store.
disable	Disables the local key store.

Considerations

You must deploy the application with data encryption.

Enabling local key store

About this task

Use the **`encryptionLocalKey enable`** command to enable the local key store.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.
2. Type **`encryptionLocalKey enable`**.
3. At the prompt, in **Enter existing passphrase**, type the existing encryption passphrase.

   If the local key store is already enabled, the application displays the following message.

   ```
   Local key store is already enabled.
   ```

Disabling local key store

About this task

Use the **`encryptionLocalKey disable`** command to disable the local key store.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.
2. Type **`encryptionLocalKey disable`**.

   The application displays the following message.

   ```
   Local keystore removed

   Local Key Store is now disabled.
   ```

Viewing data encryption status

About this task

The **`encryptionStatus`** command displays information about encryption on the system.

Procedure

1. Log in to the application command line interface with administrator privileged credentials.

   For Application Enablement Services, log in with root privileged credentials.

2. Type `encryptionStatus`.

3. When the system prompts, type the password.

   For example, if the local key store is configured, the system displays the following status:

   ```
   Data Encryption: enabled
   Local Key Store: enabled
   Encryption Passphrase Required at Boot-time: no
   ```

   For example, if the remote key server is configured, the system displays the following status:

   ```
   Data Encryption: enabled
   Local Key Store: disabled
   Encryption Passphrase Required at Boot-time: yes
   remoteKeyServers: <remoteServer1: <remoteServerIPAddress> accessible>
   ```

Chapter 10: Fault Tolerance Configuration

Fault Tolerance

VMware Fault Tolerance provides continuous availability for virtual machines by creating and maintaining a secondary virtual machine that is identical to, and continuously available to replace the primary virtual machine in the event of a failover situation.

You can enable Fault Tolerance for the most critical virtual machines. A secondary virtual machine is created and runs in virtual lockstep with the primary virtual machine. VMware vLockstep captures inputs and events that occur on the primary virtual machine and sends them to the secondary virtual machine, which is running on another host. Using this information, the secondary virtual machine runs similar to that of the primary virtual machine. Because the secondary virtual machine is in virtual lockstep with the primary virtual machine, it can take over execution at any point without interruption, by providing fault tolerant protection.

Fault Tolerance Configuration Checklist

Use the following checklist to complete fault tolerance configuration:

No.	Task	Notes	✔
1	Enable host certificate checking if you are upgrading from a previous version of vCenter server.	See, VMware documentation.	
2	Configure networking for each host.	See, VMware documentation.	
3	Create the VMware HA cluster, add hosts, and check compliance.	See, VMware documentation.	
4	Enable fault tolerance.	See, Enabling Fault Tolerance on page 214.	

Enabling Fault Tolerance

About this task

Use this procedure to enable fault tolerance for virtual machines using the vSphere Client.

Before you begin

Ensure that you meet the following prerequisites:

- The two servers with the same hardware configuration must meet the VMware Fault Tolerance prerequisites.
- Locate the two servers, for example, two Dell R620 servers in the same rack.
- Install ESXi of the same version, vCenter Server, and vCenter Client on both the servers.
- Create a cluster and add two servers into the cluster.

For more information on installing VMware, vCenter Server, vCenter Client, creating a cluster, and adding servers to a cluster, see the VMware documentation.

Procedure

1. Connect vSphere Client to vCenter Server using administrator credentials.
2. On the vSphere Client, click the **Hosts & Clusters** view.
3. Right-click the single virtual machine, and click **Fault Tolerance** > **Turn on Fault Tolerance**.

   You must enable the Fault Tolerance for one virtual machine at a time.

   After the Fault Tolerance is on, the selected virtual machine acts as a primary virtual machine and secondary virtual machine is established on the another host.

Configuring Fault Tolerance on AE Services virtual machine

About this task

Use this procedure to configure fault tolerance on AE Services virtual machine.

Before you begin

Deploy AE Services profile 1 on the Server 1. For more information, see *Deploying Avaya Aura® Application Enablement Services in Virtualized Environment*

Procedure

1. Log in to the AE Services Management Console.
2. Select and right-click the AE Services virtual machine, and click **Fault Tolerance** > **Turn On Fault Tolerance**.

3. After the Fault Tolerance is enabled, click **Fault Tolerance** > **Test Failover**.

Chapter 11: Security Database

The Security Database

The Application Enablement Services (AE Services) Security Database (SDB) provides the ability to control a user's access privileges. The SDB stores information about Computer Telephony (CT) users and the devices they control. The DMCC service, the TSAPI service, and Telephony Web Services use this information for permission checking.

For an application to take advantage of the SDB, its users must be added to the AE Services User Management service as CT users, regardless of how users are authenticated. For example if you authenticate your DMCC users using the Active Directory Services, you must still add those users to the AE Services User Management service as CT users. By administering them as CT users, they are members of the SDB. See Adding a user to User Management on page 145.

APIs that use the Security Database

The following AE Services Application Programming Interfaces (APIs) use the Security Database for determining users' access privileges.

❗ **Important:**

APIs that need to use the features of the security database must ensure that the SDB is enabled.

- TSAPI, JTAPI, and Telephony Web Service — see Enabling the Security Database - TSAPI, JTAPI, and Telephony Web Service on page 216.
- Device, Media, and Call Control (DMCC) — see Enabling the SDB for DMCC applications on page 218.

Enabling the Security Database - TSAPI, JTAPI, and Telephony Web Service

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Control**.

2. From the **SDB Control for DMCC, TSAPI, JTAPI, and Telephony Web Services** page, select the check box for **Enable SDB for TSAPI Service, JTAPI and Telephony Web Services** (by default it is not selected).
3. Click **Apply Changes**.
4. Select **Maintenance > Service Controller**.
5. From the **Service Controller** page, select the check box for the **TSAPI Service**.
6. Click **Restart Service**.
7. From the **Restart Service** page, click **Restart**.

DMCC applications and SDB authorization

This section provides recommendations for DMCC applications that use the SDB for authorization. The procedure for enabling the SDB is described in Enabling the SDB for DMCC applications on page 218.

✱ **Note:**

DMCC applications can use enterprise, or LDAP-based, authorization as an alternative to SDB authorization. For more information, see Enterprise directory user authorization policy for DMCC applications on page 195.

DMCC device services

For the DMCC API, you must enable the SDB if your applications use SDB authorization to take advantage of the DMCC device services enhancements introduced with AE Services 4.1. These enhancements allow a DMCC application to do the following:

- Get a list of the devices that are associated with a session
- Transfer a group of devices from one session to another session
- Share the control of a group of devices among multiple sessions

DMCC session services

Although DMCC session services will work with a disabled SDB, AE Services recommends that you enable it for security reasons.

DMCC applications developed prior to AE Services 4.1

If you are administering AE Services for DMCC applications that were developed prior to AE Services 4.1, you must retain the default setting and keep the SDB disabled.

Enabling the SDB for DMCC applications

About this task

Follow these steps to enable the SDB for DMCC applications that use the DMCC device series enhancements. This procedure is performed by a System Administrator from the AE Server.

Note:

When you change the SDB Control settings you must restart the affected service.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Control**.
2. From the **SDB Control for DMCC, TSAPI, JTAPI, and Telephony Web Services** page, select the check box for **Enable SDB for DMCC Service**.
3. Click **Apply Changes**.
4. Select **Maintenance > Service Controller**.
5. From the **Service Controller** page, select the check box for the **DMCC Service**.
6. Click **Restart Service**.
7. From the **Restart Service** page, click **Restart**.

TSAPI properties

The TSAPI properties in the AE Services Management Console apply globally to the SDB. If you plan to assign worktops to each user and use the settings in the SDB to effect permission levels, it is recommended that you use the default TSAPI properties.

Note:

If you are administering DMCC applications to use the SDB, you do not have to administer the TSAPI properties.

The following list summarizes the TSAPI properties settings.

- **TCP Preferred Naming Format** — By default, this field is set to **IP Address**. You have the option of setting it to **Host Name**. This setting determines whether **Auto Admin of LAN Addresses** will use Host Names or IP addresses. This setting also determines the name of the field label that appears on the **Add/Edit Worktop** page.
- **Extended Worktop Access** — By default, this setting is **disabled**. This is a system-wide feature that affects all users. If you enable it, a CTI User can log in at any worktop and control

all the devices on that worktop. For more information, see Extended worktop access on page 221.

  - If you want most of your CTI users to be restricted to the devices assigned to their worktops, you would not enable this feature.
  - If you have users who need additional access, you can use a permission scheme based on User Access Rights. For more information, see Sample SDB Administration scenario - setting up a permission scheme based on access rights on page 229.

- **Auto Admin of LAN Addresses** — By default, this setting is **disabled**. This means that you must administer an IP address (or Host Name) for each worktop.
  - If your AE Services TSAPI configuration consists of a significant number of users, you can enable this setting, and AE Services will automatically add LAN addresses for all worktops. (The LAN address is either a host name or IP address, depending on what you selected for **TCP Preferred Naming Format**.)
  - If you enable this setting, you can still override it on a per-worktop basis by typing an IP address (or host name) in the **IP Address** field on the **Add/Edit Worktop** page.
- **Advanced Settings** — Clicking this button enables you to administer the following TSAPI advanced settings:
  - TCP Send Wait Time
  - TCP Send Retries
  - Persistent AAOs
  - Persistent AAO Audit Interval
  - Persistent AAO Maximum Age
  - TSAP Service Advertising Mode (**Advertise all Tlinks** or **Advertise only those Tlinks that are currently in service**)

Configuring TSAPI Properties

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **TSAPI** > **TSAPI Properties**.
2. On the TSAPI Properties page, in the **TCP Preferred Naming Format** field, select one of the following:
   - **IP Address**: If your configuration uses fixed IP addresses for your clients.
   - **Host Name**: If your configuration uses Dynamic Host Control Protocol or if the IP addresses of your clients frequently change.
3. In the **Extended Worktop Access** field, do one of the following:
   - Select the **Extended Worktop Access** check box if you want a CTI user to be able to log in to any worktop and control all the devices on that worktop.

- Clear the **Extended Worktop Access** check box if you do not want to allow Extended Worktop Access.

4. In the **Auto Admin of LAN Addresses** field, do one of the following:
   - Select the **Auto Admin of LAN Addresses** check box if you want AE Services to automatically add LAN addresses for all worktops.
   - Clear the **Auto Admin of LAN Addresses** check box if do not want to allow automatic administering of LAN addresses.
5. Click **Apply Changes**.
6. On the Apply Changes to TSAPI Configuration Properties page, click **Apply**.
7. Restart the TSAPI service.

About granting additional permissions

The SDB provides you with the following ways to grant permissions to users.

Note:

In the context of this chapter, the term user does not necessarily refer to a person. It can be an application that logs into the TSAPI service with its own login and password.

- Assign a worktop to a user. This is a typical method of assigning permissions to a user. By default a user assigned to a worktop has permission to access only the devices associated with that worktop for the following types of requests:
  - Call Origination and Termination
  - Device/Device monitoring requests
- Administer access rights for a user. The following access rights settings provide permission to access specific devices for each of the following types of requests.
  - Call Origination/Termination and Device Status
  - Device Monitoring
  - Call On A Device Monitoring
  - Call Monitoring
  - Routing

  For a description of these access rights settings, see Access Rights options on page 221.
- Enable the **Extended Worktop Access** check box on the TS Configuration page. This allows users to roam to other worktops. For example, when a user logs in to another user’s workstation, the TSAPI service checks the Security Database for a worktop with the same LAN address as the workstation where the user is attempting to log in. If a match is found, the user is given Call Origination and Termination permissions and Device/Device monitoring permissions for any of the devices associated with that worktop.

Extended worktop access

Users can always control all the devices on their worktop and in their own call control Access Rights device group. Extended Worktop Access is a Security Database-wide administration setting that affects all users. This setting applies primarily to the contact center environment, where it is likely for users to move from one desktop to another. If this setting is enabled, a user can log in from any worktop and control the devices on that worktop.

Note:

LAN address information is used when the Extended Worktop Access setting is enabled. It enables the TSAPI service to determine from which worktop the user is logged in and which devices are associated with that worktop.

If extended worktop access is disabled

If the Extended Worktop Access setting is disabled, a user can control only the following devices:

- Primary device on the worktop
- Any device in the secondary device group associated with the worktop
- Any device in the call control Access Rights group

If a user logs in from another worktop while this option is disabled, the user cannot control the devices on that worktop. The user can still control the devices on his or her worktop and the devices in his or her call control Access Rights. See Access Rights options on page 221.

If most users should be restricted to the devices associated with their assigned worktop but specific users must control other devices, you can still disable the Extended Worktop Access feature. You can use user level access rights to allow these users to control additional devices. See Sample SDB Administration scenario - setting up a permission scheme based on access rights on page 229.

Access Rights options

For users who need additional access, you can use the following user level Access Rights permissions settings. Even with the Extended Worktop Access system option disabled, these users will be able to control the necessary devices. For settings that apply to these options, see CTI Users on page 227.

- **Call Origination and Termination**

  Call Origination and Termination permissions include any operation that the user could perform manually, using their telephone. The user (or application) can originate calls and activate features such as call forwarding, call transfer, and so on. By default, all users have this permission for the devices associated with their worktop.
- **Device/Device Monitoring**

  An application places a Device/Device monitor on a specific device so it can receive an event report any time an event occurs at that device. For example, if the device receives an incoming call or originates an outgoing call, the application receives an event report. Device/Device monitors are the most commonly used monitor. By default, all users have this permission for the devices associated with their worktop.

- **Call/Device Monitoring**

  Call/Device monitors are placed to track events for a call once it reaches the device being monitored. Unlike Device/Device monitors, events for a call continue to be received even after the call leaves the device. A common usage of this monitor is to place it on the extension that incoming calls to a call center reach before being distributed to an agent. Once the call reaches this first extension, all further events (such as transfers to queues and disconnects) are sent to the application that requested the monitor. This type of monitor is commonly used by applications that track the efficiency of a call center operation. Supervisors may use this type of application to decide how to best allocate inbound call agents.

- **Call/Call Monitoring**

  Call/Call monitors work differently from the device and call/device monitors previously mentioned. Those monitors are based on a device ID. Call/Call monitors are tracked based on a call ID (a unique identifier of the call being handled by Communication Manager). Users either have or do not have this permission; you do not need to create a device group for these Access Rights.

- **Routing**

  When a routing application is started, it sends route registration requests to Communication Manager. Each request contains a device ID. This instructs Communication Manager to send all incoming calls for these devices to the TSAPI Service (and then on to the application) for routing. Communication Manager does not route these calls. Before the route registration request is passed to Communication Manager, the TSAPI Service checks that the user (in this case, the routing application) has permission to route calls for this device.

Security Database objects

All the information that Telephony Services needs for routing messages and controlling access to the telephony network is stored in the Security Database in terms of the following objects.

Note:

If you are adding many new objects to the SDB, you may want to group the objects by object type and add them in the following order:

- Tlinks — Tlinks are created dynamically by the TSAPI service; you can not add them manually.
- Tlink groups
- Devices
- Device groups
- Worktops
- Users

Tlinks

TSAPI links (Tlinks) are service identifiers (names) dynamically created by the TSAPI service. You can not manually add a Tlink group to the SDB.

The format of a Tlink name is as follows:

```
AVAYA#switch_connection_name#service_type#AE_server_name
```

where:

- **AVAYA** is a fixed constant.
- *switch_connection_name* represents the switch connection name. You determine the switch connection name when you administer a switch connection in the AE Services Management Console, and the TSAPI service, in turn, gets the information from the database.
- *service_type* refers to the CSTA service type. It can be either of the following:
  - CSTA — if you have administered the TSAPI link as unencrypted (nonsecure)
  - CSTA-S — If you have administered the TSAPI link as encrypted (secure)
- *AE_server_name* represents the AE Server name. The AE Server name is assigned by the person who performs the AE Services installation. The TSAPI service gets this information from the operating system.

An example of a Tlink name is as follows:

```
AVAYA#CM1#CSTA-S#AESRV1
```

Tlink groups

A Tlink group is a name you assign to one or more Tlinks. If you have more than one switch, you can use Tlink groups to control access to a specific set of Tlinks (or switch connections).

When you associate a device with a Tlink group, a user can issue call control requests only for the device on a Tlink in the Tlink group.

If you do not need to restrict access to a specific switch connection, you can assign the default Tlink group, **Any**, to all devices as you add them to the SDB.

How Tlinks and Tlink groups are used

The TSAPI service uses Tlinks and Tlink groups to advertise (to clients) which switch connection or set of switch connections it supports. When a user starts an application at a client workstation, the application specifies which Tlink it should use. It may present a list of Tlinks to the user and prompt the user for a choice, or it may get the correct Tlink from an initialization file. The application then includes this Tlink in the request to establish a connection.

When the TSAPI service receives the establish connection request, it saves the Tlink name. Future application requests to control devices using this Tlink are checked by the TSAPI service. If the device can be accessed by this Tlink, the request goes through. If not, the request is rejected.

If you need this type of checking just described, you need to create groups of Tlinks. Each group is called a Tlink group. You then associate a particular Tlink group with each device, thus limiting access to the device to the Tlinks that are in that group. The following topics provide examples of how Tlink groups are used.

Tlink groups - a way to associate devices with a Switch Connection

The SDB lets you use Tlink groups as a way to associate devices with a particular switch connection (which represents a switch).

You can associate a group of devices to a Tlink group. This has two advantages:

- You know, by looking at the device object, which switch the device is associated with.
- If a user inadvertently selects the wrong Tlink when opening a connection, the TSAPI service returns an error immediately indicating that the Tlink cannot control the device. If this control were not in place, the request would be forwarded all the way to Communication Manager before the error could be detected.

Adding a Tlink group

About this task

The TSAPI service creates the default Tlink group, **Any**.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Tlink Groups**.
2. On the **Tlink Groups** page, in the **TLink Groups** field, type the name that you want to assign to the Tlink group (for example `newgroupA`) .
3. Click **Add Tlink Group**.
4. On the **Add/Edit Tlink Group** page, select the TLink(s) you want to add to this group.
5. Click **Apply Changes**.
6. On the **Apply Changes to Tlink Group Properties** page, click **Apply**.

Next steps

Continue with the procedure Adding a device to the SDB on page 225.

Devices

A device can be a telephone, a fax machine, a modem, an ACD, a VDN, or an agent ID that Communication Manager controls.

Devices can be associated with Tlink groups. Tlink groups are useful when you have a configuration that supports more than one switch connection. Tlink group names allow you to associate a device with a switch connection. For more information, see Sample SDB Administration scenario - setting up a permission scheme based on access rights on page 229.

For a sample procedure that depicts adding a device to the SDB, see Adding a Device to the SDB on page 225.

Adding a device to the SDB

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Devices**.
2. On the **Devices** page, in the **Add Device** field, type the extension number for a specific device, for example `7788`.
3. Click **Add Device**.
4. Complete the **Add/Edit Device** page, as follows:
   a. In the **Location** field, type a location name, for example `metro`. (This field is optional).
   b. In the **Device Type** field, select the appropriate device type, for example **PHONE**.
   c. In the **Tlink Group** field, select the appropriate Tlink group, for example **newgroupA**. (The default is **Any**).
   d. Click **Apply Changes**.
5. On the **Apply Changes to Device Properties** page, click **Apply**.

Device groups

A device group refers to the name of a group and the devices that make up the group. A device group can refer to:

- A group of devices in a call center or help desk operation. In this environment, an application would
  - provide call routing for this device group
  - track incoming call statistics
- A device controlled by a user such as a fax or modem

A device group can be assigned to either a user or a worktop.

- You assign a device group to a user when you want to provide the user with permissions for controlling specific devices as well as assigning the type of control that the user can exert. This type of control is called Access Rights.
- Device groups are used in the worktop object to indicate resources that are shared among the worktop objects that contain the device group.
- A device group can be treated as an exception group. If the group is designated as an exception group, the TSAPI service treats the entire group as if it contained every device except for those devices in the device group.

Adding a device group

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Device Groups**.

2. On the **Device Groups** page, in the **Add Device Group** field, type the name of the device group you want to use, for example `metrophone`.
3. Click **Add Device Group**.
4. Complete the **Add/Edit Device Group** page as follows:
   a. Leave the **Exception Group** check box blank (the default setting).
   b. From the **Device** list, select the devices you want to include in this device group.
   c. Click **Apply Changes**.
5. On the **Apply Changes to Device Group Properties** page, click **Apply**.

Worktops

A worktop refers to a collection of devices. It can consist of a telephone (the primary device) and additional telephony devices, such as fax machines or modems (secondary devices). It is an abstraction of a user's desktop devices. As such, the worktop associates the user's workstation (computer) with the user's telephone and any other telephony devices.

- Worktops are identified by a name and a TCP/IP network address (or a host name).
- Users can always control and monitor all the devices associated with their worktop, even if they are logged in from a different worktop.
- More than one user can be assigned to a worktop. For example, if your organization runs three shifts, and you want three different users to use the same worktop on a per-shift basis, you would assign all three users to the same worktop.

You can add a worktop manually or import multiple worktops from a .CSV file.

See Adding a Worktop on page 226 for more information.

Adding a worktop

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Worktops**.
2. From the **Worktops** page, in the **Add Worktop** field, type the name of the worktop you want to use, for example `sgreen`.
3. Click **Add Worktop**.
4. Complete the Add/Edit Worktop page as follows:
   a. In the **Primary Device ID** field, type the appropriate device ID for the worktop, for example `7788`.
   b. In the **Secondary Device Group** field, select the appropriate device group, for example **metrophone**.
   c. In the **IP Address (or Host Name)** field, type the IP address (or Host Name) of the computer designated as the worktop.

    d. Click **Apply Changes**.

5. In the **Apply Changes to Worktop Properties** page, click **Apply**.

Importing multiple worktops from a .CSV file

Before you begin

To import multiple worktops from a .CSV file, you must have a .CSV file that contains information for each worktop in the following format: `worktop_name, ip_address, hostname, secondary_device_id, primary_device_id` where:

- `worktop_name`: This field must be numeric and should not be assigned to an existing worktop. This field cannot be null.
- `ip_address`: This field can be either null or a properly formatted IP address.
- `hostname`: This field can be either null or a resolvable hostname.
- `secondary_device_id`: This field should contain one of the following values:
    - `ANY`
    - `NONE`: This field cannot be null.
- `primary_device_id`: The value of this field must be equal to the "device_id" of an existing device. This field cannot be null.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Worktops**.
2. From the Worktops page, click **Browse**.
3. From the Choose File to Upload dialog box, select the .CSV file that contains the information for the worktops you want to import, and then click **Open**.

   The path and file name of the .CSV file are displayed in the Upload worktops from file box
4. Click **Upload**.

   The worktops and their associated information appear on the Worktops page.

CTI Users

A CTI user is a person (or an application) administered as a CT user in the AE Services User Management database who logs in and uses the TSAPI service. The settings in the TSAPI service Security Database determine what the user is allowed to do.

Note:

You can not add or create users in the Security Database. You must use the User Management service to add or create users. For more information see Adding a user to User Management on page 145.

See Administering CTI User settings on page 228 for more information.

Administering CTI user settings

About this task

You can not add or create users in the Security Database. You must use the User Management service to add or create users. For more information see Adding a user to User Management on page 145.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > CTI Users > List All Users**.
2. From the **CTI Users** page, select **S. Green** (the name of the worktop you created in Adding a worktop on page 226).
3. Click **Edit**.
4. Complete the **Edit CTI User** page as follows:
   a. In the **Worktop Name** field, select **sgreen**.
   b. Do not change the setting for **Unrestricted Access**. It is disabled by default (the button labeled **Enabled** puts unrestricted access into effect).
   c. In the **Call Origination/Termination and Device Status** field, select an appropriate device group, for example **metrophone**.
   d. In the **Device Monitoring** field, select an appropriate device group, for example **metrophone**.
   e. In the **Calls On A Device** field, select an appropriate device group, for example **metrophone**.
   f. In the **Call Monitoring** field, leave the check box unchecked.
   g. In the **Allow Routing on Listed Device** field, select an appropriate device group, for example **metrophone**.
5. Click **Apply Changes**.
6. In the **Apply Changes to CTI User Properties** page, click **Apply**.

Changes to User Permissions

If you make changes to a user's permissions, the user must close any active applications and restart them before the changes take effect. This is because user permission information is saved in memory when the user's application first opens a connection to the TSAPI Service. Any subsequent changes to the SDB are not reflected in the saved information.

Sample SDB Administration scenario - setting up a permission scheme based on access rights

About this task

If you have users who need additional access you can use a permission scheme (a simple hierarchy) based on User Access Rights. Here is an example that demonstrates how to administer different permission levels for different users, and allow one user greater access than others. This example achieves this by using the Access Rights settings at the user level (see Access Rights options on page 221).

Note:

Because this sample scenario assumes that you already have CTI users, and it does not include adding devices, it presents tasks in a different order than described in Security Database objects on page 222.

Initial settings for the sample help desk group

About this task

Assume that you have four CTI users (Edward, Michael, Sue, and Tom), who are initially administered with default profiles. From the AE Services Management Console main menu, if you were to select **Security > Security Database > CTI Users > List All Users**, and then select a user from the **CTI Users** page, the settings on the **Edit CTI User** page (for each user) would be identical except for the User ID and Common Name.

Access privileges for members of the help desk

Next, assume that you want to set up a simple help desk function for a supervisor (Edward) and the group of people he manages (Michael, Sue, and Tom).

You want Edward to be able to make calls and to receive calls from any of the phones in the help desk group, and you want him to be able to monitor and track calls associated with each of these phones.

You want Michael, Sue, and Tom to be able to use only the phones on their desktops.

Sample - creating a worktop for each user

About this task

The first procedure in this implementation scenario is to create a worktop for each user. Since the procedure is the same for each user, this example will depict setting up Edward’s worktop.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Worktops**.
2. On the **Worktops** page, in the **Add Worktop** field, type `Edward’s Wktp`.
3. Click **Add Worktop**.

4. Complete the **Add/Edit Worktop** page as follows:
    a. In the **Primary Device ID** field, type `14088`.
    b. Leave the **Host Name (or IP Address)** field as is (assume that Auto Admin of LAN Addresses is in effect).
    c. Click **Apply Changes**.
5. In the **Apply Changes to Worktop Properties** page, click **Apply**.
6. Repeat this procedure, for Michael, Sue, and Tom. Keep in mind that each user will have a different worktop name (Michael's Wktp, Sue's Wktp, and Tom's Wktp) and a different Primary Device ID. (Michael's Primary Device ID is 14124; Sue's Primary Device ID is 14127, and Tom's Primary Device ID is 14138).

Sample - creating a device group called help desk

About this task

The next procedure in this implementation scenario is to create a Device Group called HELP DESK.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Device Group**.
2. On the **Device Groups** page, type `HELP DESK`.
3. Click **Add Device Group**.
4. Complete the **Add/Edit Device Group** page, as follows:
    a. Leave the **Exception Group** check box unchecked.
    b. From the list of devices, select the following check boxes.
        - **14088** (Edward's Primary Device ID)
        - **14124** (Michael's Primary Device ID)
        - **14127** (Sues' Primary Device ID)
        - **14138** (Tom's Primary Device ID)
    c. Click **Apply Changes**.
5. On the **Apply Changes to Device Group Properties** page, click **Apply**.

Sample - administering Edward's user profile with greater privileges

About this task

The next procedure in this implementation scenario is to administer Edward's user profile with greater privileges. Recall that you want Edward to be able to make calls and to receive calls from any of the phones in the Help Desk group, and you want him to be able to monitor and track calls from each of their phones.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > CTI Users > List All Users**.
2. On the **CTI Users** page, select **Edward**.
3. Click **Edit**.
4. Complete the **Edit CTI User** page (for User ID Edward), as follows:
   a. In the **Call Origination and Termination** field, select **HELP DESK**. (This lets Edward make calls and receive calls from any of the phones in the Help Desk group).
   b. In the **Device/Device** field, select **HELP DESK**. (This lets Edward monitor calls that arrive at any of the phones in the Help Desk device group).
   c. In the **Call/Device** field, select **HELP DESK**. (This lets Edward track calls that are transferred to any of the phones in the Help Desk device group).
   d. Leave the check box for **Call/Call** unchecked.
   e. In the **Allow Routing on Listed Device** field, accept the default (**None**).
   f. Click **Apply Changes**.
5. In the **Apply changes to CTI User Properties** page, click **Apply**.

Sample - verifying the settings of the help desk

About this task

The last procedure is to verify the administration of the help desk you just put into effect.

Procedure

1. From the AE Services Management Console main menu, select **Security > Security Database > Worktops**.
2. On the **Worktops** page, click the heading **Device Group** to sort the listings in the device group column.
3. Verify that the Device Group lists **HELP DESK** as the Device Group for the Worktop name Edward’s Wktp (Device ID 14088).

Sample Configurations

This section describes operations at a fictional organization, the ACME company. It is a mail order company that sells seeds and garden equipment. Each of the following sections explores part of the operation and describes the administration required to implement it.

The ACME corporation has disabled the “Extended Worktop Access” feature. This limits each user to their own worktop, but as you will see, some users are given permission to monitor other devices or control calls at those devices. This is accomplished by creating device groups for these devices and associating those groups with each user.

Note:

The type of permissions you need to give each user depends on the applications that the user is running. Before you assign permissions, check your applications to see what permissions they require to work properly.

Access privileges

The ACME corporation has two inbound call groups: one group handles calls for the seed catalog and the second group handles calls for the tools catalog. Members of each group have their own desks and do not run TSAPI Service applications from any desk other than their own.

The basic permissions granted to a user are enough for these users, even with the “Extended Worktop Access” option disabled.

Table 1: Basic Permissions — Worktop Administration

Worktop Name	Device ID	Secondary Device Group
Tools1	7701	Not applicable (N/A)
Tools2	7702	N/A
Seeds1	7711	N/A
Seeds2	7712	N/A

Table 2: Basic Permissions — User Administration

User ID	Worktop Name	Call Orig&Term	Device/Device Monitor	Call/Device Monitor	Routing
Michael	Tools1	Not applicable (N/A)	N/A	N/A	N/A
Sally	Tools2	N/A	N/A	N/A	N/A
Juan	Seeds1	N/A	N/A	N/A	N/A
Marie	Seeds2	N/A	N/A	N/A	N/A

Manager/Assistant Configuration

ACME has a president, two vice presidents, and a single assistant who handles all incoming calls to the executives (the president and vice presidents). The president and vice presidents handle only their own phones.

Since the president and vice presidents use only the phones at their desks, you do not need to grant additional access to these users. However, in order for their assistant to be able to control and monitor their phones, you must create a device group containing the device IDs of their telephones and assign this group to the assistant.

The following tables summarize the types of administration you can set up.

Table 3: Manager/Assistant — Device Group Administration

Device Group Name	Device IDs
EXEC LIST	7911, 7912, 7913

Table 4: Manager/Assistant — Worktop Administration

Worktop Name	Device ID	Secondary Device Group
PRESIDENT WKTP	7911	Not applicable (N/A)
VP WKTP1	7912	N/A
VP WKTP2	7913	N/A
ASSISTANT WKTP	7914	N/A

Table 5: Manager/Assistant — User Administration

User ID	Worktop Name	Call Orig&Term	Device Monitoring	Call/Device Monitoring	Routing
President	PRESIDENT WKTP	Not applicable (N/A)	N/A	N/A	N/A
VP1	VP WKTP1	N/A	N/A	N/A	N/A
VP2	VP WKTP2	N/A	N/A	N/A	N/A
Exec Assistant	ASSISTANT WKTP	EXEC LIST	EXEC LIST	N/A	N/A

You can get the same results as the above example by assigning the EXEC LIST to the secondary device group on the assistant's worktop.

Table 6: Manager/Assistant — Assistant Worktop Administration

Worktop Name	Device ID	Secondary Device Group
ASSISTANT WKTP	7914	EXEC LIST

Table 7: Manager/Assistant — User Administration

User ID	Worktop Name	Call Orig&Term	Device Monitoring	Call/Device Monitoring	Routing
Exec Assistant	ASSISTANT WKTP	Not applicable (N/A)	N/A	N/A	N/A

Call Monitoring Application

The inbound call agents are monitored by their supervisor, Martha. Martha has one application that collects call handling statistics and a second application that lets her join a call in progress at an agent's desk. To run these applications, Martha must be given call control privileges and Device/Device monitor, Call/Device monitor and Call/Call monitor privileges on the phones used by the agents. A device group containing the device IDs of the agents is created and entered in Martha's user profile, and a worktop called ACD SUPV is created.

Table 8: Call Monitoring — Device Group Administration

Device Group Name	Device IDs
ACD AGENTS	7701,7702,7711,7712

Table 9: Call Monitoring — User Administration

User ID	Worktop Name	Call Orig&Term	Device Monitoring	Call/Device Monitoring	Call/Call Monitoring
Martha	ACD SUPV	ACD AGENTS	ACD AGENTS	ACD AGENTS	Enabled

These permissions might also be required by applications that bill based on telephone usage.

Portion of User Community Shares Worktops

Two regular employees, Tom and Lalitha, normally sit at their own desks to perform their job, but may occasionally act as an in-bound call agent when a regular agent is out sick or on vacation. ACME handles this situation by creating a device group, ACD Substitutes, and assigning it to the worktops used by Tom and Lalitha.

Table 10: Shared Worktop — Device Group Administration

Device Group Object	Device IDs
ACD Substitutes	7701,7702,7711,7712

Table 11: Shared Worktop — Worktop Administration

Worktop Name	Device ID	Secondary Device Group
WKTP1	7801	ACD Substitutes
WKTP2	7802	ACD Substitutes

Table 12: Shared Worktop — User Administration

User ID	Worktop Name	Call Orig&Term	Device Monitoring	Call/Device Monitoring	Routing
Tom	WKTP1	Not applicable (N/A)	N/A	N/A	N/A
Lalitha	WKTP2	N/A	N/A	N/A	N/A

As an alternative, you could allow Michael, Sally, Juan, and Marie (the inbound call agents) to switch desks by assigning the ACD Substitutes list to the secondary device group on each worktop or by assigning the list to the Call Origination and Termination group and Device groups in each of their user profiles.

ACME also shares a worktop in its shipping department where Louise, Frank, and Susan work. There is only one worktop in this department and all three share it.

Table 13: Shared Worktop — Secondary Device Worktop Administration

Worktop Name	Device ID	Secondary Device Group
Shipping	7810	Not applicable (N/A)

Table 14: Shared Worktop — Secondary Device User Administration

User ID	Worktop Name	Call Orig&Term	Device Monitoring	Call/Device Monitoring	Routing
Louise	SHIPPING	Not applicable (N/A)	N/A	N/A	N/A
Frank	SHIPPING	N/A	N/A	N/A	N/A
Susan	SHIPPING	N/A	N/A	N/A	N/A

Prompted Digits

ACME has a telephony-enabled application that can “pop-up” information about a customer using the customer’s account number. Customers call a vector directory number (VDN), where a recorded announcement prompts them to enter their account number on their touch tone phone. The call is then directed to a customer service representative. By monitoring the VDN, ACME’s application is able to retrieve the collected digits and display the customer information at the customer service representative’s computer.

The extension associated with the VDN is 7800. The application must perform both Device/Device monitoring (on the customer service representative’s phone) and call/device monitoring (on the VDN). Therefore, the customer service representatives must be given call/device monitoring permissions.

A device group, “CSR VDN,” is created containing the VDN. This device group is then assigned to the customer service representatives in their Access Rights options.

Table 15: Prompted Digits — Device Group Administration

Device Group Name	Device IDs
CSR VDN	7800

Table 16: Prompted Digits — User Administration

User ID	Worktop Name	Call Orig&Term	Dev/Device Monitoring	Call/Device Monitoring	Routing
Beth	WKTPA	Not applicable (N/A)	N/A	CSR VDN	N/A
Sally	WKTPB	N/A	N/A	CSR VDN	N/A
Dave	WKTPC	N/A	N/A	CSR VDN	N/A

Call Routing

ACME has a server application that routes all calls to the call center based on the number called, the availability of agents and other criteria. The extension of the incoming calls are 7700 (seeds) and 7710 (tools).

The user in this case is the routing application (Routing App), not a person. The routing application logs in to the TSAPI Service just as a person would and has the same types of privileges. When the routing application begins, it sends a routing registration request to Communication Manager, requesting that incoming calls to extensions 7700 and 7710 be directed to it (the routing application). When the routing application determines which agent should get the call, it tells Communication Manager where to connect the call.

The routing application must be given routing permissions for devices 7700 and 7710. Notice that the user, Routing App, has no associated worktop.

Table 17: Call Routing — Device Group Administration

Device Group Name	Device IDs
ACD ROUTE	7700,7710

Table 18: Call Routing — User Administration

User ID	Worktop Name	Call Orig&Term	Dev/Device Monitoring	Call/Device Monitoring	Routing
Routing App					ACD ROUTE

Chapter 12: Licensing

Licensing configurations

In a typical AE Services configuration, a standard license file is installed on each AE Services server. The licenses in the license file are acquired through a local WebLM server running on the AE Services server. However, the following configurations are also possible:

- Multiple AE Services may be configured to acquire their feature licenses from a single WebLM server where a standard license file is installed. In this configuration, feature licenses can pool from one AE Services server to another as needed.
- With enterprise-wide licensing, an enterprise license file is installed on a master WebLM server. Feature licenses can be allocated from the enterprise license file to multiple AE Services servers. The local WebLM server acquires the feature licenses from the AE Services servers. If any of the feature licenses from the enterprise license are not allocated to the individual AE Services servers, these licenses can also pool among the AE Services servers.

Note:

- If network delay is high in AE Services and WebLM server, then the use of pooled licensing for AE Services is not recommended.

  If you are using pooled licenses, adjust your WebLM configuration accordingly.
- When AE Services is configured for enterprise-wide licensing, the license cannot be removed until the local WebLM entries are removed. For more information, see the Enterprise Licensing topic in the *Administering standalone Avaya WebLM* guide.
- You cannot use a Virtual IP address with enterprise-wide licensing in Geo-Redundant High Availability (GRHA). You must configure the primary AE Services IP address on the WebLM server for enterprise license to work correctly.

  If a standby or secondary AE Services server becomes the primary server, you must update the AE Services IP address on the WebLM server manually before the license grace period of 30 days expires.

Reserving unified desktop licenses

Unified desktop licenses are types of licenses used by TSAPI - typically for Microsoft Office Communicator (MOC) users. These users connect to AE Services via DMCC, but their licenses are controlled by TSAPI. Thus, like the TSAPI basic user licenses mentioned in the previous section, accessing the WebLM server for each license request can have a noticeable effect on performance. For example, if your Lync server initiates monitors for hundred MOCs, the TSAPI Service generally acquires a license from the WebLM server for each of these users successively. You can reduce the time by reserving unified desktop licenses. When you reserve unified desktop licenses, the TSAPI Service acquires all of the reserved licenses at startup time by making a single request to the WebLM server. If more than the reserved amount of unified desktop licenses are used at any given time, TSAPI acquires the extra licenses from the WebLM server successively.

About this task

After installing or upgrading to AE Services 6.3 or later, use this procedure to:

- Ensure the TSAPI Service starts successfully after a system reboot.
- Optimize the performance of the TSAPI Service.

Procedure

1. Using a web browser, log into the **AE Services Management** Console.
2. On the **AE Services Management Console** main menu, select **Licensing > WebLM Server Access**. A new browser window appears displaying the **Web License Manager** page.

   Alternatively, you can access Web License Manager using the Avaya WebLM IP address in your web browser.

   Important:

   If you are using a local Avaya WebLM server, then **AE Services Management Console** redirects you to the **Web License Manager** page automatically for the WebLM configuration.

   If you are using a standalone WebLM server or Avaya Aura® System Manager WebLM server Release 8.0 and later, then manually log in to the WebLM server or Avaya Aura® System Manager for the WebLM configuration.

   Note:

   If the WebLM server displays a Cross-Site Request Forgery vulnerability warning, ignore it because the password is sent in encrypted form in a POST request.
3. On the **Web License Manager** page, log in to WebLM.
4. Click **Application_Enablement** to view the AE Services licensed features.
5. Note the number of Unified Desktop users that are licensed (VALUE_AES_AEC_UNIFIED_CC_DESKTOP).
6. Log out of WebLM.
7. From the **AE Services Management Console** main menu, select **Licensing > Reserved Licenses**. The **Reserved Licenses** page appears.
8. In the **Reserved Unified Desktop Licenses** box, enter the number of licensed Unified Desktop users that you noted in Step 5.

9. Click **Apply Changes**.
10. On the **Apply Changes to Reserved Licenses** page, click **Apply**.
11. Do one of the following:
    - If you need to reserve TSAPI User licenses, complete steps listed in Reserving TSAPI user licenses on page 239.
    - If you do not need to reserve TSAPI User licenses, continue to the next step.
12. From the **AE Services Management Console** main menu, select **Maintenance > Service Controller**.
13. On the **Service Controller** page, select the **TSAPI Service** check box.
14. Click **Restart Service**.
15. On the Restart Service page, click **Restart**.

Reserving TSAPI user licenses

About this task

After installing or upgrading to AE Services, perform this procedure to

- ensure the TSAPI Service starts successfully after a system reboot
- optimize the performance of the TSAPI Service.

The TSAPI Service acquires its licenses from the WebLM server. Depending on the nature of your TSAPI applications and the number of extensions under TSAPI control, accessing the WebLM server for each license request can have a noticeable effect on the performance of your application. For example, if your TSAPI application initiates monitors for several hundred extensions during its initialization, the TSAPI Service acquires a license from the WebLM server for each of these extensions one at a time. You can reduce the time that it takes your TSAPI application to initialize by reserving TSAPI licenses. When you reserve TSAPI licenses, the TSAPI Service acquires all of the reserved licenses at startup time by making a single request to the WebLM server. If more than the reserved amount of TSAPI licenses are used at any given time, then TSAPI acquires the extra licenses from the WebLM server one at a time.

Procedure

1. Using a web browser, log into the AE Services Management Console.
2. On the **AE Services Management Console** main menu, select **Licensing > WebLM Server Access**. A new browser window appears displaying the **Web License Manager** page.

   Alternatively, you can access Web License Manager using the Avaya WebLM IP address in your web browser.
3. On the **Web License Manager** page, log in to WebLM.

> **Note:**
>
> If the WebLM server displays a Cross-Site Request Forgery vulnerability warning, ignore it because the password is sent in encrypted form in a POST request.

4. Click **Application_Enablement** to view the AE Services licensed features.
5. Note the number of TSAPI simultaneous users that are licensed (VALUE_AES_TSAPI_USERS).
6. Log out of WebLM.
7. From the AE Services Management Console main menu, select **Licensing > Reserved Licenses**.

   The Reserved Licenses page appears.
8. In the Reserved TSAPI Basic User Licenses box, enter the number of TSAPI simultaneous users that are licensed that you noted in Step 5 of this procedure.
9. Click **Apply Changes**.
10. On the Apply Changes to Reserved Licenses page, click **Apply**.
11. From the AE Services Management Console main menu, select **Maintenance > Service Controller**.
12. On the Service Controller page, enable (check) the **TSAPI Service** check box.
13. Click **Restart Service**.
14. On the Restart Service page, click **Restart**.

Embedded Avaya WebLM server

Embedded Avaya WebLM Server and AE Services

This feature is supported on all AE Services offers. The license file is deployed inside a AE Services server running on Tomcat.

The license file installed on the embedded Avaya WebLM server uses the AE Services host ID.

> **Note:**
>
> If the eth0 IP address is changed, you must obtain a new license file.

Embedded Avaya WebLM Server and Geographic Redundancy

Obtain the Avaya WebLM host ID from both AE Services servers prior to configuring Geographic Redundancy.

- For the Geographic Redundancy feature to be activated, the license file generated for embedded Avaya WebLM server requires host IDs of both AE Services servers within the license file.

- If Geographic Redundancy is already configured, disable HA to get the Avaya WebLM host ID from each AE Services server.

Embedded Avaya WebLM support by release

Embedded Avaya WebLM is supported on all AE Services Software-Only offers.

Embedded Avaya WebLM is supported on AE Services 6.x System Platform and software-only offers only.

From Release 7.0.1 and later, AE Services VMware offer supports Embedded Avaya WebLM.

Extended Avaya WebLM service feature

Extended Avaya WebLM service supports Avaya WebLM service deployed on System Manager or standalone Avaya WebLM server.

Enterprise Wide Licensing

In pooled mode, multiple AE Services servers share a pool of licenses installed on an external master Avaya WebLM server.

In allocation mode, a pool of licenses are subdivided and distributed to a local (or embedded) Avaya WebLM server from a master Avaya WebLM.

For a more responsive AE Services server, use allocation mode with embedded Avaya WebLM servers.

HTTPS, WebLM, and AE Services

HTTPS is used for connecting a Master Avaya WebLM server and the AE Services Avaya WebLM client or embedded Local Avaya WebLM. The Master Avaya WebLM server can operate in an allocation mode or a pooled mode or both. For the allocation mode, the Master Avaya WebLM server acts as a client of the AE Services embedded Avaya WebLM to establish an HTTPS session and push a license file down to the AE Services embedded Local Avaya WebLM. For the pooled mode, the AE Services C++ and Java Avaya WebLM clients establish an HTTPS session to the Master Avaya WebLM server or the AE Services embedded Local Avaya WebLM to acquire a license.

During the TLS handshake, for an HTTPS client-server session, the server must send its identity certificate to the client and the client must validate the server’s identity certificate. For example, the Not Before date and the Not After date timeframe is valid, and the server identity certificate was signed by a trusted Certificate Authority (CA) known by the client. If the client is unable to validate the server’s identity certificate, the handshake connection is terminated.

Note:

- For the pooled mode, the Master Avaya WebLM CA certificates must be imported into the AE Services Trusted Certificate store using the AE Services Management Console.
- For the allocation mode, the AE Services Apache Web server CA certificates must be imported into the Master Avaya WebLM trust store.

While attempting to connect to Avaya WebLM from the AE Services server or from a Master Avaya WebLM to the AE Services embedded Local Avaya WebLM, the connection might not get established. The following are some troubleshooting suggestions:

- Pooled mode: Using the Management Console, verify that the CA certificate used to sign the Master Avaya WebLM server's identity certificate is in the AE Services Trusted Certificate store. For a default System Manager installation where the Master Avaya WebLM is also embedded, the System Manager's embedded CA is used to sign the System Manager server identity certificate. Each System Manager deployment creates its own unique CA certificate with the same Common Name. Therefore, when validating whether the System Manager CA certificate is installed on the AE Services server, ensure that the System Manager CA certificate Serial ID matches the Serial ID of the System Manager CA certificate in the AE Services trust store.
- Allocation mode: Verify that the CA certificate used to sign the AE Services server identity certificate is in the Master Avaya WebLM trust store.
- Verify that the port is not blocked by a firewall.
- Verify that the Avaya WebLM server identity certificate has not expired.
- Check the AE Services log files for a TLS/SSL connection error, for example, using an unknown certificate.

Configuring the WebLM server for AE Services

About this task

Use this procedure to specify the IP address and port number of the Avaya WebLM server that Application Enablement Services uses for licensing.

The Avaya WebLM login credentials are required only for logging in to the external WebLM server and not for the embedded Avaya WebLM server.

In System Platform, the local host address 127.0.0.1 is not recommended for the primary and secondary WebLM server IP addresses. In VMware, the localhost address 127.0.0.1 is not supported for the primary or the secondary WebLM server IP addresses. From Release 7.x and later, AE Services does not support System Platform.

Procedure

1. On the Application Enablement Services management console, go to **Licensing** > **WebLM Server Address**.
2. In the **WebLM IP Address/FQDN** field, type the IP address or FQDN of the remote Avaya WebLM server.

   The WebLM server does not support IPv6. For an embedded Avaya WebLM server, you must configure the `127.0.0.1` IP address.

   Note:

   From Release 8.1.3 and later, AE Services supports FQDN for the WebLM server.

3. **(Optional)** If you are using a Secure Socket Layer (SSL) connection to the master WebLM server, select the **SSL** check box.
4. **(Optional)** If you are using a remote WebLM server, in the **WebLM Port** field, type the remote WebLM server port number.

   By default, the port number is 8443.

   If System Manager WebLM is used, you must import the System Manager CA certificate.
5. **(Optional)** If you are using the secondary WebLM server, do the following:
   a. In the **Secondary WebLM IP Address/FQDN** field, type the IP address or FQDN of the secondary WebLM server.

      The default value is 127.0.0.1. The value must match the IP address or FQDN specified for the server certificate.

      If you configure the **Secondary WebLM IP Address/FQDN**, AE Services can use only the secondary WebLM server for licensing when the primary WebLM server is not available.

      From Release 8.1.3 and later, AE Services supports FQDN for the secondary WebLM server.

   b. If you are using an SSL connection to the secondary WebLM server, select the **Secondary SSL** check box.
   c. In the **Secondary WebLM Port** field, type the port number for the secondary WebLM server.
6. Select the **Enable Certificate Hostname Validation** check box for the AE Services server to validate the **Subject Alternate Name** or **Common Name** field of the WebLM server identity certificate with the WebLM server hostname during a TLS connection. If the validation fails, the TLS connection will be dropped to verify the WebLM server certificate identity.

   AE Services validates the WebLM server identity certificate only if an external WebLM server is used with HTTPS in a pooled licensing mode. Enabling or disabling hostname validation will enable or disable the peer certification automatically.

   The **Enable Certificate Hostname Validation** field is available from Release 8.1.3 and later.

   Note:

   Avaya recommends that you use **Subject Alternate Name(SAN)** in place **Common Name(CN)** while configuring certificates because the support for **Common Name(CN)** will be removed from the future releases.
7. Click **Apply Changes**.
8. **(Optional)** Click **Restore Defaults** to restore the default settings.
9. Restart ASAI Link Manager, CVLAN, DLG, and TSAPI services for the changes to take effect.

Related links

WebLM Server Address field descriptions on page 244

WebLM Server Address field descriptions

Name	Description
WebLM IP Address/FQDN	The IP address or FQDN of the WebLM server. WebLM does not support IPv6. From Release 7.x and later, AE Services does not support System Platform and bundled server offers. From Release 8.1.3 and later, AE Services supports FQDN for the WebLM server.
SSL	The SSL connection to the master WebLM server. By default, the **SSL** check box is selected.
WebLM Port	The port number for the remote WebLM server.
Secondary WebLM IP Address/FQDN	The IP address or FQDN of the secondary WebLM server. From Release 8.1.3 and later, AE Services supports FQDN for the secondary WebLM server.
Secondary SSL	The SSL connection to the secondary WebLM server.
Secondary WebLM Port	The port number for the remote WebLM server.
Enable Certificate Hostname Validation	The **Enable Certificate Hostname Validation** check box is available only if one of the following is applicable: • You are using an external WebLM server. • You have configured the primary WebLM server using the **WebLM IP Address/FQDN** and **SSL** fields. • You have configured the secondary WebLM server using the **Secondary WebLM IP Address/FQDN** and **Secondary SSL** fields. The check box is selected by defaut if AE Services is using a standalone or external WebLM server on System Manager. The **Enable Certificate Hostname Validation** check box is available from Release 8.1.3 and later.

Button	Description
Apply Changes	To apply the changes.
Restore Defaults	To restore the default values.

Related links

Configuring the WebLM server for AE Services on page 242

Reserving DMCC licenses

About this task

After deploying or upgrading AE Services to Release 6.3 or later, perform this procedure to:

- ensure the DMCC Service starts successfully after a system reboot.
- optimize the use of the DMCC licenses.

Like the TSAPI Service, the DMCC License Service acquires its licenses from the WebLM server. DMCC licenses are used to register a DMCC endpoint (station) with Avaya Communication Manager for first-party call control. A DMCC license is required for each endpoint that is registered through DMCC.

Depending on the nature of your DMCC application and the number of endpoints it registers via DMCC, accessing the WebLM server for each license request can have a noticeable effect on the performance of your application. For example, if your DMCC application registers one or more endpoints for each of several hundred telephone extensions, the DMCC License Service will normally acquire a license from the WebLM server for each of these endpoints. Each license request to the WebLM server will be completed one license at a time.

You can reduce the time it takes your DMCC application to register these endpoints by reserving DMCC licenses. When you reserve DMCC licenses, the DMCC License Service acquires several licenses at the time of the first registration by making a single request to the WebLM server. One license will be allocated immediately for the initial registration, while the rest of the licenses will be held in reserve for future registrations. If more licenses than the specified reserve amount are required (that is, there are more concurrently registered endpoints than reserved licenses), then another increment of DMCC licenses (equal to the reserve amount) will be acquired from the WebLM server. License acquisition is performed in increments of the specified reserve amount up to the maximum number available on the WebLM server. Similarly, as endpoints are unregistered, the freed licenses will be released back to the WebLM server in similar increments (equal to the reserve amount). Note that when the last endpoint is unregistered, all of the remaining reserved DMCC licenses will be released back to the WebLM server.

Procedure

1. Estimate the maximum number of endpoints that will be registered via DMCC. If you are sure this is a firm limit, you can use this number as the value for the Reserved DMCC Licenses in the following steps. If this is not a firm limit, it may be wiser for you to use a smaller value for the Reserved DMCC Licenses in the following steps. DMCC will acquire and release licenses from the WebLM server in increments (chunks) equal to this reserve value.

   For example, if you estimate the maximum number of registered endpoints to be 1000, then you can perform *one* of the following actions:

   - Specify 1000 as the value for the Reserved DMCC Licenses. In this case, 1000 DMCC licenses will be acquired from the WebLM server on registration of the first endpoint. Note that no licenses will be released back to the WebLM server until the last endpoint is unregistered.
   - Specify a smaller number (for example, 50) as the value. In this case, only 50 licenses will be acquired on registration of the first endpoint, another 50 licenses will be acquired on registration of the 51st concurrently-registered endpoint, etc. Note also that, in this

case, as endpoints unregister and no longer need the DMCC licenses, the DMCC licenses will be released back to the WebLM server in chunks of 50 (for this example).

2. Using a web browser, log into the AE Services Management Console.
3. From the Management Console main menu, click **Licensing > Reserved Licenses**.

   The Reserved Licenses page appears.
4. In the Reserved DMCC Licenses box, enter the value you estimated in Step 1 of this procedure.
5. Click **Apply Changes**.
6. On the Apply Changes to Reserved Licenses page, click **Apply**.

Chapter 13: Administration from the operating system command prompt

AE Services Administration from the Operating System Command Prompt

This chapter describes AE Services Server (AE Server) administrative capabilities that you have through the Linux operating system at the command prompt.

⚠ **Caution:**

Do not attempt any of the commands listed in this chapter unless you have a thorough understanding of Linux administration.

Accounts for Avaya Services technicians

All accounts for Avaya Services technicians are exempt from password aging.

Username	Linux Group	Comments
sroot	root	Created when you install AE Services. The AE Server can not be directly accessed through **ssh**.
craft	suser and securityadmin	Created when you install AE Services. Provides read and write access to all AE Services Management Console features.
rasaccess	remote	For inbound modem access The rasaccess account is for modem access only. This account is manually created by Avaya Services technicians when a user purchases a Service contract.

Security alert:

AE Services technicians should change the default passwords for the services accounts immediately. See administrative roles and access privileges (role based access control - RBAC) on page 329.

Changing the default passwords for sroot, craft, and rasaccess

About this task

This procedure is for service technicians, and it applies to either an AE Services VMWare server or Software-Only offer with the Avaya Services Package (cs-service) installed.

Procedure

1. If you have the Software-Only offer with the Avaya Services Package (cs-service) or one of the VMware offers, log in to the AE Services Server as **root**.
2. Type `passwd` ***username*** to display the password prompt. For example `passwd root`.
3. At the password prompt, type a password, and press **Enter**.
4. At the prompt to re-enter your password, type the password again, and press **Enter**.
5. To change the password for **craft** or **rasaccess**, repeat Steps 2 through 4.

Adding a Linux user

About this task

This procedure is provided as an alternative to using the AE Services Management Console to add a Linux user. AE Services recommends using the Security Administration pages. For more information see Adding a local Linux account for an administrator - sample on page 172.

Use this procedure add a Linux user with access privileges to AE Services Management Console. The user you add in this procedure will be added to two Linux groups, susers and securityadmin. As a result, this user will be assigned two roles: System Administrator and Security Administrator. For more information about access privileges, see AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

Procedure

1. Do one of the following:
   a. If you have the Bundled Server offer, log in with your user account (username: **`cust`**; password **`custpw`**) and then become the superuser (**`su - sroot`**).
   b. If you have the Software-Only offer, log in as **`root`**.
2. Type `useradd -g susers -G securityadmin` *`username`* to add a user name with the same roles as the **cust** user.

   Tip:

   The **`useradd`** and **`adduser`** commands are equivalent. You can use either command, and both commands accept the same arguments.
3. Type `passwd` *`username`* to display the password prompt.
4. At the password prompt, type a password, and press **Enter**.
5. At the prompt to re-enter your password, type the password again, and press **Enter**.

6. Log out, and then log in with the new user name and password.
7. From the command line, type `userdel cust` to delete the **cust** account.

Using Tripwire

Tripwire is configuration auditing software that is installed and initially configured on the AE Services Server. The Tripwire information provided in this section applies to all the AE Services offers except the Software-Only server. This section describes how to configure Tripwire for administrative access and how to use the Tripwire features.

Note:

System Platform and Bundled Server are not supported in AE Services Release 7.0. and later.

Reconfiguring the Tripwire database for administrative access

About this task

Because the Tripwire database is installed by an automated procedure, it is set up with passphrases that are not reusable. For administrative access to the Tripwire database, you must manually reinstall and reconfigure it.

Procedure

1. Log in as **`root`**.
2. Stop the Tripwire service by typing the following command: `service tripwire stop`.
3. Delete the Tripwire configuration file, the policy file, and all key files by typing the following commands:
   a. `rm /etc/tripwire/tw.cfg`
   b. `rm /etc/tripwire/tw.pol`
   c. `rm /etc/tripwire/*.key`
4. Delete the Tripwire database file by typing the following command: `rm /var/lib/tripwire/*.twd`
5. Configure Tripwire by typing the following command:

   ```
   /etc/tripwire/cmds/twinstall.sh
   ```
6. When prompted, type unique passphrases for the site key and the local key.

   Each passphrase must consist of at least eight alphanumeric and symbolic characters (quotation marks should not be used). The maximum length of a passphrase is 1023 characters.
7. Reinitialize the tripwire database by typing the following command:

   ```
   tripwire --init
   ```

Note:

Ignore “No such file or directory” messages.

8. Start the tripwire service by typing the following command:

   ```
   service tripwire start
   ```

Routine administrative tasks for Tripwire

Perform these routine administrative tasks from the command prompt as a **root** user.

Running an integrity check

About this task

AE Services runs a Tripwire integrity check daily at 4.a.m. If Tripwire detects any changes to the database files, it generates an alarm and creates a report file.

Procedure

To manually run an integrity check, type the command `tripwire --check`.

Tripwire displays the report on your terminal screen and prints a copy of the output in a report file that you can review when the integrity check is complete.

Printing reports

About this task

If Tripwire detects any database changes or security violations when it runs the integrity check, it generates a report, located in `/var/lib/tripwire/report`.

Procedure

To print a report, type the command `twprint -m r --twrfile /var/lib/tripwire/report/<filename>.twr`.

Changes to monitored files should be expected. File changes, additions, or deletions that are not expected could indicate a compromised system. Review the Tripwire report and investigate each file identified. If the change is not expected, take corrective action.

Updating the Tripwire database

About this task

Once a file monitored by Tripwire changes, it will be flagged in every integrity check until the Tripwire database is updated.

After you have taken the necessary corrective action, update the Tripwire database using the report file.

Procedure

1. Type `tripwire --check`, and press **Enter**
2. Type `tripwire -m u -twrfile /var/lib/tripwire/report/<filename>.twr`.

This updates the Tripwire database so the modified files are not flagged in the next integrity check.

Starting and Stopping Tripwire

About this task

When Tripwire is installed, it will be configured as a service. To start or stop Tripwire, simply treat it as any other service.

Procedure

1. To start Tripwire, type the following command:

   ```
   service tripwire start
   ```

2. To stop Tripwire, type the following command:

   ```
   service tripwire stop
   ```

The netconfig utility

This information does not apply to the Software-Only server. The Software-Only server uses a different version of netconfig.

AE Services provides a customized version of the netconfig utility, which allows you to configure network information for the AE Server. The netconfig utility is located in **`/opt/mvap/bin.`** When you type **netconfig** AE Services displays a screen, which contains settings for the AE Server such as its: hostname, DNS Domain, DNS Server, network interface settings, and default gateway. Whenever you need to change these settings use the netconfig utility.

The table on page 251 provides an example of the Network Information Configuration screen settings for an AE Server with multiple network interfaces (eth0, eth1, eth2, and eth3).

Table 19: The netconfig utility - Network Information Configuration settings

		Comments
Hostname	aeserver	Host name of the AE Server
DNS Domain	example.com	Name of the DNS server
DNS Server	192.168.123.44	IP address of the DNS server.

Interface	Type	Address	Netmask	Enable	Comments
eth0	[ ]	192.168.123.43	255.255.255.0	[x]	eth0 is usually assigned the IP address for client access.
eth1	[ ]	192.168.123.42	255.255.255.0	[x]	eth1 is reserved for on-site technician use.

Table continues…

eth2	[ ]	192.168.123.41	255.255.255.0	[x]	eth2 is usually assigned the IP address for Communication Manager access (Private LAN).
eth3	[			[ ]	Reserved
eth4	[ ]			[ ]	Reserved

		Comments
Default Gateway	192.168.12.344	The IP address of the network router.

Note:

Instead of rebooting AE Services VM, the DB Service and AESVCS should be restarted. The AE Services cannot be rebooted without checking the status.

Changing the server IP address – Software-Only server

About this task

Follow this procedure to configure network interface settings for a Software-Only server.

Procedure

1. Log in as **`root`**.
2. From the command line, type the following command:

   ```
   systemctl stop aesvcs
   ```

   Note:

   Avaya recommends using a Linux utility such as **nmtui** if you are using Red Hat Enterprise Linux 7.6
3. Update the `/etc/hosts` and `/etc/sysconfig/network-scripts/ifcfg-eth0` file with the new IP address(es) for the network interfaces.
4. From the command line, as a precautionary step, type `systemctl restart network`.
5. Log in to the AE Services Management Console again using the new IP address of AE Services server.

   Note:

   If the AE Services Management Console is not responding in a reasonable amount of time, from the command prompt, type the following command: `systemctl restart tomcat`
6. From the AE Services Management Console main menu, select **Administration > Network Configuration > Local IP**.

7. On the **AE Service IP (Local IP)** page, verify that the IP address(es) for Client Connectivity, Switch Connectivity, and Media Connectivity is set to the new IP address(es) you entered in the /etc/hosts file.
8. From the AE Services Management Console main menu, select **Maintenance > Service Controller**.
9. From the **Service Controller** page, click **Restart AE Server**.
10. Make sure all services are in the Running state, and that the connection state to the switch(es) is functional.

    Note:

    If you can not access the AE Services Management Console, check the status of the httpd and tomcat5 processes. If they are not running, start them. For example, type the following commands:

    - `systemctl status httpd`
    - `systemctl start httpd`
    - `systemctl status tomcat`
    - `systemctl start tomcat`

AE Services Tools and Linux commands

This section describes AE Services Linux based capabilities and a few Linux commands that are available at the command prompt.

AE Services Linux based capabilities

AE Services provides the following Linux based capabilities.

statapp

This utility allows the user to check the status of commonly used services on AE Services and connectivity to the WebLM server.

You will see output similar to the following:

Example

[root@keystone2 cust]# statapp

```
AESVCS : active (running)
RSYSLOG : active (running)
DBSERVICE : active (running)
SNMPD : active (running)
AESVCSSPIRITAGENT : active (running)
HTTPD : active (running)
```

```
TOMCAT : active (running)
MON : active (running)
SLAPD : active (running)
SSSD : active (running)
NSLCD : active (running)
SUBAGENT1 : active (running)
SUBAGENT2 : active (running)
PRIMARY WEBLM : reachable
```

mvap.sh

Provides a way for system administrators to get a list of services running in the server and to start, stop and restart all services as a whole. Additionally, it can invoke any exposed methods on any individual service.

Note:

The AE Services Management Console Service Controller (**Maintenance** > **Service Controller**) provides equivalent functionality. Use the AE Services Management Console as your primary tool. It is recommended to use the **`mvap.sh`** utility judiciously and only when necessary, because using this utility might cause high CPU usage on AE Services Server.

Located in `/opt/mvap/bin`

Syntax

`mvap.sh` *<command name>* [*<service name>*] | *<method name> <service name> <argument-list>*

where:

<command name>

`info` - lists info name value pairs of <*service name*>

`status` - lists state of <*service name*>

`start` - invokes start on <*service name*>

`stop` - invokes stop on <*service name*>

`restart` - attempts to restart <*service name*>

`suspend` - attempts to suspend <*service name*>

`resume` - attempts to resume <*service name*>

<service name>

`CmapiService` - Device, Media, and Call Control Service

`CvlanService` - CVLAN Service

`TsapiService` - TSAPI Service

`DlgService` - DLG Service

`AsaiLinkManager` - ASAI Link Manager

`TransportService` - Transport Service

✱ **Note:**

If you omit the service name, the command assumes all service names.

Example:

```
mvap.sh info CvlanService
```

netconfig

Located in /opt/mvap/bin

Allows you to set the following values:

- Host name
- Domain name
- Domain name server
- IP address and network mask for eth0
- IP address and network mask for eth1
- IP address and network mask for eth2, if present
- IP address and network mask for eth3, if present
- Default Gateway IP address

swversion

Located in /opt/mvap/bin

There are three forms of the **`swversion`** command.

The first form, **`swversion`**, lists the following:

- Offer type
- Server type
- Patches installed
- Software version number
- Operating system (kernel) version

The second form, **`swversion -a`**, lists the following:

- Offer type
- Server type
- Patches installed
- Software version number
- Operating system (kernel) version

- List of AE Services RPMs
- List of third-party RPMs

The third form, **`swversion -s`**, lists the following:

- Application name
- Application version
- Application Deployment
- Virtualization Environment
- Current Application Size

Linux commands

This section describes Linux commands that are useful for working with AE Services.

timedatectl

Log in as **`root`** or **`sroot`** to use the following command.

Allows you to change the current time, current date and the time-zone of the AE Services server.

The following list provides the syntax of each functionality:

- *Syntax* to change the current time

  `timedatectl set-time` *HH:MM:SS*

  where

  HH represents two-digit hour

  MM represents two-digit minute

  SS represents two-digit second

  Note:

  `timedatectl` command updates the system clock and the hardware clock. However, the command fails if the NTP service is enabled on the system.

- *Syntax* to change the current date

  `timedatectl set-time` *YYYY:MM:DD*

  where

  YYYY represents four-digit year

  MM represents two-digit month

  DD represents two-digit day of the month

  Note:

  Changing the date without specifying the current time results in setting the time to 00:00:00.

- *Syntax* to change the current time-zone

  `timedatectl set-timezone` *time_zone* where *time_zone* represents the timezones from **`timedatectl list-timezones`** command.

✱ **Note:**

For more information, see Red Hat Enterprise Linux (RHEL) operating system documentation.

df

Allows you to check the disk capacity and partitions of the AE Services server.

ethtool

Allows you to query or change the settings of an Ethernet device (a network interface device, sometimes referred to as a NIC, or Network Interface Card). Use **`ethtool`** to view or change the settings of the network interfaces on the AE Services server. When you use **`ethtool`** to change the network interface settings, the changed settings will not persist after rebooting the AE Services server. To specify new persistent settings for the network connection, you must use the AE Services Management Console. For more information about changing network settings, see Editing the NIC configuration (optional) on page 323.

The following list provides examples of using the **`ethtool`** command for AE Services.

- **`ethtool eth0`**

  Displays the settings of eth0.
- **`ethtool -s eth0 autoneg on`**

  Turns on auto-negotiation for eth0. This is the default setting for any interface unless it is changed.
- **`ethtool -s eth0 autoneg off`**

  Turns off auto-negotiation for eth0. When you want to change the settings of a network interface, such as the network speed or the duplex mode, you must turn off auto-negotiation first.
- **`ethtool -s eth0 speed 100`**

  Sets the network speed of eth0 to 100 Mbs. This is the required speed for AE Services.
- **`ethtool -s eth0 duplex full`**

  Sets the duplex mode to full for eth0. This is the required duplex mode for AE Services.
- **`ethtool -s eth0 speed 100 duplex full`**

  Sets the network speed and duplex mode for eth0 with a single command entry.

For more information about **`ethtool`** command syntax, see the Linux manual page for **`ethtool`**.

route

Allows you to administer static routes.

To use this command, log in as **`root`** or **`sroot`**. Then type `route` to view or configure IP routes. For information on the different options of the **`route`** command, see the Linux manual page for **`route`**.

scp and sftp

Use the **scp** and **sftp** commands to copy files to and from the AE Services server.

service <name> start/stop/restart

Log in as **root** or **sroot** to use the service command.

Syntax

service <*name*> **[start | stop | restart | status]**

where <*name*> is:

- **mvap** — refers to all AE Services (ASAI Link Manager, CMAPI Service, CVLAN Service, DLG Service, TSAPI Service, and the Transport Layer Service).
- **DBService** — refers to the Postgres database.
- **tomcat5** — refers to the Tomcat Web application server.

shutdown -r now

Reboots the AE Services server.

ssh

The **telnet** command is disabled on the VMWare server for both incoming and outgoing connections. Use the **ssh** command instead. **ssh** uses port 22. If you are using a Windows machine to connect to the server, use a secure shell SSH client such as PuTTY to connect.

tripwire

See Using Tripwire on page 249.

Installation and upgrade logs and RPMs

For the Bundled offer, the installation/upgrade logs are located in: **/var/disk/logs/cinstall-xxxxxxxx-xxxxxx**.

For the other AE Services offers, the installation/upgrade logs are located in: **/var/disk/logs/update.out-xxxx-xxxx-xxxx**.

(Applies exclusively to Software-Only server) Copies of RPMs for each release that is installed (up to 3 installs) are located in:

/var/disk/Releases/r<aes ISO version>

Directory structure and file locations

The AE Services root directory **/opt/mvap** contains the following subdirectories

- **asailink** — ASAI specific files
- **bin**— executables and scripts
- **cmapi** — Device, Media, and Call Control specific files
- **conf** — User Management files

- **`config`**— configuration files
- **`cvlan`**— CVLAN specific files
- **`deploy`**— CMAPI hot deploy directory
- **`dlg`**— DLG specific files
- **`dms`**— Database Monitoring Service specific files
- **`lib`** — shared libraries, jars
- **`licenses`** — license files
- **`logs`** — log files including call control trace files. Starting with AE Services Release 4.1, **`logs`** is logical link to the /var/log/avaya/aes directory.
- **`transport`** — Transport Service specific files
- **`tsapi`**— TSAPI specific files
- **`web`** — Web Service files
- **`alarming`** — alarm log files
- **`resources`** — system and user resource files

postgres data files

The default directory for postgres data files is **`/var/mvap/database`**.

External scripts

External scripts, tools or binary executables are in **`/opt/mvap/bin`**.

Environment variables

Environment variables are set at login and defined in **`/etc/profile.d/mvap.sh`**.

Chapter 14: Administering SNMP

Administering SNMP

Use this chapter to set up the AE Server in an SNMP managed network.

Before you begin - SNMP basics

If you are not familiar with Simple Network Management Protocol (SNMP), read this section to learn a few basic concepts.

Simple Network Management Protocol (SNMP). SNMP is a standard network management protocol that is used to remotely monitor and manage network-capable devices such as computers, switches, and gateways. SNMP provides a way for monitored objects (SNMP agents) and monitoring objects (SNMP managers) to exchange status messages.

SNMP Agents. SNMP agents collect and store status information and make it available to SNMP NMS/Managers. In terms of the AE Services implementation, the AE Server contains an SNMP agent which supports SNMP protocols v1, v2c, and v3. The AE Server also has the ability to issue SNMP based Traps/Notifications. Whenever a significant event such as a service failure occurs, the SNMP agent sends a notification to the SNMP NMS. Notifications can be sent using either the SNMP **`trap`** command or the SNMP **`inform`** command.

- Notifications sent with the **`trap`** command do not require a confirmation from the receiver. All versions of SNMP support trap notifications.
- Notifications sent with the **`inform`** command require a confirmation from the receiver. Only SNMP versions 2c and 3 support inform notifications.

By default, AE Services uses the **`trap`** command to send notifications. In general usage, the term trap refers to an unsolicited notification from an SNMP agent to an SNMP manager.

SNMP managers. SNMP managers collect and store status information received from SNMP agents. In terms of the AE Services implementation, SNMP managers are either Avaya Secure Services Gateways (SSG), Avaya Secure Access Link (SAL), or Network Management System (NMS) devices (IBM *Tivoli* or HP *OpenView*, for example). SNMP managers get information by either issuing a request (solicited information) or by receiving a notification whenever an event occurs (unsolicited information). Traps (whether generated by the **`trap`** or **`inform`** command) are unsolicited notifications.

Management Information Base (MIB). The MIB defines (by way of data structures) the information an SNMP agent is capable of reporting. AE Services MIBs are available through the Product Licensing and Delivery System (PLDS).

SNMP components for AE Services

In terms of SNMP, the AE Server has three configuration areas in the AE Services Management Console under **Utilities** > **SNMP**.

- Product ID (also referred to as Alarm ID)
- SNMP Agent
- SNMP Trap Receivers

Product ID administration

The Product ID is used to identify an AE Server. This ID is also referred to as the Alarm ID. The ID is a 10–digit number that is included in each SNMP trap issued by the AE Server. In order to configure this value from the AE Services Management Console, from the main menu navigate to **Utilities > SNMP > Product ID**. The default AE Server Product ID is 4000000000.

Configuring the SNMP Agent

About this task

The SNMP Agent incorporated into AE Services 6.2 supports SNMP v1, v2c, and v3. This agent provides access to SNMP related system performance and metrics associated with the AE Server and AE Services (TSAPI, CVLAN, DLG, DMCC and the Transport Layer).

The agent is configured from the AE Services Management Console. By default all external access to the agent is disabled.

Procedure

1. From the AE Services Management Console main menu, select **Utilities > SNMP > SNMP Agent**.
2. In the **MIB II System Group Data** section, do the following:
    a. In the **Location** field, enter the physical location of the AE Server. For example `LabB1Area2cRack5`. Up to 255 characters are permitted.

    b. In the **Contact** field, enter the name of the person or organization to contact in regards to managing the AE Server. For example `John Smith 555-1234 jsmith@example.com`. Up to 255 characters are permitted.

    These values are used to configure the MIB II OIDs sysLocation and sysContact.
3. In the **SNMP Protocol Access** section, select one of the following settings to specify the SNMP protocol allowed to access the agent:
    - For SNMP v1 access, select the check box labeled **Enable SNMP Version 1** and provide a community string. For example `allowV1Access`.

- For SNMP v2 access, select the check box labeled **Enable SNMP Version 2** and provide a community string. For example `allowV2Access`.
- For SNMP v3 access, select the check box labeled **Enable SNMP Version 3**.

4. If you checked **Enable SNMP Version 3**, do the following:
   a. In the **User Name** field, enter the login name to be used. For example `JohnSmith`.
   b. From the **Authentication Protocol** drop down list box, select either **MD5**, or **SHA**.
   c. In the **Authentication Password** field, enter an alphanumeric authentication password for authenticated SNMP v3 messages. This password can be 6 to 32 character strings.
   d. From the **Privacy Protocol** drop down list box, select either **DES**, or **AES**.

      You must define a **Privacy Protocol** for SNMP Version 3 to work properly.
   e. In the **Privacy Password** field, enter an alphanumeric privacy password for encrypted SNMP v3 messages. This password can be a 6 to 32 character strings.
5. In the **Authorized IP Addresses for SNMP Access** section, select one of the following settings to provide the IP addresses of the NMSs that are allowed to access the AE Server SNMP Agent:
   - Select **No Access** to block all access. This is the default setting.
   - Select **Any IP Addresses** to allow anyone access.
   - Select **Following IP Addresses** to allow access for only 1 to 5 NMSs.

   Note:

   There are no IP access restrictions on Software-Only for SNMP v3.
6. Select **Apply Changes**.
7. On the confirmation screen, select **Apply**.

About sending traps to an Avaya INADS (SSG or SAL) and NMS

If you have the AE Services Server, and have purchased an agreement with Avaya Technical Services for either the Secure Access and Control Basic Offer or the Secure Access and Control Premium Offer, you can send traps to an SSG device or SAL and a local NMS device. For more information about Secure Access and Control (SAC), see http://support.avaya.com/sac.

Traps sent using the SSG or SAL device type as specified on the AE Services Management Console screen, **Utilities > SNMP > SNMP Trap Receivers**, result in Initialization and Administrative System (INADS) notifications. INADS notifications, in turn, generate trouble tickets with Avaya Services. Only a subset of the available traps issued by the AE Services server is published to a SNMP trap destination using INADS. This option is only available to Avaya Service accounts.

All available traps issued by the AE Services server are published to a SNMP trap destination when the NMS device type is specified.

Note:

Traps such as tripwire notifications and login failures are not sent to an SSG or SAL. When you are administering the AE Services Server to send traps, you will want to send these traps to a local NMS. SAL can act as an INADS or an NMS device type

If you do not have the SAC–SSG or SAL Offer, you can send traps to a NMS device only. The SAC-SSG or SAL offer is available with the AE Services VMware offer only. If you use the AE Services Software-Only server, the SAC-SSG or SAL offer does not apply.

If you do not have the SAC-SSG or SAL Offer

If you do not have the SAC–SSG or SAL Offer, you can send traps to a local NMS only. The SAC-SSG or SAL offer is available with the AE Services VMWare offer only. If you use the AE Services Software-Only server, the SAC-SSG or SAL offer does not apply.

If you provide Technical Services with modem access to the AE Server

If you provide Technical Services with modem access to the AE Server for maintenance, there is no provision for alarming. You must contact Avaya Services to report problems.

Administering SNMP trap receivers

About this task

Follow this procedure to send traps from the AE Server to an SNMP manager, which can be either a local NMS device, an Avaya SSG, or an Avaya SAL.

Procedure

1. From the AE Services Management Console main menu, select **Utilities > SNMP Traps > SNMP Trap Receivers**.
2. From the **SNMP Traps** Web page, select **Add** and complete the **Add SNMP Trap** page.

   If you are using SNMP Version 1 or 2c, complete Steps 3 through 10. If you are using SNMP Version 3, complete Steps 3 through 15.
3. Leave the **Enabled** check box selected (the default).
4. In the **Device** field, select the type of monitoring device that is to receive traps.
   - Select **NMS** to send all traps to an SNMP trap destination, for example, IBM Tivoli, HP Openview, or SAL. If you are administering a Software-Only server, the Device setting is restricted to **NMS**.
   - Select **SSG/SAL** to send INADS notifications to an Avaya Secure Services Gateway or Secure Access Link. Keep in mind that only an SSG or SAL is capable of generating INADS notifications. This option is available only to clients who have purchased an Avaya Services contract.
5. In the **IP address** field, type the host name IP address of the device to receive the traps.
6. In the **Port** field type the TCP/UDP port number that AE Services is to use for sending traps.

Keep in mind that the port number you specify must match the port number administered on the SNMP manager that is to receive the notification. The default is 162 .

7. In the **Notification Type** field, select **Trap** (the default).
8. Select the **SNMP Version** that is appropriate for your SNMP managed network.

   The default is 3. If you are sending traps to an SSG, select 2c.
9. Type the **Security Name** that is appropriate for your SNMP network, as follows:

   For devices that use SNMP version 1 or 2c, type the community name that the SNMP administrative domain uses for authentication. For devices that use SNMP version 3, type the security name that the SNMP administrative domain uses for authentication. You can not leave this field blank or use the terms public or private.
10. Based on the version of SNMP you are using, do one of the following:
    - If you are using SNMP version 1 or 2c, click **Apply** to put your settings into effect. (You have completed all the necessary fields, and the procedure is complete.)
    - If you are using SNMP version 3, you must complete Steps 11 through 15.
11. Select the option for the **Authentication Protocol** that your SNMP managed network uses:
    - **MD5** indicates that the network uses the MD5 based authentication protocol.
    - **SHA** indicates that the network uses the SHA authentication protocol.
12. Type an **Authentication Password**.

    This password can be a 6- to 32-character string. Validate the Authentication Password by retyping it in the **Confirm Password** field.
13. Select the option for the **Privacy Protocol** that your SNMP managed network uses:
    - **DES** indicates that the network uses the DES encryption protocol.
    - **AES** indicates that the network uses the AES encryption protocol.
14. Type a **Privacy Password**.

    This password can be a 6- to 32-character string. Validate the Privacy Password by retyping it in the **Confirm Password** field.
15. Click **Apply** to put your settings into effect.

Testing SNMP Traps

About this task

The following procedure is a method to verify that you are able to receive a trap locally on the following locations:

- Local: AE Services Server
- Remote: On a remote NMS device.

Note:

To get the patches, go to http://support.avaya.com/download, which requires Avaya Single Sign On (SSO), and download the appropriate patch.

Procedure

1. From a web browser, type the fully qualified domain name or IP address of the AE Services server. For example `aeserver.example.com`.
2. From the main menu, select **Continue**.
3. Complete the log in screen with the appropriate log in information.
   - Avaya Services Technicians: use the **craft** user name and password.
   - Avaya customers: use the **cust** user name and password.
4. From the AE Services Management Console main menu, select **Utilities** > **SNMP** > **Trap Receivers**.
5. From the SNMP Trap Receivers page, select **Add**, and complete the Add SNMP Trap page by following these steps:
   a. Leave the **Enabled** check box selected (the default).
   b. In the **Device** field, select **NMS**.
   c. In the **IP address** field, type one of the following:
      - Host name (for example `aeserver.example.com`)
      - IP address (for example `192.168.123.44`)
      - Loop back IP address of the AE Services Server, which is `127.0.0.1`
   d. In the **Port** field, type the port number that AE Services is to use for sending traps. The default is `162`.
   e. In the **Notification Type** field, select **Trap**.
   f. In the **SNMP Version** field, select `2c`.
   g. In the **Security Name** field, type the name that the network uses for authentication. For devices that use SNMP Version `1` or `2c`, this name corresponds to the community name. Enter a name for the test and click **Apply**.
6. Click **Add Trap**.
7. As a root user on the AE Services Server, start the trap listener by typing the following command:

   ```
   snmptrapd -fLo
   ```

8. Open another window as a root user on the AE Services Server and type the following command:

   ```
   logger -t mon -i “File Removed”
   ```

   ```
   logger -t mon -i "File Added"
   ```

9. Verify in the listener xterm window that the SNMP notification is received.
10. Verify that your remote SNMP Manager received the same trap.
11. Click **Status** > **Alarm viewer** to view the alarms you just generated.

AE Services SNMP traps, alarm codes and messages

AE Services provides the following alarm codes and messages. Each of the specified alarms will result in the generation of an SNMP trap:

- The **INADS Trap** and **NMS Trap** columns indicate which alarms will issue a trap to Avaya SSG (INADS) and/or a remote NMS.
- The **Alarm Severity** column represents the severity of the generated alarm and the SNMP trap.
- The **AES Release** column identifies the initial AE Services release which provides support for the specified SNMP trap and alarm.

AEServicesSNMPtrapsAlarmCodesAndMessages_Part1

SNMP Object Name: avAesServiceDown

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.1

SNMP Object Description: AES Service died unexpectedly

Remediation Suggestions: Review each service log file to determine the reason why the service stopped.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES000	The AE Services POSTGRES service stopped unexpectedly	Yes	Yes	Major
AAES001	The AE Services POSTGRES service started successfully	No	Yes	Cleared
AAES002	The AE Services ASAI Link Manager service stopped unexpectedly	Yes	Yes	Minor
AAES003	The AE Services ASAI Link Manager service started successfully	No	Yes	Cleared
AAES004	The AE Services CVLAN Server stopped unexpectedly	Yes	Yes	Minor
AAES005	The AE Services CVLAN Server started successfully	No	Yes	Cleared
AAES006	The AE Services DLG Server stopped unexpectedly	Yes	Yes	Minor
AAES007	The AE Services DLG Server started successfully	No	Yes	Cleared
AAES008	The AE Services Transport service stopped unexpectedly	Yes	Yes	Minor

Table continues…

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES009	The AE Services Transport service started successfully	No	Yes	Cleared
AAES010	The AE Services TSAPI service stopped unexpectedly	Yes	Yes	Minor
AAES011	The AE Services TSAPI service started successfully	No	Yes	Cleared
AAES012	The AE Services DMCC stopped unexpectedly	Yes	Yes	Major
AAES013	The AE Services DMCC service started successfully	No	Yes	Cleared
AAES014	The AE Services Lifecycle Manager stopped unexpectedly	Yes	Yes	Major
AAES015	The AE Services Lifecycle Manager service started successfully	No	Yes	Cleared

SNMP Object Name: avAesServiceColdStart

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.2

SNMP Object Description: AES Service start request received.

Remediation Suggestions: N/A

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES018	The AE Services ASAI Link Manager service cold started successfully	No	Yes	Warning
AAES020	The AE Services CVLAN Server cold started successfully	No	Yes	Warning
AAES022	The AE Services DLG Server cold started successfully	No	Yes	Warning
AAES024	The AE Services Transport service cold started successfully	No	Yes	Warning
AAES026	The AE Services TSAPI service cold started successfully	No	Yes	Warning
AAES028	The AE Services DMCC service cold started successfully	No	Yes	Warning
AAES030	The AE Services Lifecycle Manager service cold started successfully	No	Yes	Warning

SNMP Object Name: avAesServiceStopped

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.3

SNMP Object Description: AES Service stop request received.

Remediation Suggestions: If this was planned, do nothing. Otherwise, investigate the log files to determine why the service was stopped.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES019	The AE Services ASAI Link Manager service stopped successfully	No	Yes	Warning
AAES021	The AE Services CVLAN Server stopped successfully	No	Yes	Warning
AAES023	The AE Services DLG Server stopped successfully	No	Yes	Warning
AAES025	The AE Services Transport service stopped successfully	No	Yes	Warning
AAES027	The AE Services TSAPI service stopped successfully	No	Yes	Warning
AAES029	The AE Services DMCC stopped successfully	No	Yes	Warning
AAES031	The AE Services Lifecycle Manager stopped successfully	No	Yes	Warning

SNMP Object Name: avAesAuditServiceError

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.4

SNMP Object Description: The audit service experienced an error.

Remediation Suggestions: The Linux Audit service (auditd) logs to the file /var/log/audit. Review the audit log file for additional information associated with the error.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES032	The audit service experienced an error	Yes	Yes	Minor

SNMP Object Name: avAesAuditServiceLoggingIssue

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.5

SNMP Object Description: The audit service experienced a logging issue.

Remediation Suggestions: The Linux Audit service (auditd) logs to the file /var/log/audit. Review the audit log file for additional information associated with the service logging issue.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity	AES Release
AAES033	The audit service experienced a logging issue	Yes	Yes	Minor	6.3.0

SNMP Object Name: avAesHaServiceIssue

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.6

SNMP Object Description: The AE Services HA service experienced an issue.

Remediation Suggestions: Execute 'sohctl -lh' on the Linux shell or view the log file /opt/mvap/logs/ha.log for more information

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES034	The HA service experienced an error, please run 'sohctl -lh' on the Linux shell or view the log file /opt/mvap/logs/ha.log for more information	Yes	Yes	Minor
AAES035	The HA service cleared an error, please run 'sohctl -lh' on the Linux shell or view the log file /opt/mvap/logs/ha.log for more information	Yes	Yes	Cleared
AAES036	The HA service issued a failover, please run 'sohctl -lh' on the Linux shell or view the log file /opt/mvap/logs/ha.log for more information	Yes	Yes	Minor

SNMP Object Name: avAesTsapiPbxDriverError

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.1.0.7

SNMP Object Description: TSAPI PBX Driver is not responding.

Remediation Suggestions: Collect log files by running the **`getlogs.sh`** command. Copy the log files generated by running the **`getlogs.sh`** command and the core files generated at `/opt/mvap/logs/crash.tsrv.<pid>.tar.gz` path to a different server. Share the copied files at the server with Avaya support.

Do one of the following to restart the TSAPI service:

- Log in to the AE Services OAM interface and navigate to **Maintenance** > **Services Controller** > **Restart TSAPI service**.
- On the Command Line Interface, run the **`mvap.sh restart TsapiService`** command

Restarting the TSAPI service may impact your ongoing services.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES330	TSAPI PBX driver is not responding	No	Yes	Critical
AAES331	TSAPI PBX driver is back in service	No	Yes	Cleared

AEServicesSNMPtrapsAlarmCodesAndMessages_Part2

SNMP Object Name: avAesCtiLinkDown

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.2.0.1

SNMP Object Description: The CTI Link is down.

Remediation Suggestions: If the link remains down, review each service log file and use the AE Services Management Console Status screen related to the affected service to review the CTI link information.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES100	An AE Services TSAPI CTI link is down	No	Yes	Minor
AAES101	An AE Services TSAPI CTI link is up	No	Yes	Cleared
AAES102	An AE Services CVLAN CTI link is down	No	Yes	Minor
AAES103	An AE Services CVLAN CTI link is up	No	Yes	Cleared
AAES104	An AE Services DLG CTI link is down	No	Yes	Minor
AAES105	An AE Services DLG CTI link is up	No	Yes	Cleared
AAES108	An AE Services Call Info connection is down	No	Yes	Minor
AAES109	An AE Services Call Info connection is up	No	Yes	Cleared

SNMP Object Name: avAesAepConnLinkDown

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.2.0.2

SNMP Object Description: An AEP Connection link is down.

Remediation Suggestions: If the link remains down, review the transport service log file and use the AE Services Management Console Status screen related to the Switch Connection service to review the link information.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES106	An AE Services AEP connection is down	No	Yes	Minor
AAES107	An AE Services AEP connection is up	No	Yes	Cleared

SNMP Object Name: avAesWebLMConnLinkDown

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.2.0.3

SNMP Object Description: The WebLM Connection link is down.

Remediation Suggestions: If the link remains down, review the WebLM service log file, determine if the server is experiencing network related issues, and attempt to connect to the WebLM service.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES110	The WebLM connection is down	No	Yes	Minor
AAES111	The WebLM connection is up	No	Yes	Cleared

SNMP Object Name: avAesRemoteKeyServerDown

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.2.0.4

SNMP Object Description: The Remote Key Server[s] is/are down.

Remediation Suggestions: Check accessibility to the Remote Key Server.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES326	The Remote Key Server <Remote Key Server IP> is not accessible	No	Yes	Warning
AAES327	The Remote Key Server <Remote Key Server IP> is reachable	No	Yes	Cleared
AAES328	All remote key servers are not reachable	No	Yes	Minor
AAES329	One or more remote key server is up	No	Yes	Cleared

Note:

Application Enablement Services supports **avAesRemoteKeyServerDown** alarm from Release 8.1.2 and later.

AEServicesSNMPtrapsAlarmCodesAndMessages_Part3

SNMP Object Name: avAesClientLoginFailure

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.3.0.1

SNMP Object Description: An AES Client tried to log in but was not authenticated.

Remediation Suggestions: Verify the credentials used.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES200	An AE Services TSAPI user authentication failure occurred	No	Yes	Minor
AAES201	An AE Services CVLAN user authentication failure occurred; the requested signal number was not valid for the client	No	Yes	Minor
AAES202	An AE Services CVLAN user authentication failure occurred	No	Yes	Minor
AAES203	An AE Services DLG user authentication failure occurred; the requested client link number was not valid for the client	No	Yes	Minor
AAES204	An AE Services DLG user authentication failure occurred	No	Yes	Minor

SNMP Object Name: avAesCertificateFailure

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.3.0.2

SNMP Object Description: Specifies if a certificate is about to expire or has expired.

Remediation Suggestions: Replace or renew the affected certificate.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES205	The Server Certificate will expire in 30 days	No	Yes	Minor

Table continues…

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES206	The Server Certificate will expire in 10 days	No	Yes	Minor
AAES207	The Server Certificate has expired	No	Yes	Major
AAES208	The AE Services Certificate will expire in 30 days	No	Yes	Minor
AAES209	The AE Services Certificate will expire in 10 days	No	Yes	Minor
AAES210	The AE Services Certificate has expired	No	Yes	Major
AAES211	The Web Server Certificate will expire in 30 days	No	Yes	Minor
AAES212	The Web Server Certificate will expire in 10 days	No	Yes	Minor
AAES213	The Web Server Certificate has expired	No	Yes	Major
AAES214	The LDAP Server Certificate will expire in 30 days	No	Yes	Minor
AAES315	The EASG Certificate has expired	No	Yes	Major
AAES316	The EASG Certificate will expire in 30 days	No	Yes	Minor
AAES317	The EASG Certificate will expire in 180 days	No	Yes	Minor
AAES318	The EASG Certificate will expire in 365 days	No	Yes	Minor

SNMP Object Name: avAesLoginFailure

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.3.0.3

SNMP Object Description: Indicator of login failures.

Remediation Suggestions: If the failure is excessive, either use the information contained in the SNMP Trap/Notification, or review the Linux server security log to determine the offending user and IP address to take appropriate action.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES217	OAM Login Failure	No	Yes	Minor
AAES218	Remote SSH Login Failure	No	Yes	Minor
AAES219	Local Console Login Failure	No	Yes	Minor

SNMP Object Name: avAesLoginAttemptsExceeded

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.3.0.4

SNMP Object Description: Indicator of login failure attempts exceeded.

Remediation Suggestions: If the failure is excessive, either use the information contained in the SNMP Trap/Notification, or review the Linux server security log to determine the offending user and IP address to take appropriate action.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES220	OAM Login Attempts Exceeded	No	Yes	Major
AAES221	SSH Login Attempts Exceeded	No	Yes	Major
AAES222	Local Console Login Attempts Exceeded	No	Yes	Major

SNMP Object Name: avAesLicenseFailure

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.4.0.1

SNMP Object Description: Specifies if a license is about to expire or has expired.

Remediation Suggestions: Replace or renew the expired license.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES300	The AE Services license will expire in 30 days	No	Yes	Minor
AAES301	The AE Services license will expire in 10 days	No	Yes	Minor
AAES302	The AE Services license has expired	No	Yes	Minor

SNMP Object Name: avAesGracePeriodFailure

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.4.0.2

SNMP Object Description: Specifies if a license grace period is about to expire or has expired.

Remediation Suggestions: Install a valid license.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES303	DMCC entered 30 day grace period	No	Yes	Minor
AAES304	DMCC has 10 grace period days remaining	No	Yes	Minor
AAES305	DMCC entered restricted mode, 0 grace period days remain	No	Yes	Minor
AAES306	CVLAN entered 30 day grace period	No	Yes	Minor
AAES307	CVLAN has 10 grace period days remaining	No	Yes	Minor
AAES308	CVLAN entered restricted mode, 0 grace period days remain	No	Yes	Minor
AAES309	DLG entered 30 day grace period	No	Yes	Minor
AAES310	DLG has 10 grace period days remaining	No	Yes	Minor
AAES311	DLG entered restricted mode, 0 grace period days remain	No	Yes	Minor
AAES312	TSAPI entered 30 day grace period	No	Yes	Minor
AAES313	TSAPI has 10 grace period days remaining	No	Yes	Minor
AAES314	TSAPI entered restricted mode, 0 grace period days remain	No	Yes	Minor

Table continues…

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES322	DMCC entered normal license mode	No	Yes	Clear
AAES323	TSAPI entered normal license mode	No	Yes	Clear
AAES324	CVLAN entered normal license mode	No	Yes	Clear
AAES325	DLG entered normal license mode	No	Yes	Clear

AEServicesSNMPtrapsAlarmCodesAndMessages_Part4

SNMP Object Name: csDiskUsageThreshold

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.1.0.8

SNMP Object Description: Disk usage has exceeded.

Remediation Suggestions: Use the Linux df command to narrow down the affected partition and then perform clean up. For example, the removal of core files or old log files.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00008	High disk utilization `/dev/mapper/rhel-var` 80 percent used*	Yes	Yes	Minor
ACORE00010	Log disk exceeded 90% storage	Yes	Yes	Minor
ACORE00011	Log disk automatically cleared upto 70%	Yes	Yes	Cleared

Note:

*: The alarm message shows 80% disk occupancy for the given partition.

Note:

Application Enablement Services supports the alarm code ACORE00010 and ACORE00011 of **csDiskUsageThreshold** alarm from Release 8.1.2 and later.

SNMP Object Name: csDiskFull

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.1.0.9

SNMP Object Description: Disk is full.

Remediation Suggestions: Use the Linux df command to narrow down the affected partition and then perform clean up. For example, remove core files or old log files.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00009	`/dev/mapper/rhel-var_lib_ldap` disk is full**	Yes	Yes	Major

Note:

**: The alarm message shows 100% disk occupancy for the given partition.

SNMP Object Name: csCPUUtilization

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.2.0.1

SNMP Object Description: CPU utilization is at least 80%.

Remediation Suggestions: Using the information in the SNMP Trap/Notification and possible the Linux top command to investigate and determine the service or services that is using an excessive amount of the CPU time. This maybe a service not operating correctly or the load on the server may need to be distributed.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00021	CPU: CPU utilization exceeded 80%	Yes	Yes	Minor

SNMP Object Name: csSecurityFileModified

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.3.0.4

SNMP Object Description: File modified.

Remediation Suggestions: Review the Tripwire report to determine the modified file to take the appropriate corrective action. Afterwards update the Tripwire database.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00044	Security: a file has been modified illegally	No	Yes	Minor, Major, or Critical

SNMP Object Name: csSecurityFileRemoved

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.3.0.5

SNMP Object Description: File Removed.

Remediation Suggestions: Review the Tripwire report to determine the deleted file to take the appropriate corrective action. Afterwards update the Tripwire database. For log and trace files refer the log and trace rention policy list.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00045	Security: a file has been removed illegally	No	Yes	Minor, Major, or Critical
ACORE00048	Logs are deleted manually.	No	Yes	Warning
ACORE00049	Traces are deleted manually.	No	Yes	Warning

Note:

Application Enablement Services supports the alarm code ACORE00048 and ACORE00049 of **csSecurityFileRemoved** alarm from Release 8.1.2 and later.

SNMP Object Name: csSecurityFileAdded

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.3.0.6

SNMP Object Description: File Added.

Remediation Suggestions: Review the Tripwire report to determine the added file to take the appropriate corrective action. Afterwards update the Tripwire database.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00046	Security: a file has been added to the system in an illegal directory	No	Yes	Minor, Major, or Critical

AEServicesSNMPtrapsAlarmCodesAndMessages_Part5

SNMP Object Name: csSecurityInitFailed

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.3.0.7

SNMP Object Description: Failed initialization of Tripwire database.

Remediation Suggestions: Review the Tripwire logs and take the appropriate actions.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
ACORE00047	Security: tripwire failed to initialize the tripwire database	No	Yes	Major

SNMP Object Name: csWatchdogProcessUp

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.4.0.10

SNMP Object Description: Process is up.

Remediation Suggestions: N/A

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES319	Started [watched] <service name>	Yes	Yes	Minor

SNMP Object Name: csWatchdogProcessDown

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.4.0.11

SNMP Object Description: Process is down.

Remediation Suggestions: If stopping the process was planned, do nothing. Otherwise, review the watchdog logs, review the logs of the affected service and take the appropriate actions to start the service.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES320	Unit: <service name> entered failed state	Yes	Yes	Major

SNMP Object Name: csWatchdogProcessDead

SNMP OID: .1.3.6.1.4.1.6889.2.18.1.1.4.0.12

SNMP Object Description: Process is dead.

Remediation Suggestions: Review the watchdog logs, the logs of the affected service and take the appropriate actions to start the service.

Alarm Code	Alarm Message	INADS Trap	NMS Trap	Alarm Severity
AAES321	Start request repeated too quickly for <service name>	Yes	Yes	Minor

SNMP Object Name: avAesUserAccountModified

SNMP OID: .1.3.6.1.4.1.6889.2.27.2.2.2.3.0.5

SNMP Object Description: Indicator of user account modification.

Remediation Suggestions: If the failure is excessive, either use the information contained in the SNMP trap or notification, or review the Linux server security log to determine the offending user and IP address to take appropriate action.

Alarm Code	Event ID	Alarm Message
AAES113	O_AACCOUNT-00001	New user account created.
AAES114	O_AACCOUNT-00002	User account locked or unlocked.
AAES115	O_AACCOUNT-00003	User account modified.
AAES116	O_AACCOUNT-00004	User account removed.

Chapter 15: Administering Geo High Availability

Administering the Geo Redundant High Availability (GRHA)

This chapter describes how to configure and manage the GRHA feature. GRHA is a high-availability solution that works across two data centers with a pair of servers connected over a routable network. When the standby AE Services server is activated, AE Services start providing service approximately a minute after the failure detection interval is over. However, all AE Services clients, other than DMCC clients, have to re-establish all monitors/registrations similar to an AE Services server that just came up after a reboot.

Important:

- Before configuring GRHA, new Linux users that are created on the primary server must be created on the secondary server as well.
- You must log in to the OAM using the customer credentials and reset the user password because AE Services 7.1 does not restore the Linux password after migration.
- When upgrading from Release 7.1.x or earlier, AE Services does not restore the `/etc/shadow` file which results in a log in issue with the cust and the root passwords. If you face the log in issue, you must log in to the AE Services virtual machine using the command line interface after the deployment and reset the cust and the root password to the previous AE Services values and then restore the operation. Alternately, you can set the cust and root passwords on the previous AE Services version to the values you set during the 7.1.x and 8.x deployment and backup and restore the `/etc/shadow` file on the AE Services 7.1.x and 8.x virtual machine.
- The active and standby servers should have the same encryption setting. That is, either both servers should be encrypted or not.

Note:

- The IP network round trip time between two AE Services servers must be less than 100 milliseconds.
- GRHA is now supported in the AE Services Release 7.0 and later for VMware only. The use of Machine Preserving High Availability (MPHA) and Fast Reboot High Availability (FRHA) modes are not supported in the AE Services Release 7.0.

To use the GRHA feature, perform the following steps:

1. Make sure you have the appropriate information for the GRHA feature. See Configuration worksheet for Geo Redundant High Availability on page 280.
2. Configure and start GRHA, see Configuring Geo Redundant High Availability on page 283.

Note:

- You cannot change the AE Services IP address or hostname once GRHA is enabled. To change the hostname or IP address on either AE Services server, you must first disable GRHA.
- If you perform a backup when Geo Redundant High Availability is enabled and then restore that backup file when GRHA is removed, you must remove the GRHA configuration from the AE Services Management Console to be able to enable HA. See Removing Geo Redundant High Availability on page 287.
- You cannot change the AE Services Virtual IP addresses once GRHA is enabled. To change the Virtual IP addresses on either AE Services server, you must first disable GRHA.
- You cannot use Virtual IP address with enterprise-wide licensing. You must configure the primary AE Services IP address on the WebLM server for enterprise license to work properly.

  If the standby or secondary AE Services server becomes the primary server, you must update the AE Services IP address on the WebLM server manually before the license grace period of 30 days expires.

  For more information, see the Enterprise Licensing topic in the *Administering standalone Avaya WebLM* guide.
- The Virtual IP addresses and both AE Services server IP addresses must be in the same subnet. For two data centers with different subnets, one possible solution is to use an extended subnet between the data centers.
- AE Services does not support Virtual IP addresses for GRHA on the following platforms:
  - Amazon Web Services
  - Microsoft Azure
  - Google Cloud Platform
- For GRHA configuration, both active and standby servers must be on the same platform and profile. For example, if the active AE Services server is on VMware with profile 1, the standby AE Services server must also be on VMware with profile 1.

Related links

Configuration worksheet for Geo Redundant High Availability on page 280
About Eth0 Virtual IP Address on page 282
Configuring Geo Redundant High Availability on page 283
Adding ping targets for Geo Redundant High Availability on page 284
Starting Geo Redundant High Availability on page 285

Stopping Geo Redundant High Availability on page 285
Synchronizing Geo Redundant High Availability on page 285
Switching to the standby server in Geo Redundant High Availability (interchange) on page 286
Suspending Geo Redundant High Availability on page 286
Unsuspending Geo Redundant High Availability on page 287
Removing Geo Redundant High Availability on page 287

Configuration worksheet for Geo Redundant High Availability

To configure the Geo Redundant High Availability feature for AE Services, you must have the information listed in the following table.

Field	Description
Local AE Server HostName	This is a display only field. The host name is configured when AE Services application is installed. The host name of the local AE Server.
Local AE Server IP Address	This is a display only field. The IP address is configured when AE Services application is installed. The IP address of the AE Server.
Remote AE Server IP Address	IP address of the remote AE Services server.
Remote AE Server User Name	User name of any user who is a part of the super user group and has access to linux shell. The default is **cust**.
Remote AE Server User Password	The password of the remote user.
Eth0 Virtual IP Address (optional)	The virtual IP address, which is used by the active AE Server. This field is optional.
Eth1 Virtual IP Address (optional)	The virtual IP address, which is used by the active AE Server. This field is optional.
Eth2 Virtual IP Address (optional)	The virtual IP address, which is used by the active AE Server. This field is optional.
Failure Detection Interval	The Failure Detection Interval determines how long you want AE Services to wait before the standby AE Services server becomes active if the standby AE Services server cannot reach the current active AE Services server. The range is 1 - 3600 seconds. The default value is 600 seconds.

Table continues…

Field	Description
Preferred Active Node (optional)	The IP address of the preferred active node. The default value is empty. If Preferred Active Node is administered, during split brain resolution the preferred node will be chosen as the active AE Services server. If Preferred Active Node is not administered, the current active AE Services server remains active. Split brain is a condition when both AE Services servers are running in active mode due to network failure. When the network between the AE Services servers comes up, you must keep only one AE Services server active. This field is optional.
System Type	The system type is based on the number of individual licenses allocated for this AE Services server. The system depends on the number of other AE Services licenses used on the AE Services server based on the following table. Choices are **Small**, **Medium**, and **Large**.

	HA Small License	HA Medium License	HA Large License
DLG (on/off)	NA	NA	HA Large required
CVLAN (on/off)	NA	NA	HA Large required
AE Services Advanced Small Switch	HA Small required	OK	OK
AE Services Advanced Medium Switch	NA	HA Medium required	OK
AE Services Advanced Large Switch	NA	NA	HA Large required
TSAPI Simultaneous Users	<= 1000	> 1000 and <= 5000	> 5000
Unified CC API Desktop Edition	<= 1000	> 1000 and <= 5000	> 5000
Device Media and Call Control	<= 500	> 500 and <= 1000	> 1000

Note:

If an application exceeds the use of AE Services individual licenses for a configured Geo Redundant High Availability system size, AE Services Geo Redundant High Availability will enter the Geo Redundant High Availability license violation state. Once in the Geo Redundant High Availability license violation state, Geo Redundant High Availability will prohibit failover for any reason until the license violation state is cleared. There are two ways to clear the license violation state:

- Acquire and install a higher level Geo Redundant High Availability license that is appropriate to AE Services individual license usage

- Call Avaya Services to clear the violation state.

Reducing the usage of AE Services individual licenses after the license violation state is reached will not clear the license violation state.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

About Eth0 Virtual IP Address

AE Services Server supports a virtual IP address for each of the **eth0**, **eth1** and **eth2** interfaces. To be able to administer a virtual IP address, these interfaces must have a valid IP address. AE Services continues to support HA configuration without any virtual IP addresses configured. In such a configuration, the AE Services Server client applications connect one of the two IP addresses associated with each of AE Services Servers' client connectivity interfaces. This is dependent on the AE Services Server that is active.

GRHA is enhanced with the following changes:

1. Registration states are replicated, as they happen over a newly created socket (TLS) connection between active and standby AE Services server.
2. Registration states are kept in memory in the `/dev/shm/resq` directory.

   Note:

   `/dev/shm` is a memory file system.
3. Virtual IP addresses can be configured for public, private and OOBM interfaces.

Since GRHA performs a synchronous update for session states, it can be used in place of FRHA.

Using virtual IP addresses have significant advantages:

- The client application can use the same IP address to connect to the active AE Services GRHA server. The client application does not have to maintain two different AE Services Server IP addresses
- If a virtual IP address is also used for Switch and Media Connectivity, any DMCC associations that are currently in place at the time of a GRHA fail-over will be automatically recovered by the new active AE Services server. The associations include the following:
  - DMCC client sessions
  - DMCC devices and device monitors
  - DMCC station registrations
  - DMCC call associations
  - DMCC system registrations.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Configuring Geo Redundant High Availability

About this task

Follow this procedure to configure and start the Geo Redundant High Availability feature.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Configure HA**.

   The **High Availability Configuration** page appears.
3. In the **Remote AE Services Server IP Address** field, enter the IP address of the remote AE Services server.
4. In the **Remote AE Services Server User Name** field, enter the user name of the AE Services server.
5. In the **Remote AE Services Server User Password** field, enter the password.
6. In the **Eth0 Virtual IP Address —optional** field, enter the virtual IP address, which is used by the active AE Services server. This field is optional.
7. In the **Eth1 Virtual IP Address—optional** field, enter the virtual IP address, which is used by the active AE Services server. This field is optional, and can be configured to be used for private network.
8. In the **Eth2 Virtual IP Address—optional** field, enter the virtual IP address, which is used by the active AE Services server. This field is optional, and can be configured to be used for out of band network.
9. In the **Failure Detection Interval** field, enter the number of seconds for the Failure Detection Interval. The Failure Detection Interval determines how long you want AE Services to wait before the standby AE Services server becomes active if AE Services cannot reach the current active AE Services server. The range is *1*-*3600* seconds. The default value is *600* seconds.
10. In the **Preferred Active Node—optional** field, enter the IP address of the preferred active node. The default value is empty (none). This field is optional.
11. In the **System Type** area, select the appropriate system type. The system type is based on the number of individual licenses allocated for this AE Services server. The system depends on the number of other AE Services licenses used on the AE Services server based on the table in Configuration worksheet for Geo Redundant High Availability on page 280.
12. Click **Apply Changes**.
13. On the **High Availability Configuration Confirmation** page, click **Apply**.
14. On the **High Availability Status** page, click **Start** to start Geo Redundant High Availability.
15. On the **Start HA Confirmation** page, click **Apply**.

Related links

[Administering the Geo Redundant High Availability (GRHA)](#) on page 278

Adding ping targets for Geo Redundant High Availability

About this task

Follow this procedure to add ping targets for the Geo Redundant High Availability feature. Ping targets are used to determine the health of a specific network up to a specific network node. Using ping targets, you can gauge the health of the network and determine which AE Services server should be active.

Adding ping targets is an optional procedure.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Configure HA**.

   The High Availability Configuration page appears.
3. In the Ping Targets area, click **Add Ping Target**.

   A new, blank row appears for the ping target you want to add.
4. Click the check box next to the new ping target.
5. In the Ping Target (IP Address/Hostname) box, enter the IP address or hostname of the appropriate network node.

   Note:

   Only IPv4 addresses are supported.
6. In the Interval (sec) box, enter the interval. The default is 60 seconds.
7. In the Timeout (sec) box, enter the timeout interval for this target. The default is 600 seconds.
8. In the Interval AFF (sec) box, enter the interval after first failure value. The default is 60 seconds.
9. If you want to add additional ping targets, repeat steps 3 through 8.
10. When finished adding ping targets, click **Apply Changes**.
11. On the High Availability Configuration Confirmation page, click **Apply**.

Related links

[Administering the Geo Redundant High Availability (GRHA)](#) on page 278

Starting Geo Redundant High Availability

Before you begin

Geo Redundant High Availability is configured and in the stopped state.

About this task

Follow this procedure to start Geo Redundant High Availability.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Start**.
3. On the Start HA Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Stopping Geo Redundant High Availability

Before you begin

Geo Redundant High Availability must be running.

About this task

Follow this procedure to stop Geo Redundant High Availability.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Stop**.
3. On the Stop HA Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Synchronizing Geo Redundant High Availability

Before you begin

Geo Redundant High Availability is configured and running.

About this task

Follow this procedure to synchronize the active and standby servers configured for Geo Redundant High Availability.

Note:

- You may want to synchronize the active and standby servers after you make changes to the AE Services configuration.
- Synchronization is performed automatically after Geo Redundant High Availability is started and every minute after that.
- Configuration changes are copied automatically to the standby server every two minutes.
- DMCC active session states are copied to the standby instantaneously.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Synchronize**.
3. On the High Availability Synchronize Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Switching to the standby server in Geo Redundant High Availability (interchange)

Before you begin

Geo Redundant High Availability is configured and running.

About this task

Follow this procedure to make:

- the current active AE Services server become the standby AE Services server
- the current standby AE Services server become the active AE Services server

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Interchange**.
3. On the High Availability Interchange Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Suspending Geo Redundant High Availability

Before you begin

Geo Redundant High Availability is configured and running.

About this task

Follow this procedure to suspend Geo Redundant High Availability.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Suspend**.
3. On the Suspend HA Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Unsuspending Geo Redundant High Availability

Before you begin

Geo Redundant High Availability is in the suspended state.

About this task

Follow this procedure to unsuspend Geo Redundant High Availability.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Unsuspend**.
3. On the Unsuspend HA Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Removing Geo Redundant High Availability

Before you begin

Geo Redundant High Availability is configured or in the running state.

About this task

Follow this procedure to remove Geo Redundant High Availability.

Note:

If Geo Redundant High Availability is running when you perform this procedure, Geo Redundant High Availability will first be stopped, and then the configuration will be removed.

Procedure

1. From the AE Services Management Console, select **High Availability**.
2. On the High Availability Status page, click **Remove HA**.

3. On the Remove HA Confirmation page, click **Apply**.

Related links

Administering the Geo Redundant High Availability (GRHA) on page 278

Chapter 16: Dial plan administration in AES

Dial plan administration in AE Services

Configurations that require dial plan administration

Dial Plan settings apply to the following types of configurations only:

- AE Services integration is not supported with IBM Sametime due to software limitations and security concerns.
- AE Services implementation with Microsoft Lync Server 2010 and 2013 (AE Services implementation for Microsoft Lync Server)
- AE Services with DMCC clients using E.164ConversionServices
- AE Services with DMCC applications working in TelURI mode. For more information, see the following documents:
    - *Avaya Aura®Application Enablement Services Device, Media, and Call Control Java Programmer 's Guide*, 02-300359
    - *Avaya Aura®Application Enablement Services Device, Media, and Call Control XML Programmer's Guide*, 02-300358
    - *Avaya Aura®Application Enablement Services Device, Media and Call Control API .NET Programmer's Guide*, 02-602658

  Note:

  For more information about the From and To TelURI operations, see How different APIs or offers use the TelURI settings on page 302.

Note:

AE Services integration with Microsoft Office Live Communications Server 2005 and Microsoft Office Communications Server 2007 support is stopped as Microsoft has ended its support for Microsoft Office Live Communications Server 2005 on 01/09/2018 and Microsoft Office Communications Server 2007 on 07/10/2007.

Dial plan administration - converting E.164 numbers and dial strings

Dial plan administration in AE Services refers to setting up tables that convert TelURI numbers and dial strings for a switch connection. TelURI is an abbreviation for Telephony Uniform Resource Identifier.

- The AE Services Dial Plan pages in the Management Console use the **From TelURI** table to convert Tel URI phone numbers to dial strings. See General tips for setting up From TelURI conversion rules on page 291 for more information.
- The AE Services Dial Plan pages in the Management Console use the **To TelURI** table to convert dial strings to TelURI numbers. General tips for setting up To TelURI conversion rules on page 291 for more information.

Important:

To administer the dial plan settings in AE Services, you need to know how the dial plan is administered on Communication Manager. If you do not know what the dial plan settings are for a particular switch or set of switches, contact the Communication Manager administrator.

Dial plan processing requirements - TelURI formats that AE Services supports

AE Services support the following TelURI formats. The preferred format is E.164, except in cases where the extension bears no resemblance to the E.164 numbers.

Format	Example
E.164	tel:+13031234567
E.164PlusExt	tel:+13031234567;ext=1234567
extOnly	tel:5389000;phone-context=<domain> where <domain> can be any organization’s domain name tel:1234567;phone-context=example.com

Calling device and monitored device ID formats

AE Services requires the calling device and monitored devices to be in either E.164PlusExt format or E.164 format. The extOnly format should be used only if there is no correlation between the E.164 number and the extension.

Called device ID formats

Called device IDs can be in either E.164 format or E.164PlusExt format; called device IDs will not be in E.164PlusExt format.

General tips for setting up From TelURI conversion rules

The **From TelURI** table determines the way that AE Services processes inbound E.164 numbers. Generally speaking, AE Services applies matching criteria to the incoming number. When the number satisfies the matching criteria, AE Services manipulates the digits and provides the results to the requester (only one rule is applied for each number). When setting up the From TelURI settings, you can specify up to 200 rules. Each row in the table represents a rule. The rules are processed in order from top to bottom.

If you have a rule that contains a wildcard (* - asterisk) for the Minimum Length, Maximum Length, and Pattern match, it always must be the last rule in the list, and it must be a single asterisk (by itself). If you need to treat the asterisk as a literal in either the Pattern Match or the Replacement fields, you must precede it with a backslash, for example: * . Also, if your dial plan uses a number sign and you need to treat it as a literal in the Pattern Match field, you must precede it with a backslash.

Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
11	11	1303538	4	(blank)[1]
11	11	1303	1	9
*	*	*	0	9011

[1] Blank means the replacement field is empty.

General tips for setting up To TelURI conversion rules

The **To TelURI** table determines the way that the AE Services processes outbound E.164 numbers. Generally speaking, AE Services applies matching criteria to the outgoing number. When the number satisfies the matching criteria, AE Services manipulates the digits and provides the results to the requestor (only one rule is applied for each number). When setting up the To TelURI settings, you can specify up to 200 rules. Each row in the table represents a rule. The rules are processed in order from top to bottom.

If you have a rule that contains a wildcard (* - asterisk) for the Minimum Length, Maximum Length, and Pattern match, it always must be the last rule in the list, and it must be a single asterisk (by itself). If you need to treat the asterisk as a literal in either the Pattern Match or the Replacement fields, you must precede it with a backslash, for example: * . Also, if your dial plan uses a number sign and you need to treat it as a literal in the Pattern Match field, you must precede it with a backslash.

Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
7	7	538	0	1303
7	7	852	0	1732
10	10	*	0	1

Sample of setting up From TelURI conversion rules for a dial plan with fixed-length extensions

The following example depicts **From TelURI** conversion rules for a switch that uses fixed-length-extensions in its dial plan. This sample switch supports three different extension prefixes: 538, 852, and 444. The 538 prefix is used for extensions hosted on that switch, and the other two prefixes are used for switches connected via QSIG.

Example - From TelURI rules for fixed-length extensions

The following table contains sample conversion rules.

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
A	11	11	1303538	4	(blank)[1]
B	11	11	1732852	4	(blank)
C	11	11	1720444	4	(blank)
D	11	11	1303	1	9
E	11	11	1720	1	9
F	11	11	1	0	9
G	*	*	*	0	9011

1. Blank means the replacement field is empty.

Example - how the From TelURI rules process numbers for fixed-length extensions

The following table describes how From TelURI rules process numbers for fixed length extensions in Example - From TelURI rules for fixed-length extensions on page 292.

A	AE Services receives +13035381234 , an 11-digit number. Because the number is within the minimum and maximum length requirements, and the first 7 digits (1303538) are a pattern match, AE Services deletes the first 4 digits (1303) and does not prepend any digits.The resulting number is 5381234.
B	AE Services receives +17328521234, an 11-digit number. Because the number is within the minimum and maximum length requirements, and the first 7 digits (1732852) are a pattern match, AE Services deletes the first 4 digits (1732) and does not prepend any digits. The resulting number is 8521234.
C	AE Services receives +17204441234,an 11-digit number. Because the number is within the minimum and maximum length requirements, and the first 7 digits (1720444) are a pattern match, AE Services deletes the first 4 digits (1720) and does not prepend any digits. The resulting number is 4441234 to the switch.
D	AE Services receives +13036791234, an 11-digit number. Because the number is within the minimum and maximum length requirements, and the first 4 digits (1303) are a pattern match, AE Services deletes the first digit (1),and prepends 9 to the number. The resulting number is 93036791234.

Table continues…

E	AE Services receives +17202891234,an 11-digit number. Because the number is within the minimum and maximum length requirements, and the first 4 digits (1720) are a pattern match, AE Services deletes the first digit (1),replaces it with a 9. The resulting number is97202891234.
F	AE Services receives +18183891234, an 11-digit number. Because the number is within the minimum and maximum length requirements, and the firstdigit (1) is a pattern match, AE Services deletes no digits, and prepends a 9 to the number. The resulting number is918183891234.
G	AE Services receives +4926892771234, a 13-digit number. Because the minimum length, maximum length, and pattern match are set up with the wild card, any number is permitted. AE Services deletes no digits and prepends 9011 to the number. The resulting number is 90114926892771234.

Sample of setting up To TelURI conversion rules for a dial plan with fixed-length extensions

The following example depicts To TelURI conversion rules for a switch that uses fixed-length-extensions in its dial plan. This switch supports three different extension prefixes: 538, 852, and 444. The 538 prefix is used for extensions hosted on that switch, and the other two prefixes are used for switches connected via QSIG.

Example - To TelURI rules for fixed-length extensions

The following table contains sample conversion rules.

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
A	7	7	538	0	1303
B	7	7	852	0	1732
C	7	7	444	0	1720
E	5	5	2	0	173285
F	5	5	4	0	172044
G	10	10	*	0	1

Example - how the To TelURI rules process numbers for fixed-length extensions

The following table describes how To TelURI rules process numbers for fixed length extensions in Example - To URI rules for fixed-length extensions on page 293.

A	AE Services receives 5381234, a 7 digit number. Because the number is within the minimum and maximum length requirements, and the first three digits (538) are a patternmatch, AE Services deletes no digits, and prepends 1303 to the number. The resulting number is +13035381234.
B	AE Services receives 8521234, a 7 digit number, from the switch. Because the number is within the minimum and maximum length requirements, and the first three digits (852) are a patternmatch, AE Services deletes no digits, and prepends 1732 to the number. The resulting number is +17328521234.

Table continues…

C	AE Services receives 4441234, a 7-digit number, from the switch. Because the number is within the minimum and maximum length requirements, and the first three digits (444) are a patternmatch, AE Services deletes no digits, and prepends 1720 to the number. The resulting number is +17204441234.
D	AE Services receives *510, from the switch. Because the number is within the minimum and maximum length requirements, and the first character in the dial string will be an asterisk, you must precede it with a backslash. AE Services does not delete or replace any characters. The resulting dial string is *510.
E	AE Services will sometimes receive a 5 digit extension from a networked switch, even if the local dial plan is 7 digits (see Tips for dial plan settings with networked switches on page 298). In this case, AE Services receives a 5 digit number 21234. Based on the matching pattern of 2 at the beginning. AE Services prepends 173285 to the number. The resulting number is +17328521234.
F	AE Services will sometimes receive a 5 digit extension from a networked switch, even if the local dial plan is 7 digits (see Tips for dial plan settings with networked switches on page 298). In this case, AE Services receives a 5 digit number 41234. Based on the matching pattern of 4 at the beginning,AE Services prepends 172044 to the number. The resulting number is +17204441234.
G	AE Services receives a 10-digit number, 2126711234. Based on the matching pattern of any 10-digit string, AE Services deletes no digits and prepends 1 to the number. The resulting number is +1212671123.

Sample of setting up From TelURI conversion rules for a switch with variable length extensions

The following example depicts From TelURI settings for a switch that uses variable length extensions in its dial plan. This example assumes the following:

- The customer owns numbers +49697100 through +49697105 in the dial plan, but does not own +49697106 and higher.
- The dial plan accommodates 1- to 4-digit extensions
- The ARS code is 0, the inter-region code is 0, and the international dial code is 00. The ARS code, which in this case is 0, is always included before the inter-region code and international dial code.

Example - From TelURI rules for variable length extensions

The following table contains sample conversion rules.

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
A	8	11	49697100	7	(blank)[1]
B	8	11	49697101	7	(blank)
C	8	11	49697102	7	(blank)
D	8	11	49697103	7	(blank)
E	8	11	49697104	7	(blank)

Table continues…

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
F	8	11	49697105	7	(blank)
G	*	*	4969	4	0
H	*	*	49	2	00
I	9	9	46357	6	*8
J	*	*	*	0	000

1. Blank means the replacement field is empty.

Example - how the From TelURI rules process numbers for variable length extensions

The following table describes how From TelURI rules process numbers for fixed length extensions in Example - From TelURI rules for variable-length extensions on page 294.

A	AE Services receives +49697100, an 8-digit number. Because the number is within the minimum and maximum length requirements, and the number is an exact pattern match, AE Services deletes the first 7 digits (4969710) and does not prepend any digits to the number. The resulting number is 0.
B	AE Services receives +49697101988, an 11-digit number. Because the number is within the minimum and maximum length requirements, and the first 8 digits (49697101) are a pattern match, AE Services deletes the first 7 digits and does not prepend any digits to the number. The resulting number is 1988.
C	AE Services receives +4969710211, a 9-digit number. Because the number is within the minimum and maximum length requirements, and the first 8 digits (49697102) are a pattern match, AE Services deletes 7 digits and does not prepend any digits to the number. The resulting number is 211.
D	AE Services receives +496971034, a 9-digit number. Because the number is within the minimum and maximum length requirements, and the first 8 digits (49697103) are a pattern match, AE Services deletes 7 digits and does not prepend any digits to the number. The resulting number is 34.
E	AE Services receives +4969710494, a 10-digit number. Because the number is within the minimum and maximum length requirements, and the first 8 digits (49697104) are a pattern match, AE Services deletes 7 digits and does not prepend any digits to the number. The resulting number is 494.
F	AE Services receives +4969710598, a 10-digit number. Because the number is within the minimum and maximum length requirements, and the first 8 digits (49697105) are a pattern match, AE Services deletes 7 digits and does not prepend any digits to the number. The resulting number is 598.
G	AE Services receives +496971060, a 9-digit number. Because the wild card (*) permits a number of any length, and the first 4 digits (4969) are a pattern match, AE Services deletes the first 4 digits and prepends 0 to the number. The resulting number is 071060.
H	AE Services receives +49306441234, an 11-digit number from Communicator. Because the wild card (*) permits a number of any length, and the first 2 digits (49) are a pattern match, AE Services deletes the first 2 digits and prepends 00 to the number. The resulting number is 00306441234.
I	AE Services receives +4635746262, a 9-digit number from Communicator. Because the first 6 digits are a pattern match, AE Services deletes the first 6 digits and prepends *9 to the number.
J	AE Services receives +17328521234, an 11 digit number. Because the minimum length, maximum length, and pattern match are set up with the wild card, any number is permitted. AE Services deletes no digits, prepends 000. The resulting number is 00017328521234.

Sample of setting up To TelURI conversion rules for a switch with variable length extensions

The following example depicts To TelURI conversion rules for a dial plan that uses variable-length extensions in its dial plan. The set of rules in this example assumes the following:

- All numbers less than or equal to 4 digits are extensions. This assumption allows the table to have one rule, rather than 6, for all extension starts. In some cases, it might be necessary to be more specific.
- International numbers start with 00, and inter-region numbers start with 0. Any digits other than 0 or 00 are assumed to be local digits. AE Services prepends 4969, which represents country or city codes. Keep in mind that you must carefully analyze your dial plan before you attempt to apply a catch-all rule such as this.

Example - To TelURI rules for variable length extensions

The following table contains sample conversion rules.

	Minimum Length	Maximum Length	Pattern Match	Delete Length	Replacement
A	1	4	*	0	4969710
B	*	*	00	2	(blank)[1]
C	*	*	0	1	49
D	*	*	*	0	4969

[1] Blank means the replacement field is empty.

Example - how the To TelURI rules process numbers for variable length extensions

The following table describes how To TelURI rules process numbers for fixed length extensions in Example - To TelURI rules for variable length extensions on page 296.

A	AE Services receives 1234, a 4-digit number. Because the number is within the minimum and maximum length requirements, and the wild card (*) permits a match of any 1- to 4-digit number, AE Services deletes no digits and prepends 4969710 to the number. The resulting number is 49697101234.
B	AE Services receives 0017328524321, a 13-digit number. Because the number is not within the range specified by the 1- to 4-digit rule (A) it satisfies this rule (B), which permits a number of any length where first two digits (00) are a pattern match. AE Services deletes the first 2 digits, prepends nothing to the number. The resulting number is 17328524321.
C	AE Services receives 0306441234, a 10-digit number. Because the number is not within the range specified by the 1- to 4-digit rule (A) it satisfies this rule (C), which permits a number of any length where first digit (0) is a pattern match. AE Services deletes the first digit, prepends 49 to the number. The resulting number is 49306441234.

Table continues…

D	AE Services receives 45427, a 5-digit number. Because the number is not within the range specified by the 1- to 4-digit rule (A) it satisfies this “catch-all” rule that permits a number of any length and any pattern of digits. AE Services deletes no digits, prepends 4969 to the number. The resulting number is 496945427.

Pattern matching -- using Pattern and RegEx (regular expressions)

Pattern

Use Pattern when you want to use a digit string as a way of detecting the presence of a specific sequence of digits in an incoming dial string. When you select Pattern you can create a matching string based on literal digits (0 through 9), one character literal (the #), and one special character, the asterisk (*) which will match any digit or sequence of digits. If you select **Pattern**, valid dial string characters are: all digits (0-9), the number sign (#), and the asterisk (*).

RegEx

Use RegEx (regular expression) when you want to use a Java regular expression to analyze an incoming dial string. Regular expressions rely on symbolic notation - grouping of digits and special characters for analyzing incoming dial strings. For example, ([0-5]\\d{0,3}) is a regular expression which matches extensions that start with digits 0 - 5, and are 1 to 4 digits in length.

Note:

You can mix rule types. You can create a From TelURI table that uses rules based on Pattern and rules based on RegEx.

Example - To TelURI rules that use RegEx

The following table contains sample conversion rules that include regular expression rules and simple pattern match rules.

	Min length	Max length	Pattern	Delete Length	Replacement
A			4969710([0-5]\\d{0,3})		$1
B			4969(\\d{1,})		0$1
C	*	*	49	2	00
C	*	*	*	1	000

Example - How the To TelURI rules process numbers that use RegEx

The following table describes how To TelURI rules process numbers that use RegEx in Example - To TelURI rules that use RegEx on page 297.

A	This rule uses a RegEx pattern to specify that Call Control Services is to look for a string starting with 4969710, matching an extension that starts with 0 through 5 and is 1 to 4 digits in length. The parentheses around the extension indicate a group, which is correlated with the $1 in the replacement string. The $1 says to replace the matching string (the entire E.164 number) with the group designated by the parentheses (the extension).
B	This rule uses a RegEx pattern to specify that Call Control Services is to look for a string starting with 4969, followed by 1 or more digits. The parentheses again correlate with the $1 in the replacement string, which says to take the group (the E.164 number without country code or city code) and to add a 0 in front of it (the ARS code).
C	This rule uses a simple pattern match. The asterisk in the Min and Max length permits a number of any length. The pattern indicates that Call Control Services is to look for a string starting with 49. When it detects 49, it deletes the first 2 digits, and replaces them with 00.
D	This rule uses a wildcard pattern match. The asterisk in the Min and Max length permits a number of any length, and the asterisk in the pattern permits pattern of digits. When any number that does not satisfy the first 3 rules (A,B, and C) is detected, Call Control Services deletes the first digit and replaces it with 000.

Tips for dial plan settings with networked switches

When switches are networked together using ISDN QSIG tie trunks or ISDN tie trunks, in some call scenarios Communication Manager sends extension numbers from the networked switch to the AE Server. The format of these extension numbers may be different than the format of local extension numbers.

To optimize the experience of Microsoft Lync users, be sure to administer “To TelURI” rules for the networked switch, or switches, as well as the local switch. Additionally, if the networked switch has a different extension length than the local switch, extensions might be reported with both the local extension length and the networked extension length. Be sure to administer “To TelURI” rules that can successfully convert both extension lengths for the networked switch.

Also, you might need multiple entries in the To TelURI rules for the networked switch if that switch has a different extension length than the local switch.

Methods for administering dial plan settings

In AE Services you can use either of the following methods to administer dial plan settings.

- You can administer the dial plan settings for one switch at a time. For more information, see Administering dial plan settings on a per-switch basis on page 299.
- You can administer default dial plan settings that are used for all switches. For more information, see Administering default dial plan settings on page 301.

Important:

In configurations with one AE Server supporting multiple switches, AE Services does not support Microsoft Office Communicator/Microsoft Lync control of the same extension on more than one switch.

Administering dial plan settings on a per-switch basis

About this task

AE Services uses the dial plan information to convert E.164 phone numbers to switch extensions (From TelURI) and switch extensions to E.164 phone numbers (To TelURI).

Note:

If your AE Services and Microsoft LCS/Lync configuration uses a number of switches that all have the same dial plan, use the procedure described in Administering default dial plan settings on page 301. By using the default settings, you enter the dial plan settings only once.

Follow this procedure to administer the dial plan settings for a switch connection you have already administered in AE Services.

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface > Dial Plan > Switch Administration**.
2. From the **Switch Dial Plan Administration** page, select the connection name for the switch you want to administer, for example **aeslcswitch**, and click **Detail**.
3. On the **Dial Plan Settings - Conversion Rules for aeslcswitch** page, in the **From TelURI** section, click **Add**.
4. From the **Add Dial Plan - aeslcswitch** page, follow these steps to complete the **From TelURI** settings, based on your dial plan.

   Important:

   Refer to online help in the AE Services Management Console as you complete these fields.

   a. In the **Pattern Type** check box, select **Pattern** or **RegEx** based on your dial plan rules. **Pattern** is the default.

   b. In the **Minimum length** field, type a number from 1 to 21, or an asterisk (*) for any number, to specify the minimum number of characters expected in the telephone number (dial string).

   c. In the **Maximum Length** field, type a number from 1 to 21, or an asterisk (*) for any number, to specify the maximum number of characters expected in the number (dial string).

   d. In the **Matching Pattern** field, type a string of valid characters that you expect at the beginning of a dial string.

      Valid characters are all digits (0-9), the number sign (#), and the asterisk (*). You can not specify a blank space or the plus sign (+) in this field.

e. In the **Delete length** field, type a number from 1 to 21 to specify the number of characters to delete from the beginning of the number (dial string).

f. In the **Replacement String** field, type a string of characters to be prepended to the number (dial string).

g. Click **Apply Changes**.

h. On the **Add Dial Plan** page, click **Apply**.

Note:

You have added one From TelURI conversion rule. If you want to add another From TelURI conversion rule, repeat Step 4.

5. On the **Dial Plan Settings - Conversion Rules for aeslcswitch** page, in the **To TelURI** section, click **Add**.
6. From the **Add Dial Plan - aeslcswitch** page, follow these steps to complete the **To TelURI** settings, based on your dial plan.

Important:

Refer to online help in the AE Services Management Console as you complete these fields.

a. In the **Pattern Type** check box, select **Pattern** or **RegEx** based on your dial plan rules. **Pattern** is the default.

b. In the **Minimum length** field, type a number from 1 to 21, or an asterisk (*) for any number, to specify the minimum number of characters expected in the telephone number (dial string).

c. In the **Maximum Length** field, type a number from 1 to 21, or an asterisk (*) for any number, to specify the maximum number of characters expected in the number (dial string).

d. In the **Matching Pattern** field, type a string of valid characters that you expect at the beginning of a dial string.

Valid characters are all digits (0-9), the number sign (#), and the asterisk (*). You can not specify a blank space or the plus sign (+) in this field.

e. In the **Delete length** field, type a number from 1 to 21 to specify the number of characters to delete from the beginning of the number (dial string).

f. In the **Replacement String** field, type string of characters to be prepended to the number (dial string).

g. Click **Apply Changes**.

h. On the **Add Dial Plan** page, click **Apply**.

Note:

You have added one To TelURI conversion rule. If you want to add another To TelURI conversion rule, repeat Step 6.

Result

The changes you made to your dial plan settings are in effect. You do not have to restart the AE Server.

Administering default dial plan settings

About this task

If you use multiple switches in your AE Services and Microsoft for Live Communications Server configuration, and all the switches have the same dial plan settings, you can use the Default Dial Settings page as a template. When you add a switch connection, the dial plan settings that you administer on the Default Dial Plan settings page are applied to that switch connection.

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface > Dial Plan > Default Settings**.
2. On the Dial Plan Settings - Conversion Rules for default page, in the From TelURI section, click **Add**.
3. From the Add Dial Plan - default page, follow these steps to complete the **From TelURI** settings, based on your dial plan.

   Important:

   See the online help in the AE Services Management Console as you complete these fields.

   a. In **Pattern Type**, select **Pattern** or **RegEx** based on your dial plan rules.

      Pattern is the default.

   b. In **Minimum length**, type a number from 1 to 21, or an asterisk (*) for any number, to specify the minimum number of characters expected in the telephone number (dial string).

   c. In **Maximum Length**, type a number from 1 to 21, or an asterisk (*) for any number, to specify the maximum number of characters expected in the number (dial string).

   d. In **Matching Pattern**, type a string of valid characters that you expect at the beginning of a dial string.

      Valid characters are all digits (0-9), the number sign (#), and the asterisk (*). You can not specify a blank space or the plus sign (+) in this field.

   e. In **Delete length**, type a number from 1 to 21 to specify the number of characters to delete from the beginning of the number (dial string).

   f. In **Replacement String**, type string of characters to be prepended to the number (dial string).

   g. Click **Apply Changes**.

   h. On the **Add Dial Plan** page, click **Apply**.

Note:

Repeat Step 3 to add another **From TelURI** conversion rule.

4. On the Dial Plan Settings - Conversion Rules for default page, in the To TelURI section, click **Add**.
5. From the Add Dial Plan - default page, follow these steps to complete the **To TelURI** settings, based on your dial plan.

   Important:

   See online help in the AE Services Management Console as you complete these fields.

   a. In **Pattern Type**, select **Pattern** or **RegEx** based on your dial plan rules. **Pattern** is the default.
   b. In **Minimum length**, type a number from 1 to 21, or an asterisk (*) for any number, to specify the minimum number of characters expected in the telephone number (dial string).
   c. In **Maximum Length**, type a number from 1 to 21, or an asterisk (*) for any number, to specify the maximum number of characters expected in the number (dial string).
   d. In **Matching Pattern**, type a string of valid characters that you expect at the beginning of a dial string.

      Valid characters are all digits (0-9), the number sign (#), and the asterisk (*). You can not specify a blank space or the plus sign (+) in this field.
   e. In **Delete length**, type a number from 1 to 21 to specify the number of characters to delete from the beginning of the number (dial string).
   f. In **Replacement String**, type string of characters to be prepended to the number (dial string).
   g. Click **Apply Changes**.
   h. On the Add Dial Plan page, click **Apply**.

   Note:

   Repeat Step 5 to add another **To TelURI** conversion rule.

Result

Changes you made to your dial plan settings are in effect. You do not have to restart the AE Server.

How different APIs or offers use the TelURI settings

Both the DMCC API and the AE Services implementation for Microsoft Lync Server 2010 and 2013 use the From TelURI and the To TelURI settings to convert between E.164 numbers and dial strings. There are differences, however, in the way that the DMCC API and the AE Services implementation for LCS/OCS and Microsoft Lync Server handle the results of the conversion.

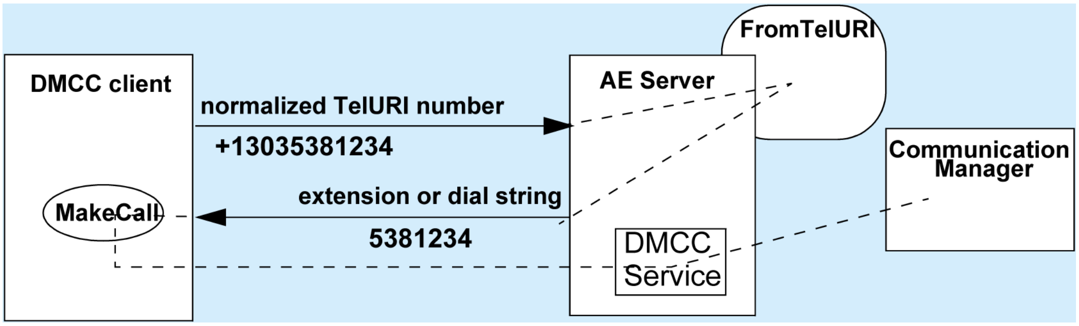
- To understand how the DMCC service uses the conversion rules, see From TelURI and ToTelURI operations for the DMCC service on page 303.
- To understand how the AE Services implementation for Microsoft Lync Server 2010 and 2013 uses the conversion rules, see From TelURI and ToTelURI operations for the AE Services implementation for LCS/OCS and Lync on page 304.

From TelURI and ToTelURI operations for the DMCC service

An application can not work in TelURI mode with AE Services. That is, an application must explicitly request conversion (from a dial string to a TelURI or from a TelURI to a dial string) from E164 conversion services as described in the two following topics, From TelURI operations for the DMCC service on page 303 and To TelURI operations for the DMCC service on page 303.

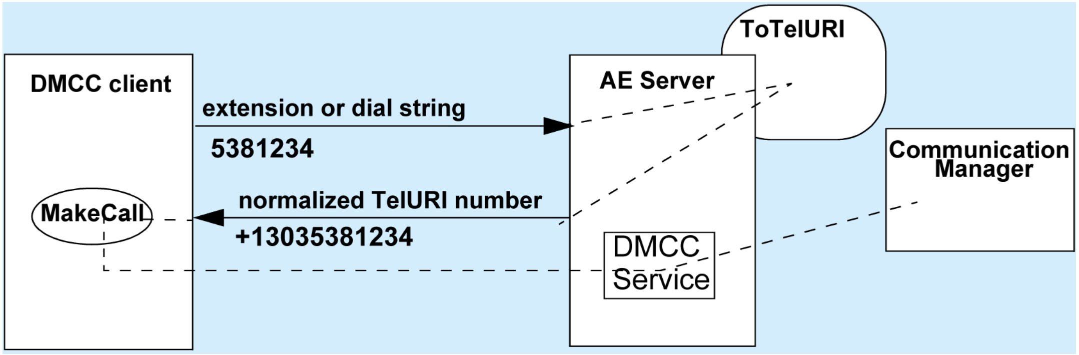
From TelURI operations for the DMCC service

The DMCC application receives a TelURI number from a directory. The DMCC application then submits the TelURI number to the E164 Conversion Service. The E164 Conversion Service provides a response, which includes a dial string. The application extracts the dial string from response and uses it in its next request, which is usually GetDeviceId.



To TelURI operations for the DMCC service

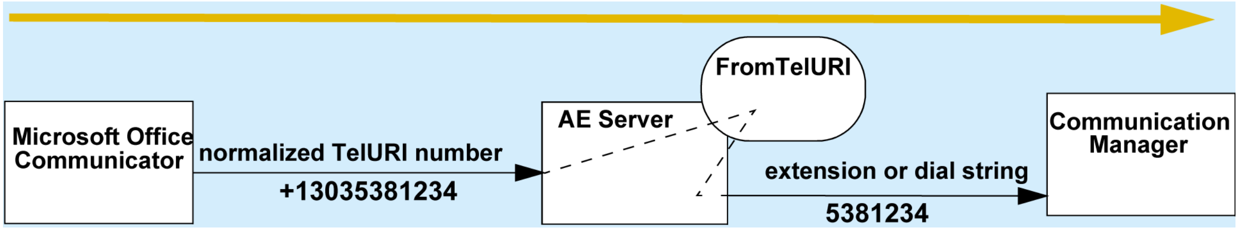
The DMCC application receives an event from Communication Manager, which includes an extension number. The DMCC application extracts the extension number and submits it to the E164 Conversion Service. The E164 Conversion Service converts the extension into a TelURI number. The application extracts the TelURI from the response, and uses it to resolve a number to a user or to display the TelURI number.



From TelURI and ToTelURI operations for the AE Services implementation for LCS/OCS and Lync

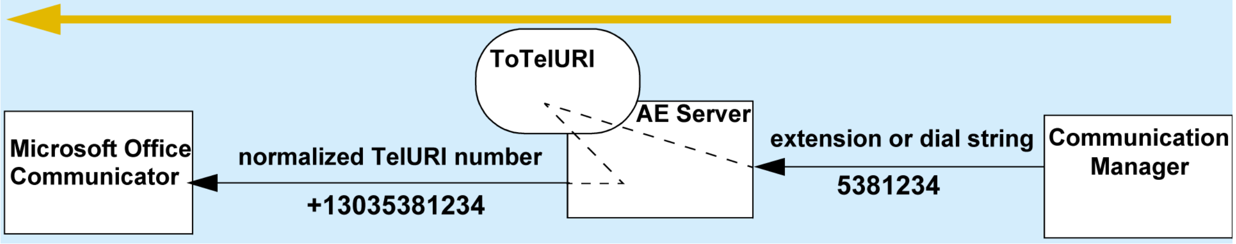
From TelURI operation for the AE Services implementation for LCS/OCS and Lync

For the AE Services implementation for LCS and Lync, From TelURI settings are used to convert normalized TelURI numbers, arriving from the Microsoft Office/Lync client, into dial strings. AE Services hands off the dial strings to the switch (Communication Manager).



To TelURI operations for the AE Services implementation for LCS/OCS and Lync

For the AE Services implementation for LCS/OCS and Lync, To TelURI settings are used to convert dial strings, arriving from the switch (Communication Manager) into normalized TelURI numbers. AE Services hands off the normalized TelURI numbers to Microsoft Office Communicator/Lync.



Creating a backup of the dial plan

About this task

Use this procedure to export the dial plan to a backup file (comma separated values format).

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface > Dial Plan > Export**.
2. On the **Export Dial Plan** page, click **Here**.

Importing a dial plan

About this task

Use this procedure to import (upload) a dial plan (comma separated values) backup file to AE Services. AE Services imports the dial plan backup file and updates the AE Services switch connection and teluri tables in the database.

Procedure

1. From the AE Services Management Console main menu, select **Communication Manager Interface > Dial Plan > Import**.
2. On the **Import Dial Plan** page, click **Browse**.
3. In the **Choose File to Upload** dialog box, select the dial plan backup file you want to import, and then click **Open**.
4. Click **Upload** .

Chapter 17: Administering for Web services-based applications

AE Services Administration for Web services-based applications

Application Enablement Services Web Services provides the ability for data application developers to interface to Communication Manager through standard Web Services methods. AE Services provides the following Web services based interfaces:

- User Management — a service component enabling the management of user profile data in the local LDAP database.

  Note:

  Effective with AE Services 4.1, AE Services had discontinued support for the User Service on AE Services 3.x and 4.0. Applications written to the User Service will continue to work on AE Services 3.x and 4.0, but AE Services will not support applications written to the User Service.

- System Management Service (SMS) — a web service that exposes selected management features of Communication Manager. SMS enables SOAP (Simple Object Access Protocol) clients to display, list, add, change and remove specific managed objects on Communication Manager.

  For information about SMS configuration settings, see SMS Configuration on page 306.

- Telephony Web Service — a high level interface to a small subset of call control services. You can configure the Session Timeout setting for TWS in the AE Services Management Console.

For more information about the Web Services, see the *Avaya Aura®Application Enablement Services Web Services Programmer's Guide*, 02-300362.

SMS Configuration

The SMS Configuration pages in the AE Services Management Console let you edit the saw.ini file using the Management Console pages. Because SMS Configuration a part of the AE Services Management Console, the saw.ini file will be backed up whenever a you use the Backup Database feature to backup the AE Server.

Effective administration of the SMS configuration settings assumes that you are working with SMS application development to configure the AE Server for SMS. Here are a few guidelines for completing the SMS Configuration Page.

Changing SMS proxy port settings

About this task

By default, AE Services assigns ports 4101 to 4116 for SMS proxy ports. If you need to change these settings follow this procedure.

Procedure

1. Log in to the AE Services Management Console with System Administrator privileges.
2. From the AE Services Management Console main menu, select **Networking > Ports.**
3. From the **Ports** page, locate the SMS Proxy Ports settings. The default settings are:
   - Proxy Port Min **4101**
   - Proxy Port Max **4116**
4. Change the port assignments to port numbers that are appropriate for your configuration.

   Note:

   SMS can use up to 16 ports. If you change any of the SMS port assignments, make sure that there are no conflicts with other ports.

Configuring SMS settings

Procedure

1. Log in to the AE Services Management Console with System Administrator privileges.
2. From the AE Services Management Console main menu, select **AE Services > SMS > SMS Properties**.
3. Complete the **SMS Properties** page.

   The following list describes the SMS configuration settings and provides some guidelines for configuring SMS.

   - **Default CM Host Address** — If you administer a Communication Manager Host Address, SMS will attempt to connect to this Communication Manager host address, as long as no host address is explicitly specified in the authorization header of a client request. If this field is blank, all SMS requests must explicitly include the target Communication Manager host address.
   - **Default CM Admin Port** — By default the System Management Service will use 5022 to connect to a Communication Manager server. The Default Communication Manager Admin Port is a default setting that can be overridden at any time by an SMS request. If you manually administer a port number, make sure that there are no conflicts with other ports
   - **CM Connection Protocol** — The Communication Manager Connection Protocol setting and the Default Communication Manager Admin Port are interdependent.

Note:

If you change the **CM Connection Protocol**, you may need to change the **Default CM Admin Port**. The default TUI (or SAT) ports on Communication Manager are as follows:

SSH Port=5022

Telnet Port=5023

- **SMS Logging** — Use the default setting **Normal** unless you are debugging. Changing this setting to **Verbose** could result in a high volume of read and write operations.
- **SMS Log Destination** — Use the default apache, unless you are debugging. The syslog setting is for debugging only.
- **CM Proxy Trace Logging** — Use the default **None**, unless you are debugging. The **Normal** and **Verbose** settings are for debugging only.
- **Proxy Log Destination** — Use the default destination **/var/log/avaya/aes/ossicm.log** for the CM Proxy Trace logs on the AE Server.
- **Max Sessions per CM** — This is a safety setting that prevents SMS from consuming all of the TUI processes on Communication Manager. By default the setting is 5. You can specify from 1 to 5 sessions. The maximum number of sessions that SMS allows open on a single Communication Manager is 5 .
- **Proxy Shutdown Timer(s)** — Use the default **1800 seconds**, unless you are developing an SMS application that requires modifying this setting.
- **SAT Login Keepalive(s)** — Use the default **180 seconds**, unless you are developing an SMS application that requires modifying this setting.
- **CM Terminal Type** — Use the default **OSSIZ**, unless you have the need to remove punctuation from extensions on list operations or security requirements. This setting allows for the ossicm proxy to change its default terminal type. Select from the following options:
    - OSSIZ (the default). Any customer-related superuser login to CM will be able to read as well as write station security codes.
    - OSSI3. Only the “init” user can read station security codes.
    - OSSIE. Exactly the same as OSSIZ except extension numbers do not contain punctuation.

Configuring TWS Properties

Procedure

1. On the Application Enablement Services management console, go to **AE Services** > **TWS** > **TWS Properties**.
2. In the **Session Timeout** field, type the appropriate value.

3. Click **Apply Changes**.
4. On the TWS Properties page, click **Apply**.
5. **(Optional)** Click **Restore Defaults** to restore the default settings.

Chapter 18: Using the Historical Metric Data Collector (HMDC)

Using the Historical Metric Data Collector (HMDC)

The Historical Metric Data Collector (HMDC) enables you to collect, store, and display real-time and historic product-specific performance data.

Using HMDC you can:

- Schedule metric-group(s) data to be collected
- Specify how long you want to keep collected data
- Generate reports with the collected data
- Delete collected data.

Related links

Scheduling data collection on page 310
Unscheduling data collection on page 312
Viewing configured schedules on page 313
Modifying a scheduled data collection on page 313
Enabling and disabling data collection on page 314
Creating a metric data report on page 315
Cleaning up data immediately on page 316

Scheduling data collection

About this task

Use this procedure to configure HMDC to collect specific data. See HMDC data on page 311 for a description of the metric data HMDC can collect.

Procedure

1. From the AE Services Management Console main menu, select **Utilities >HMDC>Configuration**.
2. From the field at the top of the Historical Metric Data Collection Configuration page, select the metric group data you want to collect.

3. Click **Schedule**.
4. On the Add/Edit Metric Group page, perform the followings steps:
    a. In the Configurable Metrics area, select the check box of the metric data you want to collect. By default, all of the check boxes are selected. See HMDC data on page 311 for a description of the metric data HMDC can collect.

    b. From the Sampling Interval field, select the time interval at which you want to collect the data sample.

    c. In the Cleanup Interval area, select the time interval after which you want the data deleted.

    d. Click **Apply Changes**.

    e. On the Edit HMDC metric group page, click **Apply**.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310
HMDC data on page 311

HMDC data

You can configure the HMDC utility to collect the data shown in the following table.

Metric Group	Metric Name	Description
System	SysCPU	Operating system total CPU utilization.
	SysMemory	Operating system memory usage.
	MvapNetRTT	Ping time for each AEP link configured on AE Services.
Transport	avAesaepLinkMsgSent	The number of messages sent for AEP Link in the last “window” minutes.
	avAesAepLinkMsgRcvd	The number of AEP messages received for AEP link in the last “window” minutes.
	avAesAepSessionsMsgSent	The number of messages sent for AEP session in the last “window” minutes.
	avAesAepSessionMsgRcvd	The number of messages received for AEP session in the last “window” minutes.
	avAesTciConnMsgSent	The number of TCI messages sent in the last “window” minutes.
	avAesTciConnMsgRcvd	The number of TCI messages received in the last “window” minutes.
CVLAN	avAesCvlanCtiLinkMsgSent	The number of messages sent to Avaya Communication Manager in the last “window” minutes.

Table continues…

Metric Group	Metric Name	Description
	avAesCvlanCtiLinkMsgRcvd	The number of messages received from Avaya Communication Manager in the last “window” minutes.
DLG	avAesDlgCtiLinkMsgSent	The count of messages sent to Avaya Communication Manager in the last “window” minutes.
	avAesDlgCtiLinkMsgRcvd	The count of messages received from Avaya Communication Manager in the last “window” minutes.
TSAPI	avAesTsapiCtiLinkMsgSent	The number of messages sent to Avaya Communication Manager in the last “window” minutes.
	avAesTsapiCtiLinkMsgRcvd	The number of messages received from Avaya Communication Manager in the last “window” minutes.
	avAesTsapiClientDeviceMonitors	The number of device monitors currently active.
	avAesTsapiClientCallMonitors	The number of call monitors currently active.
	avAesTsapiClientVdnMonitors	The number of VDN monitors currently active.
	avAesTsapiClientRegisteredRoutes	The number of route registrations currently active.
DMCC	avAesDmccActiveSessions	The number of active DMCC sessions.
	avAesDmccActiveDevices	The number of active devices.
	avAesDmccUsedMonitors	The number of monitors currently in use across the DMCC sessions.
	avAesDmccMaxMonitors	The number of monitors available to a DMCC service.

Related links

Scheduling data collection on page 310

Unscheduling data collection

About this task

Use this procedure to unschedule an HDMC collection.

Procedure

1. From the AE Services Management Console main menu, select **Utilities >HMDC>Configuration**.

2. Select the appropriate metric group.
3. Click **Unschedule**.
4. On the Unschedule HMDC metric group page, click **Apply**.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310

Viewing configured schedules

About this task

Use this procedure to view the events you have scheduled.

Procedure

From the AE Services Management Console main menu, select **Utilities >HMDC>Configuration**.

The Historical Metric Data Collection Configuration page appears and displays the scheduled events.

✱ **Note:**

If the Current Status column displays `Disabled` for a scheduled metric group, data collection for that group will not occur, but clean up of already collected data will continue according to the configured schedule.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310

Modifying a scheduled data collection

About this task

Use this procedure to modify a scheduled HMDC data collection event. See HMDC data on page 311 for a description of the metric data HMDC can collect.

Procedure

1. From the AE Services Management Console main menu, select **Utilities >HMDC>Configuration**.
2. On the Historical Metric Data Collection Configuration page, select the metric group data collection event you want to modify.
3. Click **Edit**.

4. On the Add/Edit Metric Group page, perform the followings steps:

    a. In the Configurable Metrics area, select the check box of the metric data you want to collect. By default, all of the check boxes are selected. See HMDC data on page 311 for a description of the metric data HMDC can collect.

    b. From the Sampling Interval field, select the time interval at which you want to collect the data sample.

    c. In the Cleanup Interval area, select the time interval after which you want the data deleted.

    d. Click **Apply Changes**.

    e. On the Edit HMDC metric group page, click **Apply**.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310

Enabling and disabling data collection

About this task

Use this procedure to temporarily enable or disable an HMDC data collection event.

Procedure

1. From the AE Services Management Console main menu, select **Utilities >HMDC>Configuration**.

2. On the Historical Metric Data Collection Configuration page, select the metric group data collection event you want to enable or disable.

    The Current Status column displays whether the selected data collection event is enabled or disabled.

3. Perform one of the following steps:

    - If you want to enable the selected data collection event, click **Enable**.
    - If you want to disable the selected data collection event, click **Disable**.

4. On the Disable HMDC metric group page, click **Apply** to confirm your action.

    The Current Status column displays the updated status for the selected data collection event.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310

Creating a metric data report

About this task

Use this procedure to generate a metric data report. You can download and save this report in the .CSV format.

Procedure

1. From the AE Services Management Console main menu, select **Utilities >HMDC>Reporting**.
2. From the Select Metric Group field, select the metric group data you want displayed in the report.
3. In the Select the metrics for reporting area, select the check box of the metric data you want displayed in the report. By default, all the check boxes are selected.
4. If you want to generate a historical report, perform the following steps:
    a. In the Report type area, click **Historical Report**.
    b. Click the **Calendar** button next to the From field.
    c. On the Calendar, select the starting date and time.
    d. Click **Apply**.
    e. Click the **Calendar** button next to the To field.
    f. On the Calendar, select the ending date and time.
    g. Click **Apply**.

       All collected data that fall in the range you specified will be displayed in the report.
5. If you want to generate a report that contains a “snapshot” of current data, click **Current Snapshot** in the Report type area.
6. Click **Generate report**.

   The Report page appears and displays the data.
7. If you want to save this data to a .CSV file, perform the following steps:
    a. Click **Save Report**.
    b. In the File Download dialog box, click **Save**.
    c. In the Save As dialog box, specify the folder and name of the file, and then click **Save**.
    d. In the Download complete dialog box, click **Close**.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310

Cleaning up data immediately

About this task

Use this procedure to delete collected data immediately.

Procedure

1. From the AE Services Management Console main menu, select **Utilities >HMDC>Cleanup**.
2. From the Select Metric Group field, select the metric group data you want to delete.
3. In the Select the metrics for cleanup area, select the check box of the metric data you want to delete. By default, all the check boxes are selected.
4. If you want to delete all of the logs, click **All logs** in the Remove area.
5. If you want to delete logs older than a specific date and time, perform the following steps:
    a. In the Remove type , click **Logs older than**.
    b. Click the **Calendar** button next to the Older than field.
    c. On the Calendar, select the date and time.
    d. Click **Apply**.
6. If you want to delete logs from a specific time period, perform the following steps:
    a. In the Remove area, click **Logs between**.
    b. Click the **Calendar** button next to the From field.
    c. On the Calendar, select the starting date and time.
    d. Click **Apply**.
    e. Click the **Calendar** button next to the To field.
    f. On the Calendar, select the ending date and time.
    g. Click **Apply**.
7. Click **Cleanup**.
8. On the Cleanup HMDC metric group page, click **Apply** to confirm your action.

Related links

Using the Historical Metric Data Collector (HMDC) on page 310

Chapter 19: Location of AE Services log files

Device, Media, and Call Control Service

All logs are in /var/log/avaya/aes, as follows:

- dmcc-api.log
- dmcc-error.log
- dmcc-trace.log
- dmcc-nist.log
- dmcc-wrapper.log.*x* (where *x* is a number from 1 to 4. The first wrapper log, dmcc-wrapper.log, is not numbered.)
- database.log
- reset.log

DLG Service

AE Services provides the same logs that were provided with the MAPD-based DLG.

All logs except the trace log are in the `/var/log/avaya/aes` directory, as follows:

- Security (client) log: `sec.log`
- Error log: `mvap.log`
- Command log: `cmd.log`
- Reset log: `reset.log`
- Trace log: `/var/log/avaya/aes/common/trace.out`

CVLAN Service

AE Services provides the same logs that were provided with the MAPD-based CVLAN and CVLAN Release 9 and Release 9.1 for Linux.

All logs except the trace log are in `/var/log/avaya/aes`, as follows:

- Security (client) log: `sec.log`
- Error log: `mvap.log`
- Command log: `cmd.log`
- Reset log: `reset.log`
- Trace log: `/var/log/avaya/aes/common/trace.out`

TSAPI Service

All logs, except the trace log and the G3trace log, are in `/var/log/avaya/aes`, as follows:

- Security (client) log: `sec.log`
- Error log: `mvap.log`
- Command log: `cmd.log`
- Reset log: `reset.log`
- Trace log: `/var/log/avaya/aes/common/trace.out`
- G3trace logs are located in the `/var/log/avaya/aes/TSAPI` directory. This directory includes `g3trace.out`and `csta_trace.out`.
- Import SDB log: `importsdb.log`

Telephony Web Service

The Telephony Web Service infrastructure includes Tomcat, Axis, and the TSAPI Service. Any major failure in either Tomcat or the TSAPI Service will affect the Telephony Web Service.

All logs are in /var/log/avaya/aes/tomcat, as follows:

- ws-telsvc-api.log
- ws-telsvc-error.log
- ws-telsvc-trace.log

System Management System Web Service

The System Management Service uses the Linux syslog and Apache logs.

Chapter 20: AE Services network interfaces

Out of Band Management

Out of Band Management provides the ability to move the AE Services Management Console Web based management and configuration traffic of the server to a dedicated subnetwork.

Table 20: Application Enablement Services Out of Band Management

Component	Interface	Description
DMCC Service	Eth0 (public IP)	The Device, Media, and Call Control (DMCC) service provides both, first-party and third-party call control features using a Java API. It also provides XML and .NET interfaces. Additionally, DMCC provides the integration for Microsoft Lync 2010, and Lync 2013. TCP/IP, TLS and SIP protocols may be used to connect a DMCC Client to DMCC.
DLG Service	Eth0 (public IP)	The DEFINITY LAN Gateway (DLG) service tunnels messages over TCP/IP. That is, the DLG service supports a set of TCP/IP connections for the communications channel between Avaya Aura® Communication Manager and AE Services. The DLG service is also used for transporting ASAI/Q.931 messages.
CVLAN Service	Eth0 (public IP)	The CallVisor LAN (CVLAN) service is a C/C++ based API that enables applications to exchange ASAI messages with the AE Services server. CVLAN provides a full complement of third-party call control capabilities such as controlling specific calls or stations, completing routing of incoming calls, receiving notifications of events, invoking features, and querying Avaya Aura® Communication Manager for information.
TSAPI Service	Eth0 (public IP)	The Telephony Services API (TSAPI) is a C/C++ based API that provides a full complement of third party call control capabilities. The Java Telephony API (JTAPI) is a client side interface to the TSAPI service. It provides third party call control.
Transport Service	Eth0 (public IP) Eth1 (private IP)	The Transport link is a secure TCP/IP connection between the AE Services server and Avaya Aura® Communication Manager. The default interface is eth0

Table continues…

Component	Interface	Description
System Management Service	Eth0 (public IP), or Eth2 (Out of Band Management IP	Listens on port 443 for HTTPS connection to provide users a web interface to enable SOAP-based access to Avaya Aura® Communication Manager administration functions. The default interface is eth0, unless Out-of-Band Management has been configured.
Telephony Web Service	Eth0 (public IP), or Eth2 (Out of Band Management IP)	Listens on port 8443 and 443 for HTTPS connection to provide users a web interface that enables high level call control functionality over standard web services interfaces (SOAP/ XML). The default interface is “eth0”, unless Out-of-Band Management has been configured.
AES Management Console	Eth0 (public IP) or Eth2 (Out of Band Mgmt IP)	The Application Enablement Services Management Console listens on port 443 for HTTPS connections, and provides an Operations, Administration and Management interface for maintenance of the AE Services server. The default interface is eth0, unless Out-of-Band Management has been configured.

Network interface configurations

You can configure the AE Services Server to use a single NIC, two NICs or three NIC configuration. The second and third NIC can be used for creating a private network between the AE Services server and Communication Manager, or for out of band management. Use the configuration that best suits your network topology and other characteristics of your network.

Single NIC configurations

In a single NIC configuration, you use one network interface. That is, the AE Services server uses one NIC for client, switch and media connectivity.

In a single NIC configuration, the AE Services server, Communication Manager, and the client application computer must reside on a private LAN, a virtual LAN (VLAN), or a WAN. In terms of setting up the AE Services IP (Local IP), this means you are using one NIC for client, switch, and media connectivity.

In a single NIC configuration, you must configure the IP interface for the AE Services server to be publicly accessible for the registration of IP endpoints. Always use eth0 for a single NIC configuration (eth1 is reserved for Avaya service technicians).

AE Services recommends a single NIC configuration for connectivity to S8300D and S8300E Communication Manager media servers.

Note:

The S8300 media server does not use a CLAN as a network interface, it uses a processor ethernet (procr) instead.

Two NIC configurations

In a two NIC configuration, you use two network interfaces for connectivity to two separate network segments.

In a dual NIC configuration, you use one network segment for the AE Services Server and Communication Manager and another network segment for client and media connectivity, that is LAN, VLAN, or WAN. The NICs must be on separate network segments. In a dual NIC configuration, the client segment is referred to as the production network, and the Communication Manager segment is referred to as the private network segment.

AE Services supports using two NIC configurations for duplicated Communication Manager media servers.

The second NIC can also be used for out of band management if network separation between Communication Manager and AE Services Server client applications.

Three NIC configurations

A third NIC can be configured of out of band management, if the first two NICs are used for non management related traffic, as described above.

Network interface (NIC) settings

The NIC settings choices for **eth0**, **eth1** and **eth2** are as follows:

- Auto-Negotiate:
    - Gigabit interfaces: Auto-negotiation (auto-neg) - on

      In this case, you must administer 1000-Mbps / full / auto-neg at each end of the Ethernet link.
    - 100-Mbps interfaces: Auto-negotiation (auto-neg) - on

      In this case, you must administer 100-Mbps / full / auto-neg at each end of the Ethernet link.
- Lockdown: 100-Mbps interfaces

  100-Mbps interfaces: Lockdown (auto-neg) - off

  In this case, you must administer 100-Mbps / full / Lockdown at each end of the Ethernet link.

Important:

AE Services defaults to auto-negotiation mode; it negotiates the network speed and duplex mode with the Ethernet switch. Both ends of the Ethernet link must be set to the same mode. Otherwise, a duplex mismatch will occur. Verify that both ends of the Ethernet link operate at the same desired speed and duplex settings.

Keep in mind the following:

- Auto-neg is highly desired for Gigabit links.
- Auto-neg or Lockdown is acceptable for 100-Megabit links.
- Lockdown for Gigabit links is highly discouraged.
- 10-Megabit and/or half-duplex operation is never acceptable and should be corrected.

See Editing the NIC configuration (optional) on page 323 to set up the server NICs. For detailed information about using auto-negotiation and Lockdown, see Ethernet Link Guidelines at https://support.avaya.com/css/P8/documents/100121639.

Editing the NIC configuration

About this task

Network interfaces are configured during the AE Services installation process on the Configure Network Information page.

Use this procedure only if you need to change the NIC settings from Auto-Negotiate to Lockdown (100M links only).

The values that are initially displayed on the Network Configure page reflect the negotiated values between the NICs on the AE Services server and the Ethernet switch on your network.

Important:

AE Services has been tested at 1000BaseT full duplex and 100BaseT full duplex. These are the required speed and duplex mode settings for both network interfaces eth0 and eth1.

Procedure

1. On the AE Services Management Console, click **Networking** > **Network Configure**.
2. On the Network Configure page, edit any of the settings that you want to change, and click **Apply Changes**.

   Note:

   Changing the settings for a NIC will cause the NIC to restart. Once you change the settings, they remain in effect until you reset them. Rebooting the AE Services server will not reset any of the values.

Chapter 21: TCP ports and firewall settings on the AE Services server

TCP ports and firewall settings

If you use a firewall, you must make sure that the TCP port settings on your firewall are consistent with the TCP port settings on the AE Services Server. For information about security guidelines for the AE Services Server, see the *White Paper on Security in Application Enablement Services for Bundled, AES on System Plaftorm and Software Only Solutions*. This white paper is available with the AE Services customer documents on the Avaya Support Web site: http://www.avaya.com/support.

Note:

For all AE Services servers, except the Software-Only server, a firewall is automatically configured and enabled by default.

Name				Description
CVLAN Ports	Unencrypted TCP Port	9999	Enabled/ Disabled	The port number assignment for unencrypted (nonsecure) connections with CVLAN clients. This port assignment is enabled by default. You can enable and disable this port independently of the encrypted CVLAN port. When you enable or disable a CVLAN port, it does not affect CVLAN sessions that are already open.
	Encrypted TCP Port	9998	Enabled/ Disabled	The port number assignment for encrypted (secure) connections with CVLAN clients. This port assignment is enabled by default. You can enable and disable this port independently of the unencrypted CVLAN port. When you enable or disable a CVLAN port, it does not affect CVLAN sessions that are already open.
DLG Port	TCP Port	5678	The DLG Service uses port 5678 for communication with clients. This is a fixed port number assignment.	

Table continues…

Name				Description
TSAPI Ports	TSAPI Service Port **Note:** If you disable Port 450, you must restart the TSAPI Service for the change to take effect.	450	Enable/ Disable	The port number assignment for the TSAPI listener. By default TSAPI port 450 is enabled. When you disable TSAPI 450, you also disable following TSAPI Port settings: • CSTA TLINK Ports for Non-Secured Clients • CSTA TLINK Ports for Secured Clients
	Local TLINK Ports	TCP Port Min	Reserved, port 1024	
		TCP Port Max	Reserved, port 1039	
	Unencrypted TLINK Ports. **Note:** You must restart the TSAPI Service for changes to the Tlink port assignments to take effect.	TCP Port Min	The default minimum setting is `1050`. If you elect to use another port assignment as the minimum, it can not conflict with another port number. For information about administering TSAPI Links as either secure (Encrypted) or nonsecure (Unencrypted), see Administering TSAPI Links on page 88.	
		TCP Port Max	The default maximum setting is `1065`. If you elect to use another port assignment as the minimum, it can not conflict with another port number. For information about administering TSAPI Links as either secure (Encrypted) or nonsecure (Unencrypted), see Administering TSAPI Links on page 88.	
	Encrypted TLINK Ports **Note:** You must restart the TSAPI Service for changes to the Tlink port assignments	TCP Port Min	The default minimum setting is 1066. If you elect to use another port assignment as the minimum it can not conflict with another port number. For information about administering TSAPI Links as either secure (Encrypted) or nonsecure (Unencrypted), see Administering TSAPI Links on page 88.	

Table continues…

Name				Description
	to take effect.	TCP Port Max	The default minimum setting is 1081.If you elect to use another port assignment as the minimum it can not conflict with another port number. For information about administering TSAPI Links as either secure (Encrypted) or nonsecure (Unencrypted), see Administering TSAPI Links on page 88. You must restart the TSAPI Service for changes to the Tlink port assignments to take effect.	
DMCC Server Ports **Note:** If any of these 3 ports are enabled or disabled the DMCC service must be restarted.	Unencrypted Port	4721	Enabled/ Disabled	The DMCC Service uses port 4721 for unencrypted communication. By default the Unencrypted Port is disabled. It is provided for backward compatibility with applications that were developed prior to AE Services 3.1.
	Encrypted Port	4722	Enabled/ Disabled	The DMCC Service uses port 4722 for secure communication. • By default the secure, Encrypted Port setting is enabled. • The default port number for encrypted DMCC communications is 4722.
	TR/87 Port	4723	Enabled/ Disabled	The AE Services Server uses port 4723 for the AE Services implementation for Microsoft Live Communications Server. By default this port is disabled. • You must enable this port if you are integrating AE Services with Microsoft Live Communications Server.
H.323 Port	TCP Port Min	The default minimum setting is 20000. The DMCC Service uses this port for signaling.		
	TCP Port Max	The default maximum setting for this range is 29999. The DMCC Service uses this port for signaling.		
	Local UDP Port Min	The default minimum setting is 20000. The DMCC Service uses this port for Registration Administration and Status (RAS).		
	Local UDP Port Max	The default maximum setting is 29999. The DMCC Service uses this port for RAS.		
	RTP Local UDP Port Min	The default minimum setting is 30000. The DMCC Service uses this port for the Media Real Time Protocol (RTP) sessions.		
	RTP Local UDP Port Max	The default maximum setting for this range is 49999. The DMCC Service uses this port for Media RTP sessions.		

Table continues…

Name		Description
SMS Proxy Ports	Proxy Port Min	Enter a Communication Manager proxy port range of up to 16 proxy ports. By default, the Communication Manager Proxy Port Range is 4101 to 4116. **Note:** SMS can use up to 16 ports. If you change any of the SMS port assignments, make sure that there are no conflicts with other ports.
	Proxy Port Max	Enter a Communication Manager proxy port range of up to 16 proxy ports. By default, the Communication Manager Proxy Port Range is 4101 to 4116. **Note:** SMS can use up to 16 ports. If you change any of the SMS port assignments, make sure that there are no conflicts with other ports.

Chapter 22: AE Services Management Console connectivity tests

AE Services Management Console connectivity tests

Use the following diagnostic utilities in AE Services Management Console to check connectivity:

✱ **Note:**

When AE Services server is configured in the secure mode, AE Services does not support tests under **Utilities** > **Diagnostics** > **AE Services**.

- **ASAI Test** — Use the ASAI Test utility to determine if the AE Server is communicating with Communication Manager. The ASAI Test utility sends a heartbeat message over any of the CVLAN or TSAPI links you have configured between the AE Server and Communication Manager. (**Utilities > Diagnostics > AE Service > ASAI Test**)
- **Ping Host** — Use the Ping Host utility to determine if the hostname or IP address you specify exists and is accepting requests. (**Utilities > Diagnostics > Server > Ping Host**)
- **DMCC Test** — Use the DMCC Test to test the DMCC configurations. (**Utilities > Diagnostics > AE Service > DMCC Test**)
- **TSAPI Test** — TSAPI Test is a simple test application that makes a call between two stations, primarily to verify that the client is set up correctly and the TSAPI Service has been administered correctly. TSAPI Test applies to TSAPI, JTAPI, and Telephony Web Service applications. (**Utilities > Diagnostics > AE Service > TSAPI Test**)
- **TR/87 Test** — Use the TR/87 Test utility to run tests for DMCC applications and the AE Services implementation for Microsoft Office Live Communications Server 2005, Microsoft Office Communications Server 2007, and Microsoft Lync Server 2010 and 2013. (**Utilities > Diagnostics > AE Service > TR/87 Test)**. Some of the tests may require you to administer the dial plan in AE Services before you can execute some of the TR/87 tests.

  ✱ **Note:**

  The Host AA settings for AE Services (**Security > Host AA**) have an effect on the TR/87 Test utility. If you enable host authorization, the authorized hosts list must include the Peer Certificate CN (which is the Server Certificate Subject Name). Because the TR/87 Test utility depends on the Host AA settings and uses the same certificate that is used by Tomcat, you must restart the Web Server after adding a server certificate.

Chapter 23: AE Services administrative roles

AE Services administrative roles and access privileges (role based access control - RBAC)

AE Services provides role-based access control (RBAC), which establishes the following roles for AE Services administrators (AE Services Management Console access and ssh access). The AE Services server uses the reserved Linux user ID range 500-599 and the reserved Linux group ID range 500-599 for the default AE Services server users and groups.

Role	Linux group	Linux group ID	AE Services Management Console access
System_Administrator	susers	555	Read and write access to the following menus: • AE Services • Communication Manager Interface • Licensing • Maintenance • Networking • Security (the System_Administrator does not have access to Account Management, PAM, and Tripwire Properties) • Status • Utilities • Help **Note:** The System_Administrator role does not have access to User Management.

Table continues…

Role	Linux group	Linux group ID	AE Services Management Console access
Security_Administrator	securityadmin	505	Read and write access to the following menus in the AE Services Management Console: • Security (the Security_Administrator does not have access to Enterprise Directory, Host AA, and Standard Reserved Ports) • Status • Help
UserSvc_Admin	usrsvc_admin	508	Read and write access to the following menus: • User Management **Note:** To acquire the Administrative role for User Management, a user must have an administered account in User Admin (the local LDAP data store) with the Avaya role set to userservice.useradmin.

Table continues…

Role	Linux group	Linux group ID	AE Services Management Console access
Auditor	users	100	Limited, read-only access to the following menus: • Security — access is limited to: - Audit - Certificate Management - Security Database > CTI Users • Status - Alarm Viewer - Logs -- access is limited to: • Audit Logs • Error Logs • Install Logs • User Management Service Logs • Status > Status and Control — access is limited to: - CVLAN Service Summary - DLG Service Summary - DMCC Service Summary - Switch Conn Summary - TSAPI Service Summary • Help
Backup_Restore	backuprestore	507	Limited, read and write access to the following to the following menus: • Maintenance — access is limited to: - Server Data > Backup - Server Data > Restore • Help

Table continues…

Role	Linux group	Linux group ID	AE Services Management Console access
Avaya_Maintenance	avayamaint	506	Limited, read and write access to the following menus in the AE Services Management Console: • Maintenance - Security Database - Service Controller - Server Data • Status - Logs • Utilities - Diagnostics • Help
EASG Administrator	easg	510	Read and write access of the EASG option on the PAM Password Manager.

Default accounts and AE Services Management Console access privileges

Security alert:

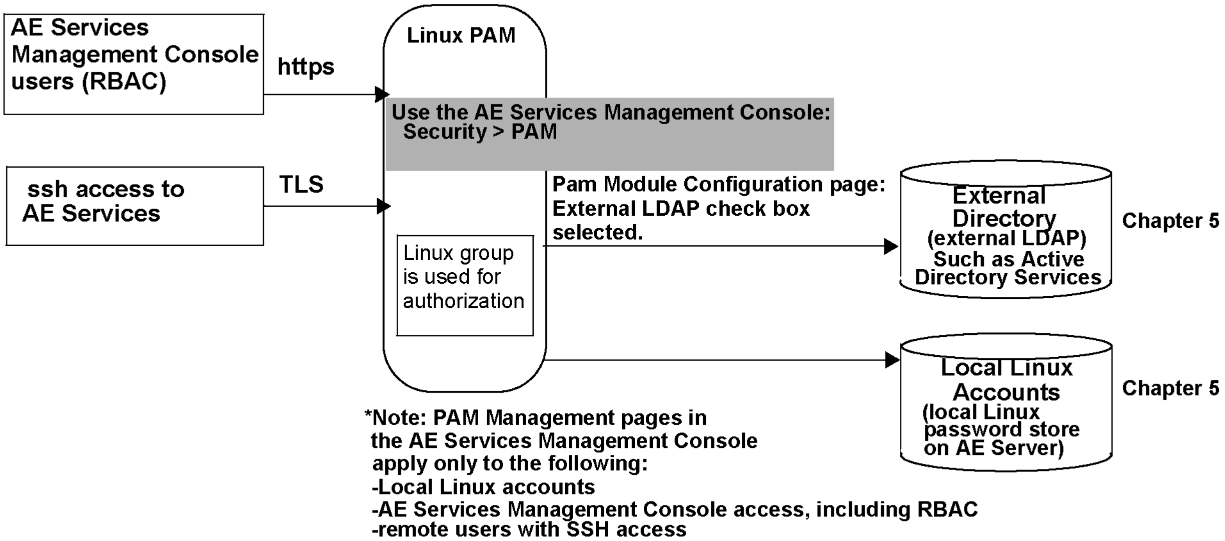
You must change the password for the **cust** account after initially using it.

Account name (log-in identifier)	Linux Group	AE Services Management Console access privileges
craft (Avaya services account) Available on: • AE Services Software - Only Server only if you enabled EASG at the time of installation. • AE Services using VMware® in the Virtualized Environment	susers securityadmin	Read and write access to the following menus: • AE Services • Communication Manager Interface • Licensing (you have access to this menu) • Maintenance • Networking • Security (AE Services sets up the craft account with access to Security) • Status • Utilities • User Management (AE Services sets up the craft account with access to Security) • Help
cust (customer account) Available on: • AE Services Software-Only Server • AE Services using VMware® in the Virtualized Environment	susers securityadmin usrsvc_admin easg datacontroller	Read and write access to the following menus: • AE Services • Communication Manager Interface • Licensing (you have access to this menu) • Maintenance • Networking • Security (AE Services sets up the cust account with access to Security) • Status • User Management (AE Services sets up the cust account with access to Security) • Utilities • Help
avaya (customer account) Available on: • AE Services Software-Only Server • AE Services using VMware® in the Virtualized Environment	Not applicable	Read and write access to the following menus: • User Management • Help • **Status** > **Logs** > **User Management Service**

Table continues…

Account name (log-in identifier)	Linux Group	AE Services Management Console access privileges
datacontroller (customer account) • AE Services Software-Only Server • AE Services using VMware® in the Virtualized Environment	datacontroller	Read and write access to the following menus: • Help • **Status** > **Log Manager**

Authenticating and authorizing administrators for AE Services Management Console and ssh access


AE Services Management Console users (RBAC)
https
ssh access to AE Services
TLS
Linux PAM
Use the AE Services Management Console: Security > PAM
Linux group is used for authorization
Pam Module Configuration page: External LDAP check box selected.
External Directory (external LDAP) Such as Active Directory Services
Chapter 5
Local Linux Accounts (local Linux password store on AE Server)
Chapter 5

*Note: PAM Management pages in the AE Services Management Console apply only to the following:
-Local Linux accounts
-AE Services Management Console access, including RBAC
-remote users with SSH access

Default AE Services accounts

Account name (log-in identifier)	Linux Group	Access privileges
craft Available on AE Services Software-Only Server only if you enabled EASG at the time of installation.	susers securityadmin	Intended for Avaya services technicians. Provides local or remote access to the Linux shell. • Local - Log in from a local console as craft, and then access the root account (`su - sroot`) • Remote - Log in from a remote console with a secure shell client (ssh), as craft, and then access the root account (`su - sroot`)
cust Available on AE Services Software-Only Server.	susers securityadmin usrsvc_admin easg datacontroller	Intended for customers. Provides local or remote access to the Linux shell. • Local - Log in from a local console as cust, and then access the root account (`su - root`) • Remote - Log in from a remote console with a secure shell client (ssh), as cust, and then access the root account (`su - root`)
avaya Available on AE Services Software-Only Server.	Not applicable	User Management administration only. You do not have access to any other administrative menus.
datacontroller Available on AE Services Software-Only Server.	datacontroller	Log and trace retention and clearing logs and traces only. You do not have access to any other administrative menus.

Accounts installed with the Avaya Services package

When you install the Avaya Services package (cs-services), the installation program sets up the AE Services server with avaya and cust accounts by default. It also adds service accounts, such as craft, for Avaya Service Technicians and Avaya Business Partners.

Note:

If you did not install the Avaya Services package, skip this section and see Creating a new System Administrator account on page 338.

The avaya account (User Management administrator)

When you install the Avaya Services package (cs-services), the installation program sets up the AE Services server with the avaya account in the local LDAP store (User Management) by default. It is not a Linux account. You must install the AE Services license in order to access Application Enablement Services Management Console with the avaya account.

The avaya account provides access to the User Management Service in the Application Enablement Services Management Console. The avaya user is the User Management administrator.

Security alert:

The customer is responsible for changing the password for the avaya account after initially using it. To learn about changing the password for the avaya account, see Changing the default password for the avaya account (User Management administrator) on page 340.

The cust accounts (Linux and User Management)

When you install the Avaya Services package (cs-services), the installation program sets up the AE Services server with the cust account by default.

Security alert:

You are responsible for changing the password for the cust account after initially using it. See Changing the default password for the cust account in local Linux on page 337 and Changing the default password for the cust account in User Management on page 341.

AE Services installs the cust account in two places: the local Linux password store and the local LDAP directory (User Management Service). As a result, the cust account has read-write access to all AE Services Management Console features.

- The Linux cust account provides remote access, using a secure shell (ssh) client, to the Linux shell. The Linux cust account belongs to two login groups: susers and security admin. As a result, the cust account has system administration privileges and security administration privileges. To see how administrative roles map to Linux groups in AE Services, refer to AE Services administrative roles and access privileges (role based access control - RBAC on page 329.
- The User Management Service cust account provides access to the User Management Service. You must install the AE Services license in order to log in to Application Enablement Services Management Console with the User Management Service cust account.

The craft account

When you install the Avaya Services package (cs-services), the installation program sets up the AE Services server with the craft account by default. The craft account is equivalent to the cust account. See Accounts for Avaya Services technicians on page 247.

The craft account provides Avaya Service Technicians and Avaya Business Partners read-write access to all administrative functions using either the Linux command line or the AE Services Management Console.

You must install the AE Services license in order to access Application Enablement Services Management Console with the craft account.

Changing the default password for the cust account in local Linux

About this task

Follow this procedure to change the default password for the cust account in local Linux. The local Linux cust account provides remote access to the Linux shell. This procedure applies only to an AE Services Software Only server with the Avaya Services package (cs-services) installed.

Note:

If you require a greater level of security, see Creating a new System Administrator account and removing the default cust account from User Management.

Procedure

1. From your browser, log in to the AE Services Management Console as cust with the default password (custpw).

   See Accounts installed with the Avaya Services package.
2. From the main menu, select **Security Administration**.
3. From the **Security Administration** home page, select **Account Management > Modify Login**.
4. From the **Modify Login** page, in the **Password authentication Enter password** field, enter a new password.

   The default Linux password policy, which is based on a US standard keyboard and the default password limits for PAM Module Configuration, calls for a minimum of 8 characters, with at least 1 uppercase character, 1 lowercase character, 1 alphanumeric character, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.

5. In the **Re-enter password** field, re-enter the new password.
6. Click **Modify**.

Related links

Creating a new System Administrator account and removing the default cust account from User Management on page 343
Accounts installed with the Avaya Services package on page 335
The avaya account (User Management administrator) on page 336
The cust accounts (Linux and User Management) on page 336
The craft account on page 337

Creating a new System Administrator account

About this task

Follow these steps to create a new System Administrator account and delete the cust account. This procedure applies to the AE Services Bundled Server and the AE Services Software-Only Server with the Avaya Services Package (cs-service) installed.

Note:

In the AE Services secure mode, the **Account Management** tab under the **Security** tab is disabled.

Procedure

1. From your browser, log in to the AE Services Management Console as cust.

   See Accounts installed with the Avaya Services package on page 335.
2. From the main menu, select **Security > Account Management > Add Login**.
3. Complete the **Add Login** page as follows:

   Note:

   These settings assume that you want to set up the new system administrator with the same administrative roles that were set up for the cust account.

   a. In the **Login ID** field, enter a new username for the system administrator, for example `aesadmin`, and click **Continue**.

   b. In the **Default login group** field, type `susers` (the susers Linux group maps to the System_Administrator role).

   c. In the **Additional login** groups field, type `securityadmin` (the securityadmin Linux group maps to the Security_Administrator role).

Note:

When completing the **Default login group** and **Additional login groups** fields, you must use the group names for RBAC assignments described in AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

d. Complete the Password authentication fields. Enter a password, and re-enter the password to confirm it.

   The default Linux password policy, which is based on a US standard keyboard and the default password limits for PAM Module Configuration, calls for a minimum of 8 characters, with at least 1 uppercase character, 1 lowercase character, 1 alphanumeric character, and 1 special character. The following characters are not permitted: $ (dollar sign), ' (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.

e. In the remaining fields, either accept the defaults, or complete the fields according to your business requirements, and click **Add**.

4. From the navigation bar, click **Logout** (you are logging out as cust).
5. Log into the AE Services Management Console again with the new system administrator account (aesadmin, based on this example).
6. From the main menu, select **Security > Account Management > Remove Login**.
7. From the **Remove Login** page, in the **Login ID** field, enter `cust` and click **Continue**.
8. On the **Remove Login** page, verify that you are removing the appropriate login (cust), and click **Delete**.

Adding a Linux System Administrator account (if the Avaya Service Package is not installed)

About this task

If you did not install the cs-services package when you installed the AE Services Software-Only server, you initially have only one account (the avaya account).

Note:

The root user can not access the AE Services Management Console.

Follow this procedure to add a user to Linux with system administration privileges (system_administrator) and security administration privileges (security_administrator).

Procedure

1. Log in to the AE Services Server as root using the password you assigned to root during the Linux installation.

2. Type `useradd -g susers -G securityadmin` *`username`*.

   For example: `useradd -g susers -G securityadmin cust00`

   Note:

   To administer a user with system administrator privileges in AE Services Management Console, you must add the user to the susers group in Linux. If you want this user to have access to the security menu in the Management Console, you must add the user to the securityadmin group as well. To see how administrative roles map to Linux groups in AE Services, refer to AE Services administrative roles and access privileges (role based access control - RBAC on page 329.

3. Type `passwd` *`username`* to display the password prompt.
4. At the password prompt, type a password, and press **Enter**.

   The default Linux password policy, which is based on a US standard keyboard and the default password limits for PAM Module Configuration, calls for a minimum of 8 characters, with at least 1 uppercase character, 1 lowercase character, 1 alphanumeric character, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.

5. At the prompt to re-enter your password, type the password you just created and press **Enter**.

Changing the default password for the avaya account (User Management administrator)

About this task

By default, AE Services installs an account called avaya for the Software-Only server. The avaya account is created for all installations of AE Services. That is, it is created regardless of whether you install the Avaya Services package (cs-services). The avaya account provides you with administrative access to User Management. The default password for this account is set to avayapassword.

Security alert:

After you initially log on using the avaya account, immediately change the password. If you require a greater level of security for this account, see Creating a new User Management administrator account and removing the default avaya account from User Management on page 342.

Procedure

1. Log in to the AE Services Management Console as avaya with the default password.

   See Accounts installed with the Avaya Services package on page 335.

2. From the main menu, select **User Management > List All Users**.
3. From the **List All Users** page, select the option button for **avaya** and click **Edit**.
4. Update the password settings as follows:
    a. In the **New Password** field, enter a new password.

    The default User Management password policy, which is based on a US standard keyboard, calls for a minimum of 8 characters, including a minimum of 1 upper case, 1 lower case, 1 alphanumeric, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.

    Note:

    If you want the avaya user to be able to access all administrative domains, the password for the avaya account must be identical to the password for the Linux user described in Adding a Linux System Administrator account (if the Avaya Service Package is not installed) on page 339.

    b. In the **Confirm New Password** field, re-enter the new password.
5. Click **Apply**.

Changing the default password for the cust account in User Management

About this task

This topic applies only to an AE Services Software-Only server with the Avaya Services package (cs-services) installed.

AE Services installs the cust account in two locations — in the local Linux password store and in the User Management service (local LDAP directory).

Note:

If you require a greater level of security for this account, see Creating a new System Administrator account on page 338.

Procedure

1. From your browser, log in to the AE Services Management Console as cust with the default password.

    See Accounts installed with the Avaya Services package on page 335.
2. From the main menu, select **User Management > List All Users**.
3. From the **List All Users** page, select the option button for **cust** and click **Edit**.

4. Update the password settings as follows:
    a. In the **New Password** field, enter a new password.

        The default User Management password policy, which is based on a US standard keyboard, calls for a minimum of 8 characters, including a minimum of 1 upper case, 1 lower case, 1 alphanumeric, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.
    b. In the **Confirm New Password** field, re-enter the new password.
5. Click **Apply**.

Creating a new User Management administrator account and removing the default avaya account from User Management

About this task

Follow these steps to create a new User Management administrator account and delete the avaya account (avaya is the default User Management administrator account). This procedure applies to the Bundled Server, the Software-Only offer with the Avaya with services package (cs-service), and the Software-Only offer without the Avaya services package (cs-service).

Procedure

1. From your browser, log in to the AE Services Management Console as avaya with the default password (avayapassword).
2. From the main menu, select **User Management > Add User**.
3. Complete the **Add User** page as follows:
    a. In the **User Id** field, enter a user ID, for example `aesuseradmin`.
    b. In the **Common Name** field, enter the name the user prefers to use, for example `Pat Adams`.
    c. In the **Surname** field, enter the users last name, for example `Adams`.
    d. In the **User Password** field, enter a password.

        The default User Management password policy, which is based on a US standard keyboard, calls for a minimum of 8 characters, including a minimum of 1 upper case, 1 lower case, 1 alphanumeric, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.
    e. In the **Avaya Role** field, select **userservice.useradmin**.

   f. Click **Apply**.

4. Log out of the AE Services Management Console (you are logging out as avaya).
5. Log in to the AE Services Management Console again with the user identifier and password you created in Step 3 (aesuseradmin, based on this example).
6. From the main menu, select **User Management > List All Users**.
7. From the **List All Users** page, select the option button next to **avaya**, and click **Delete**.
8. From the **Delete User** page, click **Delete**.

Creating a new System Administrator account and removing the default cust account from User Management

About this task

For the Bundled Server and the Software-Only server with the Avaya Services Package (cs-service), AE Services installs the cust account in two locations — in the local Linux password store and in User Management (local LDAP directory).

If you do not want to use the User Management cust account, you can create a new User Management account that is equivalent to cust, and then remove the cust account from User Management.

Procedure

1. From your browser, log in to the AE Services Management Console as cust with the default password (custpw).
2. From the main menu, select **User Management > User Admin > Add User**.
3. Complete the **Add User** page as follows:
   a. In the **User Id** field, enter a user identifier, for example `aesadmin`.

   b. In the **Common Name** field, enter the name the user prefers to use, for example `Jan Green`.

   c. In the **Surname** field, enter the user's last name, for example `Green`.

   d. In the **User Password** field, enter a password.

      The default User Management password policy, which is based on a US standard keyboard, calls for a minimum of 8 characters, including a minimum of 1 upper case, 1 lower case, 1 alphanumeric, and 1 special character. The following characters are not permitted: $ (dollar sign), ’ (apostrophe), " (quotation mark), \ (backslash), the space character, and any ASCII control-character.

   e. In the **Avaya Role** field, select **userservice.useradmin**.

   f. Click **Apply**.

4. Log out of the AE Services Management Console (you are logging out as cust).
5. Log in to the AE Services Management Console again with the user identifier and password you created in Step 3.
6. From the main menu, select **User Management > User Admin > List All Users**.
7. From the **List All Users** page, select the option button next to **cust**, and click **Delete**.
8. From the **Delete User** page, click **Delete**.

Chapter 24: Sample Device, Media, and Call Control applications

Sample application files on the AE Services server

AE Services server includes following sample application-related files:

- The application properties file for the sample application (the tutorial properties file):

  `/opt/mvap/cmapi/cmapijava-sdk/examples/resources/tutorial.properties`
- The sample application media files including:

  `/opt/mvap/cmapi/cmapijava-sdk/examples/media/0001.wav`

  `/opt/mvap/cmapi/cmapijava-sdk/examples/media/0002.wav`

  `/opt/mvap/cmapi/cmapijava-sdk/examples/media/0003.wav`

  `/opt/mvap/cmapi/cmapijava-sdk/examples/media/0004.wav`
- A README file containing a description of how to set up and run the sample application:

  `/opt/mvap/cmapi/cmapijava-sdk/examples/bin/SampleAppsReadme.txt`

About the sample DMCC applications

To help support users of the Device, Media, and Call Control capabilities of AE Services, the AE Services software automatically installed several sample applications. This section describes how to administer and run one sample application to:

- Test connectivity between AE Services and Communication Manager
- Perform various tasks involved in running an application
- Learn which files are involved in running an application
- See some of the capabilities of an AE Services Device, Media, and Call Control application

The AE Services server also installs other sample applications. After you have checked the AE Services server and Communication Manager connectivity by running the tutorial application, you optionally can run the additional sample applications from a client application computer.

Note:

As an initial test, run the tutorial application directly on the AE Services server or on another computer. In general, run all other applications on a different computer from the AE Services server so you do not affect server performance. AE Services does not support co-resident applications.

Preparing to run the sample application

Procedure

1. Administer AE Services. See Administering AE Services for the sample application on page 346.
2. Administer Communication Manager.

   Note:

   You must also know the dial plan and which Communication Manager extensions are available.
3. Edit the tutorial properties file. See Editing the tutorial properties file on page 347.

Administering AE Services for the sample application

Procedure

1. From the AE Services Management Console, select **AE Services > DMCC > Media Properties**.
2. On the **Media Properties** page, in the **Player Directory** field and the **Recorder Directory** field, type `/tmp` .

   (/tmp is the default directory.)
3. Accept the defaults for the remaining fields, and click **Apply Changes**.
4. Select **Networking** > **Ports**.
5. On the Ports page, ensure that the **DMCC Server Ports** > **Unencrypted Port** is enabled.
6. If you enabled the **Unencrypted Port**, then select **Maintenance** > **Service Controller** and restart the DMCC service.
7. From the Linux command line, copy the application media files into the directory you specified in Step 2.

   For a list of media files, see Sample application files on the AE Services server on page 345.

Editing the tutorial properties file

About this task

Before you can run the sample application, you must edit the tutorial properties file (tutorial.properties) to provide information specific to your configuration.

Procedure

1. Using the text editor of your choice, open tutorial.properties:

   ```
   /opt/mvap/cmapi/cmapijava-sdk/examples/resources/
   tutorial.properties
   ```

   In Release 8.1.1, the tutorial.properties file contains the following text:

   ```
   # tutorial.properties
   #
   # Copyright (c) 2002-2007 Avaya Inc. All rights reserved.
   .
   .
   .
   # IP address of the call server ( i.e, CLAN/PROCR/Gatekeeper), which AE Server
   would
   # use to register the device (extension) to Communication
   Manager.callserver=nnn.nnn.nnn.nnn
   extension=xxxx
   password=yyyy
   # codec choices: g711U, g711A, g729, g729A codec=g711U
   # encryption choices: aes, none
   encryption=none
   cmapi1.server_ip=nnn.nnn.nnn.nnn
   cmapi1.username=username
   cmapi1.password=password
   cmapi1.server_port=4722
   # Legal values for cmapi1.secure are true and false.
   cmapi1.secure=true
   #cmapi.trust_store_location=sdk/build/mvsdk/cmapijava-sdk/examples/resources/
   avaya.jks
   #if you do not know cmapi.trust_store_password, leave it default
   #cmapi.trust_store_password=nnnn
   #cmapi.key_store_location=nnnn.jks
   #cmapi.key_store_password=nnnn
   #cmapi.certificate_validation=true
   #pattern xxx-yyy,ppp-qqq,rrr-sss....
   #extensions=41400-41599,50001-50200,51000-51060
   # by default getButtonInfo value is true.
   #getButtonInfo=false
   ```

2. Replace the variables in the first three fields with the following values:

   a. For **callserver**, type the IP address of the media server for Communication Manager.

      - For Communication Manager S8300D, S8300E, and duplicated systems that use a Processor Ethernet (procr) this is the IP address of the media server.
      - For Communication Manager, duplicated systems that use a CLAN interface, this is the IP address of the CLAN.

   b. For **extension**, type the extension number of the station that you administered for this application.

   c. For **password**, type the security code you administered for that station.

3. Add a user_id and user_password for the `cmapi1.username` and `cmapi1.password` properties.

   By default, these values are the username and password stored in the User Management database (local LDAP).

   Note:

   To see a list of these users, log in to the AE Services Management Console, and select **User Management > User Admin > List All Users**.

4. Set the `cmapi1.server_port=4721` and the `cmapi1.secure=false`.
5. Save and close the tutorial.properties file.

Running the sample application

Before you begin

The AE Services server must be running before you can run an application.

Procedure

1. Start an SSH session and log in to the AE Services server.
2. On the AE Services server, change to the directory where the demonstration application run script resides:

   ```
   cd /opt/mvap/cmapi/cmapijava-sdk/examples/bin
   ```

3. Run the following command on the tutorial application:

   ```
   ./ant.sh runTutorial
   ```

   The application starts running. This application works as a softphone and waits for calls. When you call the extension from any other phone, the application answers with a recorded greeting that prompts you to record a message.

4. On the application, do the following:

   a. Call the extension and listen to the recorded greeting.

   b. Follow the prompts to record a message and have the system play it back to you.

      Note:

      The sample application can play only the last recorded message on a given call. If you make a new call, you can not hear a recording from a previous call. All the recorded files are saved in the directory you specified as the location of the recorded files.

Troubleshooting the sample application

If the application does not run as expected:

1. View the following log files from `/var/log/avaya/aes` on the AE Services server:
   - dmcc-error.log.*x*
   - dmcc-api.log.*x*
   - dmcc-trace.log.*x*
   - dmcc-wrapper.log

   Use the `dmcc-error.log` file to check exceptions. The `dmcc-error.log` file is the latest log file.
2. See the following table for resolving the application error messages.

Table 21: Troubleshooting error messages for the sample application

Application error message	Troubleshooting procedure
Registration failed because Gatekeeper Reject reason: terminalExcluded	Verify that the extension number in `tutorial.properties` corresponds to a correctly administered extension number in Communication Manager.
Registration failed because Gatekeeper Reject reason: securityDenial	Verify that the password in `tutorial.properties` matches the password administered in Communication Manager for the station.
Registration failed because Protocol Timeout reason: GRQ timer, tried 3 times	Verify that the IP address in `tutorial.properties` for the call server (media server) is correct. Try to ping the media server from the AE Services server to verify connectivity.
Connection refused	• Verify that the IP address of the AE Services server is correct in the `tutorial.properties` file. • Check for network problems between the client application computer and the AE Services server. For example, ping the AE Services server from the client application server. • View the `/etc/hosts` files. Verify that you included a line that explicitly lists the IP address of the AE Services server, in addition to the localhost line. • Verify that the `cmapi1.server_port=4721` is listed in the `tutorial.properties` file. Further verify that port 4721 is listening for incoming TCP connections. Use **`netstat`** command on the AE Services server.

Testing a DMCC configuration

About this task

You can test first party calls and third party calls.

Procedure

1. From the AE Services Management Console main menu, select **Utilities > Diagnostics > AE Service > DMCC Test**.
2. In the User box on the **DMCC Test** page, enter the user ID to log into AE Services.
3. In the User Password box, enter the password to log into AE Services.
4. Uncheck the **TLS** box.
5. From the Switch Name box, select the appropriate switch.
6. From the Switch IP box, select the IP address of the switch (optional).
7. In the Caller Extension box, enter the caller extension.
8. In the Caller Extension Password box, enter the password for the caller extension.
9. In the Callee Extension box, enter the callee extension.
10. In the Callee Extension Password box, enter the password for the callee extension.
11. Perform one of the following steps:
    - If you want make a first party call, click **Make First Party Call**.

      The First Party Call Test Result Page appears, displaying the results of the test.
    - If you want make a third party call, click **Make Third Party Call**.

      The Third Party Call Test Result Page appears, displaying the results of the test.

Chapter 25: Avaya Computer Telephony and CVLAN migration

TSAPI Client settings

If you are migrating from Avaya Computer Telephony, and you are using an IP address for the AE Services Server (AE Server) that is different than the IP address you used for the Avaya Computer Telephony Windows-based server, you must make sure that your clients can access the AE Services Server.

Depending on how you implemented your configuration, you might have to change your client configuration files. For information about editing client configuration files see the *Avaya Aura®Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide*, 02-300543.

Note:

If you are editing client template files (TSLIB.INI file for Windows or tslibrc for Linux) make sure that the address in the template file uses the externally facing IP address of your firewall instead of the IP address of the AE Server. For information about editing client configuration files see the *Avaya Aura®Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide*, 02-300543.

Migrating Avaya Computer Telephony users to AE Services

The AE Services Import SDB capability is designed to use the flat file created by backing up the Avaya Computer Telephony SDB. For more information about creating a flat file and backing up the Avaya Computer Telephony SDB, refer to Chapter 5, “Bulk Administration,” in the *Avaya Computer Telephony 1.3, Telephony Services Administration and Maintenance Guide* (this document is not included with AE Services, it is included with Avaya Computer Telephony Releases 1.2 and 1.3).

Migrating the Avaya Computer Telephony SDB to AE Services

About this task

Use this procedure to migrate your Avaya Computer Telephony SDB to AE Services. This is a one-time task that you perform when you are ready to migrate all members.

Procedure

1. On the Avaya Computer Telephony administrative workstation, navigate to **Admin** > **Bulk Admin** > **Create Flat file from SDB**.

   Use TSA 32 to create a flat file from the Avaya Computer Telephony SDB
2. On the AE Services Management Console main menu, navigate to **Maintenance** > **Security Database** > **Import**.
3. On the Import SDB page, click **Choose File**.
4. Select the Avaya Computer Telephony SDB backup file and click **Open**.
5. Click **Import**.

   AE Services updates the following:

   - The AE Services User Management database with your users. AE Services adds the users with the **CT User** flag set to **yes**.
   - The SDB file with the permission settings for worktops, devices, device groups, and Tlink groups. AE Services imports user passwords and Tlinks.

   The Tlink Groups are empty because Tlinks are not imported.
6. On the AE Services Management Console main menu, click **Security** > **Security Database** > **Tlink Groups**.
7. On the Tlink Groups page, select a Tlink Group, and click **Edit Tlink Group**.
8. On the Add/Edit Tlink Group page, select the Tlinks that you want to add to the Tlink Group, and click **Apply Changes**.
9. On the Apply Changes to Tlink Group properties page, click **Apply**.

Use User Management to add a CTI user

When you want to add a CTI user to AE Services, you must use the User Management Menu in the AE Services Management Console. That is, the AE Services Management Console Security menu (Security > Security Database) does not allow you to add a CTI User. See Adding a user to User Management on page 145.

Service Management (which controls User Management) periodically runs a synchronization process to update the Security Database. When the newly added user appears in the Security

Database, you can assign user permissions for the newly added user. See Administering CTI User settings on page 228.

Alternative migration strategies for Avaya Computer Telephony

If you plan to use another source of authority (Windows Active Directory Services) for user authentication, but you want to use the TSAPI Service Security Database (SDB) for user authorization, you will need to add your users to the AE Services User Management database. The AE Services User Management database is the means for populating the SDB. For information about adding users to the AE Services User Management database, see Adding a user to User Management on page 145.

Note:

If you plan to use Active Directory Services for user authentication and you do not plan to use the SDB, you can skip this section.

In terms of integrating with AE Services, the strategies are presented from the lowest level of integration to the highest. Bronze represents the lowest level of integration, Silver represents intermediate integration, and Gold represents complete integration.

Avaya Computer Telephony bronze level integration

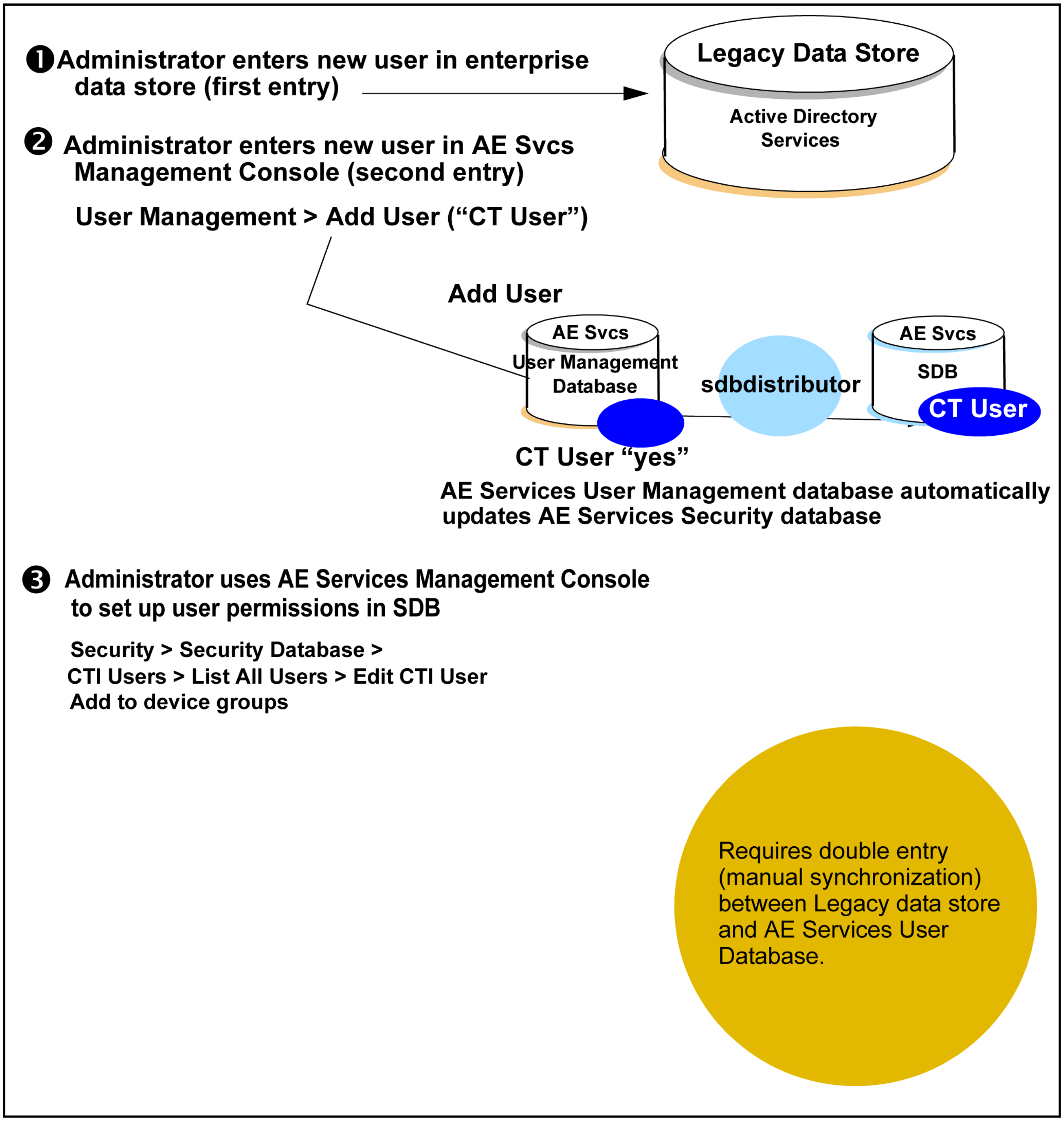
Bronze level integration is the lowest level of integration. Essentially it requires manually maintaining two sets of the same data.

How bronze level integration works

Here is a high-level description of how bronze level integration works for adding a new user. For an illustration see, Bronze Level Integration with Active Directory Services on page 354.

- Provisioning:
  - Add the user to the authoritative source (Windows Active Directory Services).
  - Add the user to AE Services User Management database with the **CT User** flag set to **yes**. This will effect an update to the AE Services SDB.
- Authentication:
  - A user attempts to log in (as a client of the TSAPI Service).
  - The user is authenticated against the Windows Active Directory Services based User Management.
  - User permissions are derived from the AE Services SDB.

Bronze level integration with Active Directory Services



❶ Administrator enters new user in enterprise data store (first entry)

❷ Administrator enters new user in AE Svcs Management Console (second entry)

User Management > Add User (“CT User”)

AE Services User Management database automatically updates AE Services Security database

❸ Administrator uses AE Services Management Console to set up user permissions in SDB

Security > Security Database >
CTI Users > List All Users > Edit CTI User
Add to device groups

Requires double entry (manual synchronization) between Legacy data store and AE Services User Database.

Avaya Computer Telephony silver level integration

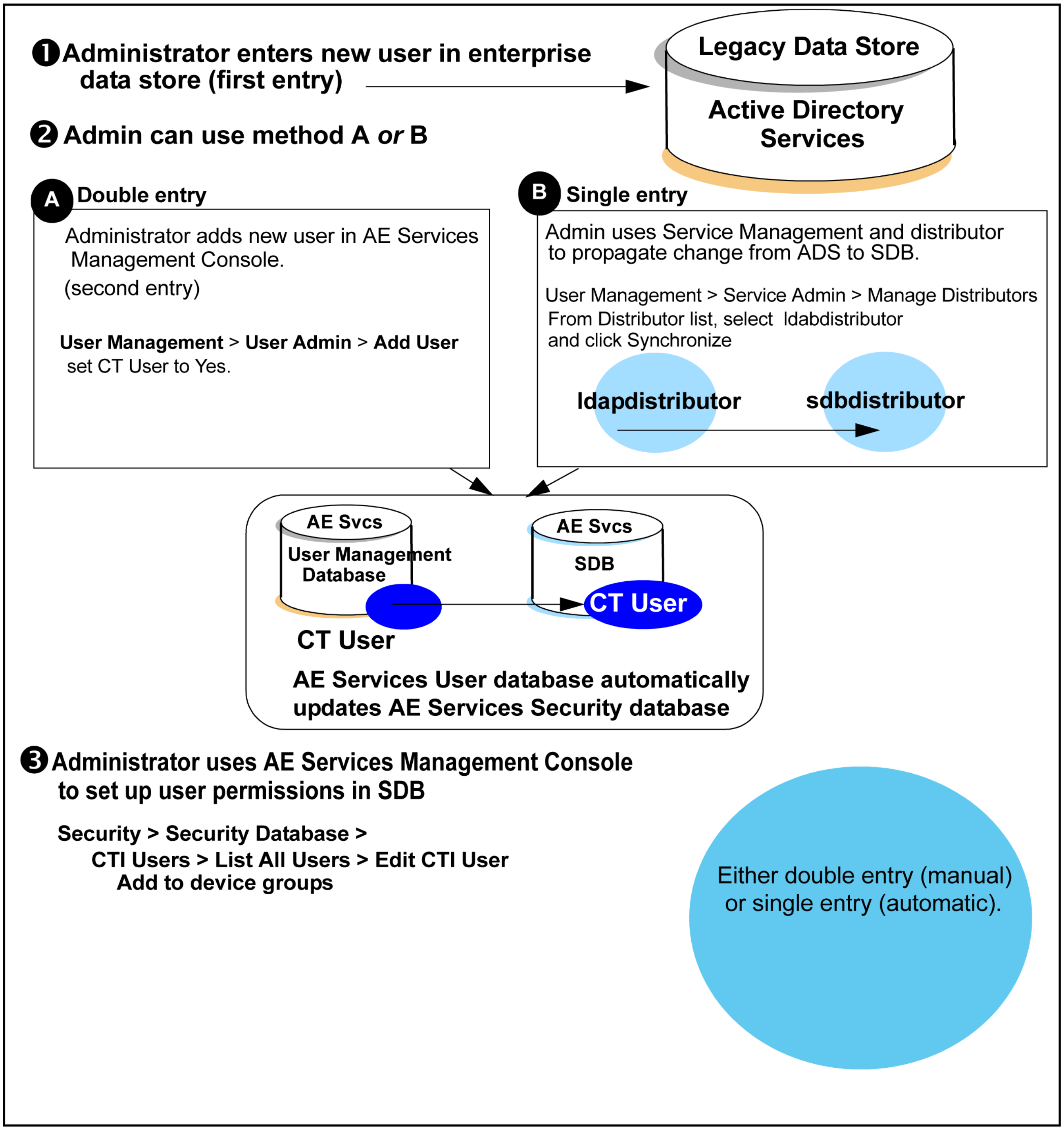
Silver level integration represents a tighter coupling between your enterprise database (Windows Active Directory Services) and AE Services User Management database.

How silver level integration works

Here is a high-level description of how silver level integration works for adding a new user. For an illustration see Silver Level Integration with Active Directory Services on page 356.

- Provisioning:
    - Add the user to the authoritative source (Windows Active Directory Services).
    - Do either of the following:
        - Add the user to AE Services User Management database with the **CT User** flag set to **yes**. This will effect an update to the AE Services SDB (double-entry).
        - From User Management run **`ldapdistributor`**, which imports the user information from Windows Active Directory Services (manual synchronization).
- Authentication:
    - A user attempts to log in (as a client of the TSAPI Service).
    - The user is authenticated against Windows Active Directory services based User Management.
    - User permissions are derived from the AE Services SDB (which is created by virtue of either double-entry or synchronization).

Silver level integration with Active Directory Services



❶ Administrator enters new user in enterprise data store (first entry)

❷ Admin can use method A *or* B

A Double entry

Administrator adds new user in AE Services Management Console.
(second entry)

User Management > **User Admin** > **Add User**
set CT User to Yes.

B Single entry

Admin uses Service Management and distributor to propagate change from ADS to SDB.

User Management > Service Admin > Manage Distributors
From Distributor list, select ldabdistributor
and click Synchronize

AE Services User database automatically updates AE Services Security database

❸ Administrator uses AE Services Management Console to set up user permissions in SDB

Security > Security Database >
CTI Users > List All Users > Edit CTI User
Add to device groups

Either double entry (manual) or single entry (automatic).

Avaya Computer Telephony gold level integration

Gold level integration means complete integration between your enterprise database, and AE Services. A single entry in your enterprise database automatically results in an entry in the AE Services SDB. Gold level integration, however, does require that you develop a solution. In effect you develop your own distributor.

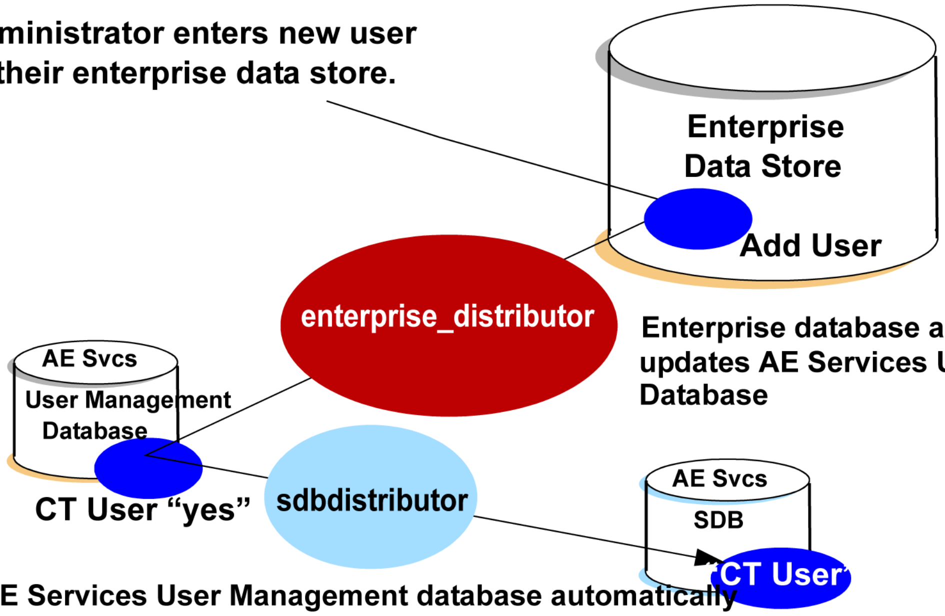
How gold level integration works

Here is a high-level description of how gold level integration works for adding a new user. For an illustration see, Gold Level Integration with Active Directory Services on page 358.

- Provisioning:
  - Add the user to your enterprise user management system.
  - Your enterprise system contacts AE Services User Management via Simple Object Access Protocol (SOAP) interface, as a normal processing activity, to provide the update.
    - Your “enterprise_distributor” updates the AE Services User Management database.
    - The AE Services sdbdistributor updates the SDB.
- Authentication:
  - A user attempts to log in (as a client of the TSAPI Service).
  - The user is authenticated against the enterprise user management system.
  - User permissions are derived from the AE Services SDB.

Gold level integration with Active Directory Services

➊ Administrator enters new user in their enterprise data store.



Enterprise database automatically updates AE Services User Management Database

AE Services User Management database automatically updates AE Services Security database

➋ Administrator uses AE Services Management Console to set up user permissions in SDB

Security > Security Database >
CTI Users > List All Users > Edit CTI User
Add to device groups

Single entry, complete integration requires developing an enterprise_distributor.

Migrating CVLAN to AE Services

Migrating CVLAN Server for Linux (Releases 9.0 and 9.1) to AE Services

About this task

AE Services does not provide a tool for migrating CVLAN Server for Linux (Releases 9.0 and 9.1) to AE Services. Migrating CVLAN Server R9.0 or R9.1 means that you are replacing a CVLAN R9.0 or R9.1 Server with the AE Services CVLAN Service for connectivity to Communication Manager 3.0, or later. You must manually obtain the CVLAN settings from Communication Manager and the CVLAN server, and then administer them on the AE Server.

Follow these steps to migrate CVLAN R9.0 or R9.1 to AE Services 3.1.

Procedure

1. Obtain the CVLAN settings on Communication Manager.

   See Obtaining the CVLAN settings from Communication Manager on page 359.

2. Obtain the CVLAN settings on the CVLAN Server.

   See Obtaining the CVLAN settings from the CVLAN R9.0 or R9.1 Server for Linux on page 360.

3. Administer the settings, which you obtained from Communication Manager and the CVLAN Server, on the AE Server.

   See Administering the CVLAN Settings on the AE Server on page 360.

Obtaining the CVLAN settings from Communication Manager

About this task

On Communication Manager, follow these steps to obtain the settings for the CTI link number and corresponding client link number for CVLAN.

Procedure

1. From the System Administration Terminal, type `change ip-services`.
2. From the **IP Services** screen, go to the **DLG Administration** screen.
3. Make a note of the CTI Link number and the corresponding Client Link number.

   You administer this information to the AE Services Management Console when you administer the CVLAN Service. (See Administering the CVLAN Settings on the AE Server on page 360.)

Obtaining the CVLAN settings from the CVLAN R9.0 or R9.1 Server for Linux

About this task

On the CVLAN Server (R9.0 or R9.1), follow these steps to obtain the name or IP address of each CVLAN client.

Procedure

1. From your CVLAN Server (R9.0 or R9.1) select **Administration > Links**.
2. Select each link and click **Edit Clients**.
3. From the **Edit Clients** page, make a note of the Name or IP Address of each client associated with the CVLAN Link you selected.

Administering the CVLAN Settings on the AE Services Server

About this task

From the AE Server with an active license for the CVLAN service, administer the CVLAN Service for connectivity to Communication Manager by following these steps.

Procedure

1. Administer the NICs. See Administering the Local IP for a single NIC configuration on page 74.
2. Administer the switch connections. See Adding a switch connection on page 77.
3. Administer the CVLAN links. See Administering CVLAN Links on page 85.

   While performing this procedure from the AE Services Management Console, follow these steps:

   a. In the Signal field, use the Client Link number you noted on the Communication Manager 2.x DLG Administration Screen in Step 1.

   b. In the Switch CTI Link number field, use the CTI Link number you noted on the Communication Manager 2.x DLG Administration Screen in Step 1.
4. Test the CVLAN links. See Testing a CVLAN link on page 87.
5. Administer the CVLAN clients. See Adding CVLAN clients on page 87.

   When you perform this procedure, use the CVLAN client information you noted in Step 2.

Migrating the MAPD-based CVLAN to AE Services

About this task

AE Services does not provide a tool for migrating the MAPD-based CVLAN to AE Services. Migration for the MAPD-based CVLAN means that you are replacing a MAPD-based CVLAN Server with the AE Services 3.1 CVLAN Service for connectivity to Communication Manager 3.0.

To migrate the MAPD-based CVLAN from AE services, you must manually obtain the settings on the MAPD and then administer them on the AE Server.

Procedure

1. Obtain the CVLAN settings from the MAPD.

   See Obtaining the CVLAN settings from the MAPD on page 361.

2. Administer the CVLAN settings, which you obtained from the MAPD, on the AE Server.

   See Administering the settings for CVLAN on the AE Server on page 361.

Obtaining the CVLAN settings from the MAPD

Procedure

1. Log in to the MAPD.

   For example `telnet` *`<host name or IP address of MAPD>`*

2. Enter the MAPD log in and password.
3. From the system prompt, type `eth_oam` to start the CVLAN screens.
4. From the main menu, select **CVLAN Administration**.
5. From the **CVLAN Administration** screen, follow these steps:

   a. From the **Node ID** column, make a note of the signal numbers (signal01, signal02, and so on).

   b. From the **Number of Clients** column, select each client number (1, 2, and so on), and make a note of the IP address of each client.

Administering the settings for CVLAN on the AE Server

About this task

Follow these steps to administer the CVLAN settings, which you obtained from the MAPD, on an AE Server with an active license for the CVLAN service

Procedure

1. Administer the NIC. See Administering the Local IP for a single NIC configuration on page 74.
2. Administer the switch connection. See Adding a switch connection on page 77.
3. Administer the CVLAN links. See Administering CVLAN Links on page 85.

   When you perform this procedure from the AE Services Management Console, follow these steps:

   a. In the **Signal** field, use the signal number you obtained on the MAPD. (See Obtaining the CVLAN settings from the MAPD on page 361.)

   b. In the **Switch CTI Link Number** field, use the client number you obtained on the MAPD. (See Obtaining the CVLAN settings from the MAPD on page 361.)

4. Test the CVLAN Links. See Testing a CVLAN Link on page 87.
5. Administer the CVLAN clients. See Adding CVLAN Clients on page 87. When you perform this procedure, use the CVLAN client information you noted in Step 2.

Chapter 26: System Manager Trust Management

Using Avaya Aura® System Manager as a Certificate Authority (CA) to generate signed certificates

About this task

Use this procedure to use the System Manager Trust Management feature as your PKI and create an End Entity for the AE Services server.

Procedure

1. On the System Manager web console, click **Services** > **Security** > **Certificates** > **Authority** > **Add End Entity**
2. Under **RA functions**, click **Add End Entity**.
3. In the **End Entity Profile** field, click **INBOUND_OUTBOUND_TLS**.
4. Type a username and password.

   This password is used to encrypt the P12 trust store file, as shown below.
5. Complete the fields that you want in your certificate as follows:
   - **mail address**: `labmanager@yourcompany.com`
   - **CN**: Common name: `aeshostname.yourcompany.com`
   - **OU**: Organizational Unit: `IT`
   - **O**: Organization: `Your Company Name`
   - **L**: Locality: `Denver`
   - **ST**: State or Province: `CO`
   - **C**: Country: `US`
6. In the **Certificate Profile** drop down list, select **ID_CLIENT_SERVER**.
7. In the **CA** drop down list select **tmdefaultca**.
8. In the **Token** drop down list select **P12** file.
9. Click **Add**.

Note:

On the top of the page the system displays the message `End Entity added successfully`.

Creating the AE Services server certificate

Procedure

1. Using the SMGR Web console, under Services, navigate to **Security** > **Certificates** > **Authority**
2. In the left hand navigation pane near the bottom of the screen, click on **Public Web**
3. On the **Public Web** screen click on **create key store**
    a. Enter the user name and password of the End Entity and click `OK`

    b. Select the certificate key length. `2048` is recommended

    c. Click on `Enroll`

    d. Save the server certificate to a known location.

    Note:

    This is the signed server certificate you have to import into the AE Services server.

Downloading the SMGR CA certificate that signed the AE Services server certificate

Procedure

1. Using the SMGR web console navigate to the **Public Web** page as described previously. Click **Fetch CA certificates**
2. Click **Download PEM chain** on the line starting with CA certificate chain
3. Save the CA certificate to a known location.

    This is the CA certificate that needs to be imported into the AE Services server.

Importing the SMGR CA certificate into the AE Services server

Procedure

1. Using the AE Services Management Console navigate to **Security** > **Certificate Management** > **CA Trusted Certificates**.
2. Click on the **Import** button and upload the SMGR CA certificate you downloaded previously. Give it an alias name, for example `caSMGR`
3. Click the **Apply** button.

   ✲ **Note:**

   You need to import this CA before you can import the AE Services server certificate.

Importing the new AE Services server certificate into the AE Services server

Procedure

1. Using the AE Services Management Console navigate to **Security** > **Certificate Management** > **Server Certificates**
2. Click on the **Import** button and upload the new AE Services server certificate you created previously. Select an alias, for example **server** from the drop down menu and Click **Apply**
3. Enter the password you used while creating the **End Entity**
4. Click the **Apply** button and then click the **Apply** button again on the following page.

   ✲ **Note:**

   You need to import the CA before you can import the AE Services server certificate.

HTTPS, WebLM, and AE Services

HTTPS is used for connecting a Master Avaya WebLM server and the AE Services Avaya WebLM client or embedded Local Avaya WebLM. The Master Avaya WebLM server can operate in an allocation mode or a pooled mode or both. For the allocation mode, the Master Avaya WebLM server acts as a client of the AE Services embedded Avaya WebLM to establish an HTTPS session and push a license file down to the AE Services embedded Local Avaya WebLM. For the pooled mode, the AE Services C++ and Java Avaya WebLM clients establish an HTTPS session to the Master Avaya WebLM server or the AE Services embedded Local Avaya WebLM to acquire a license.

During the TLS handshake, for an HTTPS client-server session, the server must send its identity certificate to the client and the client must validate the server's identity certificate. For example, the Not Before date and the Not After date timeframe is valid, and the server identity certificate was signed by a trusted Certificate Authority (CA) known by the client. If the client is unable to validate the server's identity certificate, the handshake connection is terminated.

Note:

- For the pooled mode, the Master Avaya WebLM CA certificates must be imported into the AE Services Trusted Certificate store using the AE Services Management Console.
- For the allocation mode, the AE Services Apache Web server CA certificates must be imported into the Master Avaya WebLM trust store.

While attempting to connect to Avaya WebLM from the AE Services server or from a Master Avaya WebLM to the AE Services embedded Local Avaya WebLM, the connection might not get established. The following are some troubleshooting suggestions:

- Pooled mode: Using the Management Console, verify that the CA certificate used to sign the Master Avaya WebLM server's identity certificate is in the AE Services Trusted Certificate store. For a default System Manager installation where the Master Avaya WebLM is also embedded, the System Manager's embedded CA is used to sign the System Manager server identity certificate. Each System Manager deployment creates its own unique CA certificate with the same Common Name. Therefore, when validating whether the System Manager CA certificate is installed on the AE Services server, ensure that the System Manager CA certificate Serial ID matches the Serial ID of the System Manager CA certificate in the AE Services trust store.
- Allocation mode: Verify that the CA certificate used to sign the AE Services server identity certificate is in the Master Avaya WebLM trust store.
- Verify that the port is not blocked by a firewall.
- Verify that the Avaya WebLM server identity certificate has not expired.
- Check the AE Services log files for a TLS/SSL connection error, for example, using an unknown certificate.

Chapter 27: OpenSSL as a Certificate Authority (CA)

Using OpenSSL as a Certificate Authority (CA) to generate signed certificates

The following steps use a key size, cipher, and a single-level CA, instead of a multi-level CA infrastructure, that may be considered inefficient to support your IT security requirements. It is recommended that you review the OpenSSL commands and make the necessary changes to meet or exceed your certificate security requirements. These commands are provided as is, use at your own risk, with no guarantee that they will protect your network from a possible intrusion.

The OpenSSL package is available on all Linux distributions, Windows, for example cygwin and is available for download from the OpenSSL Web site.

On a Linux server, use the man command, for example man `genrsa` to find out additional information on the openssl commands like `genrsa`, `req`, `x509`, `ca`, and `pkcs12`.

The following steps are based on the Linux® Operating System and explain how to create a single-level CA.

Setting up the OpenSSL CA

Creating the certificate directory structure

Procedure

1. Create a directory to serve as your certificate home directory, by typing the command, **`mkdir certificates`**.
2. Change directory to the certificates home directory, by typing the command **`cd certificates`**.

3. From the Linux® Operating System command line interface (CLI), run the following commands:
    - **`mkdir CA`**
    - **`mkdir CA/certs`**
    - **`mkdir CA/crl`**
    - **`mkdir CA/newcerts`**
    - **`mkdir CA/private`**
    - **`touch CA/index.txt`**
    - **`touch CA/private/cakey.pem`**
    - **`touch CA/serial`**

Configuring the OpenSSL configuration file

Procedure

1. Determine the location of OpenSSL's default `openssl.cnf` file. On RHEL, it is at `/etc/pki/tls/openssl.cnf`. If not, use the **`find`** command to locate the file, that is `find / -name openssl.cnf`
2. Copy the `openssl.cnf` file to the certificates home directory, for example `cp /etc/pki/tls/openssl.cnf /certificates`
3. Change directories to the certificates home directory, for example `cd /certificates`
4. Edit the copied version of the `openssl.cnf` file with the following changes, for example `vi /certificates/openssl.cnf`
    - Modify the following line in the section [CA_default]

      Change from:

      dir = ../../CA

      Change to:

      dir = ./CA
    - Comment out the two appearances of the following line:

      Change from:

      nsComment = "OpenSSL Generated Certificate"

      Change to:

      #nsComment = "OpenSSL Generated Certificate"
    - Uncomment the following line and add v3_req to extensions.

      Change from:

# X.509v3 extensions to use:

# extensions =

Change to:

# X.509v3 extensions to use:

extensions = v3_req

- Uncomment the following line.

  Change from:

  # req_extensions = v3_req # The extensions to add to a certificate request.

  Change to:

  req_extensions = v3_req # The extensions to add to a certificate request.

- Change the following line in the [v3_req] section.

  Change from:

  keyUsage = nonRepudiation, digitalSignature, keyEncipherment

  Change to:

  keyUsage = nonRepudiation, digitalSignature, keyEncipherment, dataEncipherment

- Add the following line to the [v3_req] section.

  extendedKeyUsage=serverAuth,clientAuth

- Add the following line to the [usr_cert] section.

  Change from:

  # These extensions are added when 'ca' signs a request.

  Change to:

  # These extensions are added when 'ca' signs a request.

  keyUsage = nonRepudiation, digitalSignature, keyEncipherment, dataEncipherment

  extendedKeyUsage=serverAuth,clientAuth

- Change `string_mask` in the [req] section to the following:

  - string_mask = MASK:0x2002

- If you want to use a message digest higher than `sha1`, for example `sha256`, change the option default_md in the [req] section

5. Save changes to the `openssl.cnf` file.

Creating the CA root key and self-signed certificate

Procedure

1. Change directories to the certificates home directory, for example: `cd /certificates`
2. Create the CA key by operating the following command:

   ```
   openssl genrsa -des3 -out cakey.pem 2048
   ```

   You will be asked for a password to encrypt the CA root key, and then you will be asked to provide that password again as verification. The key will be encrypted using triple des, for example: `des3`. You will be asked for this password when signing the CSR. The size of the key will be 2048 bits. The key will be saved to the file `cakey.pem`.
3. Run the following command to create the CA public certificate signed by the CA key:

   ```
   openssl req -new -x509 -days 3650 -key cakey.pem -out cacert.pem -
   config openssl.cnf
   ```

   You will be asked for the CA root key password. The public CA certificate will expire in 10 years. In order to change the expiration, modify the –days option. The certificate will be saved in the file `cacert.pem`. The `openssl.cnf` will be used to apply some configuration values. You will be asked to enter information that will be incorporated into your certificate request. Leave the Email Address field blank.

   An example:

   - **Country Name** (2 letter code) `[GB]:US`
   - **State** or **Province Name** (full name) `[Berkshire]:CO`
   - **Locality Name** (eg, city)`[Newbury]:Denver`
   - **Organization Name** (eg, company) [My Company Ltd]:`Your Company Name`
   - **Organizational Unit Name** (eg, section) []:`IT`
   - **Common Name** for example your name or your server's hostname) []:`YourCompanyName Root CA`
   - **Email Address** []:
4. Move the generated CA root key to the CA/private directory, that is `mv cakey.pem ./CA/private/`
5. Move the generated CA public certificate to the CA directory, that is `mv cacert.pem ./CA/`
6. You can view the contents of the CA public certificate with the following command:

   ```
   openssl x509 -in ./CA/cacert.pem -text -noout
   ```

Note:

Your CA is now configured and ready to issue certificates. This CA can be used to create all your AE Services server certificates. Only the CA certificate will need to be imported into your clients trust certificate store.

Generating a server certificate for each AE Services server

Creating a Certificate Signing Request (CSR) and key for each of your AE Services server

Procedure

1. Login to the AE Services Management console of the server for which you need to create the certificate
2. Navigate to **Security** > **Certificate Management** > **Server Certificate** > **Add**
   a. To select the **Certificate Alias**, select the appropriate alias for the certificate.
      - Select **cmtls** for the Transport Service certificate
      - Select **aeservices** for the CVLAN, DLG, DMCC and TSAPI certificates. If **cmtls** is not specified, and the switch connection Provide AE Services certificate to switch option is enabled, this certificate will be used for the Transport Service.
      - Select **web** for the Apache and Tomcat certificates.
      - Select **ldap** for the LDAP certificate.
      - Select **rsyslog** for remote logging.
      - Select **server** to include all certificates (cmtls, aeservices, web, and ldap) as a second preference.

   b. To select the **Enrollment Method**, select **Manual** from the drop down menu

   c. To select the **Encryption Algorithm**, select **3DES** from the drop down menu

   d. Enter a password in the **Password** field. This password will be used to encrypt the private key associated with the certificate. The encrypted private key will be kept on the AE Services server. Re-enter the password for verification

   e. To select the **Key Size**, select **2048** from the drop down menu

   f. Under **Signature Algorithm**, select **sha256** from the drop down menu. If your client does not support **sha256**, select **sha1**

   g. For the **Certificate Validity**, enter the number of days you want this certificate to be valid. For example, for 5 years, it would be 1825 days.

h. To select a **Distinguished Name (DN)**, enter as per the below hints:

   - **C**=US
   - **ST**=CO
   - **L**=yourCity
   - **O**=YourCompanyName
   - **OU**=yourOrg
   - **CN**=aeshostname

   Note:

   The **C** value US, the **ST** value CO and the **O** value that is YourCompanyName must match the country name, state name and the company name of the CA certificate for the CA certificate to be able to sign the CSR.

   The **Distinguished Name (DN)** field must not contain any wildcard character, that is an asterisk (*), double dots (..) or a question mark (?).

i. Modify the **Key Usage** by holding down the **Ctrl** key on the keyboard. Select the **Digital Signature**, **Non-repudiation**, **Key encipherment**, and **Data encipherment** options

j. To set the **Extended Key Usage**, hold the **Ctrl** key down on the keyboard. Select the **SSL/TSL Web Server Authentication** and **SSL/TLS Web Client Authentication** options. Leave all other fields empty

k. Click **Apply**

3. From the **Server Certificate Manual Enrollment Request** page, copy the CSR certificate in the window starting with-----**BEGIN CERTIFICATE REQUEST**----- and ending with -----**END CERTIFICATE REQUEST**-----. Save the CSR to a file named `myserver.req` in the `/certificate` directory on the server where the CA certificate was created.

Signing the AE Services server CSR

About this task

By using the server where the CA certificate was created, sign the AE Services server CSR as follows:

Procedure

1. Change directories to the certificates home directory, for example `cd /certificates`
2. Create a serial number for the certificate by using the following command:

```
tr -c -d 0-9 < /dev/urandom | head -c 10  > ./CA/serial
```

3. Sign the CSR by using the following command:

   ```
   openssl ca -config openssl.cnf -days 730 -out myserver.crt -infiles myserver.req
   ```

   The `openssl.cnf` file will be used to apply some configuration options. The signed public certificate will expire in 2 years. In order to change the expiration modify the option –days. The certificate will be saved in the file **myserver.crt**. The CSR is in the file `myserver.req`. You will be asked for the CA root key password to sign the CSR and confirmation to sign and commit the request.

4. View the contents of the newly signed public server certificate with the following command:

   ```
   openssl x509 -in ./ myserver.crt -text -noout
   ```

Importing the public CA certificate into the AE Services trust certificate store

Procedure

1. Import the public CA certificate into the AE Services trust certificate store using the AE Services Management Console as follows:

   a. Using the AE Services Management Console navigate to **Security** > **Certificate Management** > **CA Trusted Certificates**

   b. Click the **Choose File** button and upload the OpenSSL-generated CA certificate you created above. Give it an alias name, for example `myCA` and click **Apply**

      Note:

      The CA certificate must be imported before the signed server certificate can be imported into the AE Services server in the next step.

2. Import the `myserver.crt` file created in the previous step into the AE Services server using the AE Services Management Console.

   a. Using the AE Services Management Console, navigate to **Security** > **Certificate Management** > **Server Certificates**

   b. Click the **Choose File** button and upload the new AE Services server certificate, that is `myserver.crt` you created above. Select the alias you chose when creating the CSR, that is **server** or **aeservices** from the drop down menu and click **Apply**

      Note:

      Make sure that the AE Services server and the server where the CA was created are properly time synchronized to an NTP server.

3. Import the public CA certificate into the AE Services related clients trust certificate stores.

Note:

Repeat the CSR creation and subsequent steps for different AE Services servers and use the same CA to sign each of the CSRs. This way all the AE Services clients only need to know one CA certificate, that signed all the AE Services server certificates.

Chapter 28: Resources

Application Enablement Services documentation

The following table lists the documents related to Application Enablement Services. Download the documents from the Avaya Support website at http://support.avaya.com.

Title	Description	Audience
Design		
Avaya Aura® Application Enablement Services Overview and Specification	Understand high-level product features and functionality.	Customers and sales, services, and support personnel
Avaya Aura® Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide	Installing TSAPI and CVLAN Client and SDK	Customers and sales, services, and support personnel
Using		
Upgrading Avaya Aura® Application Enablement Services	Upgrading Application Enablement Services applications.	System administrators and IT personnel
Administering Avaya Aura® Application Enablement Services	Administering Application Enablement Services applications and install patches on Application Enablement Services applications.	System administrators and IT personnel
Avaya Aura® Application Enablement Services Data Privacy Guidelines	Describes how to administer Application Enablement Services to fulfill Data Privacy requirements.	Sales Engineers, Implementation Engineers, Support Personnel
Implementation		
Deploying Avaya Aura® Application Enablement Services for Microsoft® Lync Server Products	Deploy Application Enablement Services applications in Microsoft Lync Server Products	Implementation personnel
Deploying Avaya Aura® Application Enablement Services in Virtual Appliance	Deploy Application Enablement Services applications in Virtual Appliance	Implementation personnel
Deploying Avaya Aura® Application Enablement Services in Virtualized Environment	Deploy Application Enablement Services applications in Virtualized Environment	Implementation personnel

Table continues…

Title	Description	Audience
Deploying Avaya Aura® Application Enablement Services in Infrastructure as a Service Environment	Deploy Application Enablement Services applications in Infrastructure as a Service Environment	Implementation personnel
Deploying Avaya Aura® Application Enablement Services in a Software-Only Environment	Deploy Application Enablement Services applications in Software-Only Environment	Implementation personnel
Maintenance and Troubleshooting		
Maintaining Avaya Aura® Application Enablement Services	Maintaining Application Enablement Services applications and install patches on Application Enablement Services applications.	System administrators and IT personnel

Related links

Finding documents on the Avaya Support website on page 376
Accessing the port matrix document on page 377
Avaya Documentation Center navigation on page 377

Finding documents on the Avaya Support website

Procedure

1. Go to https://support.avaya.com.
2. At the top of the screen, type your username and password and click **Login**.
3. Click **Support by Product** > **Documents**.
4. In **Enter your Product Here**, type the product name and then select the product from the list.
5. In **Choose Release**, select the appropriate release number.

   The **Choose Release** field is not available if there is only one release for the product.
6. In the **Content Type** filter, click a document type, or click **Select All** to see a list of all available documents.

   For example, for user guides, click **User Guides** in the **Content Type** filter. The list only displays the documents for the selected category.
7. Click **Enter**.

Related links

Application Enablement Services documentation on page 375

Accessing the port matrix document

Procedure

1. Go to https://support.avaya.com.
2. Log on to the Avaya website with a valid Avaya user ID and password.
3. On the Avaya Support page, click **Support by Product** > **Documents**.
4. In **Enter Your Product Here**, type the product name, and then select the product from the list of suggested product names.
5. In **Choose Release**, select the required release number.
6. In the **Content Type** filter, select one or both the following categories:
   - **Application & Technical Notes**
   - **Design, Development & System Mgt**

   The list displays the product-specific Port Matrix document.
7. Click **Enter**.

Related links

Application Enablement Services documentation on page 375

Avaya Documentation Center navigation

The latest customer documentation for some programs is now available on the Avaya Documentation Center website at https://documentation.avaya.com.

Important:

For documents that are not available on Avaya Documentation Center, click **More Sites** > **Support** on the top menu to open https://support.avaya.com.

Using the Avaya Documentation Center, you can:

- Search for content by doing one of the following:
  - Click **Filters** to select a product and then type key words in **Search**.
  - From **Products & Solutions**, select a solution category and product, and then select the appropriate document from the list.
- Sort documents on the search results page.
- Click **Languages** (🌐) to change the display language and view localized documents.
- Publish a PDF of the current section in a document, the section and its subsections, or the entire document.
- Add content to your collection by using **My Docs** (☆).

Navigate to the **Manage Content** > **My Docs** menu, and do any of the following:

  - Create, rename, and delete a collection.
  - Add topics from various documents to a collection.
  - Save a PDF of selected content in a collection and download it to your computer.
  - Share content in a collection with others through email.
  - Receive collection that others have shared with you.

- Add yourself as a watcher using the **Watch** icon (👁).

  Navigate to the **Manage Content** > **Watchlist** menu, and do the following:

  - Enable **Include in email notification** to receive email alerts.
  - Unwatch selected content, all content in a document, or all content on the Watch list page.

  As a watcher, you are notified when content is updated or deleted from a document, or the document is removed from the website.

- Share a section on social media platforms, such as Facebook, LinkedIn, and Twitter.
- Send feedback on a section and rate the content.

Note:

Some functionality is only available when you log on to the website. The available functionality depends on the role with which you are logged in.

Related links

Application Enablement Services documentation on page 375

Training

The following courses are available on the Avaya Learning website at http://www.avaya-learning.com. After logging in to the website, enter the course code or the course title in the **Search** field and click **Go** to search for the course.

Course code	Course title
20980W	What's New with Avaya Aura® Release 8.1

Viewing Avaya Mentor videos

Avaya Mentor videos provide technical content on how to install, configure, and troubleshoot Avaya products.

About this task

Videos are available on the Avaya Support website, listed under the video document type, and on the Avaya-run channel on YouTube.

- To find videos on the Avaya Support website, go to https://support.avaya.com/ and do one of the following:
  - In **Search**, type `Avaya Mentor Videos`, click **Clear All** and select **Video** in the **Content Type**.
  - In **Search**, type the product name. On the Search Results page, click **Clear All** and select **Video** in the **Content Type**.

    The **Video** content type is displayed only when videos are available for that product.

  In the right pane, the page displays a list of available videos.
- To find the Avaya Mentor videos on YouTube, go to www.youtube.com/AvayaMentor and do one of the following:
  - Enter a key word or key words in the **Search Channel** to search for a specific product or topic.
  - Scroll down Playlists, and click a topic name to see the list of videos available for the topic. For example, Contact Centers.

  Note:

  Videos are not available for all products.

Support

Go to the Avaya Support website at https://support.avaya.com for the most up-to-date documentation, product notices, and knowledge articles. You can also search for release notes, downloads, and resolutions to issues. Use the online service request system to create a service request. Chat with live agents to get answers to questions, or request an agent to connect you to a support team if an issue requires additional expertise.

Related links

Using the Avaya InSite Knowledge Base on page 379

Using the Avaya InSite Knowledge Base

The Avaya InSite Knowledge Base is a web-based search engine that provides:

- Up-to-date troubleshooting procedures and technical tips
- Information about service packs
- Access to customer and technical documentation

- Information about training and certification programs
- Links to other pertinent information

If you are an authorized Avaya Partner or a current Avaya customer with a support contract, you can access the Knowledge Base without extra cost. You must have a login account and a valid Sold-To number.

Use the Avaya InSite Knowledge Base for any potential solutions to problems.

1. Go to http://www.avaya.com/support.
2. Log on to the Avaya website with a valid Avaya user ID and password.

   The system displays the Avaya Support page.
3. Click **Support by Product** > **Product-specific Support**.
4. In **Enter Product Name**, enter the product, and press `Enter`.
5. Select the product from the list, and select a release.
6. Click the **Technical Solutions** tab to see articles.
7. Select relevant articles.

Related links

Support on page 379

Glossary

AES Advanced Encryption Standard. The Advanced Encryption Standard (AES) is a Federal Information Processing Standard (FIPS) Publication (FIPS-197) that specifies a cryptographic algorithm for use by U.S. Government organizations to protect sensitive (unclassified) information.The AES specifies three key sizes: 128, 192 and 256 bits.

Alphanumeric A character string that is a combination of letters of the alphabet and numbers.

API Application Programming Interface. Software that applications use to interact with network services, telephony services, and so forth.

ASAI Adjunct Switch Application Interface. ASAI is a protocol that enables software applications to access call processing capabilities provided by Avaya Communication Manager.

Association A communication channel between the adjunct and switch for messaging purposes. An active association is an existing call in the Communication Manager call processing domain or an extension on the call.

Authentication The process of validating the identity of a user by means of user profile attributes.

Authorization The process of granting a user the ability to carry out certain activities based on permissions.

Automatic Call Distribution A feature that answers calls, and then depending on administered instructions, delivers messages appropriate for the caller and routes the call to an agent when one becomes available.

Breadcrumb Refers to the part of the navigation bar on a Web site that shows the location of the current web page relative to the site hierarchy. For example: Server Status | Logs | Audit Logs.

Call control Call control refers to the group of services that enable a telephony client application to control a call or connection on Communication Manager. These services are typically used for placing calls from a device and controlling any connection on a single call as the call moves through Communication Manager. The CVLAN Service, the DLG Service and the

TSAPI Service (which includes the Telephony Web Service and JTAPI) provide client applications with call control capabilities.

Call Information Services

Avaya Call Information Services is a collection of services that allows applications to get detailed call information (such as VDN number, agent ID, and so forth) and to determine the status of the AE Services call information link.

Call/call monitor

An SDB term. A call/call monitor is software that tracks call activity on the basis of a call ID (a unique identifier of the call being handled by Communication Manager).

Users either have or do not have call/call monitoring permission; you do not need to create a device group for call/call monitoring access rights.

Contrast with device monitors and device/device monitors, which are based on a device ID.

Call/device monitor

An SDB term. Call/device monitors are used to track events for a call once it reaches the device being monitored. Unlike device/device monitors, events for a call continue to be received even after the call leaves the device.

Certificate authority (CA)

A certificate authority is an organization that issues and manages security credentials, including digitally signed certificates containing public keys for message encryption and decryption.

CN

Common name. See Common name on page 382.

Common name

In terms of LDAP on page 385 it can refer to the name a user prefers to use (such as a first name, a middle name, a nickname, a first and last name, and so forth). It can also refer to the name of a resource, such as a computer.

Common User Store

The pool of shared user profile attributes maintained in the Lightweight Directory Access Protocol (LDAP on page 385) database. In other words, a common repository of user profiles. See also, Profile on page 386.

Communication Manager API

The Device, Media, and Call Control on page 383 API supersedes Communication Manager API (or CMAPI). Communication Manager API is the former name of a service that provided connectivity between applications (that provide device and media control) and Communication Manager.

Computer Telephony Integration

CTI. CTI is the integration of services provided by a computer and a telephone. In simplest terms it means connecting a computer to a communications server (or switch) and having the computer issue commands that control calls.

Connection name

See Switch connection names on page 387.

CT User

An abbreviation for Computer Telephony User. A user (or an application) administered in the AE Services User Management (local LDAP) as a CT User derives authorization from the Security Database. CT Users include the following users or applications: TSAPI Service users (including JTAPI users), Telephony Web Service users, and DMCC users who use Call Control Services.

CTI link

The term CTI link refers to a generic link type that is used in the context of Communication Manager administration. As a generic link type, it can refer to any of the following AE Services links: CVLAN Links, DLG links, and TSAPI links (the Call Control Services, the Telephony Web Service, and JTAPI use the TSAPI Service).

On an AE Services Management Console page, such as the TSAPI Services Summary, the column heading for Switch CTI link ID refers to a TSAPI link as it is administered on Communication Manager.

CTI User

Computer Telephony Integration user (synonymous with CT User). See CT User on page 383.

CUS

Common User Store. See Common User Store on page 382.

DES

Data Encryption Standard. DES is a United States Government Sanctioned encryption algorithm described in Federal Information Processing Standards Publication, FIPS PUB 46-1 or ANSI Standard X3.92. DES uses 64 bit keys of which 56 bits are used by the algorithm and 8 are used for error detection.

Device

An SDB term. A device can be a telephone, a FAX, an ACD, a VDN, or an agent ID that Communication Manager controls. In the Security Database, a device has the following attributes: Device ID (which is administered on Communication Manager, see Device ID on page 383), Location, Device Type, and Tlink Group.

Device group

An SDB term. A device group refers to a named list of devices in the Security Database. You can assign device groups to users and worktops.

Device ID

An SDB term. A Device ID is a 2 to 13-digit number for a phone, fax, modem, ACD, VDN, or agent id that is administered on Communication Manager. This is not the full 7 or 10 digit number used by the public network.

Device, Media, and Call Control

Device, Media, and Call Control (DMCC) refers to the service that provides first party call control (Device and Media control or Device and Media Control with Call Information Services) as well as third party call control (Device and Media Control and Call Control Services. Call Control services provides an extended set of third party call control services.

Device/device

An SDB term. Device/device refers to either a device/device monitor or a device/device monitoring group in the Security Database. An application places a device monitor on a specific device so it can receive an event report any time an event occurs at that device. For example, if the device receives an incoming call or originates an outgoing call, the application receives an event report. Device monitors are the most commonly used monitor. By default, all have this permission for the devices associated with their worktop.

Distinguished name

An LDAP protocol term. A distinguished name (DN) is unique identifier for an entry in a directory. A distinguished name is a hierarchical identifier, and as such, a distinguished name can consist of a series of relative distinguished names.

Distributors

Components of User Management that propagate changes, such as additions, changes or deletions from an application to the local LDAP database. The AE Services provides two distributors, the SDB distributor and the Generic LDAP distributor. See also Synchronize on page 387.

DMCC

See Device, Media, and Call Control on page 383.

DN

Distinguished Name. See Distinguished name on page 384.

Domain controller

Microsoft Windows based term for computer running XP Server that uses a common directory for storing account information for a complete domain.

DTMF

Dual-Tone Multi-Frequency. DTMF is a generic term for the method of pushbutton signaling from voice terminals using the voice transmission path. The code for DTMF Signaling provides 16 distinct signals, each composed of 2 voiceband frequencies (one from each of 2 mutually exclusive frequency groups of 4 frequencies each). DTMF tones are commonly known as touch tones.

Exception group

An SDB term. An exception group is a way of managing a large list by using the principle of exclusion. An exception group contains only the excluded members or the exceptions. For example, suppose Mary is a supervisor with permission to control all of the phones in the organization, except those that belong to the president and the vice president. Instead of setting up a device group that contains all of the devices except the president’s phone and the vice-president’s phone, you could set up an exception group and assign it to Mary. This exception group would contain the phones of the president and vice president

First party call control

First party call control refers to the application acting as the user to operate a telephone. The application invokes operations such as “Go off-hook”, “Press button," and so forth, until the switch collects enough digits to initiate the call.

Fully Qualified Domain Name (FQDN)

FQDN is the complete domain name of a computer in an Internet Protocol network. The FQDN includes all higher level domains.

Heartbeat

The heartbeat capability allows a client to query the server for the status of a CTI link. Heartbeat is a two-way capability. Communication Manager (as the client) can issue the heartbeat to the AE Server, or the AE Server (as the client) can issue a heartbeat to Communication Manager. Additionally, an AE Services client, such as TSAPI, JTAPI, or CVLAN can initiate a heartbeat to the AE Server.

In the AE Services Management Console you can set heartbeat state to Off or On. If heartbeat is set to off, Communication Manager initiates a heartbeat request. If the heartbeat is set to on, AE Server initiates the heartbeat request.

Host name

A name you assign to a host computer such as an AE Server. A Host name can consist of only the following characters: a through z (uppercase or lower case), the digits 0 through 9, and the hyphen. Host names must begin with a character from a through z, and they must end in either a character or a number. AE Services assumes that host names are mapped to IP addresses and can be validated by DNS.

JTAPI

Java Telephony Application Programming Interface. JTAPI is an API that provides access to the complete set of Third Party call control features provided by the TSAPI Service. JTAPI uses the TSAPI Service for communication with Avaya Communication Manager.

Kerberos

Kerberos is a network authentication protocol that lets users authenticate themselves using a secure server.

Keystore

A file that contains public and private keys.

LDAP

Lightweight Directory Access Protocol. LDAP defines a standard protocol for organizing directory hierarchies and a standard interface for clients to access directory servers.

MIB

Management Information Base. MIB is a component of SNMP. It defines what information a device's SNMP agent is capable of reporting. It is a list of all the types of information an SNMP manager can poll an SNMP agent for, as well as the traps an SNMP agent can send to an SNMP manager. The Application Enablement Services MIB resides on the AE Server.

Monitor

An SDB term. A monitor is a TSAPI Service capability that watches for activity on a call or a device. A monitor placed on a device or a call causes reports of changes in the status of the device or call to be sent to the client requesting the monitor. If your application places a device monitor on your phone, your application is notified of any change in your phone's status (for example an incoming call has been received, a call has ended, and so forth). Many applications rely on monitors to provide this type of information.

OAM

Operations, Administration, and Maintenance. This term is superseded by the term Application Enablement Services Management Console (AE Services Management Console).

PAM

Pluggable Authentication Module. PAM is software that accommodates different authentication methods.

PKI

Public key Infrastructure. PKI is a system or framework that provides users of a non-secure public network to securely and privately exchange data through the use of a cryptographic key pair that is provided by a trusted authority, typically a certificate authority. A public key infrastructure includes a certificate authority (CA), a registration authority (RA) and a means of managing certificates.

Primary device ID

An SDB term. The primary device ID is the primary device at a user's worktop. Usually it is the extension of the telephone on the worktop.

Private data

A TSAPI term. Private data is a switch-specific software implementation that provides value added services.

Profile

A set of attributes that represents a specific user in AE Services User Management.

Routing

In the sense of adjunct routing, routing is a capability for selecting an appropriate path for a call. When a routing application is started, it sends route registration requests, which contain a device ID, to Communication Manager. Routing requests instruct Communication Manager to send all incoming calls to these device IDs (in the TSAPI Service). The TSAPI Service sends the call to the application for routing. Communication Manager does not route these calls. Also referred to as adjunct routing.

In terms of access privileges (Allow Routing on Listed Device), routing refers to the ability to register with Communication Manager to route calls (as in adjunct routing). A CT User (or an application) can perform routing for a device or a device group. Routing privileges can be granted only by administering access privileges (Allow Routing on Listed Device).

SATA

Serial Advanced Technology Attachment (Serial ATA).

Secondary device group

An SDB term. A group of devices (in addition to the primary device) that are associated with the worktop or are shared among worktops. Users assigned to this worktop have permission to control and monitor all devices in this group.

Security Database (SDB)

SDB is a database that stores information about CT Users and the devices they control. The TSAPI Service uses this information in its permission checking. Administrators can control user access to the

TSAPI Service by placing restriction on the types of request users can make. The TSAPI Service uses the Postgres database for the SDB.

Server Certificate

Certificate generated on the server, which have both the private and public key pairs. Server Certificates are stored in both certificate form and PKCS12 form. Server Certificates are typically used as identity certificates by the server applications. For example, a web server would use a PKCS12 file (certificate) for establishing SSL.

Service administration

A set of functions in the AE Services Management Console that provide you with the ability to manage the User Management Service.

Simple Network Management Protocol (SNMP)

SNMP is a standard network management protocol that is used to remotely monitor and manage network-capable devices such as computers, switches, and gateways. SNMP provides a way for monitored objects (SNMP agents) and monitoring objects (SNMP managers) to exchange status messages.

SNMP agent

The component in an SNMP managed network that collects and stores status information and makes it available to the SNMP manager. One of its capabilities is to send traps (alarm notifications) to an SNMP agent when a device failure occurs.

SNMP manager

The SNMP manager is the component in an SNMP managed network that communicates with SNMP agents. It can issue requests for information and it can receive unsolicited notifications from SNMP agents. Unsolicited notifications are referred to as traps.

Switch connection names

A Switch Connection Name is a term that refers to either of the following:

- For the TSAPI Service, the Telephony Web Service, the CVLAN Service, and the DLG Service, a collection of host names or IP addresses associated with one (and only one) switch.

  Important:

  If you use multiple switch connection names, the total number of IP addresses and host names can not exceed 64 for a given AE Services Server. That is, if you use two switch connection names, SCA and SCB, the total number of names and IP addresses (or host names) can not exceed 64.

- For the DMCC Service, a collection of H.323 Gatekeepers that are associated with one (and only one) switch.

Synchronize

In the context of User Management, the Synchronize feature is used to trigger a synchronization of user data between the local LDAP database and an application user space (for example, the Security Database) through a Distributor connection. The Synchronize button on the Distributor List page provides administrators with a way to trigger the synchronization behavior of a particular Distributor. See also, Distributors on page 384.

Telephony Web Service

The Telephony Web Service is an API that provides access to basic subset of Third Party call control features of Communication Manager. It relies on the TSAPI Service to communicate with Communication Manager.

Third-party call control

Third-party call control means that, rather than acting as the user, the application is making requests on the behalf of the user. A third-party make call says “Make a call from extension X to extension Y”.

Tlink

A Tlink is a service identifier that is created when the administrator adds a TSAPI link in the AE Services Management Console. A Tlink refers to a switch connection between a specific switch and a specific AE Server.

TLS

Transport Layer Security. TLS is a protocol that guarantees privacy and data integrity between client and server components communicating over the Internet.

Transport link

A transport link is a secure TCP/IP connection between the AE Services server and a CLAN on Communication Manager. When the AE Services Transport Service starts up, it establishes the transport link between the AE server and the Communication Manager server, based on administering a switch connection in the AE Services Management Console.

The CLAN IP addresses that you administer from the Edit CLAN IPs page in the AE Services Management Console are used to set up TLS connections between AE Services and Communication Manager. These are TLS connections called transport links.

Trusted Certificate

A Trusted Certificate, typically, belongs to the root or subordinate root Certificate Authority (CA), a third party that an organization trusts. It validates the identity of the trusted third party. For example, if SampleCA certificate is in the trusted certificate repository, then a user presenting SampleCert - that is issued by SampleCA - can be trusted to be a valid user.

TSAPI Service

The CSTA-based third-party call control services provided by AE Services.

User

A person or an application administered in the local LDAP database. For example, a TSAPI application would be administered as an AE Services user with the CT User field set to Yes.

User Management

AE Services Management Console service that provides you with capabilities for managing AE Services user profiles. User Management relies on the local LDAP database to authenticate users.

User profile

A set of attributes that represent a specific user in the local LDAP database.

Vector Directory Number (VDN)

A VDN is an extension that provides access to the vectoring feature on the switch. Vectoring allows a customer to specify the treatment of incoming calls based on the dialed number.

Workstation

In general usage, a workstation, or an administrative workstation, refers to a computer running a browser with network access to the AE Server.

In terms of the AE Services Security Database (SDB), a workstation is the client computer that has either a Host Name or an IP address. It is represented in the Security Database by a host name or IP address.

Worktop

An SDB term. A worktop is a Security Database entity (object) that refers to a device, or a collection of devices, that are associated with the host name or IP address of a workstation. A worktop can consist of a client telephone (the worktop's primary device) and any number of additional telephony devices (such as fax machines or modems), which are specified through the worktop's secondary device list. The telephone extension is usually the Primary Device ID attribute in the Worktop object.

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