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Avaya Aura® Application Enablement Services

Device, Media, and Call Control SDKs, Including the DMCC Dashboard Tool

Device, Media, and Call Control (DMCC) is one of the services provided by Avaya Aura® Application Enablement (AE) Services. The DMCC service enables access to Avaya Aura Communication Manager first and third party call control capabilities via Java and .NET APIs, and an XML protocol description. Software Development Kits (SDKs) are provided for each of these interfaces to the DMCC service. The SDKs provide tools developers need to create applications that include first party device and media control, and basic third party call control.

- **The DMCC service is resident on** Application Enablement Services

- **The DMCC service enables applications to** access the device, media and basic third-party call control capabilities of Communication Manager as an access server

- **AE Services provides Java and .NET APIs, and an XML protocol description** to enable applications written in various programming languages to access the DMCC service

- **Separate SDKs include tools to help** create applications that use each of the DMCC service access methods

- **The DMCC Dashboard is also** included in the DMCC .NET SDK

- **The DMCC Dashboard incorporates an intuitive GUI which allows developers to** exercise, observe and learn about the full range of DMCC capabilities supported by AE Services

About AE Services

AE Services is a software platform that provides connectivity between client applications and Communication Manager. AE Services includes an enhanced set of Application Programming Interfaces (APIs), client-side libraries, protocols, and web services that expose the capabilities of Communication Manager to application developers.

About the DMCC Service

As the name suggests, the AE Services DMCC service enables access to Communication Manager's device, media and call control functionality:

- **Device control** allows applications to manipulate and monitor the physical aspects of devices, such as buttons, lamps, the display and the ringer. UTF-8 Unicode is supported. Applications can simulate manual actions on devices and obtain the status of their physical elements.

- **Media control** allows applications to access voice stream RTP data for the purposes of recording or analysis, and to send RTP data as outgoing voice streams. The AE Services server can record and playback WAV format files

when it is managing the media stream for a device.

- **Call control** allows applications to perform basic and advanced third party call control, such as placing calls, creating conference calls, deflecting calls, reconnecting calls, and monitoring call control events.

In addition, the DMCC service provides:

- Logical Device Services which enable applications to use call forwarding and "do not disturb" capabilities.

- Snapshot Services which allow applications to obtain information about the devices participating in calls.

- Monitoring Services which allow applications to request asynchronous notification of events.

- Call Routing Services, which enable applications to act as the routing server for a specified device or for all devices within a specified switch sub-domain.

The DMCC APIs

Depending on the underlying programming language, applications interface with the DMCC service via the:

- DMCC Java API
- DMCC .NET API
- DMCC XML protocol description

Each of these DMCC service access methods enables access to the same set of Communication Manager capabilities.

The DMCC service access methods comprise an implementation of the CSTA (Computer-Supported Telecommunications Applications) III standard (ECMA 269), plus Avaya-specific extensions. The access methods are based on a client/server model, where the application is the client, and where AE Services and Communication Manager act together as the server. Thus, the DMCC service access methods allow applications:

- to request services of Communication Manager
- to request notification of asynchronous events on Communication Manager

The DMCC SDKs

AE Services provides application developers with a variety of Software Development Kits (SDKs), offering differing levels of programmatic control, protocol support, and programming language support.

The following AE Services SDKs are available for creating applications that use the DMCC service:

- AE Services DMCC Java SDK
- AE Services DMCC XML SDK
- AE Services DMCC .NET SDK

The DMCC SDKs can be downloaded free from the Avaya DevConnect web portal (registration required). You can also obtain programmer's guides and reference documentation for each of the DMCC access methods from the web portal.

DMCC Java SDK

The DMCC Java SDK provides tools Java developers need to create applications that include DMCC functionality.

The DMCC Java SDK comprises:

- Javadoc for the DMCC Java API
- DMCC Java libraries
- Sample applications

Java sample applications:

The following sample applications are included in the DMCC Java SDK:

- **Tutorial sample application** demonstrates basic DMCC call control functionality.
- **Media Stack application** demonstrates basic media control functionality.
- **TTY application** demonstrates communication with TTY applications and analog TTY/TDD devices.
- **E-mail application** logs missed calls by sending an e-mail.
- **Simple IVR application** demonstrates basic IVR functionality supported by the DMCC service.
- **Softphone application** displays a GUI of a telephone which users can use to make and receive calls.

- **Click-to-call application** keeps a call log and allows call backs. The application interfaces to an LDAP data store with a name/number lookup capability.
- **Session recovery application** demonstrates the handing-off of devices from one instance of an application to a stand-by.

What else do Java develops need?

Applications can be developed in any environment supporting Sun Microsystems™ Java 2 Platform, Standard Edition (J2SE™) 1.5 or higher.

Java developers may also wish to make use of the DMCC Dashboard tool provided with the DMCC .NET SDK to learn about the full set of capabilities of the DMCC service.

DMCC XML SDK

The DMCC XML SDK provides the tools developers need to create applications in any programming language that supports the sending and receiving of XML data over a network connection.

The AE Services DMCC XML SDK comprises:

- AE Services DMCC API XML Programmers Guide
- XML schema definition files
- Xmldoc for the XML schemas
- Sample application code

XML sample applications:

The following sample applications are included in the DMCC XML SDK:

- **XML Java application**
- **XML C# application**

Each of the XML sample applications registers an extension with Communication Manager and then exits. The code samples demonstrate the XML formatting necessary to pass messages to the DMCC service.

What else do XML developers need?

XML developers need tools to traverse XML messages, such as an XML parser. It is also recommended that developers use tools that generate code from the XSDs.

XML developers may also wish to make use of the DMCC Dashboard tool provided with the DMCC .NET SDK. The Dashboard tool can be used to observe and capture all of the XML messages exchanged between applications and the DMCC service on an AE Services server.

DMCC .NET SDK

The DMCC .NET SDK provides the tools .NET developers need to create applications that include DMCC functionality.

The AE Services .NET SDK comprises:

• The DMCC .NET API (ServiceProvider. dll file) which must be included in DMCC .NET applications

• JavaScript libraries that makes it easy to expose DMCC functionality via a Web page

• Jsdoc for the JavaScript libraries

• Documentation for the C#, Visual Basic and Visual C++ interfaces

• C# and Visual Basic code snippets for use in Visual Studio

• The DMCC Dashboard which allows users to exercise and learn the capabilities exposed by the DMCC API. See The DMCC Dashboard below for more details

• The Dashboard User Guide

• Sample applications

.NET sample applications:

The following sample applications are included in the DMCC .NET SDK:

• **Simple record application** demonstrates basic call record functionality. The source code for the application is available in C# and Visual Basic.

• **Softphone application** that runs in Internet Explorer, demonstrating how to use the DMCC .NET API in a web page and how to make a thin client application.

What else do .NET developers need?

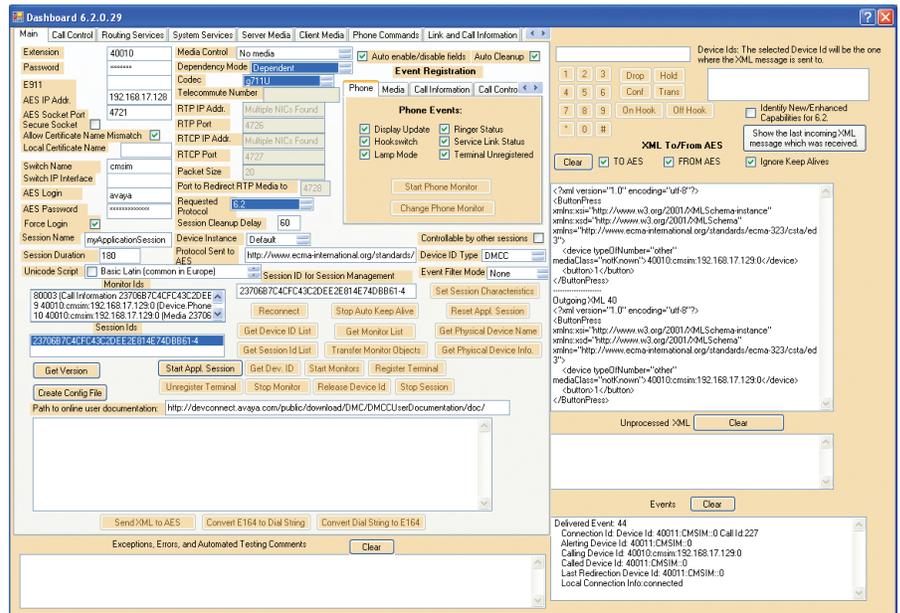Microsoft Visual Studio, set up with a reference to the ServiceProvider.dll file provided with the SDK.

Figure 1 The DMCC Dashboard GUI

The DMCC Dashboard

The DMCC Dashboard is a .NET application that allows users to exercise all the AE Services capabilities supported by the DMCC service. The DMCC Dashboard gives developers the ability to monitor the actual XML messages being sent to and from the DMCC service, without having to use a third-party tool or having to inspect the DMCC logs. In addition, developers can use the DMCC Dashboard to inject XML messages to the DMCC service and observe the results, thus simplifying the testing of applications under development.

The DMCC Dashboard is packaged with the AE Services .NET SDK, which can be downloaded from the Avaya DevConnect web portal (registration required). In addition, interim releases of the DMCC Dashboard may be available for download directly from DevConnect, giving developers early access to new features.

Although written in .NET, the DMCC Dashboard is a valuable tool for developers using any of the DMCC SDKs.

The DMCC Dashboard is provided in two versions:

• Thick client version

• Internet Explorer web browser version

Both versions have similar features and demonstrate similar DMCC capabilities.

The DMCC Dashboard GUI comprises a series of tabbed pages designed to make clear which operations are available in each of the supported media modes.

Summary of features:

• Exposes all the available functionality of the DMCC service in a single application

• Supports simple prototyping

• Tool tips provide quick information on every interface

• Ability to launch Internet Explorer and be taken directly to the DevConnect web portal for detailed information about any particular interface

• Ability to save a set of actions in a script and play it back at a later time

• Ability to monitor all XML messages going to and from the DMCC service

• Ability to send XML messages to the server

• Ability to communicate with multiple DMCC servers and devices at the same time

Communication Manager capabilities available via the DMCC Dashboard:

The following Communication Manager capabilities can be demonstrated using the DMCC Dashboard:

- First party physical device control, including: going on and off hook; dialing digits; pushing feature buttons; being notified of display, button lamp and hook switch changes, etc.

- Play WAV files to callers.

- In server media mode, record conversations to WAV files.

- Detect digits entered whilst on a call.

- Third party call control using options including Alternate Call, Answer Call, Clear Call, Clear Connection, Conference Call, Consultation Call, Deflect Call, Generate Digits, Get Third Party Device Id, Hold Call, Make Call, Reconnect Call, Retrieve Call, Single Step Conference Call, Single Step Transfer Call, Snapshot Call, Get Do Not Disturb, Get Forwarding, Set Display, Set Do Not Disturb, Set Forwarding.

- Route calls made to a Vector Directory Number (VDN) based on supported criteria.

- Observe XML messages sent to and from the DMCC service.

- Send XML messages to the DMCC service.

- Receive raw RTP/RTCP data.

- Set various monitors so that developers are notified when particular events are fired.

- Record actions and save them to a script which can then be loaded and executed on the Dashboard to facilitate automated testing.

- View XML messages that arrive during a specified time period.

- Transfer devices and monitors from one session to another.

The DMCC Dashboard running in Internet Explorer:

The web version of the DMCC Dashboard runs in the Internet Explorer browser only. The web browser version is intended for developers who want to create thin client applications that leverage DMCC capabilities. The DMCC .NET SDK includes JavaScript libraries which make it easier to create web applications that include DMCC functionality.

Additional AE Services resources for developers

The DevConnect program offers members a range of additional resources to aid in development and testing activities, including:

- Free community-based support Forums and Frequently Asked Questions (FAQs) are available to all DevConnect members.

- A software-only developer configuration of Communication Manager and AE Services, known as the Avaya Aura Basic Development Environment, suitable for installation on a single server or desktop machine.

- Free remote lab access options to Avaya Aura Communication Manager and Application Enablement Services hardware and software configurations.

- Sample applications, in addition to those included with the SDKs, that can be used to aid in the development of new applications

- Discounted procurement options for enhanced level members.