# Avaya Aura® Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide

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http://www.avaya.com/support

# Contents

# About This Document

Use this document to install the following Avaya Aura® Application Enablement Services (AE Services) clients and software development kits (SDKs):

- Telephony Services Application Programming Interface (TSAPI)
- CVLAN (CallVisor LAN)

**Note:**
The CVLAN Client/SDK is provided for maintaining existing applications. It is not intended for new application development.

This document no longer includes information about the AE Services JTAPI SDK. For information about the JTAPI SDK, see the following document:

- *Avaya Aura® Application Enablement Services JTAPI Programmer's Guide*, 02-603488

## Intended Audiences

This document is intended for anyone who is responsible for installing AE Services TSAPI or CVLAN clients or SDKs. This document addresses two primary audiences:

- **User** - A user refers to someone who uses an AE Services TSAPI or CVLAN client along with a Computer Telephony Integration (CTI) application. Users, in this sense, are concerned with installing, removing, upgrading an AE Services TSAPI or CVLAN client, and possibly running TSAPI Test or TSAPI Spy. You install the clients only; you do not need to install the SDKs.
- **Application Developer** - An application developer refers to someone who creates or maintains a TSAPI or CVLAN based CTI application. AE Services provides you with an SDK that you can use for developing TSAPI or CVLAN based CTI applications. To develop applications that run in an AE Services/Communication Manager environment, you must install the client and the SDK.

# TSAPI and CVLAN backward compatibility

AE Services 6.1 is the first 6.x release.

## TSAPI

The TSAPI Client, Release 6.1, is compatible with the following server releases:

- AE Services Release 6.1 TSAPI Service
- AE Services Release 5.2.x TSAPI Service
- AE Services Release 4.2.x TSAPI Service

## CVLAN

The CVLAN Client, Release 6.1, is compatible with the following server releases:

- AE Services Release 6.1 CVLAN Service
- AE Services Release 5.2.x CVLAN Service
- AE Services Release 4.2.x CVLAN Service

# Conventions Used in This Document

Use this section to familiarize yourself with the conventions used in this document.

- Table 1 lists examples of typographical conventions.
- About file naming conventions provides some guidelines for working with filenames. For more information about file names, see File naming conventions on page 73.

**Table 1: Typographical conventions**

| Convention | Example | Usage |
|---|---|---|
| bold monospace | **`add station`** | Indicates a Linux-based or DOS command line interface. Bold monospace indicates that you input (type) characters exactly as depicted. |
| italic monospace in angle brackets | ***`<modname>`*** | Indicates a Linux-based or DOS command line interface. Italic monospace indicates that you input (type) an appropriate substitution for the term in italics. Angle brackets are used as visual cues, do not type them. |
| plain monospace | `Port:` | Indicates a Linux-based or DOS command line interface. Plain monospace indicates standard output from the terminal display or command prompt. |
| bold | **Start** | Indicates a Graphical User Interface (GUI). Bold can indicate the following:<br>• Mouse and keyboard selections<br>• Web page displays<br>• Text you would type in a text box or a selection you would make from a drop-down list. |
| bold italic | ***service name*** | Indicates a GUI. Bold italic indicates that you input (type) an appropriate substitution for the term in italics. |

# About file naming conventions

This document contains many instructions that include file names of the TSAPI and CVLAN client and SDK components, for example: `tsapi-client-linux-6.1-x.i386.rpm`

In most cases, build numbers in file names are expressed as *x* because build numbers change frequently (an example of an actual file name would be `tsapi-client-linux-6.1-170.i386.rpm`)

When you type a command containing a file name, substitute *x* with the actual build number. For more information about file names, see File naming conventions on page 73.

# TSAPI and CVLAN client and SDK documentation

| Title | Description |
|---|---|
| **TSAPI Client and SDK** | |
| *Avaya Aura® Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide,* 02-300543 | Use this document to install the TSAPI client and SDK. |
| *Avaya Aura® Application Enablement Services TSAPI for Avaya Communication Manager Programmer's Reference*, 02-300544 | Use this document if you are developing or maintaining a TSAPI application. It contains information about the function calls and events that the AE Services TSAPI Service supports. For example, you will need to use this document to set up your application to open a stream to the AE Services TSAPI Service and to negotiate private data. |
| *Avaya Aura® Application Enablement Services TSAPI Programmer's Reference*, 02-300545. | Use this document if you are developing or maintaining a TSAPI application, and you need information about generic TSAPI syntax. |
| **CVLAN Client and SDK** | |
| *Avaya Aura® Application Enablement Services TSAPI and CVLAN Client and SDK Installation Guide,* 02-300543 | Use this document to install the CVLAN client/SDK. |
| *Avaya Aura® Application Enablement Services CVLAN Programmer's Reference*, 02-300546 | Use this document if you are developing or maintaining a CVLAN application. It contains information about the function calls and messages that CVLAN supports. |
| *ASAI Technical Reference*, 02-300549 | Use this document if you are developing or maintaining a CVLAN application and you need more information about cause values. |
| *ASAI Protocol Reference*, 02-300550 | Use this document if you are developing or maintaining a CVLAN application and you need information about the contents of message fields or the layout of ASAI messages. |

# Customer Support

For information about contacting Avaya Customer Support, see the *Avaya Aura® Application Enablement Services Overview*, 02-300360.

# Chapter 1: Getting the files for your installation

You can download the clients and SDKs from the following Web sites:

- Avaya Product Licensing and Delivery System (PLDS) Web site
  **https://plds.avaya.com**
- Avaya Support Web site (for Avaya customers with maintenance agreements)
  **http://support.avaya.com**
- Avaya DevConnect Web site (for DevConnect members)
  **http://devconnect.avaya.com**

# Downloading software from PLDS

Use the following procedure to download the TSAPI client or the CVLAN client and SDK from the Avaya Product Licensing and Delivery System (PLDS) Web site. This procedure assumes that you are an Avaya customer and you have registered on the Avaya PLDS Web site.

**Note:**
The TSAPI client and CVLAN client and SDK are available from the Avaya PLDS Web site, but the TSAPI SDK is not. To obtain the TSAPI SDK, contact an authorized Avaya Business Partner or an Avaya Account Executive.

1. Type **https://plds.avaya.com** in your web browser to open the Product Licensing and Delivery System Web site.
2. From the LOGIN NOW page, type your email address and password, and click **SUBMIT**.
3. From the main menu on the Home page, click **Assets** > **View Downloads**.
4. From the Downloads page, with the Search by Download tab displaying, follow these steps.
   a. In the Company name field, enter your company's name.
   b. From the Application field, select **Application Enablement Services**.
   c. From the Download Type field, select **Software Downloads**.
   d. From the Version field, select the current release, **6.1**, for example.
   e. Click **Search Downloads**.
5. On the Software Downloads list, locate the appropriate download, and click **Download**.
   - **Avaya Aura Application Enablement Services 6.1 TSAPI Client Linux**
   - **Avaya Aura Application Enablement Services 6.1 TSAPI Client MS Windows**
   - **Avaya Aura Application Enablement Services 6.1 CVLAN Client Windows**
   - **Avaya Aura Application Enablement Services 6.1 CVLAN Client Linux**
6. From the About Download Manager page, click **Click to download your file now**.

**Note:**
The first time you use the Download Manager, your browser displays a Security Warning and asks if you want to install the Download Manager. Click **Install** and complete the procedure for installing the Download Manager.

7. From the Save As dialog box, which displays the file name (for example, **tsapi-client-win32-6.1-454.zip)**, browse to a folder on your file system and click **Save**. (Keep in mind that this is an example file name. The numbers following tsapi-client-win32-6.1 are subject to change.)

8. Your system displays the Avaya Download Manager window. Use this window to monitor the status of your download.

   When the status is "Finished," your file has been saved to the folder you specified in the Save As dialog box.

9. Click **Exit** to exit the Avaya Download Manager. Your browser displays the PLDS Downloads page. A check mark appears next to the software you downloaded.
10. Click **Log out** to log out of PLDS.
11. Close your browser.

### Next steps

For the Windows clients, go to the folder you specified in the Save as dialog box, and extract the .zip file.

Start the installation as directed in the following chapters. The installation instructions assume that you have downloaded (and, when necessary, extracted) the files to an appropriate directory on your file system.

- Chapter 2: Installing AE Services TSAPI clients and SDKs
- Chapter 3: Installing the AE Services CVLAN Client/SDK

# Downloading clients and SDKs from Avaya Support

Use the following procedure to download the TSAPI client from the Avaya Support Web site.This procedure assumes that you are an Avaya customer and you have registered on the Avaya Support Web site.

**Note:**
The TSAPI client is available from the Avaya Support Site, but the TSAPI SDK is not. To obtain the TSAPI SDK, contact an authorized Avaya Business Partner or an Avaya Account Executive.

1. Log in to the Avaya Support Web site, **http://support.avaya.com**.
2. From the main menu on the Welcome to Avaya Support page, click **Downloads**.
3. Click **A-Z List** on the bottom of the dialog box.
4. Click **A**.
5. Click **Avaya Aura Application Enablement Services**.
6. Click **Downloads**.
7. On the Downloads page, click the appropriate download.
   - **Avaya Aura Application Enablement Services TSAPI Client MS Windows 6.1**
   - **Avaya Aura Application Enablement Services TSAPI Client Linux 6.1**
   - **Avaya Aura Application Enablement Services CVLAN Client Windows 6.1**
   - **Avaya Aura Application Enablement Services CVLAN Client Linux 6.1**
8. From the Downloads page, click the **Downloads** tab, then click the file name; for example, **tsapi-client-win32-6.1-454.zip**. (Keep in mind that this is an example of a file name. The numbers following **tsapi-client-win32-6.1** are subject to change.)

### Next steps

Save the file to your computer. For the Windows clients, extract the .zip file in a separate directory on your computer. It can be any directory on your file system.

Start the installation as directed in the following chapters. The installation instructions assume that you have downloaded (and, when necessary, extracted) the files to an appropriate directory on your file system.

- Chapter 2: Installing AE Services TSAPI clients and SDKs
- Chapter 3: Installing the AE Services CVLAN Client/SDK

# Downloading clients from Avaya DevConnect

Use the following procedure to download the TSAPI clients from the Avaya DevConnect Web site.

**Note:**
This procedure assumes that you are an Avaya DevConnect member and that you have registered on the Avaya DevConnect Web site.

**Important:**
The TSAPI client is available from the DevConnect Web site, but the TSAPI SDK is not. If you are a Gold or Platinum DevConnect member, you can order the TSAPI SDK through DevConnect. For more information, contact an authorized Avaya Business Partner or an Avaya Account Executive. The CVLAN client is not available on the Avaya DevConnect Web site.

1. Log in to the Avaya DevConnect Web site, **http://devconnect.avaya.com**
2. Click **Products and SDKs**.
3. Click **Avaya Aura Application Enablement Services**.
4. From the TSAPI SDK page, select **Avaya Aura AE Services Release 6.1 Contents: TSAPI Downloads**
5. From the Avaya Aura AE Services Release 6.1 Contents page, select the appropriate download.
   - **AE Services 6.1 TSAPI Client [Win32]**
   - **AE Services 6.1 TSAPI Client [Linux]**
6. Save the file to your computer; for example, **tsapi-client-win32-6.1-454.zip**. (Keep in mind that this is an example of a file name. The numbers following **tsapi-client-win32-6.1** are subject to change.)

### Next steps

Fo the Windows clients, extract the .zip file in a separate directory on your computer. It can be any directory on your file system.

Start the installation as directed in the following chapter. The installation instructions assume that you have downloaded (and, when necessary, extracted) the files to an appropriate directory on you file system.

- Chapter 2: Installing AE Services TSAPI clients and SDKs

# Chapter 2: Installing AE Services TSAPI clients and SDKs

This chapter describes the installation process for Avaya Aura Application Enablement Services (AE Services) Telephony Services Application Programming Interface (TSAPI) clients and software development kits (SDKs). For TSAPI applications to run in an AE Services/ Communication Manager environment, you must install the TSAPI client.

## TSAPI client and SDK operating system requirements

The AE Services TSAPI client can be installed on the following client platforms:

- Windows, see Table 2: TSAPI Windows client and SDK - operating system requirements on page 18
- Linux, see Table 3: TSAPI Linux client and SDK - hardware and software requirements on page 19
- Citrix - Avaya supports multiple Citrix clients connected to a single Citrix Server running a TSAPI Windows client application. AE Services supports Citrix Client Metaframe XPE v4.0. For more information refer to the Citrix documentation at www.citrix.com.

**Table 2: TSAPI Windows client and SDK - operating system requirements**

| Component | Requirements |
|---|---|
| CPU | Intel 8086 instruction set architecture |
| Windows 32-bit Client Platform Operating Systems | • Windows 7 Professional<br>• Windows 7 Enterprise<br>• Windows 7 Ultimate<br>• Windows XP Professional<br>• Windows 2003 Server Standard Edition |
| Windows 64-bit Client Platform Operating Systems supporting TSAPI applications running in 32-bit compatibility mode | • Windows 7 Professional<br>• Windows 7 Enterprise<br>• Windows 7 Ultimate<br>• Windows Server 2008 R2 |

**Table 3: TSAPI Linux client and SDK - hardware and software requirements**

| Component | Requirements |
|---|---|
| CPU | Intel 8086 instruction set architecture |
| Red Hat Enterprise Linux (RHEL) 32-bit Versions | • Red Hat Enterprise Linux ES v4.0 Update 6<br>• Red Hat Enterprise Linux ES v5.0 Update 3 |
| Red Hat Enterprise Linux (RHEL) 64-bit Versions supporting TSAPI applications running in 32-bit compatibility mode | • Red Hat Enterprise Linux ES v5.0 Update 3 |

**Note:**

Before installing the TSAPI Linux Client on a Red Hat Linux ES v5.0 system, you may need to perform a separate installation of the following RPM:

openssl097a-0.9.7a-9.el5_4.2.i386.rpm

This RPM may be available with your Red Hat Linux installation media and is also available for download at http://rpm.pbone.net.

# Gathering Pre-Installation Data

Before you install the TSAPI client, obtain the following information:

- IP address or Host Name of the AE Server from the AE Services administrator
- whether the TSAPI links are encrypted and, if so, whether the default CA certificate is being used for encryption. If the TSAPI links are encrypted, and the default CA certificate is not being used, you will need to supply and configure the appropriate CA certificate on the client.
- whether alternate TSAPI links are administered. If alternate TSAPI links are administered, you should configure the alternate Tlinks after the installation.

## If you do not have the host name or IP address

If you do not have the Host name or IP address of the AE Server, you can still install the client. Follow the installation procedure (Installing the TSAPI Windows client on page 20), and at Step 7 complete the **AE Services Server Configuration** dialog box as follows.

In the **Host Name or IP Address** field, type a place holder, such as **myserver** or **1.2.3.4** and accept the default port number. The setup program issues a Warning dialog when you click **Add to List** or **Next**, but it lets you continue with the installation.

After installation, when you get a valid host name or IP address, you will need to edit the tslib.ini file and add the appropriate host name or IP address for the AE Server. For more information, see Editing the TSAPI Windows client configuration file (tslib.ini) on page 25.

# Installing and Configuring the TSAPI Windows Client

## Installing the TSAPI Windows client

Use the following procedure to install the TSAPI Windows client.

**Note:**

Use the network drive based installation procedure if you need to install a significant number of TSAPI Windows clients. For information about network-based installation and setting up configuration files (tslib.ini), see Network-based installations for the TSAPI Windows client on page 33.

**Important:**
Make sure you have completed the instructions for downloading the installation files and saving them to your computer. See Chapter 1: Getting the files for your installation.

1. Log on to your computer as a user with administrator-equivalent permissions.
2. Go to the directory that contains the TSAPI Windows client files that you downloaded, and double-click **Setup.exe**.

   Setup displays the Welcome dialog box.
3. Click **Next**.

   Setup searches for any older versions of the TSAPI client.

   - If Setup detects the Avaya CT TS Win32 client, it issues the following warning “The Avaya CT Win 32 Client needs to be uninstalled before the installation can continue.” When you click **OK**, the installation program exits. For information about uninstalling the Avaya CT client, see Removing the TSAPI Windows client on page 24.
   - If Setup detects an earlier version of the Avaya Application Enablement Services TSAPI client, it displays a dialog box with the message "Setup has detected an older version of the Avaya Application Enablement Services TSAPI Client on your system. This version needs to be removed before the installation can continue. Would you like Setup to remove this version for your now?"

     Click **Yes** to have Setup remove the earlier version of the TSAPI client software for you automatically. Your exsiting TSAPI client configuration settings will be preserved.

   After completing the search, Setup displays the **Choose Destination Location** dialog box.
4. Click **Next** to accept the default destination folder: C:\Program Files\Avaya\AE Services\TSAPI Client.

   Setup displays the **AE Services Server Configuration** dialog box.
5. Complete the **AE Services Server Configuration** dialog box.

   The information you specify in this dialog box is saved in the tslib.ini file. If you do not have this information, see If you do not have the host name or IP address on page 20.

   a. In the **Host Name or IP Address** field type a valid host name or IP address of the AE Server, for example:

      **192.168.123.44** (IP address)

      **aeserver1** or **aeserver.company.com** (host name)

   b. In the **Port Number** field, accept the default **450**. If your installation uses more than one AE Server, click **Add to List**.

      You can repeat substeps a and b to add multiple host names or IP addresses to the **Configured AE Services Servers** list box.

**Note:**
If Setup detects a previously installed TSAPI client or a previous tslib.ini file, it will display the list of previously configured AE Servers (along with the default port) in the **Configured AE Services Servers** dialog box. If you are re-using any of the same AE Servers from the list, you can click **Next** to proceed. Otherwise, you can delete the AE Servers that are not required.

c. Click **Next**.

Setup displays the Ready to Install the Program dialog box.

6. Click **Install** to begin the installation.

Setup displays the **Setup Status** dialog box as it installs files, and then displays the **Installation Complete** dialog box.

7. From the **Installation Complete** dialog box, click **Finish**.

Setup exits.

This completes the procedure to install the TSAPI Windows client. Your next step is to verify that the components in your configuration can communicate. See Verifying the TSAPI Windows client installation on page 23.

## Accessing the TSAPI Windows client desktop components

After you have installed the TSAPI Windows client, use the Start menu to access AE Services TSAPI Windows client components.

- Click **Start** > **Programs** > **Avaya AE Services** > **TSAPI Client**, and select any of the following:
  - **Edit TSLIB.INI** - When you select **Edit TSLIB.INI**, Windows opens the tslib.ini file. For more information about editing this file, see Editing the TSAPI Windows client configuration file (tslib.ini) on page 25
  - **TSAPI Spy** - When you select **TSAPI Spy**, Windows opens the TSAPI Spy application. TSAPI Spy is a client message tracing application that allows you to see the flow of messages through the Telephony Services client library. For more information, see TSAPI Spy - a Windows client message tracing tool on page 75.
  - **TSAPI Test** - When you select **TSAPI Test**, Windows opens the TSAPI Test application. The TSAPI Test application allows you to test your TSAPI Client installation by opening a stream and making a call.
  - **TSAPI Client Readme** - When you select **TSAPI Client Readme,** Windows opens the TSAPI Windows Client Readme file. Review the Readme file for information about this release of the TSAPI Windows client.
  - **OpenSSL License** - When you select **OpenSSL License**, Windows opens the OpenSSL License file. Open the OpenSSL License file to review the terms of the license.

- **Apache Software Foundation License** - When you select **Apache Software Foundation License**, Windows opens the Apache Software Foundation License file. The TSAPI Spy application includes software developed by the Apache Software Foundation.
- **Apache Software Foundation Notice** - When you select **Apache Software Foundation Notice**, Windows opens the Apache Software Foundation Notice file. This file describes the software components developed by the Apache Software Foundation that are included with the TSAPI Spy application.

## Verifying the TSAPI Windows client installation

After you have installed the TSAPI Windows client, use TSAPI Test to verify that the components in your configuration can communicate.

Follow this procedure to run the TSAPI Test application.

1. Click **Start > Programs** > **Avaya AE Services** > **TSAPI Client** > **TSAPI Test**.

   AE Services displays the TSAPI Test Application dialog box.

2. Complete the TSAPI Test Application dialog box as follows:

   a. In the **Server** field, select the tlink that corresponds to the AE Services server and Avaya Communication Manager that you want to test. Tlinks are names that the TSAPI Service assigns to the TSAPI CTI links between the AE Server and Communication Manager.

   b. In the **User** field, type your CT User user ID.

**Note:**
A CT User is a person or an application administered in the AE Services User database with the "CT User" field set to "yes." CT User authorization is controlled by the AE Services Security Database.

   c. In the **Password** field, type your CT User password.

   d. In the **From** field, under Make Telephone Call, type a phone number that is administered in Avaya Communication Manager.

**Note:**
If the Security Database is enabled for the TSAPI Service, the CT User entered in step 2b must have permission in the AE Services Security Database to control this phone number.

   e. In the **To** field, under Make Telephone Call, type a second phone number that is administered in Avaya Communication Manager.

f. Click **Dial**.

If the call is successful TSAPI Test displays a message box with the following message:

Call Successfully originated. Dismiss this message box to terminate call.

**Note:**
If the call is not successful, TSAPI Test displays a message box with a message that indicates the reason for failure. See Using TSAPI Spy while running TSAPI Test.

g. Click **Close** to exit TSAPI Test.

This completes the procedure to verify the TSAPI Windows client installation

## Using TSAPI Spy while running TSAPI Test

If your call fails while you are running TSAPI Test, use TSAPI Spy to monitor the activity between the AE Server and the client running TSAPI Test. For more information about TSAPI Spy, see Appendix C: TSAPI client message tracing.

Follow this procedure to monitor your call with TSAPI Spy.

1. Click **Start** > **Programs** > **Avaya AE Services** > **TSAPI Client** > **TSAPI Spy**.

   AE Services displays the TSAPI Spy dialog box.

2. Perform the procedure Verifying the TSAPI Windows client installation and monitor the activity between the AE Services TSAPI Service and TSAPI Test.

## Removing the TSAPI Windows client

Use the following procedure to remove either the TSAPI Windows client or the Avaya CT Windows client.

**Note:**
If you are upgrading from the Avaya Computer Telephony TS Win32 client, you must remove it before you can install the AE Services TSAPI Windows client.

1. Click **Start** > **Settings** > **Control Panel**.
2. From the Control Panel, click **Add or Remove Programs**.

   Windows displays the **Add or Remove Programs** dialog box.

3. Select **Avaya Application Enablement Services TSAPI Client**, and click **Remove**. (Select **Avaya Computer Telephony TS Win32 Client** if you are removing the Avaya CT Win32 Client.)

   A confirmation dialog box appears.

4. Click **Yes**.

   Setup uninstalls the software, and displays the Uninstall Complete dialog box. (If you are removing the Avaya Computer Telephony TS Win32 client, Setup does not display the Uninstall Complete dialog box).

5. Click **Finish**.

This completes the procedure to remove the TSAPI Windows client. Note that the tslib.ini file does not get removed from the c:\Program Files\Avaya\AE Services\TSAPI Client folder.

## Upgrading the TSAPI Windows client

If you are upgrading the Avaya Computer Telephony (Avaya CT) TSAPI Windows (TS Win32) client to the Avaya Application Enablement Services TSAPI Windows client, follow this procedure.

1. Remove the Avaya CT TS Win32 client. See Removing the TSAPI Windows client on page 24.
2. Install the latest version of the client (see Procedure to install the Installing the TSAPI Windows client on page 20).

## Editing the TSAPI Windows client configuration file (tslib.ini)

You can customize the behavior of TSAPI Windows clients by editing the TSAPI client configuration files. The tslib.ini file is a file that contains configuration information for the TSAPI client. It is installed with the Windows TSAPI client. If you accept the default destination location during installation, tslib.ini is located in: C:\Program Files\Avaya\AE Services\TSAPI Client. You can open the file by clicking **Start** > **Programs > Avaya AE Services > TSAPI Client** > **Edit TSLIB.INI**.

The configuration file is organized into several sections. Before you edit the configuration, read through the following list to familiarize yourself with the contents of each section.

- **`[Telephony Servers]`-** When you install the TSAPI Client and complete the AE Services Server Configuration dialog box, AE Services adds the host name or IP address to the **`[Telephony Servers]`** section of the tslib.ini file.

  You can edit **`[Telephony Servers]`** to change the Host Name or IP address and the port number of the AE Server or to create entries for additional AE Servers. Each entry must be in the following format (spaces are not valid in host names): ***`hostname=port_number`*** or ***`IPaddress=port_number`***. For example: **`aeserver.domain.com=450`** or **`192.168.123.44=450`**

  **Note:**
  If you use a firewall, see Administering port settings for a firewall on page 48.

- **[Config] -** If you are using secure (encrypted) TSAPI links, use this section to specify where the certificate for your trusted Certificate Authority (CA) is stored. This section only applies if your AE Services Server is not using the default certificate and you are not using the predefined location (aesCerts.cer) for your CA certificates. If you are not sure whether you need to use this section, see About Specifying the location of certificates (tslib.ini) **on page 29**. If you do plan to set up the **[Config]** section, see Adding Certificate Configuration statements to the tslib.ini file **on page 30**.
- **[Alternate Tlinks] -** Use this section if you want your TSAPI Windows clients to use the Alternate Tlinks feature. See Specifying Alternate Tlinks for the TSAPI Windows client on page 27.
- **[Shared Admin] -** Use this section when you want to use a pointer to a server-based tslib.ini file. See Installing the next client: sharing a single tslib.ini file among clients **on page 36**.

## Specifying Alternate Tlinks for the TSAPI Windows client

The Alternate Tlinks feature allows the TSAPI client library to select an alternate Tlink if the preferred Tlink is unavailable when trying to establish a session. To put this feature into effect, you must specify the alternate Tlinks in the TSAPI Configuration file. For a brief description of Tlinks, see About TSAPI Links (Tlinks) on page 48.

> **Important:**
> When multiple AE Servers are used as alternates, the CT User user ID and password used by the application should be configured identically on each AE Server.

Follow these steps to set up a list of alternate Tlinks in the tslib.ini file. You are essentially adding statements that specify a list of alternate Tlinks for the TSAPI Service.

1. Click **Start** > **Programs > Avaya AE Services > TSAPI Client** > **Edit TSLIB.INI**. to open the tslib.ini file.
2. Locate the line **[Alternate Tlinks]** in the tslib.ini file, or add this line to the end of the file if it is not present. This line is required if you want your TSAPI Windows clients to use the Alternate Tlinks feature.
3. Following the **[Alternate Tlinks]** line, add a list of alternate Tlink entries.

   **Alternates(*TLINK*)=*TLINK1*:*TLINK2*:*TLINK3*:*TLINK4***

*where:*

- **Alternates** is the label for the first ordered list (you can have up to 16 lists)
- **(*TLINK*)** is the name of the preferred Tlink, for example (AVAYA#CM1#CSTA#AESRV1). Be sure to enclose the preferred Tlink name in parentheses.
- **=** The equal sign is a separator between the preferred Tlink, and the list of 1 to 4 alternate Tlinks. You must use the equal sign (**=**) to separate the preferred Tlink and the list of alternate Tlinks.
- ***TLINK1*:*TLINK2*:*TLINK3*:*T*LINK4** is an ordered list of Tlink names that are used as alternates if the preferred Tlink is not available. Be sure to separate each Tlink name with a colon. You can specify from 1 to 4 Tlinks as alternates for the preferred Tlink.

### Examples

In Example 1, there are two AE Servers, AESRV1 and AESRV2, that each have a TSAPI link to the same switch, CM1. When opening a stream, if AESERV1 is unavailable, the TSAPI client will attempt to use AESRV2 instead of AESRV1.

*Example 1*

**Alternates(AVAYA#CM1#CSTA#AESRV1)=AVAYA#CM1#CSTA#AESRV2**

In Example 2, there are four AE Servers that each have a TSAPI link to the same switch, CM1.

When opening a stream:

- If AESRV1 is unavailable, the TSAPI client will attempt to use AESRV2 instead of AESRV1.
- If AESRV2 is also unavailable, then the TSAPI client will attempt to use AESRV3.
- If AESRV3 is also unavailable, then the TSAPI client will attempt to use AESRV4.
- If AESRV4 is also unavailable, then the TSAPI client will not be able to establish a connection with an AE server.

*Example 2*

**Alternates(AVAYA#CM1#CSTA#AESRV1)=AVAYA#CM1#CSTA#AESRV2:AVAYA#CM1#CSTA#AESRV3:AVAYA#CM1#CSTA#AESRV4**

## About Specifying the location of certificates (tslib.ini)

The TSAPI Services may be configured to provide Transport Layer Security (TLS) for encrypting links between the TSAPI client and the AE Services server. If you plan to use encrypted links, you have the option of using the Avaya Product Root Certificate Authority (CA) certificate (this is the default), or the CA certificate issued by a trusted in-house or third-party certificate authority (also referred to as your own certificate). For more information about certificates, see Appendix A: Managing certificates on page 65.

**Note:**

You do not have to add any certificate configuration settings under the following conditions:

- You do not use encrypted links, and, hence, certificates.
- You use encrypted Tlinks with the default AE Services certificate. The default AE Services certificate is signed by the Avaya Product Root Certificate Authority (CA). The certificate for the Avaya Product Root CA is installed with the TSAPI client in **<*installation-directory*>\certs\ca\avayaprca.cer**. Therefore, you do not need to configure the location of the Trusted CA File in the tslib.ini file.
- You use encrypted Tlinks with your own certificates, and you have copied the trusted CA certificate to the client computer as **<*installation-directory*>\certs\ca\aesCerts.cer**. When establishing a secure connection, the TSAPI client checks to see if you have provided this file. If so, you do not need to configure the location of the Trusted CA File in the tslib.ini file.

## Adding Certificate Configuration statements to the tslib.ini file

If you are using your own certificates, and you are not using the predefined location for storing certificates (that is, the aesCerts.cer file), you must add statements to the tslib.ini file that specify where your certificates are located. For example:

**[Config]**

**Trusted CA File=*certificate_location***

**Verify Server FQDN=*0***

*where:*

- **Trusted CA File** is the label for the file specification. The equal sign (=) is a separator between the label and the file specification.

  ***certificate_location*** is the full pathname of a file containing the certificate(s) for your trusted CA in Privacy Enhanced Mail (PEM) format.

  **C:\Program Files\Avaya\AE Services\TSAPI Client\certs\ca\ExampleCorpServCert.cer**

  Note that the specified file may contain several certificates.

- **Verify Server FQDN** is a setting that determines whether the TSAPI client verifies the Fully Qualified Domain Name (FQDN) in the Server Certificate (for added security).

  **Note:**
  This setting should be set to 0 when the AE Server is using the Avaya Product Root CA Certificate

  – If you want the client to check the certificate for the FQDN, use this setting: **Verify Server FQDN=1**.

  – If you do not want the client to check the certificate for the FQDN, use this setting: **Verify Server FQDN=0**.

**Figure 1: Sample tslib.ini file - Part 1**

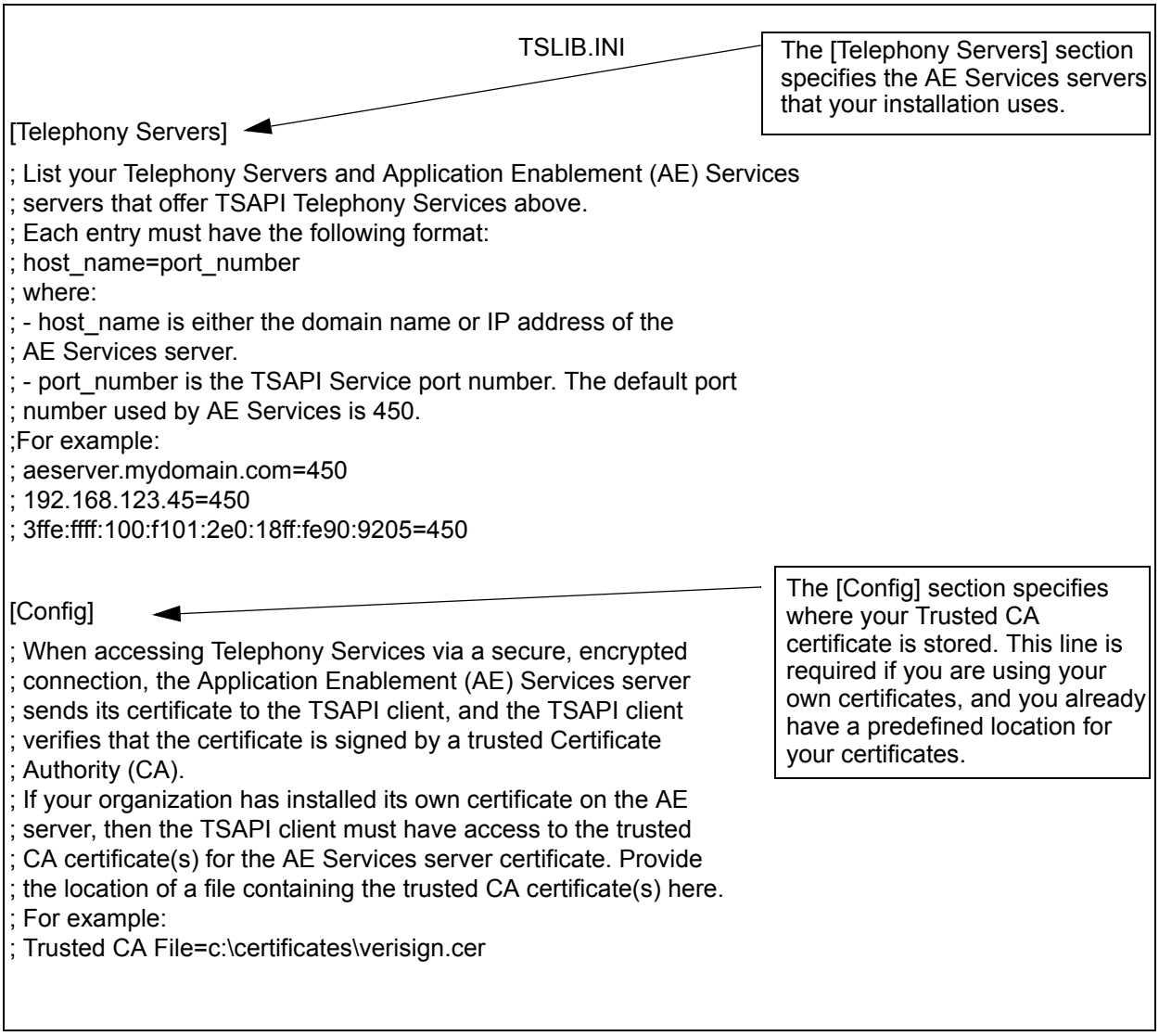
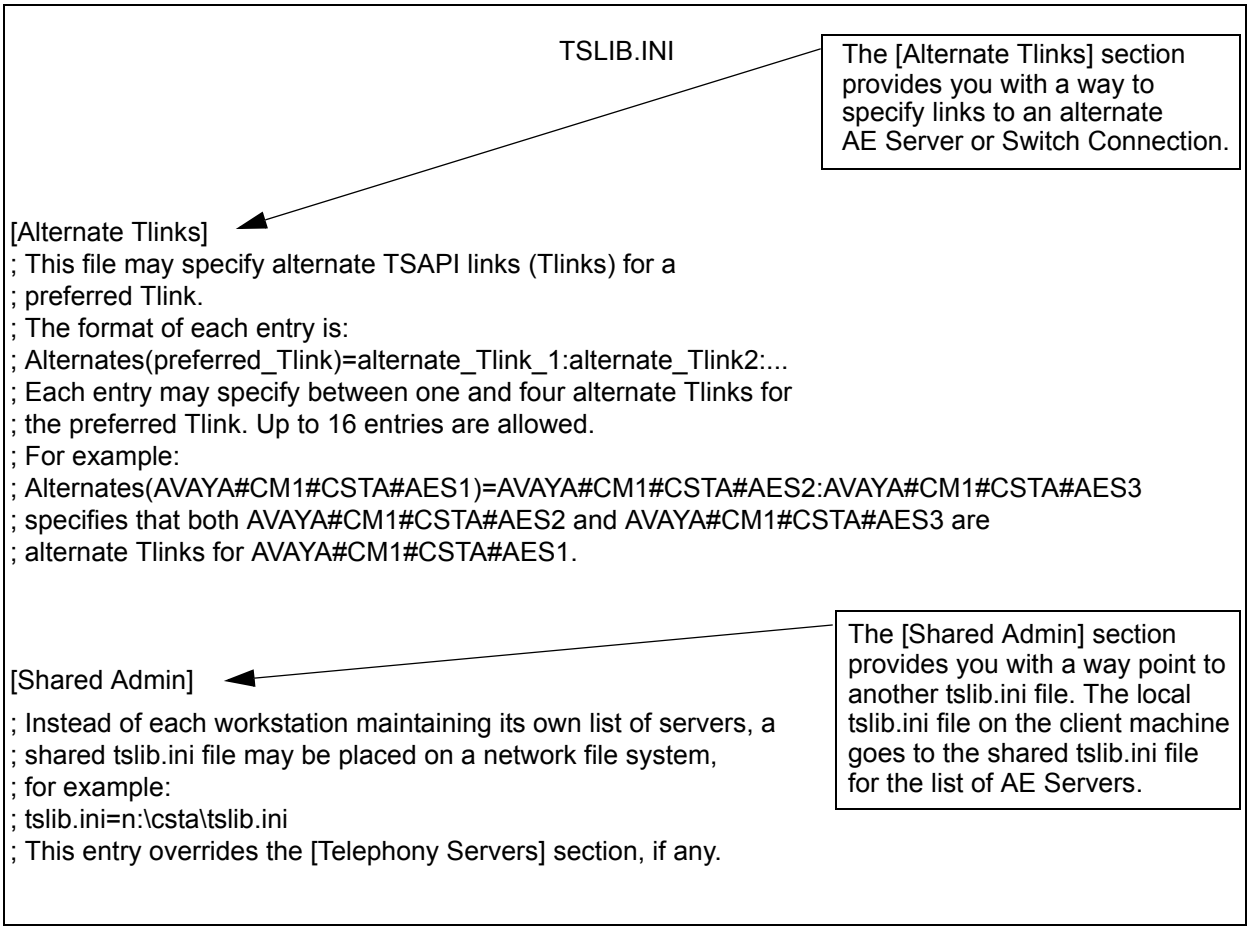


**Figure 2: Sample tslib.ini file - Part 2**



# Network-based installations for the TSAPI Windows client

This section provides two installation scenarios for network-based installation. Use the following table as your guide for the installation scenario that you want to use.

| **Scenario 1: Customizing the tslib.ini file prior to installation** | | **Scenario 2: Sharing a single tslib.ini file among clients**<br><br>**Caution:** Although this method allows you to maintain only one centrally-located configuration file, the drawback is that a single server outage could prevent all of your TSAPI clients from connecting to the AE Server. | |
|---|---|---|---|
| 1 | Copy the software and install the first TSAPI client as described in Copying the software and installing the first TSAPI client on page 34. | 1 | Copy the software and install the first TSAPI client as described in Copying the software and installing the first TSAPI client on page 34 |
| 2 | Install the next TSAPI client and all subsequent clients as described in Installing the next client: customizing the tslib.ini file prior to installation on page 35 | 2 | Install the next TSAPI client using the [Shared Admin] settings in the tslib.ini file as described in Installing the next client: sharing a single tslib.ini file among clients **on page 36** |

## Copying the software and installing the first TSAPI client

To install the Windows client software from a network drive, you must first transfer the TSAPI Windows client installation software to the network drive. Then local clients can install from the file server.

1. Create or locate a directory such as \TSAPI\Client on a network drive (you can do this remotely from a client computer, or directly from the file server).
2. Copy the files for the TSAPI Windows client installation software to the \TSAPI\Client directory on the network drive. (If the TSAPI Windows client installation software is provided as a .zip file, then extract the files from the .zip file to the \TSAPI\Client directory on the network file server.) Use Windows Explorer or the following DOS command:

   **XCOPY <*source_directory*> <*destination_directory*> /s /e**

   **Note:**
   Do not use the COPY command for this procedure. It is important to maintain the directory structure within each subdirectory.
3. [Initial client installation] On the client computer, go to the \TSAPI\Client directory on the network drive, and double-click **Setup.exe** to install the TSAPI Windows client. At this point you would follow Steps 4 through 6 of the procedure to install the TSAPI Windows client (see Installing the TSAPI Windows client on page 20). Notice that in Step 5 of the TSAPI Windows client installation procedure you are providing the Host Name or IP Address of the AE Services Server that gets added to the tslib.ini file.
4. Make any other changes to the tslib.ini file, such as specifying alternate Tlinks or configuration settings for secure Tlinks.

## Installing the next client: customizing the tslib.ini file prior to installation

Follow these steps if you want each client to have its own local copy of the tslib.ini file. Using this approach means that if there is a change that affects all of your clients (for example, the IP address of the AE Server changes), you will need to update the tslib.ini files on all your client computers individually.

1. After you have installed the TSAPI Windows client on the first client computer, copy the client's local tslib.ini file to the \TSAPI\Client directory on the network server.

   The purpose of this step is to make subsequent client installations easier. By copying the tslib.ini file to the network server, you are enabling Setup to provide the contents of the updated tslib.ini file the next time a client computer runs the Setup program.

2. **Next client installation and all subsequent clients** - From the next client computer, go to the \TSAPI\Client directory on the network drive, and double-click **Setup.exe** to install the TSAPI Windows client. This time you do not have to complete the AE Services Server Configuration dialog box. Setup will get this information from the tslib.ini file on the server. When Setup completes the installation, it will create a local tslib.ini file with the appropriate host name or IP address.

## Installing the next client: sharing a single tslib.ini file among clients

Follow these steps if you want all of your clients to share a single copy of the tslib.ini file. Using these settings means that the local tslib.ini file on each client will direct the TSAPI Windows client library to obtain the host name or IP address of the AE Services server from the shared TSLIB.INI file.

**CAUTION:**
This method allows you to maintain only one centrally-located configuration file, and the drawback is that a single server outage could prevent all of your TSAPI clients from connecting to the AE Server.

1. After you have installed the TSAPI Windows client on the first client computer, perform the following steps:
   a. Copy the client's local TSLIB.INI file to the network file server (for example, h:\TSAPI\Client\sharedtslib.ini). Do not overwrite the TSLIB.INI file in the \TSAPI\Client folder containing the TSAPI Windows client installation software.
   b. Edit the [Shared Admin] section of the client's local tslib.ini file to contain the full pathname of the shared TSLIB.INI file on the network file server. For example: tslib.ini=h:\TSAPI\Client\sharedtslib.ini (where .h:\TSAPI\Client specifies the network drive and path to the tslib.ini file on your server).

```
[Shared Admin]
; Instead of each workstation maintaining its own list of servers, a shared
; tslib.ini file may be placed on a network file system.
tslib.ini=h:\TSAPI\Client\sharedtslib.ini
```

   c. Now copy the client's local TSLIB.INI file to the \TSAPI\Client directory on the network file server, overwriting the TSLIB.INI file in the directory that contains the TSAPI Windows client installation software.
2. **Next client installation and subsequent installations** - From another client computer, go to the \TSAPI\Client directory on the network drive, and double-click **Setup.exe** to install the TSAPI Windows client. This time you do not have to complete the AE Services Server Configuration dialog box. Setup will install the updated TSLIB.INI file that points to the shared TSLIB.INI file.

# Installing and Configuring the TSAPI Linux Client

## Installing the TSAPI Linux client

Follow this procedure to install the TSAPI Linux client.

**Note:**
Make sure you have completed the instructions for downloading the installation files and saving them to your computer. See Chapter 1: Getting the files for your installation.

1. Log in to the client computer as **root**.
2. Go to the directory that contains the TSAPI Linux client files that you downloaded.
3. Install the TSAPI Linux client using the **rpm** command. For example:

   **rpm -i tsapi-client-linux-*version*-*build*.i386.rpm**

   *where:*

   - ***version*** is the current version number.
   - ***build*** is the curent build number.

   For example:

   **rpm -i tsapi-client-linux-6.1-155.i386.rpm**
4. Use the **rpm** command to verify that the Linux client is installed. For example:

   **rpm -q tsapi-client-linux**
5. The system will display the file name of the Linux client if it is installed; for example: **tsapi-client-linux-6.1-*x***

This completes the procedure to install the TSAPI Linux client. Your next step is to edit the tslibrc file. See Editing the Linux client configuration file on page 40).

# Using TSAPI Test to verify Linux client installations

To verify the TSAPI Linux client installation, use TSAPI Test to make a call.

Follow this procedure to run a TSAPI Test session for the Linux clients. See Figure 3 an example of a TSAPI Test session.

**Note:**
Before performing this procedure, you must edit the /usr/lib/tslibrc file (or the .tslibrc file in your home directory) so that it contains the host name or IP address of the AE Services server. See Making basic changes to the tslibrc file on page 41.

1. Log in as **root** to the client computer.
2. Start the TSAPI Test program by typing **`/usr/lib/tstest`** at the command prompt.
3. At the prompt to enter a server number (the range of numbers varies according to your configuration), type an appropriate number.
4. At the Server login prompt type your CT User user id.

**Note:**
A CT User is a person or an application administered in the AE Services User database with the "CT User" field set to "yes." CT User authorization is controlled by the AE Services Security Database.

5. At the Server password prompt enter your CT User password.
6. At the calling number prompt, enter a valid extension number, for example: **72412**. At the called number prompt, type another valid extension number, for example: **75587**.

   After entering all the information, TSAPI Test attempts to open a stream and make a call from the calling number to the called number. TSAPI Test indicates the results of the test. If the open stream request cannot open a stream to the server, TSAPI Test will display an error message, and TSAPI Test will terminate.

- For information about Application control services (ACS) error messages, see Appendix A: Universal Failure Events, in the *Avaya Aura® Application Enablement Services TSAPI for Avaya Communication Manager Programmer's Reference*, 02-300544.
- For information about CSTA messages see, Chapter 4 of the *Avaya Aura® Application Enablement Services TSAPI for Avaya Communication Manager Programmer's Reference*, 02-300544.

**Figure 3: Sample TSAPI Test session**

**Start the session**

```
Telephony Services
*** Make Call Test ***

Searching for Servers...

1) ATT#G3_SWITCH#CSTA#SERVER1
2) ATT#G3_SWITCH#CSTA#POOH
3) ATT#G3_SWITCH#CSTA#DAGOTTO

Enter a server number between 1 and 3 (default 1):
Server login (default admin):
Server password
CallING number: 72412
CallED number: 75587
```

**If the open stream succeeds, TSAPI Test displays the following:**

```
cstaMakeCall() succeeded!
cstaClearConnection() succeeded!
```

**If the open stream fails, TSAPI Test will display an ACS error, for example:**

```
acsOpenStream() failed with ACS Universal Failure
Error 25:
Bad password or login.
```

**If a CSTA service fails, TSAPI Test will display a CSTA error, for example:**

```
cstaMakeCall failed with CSTA Universal Failure
Error 12:
Invalid CSTA device identifier
```

# Removing the TSAPI Linux client

Follow this procedure to remove the TSAPI Linux client.

1. Log in as **root**.

2. Use the **rpm -e** command to remove the TSAPI client. For example:

   **rpm -e tsapi-client-linux**

   The RedHat package manager removes the TSAPI Linux client

3. To verify that the software has been removed, type the following command:

   **rpm -q tsapi-client-linux**

   The system responds with the following message:

   ```
   package tsapi-client-linux is not installed
   ```

This completes the procedure to remove the TSAPI Linux client.

# Upgrading the TSAPI Linux client

Follow these steps to upgrade the AE Services TSAPI Linux client.

1. Remove the previous version of the client (see Removing the TSAPI Linux client on page 39)
2. Install the latest version of the client (see Installing the TSAPI Linux client on page 37).

# Editing the Linux client configuration file

You can customize the behavior of TSAPI Linux clients by editing the TSAPI client configuration files. The TSAPI Linux client uses a configuration file called **tslibrc**, which, by default, is located in /usr/lib/tslibrc.

## Specifying the location of the tslibrc file

TSAPI Linux clients rely on the tslibrc configuration file to identify the AE Servers that are available on the network. To provide TSAPI Linux clients with access to the AE Servers, you must edit the tslibrc configuration file.

You can specify an alternate location for this file by setting and exporting the shell environment variable TSLIBRC. If the TSLIBRC variable is not set, the client library searches your $HOME directory for a file named .tslibrc. If the client library cannot locate a configuration file after looking in both TSLIBRC and .tslibrc, it looks for the file /usr/lib/tslibrc.

## Making basic changes to the tslibrc file

Follow this procedure to edit the tslibrc file.

1. Use your text editor to open the /usr/lib/tslibrc file.
2. Replace **`127.0.0.1`** with either the fully qualified domain name or the IP address of the AE Server that you want to access, and the port number you want to use (450 is the default port number for the TSAPI Service).

   *host_name* *port_number* *# comment*

*where:*

- *host_name* is an Internet domain name or IP address (spaces are not valid in host names)
- *port_number* is the TCP port for the TSAPI Service's name. If the port number is omitted, a default value of 450 is assumed.
- *# comment* is the area to the right of the pound sign for comments.

If you use a firewall, see Administering port settings for a firewall on page 48.

## Specifying Alternate Tlinks for the Linux client

The Alternate Tlinks feature allows the TSAPI client library to select an alternate Tlink if the preferred Tlink is unavailable when trying to establish a session. To put this feature into effect, you must specify the alternate Tlinks in the TSAPI Configuration file. For a brief description of Tlinks, see About TSAPI Links (Tlinks) on page 48.

**Important:**
When multiple AE Servers are used as alternates, the CT User user id and password used by the application should be configured identically for each AE Server.

Follow these steps to set up a list of alternate Tlinks in the tslib.ini file.

1. Use your text editor to open the /usr/lib/tslibrc file.
2. Add a list of alternate Tlink entries, using the following format.

   **Alternates(*TLINK*) = *TLINK1*:*TLINK2*:*TLINK3*:*TLINK4***

*where:*

- **Alternates** is the label for the first ordered list (you can have up to 16 lists)
- **(*TLINK*)** is the name of the preferred Tlink, for example (AVAYA#CM1#CSTA#AESRV1). Be sure to enclose the preferred Tlink name in parentheses.
- **=** The equal sign is a separator between the preferred Tlink, and the list of 1 to 4 alternate Tlinks. You must use the equal sign (**=**) to separate the preferred Tlink and the list of additional alternate Tlinks.
- ***TLINK1*:*TLINK2*:*TLINK3*:*T*LINK4** is an ordered list of Tlink names that are used as alternates if the preferred Tlink is not available. Be sure to separate each Tlink name with a colon. You can specify from 1 to 4 Tlinks for each list of alternates.

### Examples

In Example 1, there are two AE Servers, AESRV1 and AESRV2, that each have a TSAPI link to the same switch, CM1. When opening a stream, if AESERV1 is unavailable, the TSAPI client will attempt to use AESRV2 instead of AESRV1.

*Example 1*

**#[Alternate Tlinks]**
**Alternates(AVAYA#CM1#CSTA#AESRV1)=AVAYA#CM1#CSTA#AESRV2**

In Example 2, there are four AE Servers that each have a TSAPI link to the same switch, CM1.

When opening a stream:

- If AESRV1 is unavailable, the TSAPI client will attempt to use AESRV2 instead of AESRV1.
- If AESRV2 is also unavailable, then the TSAPI client will attempt to use AESRV3.
- If AESRV3 is also unavailable, then the TSAPI client will attempt to use AESRV4.
- If AESRV4 is also unavailable, then the TSAPI client will not be able to establish a connection with an AE server.

*Example 2*

**#[Alternate Tlinks]**
**Alternates(AVAYA#CM1#CSTA#AESRV1)=AVAYA#CM1#CSTA#AESRV2:AVAYA#CM1#CSTA#AESRV3:AVAYA#CM1#CSTA#AESRV4**

## About specifying the location of certificates (tslibrc)

The TSAPI Services may be configured to provide Transport Layer Security (TLS) for encrypting data exchanged between the TSAPI client and the AE Services server. If you plan to use encrypted links, you have the option of using the Avaya Product Root Certificate Authority (CA) certificate (this is the default), or using certificates issued by a trusted in-house or third-party certificate authority (also referred to as your own certificates). For more information about certificates, see Appendix A: Managing certificates on page 65.

**Note:**

You do not have to add any configuration settings for certificates under the following conditions:

- You do not use encrypted links, and, hence, certificates.
- You use encrypted Tlinks with the default AE Services certificate. The default AE Services certificate is signed by the Avaya Product Root Certificate Authority (CA). The certificate for the Avaya Product Root CA is installed with the TSAPI Linux client in /opt/mvap/tsapi/client/certs/CA/avayaprca.pem.
- You use encrypted Tlinks with your own certificates, and you have copied the trusted CA certificate to the client computer as **/opt/mvap/tsapi/client/certs/CA/aesCerts.pem**. When establishing a secure connection, the TSAPI client checks to see if you have provided this file. If so, you do not need to configure the location of the Trusted CA File in the tslibrc file.

## Adding certificate configuration statements to the tslibrc file

If you are using your own certificates, and you are not using the predefined location for storing certificates (that is, /opt/mvap/tsapi/client/certs/CA/aesCerts.pem), you must add statements to the tslibrc file that specify where your certificates are located. For example:

**Trusted CA File=*certificate_location***

**Verify Server FQDN=*0***

*where:*

- **Trusted CA File** is the label for the file specification. The equal sign (=) is a separator between the label and the file specification.

  ***certificate_location*** is the full pathname of a file containing the certificate(s) for your trusted CA in Privacy Enhanced Mail (PEM) format. For example:

  **/opt/mvap/tsapi/clients/certs/CA/exampleCA.pem**

  Note that the specified file may contain several certificates.

- **Verify Server FQDN** is a setting that determines whether the TSAPI client verifies the Fully Qualified Domain Name (FQDN) in the Server Certificate (for added security).

**Note:**

This setting should be set to 0 when the AE Server is using the Avaya Product Root CA Certificate.

- If you want the client to check the certificate for the FQDN, use this setting: **Verify Server FQDN=1**
- If you do not want the client to check the certificate for the FQDN, use this setting: **Verify Server FQDN=0** (

  Alternatively, you could just omit this line.

**Figure 4: Editing the tslibrc file - Part 1**

```
# /usr/lib/tslibrc - Linux Telephony Services Library Configuration File
# Blank lines and text beginning with "#" are ignored.
#
# [Telephony Servers]
#
# List your Telephony Servers and Application Enablement (AE) Services
# servers that offer TSAPI Telephony Services below.
#
# Each entry must have the following format:
#
# host_name [port_number]
#
# where:
#
# - host_name is either the domain name or IP address of the AE Services
#   server.
# - port_number is the TSAPI Service port number.  The default port number
#   used by AE Services is 450.
#
# For example:
#
# aeserver.mydomain.com 450                    # host name example
# 192.168.123.45        450                    # IPv4 address example
# 3ffe:ffff:100:f101:2e0:18ff:fe90:9205 450    # IPv6 address example
#
# Edit the following entry to use the actual host name or IP address of
# your AE Services server.

127.0.0.1               450                    # Edit this entry

# [Config]
#
# When accessing Telephony Services via a secure, encrypted connection,
# the Application Enablement (AE) Services server sends its certificate
# to the TSAPI client, and the TSAPI client verifies that the certificate # is signed by
a trusted Certificate Authority (CA).
#
# If your organization has installed its own certificate on the AE
# Server, then the TSAPI client must have access to the trusted CA
# certificate(s) for the AE Services server certificate.  Provide the
# location of a file containing the trusted CA certificate(s) here.
# For example:
#
# Trusted CA File=/usr/local/ssl/certs/verisign.pem
```

**Figure 5: Editing the tslibrc file - Part 2**

```
# [Alternate Tlinks]
#
# This file may specify alternate TSAPI links (Tlinks) for a preferred
# Tlink.
#
# The format of each entry is:
#
# Alternates(preferred_Tlink)=alternate_Tlink_1:alternate_Tlink_2:...
#
# Each entry may specify between one and four alternate Tlinks for the
# preferred Tlink.  Up to 16 entries are allowed.
#
# For example:
#
# Alternates(AVAYA#CM1#CSTA#AES1)=AVAYA#CM1#CSTA#AES2:AVAYA#CM1#CSTA#AES3
#
# specifies that both AVAYA#CM1#CSTA#AES2 and AVAYA#CM1#CSTA#AES3 are
# alternate Tlinks for AVAYA#CM1#CSTA#AES1.

# Individual users may override the contents of this file by setting
# the TSLIBRC environment variable to the pathname of an alternate file
# (in this same format) or by creating a ".tslibrc" file in their $HOME
# directory.
```

# About TSAPI Links (Tlinks)

A TSAPI Link (Tlink) represents the availability of the TSAPI Service for a particular switch connection by way of a particular AE Server. The AE Services administrator creates a Tlink by adding a TSAPI Link (**AE Services** > **TSAPI** > **TSAPI Links**). A Tlink name has the following format:

AVAYA*#switch_connection_name#service_type#AE-server-name*

*where:*

- **AVAYA** indicates that the TSAPI Service is provided by Avaya.
- *switch_connection_name* represents the Switch Connection name. The AE Services administrator determines the switch connection name when he/she administers a Switch Connection in AE Services OAM.
- *service_type* refers to the CSTA service type. It can be either of the following:
  - CSTA - If theTSAPI Link is administered as unencrypted (nonsecure).
  - CSTA-S - If the TSAPI Link is administered as encrypted (secure).
- *AE_server_name* is the name of the AE Server providing the TSAPI Service for the switch connection. The AE Server name is assigned by the person who performs the AE Services installation.

**Example**

**AVAYA#CM1#CSTA-S#AESRV1**

# Administering port settings for a firewall

If you use a firewall, make sure that the address in the TSLIB.INI or tslibrc configuration file uses the externally facing IP address of your firewall instead of the IP address of the AE Server.

# Installing and Managing the TSAPI Windows SDK

## The AE Services TSAPI SDK and the programming environment

AE Services recommends that you install the TSAPI client when you install the TSAPI SDK. The TSAPI client provides the run-time libraries that are necessary for running your application in the AE Services-Communication Manager environment, and it provides tools for verifying the installation. Also, if you plan to use the TSAPI Exerciser, you must install the TSAPI Windows client.

**Note:**
The TSAPI Exerciser is available for the TSAPI Windows client only.

After you install the AE Services TSAPI client and SDK for your particular operating system, see the *Avaya Aura® Application Enablement Services TSAPI for Communication Manager Programmer's Reference*, 02-3005444, for information about using the SDK components.

## How to obtain the TSAPI SDK

The TSAPI SDK must be purchased. If you are a customer, contact an authorized Avaya Business Partner or an Avaya Account Executive to obtain the TSAPI SDK. If you are a Gold or Platinum DevConnect member, you can order the TSAPI SDK through DevConnect.

## Installing the TSAPI Windows SDK

Follow this procedure to install the TSAPI Windows SDK.

**Note:**
For information about obtaining the TSAPI SDK, see How to obtain the TSAPI SDK on page 49.

1. Log on to your computer as a user with administrator-equivalent permissions.
2. Insert the TSAPI SDK CD into your computer's CD-ROM drive.
3. From the toolbar, click **Start** > **Run**.
4. In the Run window, type the drive ID of your CD-ROM drive (for example, **D:**), and click **OK**.
5. From the window displaying the files on the CD, navigate to the sdk\Windows folder, open the file **tsapi-sdk-win32-6.1-*build*.zip**, and double-click **Setup.exe**.

   Setup displays the Welcome dialog box.

6. Click **Next**.

   Setup searches for any previously installed files.

   - If Setup detects the Avaya Computer Telephony version of the SDK, it issues the following warning and stops the installation: "The Avaya CT SDK needs to be uninstalled before the installation can continue. For more information about uninstalling the Avaya CT SDK, see Removing the TSAPI Windows SDK on page 51.
   - If Setup detects an earlier version of the Avaya Application Enablement Services TSAPI SDK, it displays a dialog box with the message: "Setup has detected an older version of the Avaya Application Enablement Services TSAPI SDK on your system. This version needs to be removed before the installation can continue. Would you like Setup to remove this version for you now?

     Click **Yes** to have Setup remove the earlier version of the TSAPI SDK software for you automatically.

   Setup displays the **License Agreement** dialog box.

7. Carefully review the license agreement, select **I accept the terms of the license agreement**, and then click **Next**.

   Setup displays the **Choose Destination Location** dialog box with the default destination folder C:\Program Fles\Avaya\AE Services\SDKs\TSAPI .

8. Click **Next**.

   Setup displays the **Select Features** dialog box with all of the TSAPI SDK Components selected by default: **Headers and Libraries**, **Sample Code**, and **TSAPI Exerciser**.

9. Click **Next**.

   Setup displays the **Ready to Install the Program** dialog box

10. Click **Install** .

    Setup installs the files. When it has finished installing files, Setup displays the **InstallShield Wizard Complete** dialog box.

11. Click **Finish**.

This completes the procedure to install the Windows TSAPI Windows SDK. Continue with Viewing the TSAPI Windows SDK Components to learn about the TSAPI SDK.

## Viewing the TSAPI Windows SDK Components

To view the TSAPI Windows SDK components click **Start** > **Programs** > **Avaya AE Services** > **SDKs** > **TSAPI** and select any of the following components.

- **Explore Sample Code** - When you select **Explore Sample Code**, Windows displays the Samples directory which includes additional directories that contain coding examples for developing applications. For more information about Sample Code, see “Contents of the TSAPI SDK,” in Chapter 2 of the *Avaya Aura® Application Enablement Services TSAPI for Communication Manager Programmer’s Reference*, 02-300544.
- **Read Me** - When you select **Read Me**, Windows displays the TSAPI Windows SDK Readme file, which contains late-breaking information that might be not included in the documentation.
- **TSAPI Exerciser** - When you select **TSAPI Exerciser**, Windows opens the TSAPI Exerciser. The TSAPI Exerciser is an application that enables you to send CSTA requests across a TSAPI CTI link and view the exchange of messages between the TSAPI Exerciser and the AE Server. For more information about using the TSAPI Exerciser, see TSAPI Exerciser Help, which is included with the TSAPI Exerciser.
- **TSAPI Exerciser Scripting Instructions** - When you select TSAPI Exerciser Scripting Instructions, Windows opens a PDF file that describes the TSAPI Exerciser script integrator.

## Removing the TSAPI Windows SDK

Use the standard Windows procedure to remove either the TSAPI Windows SDK or the Avaya CT Windows SDK.

1. From the desktop, open the Control Panel. For example, click **Start** > **Settings** > **Control Panel**.
2. From the Control Panel, click **Add or Remove Programs**.

   Windows displays the **Add or Remove Programs** dialog box.
3. Select **Avaya Application Enablement Services TSAPI SDK**, and click **Remove**. (Select **Avaya Computer Telephony TS Win32 SDK** if you are removing the Avaya CT Win32 SDK.)

   A confirmation dialog box appears.
4. Click **Yes**.

   Setup uninstalls the software, and displays the Uninstall Complete dialog box. (If you are removing the Avaya Computer Telephony TS Win32 SDK, Setup does not display the Uninstall Complete dialog box).
5. Click **Finish**.

This completes the procedure to remove the TSAPI Windows SDK.

# Upgrading the TSAPI Windows SDK

If you are upgrading the Avaya Computer Telephony (Avaya CT) TSAPI Windows (Win32) SDK to the Avaya Application Enablement Services TSAPI Windows SDK, follow this procedure.

1. Remove the Avaya CT TS Win32 SDK. See Removing the TSAPI Windows SDK on page 51.
2. Remove the Avaya CT TS Win32 client. See Removing the TSAPI Windows client on page 24. This step is necessary because the Avaya CT Windows SDK installed the Windows client (TS Win32) by default.
3. Install the AE Services TSAPI Windows client. See Installing the TSAPI Windows client on page 20.
4. Install the AE Services TSAPI Windows SDK. See Installing the TSAPI Windows SDK on page 49.

# Installing and Managing the TSAPI Linux SDK

## Installing the TSAPI Linux SDK

Follow this procedure to install the TSAPI Linux SDK.

**Note:**
For information about obtaining the TSAPI SDK, see How to obtain the TSAPI SDK on page 49.

1. Log in to the computer where you are installing the SDK as **root**.
2. Insert the TSAPI SDK CD into your computer's CD-ROM drive.
3. Type **mount /mnt/cdrom/** to mount the file system.
4. Type **cd /mnt/cdrom/sdk/Linux** to change to the directory containing the TSAPI Linux SDK .rpm file.
5. Install the TSAPI Linux SDK using the **rpm** command:

   **rpm -i tsapi-sdk-linux-*version-build*.i386.rpm**

   *where:*

   - **version** is the current version number.
   - **build** is the current build number.

   For example:

   **rpm -i tsapi-sdk-linux-6.1-155.i386.rpm**
6. Use the rpm command to verify that the TSAPI Linux SDK is installed. For example:

   **rpm -q tsapi-sdk-linux**

   The system will display the file name of the TSAPI Linux SDK if it is installed; for example:

   **tsapi-sdk-linux-6.1-155.i386.rpm**

This completes the procedure to install the TSAPI Linux SDK.

## Removing the TSAPI Linux SDK

Follow this procedure to remove the TSAPI Linux SDK.

1. Log in as **root**.

2. Use the **rpm -e** command to remove the TSAPI Linux SDK. For example:

   **rpm -e tsapi-sdk-linux**

   The Red Hat package manager removes the TSAPI Linux SDK.

3. To verify that the software has been removed, type the following command:

   **rpm -q tsapi-sdk-linux**

   The system responds with the following message:

   ```
   package tsapi-sdk-linux is not installed
   ```

This completes the procedure to remove the TSAPI Linux SDK.

## Upgrading the TSAPI Linux SDK

Follow these steps to upgrade the AE Services TSAPI Linux SDK.

1. Remove the previous version of the SDK (see Removing the TSAPI Linux SDK on page 53).
2. If a previous version of the TSAPI Linux client is installed, remove the previous version of the client (see Removing the TSAPI Linux client on page 39).
3. Install the latest version of the TSAPI Linux client (see Installing the TSAPI Linux client on page 37.
4. Install the latest version of the SDK (see Installing the TSAPI Linux SDK on page 53).

# Chapter 3: Installing the AE Services CVLAN Client/SDK

The Avaya Aura Application Enablement Services CVLAN Client/SDK, which can be installed on a client workstation, provides client computers with remote access to Communication Manager third-party call control capabilities. Access is provided by the CVLAN Service running on an AE Services Server (referred to as the AE Server).

The CVLAN Client and the CVLAN Software Development Kit (referred to in this document as the CVLAN Client/SDK) are packaged together.

**Note:**
The CVLAN Client/SDK is provided for maintaining existing applications. It is not intended for new application development.

## The CVLAN Client

The CVLAN client provides the runtime libraries (cvlancli.dll for Windows-based systems, and libcvlancli.so for Linux-based systems) that are required by CVLAN applications.

## CVLAN client and certificate management

The CVLAN client/SDKs uses the OpenSSL mechanism of a trusted certificate directory that contains a Privacy Enhanced Mail (PEM) file for the Avaya Root CA certificate. AE Services provides a directory structure for the trusted certificates, and the Avaya Product Root Certificate is installed as follows:

- Windows CVLAN clients: Avaya Product Root Certificate is installed in the following location: **<*installation-directory*>\certs\ca\avayaprca.cer**
- Linux CVLAN client: **/usr/adm/cvlan/certs/CA/avayaprca.pem.**

If you use certificates issued by a trusted in-house or third-party certificate authority (also referred to as your own certificates), you may overwrite this file with your trusted CA certificate.

# The CVLAN SDK

The CVLAN SDK provides additional software for developing and maintaining CVLAN based applications. The CVLAN SDK contains the following components for developing or updating your applications:

- CVLAN client (cvlancli.dll for Windows based systems and libcvlancli.so for Linux systems)
- header files
- sample code
- scripts
- utilities

For information about developing and maintaining CVLAN applications, see the *Avaya Aura*® *Application Enablement Services CVLAN Programmer's Reference*, 02-300546.

## CVLAN client connections with AE Services

CVLAN application programs use the asai_open() function to specify connections to the AE Server.

Use the **asai_open()** function in your program to specify a non-secure connection for port number 9999 and a secure connection for any other port number. For more information, see the *Avaya Aura*® *Application Enablement Services CVLAN Programmer's Reference*, 02300546. See **asai_open (3ASAI)**.

The **asai_open_port()** API call allows your program to specify a specific port number in the port_number parameter and to explicitly indicate whether the connection is secure. For more information, see *Avaya Aura*® *Application Enablement Services CVLAN Programmer's Reference*, 02300546. See asai_open_port (3ASAI).

# CVLAN Client/SDK requirements

The AE Services CVLAN Client/SDK can be installed on the following client platforms.

- Windows - for more information, see Table 4: CVLAN Windows Client/SDK - hardware and software requirements on page 57
- Linux - for more information, see Table 5: CVLAN Linux Client/SDK - hardware and software requirements on page 57

**Table 4: CVLAN Windows Client/SDK - hardware and software requirements**

| Component | Requirements |
|---|---|
| CPU | Intel 8086 instruction set architecture |
| Windows 32-bit Client Platform Operating Systems | • Windows 7 Professional<br>• Windows 7 Enterprise<br>• Windows 7 Ultimate<br>• Windows XP Professional<br>• Windows 2003 Server Standard Edition |
| Windows 64-bit Client Platform Operating Systems supporting TSAPI applications running in 32-bit compatibility mode | • Windows 7 Professional<br>• Windows 7 Enterprise<br>• Windows 7 Ultimate<br>• Windows Server 2008 R2 |

**Table 5: CVLAN Linux Client/SDK - hardware and software requirements**

| Component | Requirements |
|---|---|
| CPU | Intel 8086 instruction set architecture |
| Red Hat Enterprise Linux (RHEL) 32-bit Versions | Red Hat Enterprise Linux ES v5.0 Update 3 |
| Red Hat Enterprise Linux (RHEL) 64-bit Versions supporting CVLAN applications running in 32-bit compatibility mode | Red Hat Enterprise Linux ES v5.0 Update 3 |

Before installing this release of the CVLAN Linux Client on a Red Hat Linux ES v5.0 system, you may need to perform a separate installation of the following RPM:

**openssl097a-0.9.7a-9.el5_4.2.i386.rpm**

This RPM may be available with your Red Hat Linux installation media and is also available for download at http://rpm.pbone.net.

# Installing the CVLAN Windows Client/SDK

Follow this procedure to install the CVLAN Windows Client/SDK on a Windows workstation.

**Important:**
Make sure you have completed the instructions for downloading the installation files and saving them to your computer. See Chapter 1: Getting the files for your installation.

1. Log on to your computer as a user with administrator-equivalent permissions.
2. Go to the directory that contains the CVLAN Windows client/SDK files that you downloaded, and double-click **Setup.exe**.

   Setup displays the Welcome dialog box.
3. Click **Next**.

   Setup displays the **License Agreement** dialog box.
4. Carefully review the license agreement, select **I accept the terms of the license agreement**, and then click **Next**.

   Setup displays the **Choose Destination Location** dialog box with the default destination folder C:\Program Fles\Avaya\AE Services\CVLAN .
5. Click **Next**.

   Setup displays the **Ready to Install the Program** dialog box
6. Click **Install** .

   Setup installs the files. Next, Setup displays a Question box asking if you want to view the Readme file now.
7. Click **Yes**. to view the Readme file. After reviewing the Readme file, either close the file or minimize the display.

   Setup displays the **InstallShield Wizard Complete** dialog box.
8. Click **Finish**.

Continue with Using the ASAI test utility on page 63.

# Removing the CVLAN Windows Client/SDK

Follow this procedure to remove the CVLAN Windows Client/SDK.

1. From the desktop click **Start** > **Settings** > **Control Panel**.
2. From the Control Panel, click **Add/Remove Programs**.

   Windows displays the **Add/Remove Programs Properties** dialog box.
3. Select **Avaya Application Enablement Services CVLAN Client**, and click **Remove**.

   A confirmation dialog box appears.
4. Click **Yes**.

   The uninstall program removes the software and displays an Information box indicating that the program and all of its components have been removed.
5. Click **Finish**.

This completes the procedure to remove the CVLAN Windows Client/SDK.

# Upgrading the CVLAN Windows Client/SDK

If you are upgrading a previous CVLAN Windows client the recommended steps are as follows:

1. Remove the previous version of the Client/SDK. See Removing the CVLAN Windows Client/SDK on page 60)
2. Install the latest version of the Client/SDK. See Installing the CVLAN Windows Client/SDK on page 59).

Although it is not a requirement that you remove the previous version of the Client/SDK, it is strongly recommended.

# Installing the CVLAN Linux Client/SDK

Follow this procedure to install the CVLAN Linux Client/SDK.

**Note:**
Make sure you have completed the instructions for downloading the installation files and saving them to your computer. See Chapter 1: Getting the files for your installation.

1. Log in to the computer where you are installing the CVLAN Linux client/SDK as **root**.
2. Go to the directory that contains the CVLAN Linux client/SDK files that you downloaded.
3. Install the CVLAN Linux client/SDK using the **rpm** command. For example:

   **rpm -i cvlan-client-linux-6.1-*x*.i386.rpm**

   where:

   ***x*** is the latest build number.
4. Use the **rpm** command to verify that the CVLAN Linux client is installed. For example:

   **rpm -q cvlan-client-linux**

   The system will display the file name of the CVLAN Linux client if it is installed; for example: **cvlan-client-6.1.0-1.linux.rpm**

This completes the procedure to install the CVLAN Linux Client/SDK.

**Note:**
Review the readme file (`/usr/adm/cvlan/readme`) for release-specific information.

- Continue with Using the ASAI test utility on page 63.

# Removing the CVLAN Linux Client/SDK

Follow this procedure to remove the CVLAN Linux Client/SDK.

1. Log in to the client computer as **root**.
2. To remove the CVLAN Linux client, type the following command:

   **rpm -e cvlan-client-linux**
3. To verify that the software has been removed, type

   **rpm -q cvlan-client-linux**

   The system responds with the following message:

   ```
   package cvlan-client-linux is not installed
   ```

This completes the procedure to remove the CVLAN Linux Client/SDK.

# Upgrading the CVLAN Linux Client/SDK

Use the following guidelines to upgrade the AE Services CVLAN Linux Client/SDK,.

1. Remove the previous version of the Client/SDK. See Removing the CVLAN Linux Client/SDK on page 62)
2. Install the latest version of the Client/SDK. See Installing the CVLAN Linux Client/SDK on page 61).

Although it is not a requirement that you remove the previous version of the Client/SDK, it is strongly recommended.

# The ASAI test utility

Use the ASAI test utility (**asai_test**) to determine if the CVLAN client and AE Server are communicating. The format of the **asai_test** command is as follows:

**<*path*> asai_test -m <*server*> <*link number*>**

where:

**<*path*>** is as follows:

- Linux systems: **/usr/adm/cvlan/bin/**
- Windows-based systems: **C:\Program Files\Avaya\AE Services\CVLAN\utils**

**-m** (machine) always use this argument

**<*server*>** is the name or IP address of the AE Server running the CVLAN Service.

**<*link number*>** is the number of the link of the AE Server running the CVLAN Service.

# Using the ASAI test utility

Follow this procedure to using the ASAI test utility.

1. At the command prompt (Linux based systems) or MS-DOS prompt (Windows), type the following command.

   Linux

   **/usr/adm/cvlan/bin/asai_test -m abcserver 2**

   where: **abcserver** is the host name or IP address of the AE Server.

   Windows

   **\Program Files\Avaya\AE Services\CVLAN\utils\asai_test -m abcserver 2**

   where: **abcserver** is the host name or IP address of the AE Server.

   If the test is successful, the CVLAN Service responds with results similar to the following:

```
=== Test for CVLAN Link 2===
Heartbeat test with switch for CVLAN Link 02 was successful
===Test Completed===
```

2. If asai_test fails, take the appropriate course of action:
   - Contact the AE Services administrator.
   - If you are authorized to perform AE Services OAM administration, continue with the following steps.
     a. Log into the AE Server, and select **Utilities > Diagnostics > AE Services > ASAI Test**.

        AE Services OAM displays the ASAI Test page.

     b. Select the link numbers you want to test with the ASAI Test utility, and click **Test**.

        OAM displays the ASAI Test Result page, which indicates the results of the test. A successful test will display the following message on the ASAI Test Result page.

        **Heartbeat test with switch for CVLAN Link 02 was successful.**

# Appendix A: Managing certificates

## An overview of certificate management for TSAPI and CVLAN clients

**Important:**
The information in this appendix applies only if you are using encrypted links.

This overview of certificate management describes the authentication method that TSAPI and CVLAN clients use, which is server authentication. Additionally it describes how to configure the TSAPI and CLVAN clients if you plan to use certificates issued by a trusted in-house or third-party certificate authority instead of using the default certificate, which the TSAPI and CVLAN installation program installs. Certificates issued by a trusted in-house or third-party certificate authority are also referred to as "your own certificates."

**Note:**
Application Enablement Services (AE Services) does not support client authentication for TSAPI and CVLAN. Client authentication refers to the AE Server authenticating a TSAPI or CVLAN client computer’s certificate.

## Server authentication

In terms of certificate management, AE Services TSAPI and CVLAN clients rely on the server authentication process. This process is the same if you use your own certificates or if you use the Avaya Product Root Certificate Authority (CA) certificate. See Figure 6: Server Authentication on page 67 for an illustration.

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

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. (Not applicable to CVLAN)

   b. If the server certificate is within its validity window.

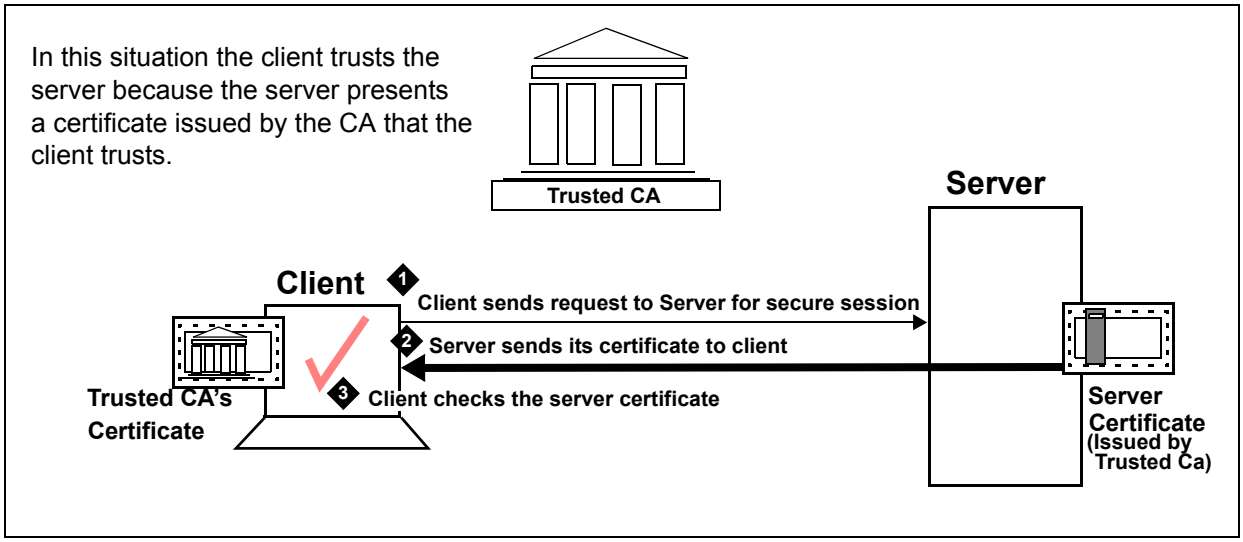
      The client checks to see if the current time falls between the Not Before and Not After dates in the server certificate.

   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. This only applies if the client has been configured with "Verify Server FQDN=1". (Not applicable to CVLAN.

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

**Figure 6: Server Authentication**



## Using the default certificate - no certificate configuration required

The AE Services license file installs a default server certificate, which is signed by the Avaya Product Certificate Authority (CA). Also, by default the AE Services client installation programs for TSAPI and CVLAN install the Avaya Product CA certificate on the client computer. See Figure 7 for an illustration.

**Important:**
If you plan to use the default certificate you do not have to perform any additional client configuration.

**Table 6: Where AE Services installs the default CA certificate**

| | |
|---|---|
| TSAPI Win32 client | C:\Program Files\Avaya\AE Services\TSAPI Client\certs\ca\avayaprca.cer |
| TSAPI Linux client | /opt/mvap/tsapi/client/certs/CA/avayaprca.pem |
| CVLAN Linux client | /usr/adm/cvlan/certs/CA/avayaprca.pem |
| CVLAN Win32 client | C:\Program Files\Avaya\CT\CVLAN\certs\ca\avayaprca.cer |

## If you use TSAPI and your own certificates -- the "default location" option

Notice in Figure 7 that frame B is labeled as the "default location" option.

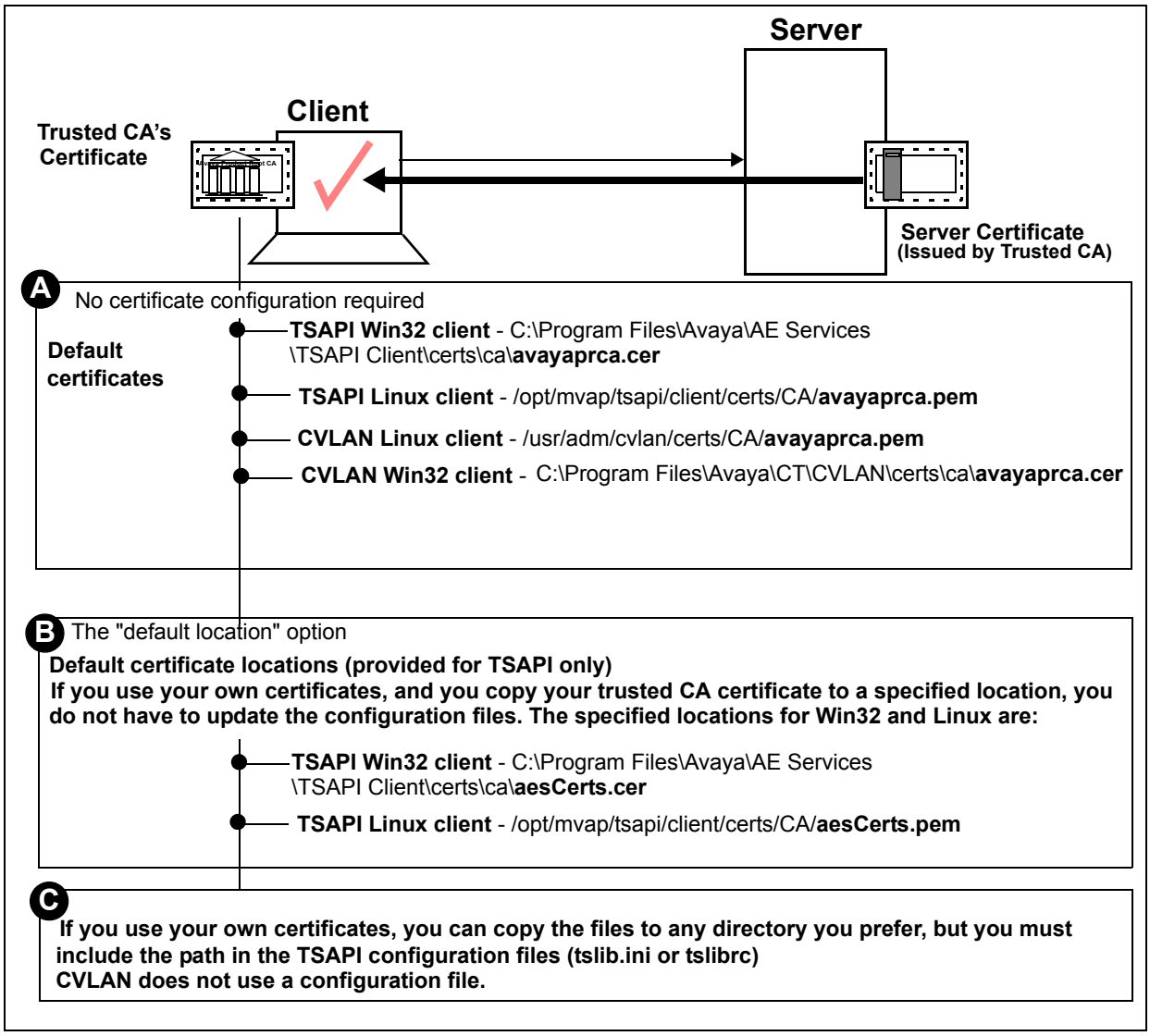
**Note:**
This option is available for TSAPI clients only.

If you use your own certificates, and you copy your certificates to a specified location, you do not have to update the configuration files (tslib.ini, for Win32 clients and tslibrc, for Linux clients). The specified locations are listed in Table 7.

**Table 7: TSAPI - if you use your own certificates: the "default location option"**

| | |
|---|---|
| TSAPI Win32 client | TSAPI Win32 client - C:\Program Files\Avaya\AE Services \TSAPI Client\certs\ca\aesCerts.cer |
| TSAPI Linux client | /opt/mvap/tsapi/client/certs/CA/aesCerts.pem |

**Figure 7: Where AE Services installs the CA certificate (per-client)**



# Using certificates issued by a trusted in-house or third-party certificate authority

If you plan to use your own certificates, as opposed to using the default Avaya certificate, familiarize yourself with the tasks described in Table 8.

**Table 8: Scenario for setting up AE Services - if you use your own certificates**

| | Task | Interface |
|---|---|---|
| **TSAPI** | | |
| 1 | Install the Trusted CA's Certificate on your client. | On the computer that the client is installed on. |
| 2 | If you are using your own certificates, and you are not using the predefined location for storing certificates, you must add statements to the configuration file that specify where your certificates are located. | Text editor - Win 32 client, tslib.ini file. See About Specifying the location of certificates (tslib.ini) on page 29. |
| | | On the computer that the client is installed on. Edit the Linux client, tslibrc file. See About specifying the location of certificates (tslibrc) on page 44. |
| **CVLAN** | | |
| 1 | Install the Trusted CA's Certificate on your client. | On the computer that the client is installed on. |
| 2 | Make sure the certificate is installed in the proper location. | On the computer that the client is installed on. See CVLAN client and certificate management on page 55. |
| 3 | Set up your application to open a connection to the AE Server. | On the computer that the client is installed on. See the AE Services CVLAN Programmer's Reference, 02300546 (asai_open and asai_open_port). |
| | | |

# AE Services certificate administration

If you are using your own certificates, the scope of both AE Services client and AE Services server administration tasks increases. To be able to use your own certificates for the AE Services TSAPI and CVLAN clients, certificate administration is required on the AE Services server.

If you are configuring TSAPI and CVLAN clients in an environment that uses certificates issued by a trusted in-house or third-party certificate authority, Table 9 provides you with a general frame of reference for the related AE Services administrative tasks.

**Table 9: Scenario for setting up TSAPI and CVLAN - if you use your own certificates**

| | Description | Notes |
|---|---|---|
| 1 | Create a server certificate request for AE Services. | See "Creating a server certificate signing request for the AE Services server" in the *Avaya Aura® Application Enablement Services Administration and Maintenance Guide, 02-30357* (AE Services Administration and Maintenance Guide). |
| 2 | Create an AE Services server certificate. | See "Creating a server certificate for AE Services" in the AE Services Administration and Maintenance Guide. |
| 3 | Import the server certificate into AE Services. | See "Importing the server certificate into AE Services" in the AE Services Administration and Maintenance Guide. |
| **TSAPI Client related administrative tasks** | | |
| 1 | Administer TSAPI links as encrypted. | See "Administering TSAPI Links" in the AE Services Administration and Maintenance Guide. |
| 2 | If you use an external directory server for client authentication and authorization, administer the Enterprise Directory Configuration settings (including enabling the LDAP-S setting). | See "Configuring AE Services to access an enterprise directory" in the AE Services Administration and Maintenance Guide. |
| **CVLAN Client related administrative tasks** | | |
| 1 | Add a CVLAN link. | See "Administering CVLAN Links" in the AE Services Administration and Maintenance Guide. |
| 2 | Add a CVLAN client. | See "Adding CVLAN Clients" in the AE Services Administration and Maintenance Guide. |
| | | |

# Appendix B: File naming conventions

The following file naming convention provides you with a convenient way of interpreting the file names of AE Services deliverables. This naming convention is not a formal standard, it is simply a guideline for reading file names.

***<api>- <type>- <target>- <version> - <build> [.<platform>] .<suffix>***

***Where:***

| | |
|---|---|
| ***<api-name>-*** | Refers to the name of the API. For example, **tsapi** or **cvlan** |
| ***<type>-*** | Refers to the type of deliverable. Can be **client-** , **sdk-** ,or **client-sdk** (for ISOs). |
| ***<target>*** | Refers to the name of the operating system. |
| ***<version>*** | Refers to the software version. |
| ***- <build>*** | Refers to the software build number, preceded by a dash.<br>**Note:** This number changes frequently. It is often represented in this document by ***x*** instead of an actual build number. |
| **[*.platform*]** | Refers to a platform designation. An optional field, currently used for Linux rpms only. |
| ***.<suffix>*** . | Refers to the file or package type. |

**Examples**

- TSAPI Windows client - **tsapi-client-win32-6.1-170.zip**
- TSAPI Linux client - **tsapi-client-linux-6.1-170.i386.rpm**
- TSAPI Windows SDK - **tsapi-sdk-win32-6.1-170.zip**
- CVLAN Windows client - **cvlan-client-win32-6.1-70.zip**
- CVLAN Linux client - **cvlan-client-linux-6.1-70.i386.rpm**

Table 10 applies the naming convention to the AE Services deliverables.

### Table 10: AE Services TSAPI and CVLAN software deliverables -- file names

| <*api*>- | <*type*>- | <*target*>- | <*version*> | -<*build*>[1] | [.<*platform*>] | .<*suffix*> |
|---|---|---|---|---|---|---|
| tsapi- | client- | linux- | 6.1 | -170 | .i386 | .rpm |
| tsapi- | client- | win32- | 6.1 | -170 | n/a | .zip |
| tsapi- | sdk- | linux- | 6.1 | -170 | .i386 | .rpm |
| tsapi- | sdk- | win32- | 6.1 | -170 | n/a | .zip |
| cvlan- | client- | linux- | 6.1 | -70 | n/a | .rpm |
| cvlan- | client- | win32- | 6.1 | -70 | n/a | .zip |

1. Build numbers change frequently. These numbers are provided as examples only.

# Appendix C: TSAPI client message tracing

## TSAPI Spy - a Windows client message tracing tool

The TSAPI Client includes TSAPI Spy, a client message tracing application that lets you see the flow of messages through the client TSAPI Library (TSLIB). TSAPI Spy traces messages as they enter and leave the library in both directions: from application(s) to the TSAPI Service; from the TSAPI Service to application(s). This section includes the following topics:

# Overview of the TSAPI Spy for Windows interface

Use this section to familiarize yourself with the TSAPI Spy for Windows interface.

- Read Table 11 and Table 12 for an operational summary of TSAPI Spy.

### Table 11: Summary of TSAPI Spy main window

| | |
|---|---|
| **Tracing...** | • Enabled - the default setting. When Tracing is enabled, message tracing information is displayed in the two display areas of the TSAPI Spy main window.<br>• Disabled - Select Disabled to disable message tracing. Tracing can be disabled at any time while TSAPI Spy is running. If you disable tracing, and then exit TSAPI Spy (File > Exit), the next time you start TSAPI Spy, it will be Disabled. |
| **Open Streams (+)** | Indicates the number of streams currently open from the TSLIB to all telephony servers. This number is updated in real time as applications open and close connections. |
| **Closed Streams (-):** | Indicates the number of streams previously open from the TSLIB to all AE Servers, but which are now closed. This number is updated in real time as applications close streams. |
| **Streams list** (white background) - displays information about currently and previously open connections from the TSLIB to all telephony servers. For more information see, Working with the streams list on page 81. | |
| • **Handle:** | The internal ID for a stream. All the message lines in the trace file are prefixed with the handle of the connection to which the message belongs. The handle is generated by the TSLIB. Currently open connections are indicated with a "+" prefix on the Handle. Streams that were previously open but are now closed are indicated with a "-" prefix on the Handle |
| • **Server ID** | The Tlink to which this connection has been opened. This information is provided to the TSLIB by the application when a request is made to open a connection. |
| • **Appl** | The name of the application that has opened this connection. This information is provided to the TSLIB by the application when a request is made to open a connection. |
| • **Login** | The login ID under which the application has opened this connection. Multiple applications may be opened under the same or different login IDs at a single client. This information is provided to the TSLIB by the application when a request is made to open a connection. |
| **Output** display window (grey background) - displays the trace output in real time as messages are passed through TSLIB. This output window can display approximately 30,000 characters of trace history. Once the output limit has been reached, the oldest trace information is deleted in favor of the newer trace information. For long trace outputs, it is recommended that the trace be logged to a file. For more information, see Using the Log to File option to direct output to a trace file on page 78. | |
| **Trace file status**<br>This line, below the Output window, indicates whether the Log To File option has been selected, and tracing. The default is "**No trace file**." When file logging is active, this line indicates the file name (with full path) and file size. | |

### Table 12: TSAPI Spy Menu Options

| | |
|---|---|
| **File**: | • **Exit** - Use menu item is used to exit TSAPI Spy. The system menu may also be used to exit the application. |
| **Edit:** | • **Copy** - copies the selected text (if any) from the Output window onto the Clipboard. The text is then available to be pasted into any application of your choosing. If no text is selected in the Output window, this menu item is grayed and disabled.<br>• **Clear Buffer** - clears out the contents of the Output window. Once this is done, the original contents are lost (the data is NOT copied to the Clipboard).<br>• **Select All** - selects all of the text in the Output window. The Copy menu item can then be used.<br>• **Purge Closed Streams** - deletes all closed connections (indicated with a "-" prefix) from the streams list and resets the Closed Streams count to 0, leaving only currently open connections in the Streams List. |
| **Options**<br>All options, except **Auto-Trace New Streams**, are disabled by default. | • **Always On Top** - causes the TSAPI Spy window to be topmost on the screen display.This setting is disabled by default (a check mark does not appear next to it).<br>• **Auto-Trace New Streams** - causes newly opened connections (which open after TSAPI Spy is started) to be traced automatically. This option is described in more detail in Working with the streams list on page 81. This setting is enabled by default (a check mark appears next to it).<br>• **Show Internal Events** - causes non-application messages to be traced. The majority of messages normally traced through the CSTA32.DLL are application-to-telephony server and telephony server-to-application messages. There are, however, a small number of messages that the TSLIB generates to facilitate application/telephony server communications.This setting is disabled by default (a check mark does not appear next to it).<br>• **Log To File** - causes all trace messages to be logged to a file specified by the user. See Using the Log to File option to direct output to a trace file on page 78. This setting is disabled by default (a check mark does not appear next to it). |

## Using the Log to File option to direct output to a trace file

The TSAPI Spy application allows you to trace the TSAPI messages exchanged by the TSAPI Windows client library and the TSAPI Service. The trace output is displayed in the main window, but you may also direct the trace output to a file by enabling the "Log to File" option.

Prior to Release 5.2, this option created a single log file that would grow without bound. Beginning with Release 5.2, you can limit the amount of disk space used by the TSAPI Spy "Log to File" option:

Within the TSAPI Spy "Log to File" dialog box, set the check box for "Use Multiple Trace Files". Then adjust the values for "Maximum Number of Trace Files to Create" and "Maximum Size for Each Trace File" based on your preferences.

Each time the trace file reaches its maximum size, the trace file will "roll over". This means that if messages are being logged to file tsapispy.trc, then the first time the trace file rolls over, that file is renamed as tsapispy.trc.1 and a new tsapispy.trc file is created to receive additional log output.

To generalize, if the Trace File Name is tsapispy.trc and the "Maximum Number of Trace Files to Create" is some value n, then each time the tsapispy.trc file reaches the maximum size:

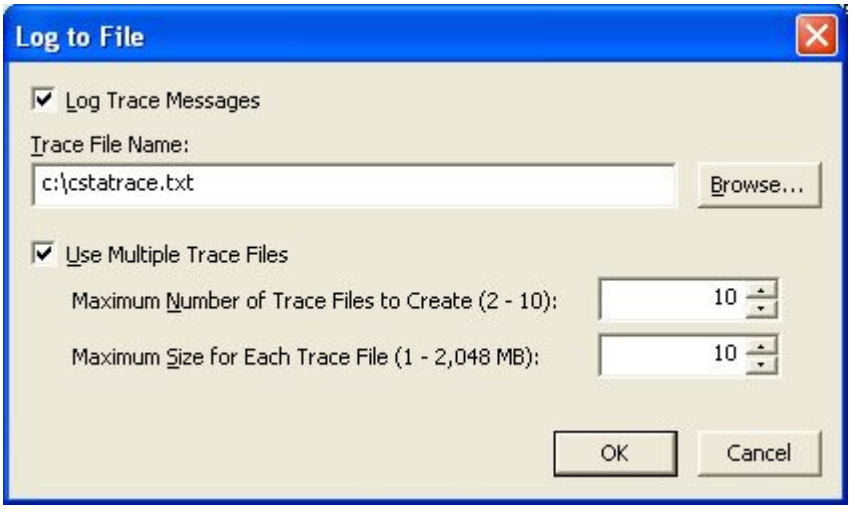
- The file tsapispy.trc.n is removed.
- Any trace files (tsapispy.trc.1, tsapispy.trc.2, ..., tsapispy.trc.n-1) that exist are renamed as (tsapispy.trc.2, tsapispy.trc.3, ..., tsapispy.trc.n).
- The file tsapispy.trc is renamed tsapispy.trc.1.
- A new tsapispy.trc file is created to receive additional log output.

## Procedure for creating a trace file

Follow this procedure to create a trace file.

1. Click **Start** > **Programs** > **Avaya AE Services** >**TSAPI Client** >**TSAPI Spy**. Windows displays the TSAPI Spy for Win32 window.
2. From the Telephony Services Spy for Win32 window, select **Options** > **Log To File...** .

   Windows displays the **Log to File** dialog box.




3. Follow these steps to complete the **Create Trace File** dialog box:
   a. Accept the default for Log Trace Messages (enabled).
   b. In the Trace File Name field, type a name for the trace file (for example, c:\cstatrace.txt), or, choose a location by clicking **Browse**.

      The default extension assigned to trace files is .trc, but you can use any filename and extension.
   c. If you would like the trace messages to be logged to a single file that grows without bound, clear the check box for Use Multiple Trace Files and click **OK**.

      **Important:**
      Use this option with care to avoid using excessive disk space.
   d. If you would like to control the amount of disk space consumed by the trace files, set the check box for **Use Multiple Trace Files**. Then adjust the values for "Maximum Number of Trace Files to Create" and "Maximum Size for Each Trace File" based on your preferences and click **OK**.

### Turning off Log to File

When you want to stop TSAPI Spy from writing output to the trace file, follow this procedure.

1. Select **Options** > **Log To File** (the Log to File option will have a check mark).
2. Uncheck the **Log Trace Messages** check box.

   All of the options become disabled.
3. Click **OK**.

   TSAPI Spy displays an information box that prompts you to confirm that you want to close the trace file.
4. Click **OK**.

   TSAPI Spy closes the trace file.

## Working with the streams list

When you first start TSAPI Spy, **Tracing** and **Auto-Trace New Streams** are enabled by default. When **Tracing** is enabled, all connections that are currently open are traced. When **Auto-Trace New Stream** is enabled, tracing is enabled when a new connection is opened.

To indicate that tracing is enabled for a connection (or connections), TSAPI Spy highlights the connection displayed in the streams list.

To disable tracing for a connection, click the connection (you can click more that one connection at a time) in the streams list. TSAPI Spy disables tracing for the connection you selected, and removes the highlighting to indicate that tracing is disabled.

- To disable Tracing for all streams, select the **Disabled** option button.
- To disable Auto-Trace New Streams, select **Options** > **Auto-Trace New Streams.** When you clear the check mark for **Auto-Trace New Streams,** tracing is not enabled for a new connection when it is opened.

# Understanding trace output

To understand trace output, think of the client library as a two-way pipeline, with messages entering and leaving both ends. Messages may originate or terminate in one of three places:

- the application
- the TSAPI Service
- the client library (for internal events)

The trace records track the progress of a message through the pipeline, enabling you to determine which messages have been sent and whether or not they have reached their destination.

Normally, two trace records are generated for each message: one as it enters the pipeline, and one as it exits. Messages entering and leaving the application side (or the library itself) are presented in detail, with the value of each data element displayed in an appropriate format. The corresponding trace records to/from the TSAPI Service only indicate successful transport of the message across the network.

## TSAPI Spy Trace Records

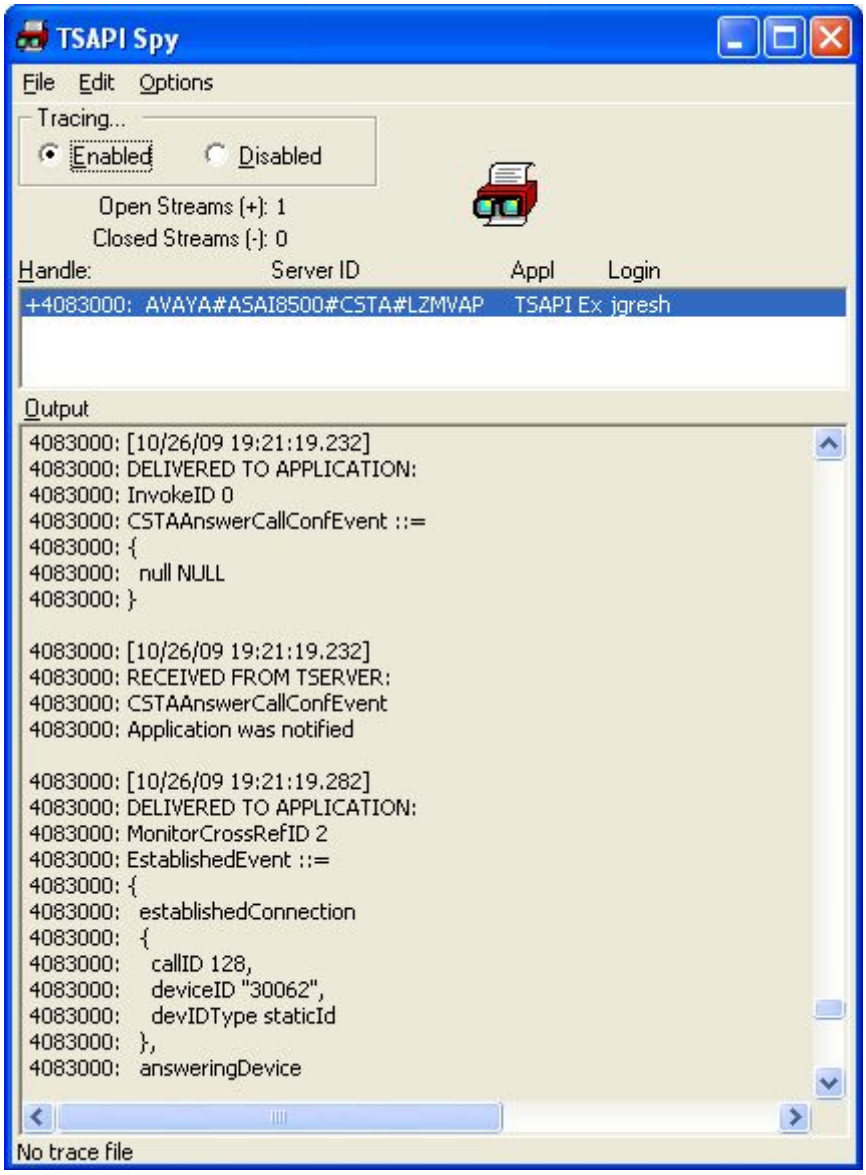
Trace records displayed in the Output window (or trace file) are separated by blank lines. Each begins with a time stamp and one of the following phrases which describes the record:

- RECEIVED FROM APPLICATION - the application has generated a message to be delivered to the TSAPI Service. The message is displayed in detail.
- DELIVERED TO TSERVER - the TSAPI Service has acknowledged receipt of the message. Notification only.
- RECEIVED FROM TSERVER - a message from the TSAPI Service has arrived in the client library receive queue. Notification only.
- DELIVERED TO APPLICATION - the application has accepted the message from the client library. The message is displayed in detail.
- FROM LIBRARY - the client library has generated an internal message to be delivered to the TSAPI Service. The message is displayed in detail.
- FOR LIBRARY - the client library has accepted an internal message from the TSAPI Service. The message is displayed in detail.

A typical request from an application generates four trace records, in the following sequence: DELIVERED TO TSERVER, RECEIVED FROM APPLICATION, RECEIVED FROM TSERVER, DELIVERED TO APPLICATION. An event report from the TSAPI Service generates only the latter two records. Trace records from multiple messages may be interleaved.

Figure 8 shows a portion of the trace output resulting from a cstaMakeCall request:

**Figure 8: Trace Output sample display**



## TSAPI Spy Error Records

Certain network errors are also reported by TSAPI Spy. These reports are displayed in the following form:

- CONNECTION TERMINATED BY TSERVER (condition code = xxxx)

  where xxxx is a numerical error code in hexadecimal notation. The most common error codes reported are:

  - 2745 (this means the connection is aborted)
  - 2746 (the connection has been reset)
  - 2742 (the network is down)
- CONNECTION TERMINATED BY CLIENT LIBRARY (condition code = 0), which indicates that the client has detected a loss of connectivity with the AE Services server

Other codes are possible under unusual conditions. Report the code to technical support when you request assistance.

# Client message tracing for Linux-based TSAPI clients

For Linux-based clients, the message tracing ability is built into the shared client library file (libcsta.so). The tracing capability allows a user to log the flow of messages through applications using the TSAPI Linux clients.

Messages are traced as they enter and leave the library in both directions: from applications to the TSAPI Service and from the TSAPI Service to applications. Trace messages are written directly to a file specified by the user. Message tracing is performed on an application-by-application basis, according to each application's environment settings.

## How to enable message tracing

Release 5.2 of the AE Services TSAPI Linux client enhanced the TSAPI Message Tracing feature. This feature allows you to capture the flow of TSAPI messages through the TSAPI client library. The messages are logged in a text file.

To enable the TSAPI Message Tracing feature, set and export the environment variable CSTATRACE before starting your TSAPI application. The CSTATRACE environment variable specifies the name of the file where the TSAPI messages will be logged.

Beginning with Release 5.2 of the AE Services TSAPI Linux client, you can control the amount of disk space used by the TSAPI Message Tracing feature by setting and exporting the following additional environment variables:

- CSTATRACE_MAX_FILE_INDEX - This environment variable controls the number of TSAPI trace files that will be created.

  Each time the trace file reaches its maximum size (see CSTATRACE_MAX_FILE_SIZE, described below), the trace file will "roll over". This means that if messages are being logged to file cstatrace, then the first time the trace file rolls over, that file is renamed as cstatrace.1 and a new cstatrace file is created to receive additional log output.

  To generalize, if messages are being logged to file cstatrace and CSTATRACE_MAX_FILE_INDEX is set to some value n, then each time the cstatrace file reaches its maximum size:

  - The file cstatrace.n is removed.
  - Any trace files (cstatrace.1, cstatrace.2, ..., cstatrace.n-1) that exist are renamed as (cstatrace.2, cstatrace.3, ..., cstatrace.n).
  - The file cstatrace is renamed cstatrace.1.
  - A new cstatrace file is created to receive additional log output.

  In effect, the number of TSAPI trace files that may be created is limited to CSTATRACE_MAX_FILE_INDEX + 1.

  Valid values for CSTATRACE_MAX_FILE_INDEX are 1-9. If CSTATRACE_MAX_FILE_SIZE is set but CSTATRACE_MAX_FILE_INDEX is not set, then CSTATRACE_MAX_FILE_INDEX defaults to 9.

- CSTATRACE_MAX_FILE_SIZE - This environment variable controls the maximum size of each TSAPI trace file.

  Valid values for CSTATRACE_MAX_FILE_SIZE are 1-10000 (MB). If CSTATRACE_MAX_FILE_INDEX is set but CSTATRACE_MAX_FILE_SIZE is not set, then CSTATRACE_MAX_FILE_SIZE defaults to 10 (MB).

  When neither CSTATRACE_MAX_FILE_INDEX nor CSTATRACE_MAX_FILE_SIZE is set, then messages will be logged to a single file that grows without bound. Use caution when collecting TSAPI trace messages this way to avoid using excessive disk space.

  Also, note that the TSAPI Message Tracing feature is provided for troubleshooting purposes only. Enabling this feature will degrade the performance of the TSAPI Linux client library.

## Examining trace files

Figure 9 depicts sample output from a tracing session started by setting CSTATRACE. The number that appears at the beginning of each line is the ACS handle for the stream.

**Figure 9: Sample output from CSTA Trace**

```
                                                :
00722aa0: [10/26/09 19:26:44.444]
00722aa0: RECEIVED FROM APPLICATION:
00722aa0: InvokeID 00000002
00722aa0: ACSOpenStream ::=
00722aa0: {
00722aa0:   streamType stCsta,
00722aa0:   serverID "AVAYA#SCORPION#CSTA#LZMVAP244",
00722aa0:   loginID "jgresh",
00722aa0:   cryptPass '3A2578E343C2F56B95B84571FBF0F56B95 ...'H,
00722aa0:   applicationName "TSTEST",
00722aa0:   level acsLevel1,
00722aa0:   apiVer "TS1-2",
00722aa0:   libVer "AES6.1.0 Build 415",
00722aa0:   tsrvVer ""
00722aa0: }

00722aa0: [10/26/09 19:26:44.451]
00722aa0: DELIVERED TO APPLICATION:
00722aa0: InvokeID 00000002
00722aa0: ACSOpenStreamConfEvent ::=
00722aa0: {
00722aa0:   apiVer "ST2",
00722aa0:   libVer "AES6.1.0 Build 415",
00722aa0:   tsrvVer "6.1.0 Build 415",
00722aa0:   drvrVer "6.1.0 Build 415"
00722aa0: }


00722aa0: [10/26/09 19:26:44.452]
00722aa0: RECEIVED FROM APPLICATION:
00722aa0: InvokeID 00000003
00722aa0: CSTAMakeCall ::=
00722aa0: {
00722aa0:   callingDevice "32201",
00722aa0:   calledDevice "32202"
00722aa0: }
00722aa0: [10/26/09 19:26:44.599]
00722aa0: DELIVERED TO APPLICATION:
00722aa0: InvokeID 00000003
00722aa0: CSTAMakeCallConfEvent ::=
00722aa0: {
00722aa0:   newCall
00722aa0:   {
00722aa0:     callID 2261,
00722aa0:     deviceID "32201",
00722aa0:     devIDType staticId
00722aa0:   }
00722aa0: }
```

# Glossary

| | |
|---|---|
| **API** | Application Programming Interface. An API is a published specification that describes how to access the functions of a software-based service. |
| **ASAI** | Adjunct Switch Application Interface - ASAI is a protocol that enables software applications to access call processing capabilities provided by Avaya Communication Manager. |
| **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. |
| **Computer Telephony Integration** | Abbreviated as CTI. 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. All services running on the AE server (TSAPI, CVLAN, DLG, and DMCC) are CTI services. |
| **CTI** | Computer Telephony Integration. CTI is the use of computers to manage telephone calls. |
| **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 (JTAPI and the Telephony Web Service use TSAPI links). When an OAM Web page, such as TSAPI Service Summary, displays a column heading for a CTI link type, it is referring to TSAPI link as it is administered on Communication Manager. Up to 64 links can be administered on Communication Manager. |

| | |
|---|---|
| **CT User** | Computer Telephony User. A user (or an application) administered in the AE Services User Service 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 Device, Media and Call Control users who use the Call Control Services (CSTA III Single-Step Conference, Snapshot Call, and Snapshot Device). |
| **CVLAN** | CallVisor/LAN - CallVisor/LAN is a C programming API based on the ASAI message set. |
| **JTAPI** | Java Telephony Application Programming Interface. JTAPI is a scalable, extensible API integrating both first-party and third-party call control models. The AE Services JTAPI implementation 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. For information about JTAPI, see the *Avaya Aura® Application Enablement Services JTAPI Programmer's Guide*, 02-603488. |
| **Link** | A communications channel between system components. |
| **Operations, Administration, and Maintenance** | Abbreviated as OAM. The administrative interface for the Application Enablement Services platform. |
| **PEM** | Privacy Enhanced Mail - A file format for storing private keys, public keys, and certificates. A PEM file may contain either personal certificates or certificates from a Certificate Authority. |
| **Private Data** | Private data is a switch-specific software implementation that provides value added services. |
| **Routing** | 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. |

| | |
|---|---|
| **SDK** | Software Development Kit. An SDK is a package that enables a programmer to develop applications for a specific platform. Typically, an SDK includes one or more APIs, documentation, and, in some cases, programming tools. |
| **Tlink** | A Tlink is a service identifier that is created when the administrator adds a TSAPI Link in AE Services OAM. A Tlink refers to a switch connection between a specific switch and a specific AE Server. |
| **TLS** | Transport Layer Security. TLS is a protocol intended to secure and authenticate communications across public networks through data encryption. TLS is an enhancement to SSL version 3, and is a proposed Internet Standard. |
| **TSAPI** | Telephony Services API. TSAPI is a C- language based API for third-party call and device control, and based on CSTA standards. |

# Index