



## Program Files in the ECDS Software

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ECDS software uses programs to enable support for live multicast and scheduled rebroadcast events. A program in the ECDS software is defined as a scheduled event in which the content is presented to the end user. The three attributes of a program are:

- **Schedule**—Defines when the content is presented to the end user.
- **Content**—Defines what is presented to the end user. In the ECDS software, this can be pre-positioned or live content.
- **Presentation**—Defines how the content is presented to the end user. The presentation attributes include the set of Service Engines that know about the program, and a service type that identifies the streaming server used to deliver the content. The streaming server can exist in the Service Engine (Windows Media Technology [WMT] or Movie Streamer).

A program file contains the elements that define the schedule, content, and presentation parameters. It is a text file written in XML format, similar to the Manifest file. For more information about Manifest files, refer to the [Cisco ECDS 2.6 Software Configuration Guide](#). See the [“Related Documentation” section on page 3](#) for links to documentation online.

Program types determine the hardware or software component involved in delivering content to the user. Different program types are:

- Movie Streamer
- WMT

The CDSM manages multicast addresses to be used for programs. Each Service Engine assigned to the program uses the multicast address for broadcast. The Service Engine determines which multicast address is to be used based on the program data. A set of multicast addresses can be specified either in the Program API or by using the CDSM. Each time a program requires a multicast address, the CDSM associates one of the addresses with the program. Addresses are allocated for the life of a program. Programs can be configured with an autodelete feature, which allows program addresses to be freed up automatically about 24 hours after a program schedule is complete.

When users request a specific address or a set of addresses to be used for a program, ECDS software issues only those addresses that are not used by any of the existing programs. Users receive an error message if there is no multicast address associated with the imported program file and no addresses are available to be configured from the pool or if the multicast pool has not been configured.

When you define a Movie Streamer live program using the createProgram API, you can specify a single backup broadcast server for the program. To do this, you must specify the IP addresses of the primary and backup broadcast servers in the program file using the <media> tag. The <media> tag in the program file should be in the following format:

```
<media index="number" src="primary_broadcast_server:port;backup_broadcast_server:port"/>
```

## Program File DTD

The following is the Document Type Definition (DTD) for ECDS program files. You can use the DTD to create program files for importing programs from third-party systems.

```
<?xml version="1.0"?>
<!DOCTYPE program[
  <!ELEMENT program (media+, ucastInfo?, mcastInfo?, schedule*, attribute?)>
  <!ATTLIST program
    version          CDATA "1.0"
    name             CDATA #REQUIRED
    serviceType      (wmt | movieStreamer) "wmt"
    description       CDATA #IMPLIED
    playTime         CDATA #IMPLIED
    lastModificationTime CDATA #IMPLIED
    gracefulExit     (false | true) "false"
    shuffle          (false | true) "false"
    autoDelete       (false | true | default) "default"
    live             (false | true) "false"
  >
  <!ELEMENT media EMPTY>
  <!ATTLIST media
    index           CDATA #IMPLIED
    src             CDATA #REQUIRED
    id              CDATA #IMPLIED
    playTime       CDATA #IMPLIED
  >
  <!ELEMENT ucastInfo EMPTY>
  <!ATTLIST ucastInfo
    referenceUrl    CDATA #REQUIRED
  >
  <!ELEMENT mcastInfo (addrPort*)>
  <!ATTLIST mcastInfo
    referenceUrl    CDATA #REQUIRED
    TTL            CDATA #IMPLIED
  >
  <!ELEMENT addrPort EMPTY>
  <!ATTLIST addrPort
    addrVal        CDATA #REQUIRED
    portVal        CDATA #REQUIRED
    id             CDATA #IMPLIED
  >
  <!ELEMENT schedule (repeats?)>
  <!ATTLIST schedule
    timeSpec       (local | gmt) "local"
    startTime      CDATA #IMPLIED
    activeDuration CDATA #IMPLIED
  >
  <!ELEMENT repeats (dayOffset*)>
  <!ATTLIST repeats
    type           (timeInterval | days) "timeInterval"
    interval       CDATA #IMPLIED
    endTime       CDATA #IMPLIED
  >
  <!ELEMENT dayOffset EMPTY>
  <!ATTLIST dayOffset
    value          (0 | 1 | 2 | 3 | 4 | 5 | 6) "0"
  >
  <!ELEMENT attribute EMPTY>
  <!ATTLIST attribute
    value          CDATA #REQUIRED
  >
]>
```

Table A-1 describes the elements in the DTD and their attributes.

**Table A-1 Program File DTD Elements and Attributes**

Element	Attributes	Description
program	version	Version of the program file. ECDS software generates playlist files with a version level of 1.
	name	Name of the program.
	serviceType	Type of program, which dictates the mode of delivery. This element identifies the software or hardware component involved in delivering the content to the user.
	description	Brief description of the program.
	playTime	Total playtime in seconds. This is the sum of the playtime values of the media files, if set. If there are files in the program that have invalid playtimes, then this field is set to -1.
	lastModificationTime	Time when the playlist was created or modified last, as recorded in the CDSM. The format is hh:mm:ss. The assumption is that all devices in the ECDS network are time-synchronized (for example, using the Network Time Protocol [NTP]).
	gracefulExit	Specifies how to handle scheduled exits. Options are: <ul style="list-style-type: none"> <li>• True—Exit after the current media file is played completely.</li> <li>• False—Exit immediately.</li> </ul>
	shuffle	Specifies whether the media files should play in any order. Options are: <ul style="list-style-type: none"> <li>• True—Play media files at random.</li> <li>• False—Play media files in order.</li> </ul> When this attribute is not specified, it is set to false by default.
	autoDelete	Specifies whether the program should be automatically deleted 24 hours after it is last played. Options are: <ul style="list-style-type: none"> <li>• True—Delete the program 24 hours after it is last played.</li> <li>• False—Retain the program for more than 24 hours after it is last played.</li> <li>• Default—When the value for the live attribute is set to true, the default value is true for <i>autoDelete</i>, and false if the live attribute is set to false.</li> </ul>
live	Specifies whether the program contains live content. Options are: <ul style="list-style-type: none"> <li>• True—The program contains live content.</li> <li>• False—The program does not contain live content.</li> </ul>	

Table A-1 Program File DTD Elements and Attributes (continued)

Element	Attributes	Description
media	index	Order of the media file in the list of files, ranging from 1 to mediaCount (the number of media files in the program). The index attribute specifies the order of the media files when the shuffle attribute in the <media> tag is set to false.
	src	<p>Reference to the source of the media file.</p> <ul style="list-style-type: none"> <li>For live content, this field contains information about how the streaming server will correlate with the live feed.</li> <li>For prefetched content, this field contains the portion of the URL that follows the origin server; that is, the fully qualified domain name (FQDN).</li> </ul> <p>For example, if the source file URL is <code>http://mycontentorigin/mydirectory/myfile</code>, the value assigned to this field is <code>mydirectory/myfile</code>.</p> <p><b>Note</b> When prefetched content is exported, this field contains the URL for the file that can be routed in the ECDS network, without the protocol specification.</p> <ul style="list-style-type: none"> <li>Live source failover is supported.</li> </ul> <p>For WMT live, multiple encoders or streaming servers can be specified.</p> <pre>src="http://encoder_1:8080;rtsp://source_hostip/filename"</pre> <p>For Movie Streamer live, only a single backup can be specified.</p> <pre>src="sourceaddress1:destinationport1;sourceaddress2:destinationport2"</pre>
	id	<p>Media file identifier. For WMT rebroadcast events, this field contains the ID of the delivery service containing this media file. For Movie Streamer rebroadcast events, this field contains the track number. In the case of live events, this field is used to correlate a stream source with a multicast address.</p> <p><b>Note</b> For live unicast programs, do not include the ID attribute.</p>
	playTime	<p>Playtime for the file in seconds, when it is known. This attribute is used only for MPG media files. Options are:</p> <ul style="list-style-type: none"> <li>-2—If the file is not an MPG file</li> <li>-1—If the file is an MPG file but the ECDS software cannot determine the playtime</li> <li>0 or greater—If the playtime is correctly determined from the file</li> </ul>
ucastInfo	referenceUrl	<p>URL used by the end user to request this program over the network using unicast.</p> <p><b>Note</b> All letters in the reference URLs must be in lowercase.</p>

Table A-1 Program File DTD Elements and Attributes (continued)

Element	Attributes	Description
mcastInfo	referenceUrl	URL used by the end user to request this program over the network using multicast. <b>Note</b> All letters in the reference URLs must be in lowercase.
	TTL	Multicast time-to-live (TTL) value to be used for the packets sent using multicast.
addrPort	addrval	Address to be used when this program is multicast.
	portVal	Port (within the multicast address) to be used when this program is multicast.
	id	Address and port identifier. For rebroadcast events, this field contains the ID of the delivery service using this address and port. In the case of live events, this field is used to correlate a stream source with a multicast address.
schedule	timeSpec	Specifies how time values should be interpreted. Options are: <ul style="list-style-type: none"> <li>Local</li> <li>Greenwich Mean Time (GMT)</li> </ul>
	startTime	Time (in seconds) since the epoch (January 1, 1970) when the program should start playing. <b>Tip</b> For UNIX operating systems, the epoch is 00:00:00 GMT, January 1, 1970. This represents the time and date corresponding to 0 in the UNIX operating system's date and time stamp. System time is measured in seconds past the epoch.
	activeDuration	Duration of the program (in seconds). For a scheduled rebroadcast, this value specifies how long the files should loop (that is, loop for $x$ seconds). If there is no looping, this value is 0. For live programs, this value is the duration of the event.
repeats	type	Type of repeat. For example, you can set the program to repeat every $x$ seconds, or repeat on specified days of the week at the same time specified in the start time. Options are: <ul style="list-style-type: none"> <li>TimeInterval</li> <li>Days</li> </ul>
	interval	Time interval (in seconds) for the repeat broadcast of the program. For example, if this value to 28800 seconds, the program repeats every 8 hours.
	endTime	Time (in seconds) since the epoch (January 1, 1970) when program repeats should end. For a program that repeats forever, enter the value zero (0).

Table A-1 Program File DTD Elements and Attributes (continued)

Element	Attributes	Description
dayOffset	value	Day to repeat the program, for example, every Monday. The time (during the day) of the repeat is inherited from the startTime attribute.
attribute	value	Element used if a third-party device is used to import some data that is transparent to a ECDS network, and that is directly used by the software or hardware component involved in delivering the content to the user. The Centralized Management System (CMS) relays the data without interpreting it. A recommended method for encoding this field is to use a name/value pair in the string, for example, name1=value1; name2=value2.

## Program File Examples

This section contains program file examples, each describing the contents for specific event types. The examples are provided for the following event types:

- [WMT Unicast-Multicast Live Event, page A-6](#)
- [WMT Multicast Live Event, page A-7](#)
- [WMT Multicast Rebroadcast Event, page A-7](#)
- [WMT Alternate URL Live Event, page A-8](#)
- [Movie Streamer Multicast Event, page A-8](#)
- [Movie Streamer Live-Split Event, page A-9](#)

### WMT Unicast-Multicast Live Event

This example shows the program file for WMT Unicast-Multicast live event.

```
<?xml version="1.0"?>
<!DOCTYPE program SYSTEM "program.dtd">
<program version="1.0" name="liveProgram" serviceType="wmt" description="test"
autoDelete="true" live="true">
<media index="1" src="http://WMT_encoder:8080" id="media0"/>
<ucastInfo referenceUrl="rtsp://contentacquirer/liveprogram" />
<mcastInfo referenceUrl="http://contentacquirer/liveprogram.nsc" TTL="22">
<addrPort addrVal="239.232.25.95" portVal="61248" id="media0"/>
</mcastInfo>
<schedule timeSpec="gmt" startTime="0" activeDuration="0"/>
</program>
```



#### Note

With createProgram API - Program will enable AlternateUnicastUrl, if ucastInfo and mcastInfo referenceUrls have different LiveProgram events..

## WMT Multicast Live Event

The following example shows the program file for a WMT multicast live event in which the multicast address is specified using the `addrPort` element:

```
<?xml version="1.0"?>
<!DOCTYPE program SYSTEM "program.dtd">
<program version="1.0" name="liveProgram" serviceType="wmt" description="test"
autoDelete="true" live="true">
<media index="1" src="http://WMT_encoder:8080" id="media0"/>
<mcastInfo referenceUrl="http://contentacquirer/liveprogram.nsc" TTL="22">
<addrPort addrVal="239.232.25.95" portVal="61248" id="media0"/>
</mcastInfo>
<schedule timeSpec="gmt" startTime="0" activeDuration="0"/>
</program>
```

## WMT Multicast Rebroadcast Event

This example shows the program file for a WMT multicast rebroadcast event:

```
<?xml version="1.0"?>
<!DOCTYPE program SYSTEM "program.dtd">
<program version="1.0" name="chanrebroad" serviceType="wmt" description="test"
autoDelete="false" live="false">
<media index="1" src="sen/beck.asf" id="Channel_35748"/>
<media index="2" src="sen/CSCin53585.wmv" id="Channel_35748"/>
<media index="3" src="sen/starsnstripes.asf" id="Channel_35749"/>
<mcastInfo referenceUrl="http://contentacquirer/chanrebroad.nsc">
<addrPort addrVal="239.232.25.195" portVal="61248" id="Channel_35748"/>
</mcastInfo>
<schedule timeSpec="local" startTime="1010170800" activeDuration="1300">
<repeats type="timeInterval" interval="2600"/>
</schedule>
</program>
```

The *referenceUrl* attribute is the link that the user clicks to join the program. You can provide the external IP address of the Content Acquirer (for example, `http://ServiceEngine/prog1.nsc`) in the *referenceUrl* attribute.



### Note

A media file can be uniquely identified using a URL of the form `<protocol>://<FQDN>/<relative_URL>`. The *id* attribute in the media element specifies the ID of the delivery service containing the media file. Each delivery service is associated with the FQDN of a Service Engine or that of an origin server. The *src* attribute in the media element provides the relative part of the URL, which along with the *id* attribute identifies the file.

You can provide the FQDN of the Service Engine that hosts the media file if a Service Router is used to direct the user request to the appropriate Service Engine. In this case, the FQDN must be associated with a website or delivery service that maps to the same Service Engines that can serve the program.

You can provide the name of the Service Engine if the user request goes to a preselected Service Engine. If a third-party device assigns the Service Engines directly to the program, you can use any one of the Service Engines assigned to the program in the *referenceUrl* attribute. If the third-party device assigns a delivery service to the program, you can use the name of any Service Engine in that delivery service (for example, the Content Acquirer) in the *referenceUrl* attribute.

## WMT Alternate URL Live Event

WMT Alternate unicast URL API is used to configure a live WMT video program Multicast stream to failover to a custom alternate Unicast URL other than the default unicast URL within the program.

This example shows the program file for WMT Alternate URL live event.

```
<?xml version="1.0"?>
<!DOCTYPE program SYSTEM "program.dtd">
<program version="1.0" name="liveProgram" serviceType="wmt" description="test"
autoDelete="true" live="true">
<media index="1" src="http://WMT_encoder:8080" id="media0"/>
<ucastInfo referenceUrl="rtsp://contentacquirer/liveprogram1"/>
<mcastInfo referenceUrl="http://contentacquirer/liveprogram.nsc" TTL="22">
<addrPort addrVal="239.232.25.95" portVal="61248" id="media0"/>
</mcastInfo>
<schedule timeSpec="gmt" startTime="0" activeDuration="0"/>
</program>
```



### Note

Unicast Reference URL is different in program XML file, and results in enabling alternate URL for the Live Program.



### Note

Use the 'convert' option in the UI to convert API to CDSM user interface.

## Known Limitations

Programs which are managed by CDSM user interface cannot be modified by an API. Once program is converted into CDSM user interface, there is no option to convert back to an API.

## Movie Streamer Multicast Event

This example shows the program file for a Movie Streamer multicast event. This event can also be accessed using unicast by specifying the *referenceUrl* attribute in the *ucastInfo* element.

```
<?xml version="1.0" ?>
<!DOCTYPE program SYSTEM "program.dtd">
<program version="1.0" name="prog5lfs_1673" serviceType="movieStreamer"
description="prog5lfs" playTime="3600" autoDelete="false" live="true">
<media index="1" src="source_ip_address:destination_port" id="media0"/>
<media index="2" src="source_ip_address:destination_port" id="media1"/>
<ucastInfo referenceUrl="rtsp://pm_fqdn_or_ip_addr/pm_1673.sdp"/>
<mcastInfo referenceUrl="http://pm_fqdn_or_ip_addr/programs/1673" TTL="15">
<addrPort addrVal="224.2.250.195" portVal="61036" id="media0"/>
<addrPort addrVal="224.2.250.196" portVal="61038" id="media1"/>
</mcastInfo>
<schedule timeSpec="gmt" startTime="3264429600"/>
<attribute value="unicastPushSDP:http://2.43.12.6/programs/1673"/>
</program>
```



**Note**

The media source (*src*) is the live feed. The *src* attribute contains the IP address of the Broadcast Server and the destination port of the Content Acquirer. The Content Acquirer listens for the program stream on the specified destination port. There is more than one media source, because audio, video, and other feeds may be broadcast on a separate stream, using a separate multicast address. The *id* attribute in the media element and the *id* attribute in the *addrPort* element are used to correlate the address to the stream.

## Movie Streamer Live-Split Event

This example shows the program file for a Movie Streamer live-split event:

```
<?xml version="1.0" ?>
<!DOCTYPE program SYSTEM "program.dtd">
<program version="1.0" name="prog5lfs_1674" serviceType="movieStreamer"
description="prog52fs" playTime="3600" autoDelete="false" live="true">
<media index="1" src="source_ip_address:destination_port" />
<media index="2" src="source_ip_address:destination_port" />
<ucastInfo referenceUrl="rtsp://pm_fqdn_or_ip_addr/pm_1674.sdp"/>
<schedule timeSpec="gmt" startTime="3264429600" activeDuration="7200"/>
<attribute value="unicastPushSDP:http://2.43.12.6/programs/1673"/>
</program>
```

**Note**

Attributes for the *schedule* element must be specified for the Movie Streamer streaming server. The *id* attribute is not required because there are no separate multicast addresses for the program streams.

