Dialogic®

Dialogic® PowerMedia™ XMS JSR 309 Connector Software

Developer's Guide

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Revision History

Revision	Release Date	Notes
1.4	April 2015	Updates to support JSR 309 Connector Release 4.0 Service Update 3. JSR 309 Connector APIs: • Added JSR 309 Connector Extension section in SignalDetector. Release Issues: • Added the following Resolved Issues: MSC-164.
1.3	February 2015	JSR 309 Connector Requirements: • Added note to Minimum Requirements section in Supported Platforms. Development Considerations: • Updated with details on hot active/standby in Redundant Media Servers Guidelines. JSR 309 Connector APIs: • Added details for flushBuffer() method in SignalDetector.
1.2	January 2015	Updates to support JSR 309 Connector Release 4.0 Service Update 1. Development Considerations: • Updated example from Scenario C section in Using Timer Listener in Application Servlet. JSR 309 Connector APIs: • Added new Use of DTMF Pattern[]: section in SignalDetector. Release Issues: • Added new section. • Added the following Known Issues: XMS-1511. • Added the following Resolved Issues: MSC-40, MSC-41, MSC-42, MSC-43.
1.1	November 2014	Updates with miscellaneous fixes.
1.0	October 2014	Initial release of this document.
Last modified: April 2015		

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1. Welcome

This Developer's Guide is written for developers of the Dialogic® PowerMedia™ XMS JSR 309 Connector Software (also referred to herein as "JSR 309 Connector"), which is used in conjunction with the Dialogic® PowerMedia™ Extended Media Server (also referred to herein as "PowerMedia XMS" or "XMS").

This Developer's Guide describes the JSR 309 Connector, provides information on its features, and describes any extensions added to the JSR 309 Connector (based on JSR 309 specification) in addition to which methods/parameters are supported.

Assumptions

This Developer's Guide assumes that you have the following knowledge and experience:

- Familiarity with the Java Specification Request (JSR) 309 documentation version 1.0.
- Familiarity with the JSR 309 Overview of Media Server Control API document provided with JSR 309 specification download at www.jcp.org.
- Familiarity with application server platform development and administration of choice.
- Prior experience with JSR 289 (SIP Servlets).
- Prior experience with Java Platform Enterprise Edition (Java EE) development.
- Familiarity with PowerMedia XMS administration and configuration.

Related Information

See the following for more information:

- PowerMedia XMS datasheet at www.dialogic.com.
- PowerMedia XMS documentation at www.dialogic.com/manuals.
- Dialogic technical support at www.dialogic.com/support.
- JSR 309 documentation on the Java Community Process website at www.jcp.org: http://www.jcp.org/aboutJava/communityprocess/final/jsr309/index.html

2. Overview

This section provides an overview of the Java Specification Request (JSR) 309 and describes the JSR 309 Connector features and limitations.

Terminology

A brief description of terminology used in this document is provided for reference.

- **Servlet** – A Java class which conforms to the Java Servlet Interface, by which a Java class may respond to HTTP requests. Applications using servlets may be packaged in a WAR file as a web application.
- **Java Specification Request (JSR)** – A formal document created by members of the Java Community Process (JCP) that adds features and functionality to the Java platform.
- **JEE or J2EE** – Java Platform, Enterprise Edition. A platform for server programming in the Java programming language.
- **Web Application Server** – Application Server based on JEE or J2EE.
- **MSML** – Media Server Markup Language.
- **AS** – Application Server.

JSR 309 Media Server Control API

Java Specification Request (JSR) 309 is a standard Java media server control API for multimedia application development. It provides a generic media server abstraction interface that is independent of the underlying media server control protocol. The multimedia applications, such as IVR, voice-mail, audio conferencing, and call center, are typically deployed in a SIP-based infrastructure.

The JSR 309 API provides three areas of functionality:

- Network Connection (NC) to establish media streams.
- Media Group (MG) functions such as to play, record, and control media content.
- Media Mixer (MM) functions to join media functions to a network connection so as to create conferences and call bridges.

For details on the JSR 309 API, see the documentation on the Java Community Process website at www.jcp.org.

For a list of JSR 309 APIs and parameters supported by the JSR 309 Connector, see Supported Features.

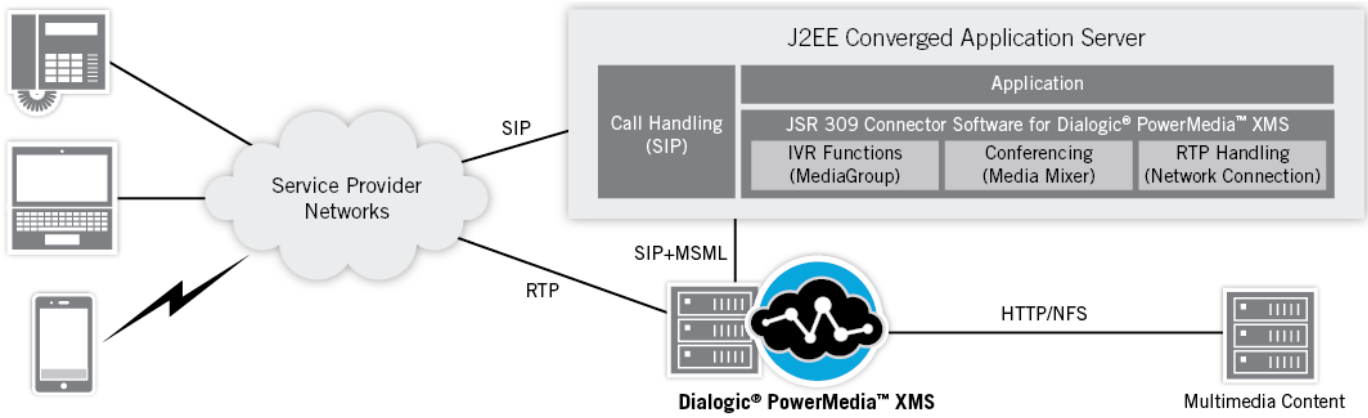
JSR 309 Connector

The JSR 309 Connector is the Dialogic implementation of the JSR 309 version 1.0 final specification. This software runs on various supported application servers and enables a multimedia application on the application server to control the PowerMedia XMS using the JSR 309 API. For a list of supported application servers, refer to Supported Platforms.

The JSR 309 Connector is designed to support an asynchronous programming model. Applications using the connector should be designed to interface using Listener objects for events on operation completion.

System Overview

The following figure illustrates the role of the JSR 309 Connector in a typical deployment:



The following components are included in the figure:

- **J2EE Converged Application Server** – Handles SIP call control and other aspects of real-time multimedia communications using a Java EE environment with JSR 289 support.
- **Application** – Runs on the J2EE Converged Application Server. Examples of applications: IVR, conferencing, announcements, and call centers.
- **JSR 309 Connector** – Software connector that enables the J2EE Converged Application Server to control PowerMedia XMS through JSR 309-compliant API calls.
- **PowerMedia XMS** – Performs the multimedia operations required to establish and maintain real-time communications while providing a high-quality user experience.
- **External Servers** – Used for storing and streaming multimedia content.
- **SIP Servlet API for Call Handling** – SIP stack used to communicate with SIP compliant user agents. JSR 289 is the standard API servlet used by Converged Communication Application Servers.

3. Supported Features

The JSR 309 Connector is compatible with the JSR 309 Media Server Control API version 1.0.

The JSR 309 Connector supports the following functionality:

- Driver loading with driver property support
- Video conference layout
- Audio recording
- Conference mixing
- Bridge conference
- Basic prompt and collect
- Video conference
- Signal detection
- Setup of media server URI programmatically
- Redundant media servers
- Serialization/cluster support
- Video streaming to network connections
- Media mixing with video layout
- Media play/record
- Media handling for WebRTC
- TCK pre-certification at 61%

4. JSR 309 Connector Requirements

The following requirements are needed to be in place before installing the JSR 309 Connector:

- A functional J2EE application server platform for development and testing.
- A functional PowerMedia XMS system.
- SIP phones or soft clients.

Supported Platforms

The JSR 309 Connector was developed using the Java SDK version 1.6.0 and 1.7.x platform dependent.

The JSR 309 Connector has been deployed and tested on the following application server platforms:

Minimum Requirements

Oracle

- Oracle Communications Converged Application Server (OCCAS) 5.1.0

TeleStax

- TelScale JBoss and Apache-Tomcat Application Server:
  - *TelScale-SIP-Servlets-7.0.2.GA-jboss-as-7.2.0.Final*
  - *TelScale-SIP-Servlets-7.0.2.GA-apache-tomcat-7.0.50*
- Mobicents JBoss and Apache-Tomcat Application Server:
  - *mss-3.0.xxx-jboss-as-7.2.0.Final*
  - *mss-3.0.xxx-apache-tomcat-7.0.50*

  Note: *xxx* = 536 or higher.

5. Development Considerations

This section provides application development guidelines for the JSR 309 Connector.

Redundant Media Servers Guidelines

The JSR 309 Connector supports redundant (hot active/standby) configuration of PowerMedia XMS Media Servers.

The following explains the logic behind establishing hot active/standby Media Servers:

1. During initial startup, the JSR 309 Connector will send a ping to the hot active Media Server (specified in *dlgc_JSR309.properties* by mediaserver.1.sip.address and mediaserver.1.sip.port).
2. After mediaserver.redundancy.check.interval (default: 5000 ms) * mediaserver.redundancy.nonprimary.discover.clock.cycle (default: 1), a ping to the hot standby Media Server (as configured by mediaserver.x.sip.address/ mediaserver.x.sip.port where x can go from 2 to "n" number of hot standby designated Media Servers) is sent.
3. If the Media Server configured as hot active responds to a keep alive ping, it is marked as active and will be used by a connector for all its requests.
4. Any Media Server configured as hot standby that responds to a keep alive ping is marked as alive=true and placed in alive=true pool of available Media Servers.
5. At this point, the JSR 309 Connector will ping every hot active/standby Media Server every mediaserver.redundancy.check.interval (default: 5000 ms) interval.

The following explains what happens if the hot active/standby Media Servers no longer respond to keep alive:

1. Any hot standby Media Server that does not respond to a keep alive ping is marked as alive=false and it is taken out of the pool of available hot standby Media Servers.
2. If the hot active Media Server does not respond to keep alive ping, the following actions are taken:
    a. All the network connections on that Media Server will notify the application by sending the NETWORK_STREAM error.
    b. The JSR 309 Connector takes hot standby configured Media Server from alive=true pool and marks it as hot active.
    c. At this point, the JSR 309 Connector software will automatically route new invite requests to the newly promoted hot active Media Server.

    Note: If the pool of hot standby (alive=true) Media Servers are empty, all the new calls will fail until one of the configured Media Servers becomes available.
3. At this point, the JSR 309 Connector continuously pings every hot active/standby Media Server every mediaserver.redundancy.check.interval (default: 5000 ms) interval in trying to determine if it is active or not.

The Redundant Media Server feature is configured in the *dlgc_JSR309.properties* file. Information on configuration and various options of this feature can be found in the *Dialogic® PowerMedia XMS JSR 309 Connector Software Installation and Configuration Guide* for each supported platform.

Configuring Network Time Protocol (NTP) for Accurate SIP Timers

As with any distributed architecture it is important that every component is synchronized to a common system clock. It is highly recommended for each distributed component to synchronize to a common NTP server. Differences in system clock settings can cause a number of severe issues such as:

- SIP timers firing prematurely on servers with the fast clock settings.
- Poor distribution of timer processing between two distributed elements. For example, because the initial T1 timer value of 500 milliseconds controls the retransmission interval for INVITE request and responses, and also sets the initial values of other timers, even small differences in system clock settings can cause improper SIP protocol behavior.

Configuring the Application Server

For each supported J2EE Application Server Platform, it is expected that the developer has a good understanding of its configuration, setup, and administration. However, there are simple step by step installation instructions in the Appendix of the platform specific *Dialogic® PowerMedia™ XMS JSR 309 Connector Software Installation and Configuration Guide.* These instructions make it easy to quickly install and configure the Application Server platform in order to start using it with JSR 309 Connector.

Application Server Serialization

Java object serialization is used to support replication of Java objects to another process. Serialization enables an application in a distributed or clustered environment to support application replication. By default serialization is turned off in the JSR 309 Connector. Refer to the specific platform *Dialogic® PowerMedia™ XMS JSR 309 Connector Software Installation and Configuration Guide* for further details.

Note: Application Server must support serialization clustering.

SIP Servlet Initialization

This section recommends the proper way to write your SIP Servlet Initialization when using the JSR 309 Connector.

Since the JSR 309 Connector supports various Application Server Platforms and with each platform differing a bit in how the SIP Servlet Initialization is executed, the following way is recommended for application to write the SIP Servlet Initialization code.

Here are the recommended steps (more details available in the Dialogic Demo Application):

1. The application servlet class must implement the SipServletListener Interface.
    - The application servlet needs to be defined as follows:

```
public class MyAppServlet extends SipServlet implements Serializable, SipServletListener
```

    - The application's *sip.xml* needs to define first the two <servlet> <listener> pairs needed for JSR 309 Connector:

```
<servlet>
  <javaee:description>XMS Keep Alive Monitor</javaee:description>
  <javaee:display-name>KeepAliveMonitor</javaee:display-name>
  <javaee:servlet-name>DlgcMsMonitorServlet</javaee:servlet-name>
  <javaee:servlet
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:servlet-class>
  <javaee:load-on-startup>1</javaee:load-on-startup>
</servlet>
<listener>
  <javaee:description>XMS Keep Alive</javaee:description>
  <javaee:display-name>KeepAliveMonitor</javaee:display-name>
  <javaee:listener
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:listener-class>
</listener>

<servlet>
  <javaee:description>Component receiving SIP request and response from IPMS</javaee:description>
  <javaee:display-name>DlgcSipServlet</javaee:display-name>
  <javaee:servlet-name>DlgcSipServlet</javaee:servlet-name>
  <javaee:servlet
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcSipServlet</javaee:servlet-class>
  <javaee:load-on-startup>2</javaee:load-on-startup>
</servlet>
<listener>
  <javaee:description>DlgcSipServletListener</javaee:description>
  <javaee:display-name>DlgcSipServletListener</javaee:display-name>
  <javaee:listener
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcSipServlet</javaee:listener-class>
</listener>
```

    - The application's *sip.xml* needs to define <servlet> <listener> pairs for each of its servlets. For example:

```
<servlet>
  <javaee:description>Simple Player Test</javaee:description>
  <javaee:display-name>DlgcPlayerTest</javaee:display-name>
  <javaee:servlet-name>DlgcPlayerTest</javaee:servlet-name>
  <javaee:load-on-startup>3</javaee:load-on-startup>
  <javaee:servlet-class>testing.unit.DlgcPlayerTest</javaee:servlet-class>
</servlet>
<listener>
  <javaee:description>DlgcPlayerTest</javaee:description>
  <javaee:display-name>DlgcPlayerTest</javaee:display-name>
  <javaee:listener-class>testing.unit.DlgcPlayerTest</javaee:listener-class>
</listener>
```

2. Upon loading the application servlet, there are two methods that need to be overloaded:
    - The init() method:
        - The init() method can be used to initialize non-SIP related components of the application. For example:

```
@Override
public void init(ServletConfig cfg)
throws ServletException
{
        super.init(cfg);
        myServletLoaded = true;
# application specific non-SIP Servlet init code goes here…
}
```

    - The servletInitialized() method:
        - The application servlet class must Override the servletInitialized() method and it should be used to initialize SIP-related components. For example:

```
public void servletInitialized(SipServletContextEvent evt) { }
```

There are a few rules to follow in order to properly initialize the application using JSR 309 Connector library:

- DlgcSipServlet needs to be initialized before the application can use JSR 309 Connector. Therefore, in servletInitialized() method application code needs to assure that DlgcSipServlet has been called by a systems framework. It also needs to be aware when it is called to be initialized and only then can it start to initialize JSR 309 Connector. For example:

```
if ( ( platform != null ) && (platform.compareToIgnoreCase(DlgcTest.TELESTAX PLATFORM) == 0 ) ||
( platform != null ) && (platform.compareToIgnoreCase(DlgcTest.ORACLE_PLATFORM) == 0 )) {
        if( sName.equalsIgnoreCase("DlgcSipServlet") )
        {
                dlgcSipServletLoaded = true;
                log.debug(" DlgcPlayerTest::servletInitialized DlgcSipServlet loaded");
        }
```

- It should flag when it is called to be initialized. For example:

```
else if( sName.equalsIgnoreCase("MyAppServlet") )
        myServletInitCalled =true;
```

- After flagging that both Connector Servlet (DlgcSipServlet) and itself was called to be initialized, then execute the code for the SIP Servlet Initialization. For example:

```
if( myServletInitCalled && dlgcSipServletLoaded)
        initDriver();
        whatever the application need to init.
```

- Refer to the Dialogic Demo Application for examples on how to initialize your SIP Servlet.

Using Timer Listener in Application Servlet

J2EE Application Server provides a SIP Timer Listener facility to the application. This section will illustrate the proper ways to build a customer application using Timer Listener in conjunction with JSR 309 Connector.

One SIP Timer Listener is allowed to be registered per application (war). There are cases in which the application requires the use of such timer for its own purposes. However, if the application uses JSR 309 Connector, the application needs to take certain considerations when it comes to sharing of the TimerListener method. The JSR 309 Connector depends on TimerListener functionality in order to provide Media Server redundancy feature. Refer to Redundant Media Server Guidelines for details on this feature.

The JSR 309 Connector uses SIP Timer Listener to PING the state of each configured Media Server. This scenario creates a problem when both connector and application requires the SIP Timer Listener.

To better illustrate the usage of TimerListener bellow are 3 scenarios which come into play:

- Scenario A: Application requires the use of the SIP Timer Listener but the JSR 309 Connector redundancy feature is turned off.
- Scenario B: Application does not need SIP TimerListener but the JSR 309 Connector redundancy feature is turned on.
- Scenario C: Application requires the use of the SIP Timer Listener and the JSR 309 Connector redundancy feature is turned on.

Each scenario is described in detail below in order to show the application developer how to manage a single SIP Timer Listener.

Note: The source of below code is available with the JSR 309 Connector distribution package called "timer_demo".

Scenario A

Application requires the use of the SIP Timer Listener but the JSR 309 Connector redundancy feature is turned off

In this scenario, the connector redundancy functionality is turned off via its property file, which disables the redundancy feature that pings for the status of the Media Server(s). In this case, the application requires SIP Timer Listener.

The following considerations need to be put in place:

- *sip.xml* used should have DlgcMsMonitorServlet and the corresponding listener entry comment out:

```
<?xml version="1.0" encoding="UTF-8"?>
<sip-app xsi:schemaLocation="http://www.jcp.org/xml/ns/sipservlet
http://www.jcp.org/xml/ns/sipservlet/sip-app_1_1.xsd http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns="http://www.jcp.org/xml/ns/sipservlet"
xmlns:javaee="http://java.sun.com/xml/ns/javaee"
id="SipApp ID">
    <app-name>Dialogic-Samples</app-name>
    <javaee:display-name>Dialogic-Samples</javaee:display-name>
    <session-config>
       <javaee:session-timeout>0</javaee:session-timeout>
    </session-config>
    <distributable/>
        <!--<servlet> <javaee:description>XMS Keep Alive Monitor</javaee:description>
        <javaee:display-name>KeepAliveMonitor</javaee:display-name> <javaee:servlet-
        name>DlgcMsMonitorServlet</javaee:servlet-name> <javaee:servlet-
```

```
        class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:servlet-
        class> <javaee:load-on-startup>1</javaee:load-on-startup> </servlet> <listener>
        <javaee:description>XMS Keep Alive</javaee:description> <javaee:display-
        name>KeepAliveMonitor</javaee:display-name> <javaee:listener-
        class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:
        listener-class> </listener> -->
    <servlet>
        <javaee:description>Connector Independent Timer</javaee:description>
        <javaee:display-name>ConnectorIndependentTimer</javaee:display-name>
        <javaee:servlet-name>DlgcIndependentTimerServlet</javaee:servlet-name>


        <javaee:servlet-
           class>testing.timer demo.DlgcConnectorIndependentTimerServlet</javaee:servlet-class>
        <javaee:load-on-startup>2</javaee:load-on startup>
    </servlet>
    <listener>
        <javaee:description>Connector Independent Timer</javaee:description>
        <javaee:display-name>DlgcIndependentTimerServlet</javaee:display-name>
        <javaee:listener-
           class>testing.timer demo.DlgcConnectorIndependentTimerServlet</javaee:listener-class>
    </listener>
    <servlet-selection>
            <!-- <servlet-mapping> <servlet-name>DlgcMsMonitorServlet</servlet-name> <pattern>
            <and> <equal> <var>request.method</var> <value>INVITE</value> </equal> <equal>
            <var>request.to.uri.user</var> <value></value> </equal> </and> </pattern> </servlet-
            mapping>-->
        <servlet-mapping>
            <servlet-name>DlgcConnectorIndependentTimerServlet</servlet-name>
            <pattern>
                <and>
                   <equal>
                      <var>request.method</var>
                      <value>INVITE</value>
                   </equal>
                   <equal>
                      <var>request.to.uri.user</var>
                      <value/>
                   </equal>
                </and>
            </pattern>
        </servlet-mapping>
    </servlet-selection>
</sip-app>
```

- Application needs to implement TimerListener, SipServletListener in its timer servlet. Below is a working code example: *DlgcIndependentTimerServlet.java*:

```
*/
package testing.timer demo;

import javax.servlet.ServletConfig;
import javax.servlet.ServletContext;
import javax.servlet.ServletException;
import javax.servlet.sip.ServletTimer;
import javax.servlet.sip.SipApplicationSession;
import javax.servlet.sip.SipFactory;
import javax.servlet.sip.SipServlet;
import javax.servlet.sip.SipServletContextEvent;
import javax.servlet.sip.SipServletListener;
import javax.servlet.sip.TimerListener;
import javax.servlet.sip.TimerService;

import org.slf4j.Logger;
import org.slf4j.LoggerFactory;

public class DlgcIndependentTimerServlet extends SipServlet implements TimerListener,
SipServletListener{

       /**
        *
        */
```

```
	private static final long serialVersionUID = 1L;
	private static Logger log = LoggerFactory.getLogger(DlgcIndependentTimerServlet.class);
	public static TimerService msTimerService;
	private static int counter = 0;
	private int timerInterval = 5000;
	public String timerId = null;

	@Override
	public void timeout(ServletTimer timer) {
		// TODO Auto-generated method stub
		final String timerID = timer.getId();

		log.debug("timeout:Timer id:::" + timerID+"----"+timer.getInfo());
		log.debug("Enter DlgcIndependentTimerServlet:timeout() generated by timerID: " +
timerID );

		if (counter < 5){
			start();
			counter++;
		}

	}

	@Override
	public void init(ServletConfig cfg) throws ServletException
	{
		super.init(cfg);
		log.debug("Leaving DlgcIndependentTimerServlet::init");
	}
	@Override
	public void servletInitialized(SipServletContextEvent arg0) {
		// TODO Auto-generated method stub
		log.debug("Entering DlgcIndependentTimerServlet::servletInitialized");
		msTimerService = (TimerService) getServletContext().getAttribute(TIMER SERVICE);
		start();

	}
	public void start()
	{
		log.debug("DlgcIndependentTimerServlet::start()::counter: " + counter);
		try{
			String name = "timer_demo"+counter;
			SipApplicationSession  sas = createSipApplicationSession();
			ServletTimer ts =
DlgcIndependentTimerServlet.getTimerService().createTimer(sas, this.timerInterval, false, name);
			this.timerId = ts.getId();
			log.debug("Start:Timer id:::" + this.timerId+"----"+ts.getInfo());
		}
		catch(Exception e){
			e.printStackTrace();
			log.error("Exception in start: " + e);
		}

	}
	public SipApplicationSession createSipApplicationSession(){
		ServletContext ctx = this.getServletContext();
		SipFactory factory = (SipFactory) ctx.getAttribute(SIP FACTORY);
		SipApplicationSession appSession = factory.createApplicationSession();
		return appSession;
	}

	public static TimerService getTimerService()
	{
		return msTimerService;
	}

}
```

Scenario B

Application does not need SIP TimerListener but the JSR 309 Connector redundancy feature is turned on

In this scenario, the application does not use SIP TimerListener functionality. Since JSR 309 Connector is enabled for Media Server redundancy, the application's descriptor (*sip.xml)* needs to contain certain definitions:

- <servlet> definition "XMS Keep Alive Monitor"
- <listener> definition "XMS Keep Alive"
- <servlet-selection> definition "DlgcMsMonitorServlet"

As illustrated in the following example:

```
<?xml version="1.0" encoding="UTF-8"?>
-<sip-app xsi:schemaLocation="http://www.jcp.org/xml/ns/sipservlet
http://www.jcp.org/xml/ns/sipservlet/sip-app_1_1.xsd http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://www.jcp.org/xml/ns/sipservlet" xmlns:javaee="http://java.sun.com/xml/ns/javaee"
id="SipApp ID">
    <app-name>Dialogic-Samples</app-name>
    <javaee:display-name>Dialogic-Samples</javaee:display-name>
    <session-config>
        <javaee:session-timeout>0</javaee:session-timeout>
    </session-config>
    <distributable/>
    <servlet>
        <javaee:description>XMS Keep Alive Monitor</javaee:description>
        <javaee:display-name>KeepAliveMonitor</javaee:display-name>
        <javaee:servlet-name>DlgcMsMonitorServlet</javaee:servlet-name>
        <javaee:servlet
           class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:
           servlet-class>
        <javaee:load-on-startup>1</javaee:load-on-startup>
    </servlet>
    <listener>
        <javaee:description>XMS Keep Alive</javaee:description>
        <javaee:display-name>KeepAliveMonitor</javaee:display-name>
        <javaee:listener
           class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:
           listener-class>
    </listener>
    <servlet-selection>
         <servlet-mapping>
             <servlet-name>DlgcMsMonitorServlet</servlet-name>
             <pattern>
                 <and>
                    <equal>
                       <var>request.method</var>
                       <value>INVITE</value>
                    </equal>
                    <equal>
                       <var>request.to.uri.user</var>
                       <value/>
                    </equal>
                 </and>
             </pattern>
         </servlet-mapping>
     </servlet-selection>
</sip-app>
```

Scenario C

Application requires the use of the SIP Timer Listener and the JSR 309 Connector redundancy feature is turned on

This scenario is the most complicated, because the application needs to share SIP TimerListener functionality with JSR 309 Connector (as Media Server redundancy is turned on). Since only one TimerListener is allowed, the following considerations need to be put in place:

- The application needs to extend the DlgcMsMonitorServlet for its timer class.
- The <servlet> "XMS Keep Alive Monitor", <listener> "XMS Keep Alive", and <servlet-mapping> "DlgcMSMonitorServlet" need to be commented out.
- Add <servlet>, <listener>, and <servlet-mapping> for the application. In our example they are referenced as:
    - <servlet> definition "Connector Dependent Timer"
    - <listener> definition "Connector Dependent Timer"
    - <servlet-mapping> definition "DlgcConnectorDependentTimerServlet"
- The application needs to call the super methods of init() and servletInitialized() from the corresponding methods of timer class.
- In Timeout() method, check whether the timer is client app timer or JSR 309 Connector timer. If it is a Dialogic timer, call the super.timeout() else call your own method.

See *sip.xml* and *DlgcConnectorDependentTimerServlet.java* for reference:

sip.xml:

```
<?xml version="1.0" encoding="UTF-8"?>
<sip-app id="SipApp ID"  xmlns:javaee="http://java.sun.com/xml/ns/javaee"
xmlns="http://www.jcp.org/xml/ns/sipservlet" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance"
  xsi:schemaLocation="http://www.jcp.org/xml/ns/sipservlet
http://www.jcp.org/xml/ns/sipservlet/sip-app 1 1.xsd http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app 2 5.xsd">

  <app-name>Dialogic-Samples</app-name>
  <javaee:display-name>Dialogic-Samples</javaee:display-name>

  <session-config>
   <javaee:session-timeout>0</javaee:session-timeout>
  </session-config>

  <distributable />

  <!--servlet>
    <javaee:description>XMS Keep Alive Monitor</javaee:description>
    <javaee:display-name>KeepAliveMonitor</javaee:display-name>
    <javaee:servlet-name>DlgcMsMonitorServlet</javaee:servlet-name>
    <javaee:servlet-
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:servlet-class>
    <javaee:load-on-startup>1</javaee:load-on-startup>
  </servlet>

  <listener>
    <javaee:description>XMS Keep Alive</javaee:description>
    <javaee:display-name>KeepAliveMonitor</javaee:display-name>
    <javaee:listener-
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet</javaee:listener-class>
  </listener>
  -->
```

```
  <servlet>
    <javaee:description>Component receiving SIP request and response from
IPMS</javaee:description>
    <javaee:display-name>DlgcSipServlet</javaee:display-name>
    <javaee:servlet-name>DlgcSipServlet</javaee:servlet-name>
    <javaee:servlet-
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcSipServlet</javaee:servlet-class>
    <javaee:load-on-startup>2</javaee:load-on-startup>
  </servlet>

  <listener>
    <javaee:description>DlgcSipServletListener</javaee:description>
    <javaee:display-name>DlgcSipServletListener</javaee:display-name>
    <javaee:listener-
class>com.vendor.dialogic.javax.media.mscontrol.sip.DlgcSipServlet</javaee:listener-class>
  </listener>

  <servlet>
    <javaee:description>Simple Player Test</javaee:description>
    <javaee:display-name>DlgcPlayerTest</javaee:display-name>
    <javaee:servlet-name>DlgcPlayerTest</javaee:servlet-name>
    <javaee:load-on-startup>3</javaee:load-on-startup>
    <javaee:servlet-class>testing.unit.DlgcPlayerTest</javaee:servlet-class>
  </servlet>
  <listener>
    <javaee:description>DlgcPlayerTest</javaee:description>
    <javaee:display-name>DlgcPlayerTest</javaee:display-name>
    <javaee:listener-class>testing.unit.DlgcPlayerTest</javaee:listener-class>
  </listener>

   <!--
  <servlet>
    <javaee:description>Independent Timer</javaee:description>
    <javaee:display-name>IndependentTimer</javaee:display-name>
    <javaee:servlet-name>DlgcIndependentTimerServlet</javaee:servlet-name>
    <javaee:servlet-class>testing.timer demo.DlgcIndependentTimerServlet</javaee:servlet-class>
    <javaee:load-on-startup>1</javaee:load-on-startup>
  </servlet>

  <listener>
    <javaee:description>Independent Timer</javaee:description>
    <javaee:display-name>IndependentTimer</javaee:display-name>
    <javaee:listener-class>testing.timer demo.DlgcIndependentTimerServlet</javaee:listener-class>
  </listener>
  -->

  <servlet>
    <javaee:description>Connector Dependent Timer</javaee:description>
    <javaee:display-name>ConnectorDependentTimer</javaee:display-name>
    <javaee:servlet-name>DlgcConnectorDependentTimerServlet</javaee:servlet-name>
    <javaee:servlet-class>testing.timer demo.DlgcConnectorDependentTimerServlet</javaee:servlet-
class>
    <javaee:load-on-startup>1</javaee:load-on-startup>
  </servlet>

  <listener>
    <javaee:description>Connector Dependent Timer</javaee:description>
    <javaee:display-name>ConnectorDependentTimer</javaee:display-name>
    <javaee:listener-
class>testing.timer demo.DlgcConnectorDependentTimerServlet</javaee:listener-class>
  </listener>

  <servlet-selection>

   <!-- servlet-mapping>
      <servlet-name>DlgcMsMonitorServlet</servlet-name>
      <pattern>
        <and>
          <equal>
            <var>request.method</var>
```

```
          <value>INVITE</value>
        </equal>
        <equal>
          <var>request.to.uri.user</var>
          <value></value>
        </equal>
      </and>
    </pattern>
  </servlet-mapping> -->

  <servlet-mapping>
    <servlet-name>DlgcSipServlet</servlet-name>
    <pattern>
      <and>
        <equal>
          <var>request.method</var>
          <value>INVITE</value>
        </equal>
        <equal>
          <var>request.to.uri.user</var>
          <value></value>
        </equal>
      </and>
    </pattern>
  </servlet-mapping>

  <servlet-mapping>
    <servlet-name>DlgcPlayerTest</servlet-name>
    <pattern>
      <and>
        <equal>
          <var>request.method</var>
          <value>INVITE</value>
        </equal>
        <equal>
          <var>request.to.uri.user</var>
          <value>DlgcPlayerDemo</value>
        </equal>
      </and>
    </pattern>
  </servlet-mapping>

   <!-- servlet-mapping>
    <servlet-name>DlgcIndependentTimerServlet</servlet-name>
    <pattern>
      <and>
        <equal>
          <var>request.method</var>
          <value>INVITE</value>
        </equal>
        <equal>
          <var>request.to.uri.user</var>
          <value></value>
        </equal>
      </and>
    </pattern>

  </servlet-mapping> -->

  <servlet-mapping>
    <servlet-name>DlgcConnectorDependentTimerServlet</servlet-name>
    <pattern>
      <and>
        <equal>
          <var>request.method</var>
          <value>INVITE</value>
        </equal>
        <equal>
          <var>request.to.uri.user</var>
          <value></value>
        </equal>
```

```
        </and>
      </pattern>
    </servlet-mapping>

  </servlet-selection>
</sip-app>
```

DlgcConnectorDependentTimerServlet.java

```
package testing.timer_demo;

import java.io.Serializable;

import javax.servlet.ServletConfig;

import javax.servlet.ServletContext;

import javax.servlet.ServletException;

import javax.servlet.sip.ServletTimer;

import javax.servlet.sip.SipApplicationSession;

import javax.servlet.sip.SipFactory;

import javax.servlet.sip.SipServletContextEvent;

import javax.servlet.sip.TimerService;

import org.slf4j.Logger;

import org.slf4j.LoggerFactory;

import com.vendor.dialogic.javax.media.mscontrol.sip.DlgcMsMonitorServlet;

public class DlgcConnectorDependentTimerServlet extends DlgcMsMonitorServlet implements
Serializable{

        /**

         *

         */

        private static final long serialVersionUID = 1L;

        private static Logger log =
LoggerFactory.getLogger(DlgcConnectorDependentTimerServlet.class);

        public static TimerService msTimerService;

        private static int counter = 0;

        private int timerInterval = 10000;

        public String timerId = null;

        SipApplicationSession  sas =null;

        @Override

        public void timeout(ServletTimer timer) {

                // TODO Auto-generated method stub

                final String timerID = timer.getId();

                log.debug("timeout:Timer id:::" + timerID+"----"+timer.getInfo());

                log.debug("Enter DlgcConnectorDependentTimerServlet:timeout() generated by
timerID: " + timerID );

                if(!timer.getInfo().toString().contains("timer_demo")){

                        log.debug("Leaving DlgcConnectorDependentTimerServlet timeout method");

                        super.timeout(timer);

                }

                else{

                                startTimer();

                }

        }

        @Override
```

```
	public void init(ServletConfig cfg) throws ServletException
	{
		super.init(cfg);
		log.debug("Leaving DlgcConnectorDependentTimerServlet::init");
	}
	@Override
	public void servletInitialized(SipServletContextEvent arg0) {
		// TODO Auto-generated method stub
		log.debug("Entering DlgcConnectorDependentTimerServlet::servletInitialized");
		log.debug("DlgcConnectorDependentTimerServlet::servletInitialized servletName: " +
arg0.getSipServlet().getServletName());
		super.servletInitialized(arg0);
		createSipApplicationSession();
		msTimerService = (TimerService) getServletContext().getAttribute(TIMER_SERVICE);
		startTimer();
	}
	public void startTimer()
	{
		log.debug("DlgcConnectorDependentTimerServlet::start()::counter: " + counter);
		try{
			String name = "timer_demo"+counter;
			//SipApplicationSession  sas = createSipApplicationSession();
			//ServletTimer ts =
DlgcMsMonitorServlet.getTimerService().createTimer(sas, this.timerInterval, false, name);
			ServletTimer ts = msTimerService.createTimer(sas, this.timerInterval,
false, name);
			this.timerId = ts.getId();
			log.debug("Start:Timer id:::" + this.timerId+"----"+ts.getInfo());
		}
		catch(Exception e){
			e.printStackTrace();
			log.error("Exception in start: " + e);
		}
	}
	public SipApplicationSession createSipApplicationSession(){
		ServletContext ctx = this.getServletContext();
		SipFactory factory = (SipFactory) ctx.getAttribute(SIP_FACTORY);
		sas = factory.createApplicationSession();
		return sas;
	}
}
```

Setting the Media Server URI Programmatically

The Media Server can be set statically via the connector property file; however, the application can configure the connector to use specific media server URI programmatically using the MEDIA_SERVER_URI.

Sample code:

```
try
{
        Properties factoryProperties = new Properties();
        factoryProperties.setProperty(MsControlFactory.MEDIA_SERVER_URI, targetMediaServer);
        mscFactory = dlgcDriver.getFactory(factoryProperties);
        …
} catch (Exception e) {
        log.error("Error in servletInitialized",e.toString());
}
```

Note: If you want to specify the Media Server programmatically to be used by the JSR 309 Connector, you must create a new factory. If you want to use the *dlgc_JSR309.properties* file configuration to obtain the Media Server address and port pass "null" to the getFactory method.

The Media Server URI format is a given by the JSR 309 Specification; namely, *sip:username@ip:port*.

Multiple NCs per Media Session versus Single NC per Media Session Model

The JSR 309 API allows multiple Network Connections per a Media Session. The connector by default, only allows one Network Connection per Media Session.

It is recommended for application developers to use one to one relation between NC and MS; however, the connector has the ability to enable handling of multiple Network Connections per Media Session. In order to enable the Multiple Network Connections to a single Media Session mode, you must enable this mode via the connector property file:

```
multiple.network.connection.enabled=true
```

Application Call Leg to Media Session Facts

This section describes some important object relational models that may be useful for application developers:

1. When an application receives an invite to be a proxy to the Media Server, it is recommended to create dedicated JSR 309 Media Session (i.e., Media Session per Application Call Leg). This means if a second invite is received by the application, the application creates a second Media Session.
2. A Media Session is composed of two Session Application Sessions as explained in the advanced section.
3. A Media Session contains the call leg connector state machine. Thus there is a state machine per Media Session.
4. A Media Session only is connected to one and only one Media Server.
5. The connector internally serializes the Media Session across a cluster. Note, the Media Session is the top object that contains all specific object and including state machine for the specific call leg.
6. Release the Media Session, the connector releases all associated resources related to the Media Session from the Media Server.

6. JSR 309 Connector APIs

API Overview

This section describes JSR 309 Connector functionality that is either unsupported or supported extensions to a standard JSR 309 specification.

The standard specification can be found at www.jcp.org:
http://www.jcp.org/aboutJava/communityprocess/final/jsr309/index.html

List of Packages

Package	Supported	Description
javax.media.mscontrol	Yes	Provides a Java Application Server with a Media Server Control API.
javax.media.mscontrol.join	Yes	Joins media objects to establish media streams between them.
javax.media.mscontrol.mediagroup	Yes	MediaGroup is mostly a player/recorder.
javax.media.mscontrol.mediagroup.http	No	MediaGroup parameters specialized for HTTP file play and record.
javax.media.mscontrol.mediagroup.signals	Yes	Provides resources for detecting and generating signals (DTMF, speech, etc.) for any type of media.
javax.media.mscontrol.mixer	Yes	MediaMixer has the capacity to combine the media streams coming from multiple sources, into a single media stream.
javax.media.mscontrol.networkconnection	Yes	Manages a network termination point, using RTP for an IP network.
javax.media.mscontrol.resource	Yes	Provides the base definitions for managing media processing resources.

Package	Supported	Description
javax.media.mscontrol.resource.common	No	Manages resources that can be inserted in a different ResourceContainer like MediaGroup, NetworkConnection, or MixerAdapter.
javax.media.mscontrol.resource.video	Yes	Capabilities to handle video resources, layout and rendering.
javax.media.mscontrol.spi	Yes	Provides classes and interfaces defining a driver service provider interface (SPI).
javax.media.mscontrol.vxml	No	Capabilities to control VXML dialogs that are delegated to the Media Server.

List of Methods

Method – provides list of all Methods as defined by the JSR 309 standard specification.

Supported? – provides information about its support in the JSR 309 Connector.

Supported – means that it is fully supported by the JSR 309 Connector.

Partially – means that not all features of the Method are supported by the JSR 309 Connector.

Not Supported – means that there is no current support for this Method by the JSR 309 Connector.

Extension – provides information about a Method to have additional support/extension not provided by the JSR 309 specification.

Method	Supported?	Extension
Action	Not Supported	
AllocationEvent	Supported	Yes
AllocationEventListener	Supported	No
AllocationEventNotifier	Supported	No
CodecConstants	Partially	Yes
CodecPolicy	Not Supported	No
Configuration	Supported	No

Method	Supported?	Extension
Driver	Supported	No
DriverManager	Supported	No
EventType	Supported	No
FileFormatConstants	Partially	Yes
HttpFilePlayerConstants	Not Supported	
HttpFileRecorderConstants	Not Supported	
Joinable	Supported	No
Joinable.Direction	Supported	No
JoinableContainer	Supported	No
JoinableDialog	Not Supported	
JoinableStream	Partially	No
JoinableStream.StreamType	Supported	No
JoinEvent	Supported	Yes
JoinEventListener	Supported	No
JoinEventNotifier	Supported	No
JoinException	Not Supported	No
MediaConfig	Partially	No
MediaConfigException	Not Supported	No
MediaErr	Supported	No
MediaEvent	Supported	No
MediaEventListener	Supported	No
MediaEventNotifier	Supported	No
MediaException	Supported	No
MediaGroup	Supported	No

Method	Supported?	Extension
MediaMixer	Partially	No
MediaObject	Supported	No
MediaServiceException	Not Supported	
MediaSession	Supported	No
MixerAdapter	Partially	No
MixerEvent	Not Supported	
MsControlException	Supported	No
MsControlFactory	Supported	No
NetworkConnection	Supported	No
Parameter	Supported	No
Parameters	Supported	No
Player	Partially	No
PlayerEvent	Partially	No
PropertyInfo	Partially	No
Qualifier	Partially	No
Recorder	Partially	No
RecorderEvent	Partially	No
Resource	Supported	No
ResourceContainer	Supported	No
ResourceEvent	Supported	No
RTC	Partially	No
SdpException	Not Supported	
SdpPortManager	Partially	Yes
SdpPortManagerEvent	Partially	No

Method	Supported?	Extension
SdpPortManagerException	Partially	No
SignalConstants	Partially	No
SignalDetector	Partially	Yes
SignalDetectorEvent	Partially	No
SignalGenerator	Not Supported	
SignalGeneratorEvent	Not Supported	
SpeechDetectorConstants	Not Supported	
SpeechRecognitionEvent	Not Supported	
SupportedFeatures	Partially	No
TimeoutException	Not Supported	
TooManyJoineesException	Not Supported	
TranscodingException	Not Supported	
Trigger	Not Supported	
UnsupportedException	Supported	No
UnsupportedLayoutException	Not Supported	
Value	Supported	No
VideoLayout	Supported	
VideoRenderer	Supported	
VideoRendererEvent	Partially	
VideoRenderingException	Supported	
VolumeConstants	Not Supported	
VxmlDialog	Not Supported	
VxmlDialogEvent	Not Supported	
WrongStateException	Partially	No

Method Details

This section provides detailed information of each Method and its parameters focused specifically on "**What's not supported**" and any extensions which were added by the JSR 309 Connector. For the complete listing of Methods and its parameters, refer to the JSR 309 standard documentation available at www.jcp.org.

AllocationEvent

What's not supported

Field Summary	
static EventType	ALLOCATION_CONFIRMED This EventType is returned by getEventType() to signal the completion of a ResourceContainer.confirm().
static EventType	IRRECOVERABLE_FAILURE Indicates that an irrecoverable failure occurred, like the loss of connectivity to the media server.

Method inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

JSR 309 Connector Extension:

NC join to mixer followed by nc.processSDP or nc.generateSDP. Provided that this is the first join to the mixer the AllocationEvent will be sent to application notifying it of successful conference creation on Media Server.

Note: The connector.property file needs to be enabled for extensions.

CodecConstants

What's not supported

Audio Codecs

AUDIO_CODEC		**FILE_FORMAT**		
		FileFormatConstants.RAW	FileFormatConstants.WAV	FileFormatConstants.GSM
ADPCM_32K	IMA's **A**daptive **D**ifferential **P**ulse **C**oded **M**odulation	N/A	N/A	N/A
ADPCM_32K_OKI	OKI's ADPCM	N/A	N/A	N/A
G723_1B	G723.1	N/A	N/A	N/A
AMR	AMR format at Adaptive Rate, used with additional parameters	N/A	N/A	N/A
AMR_WB	AMR wide band format	N/A	N/A	N/A
G729_A	G729 format at 8kb/s	N/A	N/A	N/A
EVRC	EVRC format	N/A	N/A	N/A
GSM	GSM format	N/A	N/A	N/A

JSR 309 Connector extends support of FILE_FORMAT to FileFormatConstants.INFERRED:

AUDIO_CODEC		**FILE_FORMAT**
		FileFormatConstants.INFERRED
LINEAR_16BIT_128K	default, internal, plain format	supported (proprietary payload type)
LINEAR_16BIT_256K	high quality format	supported (proprietary payload type)
ALAW_PCM_64K	common European format	supported (proprietary payload type)

AUDIO_CODEC		FILE_FORMAT
MULAW_PCM_64K	common American format	supported (proprietary payload type)
AMR	AMR format at Adaptive Rate, used with additional parameters	supported (proprietary payload type)
AMR_WB	AMR wide band format	supported (proprietary payload type)

Supported AMR/AMR_WB ClockRate in Dialogic Proprietary Payload Type

In Hz	AMR	AMR_WB
4750	Supported (default)	n/a
5150	Supported	n/a
5900	Supported	n/a
6700	Supported	n/a
7400	Supported	n/a
7950	Supported	n/a
10200	Supported	n/a
12200	Supported	n/a
6600	n/a	Supported
8850	n/a	Supported
12650	n/a	Supported
14250	n/a	Supported
15850	n/a	Supported
18250	n/a	Supported
19850	n/a	Supported
23050	n/a	Supported
23850	n/a	Supported

Video Codecs:

FileFormatConstants.FORMAT_3GP – Not supported.

Video Codecs only supported as proprietary payload type.

Video / Audio Codecs (not supported)

Field Summary	
static Value	ADPCM_16K_G726 G726 16k
static Value	ADPCM_32K ADPCM
static Value	ADPCM_32K_G726 G726 32k
static Value	ADPCM_32K_OKI ADPCM Oki (vox files)
static Value	ALAW_PCM_48K
static Value	ALAW_PCM_64K Alaw PCM (mimetype: pcma)
static Value	AMR AMR (narrow band)
static Value	AMR_WB AMR wideband
static Value	EVRC EVRC codec
static Value	G723_1B G.723 codec Valid fmtp values, per RFC 3555, paragraph 4.1.3: "bitrate=6.3" or "bitrate="5.3" "annexa=yes" (default) or "annexa=no". These values may be assigned to Recorder.AUDIO_FMTP.
static Value	G729_A G.729 codec Valid fmtp values, per RFC 3555, paragraph 4.1.9: "annexb=yes" (default) or "annexb=no". These values may be assigned to Recorder.AUDIO_FMTP.
static Value	GSM GSM codec
static Value	LINEAR_16BIT_128K 16bits, linear, 8000 samples/second, 128 kbits/s
static Value	LINEAR_16BIT_256K 16bits, linear, 16000 samples/second, 256kbits/s
static Value	LINEAR_8BIT_64K 8bits, linear, 8000 samples/second, 64kbits/s

Field Summary	
static Value	MULAW_PCM_64K Mulaw PCM (mimetype: pcmu)

DriverManager

Note: In the OCCAS Application Server platform, the driver is registered by a connector implicitly where in other platforms it is done explicitly.

FileFormatConstants

What's not supported

Field Summary	
static Value	FORMAT_3G2 3gpp2 files format.
static Value	FORMAT_3GP 3gp files format.
static Value	GSM GSM file format.

JoinableContainer

What's not supported

The JSR 309 API has three core JSR API resource containers, NC, MG, and MX, that can be joined together in three different modes, SEND, RECV, and DUPLEX. However, not all combinations are supported.

NC refers to Network Connection and provides functionality to establish media streams. MG refers to Media Group and provides functionality to play, record, and control media content. MX refers to Media Mixer and provides functionality to join media functions to a network connection so as to create conferences and call bridges.

SEND means the media streams can flow from joiner to joinee only. RECV means the media streams can flow from joinee to joiner only. DUPLEX means the media streams can flow both ways.

The following table shows the supported configurations:

	NC	MG	MX
NC (DUPLEX)	YES	YES	YES
NC (SEND)	YES	NO	YES
NC (RECV)	YES	NO	YES

	NC	MG	MX
MG (DUPLEX)	YES	NO	YES
MG (SEND)	NO	NO	NO
MG (RECV)	NO	NO	NO
MX (DUPLEX)	YES	YES	NO
MX (SEND)	YES	NO	NO
MX (RECV)	YES	NO	NO

The following join combinations are the same and can be used to set up a full duplex connection. In the examples below, a Media Mixer is connected in full duplex to a Network Connection for play/record capability.

```
networkConnection.join(Direction.RECV, mixer)
mixer.join(Direction.SEND, networkConnection)

networkConnection.join(Direction.SEND, mixer)
mixer.join(Direction.RECV, networkConnection)

networkConnection.join(Direction.DUPLEX, mixer)
mixer.join(Direction.DUPLEX, networkConnection)
```

As per the JSR 309 Connector implementation for any above join combination, make note that the Allocation Event is always sent to the Network Connection component.

Methods inherited from javax.media.mscontrol.join.Joinable	
joinInitiate	Asynchronous version of join.
unjoinInitiate	Asynchronous version of unjoin.

Methods inherited from javax.media.mscontrol.join.JoinEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

JoinableStream

What's not supported

Methods inherited from javax.media.mscontrol.join.Joinable	
joinInitiate	Asynchronous version of join.
unjoinInitiate	Asynchronous version of unjoin.

JoinEvent

What's not supported

Field Summary	
static MediaErr	NO_TRANSCODER Error sent by media server when it is unable to perform the transcoding required by the join.
static MediaErr	TOO_MANY_JOINEES Error sent by media server when the number of joined objects is too high (value is implementation dependent).

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

JSR 309 Connector Extension:

NC join to mixer followed by nc.processSDP or nc.generateSDP. Provided that this is the first join to the mixer the AllocationEvent will be sent to application notifying it of successful join to existing conference on Media Server.

Note: The connector.property file needs to be enabled for extensions.

MediaConfig

What's not supported

Method Summary	
MediaConfig	createCustomizedClone(Parameters params) Create a new MediaConfig, altering the given parameters with the given values.
java.lang.String	marshall()

MediaGroup

What's not supported

Field Summary	
static Configuration<MediaGroup>	PLAYER_RECORDER_SIGNALDETECTOR_SIGNAL GENERATOR A MediaGroupConfig containing Player, Recorder, SignalDetector, and SignalGenerator.
static RTC	SIGDET_STOPPLAY The common RTC to stop a prompt when a DTMF is detected.
static RTC	SIGDET_STOPRECORD The common RTC to stop a recording when a DTMF is detected.
static Configuration<MediaGroup>	SIGNALDETECTOR Defines a MediaGroupConfig containing only a SignalDetector.

JSR 309 Connector Extension:

static Configuration<MediaGroup>	SIGNALDETECTOR **Note:** JSR 309 Connector creates MediaGroup as PLAYER_SIGNALDETECTOR.

Method Summary	
SignalGenerator	getSignalGenerator() Returns the SignalGenerator of this MediaGroup.

Note: getPlayer(), getRecorder(), getSignalDetector() will return same Object reference for each resource request of the same MediaGroup.

Methods inherited from javax.media.mscontrol.join.JoinableContainer	
getJoinableStream	Returns existing stream.
getJoinableStreams	Returns an array of all existing streams.

Methods inherited from javax.media.mscontrol.join.Joinable	
getJoinees	Returns Joinables filtered on the connection direction.
getJoinees	Returns Joinables.
join	Establish a media stream between this object and other.
joinInitiate	Asynchronous version of join.
unjoin	Disconnect any media streams flowing between this object and other's.
unjoinInitiate	Asynchronous version of unjoin.

Methods inherited from javax.media.mscontrol.join.JoinEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

Methods inherited from javax.media.mscontrol.resource.ResourceContainer	
confirm	Request that all pending allocations/initializations are completed.
getConfig	
getResource	Return a handle on a resource of type resource.
triggerAction	Triggers a RTC action, requested by the application.

Methods inherited from javax.media.mscontrol.MediaObject	
createParameters	Create an empty Parameters map.
getMediaObject	Return an Iterator over all the children of this MediaObject.
getMediaObjects	Similar to getMediaObjects(), with an additional filtering based on the given type.
getParameters	Gets the value of various Parameter's from the media object.
getURI	Return a URI that uniquely identifies this object.
release	Release the resources associated to this media object.
setParameters	Set the value of various Parameter's for the media object.

Methods inherited from javax.media.mscontrol.resource.AllocationEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

MediaMixer

JSR 309 Connector Extension:

Set the asn sampling time by using the Mixer Media Session. For example:

```
myMs.setAttribute("connector.asn.louder.sample.time", new Integer(5) );
```

What's not supported

Field Summary	
static Configuration<MediaMixer>	AUDIO_EVENTS This Configuration supports audio mixing, plus the events related to the active talkers.
static Configuration<MediaMixer>	AUDIO_VIDEO_RENDERING This Configuration supports the features of AUDIO_VIDEO, plus a VideoRenderer.

Field Summary	
static Parameter	ENABLED_EVENTS An array of Mixer EventTypes, indicating which events are generated and delivered to the application, including MOST_ACTIVE_INPUT_CHANGED.

Methods inherited from javax.media.mscontrol.join.JoinableContainer	
getJoinableStream	Returns existing stream.
getJoinableStreams	Returns an array of all existing streams.

Methods inherited from javax.media.mscontrol.join.Joinable	
getJoinees	Returns Joinables filtered on the connection direction.
getJoinees	Returns Joinables.
join	Establish a media stream between this object and other.
joinInitiate	Asynchronous version of join.
unjoin	Disconnect any media streams flowing between this object and other's.
unjoinInitiate	Asynchronous version of unjoin.

Methods inherited from javax.media.mscontrol.join.JoinEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

Methods inherited from javax.media.mscontrol.resource.ResourceContainer	
confirm	Request that all pending allocations/initializations are completed.

Methods inherited from javax.media.mscontrol.resource.ResourceContainer	
getConfig	
getResource	Return a handle on a resource of type resource.
triggerAction	Triggers a RTC action, requested by the application.

Methods inherited from javax.media.mscontrol.MediaObject	
createParameters	Create an empty Parameters map.
getMediaObject	Return an Iterator over all the children of this MediaObject.
getMediaObjects	Similar to getMediaObjects(), with an additional filtering based on the given type.
getParameters	Gets the value of various Parameter's from the media object.
getURI	Return a URI that uniquely identifies this object.
release	Release the resources associated to this media object.
setParameters	Set the value of various Parameter's for the media object.

Methods inherited from javax.media.mscontrol.resource.AllocationEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

Methods inherited from javax.media.mscontrol.MediaEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.

Methods inherited from javax.media.mscontrol.MediaEventNotifier	
removeListener	Remove a listener that was previously added.

Mixer Limitations:

Side-bar and coach-pupil conference to conference formats are not supported.

MediaSession

What's not supported

Field Summary	
static Parameter	TIMEOUT The value of this Parameter is an Integer, in milliseconds, after which an API call (on the objects created by this MediaSession) should timeout.

Method Summary	
VxmlDialog	createVxmlDialog (Parameters parameters) A VxmlDialog is a Joinable object that can interpret a vxml script.

Methods inherited from javax.media.mscontrol.MediaObject	
createParameters	Create an empty Parameters map.
getMediaObjects	Return an Iterator over all the children of this MediaObject.
getMediaObjects	Similar to getMediaObjects(), with an additional filtering based on the given type.
getParameters	Gets the value of various Parameter's from the media object.
getURI	Return a URI that uniquely identifies this object.
release	Release the resources associated to this media object.
setParameters	Set the value of various Parameter's for the media object.

MixerAdapter

What's not supported

Field Summary	
static Configuration<MixerAdapter>	DTMFCLAMP_VOLUME This config clamps the DTMF's that would otherwise enter the Mixer, and include a volume control.
static Configuration<MixerAdapter>	EMPTY This config is a pass-through, no media processing is performed on any stream.

Methods inherited from javax.media.mscontrol.join.JoinableContainer	
getJoinableStream	Returns existing stream.
getJoinableStreams	Returns an array of all existing streams.

Methods inherited from javax.media.mscontrol.join.Joinable	
getJoinees	Returns Joinables filtered on the connection direction.
getJoinees	Returns Joinables.
join	Establish a media stream between this object and other.
joinInitiate	Asynchronous version of join.
unjoin	Disconnect any media streams flowing between this object and other's.
unjoinInitiate	Asynchronous version of unjoin.

Methods inherited from javax.media.mscontrol.join.JoinEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

Methods inherited from javax.media.mscontrol.resource.ResourceContainer	
confirm	Request that all pending allocations/initializations are completed.
getConfig	
getResource	Return a handle on a resource of type resource.
triggerAction	Triggers a RTC action, requested by the application.

Methods inherited from javax.media.mscontrol.MediaObject	
createParameters	Create an empty Parameters map.
getMediaObject	Return an Iterator over all the children of this MediaObject.
getMediaObjects	Similar to getMediaObjects(), with an additional filtering based on the given type.
getParameters	Gets the value of various Parameter's from the media object.
getURI	Return a URI that uniquely identifies this object.
release	Release the resources associated to this media object.
setParameters	Set the value of various Parameter's for the media object.

Methods inherited from javax.media.mscontrol.resource.AllocationEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

MsControlFactory

What's not supported

Field Summary	
static java.lang.String	MEDIA_SERVER_URI MsControlFactory property defining an URI of a media server, for example sip:ms@192.168.1.2:5060. When NULL the Media Server definition from the property file is used. **Note:** The JSR 309 Connector Media Server Redundancy feature cannot be used and needs to be turned off. Refer to Setting the Media Server URI Programmatically for further details.

Method Summary	
VideoLayout	createVideoLayout(java.lang.String mimeType, java.io.Reader xmlDef) Factory method for creating an instance of VideoLayout.
MediaConfig	getMediaConfig(java.io.Reader xmlDef) Create an instance of MediaConfig, from an xml byte stream (for example a file, or a String). Example: Reader xmlDoc = new StringReader("<?
VideoLayout	getPresetLayout(java.lang.String type) Returns a VideoLayout (supported by the media server), with the characteristics as defined by type.
VideoLayout[]	getPresetLayouts(int numberOfLiveRegions) Returns an array of mixer VideoLayouts that are supported by the media server.

NetworkConnection

What's not supported

Field Summary	
static Configuration<NetworkConnection>	DTMF_CONVERSION Contains what BASIC contains, plus a SignalDetector and a SignalGenerator for forwarding DTMFs carried by the signaling channel (advanced feature).
static Configuration<NetworkConnection>	ECHO_CANCEL Contains what BASIC contains, plus an echo canceler feature.

Note: Refer to Multiple NCs per Media Session versus Single NC per Media Session Model section under Development Considerations.

Methods inherited from javax.media.mscontrol.join.JoinableContainer	
getJoinableStream	Returns existing stream.
getJoinableStreams	Returns an array of all existing streams.

Methods inherited from javax.media.mscontrol.join.Joinable	
getJoinees	Returns Joinables filtered on the connection direction.
getJoinees	Returns Joinables.
join	Establish a media stream between this object and other.
joinInitiate	Asynchronous version of join.
unjoin	Disconnect any media streams flowing between this object and other's.
unjoinInitiate	Asynchronous version of unjoin.

Methods inherited from javax.media.mscontrol.join.JoinEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.

Methods inherited from javax.media.mscontrol.join.JoinEventNotifier	
removeListener	Remove a listener that was previously added.

Methods inherited from javax.media.mscontrol.resource.ResourceContainer	
confirm	Request that all pending allocations/initializations are completed.
getConfig	
getResource	Return a handle on a resource of type resource.
triggerAction	Triggers a RTC action, requested by the application.

Methods inherited from javax.media.mscontrol.MediaObject	
createParameters	Create an empty Parameters map.
getMediaObject	Return an Iterator over all the children of this MediaObject.
getMediaObjects	Similar to getMediaObjects(), with an additional filtering based on the given type.
getParameters	Gets the value of various Parameter's from the media object.
getURI	Return a URI that uniquely identifies this object.
release	Release the resources associated to this media object.
setParameters	Set the value of various Parameter's for the media object.

Methods inherited from javax.media.mscontrol.resource.AllocationEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

Player

What's not supported

Field Summary	
static Parameter	AUDIO_CODEC Parameter identifying the audio codec used.
static Parameter	BEHAVIOUR_IF_BUSY Indicates the action to take if Player is busy when play() is invoked.
static Parameter	ENABLED_EVENTS An array of Player EventTypes, indicating which events are generated and delivered to the application.
static Value	FAIL_IF_BUSY value for BEHAVIOUR_IF_BUSY: signal an error, throw a MediaResourceException.
static Parameter	FILE_FORMAT A Parameter identifying the File Format used during a play.
static Action	JUMP_BACKWARD Jump backward by the amount specified by JUMP_TIME.
static Action	JUMP_BACKWARD_IN_PLAYLIST Jump backward the number of items indicated by JUMP_PLAYLIST_INCREMENT.
static Action	JUMP_FORWARD Jump forward by the amount specified by JUMP_TIME.
static Action	JUMP_FORWARD_IN_PLAYLIST Jump forward the number of play list items indicated by JUMP_PLAYLIST_INCREMENT.
static Parameter	JUMP_PLAYLIST_INCREMENT Integer number of items to jump forward or backward in the play list, for either a JUMP_FORWARD_IN_PLAYLIST or JUMP_BACKWARD_IN_PLAYLIST.
static Parameter	JUMP_TIME Integer number of milliseconds by which the current play list items offset is changed by JUMP_FORWARD or JUMP_BACKWARD.
static Action	JUMP_TO_PLAYLIST_END Jump to the last item in the play list.
static Action	JUMP_TO_PLAYLIST_ITEM_END Jump to the end of the current play list item.

Field Summary	
static Action	JUMP_TO_PLAYLIST_ITEM_START Jump to the start of the current play list item.
static Action	JUMP_TO_PLAYLIST_START Jump to the first item in the play list.
static Action	NORMAL_SPEED Set speed to normal.
static Action	NORMAL_VOLUME Set volume to normal.
static Action	PAUSE Pause the current Play operation, maintaining the current position in the play list item and play list.
static Trigger	PLAY_COMPLETION Trigger when a Play is completed.
static Trigger	PLAY_START Trigger when a Play is started.
static Value	QUEUE_IF_BUSY value for BEHAVIOUR_IF_BUSY: wait for previous requests to complete.
static Action	RESUME Resume the current Play operation if paused.
static Action	SPEED_DOWN Decrease speed.
static Action	SPEED_UP Increase speed.
static Parameter	START_IN_PAUSED_MODE Boolean indicating that this or subsequent play should be started in the Paused state.
static Action	STOP Stop the current Play operation.
static Action	STOP_ALL Stop the current Play operation and all pending play operations in queue.
static Value	STOP_IF_BUSY Value for BEHAVIOUR_IF_BUSY: stop any previous play.
static Action	TOGGLE_VOLUME Toggle volume between normal and previous adjusted value.

Field Summary	
static Parameter	VOLUME_CHANGE Determines the amount by which the volume is changed by the RTC actions VOLUME_UP and VOLUME_DOWN.
static Action	VOLUME_DOWN Decrease volume by value of parameter VOLUME_CHANGE.
static Action	VOLUME_UP Increase volume by value of parameter VOLUME_CHANGE.

Note: When play action is performed on the leg that is in a conference, the connector logic will take the leg out of conference, play a file, and then join back to the conference automatically.

Methods inherited from javax.media.mscontrol.MediaEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

PlayerEvent

What's not supported

Field Summary	
static EventType	PAUSED Play has been paused by RTC.
static EventType	RESUMED Play has been resumed by RTC.
static EventType	SPEED_CHANGED Playback speed has been changed due to RTC.
static EventType	VOLUME_CHANGED Playback volume has been changed due to RTC.

Method Summary	
Action	getChangeType() Return an Action that identifies the type of Speed or Volume adjustment.

Method Summary	
int	getIndex() Return the index into the play list, indicating which play list item was stopped, or paused, etc.
int	getOffset() Return the milliseconds offset (from start) where the play stopped or paused.

Methods inherited from javax.media.mscontrol.resource.ResourceEvent	
getQualifier	Get additional information about how/why a transaction terminated, the reason that causes this event.
getRTCTrigger	Get the RTC Trigger that caused this transaction completion.

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

Recorder

What's not supported

Field Summary	
static Parameter	APPEND Indicates that recording should append to the end of an existing TVM rather than overwrite it.
static Parameter	AUDIO_CLOCKRATE The desired clock rate (or sample rate) of the audio encoding The value is an Integer, in Hz.
static Parameter	AUDIO_CODEC Parameter identifying the audio Codec used for a new recording.

Field Summary	
static Parameter	AUDIO_FMTP A string-valued list of detailed audio codec parameters, in the format described by RFC 4566.
static Parameter	AUDIO_MAX_BITRATE The maximum accepted bitrate for the audio stream.
static Parameter	BEEP_FREQUENCY The frequency of the start beep.
static Parameter	BEEP_LENGTH Length of Beep preceding recording.
static Action	CANCEL Cancel the current recording operation.
static Value	DETECT_ALL_OCCURRENCES value for SPEECH_DETECTION_MODE.
static Value	DETECT_FIRST_OCCURRENCE value for SPEECH_DETECTION_MODE.
static Value	DETECTOR_INACTIVE value for SPEECH_DETECTION_MODE.
static Parameter	ENABLED_EVENTS An array of Recorder EventTypes, indicating which events are generated and delivered to the application.
static Parameter	FILE_FORMAT A Parameter identifying the File Format used during recording.
static Action	PAUSE Pause the current operation on a recorder, maintaining the current position in the Media Stream being recorded.
static Trigger	RECORD_COMPLETION Trigger when a Record is completed.
static Action	RESUME Resume the current operation on a recorder if paused.
static Parameter	SIGNAL_TRUNCATION_ON Boolean indicating whether signal(DTMF) truncation is enabled.
static Parameter	START_IN_PAUSED_MODE Boolean indicating whether subsequent record will start in PAUSE mode.
static Action	STOP Stop the current recording operation.

Field Summary	
static Parameter	VIDEO_CODEC Parameter indicating the video codec to use for a new recording (if it includes a video track).
static Parameter	VIDEO_FMTP A string-valued list of detailed video codec parameters.
static Parameter	VIDEO_MAX_BITRATE The maximum accepted bitrate for the video stream.

Methods inherited from javax.media.mscontrol.resource.Resource	
getContainer	

Methods inherited from javax.media.mscontrol.MediaEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

RecorderEvent

What's not supported

Field Summary	
static EventType	PAUSED Indicates that recording has been paused.
static EventType	RESUMED Indicates that recording has been resumed.
static EventType	STARTED Indicates that the recording has started.

Methods inherited from javax.media.mscontrol.resource.ResourceEvent	
getQualifier	Get additional information about how/why a transaction terminated, the reason that causes this event.
getRTCTrigger	Get the RTC Trigger that caused this transaction completion.

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

ResourceContainer

What's not supported

Method Summary	
void	confirm() Request that all pending allocations/initializations are completed.
void	triggerAction(Action rtca) Triggers a RTC action, requested by the application.

Methods inherited from javax.media.mscontrol.MediaObject	
createParameters	Create an empty Parameters map.
getMediaObject	Return an Iterator over all the children of this MediaObject.
getMediaObjects	Similar to getMediaObjects(), with an additional filtering based on the given type.
getParameters	Gets the value of various Parameter's from the media object.
getURI	Return a URI that uniquely identifies this object.

Methods inherited from javax.media.mscontrol.MediaObject	
release	Release the resources associated to this media object.
setParameters	Set the value of various Parameter's for the media object.

Methods inherited from javax.media.mscontrol.resource.AllocationEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

ResourceEvent<T>

What's not supported

Field Summary	
static Trigger	MANUAL_TRIGGER The Trigger returned by getRTCTrigger() when ResourceContainer.triggerAction(Action) is called.
static Qualifier	RTC_TRIGGERED Qualifier: Completion caused by a Run-Time Control.

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

SdpPortManager

What's not supported

Method Summary	
CodecPolicy	getCodecPolicy() Get the current CodecPolicy.
void	setCodecPolicy(CodecPolicy policy) Install the given CodecPolicy.

Methods inherited from javax.media.mscontrol.resource.Resource	
getContainer	

Methods inherited from javax.media.mscontrol.resource.AllocationEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

SdpPortManagerEvent

What's not supported

Field Summary	
static Qualifier	OFFER_PARTIALLY_ACCEPTED ResourceEvent.getQualifier() returns this Qualifier to indicate that the offer is partially accepted (at least 1 Media description is accepted). The application must use SdpPortManager.getMediaServerSessionDescription() to know what was accepted and what was rejected.
static Qualifier	RESOURCE_PARTIALLY_AVAILABLE ResourceEvent.getQualifier() returns this Qualifier to indicate that a media resource cannot be allocated from the Media Server.
static MediaErr	RESOURCE_UNAVAILABLE Error sent by media server in case of resource shortage.

Field Summary	
static MediaErr	SDP_GLARE Error reported by the media server when both sides of the media channel attempted to re-negotiate the SDP at the same time.
static MediaErr	SDP_NOT_ACCEPTABLE Error sent when the offer/answer procedure does not find any matching codec for any stream.

Methods inherited from javax.media.mscontrol.resource.ResourceEvent	
getQualifier	Get additional information about how/why a transaction terminated, the reason that causes this event.
getRTCTrigger	Get the RTC Trigger that caused this transaction completion.

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

SignalConstants

What's not supported

Field Summary	
static Value	CED_TONE Value for CED. 2100Hz tone answer to CNG_TONE.
static Value	CNG_TONE Value for CNG. 1100Hz tone answered by CED_TONE.
static Value	VFU_REQUEST Value representing a request for a **V**ideo**F**ast**U**pdate.

SignalDetector

What's not supported

Field Summary	
static Parameter	BUFFER_SIZE Size of the signal buffer.
static Parameter	BUFFERING Enable/disable buffering of signals.
static Action	CANCEL RTC Action to cause the cancellation of the current receiveSignals operation.
static Trigger	DETECTION_OF_ONE_SIGNAL Some signal was detected.
static Parameter	ENABLED_EVENTS An array of SignalGenerator event types, indicating which events are generated for the application.
static Action	FLUSH_BUFFER RTC Action to cause the buffer to be flushed.
static Trigger	FLUSHING_OF_BUFFER Buffer has been flushed.
static Trigger	RECEIVE_SIGNALS_COMPLETION The receiveSignals transaction has completed.
static Action	STOP RTC Action to cause the current receiveSignals operation to stop.

JSR 309 Connector Extension:

Field Summary	
Static Parameter	PROMPT Indicates a prompt to be played allowing signal detection in parallel but delaying INITIAL_TIMEOUT until after prompt completes.

Method Summary	
void	flushBuffer() Removes all signals from the signal buffer. Refer to details on specific JSR 309 Connector implementation below.
void	receiveSignals(int numSignals, Parameter[] patternLabels, RTC[] rtcs, Parameters optargs). Refer to details on specific JSR 309 Connector implementation below.
void	stop() Refer to details on specific JSR 309 Connector implementation below.

The flushBuffer() method is supported by JSR 309 Connector and used to indicate to the SignalDetector to flush any digits before executing receiveSignals request. When the flushBuffer() method is not called, the next receiveSignals() request will take existing digits (if they exist) as part of its signal detection logic.

Note: The flushBuffer() method needs to be called each time to clear the buffer before signal detection takes place. Otherwise, the default path is executed where existing digits in the buffer will not be cleared before collection.

Example:

```
mg.getSignalDetector().flushBuffer();

mg.getSignalDetector().receiveSignals(testPropNumOfSign, detectDigitPattern, rtcs,
collectOptions);
```

The receiveSignals() method is supported by JSR 309 Connector in the following variations:

- **Collect**
  The receiveSignals() collects any numSignals > 0 with optional patterns. Once a signal is detected, the detection process will be terminated. When terminated, the RECEIVE_SIGNALS_COMPLETED event will be sent.
- **Prompt and Collect**
  The receiveSignals() will collect specified signals >0 with optional patterns during the play. Once either appropriate signals are detected or play has reached the end, the receiveSignals() method will be terminated. When terminated, the RECEIVE_SIGNALS_COMPLETED event will be sent.
- **Async DTMF Detection**
  The receiveSignals() extends the signal detection functionality by providing what is known as Asynchronous (Async) DTMF detection. Async DTMF detection is supported by the JSR 309 Connector by extending the SignalDetector receiveSignals() semantics. Async DTMF allows the application to program the Media Server to generate a single DTMF event every time a DTMF digit is pressed. The single digit detection is enabled until the application decides to turn it off by using stop() method. Once the stop() method is called, the RECEIVE_SIGNALS_COMPLETED event will be sent to notify application that Async DTMF detection has been stopped.

The following method parameters need to be defined in order to use the receiveSignals() method for Async DTMF detection:

```
//Setup Detector callback
configuration = MediaGroup.PLAYER_SIGNALDETECTOR;
sigDetListener = new MySignalDetectorListener();

// Setup the options for receiveSignals
collectOptions = mscFactory.createParameters();

// Initialize
// Indicate that we want to do DTMF Async Continous Detection
// note all timeouts are default to FOREEVER
// These parameters must be set in order to trigger the forever detection

collectOptions.put(SignalDetector.BUFFERING, Boolean.FALSE );
EventType[] arrayEnabledEvents = {SignalDetectorEvent.SIGNAL_DETECTED} ;
collectOptions.put(SignalDetector.ENABLED_EVENTS, arrayEnabledEvents);

receiveSignals(-1, null, null, collectOptions);
```

The stop() method can be used during "collect" or "prompt and collect". When used before the signal is detected, the receiveSignals() method will be terminated and the RECEIVE_SIGNALS_COMPLETED event will be sent to notify application. If the stop() is called after receiveSignals() has completed, it will result in an error event being sent to the application.

Note: The reason for error is that when the receiveSignals() method is called (except for Async DTMF detection), it is executed for one time functionality (i.e., once the detection takes place it is terminated automatically).

Methods inherited from javax.media.mscontrol.resource.Resource	
getContainer	

Methods inherited from javax.media.mscontrol.MediaEventNotifier	
addListener	Add a listener class.
getMediaSession	Gives access to the MediaSession on which this event belong to.
removeListener	Remove a listener that was previously added.

Use of DTMF Pattern[]:

There are two ways to specify DTMF Pattern[] in the JSR 309 Connector:

- Storing patterns as part of the Media Group
- One time use DTMF pattern detection

Storing patterns as part of the Media Group

Storing patterns as part of the Media Group which will be in effect for the life of the Media Group. This way the pattern can be pre-set and used whenever applicable.

There are Media Group parameters which can be stored and referenced later from the particular Media Group under which they were assigned. This is useful when the application has a set of patterns being reused for the life of the Media Group.

The application can assign values of the Media Group Detector Static Pattern table by writing the following sample code:

```
private Parameters collectOptions;
collectOptions = mscFactory.createParameters();

collectOptions.put(SignalDetector.INITIAL_TIMEOUT, initialDigitTimeout);
collectOptions.put(SignalDetector.INTER_SIG_TIMEOUT, interDigitTimeout);
collectOptions.put(SignalDetector.MAX_DURATION, interMaxDuration );
Parameters mgParms = mg.createParameters();

string testPropPattern="#";

mgParms.put(SignalDetector.PATTERN[1], testPropPattern);
mg.setParameters(mgParms);

Parameter[] detectDigitPattern = { SignalDetector.PATTERN[1] }; //redefine the pattern 1 value
mg.getSignalDetector().receiveSignals(testPropNumOfSign, detectDigitPattern, rtcs,
collectOptions);
```

One time use DTMF pattern detection

One time use DTMF pattern detection when pattern is just needed for the one time execution and storing it is not needed.

Local function definition of the DTMF patterns can be defined as well and simply passed as a parameter attribute to the appropriate signal detection method:

```
private Parameters collectOptions;
collectOptions = mscFactory.createParameters();

collectOptions.put(SignalDetector.INITIAL_TIMEOUT, initialDigitTimeout)
collectOptions.put(SignalDetector.INTER_SIG_TIMEOUT, interDigitTimeout);
collectOptions.put(SignalDetector.MAX_DURATION, interMaxDuration );

string testPropPattern="#";

collectOptions.put(SignalDetector.PATTERN[1], testPropPattern);
Parameter[] detectDigitPattern = { SignalDetector.PATTERN[1] };
mg.getSignalDetector().receiveSignals(testPropNumOfSign, detectDigitPattern, rtcs,
collectOptions);
```

Supported Patterns and Examples

The following tables provide a list of supported patterns and examples:

- Supported patterns where "Number of Signals" is set to 1 or more
- Supported patterns where "Number of Signals" is set to 0 or less

The "Number of Signals" column defines the number of signals to be detected.

The "Match Pattern" column defines the DTMF pattern to look for. Note, the definitions of this parameter depend on "Number of Signals" used.

The "DTMF Entered" column shows the string of DTMF which were pressed during the test. Note, the digit highlighted in **bold** shows the DTMF which caused a completion of collection.

Supported patterns where "Number of Signals" is set to 1 or greater

"Number of Signals" defines the maximum required number of DTMF signals to look for. Note, the minimum value is always set to 1.

"Match Pattern" defines a digit which will terminate the DTMF signal detection. Note, the only valid values for "Match Pattern" are a single digit: 0-9, A, B, C, D, *, or #.

The DTMF defined in "Match Pattern" will be returned as part of matched string. Note, the DTMF used in Match Pattern can only be used as a DTMF that terminates detection.

Sample Number	Number of Signals	Match Pattern	DTMF Entered	Outcome
1	5	4	**4**56	No Match: 4 Match Pattern value was detected but minimum number of signals was not satisfied
2	5	4	56**4**	Match 564
3	5	#	12**#**	Match 12#
4	3	#	258	No Match: 258 As "#" was expected but not present.
5	5	#	12345**6**	No Match: 123456 As "#" was expected but "6" was received instead.

Supported patterns where "Number of Signals" is set to 0 or less

"Number of Signals" needs to be set to "0".

"Match Pattern" defines a pattern string which will be used to detect DTMFs.

There are two supported types of match pattern strings:

- String which will define minimum (min) and maximum (max) number of digits to be looked for with optional termination key (rtk).

  Example: "min=X;max=Y" or "min=X;max=Y;rtk=Z"

  X - defines minimum number of digits to be collected
  Y - defines maximum number of digits to be collected
  Z - defines a single digit type to be used as a termination digit of expected DTMF pattern (optional)

  Note: This is similar to the table above except this option allows setting the minimum value for the pattern to be detected.

- String defining specific number and type of DTMFs to look for with an option of using a wild card "X". Supported characters in this string are: 0-9, A, B, C, D, *, or # as well as "X" which is used as a wild card representing any of the supported DTMF characters.

  Example: "1234", "123x4", "xxxx", etc.

  Note: The only valid values for "Match Pattern" are a single digit: 0-9, A, B, C, D, *, or # DTMF defined in "Match Pattern" will be returned as part of matched string.

Sample Number	Number of Signals	Match Pattern	DTMF Entered	Outcome
1	0	min=3;max=5	123	Match: 123 As soon as Inter Digit Timeout expires after digit "3" was pressed.
2	0	min=3;max=5; rtk=#	12345**#**	Match: 12345#
3	0	min=2;max=5; rtk=#	123456	No Match: 123456 Expected rtk "#" but received "6" instead.
4	0	min=1;max=5; rtk=#	12345**#**	Match: 12345#
5	0	123	12**3**	Match: 123
6	0	XXXX	123**4**	Match: 1234
7	0	min=2;max=5; rtk=3	**3**33	No Match: 3 Received rtk digit but min/max range was not satisfied.
8	0	12X33	1293**3**	Match: 12933 **Note:** DTMF "9" was matched by a wild card "x".

SignalDetectorEvent

What's not supported

Field Summary	
static EventType	FLUSH_BUFFER_COMPLETED FlushBuffer completion event.
static EventType	OVERFLOWED The SignalDetector signal buffer has overflowed.
static Qualifier	PROMPT_FAILURE Returned by SignalDetectorEvent.getQualifier() to indicate that the receiveSignals operation was aborted, because the prompt could not be played.

Method Summary	
Value[]	getSignalBuffer() Get array of matched signal names.

Methods inherited from javax.media.mscontrol.resource.ResourceEvent	
getQualifier	Get additional information about how/why a transaction terminated, the reason that causes this event.
getRTCTrigger	Get the RTC Trigger that caused this transaction completion.

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.
isSuccessful	

SpeechDetectorConstants

What's not supported

Field Summary	
static Parameter	BARGE_IN_ENABLED Controls whether the caller can start speaking before prompts have ended.
static Trigger	END_OF_SPEECH Trigger when end of speech has been detected (i.e., final timeout popped).
static Qualifier	END_OF_SPEECH_DETECTED SpeechDetector stopped because end of speech has been detected.
static Parameter	FINAL_TIMEOUT Controls the length of a period of silence after callers have spoken to conclude they finished.
static Parameter	INITIAL_TIMEOUT Controls how long the recognizer should wait after the end of the prompt for the caller to speak before sending a Recorder event (COMPLETED, INITIAL_TIMEOUT_EXPIRED, null, NO_ERROR).

Field Summary	
static Trigger	INITIAL_TIMEOUT_EXPIRATION Trigger when no speech has been detected before the initial timeout popped.
static Qualifier	INITIAL_TIMEOUT_EXPIRED SpeechDetector stopped because no speech has been detected before the initial timeout popped.
static Action	PROMPT_DONE Advise the Speech Detector that the prompt is finished.
static Parameter	SENSITIVITY Sensitivity of the speech detector when looking for speech.
static Qualifier	SPEECH_DETECTED SpeechDetector detected speech.
static Trigger	START_OF_SPEECH Trigger when speech has been detected.

VideoRendererEvent

What's not supported

Field Summary	
static EventType	RENDERING_COMPLETED EventType of the VideoRendererEvent that is sent when the rendering of all discrete or continuous media is complete.

Methods inherited from javax.media.mscontrol.resource.ResourceEvent	
getRTCTrigger	Get the RTC Trigger that caused this transaction completion.

Methods inherited from javax.media.mscontrol.MediaEvent	
getError	Identify the reason or cause of an error or failure.
getErrorText	Returns a human-readable error cause, if any.
getEventType	Get the EventType that identifies the event nature.
getSource	Gives access to the source of the Media Event.

Methods inherited from javax.media.mscontrol.MediaEvent	
isSuccessful	

7. Release Issues

This section lists the issues that may affect the JSR 309 Connector.

Issues Table

The table below lists issues that affect the JSR 309 Connector. The following information is provided for each issue:

Issue Type

This classifies the type of release issue based on its effect on users and its disposition:

- Known – A minor issue. This category includes interoperability issues and compatibility issues. Known issues are still open but may or may not be fixed in the future.
- Known (permanent) – A known issue or limitation that is not intended to be fixed in the future.
- Resolved – An issue that was resolved (usually either fixed or documented) in this release.

Defect No.

A unique identification number that is used to track each issue reported.

Release No.

For defects that were resolved in a release, the release number is shown.

Product or Component

The product or component to which the problem relates; for example, an API.

Description

A summary description of the issue. For non-resolved issues, a workaround is included when available.

Issues Sorted by Type, JSR 309 Connector

Issue Type	Defect No.	Release No.	Product or Component	Description
Resolved	MSC-164	4.0 SU3	JSR 309 Connector	Resolved scenario where SignalDetector and PROMPT correctly utilizes INITIAL_TIMEOUT which will be used after the PROMPT finishes.
Known	XMS-1511	4.0 SU1	JSR 309 Connector	The measured duration for TCK test_2_1_1_4_RepeatCount test takes too long at 5821 ms compared to the allowed duration of 5800 ms.

Issue Type	Defect No.	Release No.	Product or Component	Description
Resolved	MSC-43	4.0 SU1	JSR 309 Connector	MEDIA_SERVER_URI should be able to allow for "=".
Resolved	MSC-42	4.0 SU1	JSR 309 Connector	In a specific scenario when the user defines min and max values for their detector, the JSR 309 Connector incorrectly inserts rtk parameter into MSML payload.
Resolved	MSC-41	4.0 SU1	JSR 309 Connector	In some instances when SASID is null, the log reports this as INFO Null Pointer exception which causes issues in debugging process.
Resolved	MSC-40	4.0 SU1	JSR 309 Connector	There should be flush buffer functionality for signal detector. The user would be able to flush a buffer before starting signal detection.
Resolved		4.0 SU1	JSR 309 Connector	Resolved issue in handling detector receiveSignals filter. The user is allowed to either override the default filter table by using mg.setParameters() or set the detector filter via the parameter value as part of the receiveSignals API.

8. Appendix A: DLGCSMIL Video Layout <dlgcsmil>

Acronym	Description
DLGCSMIL	Dialogic SMIL like makeup language to define the video layout in the conference
XML	Extended Markup Language
RGB	Red-Green-Blue color model
JPEG	Joint Photographic Experts Group image format
PNG	Portable Network Graphics file format

The DLGCSMIL Video Layout <dlgcsmil> has the following elements:

- <head>
- <layout>
- <region>
- <body>
- <par>
- <ref>
- <text>
- <img>
- <scroll>

```
<dlgcsmil …>
   <head>
      <layout…>
         <region …/>
         <region …/>
         …
      </layout>
   </head>
   <body>
      <par>
         <ref …/>
         <text …>
            <scroll …/>
         </text>
         <img …>
            <scroll …/>
         </img>
      </par>
   </body>
</dlgcsmil>
```

Elements

<head>

Parent: <dlgcsmil>

Child Elements: <layout>

Description

Contents layout info, only one layout element is allowed.

<layout>

Parent: <head>

Child: <region>

Description

A layout is specified using the <layout> element. It is used as a container to hold elements that describe all of the properties of a video mix. When the video mix in composed of multiple panes, the location and characteristics of the panes are defined by one or more <region> elements.

Attributes

Attributes	Description
size	This attribute specifies the resolution of the root window. Supported values are: QCIF, CIF, 4CIF, 16CIF, VGA, and 720p. The attribute is optional when creating the Conference. • Default value = CIF

<region>

Parent: <layout>

Child Elements: None.

Description

The <region> element is used to define video panes (or tiles) that are used to display participant video streams in a video conference. Regions are rendered on top of the root window. Up to 10 regions may be defined for each conference.

The location of the top left corner of a region is specified using the position attributes "top" and "left" and is defined relative to the top left corner of the root window. The size of a region is specified using the "relativesize" attribute and is defined relative to the size of the root window.

An example of a video layout with six regions is:

```
+----------+-----+
|           | 2  |
|        1 +-----+
|           | 3  |
+----+----+------+
| 6  | 5   |  4  |
+---+------+-----+
```

```
< layout size="CIF"/>
         <region id="1" left="0" top="0" relativesize="2/3"/>
         <region id="2" left="67" top="0" relativesize="1/3"/>
         <region id="3" left="67" top="33" relativesize="1/3">
         <region id="4" left="67" top="67" relativesize="1/3"/>
         <region id="5" left="33" top="67" relativesize="1/3"/>
         <region id="6" left="0" top="67" relativesize="1/3"/>
</layout>
```

Portions of regions that extend beyond the root window will be cropped.

For example, a layout specified as:

```
< layout size="CIF"/>
         <region id="foo" left="50%" top="50%" relativesize="2/3"/>
</layout>
```

Would appear similar to:

```
+---------- --+
| root        |
|background   |
|         +--- +--
|         |    |//
|         |foo |//
+--------+----+//
       |////////
```

The area of the root window covered by a region is a function of the region's position and its size. When areas of different regions overlap, they are layered in order of their "priority" attribute. The region with the highest value for the "priority" attribute is below all other regions and will be hidden by overlapping regions. The region with the lowest non-zero value for the "priority" attribute is on top of all other regions and will not be hidden by overlapping regions. The priority attribute may be assigned values between 0 and 1. Note that a value of "0" is currently not supported.

Regions that do not specify a priority will be assigned a priority by a media server when a conference is created. The first region within the <layout> element that does not specify a priority will be assigned a priority of one, the second a priority of two, etc. In this way, all regions that do not explicitly specify a priority will be underneath all regions that do specify a priority. As well, within those regions that do not specify a priority, they will be layered from top to bottom, in the order they appear within the <layout> element.

For example, if a layout was specified as follows:

```
<layout>
         <region id="a" ... priority=".3" .../>
         <region id="b" ... />
         <region id="c" ... priority=".2" ...>
         <region id="d" ... />
</layout>
```

Then the regions would be layered, from top to bottom: c,a,b,d.

Attributes

Attributes	Description
id	Mandatory: This attribute specifies a name that is used to refer to the region. For example, reference to a region is required when modifying the characteristics of a region and when specifying which region a video stream will be displayed in. Note that once a region is created for a conference, that region will continue to exist for the life of the conference. Therefore only 10 regions with 10 unique ids can be used for regions of a conference. The region can be made invisible and it can be reused with different characteristics. But the region and its id will only be destroyed when the conference that it belongs to is destroyed or the video mix of the conference that it belongs to is destroyed.
left	Mandatory: This attribute specifies the position of the left edge of the region as a relative offset from the left edge of the root window. Values may be expressed either as a percent (%) of the horizontal dimension of the root window.
top	Mandatory: This attribute specifies the position of the top edge of the region as a relative offset from the top edge of the root window. Values may be expressed either as a percent (%)of the horizontal dimension of the root window.
left	Optional: This attribute specifies a priority level determining how regions are visible when they overlap with other regions. Regions with lower priority levels will be layered on top of regions with higher priority levels. Supported values are 0.1 to 0.9 (0.1, 0.2, …, 0.9) For regions with the same priority level, the last region created will be layered on top of previous regions created. Note that a value of "0" is currently not supported. Default value = 1.

<body>

Parent: <dlgcsmil>

Child Elements: <par>

Description

Specify the region's display and text/img overlay in the region.

<par>

Parent: <body>

Child Elements: <ref>, <text>, <img>

Description

A par container, it is a placeholder for now.

<ref>

Parent: <par>

Child Elements: None.

Description

It is a generic media object that displays in the region. In the JSR 309 Connector, it could be the following URIs:

- mscontrol:////Mixer/StreamGroup.__Any__ (Any Stream)

  Example:

  ```
  <ref region="1" src=" mscontrol:////Mixer/StreamGroup.__Any__"/>
  ```

- mscontrol:////Mixer/StreamGroup.__MostActive__ (Most Active Stream)

  Example:

  ```
  <ref region="1" src=" mscontrol:////Mixer/StreamGroup.__Any__"/>
  ```

- network connection object's URI

  Example:

  ```
  <ref region="1" src=" mscontrol://146.152.122.179/app-pko6kgxamxoi 9601 -
  40f42b601b40bc91.MS-458b3131fc991/com.vendor.dialogic.javax.media.mscontrol.
  networkconnection.DlgcXNetworkConnection.XNC-458b3137b7551"/>
  ```

For "Most Active Stream" only can be defined once in a life time of the conference, and it cannot be removed once it is be defined in a region.

Attributes

Attributes	Description
region	Mandatory: This attribute specifies the identifier of a video layout region that is to be used to display the video stream.
src	Mandatory: This attribute specifies the URI of a video stream source that is to be displayed in the region.

<text>

Parent: <par>

Child Elements: <scroll>

Description

The text overlay is placed in a region.

For "Most Active Stream" only can be defined once in a life time of the conference, and it cannot be removed once it is be defined in a region.

Attributes

region: (mandatory) This attribute specifies the identifier of a video layout region that is to be used to display the text overlay.

src: (mandatory) This attribute specifies the URI of a video stream source that is to be displayed in the region.

leftPosition: the position of the overlay from the left side of the reference window, defined as a % of the overall width of the reference window. Supported values, when expressed as a percent, range from -100 to 100. Default value = 0 if not previously specified.

topPosition: the position of the overlay from the top of the reference window, defined as a % of the overall height of the reference window. Supported values, when expressed as a percent, range from -100 to 100. Default value = 0 if not previously specified.

horizontalSize: the horizontal size of the layout expressed as a % of the reference window horizontal size. Supported values, when expressed as a percent, range from 0% to 100%. Default value = 0 if not previously specified.

verticalSize: the vertical size of the layout expressed as a % or fraction of the reference window vertical size. Supported values, when expressed as a percent, range from -100% to 100%. Supported values, when expressed as a percent, range from -100 to 100. Default value = 0 if not previously specified.

priority: a number between 0 and 1 that is used to define the precedence when rendering overlapping layouts. A value of "0" (zero) deletes the overlay. When areas of different layouts overlap, they are layered in order of their "priority" attribute. The layout with the highest value for the "priority" attribute is below all other layouts and may be hidden by overlapping layouts. The layout with the lowest non-zero value for the "priority" attribute is on top of all other layouts and will not be hidden by overlapping layouts. The priority attribute may be assigned values between 0 and 1. A value of zero disables the layout deleting it and freeing any resources associated with the layout. Note that layouts at the root level will always display on top of layouts specified at the region level, regardless of the priority setting.

borderWidth: Horizontal and vertical border width of the overlay defined as a % of the overall height of the layout window. Supported values, when expressed as a percent, range from 0% to 50%. This specifies the width sizes of the border inside the layout window. This attribute overrides hBorderWidth and vBorderWidth. It should not be specified when using hBorderWidth and vBorderWidth. Default is "0", no border.

hBorderWidth: Horizontal border width of the overlay defined as a % of the overall height of the layout window. This attribute may be used if there is a desire to have different settings for the horizontal and vertical borders. For example, a vertical border may be desired while a horizontal border may not be desired. Supported values, when expressed as a percent, range from 0% to 20%. This specifies the horizontal width size of the border inside the layout window. Default is "0", no border.

vBorderWidth: Vertical border width of the overlay defined as a % of the overall height of the layout window. This attribute may be used if there is a desire to have different settings for the horizontal and vertical borders. For example, a vertical border may be desired while a horizontal border may not be desired. Supported values, when expressed as a percent, range from 0% to 20%. This specifies the vertical width size of the border inside the layout window. Default is "0", no border.

borderColor: Color of the overlay border. For supported values, see Supported Colors. The default value is "gray".

borderOpacity: This attribute defines the opacity of the border of the overlay region. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. A borderOpacity=0% results in a fully transparent border. The default value of this attribute is 100 (fully opaque).

backgroundColor: Background color of the layout. For supported values, see Supported Colors. The default value is "blue".

backgroundOpacity: This attribute defines the opacity of the background of the overlay region. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. The default value of this attribute is 100%. A backgroundOpacity=0% results in a fully transparent background.

fontFamily: Name of the font family. Values are as follows: Arial, Courier New, Tacoma, Times New Roman, Verdana, or any font type that is supported on the host platform.

fontStyle: Font style: Values are: normal and italic. The default value is "normal".

fontWeight: Font weight. Values are: normal and bold. The default value is "normal".

fontEffects: Font effects. Values are: none and underlined. The default value is "none".

fontSize: Font size. Values are specified as a % of the vertical size of the layout region. Supported values, when expressed as a percent, range from 0.0% to 100.0%. The default value is 90 (90%).

fontColor: Color of text. For supported values, see Supported Colors. The default value is white.

fontOpacity: This attribute defines the opacity of the font color to be applied to the font when this style is applied. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. The default value of this attribute is 100%.

textBackgroundColor: Background color of the text. For supported values, see Supported Colors. The default value is "blue".

textBackgroundOpacity: This attribute defines the opacity of the background of the text. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. The default value of this attribute is 100%. A backgroundOpacity=0% results in a fully transparent background.

textAlignment: Alignment of text within the layout region. Values supported are: center, centerLeft, centerRight, topLeft, bottomLeft, topRight, bottomRight, topCenter, bottomCenter. Default value is center. For the case where content applied is static, textAlignment refers to the positioning of static text within the overlay window. For the value center, text is centered within the layout window. For the case where content applied is scrolled, textAlignment does not apply.

wrapOption: Wrap option. The default value is "nowrap". Values are: "wrap" (word wrap) and "nowrap". Wrap direction is by default, top to bottom when text-direction is either lr or rl, and is left to right when text-direction is either tb or bt.

duration: Specifies time duration for the content to be displayed. Values are specified in seconds and milliseconds. A value of "0" indicates that the content should be displayed indefinitely. Duration does not apply when content is scrolled. Default = "0".

src: Identifies the location of the text to be overlaid. The file and http schemes are supported. This attribute may be omitted if inline text is specified using the text attribute.

type: Used with the src attribute. Specifies the MIME type of the text to be overlaid. Values supported are: text/plain. Default value is text/plain.

encoding: The encoding type of the text. Values are: "UTF8", "ASCII", or "GB18030". Default value is "UTF8".

text: The inline text.

Notes

The fontFamily types are limited to those installed on the host system. The system uses two open source engines for text layout (Pango) and graphical rendering (Cairo). These engines are configured to use the same font libraries as used by the Host system when displaying text. When a font family (fontFamily) type is specified, the system will use the pre-installed libraries (i.e., Fontconfig/Freetype open source libraries) and the UTF-8 formatted input to determine the fontFamily style in which the text is rendered.

The system always requires text in UTF-8 format. For all inline specifications, the text must be in UTF-8 format. For text specifications in which the text is not inline, and the file containing the text is not encoded in UTF-8, the encoding attribute is required to determine if conversion is required by the system prior to rendering.

At least one of the src and text attributes has to be defined. If both are being defined, text has higher priority.

Parent: <par>

Child Elements: <scroll>

Description

The image overlay is placed in a region.

Attributes

region: (mandatory) This attribute specifies the identifier of a video layout region that is to be used to display the image overlay.

leftPosition: the position of the overlay from the left side of the reference window, defined as a % of the overall width of the reference window. Supported values, when expressed as a percent, range from -100 to 100. Default value = 0 if not previously specified.

topPosition: the position of the overlay from the top of the reference window, defined as a % of the overall height of the reference window. Supported values, when expressed as a percent, range from -100 to 100. Default value = 0 if not previously specified.

horizontalSize: the horizontal size of the layout expressed as a % of the reference window horizontal size. Supported values, when expressed as a percent, range from 0% to 100%. Default value = 0 if not previously specified.

verticalSize: the vertical size of the layout expressed as a % or fraction of the reference window vertical size. Supported values, when expressed as a percent, range from -100% to 100%. Supported values, when expressed as a percent, range from -100 to 100. Default value = 0 if not previously specified.

priority: a number between 0 and 1 that is used to define the precedence when rendering overlapping layouts. A value of "0" (zero) deletes the overlay. When areas of different layouts overlap, they are layered in order of their "priority" attribute. The layout with the highest value for the "priority" attribute is below all other layouts and may be hidden by overlapping layouts. The layout with the lowest non-zero value for the "priority" attribute is on top of all other layouts and will not be hidden by overlapping layouts. The priority attribute may be assigned values between 0 and 1. A value of zero disables the layout deleting it and freeing any resources associated with the layout. Note that layouts at the root level will always display on top of layouts specified at the region level, regardless of the priority setting.

borderWidth: Horizontal and vertical border width of the overlay defined as a % of the overall height of the layout window. Supported values, when expressed as a percent, range from 0% to 50%.This specifies the width sizes of the border inside the layout window. This attribute overrides hBorderWidth and vBorderWidth. It should not be specified when using hBorderWidth and vBorderWidth. Default is "0", no border.

hBorderWidth: Horizontal border width of the overlay defined as a % of the overall height of the layout window. This attribute may be used if there is a desire to have different settings for the horizontal and vertical borders. For example, a vertical border may be desired while a horizontal border may not be desired. Supported values, when expressed as a percent, range from 0% to 20%. This specifies the horizontal width size of the border inside the layout window. Default is "0", no border.

vBorderWidth: Vertical border width of the overlay defined as a % of the overall height of the layout window. This attribute may be used if there is a desire to have different settings for the horizontal and vertical borders. For example, a vertical border may be desired while a horizontal border may not be desired. Supported values, when expressed as a percent, range from 0% to 20%. This specifies the vertical width size of the border inside the layout window. Default is "0", no border.

borderColor: Color of the overlay border. For supported values, see Supported Colors. The default value is "gray".

borderOpacity: This attribute defines the opacity of the border of the overlay region. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. A borderOpacity=0% results in a fully transparent border. The default value of this attribute is 100 (fully opaque).

backgroundColor: Background color of the layout. For supported values, see Supported Colors. The default value is "blue".

backgroundOpacity: This attribute defines the opacity of the background of the overlay region. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. The default value of this attribute is 100%. A backgroundOpacity=0% results in a fully transparent background.

imgBackgroundColor: Background color of the image. For supported values, see Supported Colors. The default value is "blue".

imgBackgroundOpacity: This attribute defines the opacity of the background of the image. It accepts a percentage value in the range 0-100% or a number in the range 0.0-1.0, with 100% or 1.0 meaning fully opaque. The default value of this attribute is 100%. A backgroundOpacity=0% results in a fully transparent background.

applyMode: Fill mode: Specifies how the image will be applied to the overlay window. Values are as follows:

- resizeToFit: The image will be resized to fit within the overlay window while maintaining the aspect ratio of the image.
- resizeToFill: The image will be resized in both the horizontal and/vertical dimensions if necessary.
- maintainSize: The image is not resized. If the overlay image is equal in size or smaller than the overlay window, the image will be displayed in its entirety. If the overlay image is larger than the overlay window, in either the horizontal or vertical dimension, the image will be cropped when displayed.
- Default is resizeToFit.

imgSize: Image size values are specified as a % of the vertical size of the layout region. Supported values, when expressed as a percent, range from 0.0% to 100.0%. The default value is 90 (90%).

imgAlignment: Alignment of the image within the layout region. This attribute does not apply when the applyMode is set to resizeToFill. Values supported are: center, centerLeft, centerRight, topLeft, bottomLeft, topRight, bottomRight, topCenter, bottomCenter. For the case where content applied is static, imgAlignment refers to the positioning of a static image within the overlay window. For the value center, the image is centered within the layout window. For the case where content applied is scrolled, imgAlignment does not apply. Default is center.

duration: Specifies a time duration for the content to be displayed. Values are specified in seconds and milliseconds. A value of "0" indicates that the content should be displayed indefinitely. Duration does not apply when content is scrolled. Default = "0".

src: (mandatory) Identifies the location of the image to be overlaid. The file and http schemes are supported.

type: Specifies the image MIME type of the image to be overlaid. Values supported are: image/png, image/jpeg.

Notes

Lower levels (media processing engine) require that the file extension reflect the correct format of image type (i.e., jpg or png).

The system supports both local and remote file name specifications, with the exception of overlay template files that must be local.

The duration does not apply, if the image is being scrolled.

<scroll>

Parent: <text>, <img>

Child Elements: None.

Description

The <scroll> element is used to describe how text is rendered in an overlay. It describes attributes with respect to how scrolling is performed and the look and feel of the scrolling output (i.e., speed, direction, alignment).

Attributes

mode: The scrolling mode. Values are: scrollOnce (scroll content one time), scrollContinuous (scroll continuously). Default is scrollOnce.

speed: Speed of content scrolling in % per second relative to the text/img layout region. Values supported are from 1 to 100 in increments of 1%. The default value is 25 (25%).

direction: Direction of content to be scrolled. Values supported are: lr (left to right), rl (right to left), tb (top to bottom), bt (bottom to top). The default value is rl (right to left).

padding: Specifies minimum padding to be added before the scrolled text/img . Values are in % relative to the text layout region in the dimension (width, height) of scrolling and supported values are from 1 to 100 in increments of 1%. The default value is set to a value of 5 (5%).

Supported Colors

Attributes that specify color are as follows:

- For <overlay>, attributes backgroundColor and borderColor.
- For <textStyle>, attributes fontColor and backgroundColor.
- For <imgStyle>, attributes backgroundColor.

Supported values for these attributes are as follows:

aliceblue, antiquewhite, aqua, aquamarine, azure, beige, bisque,
black, blanchedalmond, blue, blueviolet, brown, burlywood, cadetblue, chartreuse,
chocolate, coral, cornflowerblue, cornsilk, crimson, cyan, darkblue,
darkcyan, darkgoldenrod, darkgray, darkgrey, darkgreen, darkkhaki, darkmagenta, darkoliv
egreen, darkorange, darkOrchid, darkred, darksalmon,
darkseagreen, darkslateblue, darkslategray, darkslategrey, darkturquoise, darkviolet,
deeppink, deepskyblue, dimgray, dimgrey, dodgerblue, firebrick, floralwhite,
forestgreen, fuchsia, gainsboro, ghostwhite, gold, goldenrod,
gray, grey, green, greenyellow, honeydew, hotpink, indianred, indigo,
ivory, khaki, lavender, lavenderblush, lawngreen, lemonchiffon, lightblue, lightcoral,
lightcyan, lightgoldenrodyellow, lightgray, lightgrey, lightgreen, lightpink, lightsalmon,
lightseagreen, lightskyblue, lightslategray, lightslategrey, lightsteelblue, lightyellow, lime,
limegreen, linen, magenta, maroon, mediumaquamarine, mediumblue, mediumorchid,
mediumpurple, mediumseagreen, mediumslateblue, mediumspringgreen, mediumturquoise,
mediumvioletred, midnightblue, mintcream, mistyrose, moccasin, navajowhite, navy,
oldlace, olive, olivedrab, orange, orangered, orchid, palegoldenrod, palegreen,
paleturquoise, palevioletred, papayawhip, peachpuff, peru, pink, plum, powderblue, purple,
red, rosybrown, royalblue, saddlebrown, salmon, sandybrown, seagreen,
seashell, sienna, silver, skyblue, slateblue, slategray, slategrey, snow, springgreen,
steelblue, tan, teal, thistle, tomato, turquoise, violet, wheat, white, whitesmoke, yellow, and
yellowgreen

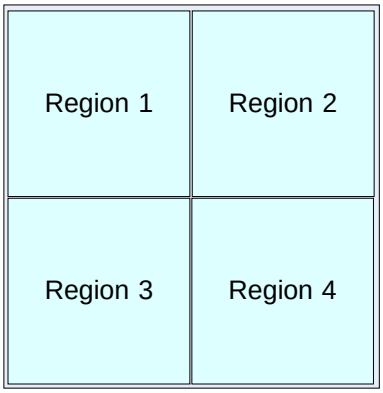
Also supported are colors defined in compliance with W3C CSS2 recommendation section 4.3.6 subclause. The section describes a list of color keywords that can be specified in the RGB color space. For example, the rgb(255,255,255) format. See the following specifications for more details.

http://www.w3.org/TR/CSS2/syndata.html#color-units

Color specification using the HTML color code hexadecimal triplets format is also supported (i.e., #FFFFFF). This format represents the colors red, green and blue (#RRGGBB) and can be used with any of the color attributes.

DLGCSMIL Script Examples for Text and Image Overlays Applied to a Conference

All examples in this section apply overlays to a video conference using a 4 party layout and a VGA root size, as shown in the following figure, and the <head> element is used in script that follows to create each region for the participants.



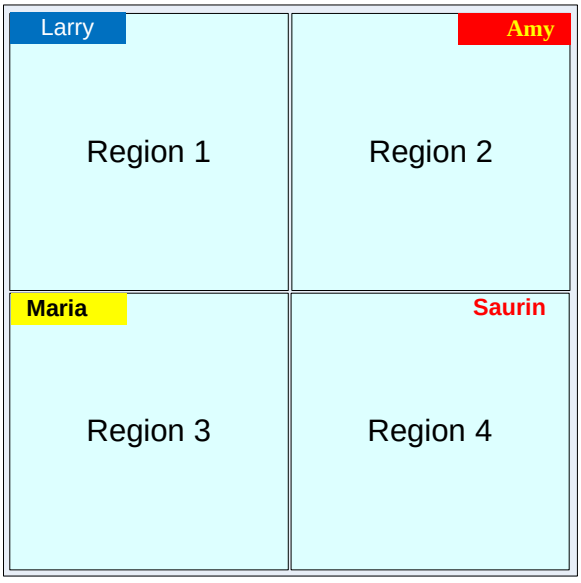
Video Layout 4.1

```
<?xml version="1.0" encoding="UTF-8"?>
<dlgcsmil version="1.0">
<head">
<layout size="VGA"/>>
<region id="1" left="0" top="0" relativesize="1/2"/>
<region id="2" left="50" top="0" relativesize="1/2"/>
<region id="3" left="0" top="50" relativesize="1/2"/>
<region id="4" left="50" top="50" relativesize="1/2"/>
</layout>
</head>
…
</dlgcsmil>
```

Example Adding Static Text Overlays to Regions of a Conference

For this example, a persistent text overlay is added to each region of the conference to display the name of the party in that region. All 4 overlays are added via the same dlgcsmil script.

Figure 1



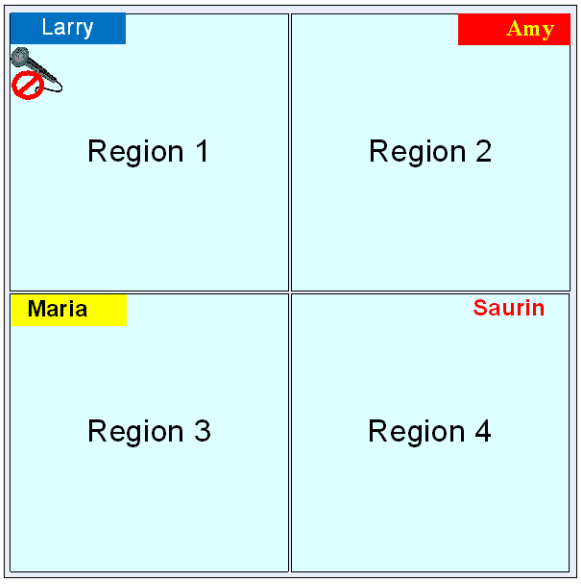
The below dialog script defines the conference layout as illustrated in Figure 1. Each region is defined in addition with an overlay name (i.e., the conferee name) and its display characteristics. Each name overlay has a different color scheme (text color, background) and is located in the upper right or left corner of the region.

```
<?xml version="1.0" encoding="UTF-8"?>
<dlgcsmil version="1.0">
        <head>
                <layout size="VGA">
                        <region id="1" left="0" top="0" relativesize="1/2"/>
                        <region id="2" left="50" top="0" relativesize="1/2"/>
                        <region id="3" left="0" top="50" relativesize="1/2"/>
                        <region id="4" left="50" top="50" relativesize="1/2"/>
                </layout>
        </head>
        <body>
                <par>
                        <ref region="1" src="mscontrol:////Mixer/StreamGroup.__MostActive__" />
                        <ref region="2" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <ref region="3" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <ref region="4" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <text region="1" leftPosition="0" topPosition="0" horizontalSize="40"
verticalSize="10"
                                                backgroundOpacity="0" priority="0.1"
fontFamily="Arial" textBackgroundColor="blue"
                                                text="Larry"/>
                        <text region="2"  leftPosition="60" topPosition="0" horizontalSize="40"
verticalSize="10"
  borderColor="red" backgroundOpacity="0" priority="0.1"
 fontFamily="TimesNewRoman" fontWeight="bold" fontColor="yellow"
 textBackgroundColor="red" textAlignment="centerRight" text="Amy"
 duration />>
                        <text region="3"  leftPosition="0" topPosition="0" horizontalSize="40"
verticalSize="10"
  backgroundOpacity="0" priority="0.1" fontFamily="Arial"  fontWeight="bold"
  fontColor="black" textBackgroundColor="yellow" textAlignment="centerLeft"
  text="Maria"/>
                        <text region="4"  leftPosition="60" topPosition="0" horizontalSize="40"
verticalSize="10"
                                        backgroundOpacity="0" priority="0.1" fontFamily="Arial"
fontWeight="bold"
                                                fontColor="red" textBackgroundOpacity="0"
text="Saurin"/>
                </par>
        </body>
</dlgcsmil>
```

Example Adding an Additional Static Image Overlay to a Region of a Conference

For this example, a persistent image overlay is added to region 1 to indicate that party in that region is currently muted. The resulting displayed video for the conference will be as illustrated in Figure 2 below.

Figure 2




```
<dlgcsmil version="1.0">
        <head>
                <layout size="VGA">
                        <region id="1" left="0" top="0" relativesize="1/2"/>
                        <region id="2" left="50" top="0" relativesize="1/2"/>
                        <region id="3" left="0" top="50" relativesize="1/2"/>
                        <region id="4" left="50" top="50" relativesize="1/2"/>
                </layout>
        </head>
        <body>
                <par>
                        <ref region="1" src="mscontrol:////Mixer/StreamGroup.__MostActive__" />
                        <ref region="2" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <ref region="3" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <ref region="4" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <text region="1" leftPosition="0" topPosition="0" horizontalSize="40"
verticalSize="10"
                                                backgroundOpacity="0" priority="0.1"
fontFamily="Arial" textBackgroundColor="blue"
                                                text="Larry"/>
                        <text region="2"  leftPosition="60" topPosition="0" horizontalSize="40"
verticalSize="10"
  borderColor="blue" backgroundOpacity="0" priority="0.1"
 fontFamily="TimesNewRoman" fontWeight="bold" fontColor="yellow"
```

```
 textBackgroundColor="red" textAlignment="centerRight" text="Amy"
 duration />>
                        <text region="3"  leftPosition="0" topPosition="0" horizontalSize="40"
verticalSize="10"
  backgroundOpacity="0" priority="0.1" fontFamily="Arial"  fontWeight="bold"
  fontColor="black" textBackgroundColor="yellow" textAlignment="centerLeft"
  text="Maria"/>
                        <text region="4"  leftPosition="60" topPosition="0" horizontalSize="40"
verticalSize="10"
                                backgroundOpacity="0" priority="0.1" fontFamily="Arial"
fontWeight="bold"
                                                fontColor="red" textBackgroundOpacity="0"
text="Saurin"/>
                        <img region="1" leftPosition="0" topPosition="10" horizontalSize="20"
verticalSize="20"
                                                 backgroundOpacity="0" priority="0.1"
type="image/png"
  src="file:////var/lib/xms/imagemaker/images/diastar-logo.png"/>
                </par>
        </body>
</dlgcsmil>
```

Example Deleting an Overlay Applied to a Region

For this example, a persistent image overlay is removed from region 1 to and remove the region 3 text.

The resulting displayed video for the conference will be as illustrated in Figure 3 below.

```
<?xml version="1.0" encoding="UTF-8"?>
<dlgcsmil version="1.0">
        <head>
                <layout size="VGA">
                        <region id="1" left="0" top="0" relativesize="1/2"/>
                        <region id="2" left="50" top="0" relativesize="1/2"/>
                        <region id="3" left="0" top="50" relativesize="1/2"/>
                        <region id="4" left="50" top="50" relativesize="1/2"/>
                </layout>
        </head>
        <body>
                <par>
                        <ref region="1" src="mscontrol:////Mixer/StreamGroup.__MostActive__" />
                        <ref region="2" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <ref region="3" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <ref region="4" src="mscontrol:////Mixer/StreamGroup.__Any__" />
                        <text region="1" leftPosition="0" topPosition="0" horizontalSize="40"
verticalSize="10"
                                                backgroundOpacity="0" priority="0.1"
fontFamily="Arial" textBackgroundColor="blue"
                                                text="Larry"/>
                        <text region="2"  leftPosition="60" topPosition="0" horizontalSize="40"
verticalSize="10"
```

```
  borderColor="blue" backgroundOpacity="0" priority="0.1"
 fontFamily="TimesNewRoman" fontWeight="bold" fontColor="yellow"
 textBackgroundColor="red" textAlignment="centerRight" text="Amy"
 duration />>
                        <text region="4"  leftPosition="60" topPosition="0" horizontalSize="40"
verticalSize="10"
                                    backgroundOpacity="0" priority="0.1" fontFamily="Arial"
fontWeight="bold"
                                                fontColor="red" textBackgroundOpacity="0"
text="Saurin"/>
                </par>
        </body>
</dlgcsmil>
```

Figure 3