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Version 2.3.x

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Overview

Delta is a video delivery platform designed to optimize the management, monetization and distribution of video across internal and external IP networks. The platform provides a complete solution for time-shifted TV and just-in-time video packaging while enabling real-time content delivery with advanced levels of personalization, customization and control.

Delta can be controlled, configured and monitored through the following interfaces:

<table>
<thead>
<tr>
<th>Interface</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web browser via HTML</td>
<td>Using a web browser is the easiest way to control, configure, and monitor Delta. This interface is used when a human is interacting with the server, or when no automation or integration with other systems is required. Elemental recommends Mozilla Firefox as the client browser.</td>
</tr>
<tr>
<td>Web Services REST interface</td>
<td>The REST-based interface supports all features of the web interface as well as automation features. More general information on REST-based interfaces is available online.</td>
</tr>
<tr>
<td>SNMP interface</td>
<td>The SNMP interface allows basic monitoring and control of the Delta system. It allows a management system to query the state of the service and content it manages.</td>
</tr>
<tr>
<td>Secure shell access</td>
<td>Secure shell access allows the user to access the system's configuration files and directory structure. The secure shell interface is provided for users who need to modify the base behavior of the Delta system or for diagnostics.</td>
</tr>
</tbody>
</table>

Terminology

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Input Filters | Define ingest points for content received by the system. Input filters can control storage locations for content, retention windows, and content types.  
See Forming Input Filters in AWS Elemental Delta (p. 10) for information about input filters. |
| Content | Defines the source input received by the system through input filters. Content can either be:  
• Linear: as sourced from products such as Elemental Live |
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Video on demand (VOD): as sourced from products such as Elemental Server</td>
<td>See Supported Content Types (p. 3) for more information about content.</td>
</tr>
<tr>
<td>Storage Location</td>
<td>Defines where content that Delta will manage is stored.</td>
</tr>
<tr>
<td>Content can either be stored:</td>
<td></td>
</tr>
<tr>
<td>• Locally, either on the system's disk or network attached storage through mount points, or</td>
<td></td>
</tr>
<tr>
<td>• Using Amazon Simple Storage Service (S3)</td>
<td></td>
</tr>
<tr>
<td>The storage location is defined in input filter configurations.</td>
<td></td>
</tr>
<tr>
<td>AWS Credentials</td>
<td>Username and password for accessing content stored on Amazon S3. Valid credentials must be configured on the Settings page on the web interface when using S3.</td>
</tr>
<tr>
<td>Output Filters</td>
<td>Allow the operator to manipulate content before being served to a requesting end-user.</td>
</tr>
<tr>
<td>Output filters can be chained together to create a more complicated workflow. For example, an operator can add an Add Removal filter after a Live to VOD filter to create an endpoint that delivers a completed program without advertisements as a VOD asset to the end-user.</td>
<td></td>
</tr>
<tr>
<td>See About Output Filters (p. 35) for more information about output filters.</td>
<td></td>
</tr>
<tr>
<td>Output Templates</td>
<td>Sets of output filters that can be applied to new content. Input filters can be configured to apply a particular output template to incoming content.</td>
</tr>
<tr>
<td>Stream Sets</td>
<td>Allow the operator to assign certain input video streams, audio streams, or subtitles tracks to outputs in a packaging filter.</td>
</tr>
<tr>
<td>For example, when incoming MSS content has two audio languages, the operator can create a separate HDS packaging filter for each language and assign the appropriate audio stream to each video stream in the packaging filter. When a subtitles track in a supported input format is added to a stream set, Delta will repackage it on the fly to the right output format.</td>
<td></td>
</tr>
</tbody>
</table>
**Supported Content Types**

**Content Ingest**

Delta supports the following content types for ingest and storage:

<table>
<thead>
<tr>
<th>Content</th>
<th>More Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP Live Streaming (HLS)</td>
<td>Supports media delivery to Apple iOS devices, many Android devices, and several set-top boxes. Subtitles are supported through the WebVTT W3C standard.</td>
</tr>
<tr>
<td>MPEG4 (MP4) with H.264 or H.265 video and AAC audio</td>
<td>Multiple MP4 files may be grouped together for adaptive bitrate content. MP4 files are ingested via the Watch Folder input filter. Files are not ingested until a SMIL (.smil) file (referencing the .mp4 files) is present in the watch folder.</td>
</tr>
<tr>
<td>MPEG Transport Streams (TS)</td>
<td>Multiple single program transport streams (SPTS) can be grouped together for ABR content. These streams should have presentation timestamps (PTS) aligned at keyframes for proper bitrate switching. They can have Encoder Boundary Point (EBP) markers to signal fragmentation points to Delta.</td>
</tr>
<tr>
<td>RTMP (both Live and VOD applications)</td>
<td>RTMP streams must contain video and have keyframes aligned at the same timestamp for ABR content.</td>
</tr>
<tr>
<td>Microsoft Smooth Streaming (MSS)</td>
<td>Subtitles are supported using the text-mode TTML format.</td>
</tr>
</tbody>
</table>
Encrypted Content

Encrypted content can be ingested as follows:

- Delta-encrypted HLS content: Delta-encrypted HLS content is HLS (Live or VOD) content that has been encrypted using the local instance of Delta (or another Delta node in the local Delta cluster) as the keyprovider server. See Creating AWS Elemental Delta-encrypted Content (p. 142) for information on setting up for encryption.

  This content can be ingested by Delta. In addition, all output filters that are valid for unencrypted HLS content are also valid for this encrypted HLS content.

- Pre-encrypted content is HLS (Live or VOD) content or MSS (Live or VOD) content that has been encrypted, but not using the local Delta as the keyprovider server. This content can be ingested by Delta but there are restrictions on the output filters that are valid. See Content Compatibility (p. 41).

Content Delivery

Through the use of packaging filters, Delta can deliver any of the following content formats:

- CMAF
- DASH-ISO
- HLS content
- MSS content
- MPEG-TS
- MP4
- HDS

Additionally, through the use of the File Copy output filter, Delta can store to a filesystem MPEG-TS, MP4, HLS, CMAF, and MPEG-DASH files packaged by Delta.

Delta Clustering

Delta can be deployed in one of four configuration options:

<table>
<thead>
<tr>
<th>Configuration</th>
<th>More Information</th>
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</thead>
<tbody>
<tr>
<td>Single node</td>
<td>AWS Elemental Delta 2.3 Cluster Standard Configuration Guide</td>
</tr>
<tr>
<td>Leader and secondary node</td>
<td>AWS Elemental Delta 2.3 Cluster Standard Configuration Guide</td>
</tr>
<tr>
<td>Leader and secondary node with a load balancer</td>
<td>AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration</td>
</tr>
<tr>
<td>Configuration</td>
<td>More Information</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Leader and secondary node with one or more egress-only nodes and a load balancer for ingest and egress</td>
<td><a href="#">AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration</a></td>
</tr>
</tbody>
</table>
Getting Started in AWS Elemental Delta

After the initial configuration, you must prepare Delta for content management. At a high level, the steps you will perform in the web interface are provided here.

To get started in Delta

1. Access the web interface. See Working with the AWS Elemental Delta Web Interface (p. 7).
3. Create input filters to receive content. See Forming Input Filters in AWS Elemental Delta (p. 10).
4. Create a content entity to represent the ingested asset. Note that most content types are automatically created when the asset is ingested. See Forming Contents in AWS Elemental Delta (p. 32).
5. Add output filters for packaging, processing, and restricting access to the content. See Starting the Output Filter Tree in AWS Elemental Delta (p. 46).
6. Address audio, video, and subtitles tracks by creating stream sets. See the settings information for each output filter:
   • Common Media Application Format (CMAF) Output Filter (p. 50)
   • Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)
   • HTTP Dynamic Streaming (HDS) Output Filter (p. 57)
   • HTTP Live Streaming (HLS) Output Filter (p. 60)
   • MPEG-4 (MP4) Output Filter (p. 67)
   • MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)
   • Microsoft Smooth Streaming (MSS) Output Filter (p. 72)
8. Manage Delta resources. See Managing Resources in AWS Elemental Delta (p. 127).
Working with the AWS Elemental Delta Web Interface

To access the AWS Elemental Delta web interface for your workstation, open a web browser and enter the Delta IP address and port (8080).

Example

http://10.24.34.2:8080

- If your Delta node is not in a cluster, enter the IP address of the individual node.
- If your Delta node is in a cluster, enter the Virtual IP (VIP) address that you set up during the configuration procedure as described in AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration.

Using the web interface with user authentication enabled

If user authentication has been enabled on the cluster, then when you display the web interface, the Login screen will appear. Obtain your user credentials from the person who initially set up the cluster.

When you're logged in to the web interface, your username is shown in the menu bar. If you have an admin role, click your name to access the Manage Users screen. For information about managing users, see AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration.

Navigating AWS Elemental Delta

Menu bar gives you access to all areas of Delta.

AWS Elemental Delta logo

Returns you to the Delta home page (the Contents screen).

Menu names

Links to the different Delta screens and supporting documentation (through the Support menu). The following sections describe the pages that you can access from these links:

- Forming Input Users in AWS Elemental Delta (p. 9)
- Forming Input Filters in AWS Elemental Delta (p. 10)
- Forming Contents in AWS Elemental Delta (p. 32)
- Working with Output Templates in AWS Elemental Delta (p. 132)

For information about the Nodes and Settings screens, see AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration.

Support drop-down

Provides links to additional help documentation.

Icons

Shortcuts to currently active Alerts and Messages. For information about alerts and messages, see Viewing Usage and Health Statistics in AWS Elemental Delta (p. 134).
Time

Current time, based on the timezone selected in General Settings. For setup information, see AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration.
Forming Input Users in AWS Elemental Delta

Input Users are used for WebDAV input filters and (optionally) RTMP input filters only. They contain the credentials required for a client to post video content to the WebDAV service on the Delta node. When the client posts, it passes these credentials. The WebDAV server receives the request and validates the credentials before accepting the post.

**Note**
Input users are not to be confused with user roles. User roles define user access limitations to the Delta node when user authentication is enabled. For more information about user roles, see *Enabling User Authentication* in AWS Elemental Delta 2.3 Solutions- Best Practices for Configuration.

To access input users in Delta, click **Input** in the menu bar and select **Input Users**.

From here, you can:
- View, edit, and delete existing input users. For information about performing these actions, see Working with Input Users in AWS Elemental Delta (p. 127).
- Create input users, as described below.

**To create an input user**

1. Display the **Input Users** screen, as described above.
2. Choose **Create Input User**.
3. Complete the **Username** and **Password** fields and choose **Create**.

You can now use these credentials when you send WebDAV content to Delta.
Forming Input Filters in AWS Elemental Delta

Input Filters specify the content to be ingested and define rules about how to ingest it. Different filter types are used for different types of content.

**Warning**

Sending identical streams to the same input filter can cause the Delta node to become unresponsive. Delta cannot discern individual streams when multiple identical streams are sent to the same input filter. Instead, it treats them as one stream, which causes a backup of content on the system. This backup fills up the disk space and causes Delta to stop running. If you are sending identical streams, they must be ingested by different input filters.

The input filter that you use is dependent on the type of content that you’re sending and how you send it to Delta. Find your input content type below to see what input filters may apply.

### HLS

- **Live Content**
  - **HTTP PUT** — you can push content to Delta. For more information about this input filter, see [HTTP Put Input Filter](#).
  - **Remote Input** — Delta pulls content from a remote directory. For more information about this input filter, see [Remote Input Filter](#).
  - **WebDAV** — you can push content to Delta. For more information about this input filter, see [WebDAV Input Filter](#).

- **VOD Content**
  - **HTTP PUT** — you can push content to Delta. For more information about this input filter, see [HTTP Put Input Filter](#).
  - **Remote Input** — Delta pulls content from a remote directory. For more information about this input filter, see [Remote Input Filter](#).
  - **VOD Catalog** — Delta pulls content from your Amazon S3 bucket or network-attached storage (NAS). For more information about this input filter, see [VOD Catalog Input Filter](#).
  - **Watch Folder** — Delta pulls content from a remote folder. For more information about this input filter, see [Watch Folder Input Filter](#).
  - **WebDAV** — you can push content to Delta. For more information about this input filter, see [WebDAV Input Filter](#).

### MSS

- **Live Content**
  - **MSS** — you can push content to Delta. For more information about this input filter, see [MSS Input Filter](#).
  - **VOD Catalog** — Delta pulls content from network-attached storage (NAS). For more information about this input filter, see [VOD Catalog Input Filter](#).

- **VOD Content**
  - **Watch Folder** — Delta pulls content from a remote folder. For more information about this input filter, see [Watch Folder Input Filter](#).
RTMP

For both live and VOD content, use the RTMP input filter to receive content that you push to Delta. For more information about this input filter, see RTMP Input Filter (p. 18).

MP4

MP4 is only available as VOD content. Delta can receive it with either of these input filters:
- VOD Catalog — Delta pulls content from your Amazon S3 bucket or network-attached storage (NAS). For more information about this input filter, see VOD Catalog Input Filter (p. 25).
- Watch Folder — Delta pulls content from a remote folder. For more information about this input filter, see Watch Folder Input Filter (p. 26).

TS

TS is only available as live content. Use the UDP input filter to receive content that you push to Delta. For more information about this input filter, see UDP Input Filter (p. 21).

To access input filters in Delta, click Input in the menu bar and select Input Filters.

From here, you can:
- View, edit, and delete existing input filters. For information about performing these actions, see Working with Input Filters in AWS Elemental Delta (p. 128).
- Create input filters, as described below.

To create an input filter

1. Display the Input Filters screen, as described above.
2. Choose New Input Filter.
3. Complete the general fields as described in the following sections and choose Create.

Topics
- HTTP Put Input Filter (p. 11)
- MSS Input Filter (p. 15)
- Remote Input Filter (p. 17)
- RTMP Input Filter (p. 18)
- UDP Input Filter (p. 21)
- VOD Catalog Input Filter (p. 25)
- Watch Folder Input Filter (p. 26)
- WebDAV Input Filter (p. 27)

HTTP Put Input Filter

This filter allows HLS live or VOD content to be pushed to the Delta node over HTTP. The filter holds information about the location at which to store incoming content. The following sections provide information about creating an HTTP PUT input filter.

Topics
- HTTP Put Input Filter General Fields (p. 12)
HTTP Put Input Filter General Fields

The following fields are used to capture general information about how the manifest is treated. If the incoming content is live and will be output as live, no other fields are required.

If you are ingesting content as VOD or will be converting live or VOD content to VOD Catalog after ingest, continue to HTTP PUT VOD Catalog Fields (p. 14).

Filter Label

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format Filter x, where x is the ID that Delta assigns to the input filter upon creation.

Relative Path

The relative path where content is posted.

If content is posted to <Delta IP address>/in_http/, then leave this field empty.

If content is posted to a subfolder of <Delta IP address>/in_http/, specify that subfolder path in the format <subfolder/sub-subfolder/> (with no leading slash).

Output Template

If you have any output templates already created, you can choose one to associate with this input filter from the drop-down. Delta automatically assigns the output filters that belong to the specified template to the content when it's created.

If you aren't using a template, manually add the output filters. For information about adding output filters, see Output Filter Trees (p. 40).

Storage Type

Folder where Delta stores incoming content.

Available options:
- Local — content is stored to a folder that the Delta node has access to.
- S3 — content is stored to an Amazon S3 bucket.

Local Storage Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Storage Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as s3://<full_path>.

Encrypt Storage

When enabled, AWS Elemental Delta encrypts VOD content while it's in storage:
- On ingested VOD content, Delta encrypts the segments prior to saving them to storage.
- On live-to-VOD content, Delta encrypts the segments as they're converted from live to VOD content, then saves them to storage.
Delta uses AES-128 encryption and generates a single key per playlist. When the content is requested for playback, Delta retrieves it from storage and decrypts it using the key.

**Important**
Make sure that you maintain regular database backups when you are encrypting content in storage. If you lose the database, Delta also loses the decryption key. You can't access the encrypted content without the key.

**Content Window**
Rule for how long to keep content.

Available options:

- **Keep All Content** — Delta will never automatically discard content.
  
  This option is intended for short-lived content such as events or VOD content. When you delete the Content entity when it's no longer being used, the stored content is also deleted. This option is not recommended for live sources because it will eventually use up all of your storage.

- **Package Controlled** — delete requests are honored in WebDAV. Valid on WebDAV input filters only.

- **Keep Time Specified** — content is saved up to the specified time limit. As new content is added, old content is removed on a first in, first out basis.

  Specify the time limit in **Duration to Keep**.

  For all values, keep in mind that if you later remove all output filters from the Content entity, Delta will continue to ingest and store the content.

**Duration to Keep**
Required when **Content Window** is set to **Keep Time Specified**.

Indicates how long Delta stores the content.

If you plan to create a passthrough output filter for the content associated with this input filter, then make sure that the duration is equal to or greater than the window of the upstream encoder. Otherwise, playback may be disrupted.

**Time Source**

The clock that Delta references for operations such as performing live to VOD clipping.

Ingest time is the default if embedded or program date times are not available in the input stream.

**HTTP Put Input Filter VOD and VOD Catalog Fields**
The following sections describe the fields that relate to VOD and VOD Catalog.

**HTTP PUT VOD Ingest Fields**
Use the following fields if you are ingesting VOD content.

**VOD Content**

- When you select **Enabled**, it indicates that the asset being handled by this input filter is VOD.

**Promote After Ingest**

- When you select **Promote After Ingest**, VOD content is automatically converted to VOD Catalog content when ingest is complete. Otherwise, content is stored as VOD.
These following fields are for VOD content that will be promoted to VOD Catalog after ingest. They aren't needed if you plan on leaving the content as standard VOD.

Promotion Delay

If you require a delay after ingest before VOD content is converted to VOD Catalog, set a promotion delay. Delta waits the set amount of time after ingest is complete before content is promoted.

VOD Catalog URL Prefix

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

VOD Catalog Output Template

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

HTTP PUT VOD Catalog Fields

Use the following fields if you are converting live content to VOD Catalog after ingest.

1. For VOD Content, do not select Enabled.
2. Complete the VOD Catalog fields as described below.

VOD Catalog URL Prefix

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

VOD Catalog Output Template

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

Live to VOD Catalog Output Location Type

Folder where Delta stores VOD Catalog contents that are produced using a Live to VOD Catalog output filter.

Available options:
- Local — content is stored to a folder that the Delta node has access to.
- S3 — content is stored to an Amazon S3 bucket.

Local Live to VOD Catalog Output Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Local Live to VOD Catalog Output Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as s3://<full_path>.

Live to VOD Catalog AWS Credentials

Username and password that Delta uses to access the S3 bucket for VOD Catalog content storage. If S3 is used for both the storage location and output location, then both must use the same AWS credentials.

You can create and manage AWS credentials for Delta on the Settings > AWS Credentials screen. For more information, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.
MSS Input Filter

This filter allows Microsoft Smooth Streaming (MSS) live content to be pushed to Delta over HTTP. The filter holds information about the location at which to store incoming content. The following sections provide information about creating an MSS input filter.

Topics
- MSS Input Filter General Fields (p. 15)
- MSS VOD Catalog Fields (p. 16)

MSS Input Filter General Fields

The following fields are used to capture general information about how the manifest is treated. If the incoming content is live and will be output as live, no other fields are required.

If you are converting live content to VOD Catalog after ingest, see MSS VOD Catalog Fields (p. 16).

Filter Label

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format Filter x, where x is the ID that Delta assigns to the input filter upon creation.

Relative Path

The relative path where content is posted.

If content is posted to <Delta IP address>/in_http/, then leave this field empty.

If content is posted to a subfolder of <Delta IP address>/in_http/, specify that subfolder path in the format <subfolder/sub-subfolder/> (with no leading slash).

Output Template

If you have any output templates already created, you can choose one to associate with this input filter from the drop-down. Delta automatically assigns the output filters that belong to the specified template to the content when it's created.

If you aren't using a template, manually add the output filters. For information about adding output filters, see Output Filter Trees (p. 40).

Storage Type

Folder where Delta stores incoming content.

Available options:
- Local — content is stored to a folder that the Delta node has access to.
- S3 — content is stored to an Amazon S3 bucket.

Local Storage Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Storage Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as s3://<full_path>.
Encrypt Storage

When enabled, AWS Elemental Delta encrypts VOD content while it's in storage:
- On ingested VOD content, Delta encrypts the segments prior to saving them to storage.
- On live-to-VOD content, Delta encrypts the segments as they're converted from live to VOD content, then saves them to storage.

Delta uses AES-128 encryption and generates a single key per playlist. When the content is requested for playback, Delta retrieves it from storage and decrypts it using the key.

Important
Make sure that you maintain regular database backups when you are encrypting content in storage. If you lose the database, Delta also loses the decryption key. You can't access the encrypted content without the key.

Content Window

Rule for how long to keep content.

Available options:
- Keep All Content — Delta will never automatically discard content.
  - This option is intended for short-lived content such as events or VOD content. When you delete the Content entity when it's no longer being used, the stored content is also deleted. This option is not recommended for live sources because it will eventually use up all of your storage.
- Package Controlled — delete requests are honored in WebDAV. Valid on WebDAV input filters only.
- Keep Time Specified — content is saved up to the specified time limit. As new content is added, old content is removed on a first in, first out basis.

Specify the time limit in Duration to Keep.

For all values, keep in mind that if you later remove all output filters from the Content entity, Delta will continue to ingest and store the content.

Duration to Keep

Required when Content Window is set to Keep Time Specified.

Indicates how long Delta stores the content.

If you plan to create a passthrough output filter for the content associated with this input filter, then make sure that the duration is equal to or greater than the window of the upstream encoder. Otherwise, playback may be disrupted.

Time Source

The clock that Delta references for operations such as performing live to VOD clipping.

Ingest time is the default if embedded or program date times are not available in the input stream.

MSS VOD Catalog Fields

Use the following fields if you are converting live content to VOD Catalog after ingest.

VOD Catalog URL Prefix

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.
VOD Catalog Output Template

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

Live to VOD Catalog Output Location Type

Folder where Delta stores VOD Catalog contents that are produced using a Live to VOD Catalog output filter.

Available options:
- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

Local Live to VOD Catalog Output Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Local Live to VOD Catalog Output Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.

Live to VOD Catalog AWS Credentials

Username and password that Delta uses to access the S3 bucket for VOD Catalog content storage. If S3 is used for both the storage location and output location, then both must use the same AWS credentials.

You can create and manage AWS credentials for Delta on the Settings > AWS Credentials screen. For more information, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.

Remote Input Filter

This filter allows Delta to pull HLS live or VOD content that originates on a web server (so ingestion is over HTTP). The filter holds information about the remote address and about specific files. When these files are detected on the origination server, the manifest and a few segments are cached in memory in Delta. Other content is pulled only when it is requested by downstream players.

The following fields are on the Remote input filter.

Filter Label

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format `Filter x`, where `x` is the ID that Delta assigns to the input filter upon creation.

Remote Location

Base URI of remote origin server to fetch content from. Individual content paths consist of this remote_uri appended by uri (from the remote input content associated with this input filter).

Format:

```
http://<server><path><file.m3u8>
```

For example, the remote_uri might be:

```
http://10.24.34.2/popular/interviews
```
The uri might be:

```
2015_May/mendis.m3u8
```

**Disk Cache Size**

The size of the disk cache (in MB) for content associated with this input filter. Delta saves content up to this limit. As new content is added, Delta removes old content on a first in, first out basis.

**Memory Cache Size**

The size of the cache (in MB) for content associated with this input filter. Delta saves content up to this limit. As new content is added, Delta removes old content on a first in, first out basis.

**Output Template**

If you have any output templates already created, you can choose one to associate with this input filter from the drop-down. Delta automatically assigns the output filters that belong to the specified template to the content when it's created.

If you aren't using a template, manually add the output filters. For information about adding output filters, see Output Filter Trees (p. 40).

**Local Storage Location**

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

**Re-Create Output Filters When Template Changes**

When you have a value in the **Output Template** field, indicate how Delta handles changes to the template.

When you select **Re-Create Output Filters When Template Changes**, Delta updates the output filters on the Content entity when the output template changes. Otherwise, the existing output filters are left unchanged, even after the output template is updated.

**VOD Content**

When you select **Enabled**, it indicates that the asset being handled by this input filter is VOD.

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## RTMP Input Filter

This filter allows RTMP live or VOD content to be pushed to Delta over RTMP. This filter holds information about the RTMP port where Delta will listen for RTMP content, and the location at which to store incoming content. It can optionally include user credentials: you create an input user in Delta and pass these credentials when posting the content to Delta (from outside of Delta).

The following sections provide information about creating an RTMP input filter.

**Topics**

- RTMP Input Filter General Fields (p. 18)
- RTMP Input Filter VOD and VOD Catalog Fields (p. 20)

## RTMP Input Filter General Fields

The following fields are used to capture general information about how the manifest is treated. If the incoming content is live and will be output as live, no other fields are required.
If you are ingesting content as VOD or will be converting live or VOD content to VOD Catalog after ingest, see RTMP Input Filter VOD and VOD Catalog Fields (p. 20).

**Filter Label**

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format `Filter x`, where x is the ID that Delta assigns to the input filter upon creation.

**Username**

The input user that you will pass when you post content to the Delta WebDAV server. The username and password are required for WebDAV content. For information about setting up input users, see Forming Input Users in AWS Elemental Delta (p. 9).

**Password**

The selected input user's password.

**Output Template**

If you have any output templates already created, you can choose one to associate with this input filter from the drop-down. Delta automatically assigns the output filters that belong to the specified template to the content when it's created.

If you aren't using a template, manually add the output filters. For information about adding output filters, see Output Filter Trees (p. 40).

**Storage Type**

Folder where Delta stores incoming content.

Available options:
- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

**Local Storage Location**

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

**S3 Storage Location**

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.

**Content Window**

Rule for how long to keep content.

Available options:
- **Keep All Content** — Delta will never automatically discard content.
  
  This option is intended for short-lived content such as events or VOD content. When you delete the Content entity when it's no longer being used, the stored content is also deleted. This option is not recommended for live sources because it will eventually use up all of your storage.
- **Package Controlled** — delete requests are honored in WebDAV. Valid on WebDAV input filters only.
- **Keep Time Specified** — content is saved up to the specified time limit. As new content is added, old content is removed on a first in, first out basis.
Specify the time limit in **Duration to Keep**.

For all values, keep in mind that if you later remove all output filters from the Content entity, Delta will continue to ingest and store the content.

**Duration to Keep**

Required when **Content Window** is set to **Keep Time Specified**.

Indicates how long Delta stores the content.

If you plan to create a passthrough output filter for the content associated with this input filter, then make sure that the duration is equal to or greater than the window of the upstream encoder. Otherwise, playback may be disrupted.

**Listening Port**

The port on the Delta node where Delta listens for incoming RTMP content. The default port is 1935.

**Storage File Duration**

When you're using local storage, set the storage file duration to customize the segment duration (in seconds) Delta uses when saving files to disk. Valid values are between 0 and 600 seconds.

When you specify a value for the storage file duration, Delta concatenates segments up to the specified value when storing contents on the disk. For this reason, the value you use must be greater than the source segment duration. If you don't enter a value, the duration on the disk matches the source segment duration.

The storage file duration can't be used with content stored on Amazon S3.

**Time Source**

The clock that Delta references for operations such as performing live to VOD clipping.

Ingest time is the default if embedded or program date times are not available in the input stream.

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**RTMP Input Filter VOD and VOD Catalog Fields**

The following sections describe the fields that relate to VOD and VOD Catalog.

**RTMP VOD Ingest Fields**

Use the following fields if you are ingesting VOD content.

**VOD Content**

When you select **Enabled**, it indicates that the asset being handled by this input filter is VOD.

**Promote After Ingest**

When you select **Promote After Ingest**, VOD content is automatically converted to VOD Catalog content when ingest is complete. Otherwise, content is stored as VOD.

These following fields are for VOD content that will be promoted to VOD Catalog after ingest. They aren't needed if you plan on leaving the content as standard VOD.

**Promotion Delay**

If you require a delay after ingest before VOD content is converted to VOD Catalog, set a promotion delay. Delta waits the set amount of time after ingest is complete before content is promoted.
VOD Catalog URL Prefix

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

VOD Catalog Output Template

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

RTMP VOD Catalog Fields

Use the following fields if you are converting live content to VOD Catalog after ingest.

1. For VOD Content, do not select Enabled.
2. Complete the VOD Catalog fields as described below.

VOD Catalog URL Prefix

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

VOD Catalog Output Template

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

Live to VOD Catalog Output Location Type

Folder where Delta stores VOD Catalog contents that are produced using a Live to VOD Catalog output filter.

Available options:

- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

Local Live to VOD Catalog Output Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Local Live to VOD Catalog Output Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.

Live to VOD Catalog AWS Credentials

Username and password that Delta uses to access the S3 bucket for VOD Catalog content storage. If S3 is used for both the storage location and output location, then both must use the same AWS credentials.

You can create and manage AWS credentials for Delta on the Settings > AWS Credentials screen. For more information, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.

UDP Input Filter

This filter allows live adaptive bitrate (ABR) content to be pushed to Delta as single-program or multi-program MPEG transport streams over unicast or multicast UDP. The streams may have RTP headers.
filter holds information about the URIs where content is being published. The following sections provide
information about creating a UDP input filter.

Topics
- UDP Input Filter General Fields (p. 22)
- UDP VOD Catalog Fields (p. 24)

UDP Input Filter General Fields

The following fields are used to capture general information about how the manifest is treated. If the
incoming content is live and will be output as live, no other fields are required.

If you are converting live content to VOD Catalog after ingest, see UDP VOD Catalog Fields (p. 24).

Filter Label

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you
leave this field empty, Delta automatically generates a name in the format Filter x, where x is the ID
that Delta assigns to the input filter upon creation.

URI

The URI of the UDP or TRP asset that Delta will ingest. Use this format: <protocol>://<IP
address>:<port>

Example: <udp>://<10.10.10.1>:<5001>

If the firewall is enabled, make sure that this port is on the list of open incoming ports for the Delta
node. For information about configuring ports, see AWS Elemental Delta 2.3 Cluster Standard
Configuration Guide.

IGMP Source

IP address for source-specific multicast streams. Optional.

Program Number

For use with Multi-program Transport Streams (MPTS).

Which program's tracks are ingested. Delta ingests the selected program for the given bitrate. Delta
ignores any other non-selected content within the MPTS.

Interface

The network interface for Delta to use (such as eth2).

Optional. If you don't specify an interface, Delta uses the system routing table to select an interface.

Output Template

If you have any output templates already created, you can choose one to associate with this input
filter from the drop-down. Delta automatically assigns the output filters that belong to the specified
template to the content when it's created.

If you aren't using a template, manually add the output filters. For information about adding output
filters, see Output Filter Trees (p. 40).

Storage Type

Folder where Delta stores incoming content.
Available options:

- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

**Local Storage Location**

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

**S3 Storage Location**

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.

**Segmentation Marker**

The type of marker that identifies segmentation in the input stream.

Available options:

- **IDR Frames** — instantaneous decoder refresh (IDR) segments are positioned at each closed group of pictures (GOP) boundary.
- **EBP Markers** — segments are positioned at encoder boundary points (EBP) as specified by OpenCable OC-SP-EBP-101-130118.

**FEC Decode**

Controls how Delta handles forward error correction (FEC) on the input stream.

When you select **Enable**, Delta reception is permitted for SMPTE-2022-1 and SMPTE-2022-2 (ProMPEG) FEC. If FEC data is not received, the input will function but errors are not logged.

Compatible with only RTP inputs.

**Buffer Time**

 Applies to cluster deployments with a leader and secondary Delta node.

The amount of time (in seconds) that the secondary node continually buffers of the incoming content. During a failover, when the secondary node becomes leader, it inserts this buffered content to compensate for content loss during the failover.

The buffer time must be higher than the value in **Drop Node After** on the Nodes screen. For more information about clusters, see **AWS Elemental Delta 2.3 Cluster Standard Configuration Guide**.

**Storage File Duration**

When you're using local storage, set the storage file duration to customize the segment duration (in seconds) Delta uses when saving files to disk. Valid values are between 0 and 600 seconds.

When you specify a value for the storage file duration, Delta concatenates segments up to the specified value when storing contents on the disk. For this reason, the value you use must be greater than the source segment duration. If you don’t enter a value, the duration on the disk matches the source segment duration.

The storage file duration can't be used with content stored on Amazon S3.

**Content Window**

Rule for how long to keep content.

Available options:

- **Keep All Content** — Delta will never automatically discard content.
This option is intended for short-lived content such as events or VOD content. When you delete the Content entity when it's no longer being used, the stored content is also deleted. This option is not recommended for live sources because it will eventually use up all of your storage.

- **Package Controlled** — delete requests are honored in WebDAV. Valid on WebDAV input filters only.
- **Keep Time Specified** — content is saved up to the specified time limit. As new content is added, old content is removed on a first in, first out basis.

Specify the time limit in **Duration to Keep**.

For all values, keep in mind that if you later remove all output filters from the Content entity, Delta will continue to ingest and store the content.

**Duration to Keep**

Required when **Content Window** is set to **Keep Time Specified**.

Indicates how long Delta stores the content.

If you plan to create a passthrough output filter for the content associated with this input filter, then make sure that the duration is equal to or greater than the window of the upstream encoder. Otherwise, playback may be disrupted.

**Time Source**

The clock that Delta references for operations such as performing live to VOD clipping.

Ingest time is the default if embedded or program date times are not available in the input stream.

## UDP VOD Catalog Fields

Use the following fields if you are converting live content to VOD Catalog after ingest.

**VOD Catalog URL Prefix**

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

**VOD Catalog Output Template**

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

**Live to VOD Catalog Output Location Type**

Folder where Delta stores VOD Catalog contents that are produced using a Live to VOD Catalog output filter.

Available options:

- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

**Local Live to VOD Catalog Output Location**

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

**S3 Local Live to VOD Catalog Output Location**

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.
Live to VOD Catalog AWS Credentials

Username and password that Delta uses to access the S3 bucket for VOD Catalog content storage. If S3 is used for both the storage location and output location, then both must use the same AWS credentials.

You can create and manage AWS credentials for Delta on the Settings > AWS Credentials screen. For more information, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.

VOD Catalog Input Filter

This filter allows Delta to pull VOD content that already exists on a NAS or Amazon S3. The CMS uses an API to tell Delta the path to the content to ingest on this input filter. Delta indexes the content in-place and generates the metadata to create a VOD Catalog asset (content). The existing content files are not moved or copied.

**Warning**

Content that is stored on S3 is also accessed for egress/playback from S3. Playing content directly from your S3 storage may have billing implications.

For more information about VOD Catalog, see Working with VOD Catalog Assets in AWS Elemental Delta.

The following fields are on a VOD Catalog input filter.

**Filter Label**

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format `Filter x`, where `x` is the ID that Delta assigns to the input filter upon creation.

**VOD Catalog URL Prefix**

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

**Take Ownership of Content**

When you select **Enabled**, it indicates that Delta takes ownership of the content after ingest. This means that when the VOD Catalog content is deleted in Delta, the original data is also deleted.

**VOD Catalog Output Template**

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

**Location Type**

Folder where Delta stores VOD Catalog contents.

Available options:

- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

**Local Live to VOD Catalog Output Location**

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

**S3 Local Live to VOD Catalog Output Location**

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.
Live to VOD Catalog AWS Credentials

Username and password that Delta uses to access the S3 bucket for VOD Catalog content storage. If S3 is used for both the storage location and output location, then both must use the same AWS credentials.

You can create and manage AWS credentials for Delta on the Settings > AWS Credentials screen. For more information, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.

Encrypt VOD Catalog

When you specify a location, AWS Elemental Delta copies VOD Catalog content as it's ingested, encrypts the audio and video segments, and saves all segments (including unencrypted captions segments) to the location that you specified.

Delta uses AES-128 encryption and generates a single key per playlist. When the content is requested for playback, Delta retrieves it from storage and decrypts it using the key.

Important
Make sure that you maintain regular database backups when you are encrypting content in storage. If you lose the database, Delta also loses the decryption key. You can't access the encrypted content without the key.

Watch Folder Input Filter

This filter allows Delta to pull VOD content that is published to a folder on a server in your network. The filter holds information about this folder so that Delta can watch it. As soon as Delta sees new content in that folder (content with a name it doesn't know about yet), it ingests it and creates a Content for it.

The following fields are on a Watch Folder input filter.

Filter Label

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format Filter x, where x is the ID that Delta assigns to the input filter upon creation.

Incoming Folder

The folder for Delta to watch for new content. Delta must be able to access the folder to tell when new content is added, and to pull new content from the folder. For example, it can be a remote server mounted onto Delta. For information about mounting folders, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.

Recursion Depth

The number of layers of subdirectories that Delta must monitor within the watch folder.

Available options:
- **Top Level Only** — Delta monitors only the top-level folder.
- **Search All Subdirectories** — Delta monitors all subdirectories in the folder.
- 1 through 10 — Delta monitors the specified number of layers.

Output Template

If you have any output templates already created, you can choose one to associate with this input filter from the drop-down. Delta automatically assigns the output filters that belong to the specified template to the content when it's created.
If you aren’t using a template, manually add the output filters. For information about adding output filters, see Output Filter Trees (p. 40).

**WebDAV Input Filter**

This filter allows HLS content to be pushed to the WebDAV server being hosted by the Delta node. You create WebDAV credentials in Delta (POST Input User) and pass these credentials when posting the content to Delta (from outside of Delta). The WebDAV input filter holds information about the credentials and the path to the WebDAV server. The following sections provide information about creating a WebDAV input filter.

**Topics**
- WebDAV General Fields (p. 27)
- WebDAV Input Filter VOD and VOD Catalog Fields (p. 29)

**WebDAV General Fields**

The following fields are used to capture general information about how the manifest is treated. If the incoming content is live and will be output as live, no other fields are required.

If you are ingesting content as VOD or will be converting live or VOD content to VOD Catalog after ingest, see WebDAV Input Filter VOD and VOD Catalog Fields (p. 29).

**Filter Label**

Name for the filter.

Delta uses this value when naming the Content entity that is associated with this input filter. If you leave this field empty, Delta automatically generates a name in the format `Filter x`, where x is the ID that Delta assigns to the input filter upon creation.

**Relative Path**

The relative path where content is posted.

If content is posted to `<WebDAV server>/in/`, then leave this field empty.

If content is posted to a subfolder of `<WebDAV server>/in/`, specify that subfolder path in the format `<subfolder/sub-subfolder/>` (with no leading slash).

**Username**

The input user that you will pass when you post content to the Delta WebDAV server. The username and password are required for WebDAV content. For information about setting up input users, see Forming Input Users in AWS Elemental Delta (p. 9).

**Password**

The selected input user's password.

**Output Template**

If you have any output templates already created, you can choose one to associate with this input filter from the drop-down. Delta automatically assigns the output filters that belong to the specified template to the content when it's created.

If you aren’t using a template, manually add the output filters. For information about adding output filters, see Output Filter Trees (p. 40).
Storage Type

Folder where Delta stores incoming content.

Available options:
- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

Local Storage Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Storage Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as **s3://<full_path>**.

Encrypt Storage

When enabled, AWS Elemental Delta encrypts VOD content while it's in storage:
- On ingested VOD content, Delta encrypts the segments prior to saving them to storage.
- On live-to-VOD content, Delta encrypts the segments as they're converted from live to VOD content, then saves them to storage.

Delta uses AES-128 encryption and generates a single key per playlist. When the content is requested for playback, Delta retrieves it from storage and decrypts it using the key.

**Important**

Make sure that you maintain regular database backups when you are encrypting content in storage. If you lose the database, Delta also loses the decryption key. You can't access the encrypted content without the key.

Content Window

Rule for how long to keep content.

Available options:
- **Keep All Content** — Delta will never automatically discard content.
- **Package Controlled** — delete requests are honored in WebDAV. Valid on WebDAV input filters only.
- **Keep Time Specified** — content is saved up to the specified time limit. As new content is added, old content is removed on a first in, first out basis.

Specify the time limit in **Duration to Keep**.

For all values, keep in mind that if you later remove all output filters from the Content entity, Delta will continue to ingest and store the content.

Duration to Keep

Required when **Content Window** is set to **Keep Time Specified**.

Indicates how long Delta stores the content.

If you plan to create a passthrough output filter for the content associated with this input filter, then make sure that the duration is equal to or greater than the window of the upstream encoder. Otherwise, playback may be disrupted.
**Time Source**

The clock that Delta references for operations such as performing live to VOD clipping.

Ingest time is the default if embedded or program date times are not available in the input stream.

---

**WebDAV Input Filter VOD and VOD Catalog Fields**

The following sections describe the fields that relate to VOD and VOD Catalog.

### WebDAV VOD Ingest Fields

Use the following fields if you are ingesting VOD content.

**VOD Content**

When you select *Enabled*, it indicates that the asset being handled by this input filter is VOD.

**Promote After Ingest**

When you select *Promote After Ingest*, VOD content is automatically converted to VOD Catalog content when ingest is complete. Otherwise, content is stored as VOD.

These following fields are for VOD content that will be promoted to VOD Catalog after ingest. They aren't needed if you plan on leaving the content as standard VOD.

**Promotion Delay**

If you require a delay after ingest before VOD content is converted to VOD Catalog, set a promotion delay. Delta waits the set amount of time after ingest is complete before content is promoted.

**VOD Catalog URL Prefix**

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

**VOD Catalog Output Template**

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.

---

**WebDAV VOD Catalog Fields**

Use the following fields if you are converting live content to VOD Catalog after ingest.

1. For **VOD Content**, *do not* select *Enabled*.
2. Complete the VOD Catalog fields as described below.

**VOD Catalog URL Prefix**

Partial URL added to the start of all VOD Catalog content endpoints produced through the input filter.

**VOD Catalog Output Template**

The VOD Catalog output template that will be applied to VOD Catalog content. Required when content is being converted to VOD Catalog after ingest.
Live to VOD Catalog Output Location Type

Folder where Delta stores VOD Catalog contents that are produced using a Live to VOD Catalog output filter.

Available options:
- **Local** — content is stored to a folder that the Delta node has access to.
- **S3** — content is stored to an Amazon S3 bucket.

Local Live to VOD Catalog Output Location

What local folder Delta uses as the remote file cache. Select the appropriate folder from the listed directory.

S3 Local Live to VOD Catalog Output Location

What Amazon S3 folder Delta uses as the remote file cache. Enter the S3 URL as `s3://<full_path>`.

Live to VOD Catalog AWS Credentials

Username and password that Delta uses to access the S3 bucket for VOD Catalog content storage. If S3 is used for both the storage location and output location, then both must use the same AWS credentials.

You can create and manage AWS credentials for Delta on the Settings > AWS Credentials screen. For more information, see AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.
Contents Reference

The Content entity holds the video asset that is being ingested, as identified by the corresponding input filter. The input filter holds the rules about how the video asset is being ingested. The Content holds the actual video, audio, and subtitles from the asset.

To access Contents in Delta, click Contents in the menu bar.

Live Content Egress

When live content to HLS and UDP inputs is missing one or more streams (such as when there are encoder or network issues, or if you intentionally remove a stream), the remaining streams are still available for output from AWS Elemental Delta. Here is what happens if a stream goes missing from the stream set:

**Important**
This description applies when you’re using default stream sets only. If you’re using custom stream sets, manually update the stream set when a stream becomes unavailable.

- Delta considers the stream as ended and removes it from the stream set.
- Delta recreates the default stream sets, excluding the ended stream.
- On the Contents screen, the content itself still shows as Live - Active as long as at least one stream is still available for playback. The missing stream is marked as stale.

When the missing stream resumes, Delta restores it to the stream set and playback continues as normal.

If all streams in the stream set become unavailable, the content status goes to Live - Stale.
Forming Contents in AWS Elemental Delta

A content entity is created automatically or manually, as shown in the table below.

<table>
<thead>
<tr>
<th>Content Type</th>
<th>Direction</th>
<th>Type of Content Entity</th>
<th>When Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP Input</td>
<td>Push</td>
<td>Content</td>
<td>Automatically, when an asset is pushed to Delta.</td>
</tr>
<tr>
<td>MSS Input</td>
<td>Push</td>
<td>Content</td>
<td>Automatically, when an asset is pushed to Delta.</td>
</tr>
<tr>
<td>RTMP Input</td>
<td>Push</td>
<td>Content</td>
<td>Automatically, when an asset is pushed to Delta.</td>
</tr>
<tr>
<td>UDP Input</td>
<td>Push</td>
<td>Content</td>
<td>Automatically, when an asset is pushed to Delta.</td>
</tr>
<tr>
<td>Watch Folder Input</td>
<td>Pull</td>
<td>Content</td>
<td>Automatically, the first time Delta detects an asset in the watched folder.</td>
</tr>
<tr>
<td>WebDAV Input</td>
<td>Push</td>
<td>Content</td>
<td>Automatically, when an asset is pushed to Delta.</td>
</tr>
<tr>
<td>VOD Catalog Input</td>
<td>Varies</td>
<td>VOD Catalog Content</td>
<td>See Creating VOD Catalog Content in AWS Elemental Delta (p. 33).</td>
</tr>
</tbody>
</table>

Creating Remote Input Content in AWS Elemental Delta

Manually create remote input content from the input filter.

**To create remote input content**

1. Make note of the location from which Delta will ingest content.
2. Create a Remote Input filter, as described in the section called “Remote Input Filter” (p. 17).
3. On the input filter, click **Add Content**.
4. Complete the following fields in the **Add Content** dialog and click **Add**.
• **Name** — A name for this content.

• **URI** — The final portion of the path to the remote content. This value is appended to the Remote Location identified in the Remote Input input filter.

In this example,

```
http://10.10.10.1/popular/interviews/mendis.m3u8
```

The following are true:

- The remote location is `10.10.10.1/popular/interviews/`
- The URI is `mendis.m3u8`

The content is created and displayed on the Contents screen upon ingest.

## Creating VOD Catalog Content in AWS Elemental Delta

VOD Catalog contents are created through one of four methods. The following sections describe these methods. Note that prior to performing any of these methods, a VOD Catalog output template must be defined. See [Filter Trees on an Output Template](p. 42).

See the [Working with VOD Catalog Assets in AWS Elemental Delta](feature-guide) feature guide for more detailed information about VOD Catalog.

### Live to VOD Catalog

Delta automatically converts live assets to VOD Catalog contents at the end of the Live-to-VOD window.

**To create VOD Catalog contents from live content**

1. Complete the VOD Catalog fields on the input filter. See specific information for input filters in [Forming Input Filters in AWS Elemental Delta](p. 10).
2. When the live content entity is created, add a VOD Catalog output filter to the output filter tree. For information about the output filter, see [Live to VOD Catalog Output Filter](p. 119).

When the Live-to-VOD window is complete, the VOD Catalog content is created.

### Streaming VOD Ingest

Delta automatically promotes VOD assets to VOD Catalog contents after ingest.

**To create VOD Catalog contents from VOD content**

1. Perform all of these steps on the input filter. Select **VOD Content**.
2. Place a check in the box for **Promote After Ingest**.
3. Complete the VOD Catalog fields on the input filter. See [Forming Input Filters in AWS Elemental Delta](p. 10) for help.

After the VOD content has been ingested, the VOD Catalog content is created.
Existing VOD to VOD Catalog

Promote VOD assets that already exist as content in Delta to VOD Catalog.

To create VOD Catalog content from an existing VOD content

1. On the VOD Contents tab of the Contents page, locate the content to be promoted.
2. On the selected content, click the promote icon (arrow pointing up).
3. In the dialog box, select the VOD Catalog output template that the content will use. Optionally, type a content alias that will be used as an alternate way to reference the content. For more information about the content alias, see Live to VOD Catalog Output Filter (p. 119).
4. Click Promote.

The VOD Catalog content is created.

For information about promoting existing VOD content through the REST API, see the POST VOD Catalog Content section in the AWS Elemental Delta 2.3 API Guide.

VOD Catalog Ingest

Ingest content that already exists on a NAS or Amazon S3 as VOD Catalog content.

To ingest VOD Catalog content

1. Create a VOD Catalog input filter as described in VOD Catalog Input Filter (p. 25).
2. When content is ready to be ingested, click Ingest Content on the input filter.
3. Enter the path to the content manifest and click Ingest.

The asset is ingested as VOD Catalog content.

Alternatively, you can use the REST API to alert Delta of content to ingest. See the VOD Catalog Ingest section of Working with VOD Catalog Assets in AWS Elemental Delta for more information.
Output Filter Reference

The following sections describe what output filters are and how to use them.

Topics
• About Output Filters (p. 35)
• Output Filter Trees (p. 40)

About Output Filters

Output filters provide information about how to package the content. An output filter is always associated with one content entity. For more information on output filters and content entities, see ??? (p. 6).

Topics
• Output Filter Types (p. 35)
• Package Output Filters Change Content Type (p. 35)
• Endpoints on Output Filters (p. 36)

Output Filter Types

There are several types of output filter:

• Package output filters package the output for access by different types of players. See Creating Package Output Filters (p. 48).
• Access Restriction output filters:
  • DRM filters (which contain encryption information so that the content can be handled by a DRM system. See Digital Rights Management (DRM) Output Filters (p. 76).
  • Authentication output filters, which contain authentication information so that the content can be handled by an authentication mechanism. See Authentication Output Filters (p. 101).
  • White/blacklist output filters, which limit access to players whose IP address is within a range or outside a range. See Blacklist and Whitelist Output Filters (p. 104).
  • The User Agent output filter restricts access to the content to specific types of user agents. See User Agent Output Filter (p. 105).
• Processing output filters process the output content in various ways. See Creating Processing Output Filters (p. 107).

Package Output Filters Change Content Type

Package output filters may change the content type from the type originally ingested. For example, MSS Live input can be converted to DASH output by creating a DASH package output filter.

Depending on the ingested content type, a package filter may be required to exist somewhere in the filter tree. See the following table.

<table>
<thead>
<tr>
<th>Ingested Format Type</th>
<th>Package Filter Required somewhere in Tree?</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLS</td>
<td>No</td>
</tr>
</tbody>
</table>

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Rev 1

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Ingested Format Type | Package Filter Required somewhere in Tree?
---|---
Delta-encrypted HLS | No
MP4 | No
MSS | No
Pre-encrypted HLS or MSS | No. In fact, not only is a package output filter not required, it is not allowed. You cannot create a package output filter to convert pre-encrypted content.
RTMP | Yes
TS | Yes

Endpoints on Output Filters

All output filters (not only package output filters) have the potential to enable an endpoint for a player, meaning that the appropriate player could play the content as it currently exists after the processing represented by the filter.

The type of player that can access the endpoint is determined as follows:

- If the current output filter is any packaging filter except the passthrough filter, it is determined by the capabilities of that filter. For example, a DASH-ISO filter produces an .mpd endpoint.
- If the current output filter is the passthrough packaging filter, it is determined by the type of the input content.
- If the current output filter is not a packaging filter, it is determined by the packaging filter upstream of this filter (even if the packaging filter upstream does not have an endpoint enabled).
- If the current output filter is not a packaging filter and there is no upstream packaging filter, it is determined by the type of the input content.

Endpoints and Manifests

This table summarizes the manifests that are created when there is no package output filter upstream (column 1) and when there is a package output filter upstream (column 2). The third column specifies the manifests that are created.
<table>
<thead>
<tr>
<th>Input Content</th>
<th>Output Filter</th>
<th>Manifest that's Created at the Endpoint</th>
</tr>
</thead>
</table>
| MP4           | None          | One manifest in the format `<filter>.mp4`  
Where `<filter>` is the ID of the filter for this endpoint. |
| MSS           | None          | One manifest in one of these formats:  
- `<filter>.ism/Manifest`  
- `<filter>.isml/Manifest`  
Where `<filter>` is the ID of the filter for this endpoint.  
The extension used depends on the extension that is used in the input content. VOD usually uses .ism. Live usually uses .isml. |
| RTMP          | None          | Not applicable because it is not possible to enable endpoints on RTMP content; the content must be converted to a different format via a package output filter. |
## Endpoints on Output Filters

<table>
<thead>
<tr>
<th>Input Content</th>
<th>Output Filter</th>
<th>Manifest that's Created at the Endpoint</th>
</tr>
</thead>
</table>
| Any           | CMAF          | - One manifest in the format `<filter>.m3u8`  
|               |               | - Several variant manifests (one per stream set) in the format `<filter>_n.m3u8`  
|               |               | - Content files in the formats `<filter>_n_m.mp4`  
|               |               | Where  
|               |               | - `<filter>` is the ID of the filter for this endpoint.  
|               |               | - `_n` is a number corresponding to the stream set ID: 1, 2, 3 and so on.  
|               |               | - `_m` is the segment number.  
| Any           | HDS           | One manifest in the format `<filter>.f4m`  
|               |               | Where `<filter>` is the ID of the filter for this endpoint.  

**Warning**

CMAF and HLS output filter endpoints use the same manifest file extension. If you have both CMAF and HLS endpoints on the same content and use custom URLs, make sure the URLs that you define are unique to avoid playback issues.
### Endpoints on Output Filters

<table>
<thead>
<tr>
<th>Input Content</th>
<th>Output Filter</th>
<th>Manifest that's Created at the Endpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>HLS</td>
<td>• One manifest in the format <code>&lt;filter&gt;.m3u8</code>&lt;br&gt;• Several variant manifests (one per stream set) in the format <code>&lt;filter&gt;_n.m3u8</code>&lt;br&gt;• Content files in these formats:&lt;br&gt;  • For single-track stream sets: `&lt;filter&gt;_[audio</td>
</tr>
<tr>
<td>Any</td>
<td>MPEG-TS</td>
<td>• One manifest in the format <code>&lt;filter&gt;.smil</code>&lt;br&gt;• Content files in the format in the format <code>&lt;filter&gt;_n.ts</code>&lt;br&gt;Where&lt;br&gt;  • <code>&lt;filter&gt;</code> is the ID of the filter for this endpoint.&lt;br&gt;  • <code>_n</code> is a number corresponding to the stream set ID: 1, 2, 3 and so on.</td>
</tr>
</tbody>
</table>
Output Filter Trees

Output filters are linked together into a filter tree. The tree can include branches, which represent different treatments to the output content.

In general, organize output filters and make branches in the order in which it makes sense for you. For example, if you want all of the endpoints to use the same ad content, then you probably want to position the Ad Replace output filter (a processing output filter) at the start of the tree. But if you want some content to have one set of ads and other content to have another set of ads, then it makes sense to branch the filter tree and then insert the Ad Replace output filter in each branch.

An important use case for branching is to ensure you follow the content compatibility rule, as described in Content Compatibility.

Topics
- Content Compatibility (p. 41)
- Methods for Creating an Output Filter Tree (p. 42)
- Output Template Replacement Tokens (p. 43)
Content Compatibility

All of the filters in a particular branch, from the end of the branch all the way up to the start of the tree, must be compatible with the content of that branch. For example, on a branch that is considered to be "HLS content", all the filters on that branch must be compatible with HLS content.

Compatibility is determined by one of these:

- The package output filter on the branch. For example, if the branch has an HLS package output filter, all the filters on that branch must be HLS compatible.
- Or, if the branch has no package output filter, by the format of the original input content or by the Live to VOD filter. For example, if the original input content is HLS and there will be no output packaging filter (because you want to output HLS without changing the manifests and segment sizes), then all the filters on that branch must be HLS compatible.

If you do not follow this compatibility rule, you will eventually run into trouble. For example, assume that your input content is HLS and your package output filter is MPEG-TS. You could theoretically create an Ad Replace content high up in the filter tree (because this filter is compatible with HLS content). But the presence of the Ad Replace content would prevent you from adding an MPEG-TS package output filter downstream in the filter tree.

This table shows output content compatibility with the various output filters.

<table>
<thead>
<tr>
<th>Output Filter</th>
<th>Compatible Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Encryption DRM output filter</td>
<td>DASH</td>
</tr>
<tr>
<td>Flash Access DRM output filter</td>
<td>• Live HDS (for Full Flash Access option)</td>
</tr>
<tr>
<td></td>
<td>• Live or VOD HLS (for Protected Flash Access option)</td>
</tr>
<tr>
<td></td>
<td>• Delta-encrypted HLS</td>
</tr>
<tr>
<td>PlayReady DRM output filter</td>
<td>Live or VOD MSS</td>
</tr>
<tr>
<td>HLS Encryption DRM output filter</td>
<td>• Live or VOD CMAF</td>
</tr>
<tr>
<td></td>
<td>• Live or VOD HLS</td>
</tr>
<tr>
<td></td>
<td>• Delta-encrypted HLS</td>
</tr>
<tr>
<td>Akamai G2o authentication output filter</td>
<td>Any</td>
</tr>
<tr>
<td>Cisco URL Signing authentication output filter</td>
<td>• Live or VOD CMAF</td>
</tr>
<tr>
<td></td>
<td>• Live or VOD HLS</td>
</tr>
<tr>
<td></td>
<td>• Delta-encrypted HLS</td>
</tr>
<tr>
<td>IP Blacklist output filter</td>
<td>Any</td>
</tr>
<tr>
<td>IP Whitelist output filter</td>
<td>Any</td>
</tr>
<tr>
<td>User Agent output filter</td>
<td>Any</td>
</tr>
<tr>
<td>Ad Removal processing output filter</td>
<td>• Live or VOD CMAF</td>
</tr>
<tr>
<td></td>
<td>• Live or VOD HLS</td>
</tr>
<tr>
<td></td>
<td>• Delta-encrypted HLS</td>
</tr>
<tr>
<td>Ad Replace processing output filter</td>
<td>• Live or VOD CMAF</td>
</tr>
<tr>
<td></td>
<td>• Live or VOD HLS</td>
</tr>
</tbody>
</table>
Methods for Creating an Output Filter Tree

The output filter tree structure can be created two ways:

- Directly on individual Content entities: allows for customization and flexibility across contents.
- In an output template to be used across multiple input filters: creates efficiency when the settings are the same across contents.

The following sections provide more information on each creation method.

Topics

- Filter Trees on a Content Entity (p. 42)
- Filter Trees on an Output Template (p. 42)

Filter Trees on a Content Entity

The output filter tree can be added directly to VOD and live Content entities. A VOD Catalog output template must be used with VOD Catalog content.

Filter Trees on an Output Template

Note

Output templates are considered an advanced feature. This section assumes that you are familiar with output filters (as described in About Output Filters (p. 35)).

An output template is a framework of an output filter tree consisting of one or more output filters of any type.

These templates are useful when you have an input filter such as a WebDAV or Watch Folder that creates multiple content instances. Each time that the input filter automatically creates a content entity (for example, when a watch folder input filter detects a new asset), the content is automatically created, as

<table>
<thead>
<tr>
<th>Output Filter</th>
<th>Compatible Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitrate Selector processing output filter</td>
<td>Any</td>
</tr>
<tr>
<td>Blackout processing output filter</td>
<td>Any</td>
</tr>
<tr>
<td>Cache Control processing output filter</td>
<td>Any</td>
</tr>
<tr>
<td>File Copy processing output filter</td>
<td>Any VOD</td>
</tr>
<tr>
<td>Live to VOD processing output filter</td>
<td>Any live</td>
</tr>
<tr>
<td>Live to VOD Catalog processing output filter</td>
<td>Any live</td>
</tr>
<tr>
<td>Preroll Ad Insertion processing output filter</td>
<td>Any VOD</td>
</tr>
<tr>
<td>Postroll Ad Insertion processing output filter</td>
<td>Any VOD</td>
</tr>
<tr>
<td>Time Delay processing output filter</td>
<td>Any live</td>
</tr>
<tr>
<td>VOD Clip processing output filter</td>
<td>Any VOD</td>
</tr>
</tbody>
</table>
usual. But in addition, the output filters specified in the output template are also created and attached to the content. This capability is of particular interest to VOD content because it is likely that the same packaging and filtering rules will apply to all assets in the same watch folder.

An output template is also useful when you have two input filters (of the same type) that both need the same packaging and filtering. You could attach the same output template to both input filters. In this way, you have to perform the output filter setup only once, in the output template, but you can use and re-use it with different input filters.

A VOD Catalog output template is required for all VOD Catalog content.

**VOD Catalog Output Templates**

VOD Catalog output templates perform the same function as standard output templates, but can only be applied to VOD Catalog content. VOD Catalog output templates do not allow output filters that are irrelevant to VOD Catalog content (such as Live-to-VOD output filters and output filters that are specific to live content).

For more information about VOD Catalog, see the [Working with VOD Catalog Assets in AWS Elemental Delta feature guide](#).

**Requirements for Output Templates**

To use an output template, the same rules as for output filters must be met. For example, if you create an HLS package output filter, the stream set must contain one and only one video track element.

### Output Template Replacement Tokens

Replacement tokens are temporary values used on output templates (VOD and standard) with the intent to be replaced with real values when the output template is applied to a contents. Tokens are primarily used on filters that require unique values per contents, or for custom URLs.

See the following sections for replacement token information by output template type.

**Using Live and VOD Output Template Replacement Tokens**

These are the replacement tokens available on live and VOD content.

<table>
<thead>
<tr>
<th>Token</th>
<th>Filters used in</th>
<th>Settings used in</th>
<th>What it's replaced with</th>
</tr>
</thead>
<tbody>
<tr>
<td>$fn$</td>
<td>All</td>
<td>Custom URL (output_url in the API)</td>
<td>The system-generated name of the Content entity that the output template is applied to.</td>
</tr>
<tr>
<td>$ex$</td>
<td>All</td>
<td>Custom URL (output_url in the API)</td>
<td>The endpoint file format extension on the Content entity that the output template is applied to.</td>
</tr>
<tr>
<td>$id$</td>
<td>All encryption filters</td>
<td>Any string-based settings on encryption filters, including keyprovider settings.</td>
<td>The ID of the Content entity that the output template is applied to.</td>
</tr>
</tbody>
</table>

When creating the output template, enter $fn$, $ex$, or $id$ as needed on applicable output filters.
When content is ingested and the live or VOD Content entity is created, the tokens are replaced with values Delta assigned to the contents when it was created.

**Using VOD Catalog Output Template Replacement Tokens**

These are the replacement tokens available on VOD Catalog content.

<table>
<thead>
<tr>
<th>Token</th>
<th>Filters used in</th>
<th>Settings used in</th>
<th>What it's replaced with</th>
</tr>
</thead>
<tbody>
<tr>
<td>$name$</td>
<td>All</td>
<td>Custom URL (output_url in the API)</td>
<td>The user-defined name from the Live to VOD Catalog output filter, or from the VOD Catalog Content entity. Delta populates the replacement value when the VOD output template is applied (at content egress).</td>
</tr>
</tbody>
</table>
|           |                 |                                | **Important**  
|           |                 |                                | Be careful not to overlap endpoint filter names when the filters have the same extension. For example, if one filter is named $name$.mpd and another is named $name$$_encrypted.mpd, Delta sees $name$ in the request URL and might serve the wrong content based on the partial name match. To avoid this, if you use a suffix on one endpoint, use one on others that have the same $name$ value and extension. |
| $resourceid$ | All         | String-based settings on encryption filters, including keyprovider settings on DRM filters. | The user-defined name from the Live to VOD Catalog output filter, or from the VOD Catalog Content entity. Delta populates the replacement value when the VOD output template is applied (at content egress). |
Output Template Replacement Tokens

<table>
<thead>
<tr>
<th>Token</th>
<th>Filters used in</th>
<th>Settings used in</th>
<th>What it's replaced with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Does not work in the <strong>Custom URL</strong> field (output_url in the API)</td>
<td>Catalog Content entity. Delta populates the replacement value when the VOD output template is applied (at content egress).</td>
</tr>
<tr>
<td>$resourceid_alt$</td>
<td>All</td>
<td>String-based settings on encryption filters, including keyprovider settings on DRM filters. Does not work in the <strong>Custom URL</strong> field (output_url in the API)</td>
<td>The $resourceid_alt$ behaves in the same way as $resourceid$ (above). Use $resourceid_alt$ when you need to use more than one variable on an output filter.</td>
</tr>
</tbody>
</table>

**To use replacement tokens**

1. On the VOD output template, enter $name$, $resourceid$, and $resourceid_alt$ as needed on applicable output filters.
2. Define the content-specific name and resourceid values. Either:
   - On the Live to VOD Catalog output filter, enter values in the Name and/or Resource ID field.
   - If you're not using Live to VOD Catalog, after content has been ingested and a VOD Catalog contents is created, use the REST API to modify the contents and define name and resourceid. See the **PUT VOD Catalog Contents** of the AWS Elemental Delta 2.3 API Guide.

At egress, the output template is applied to the contents and the $name$, $resourceid$, and $resourceid_alt$ tokens are replaced with the values defined on the VOD Catalog contents.
Forming Output Filters in AWS Elemental Delta

Topics
- Starting the Output Filter Tree in AWS Elemental Delta (p. 46)
- Creating Package Output Filters (p. 48)
- Creating Access Restriction Output Filters (p. 75)
- Creating Processing Output Filters (p. 107)

Starting the Output Filter Tree in AWS Elemental Delta

You can create an output filter tree on each individual Content entity, or you can create an output template that populates the output filter tree on a Content entity when the entity is created.

Topics
- Add a Tree to a Content Entity (p. 46)
- Create an Output Template (p. 46)

Add a Tree to a Content Entity

1. Access the Contents screen and click in to the Content entity to display the Output Filters screen, as described in View Content Entities (p. 129).
2. The output filter tree can have several branches. To:
   - Start a new branch, click Add a Top Level Filter and select the output filter that starts this branch.
   - Load the output filter tree from an output template, choose Load from Template.
   - Add output filters to an existing branch, locate the existing output filter that the new filter will be downstream of and click the add button (plus sign). In the new output filter box, select the next output filter from the Select a Filter drop-down.
3. Complete the settings on the output filter and choose Create.

For help with output filter settings, see the following sections:
- Creating Package Output Filters (p. 48)
- Creating Access Restriction Output Filters (p. 75)
- Creating Processing Output Filters (p. 107)

Create an Output Template

1. Access the Output Templates screen as described in View Output Templates (p. 132).
2. Choose Add New and select the type of template that you are creating: standard output template (for live and VOD content), or VOD Catalog output template (for VOD Catalog content).
3. Complete the Name field and the Alias field (for VOD Catalog output templates) and choose Create.

Note that the alias is how you reference the VOD Catalog output template.

4. Add output filters as described in the procedure above for adding an output filter tree to a Content entity. To use replacement tokens in the template, see Output Template Replacement Tokens (p. 43).

See the following section for information about stream sets in output templates.

Output Template Stream Sets

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

You can skip the remainder of this section.

Note
Subtitle and captions tracks are not automatically assigned to stream sets. If you're using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually, you can set up any track in a stream set to include a track selector. In this way, you can specify that a track meets a specific criterion, for example, that a video track uses the H.264 codec.

When the output template is used to create an output filter attached to content, a track element will be created if the criterion specified in that type of track is met. If the criterion is not met, no track will be created.

To include a track selector:
1. Uncheck Use Default Stream Sets.
2. Choose New Stream Set.
3. In the Add New Stream Set dialog, click Add Track for each applicable track type and add the track criteria.
4. Complete the fields.

Codec

Use the track that matches the specified codec. This selector works on only ingested content that has one track that matches your selection. If the ingested content contains two tracks with the specified codec, then Delta automatically uses the first one.

Available codecs:
- **Video** — H264 or H265
- **Audio** — AAC, AC3, EAC3, AACH, or WMA2
- **Subtitles and Captions** — DFXP, TTML, WebVTT, DVBSub, DVBText, or SRT

PID

Select one track that matches the specified program identifier (PID). This field only applies to output filters that are attached to HLS or TS content.

Minimum Bitrate

Select all tracks with a bitrate more than this bitrate. Maximum bitrate is required with minimum bitrate so you can supply a range

Enter kiloboits and megabits as described in **Maximum Bitrate**.
Creating Package Output Filters

Package output filters format the output for access by different types of players.

The package output filter that you use is dependent on the type of content you’ve received and how it will be consumed by viewers. Find your content type below to see what output filters apply.

**HLS**

For HLS content that Delta received as un-encrypted, you can use the following package output filters:

- Common Media Application Format (CMAF) Output Filter (p. 50)
- Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)
- HTTP Dynamic Streaming (HDS) Output Filter (p. 57)
- HTTP Live Streaming (HLS) Output Filter (p. 60)
- MPEG-4 (MP4) Output Filter (p. 67)

For live content, the MP4 packaging filter must be after a Live to VOD or Live to VOD Catalog output filter:

- MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)

For live content, the MPEG-TS packaging filter must be after a Live to VOD or Live to VOD Catalog output filter:

- Microsoft Smooth Streaming (MSS) Output Filter (p. 72)
- Passthrough Output Filter (p. 74)

**Delta-encrypted HLS**

For HLS content that is encrypted using Delta as the digital rights management (DRM) keyprovider, you can use the following package output filters:

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**Maximum Bitrate**

Select all tracks with a bitrate less than this bitrate. Minimum bitrate is required with maximum bitrate so you can supply a range.

Specify megabits as a 7-digit number or a whole number with an m. For example, you can enter 5 megabits as 5000000 or 5m.

Specify kilobits as a 5-digit number or a decimal with an m. For example, you can enter 500 kilobits as 50000 or 0.5m.

**Input Stream Index**

In the incoming content, select one track, by index relative to other tracks. For example, a value of 2 will select the track that is ranked second. If the track indexes are 189, 190, and 191, a value of 2 selects the track with index 190.

**Language**

Select all of the tracks that match the specified language. Use the ISO-639-2 three-letter code to identify a language.

**Track Index**

The order that Delta displays this track in the stream set once it's created.

**Name**

Name of the track once it's created.
• Common Media Application Format (CMAF) Output Filter (p. 50)
• Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)
• HTTP Dynamic Streaming (HDS) Output Filter (p. 57)
• HTTP Live Streaming (HLS) Output Filter (p. 60)
• MPEG-4 (MP4) Output Filter (p. 67)

For live content, the MP4 packaging filter must be after a Live to VOD or Live to VOD Catalog output filter.

• MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)

For live content, the MPEG-TS packaging filter must be after a Live to VOD or Live to VOD Catalog output filter.

• Microsoft Smooth Streaming (MSS) Output Filter (p. 72)

Pre-encrypted HLS

For HLS content that was encrypted before it was sent to Delta, you can use the Passthrough Output Filter (p. 74).

MSS

For MSS content, you can use the following package output filters:
• Common Media Application Format (CMAF) Output Filter (p. 50)
• Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)
• HTTP Dynamic Streaming (HDS) Output Filter (p. 57)
• HTTP Live Streaming (HLS) Output Filter (p. 60)
• MPEG-4 (MP4) Output Filter (p. 67)

For live content, the MP4 packaging filter must be after a Live to VOD or Live to VOD Catalog output filter.

• MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)

For live content, the MPEG-TS packaging filter must be after a Live to VOD or Live to VOD Catalog output filter.

• Microsoft Smooth Streaming (MSS) Output Filter (p. 72)

MP4

For MP4 content, you can use any package output filter.
• Common Media Application Format (CMAF) Output Filter (p. 50)
• Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)
• HTTP Dynamic Streaming (HDS) Output Filter (p. 57)
• HTTP Live Streaming (HLS) Output Filter (p. 60)
• MPEG-4 (MP4) Output Filter (p. 67)
• MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)
• Microsoft Smooth Streaming (MSS) Output Filter (p. 72)
• Passthrough Output Filter (p. 74)

RTMP

For RTMP content, you can use the following package output filters:
• Common Media Application Format (CMAF) Output Filter (p. 50)
• Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)
• HTTP Dynamic Streaming (HDS) Output Filter (p. 57)
• HTTP Live Streaming (HLS) Output Filter (p. 60)
• **MPEG-4 (MP4) Output Filter (p. 67)**

For live content, the MP4 packaging filter must be after a Live to VOD or Live to VOD Catalog output filter.

• **MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)**

For live content, the MPEG-TS packaging filter must be after a Live to VOD or Live to VOD Catalog output filter.

• **Microsoft Smooth Streaming (MSS) Output Filter (p. 72)**

**TS**

For TS content, you can use the following package output filters:

- **Common Media Application Format (CMAF) Output Filter (p. 50)**
- **Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter (p. 54)**
- **HTTP Dynamic Streaming (HDS) Output Filter (p. 57)**
- **HTTP Live Streaming (HLS) Output Filter (p. 60)**
- **MPEG-4 (MP4) Output Filter (p. 67)**
- **MPEG Transport Stream (MPEG-TS) Output Filter (p. 69)**, if there is a Live to VOD output filter before the MP4 packaging output filter.
- **Microsoft Smooth Streaming (MSS) Output Filter (p. 72)**

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**Common Media Application Format (CMAF) Output Filter**

Create a Common Media Application Format (CMAF) output filter if you need to deliver live or VOD HLS fragmented MP4 (fMP4) to Apple devices.

**Topics**

- **CMAF Package Settings (p. 50)**
- **CMAF Stream Sets (p. 52)**

**CMAF Package Settings**

These are the fields on the Settings tab of the CMAF output filter.

**Enable Endpoint**

Indicates if content is playable from this filter.

When you select **Enable Endpoint**, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

**Custom URL**

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.m3u8
Child manifest names include the custom URL text with a sequential number appended:

- `custom_url_text_1`
- `custom_url_text_2`

**Warning**

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

**Description**

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

**Segment Duration**

The duration (in seconds) of each segment. If the value that you type here is different from the input segment size, Delta rounds segments to the nearest multiple of the input segment duration.

**Index Duration**

Length of time (in seconds) in the manifest for live content. Default is 60.

**Playlist Type**

On VOD content or live to VOD content, specifies the type of playlist in the output manifest. This type is represented in the value of the `EXT-X-PLAYLIST-TYPE` tag in the manifest.

Available options:

- **EVENT** — Delta inserts `EXT-X-PLAYLIST-TYPE:EVENT` in the output manifest. Indicates that the playlist is initially left open (doesn't include an `EXT-X-ENDLIST` tag. New content as it's available is added to the end of the playlist.
- **VOD** — Delta inserts `EXT-X-PLAYLIST-TYPE:VOD` in the output manifest. Indicates that the playlist holds the entire duration of the content. New content isn't added to the playlist.
- **None** — Delta doesn't insert `EXT-X-PLAYLIST-TYPE` tags in the output manifest.

**Avail Trigger**

Specifies which type of ad avail SCTE-35 messages prompt Delta to include cueInfos in the output manifest. Typically, select the trigger to match the ad avail type that the input stream uses.

Available options:

- **All** — the input uses splice inserts to indicate ad avails.
- **Placement Opportunity** — the input contains time signals of the Placement opportunity segmentation type.

In either case, the input may also contain messages for other events such as chapters or programs, which also result in cueInfos.

**Ad Markers**

How Delta includes ad markers in the packaged content.

Available options:

- **None** — copy the SCTE-35 messages directly from the input stream to the output manifest.
- **SCTE-35 Enhanced** — generate ad markers and blackout tags based on the SCTE-35 messages from the input stream.
• **Passthrough** — omit all SCTE-35 ad markers from the output.

**Broadcast Time**

How ID3 timed metadata messages appear in the output manifest.

When you select **Broadcast Time**, Delta generates messages every 5 seconds and inserts them in the output manifest with the content ingest time. Otherwise, Delta doesn’t insert these messages in the output manifest.

**Ignore "Web Delivery Allowed"**

What Delta does when the input stream has segmentation descriptors with `web_delivery_allowed` set to 0.

When you select **Ignore "Web Delivery Allowed"** and these segmentation descriptors are present, Delta ignores them and doesn’t insert blackouts or avails into the output manifest. Otherwise, Delta honors the segmentation descriptors and does insert blackouts or avails.

**Ignore "No Regional Blackout"**

What Delta does when the input stream has segmentation descriptors with `no_regional_blackout` set to 0.

When you select **Ignore "No Regional Blackout"** and these segmentation descriptors are present, Delta ignores them and doesn’t insert blackouts or avails into the output manifest. Otherwise, Delta honors the segmentation descriptors and does insert blackouts or avails.

**Enable Blackout**

What Delta does with SCTE-35 Network Start and End segmentation descriptors from the input stream.

When you select **Enable Blackout**, Delta adds blackout tags to the output manifest based on these markers. This has no effect on the video content itself. This option requires the Network ID (in the **Network End Blackout** field), which is matched against the SCTE-35 message to determine the blackout state.

If you don’t select **Enable Blackout**, Delta won’t add blackout tags to the output manifest.

**Network End Blackout**

The Entertainment Identifier Registry (EIDR) ID of the network. Network end events with this ID will trigger blackout. Must be in the format `10.nnnn/yyyy-yyyy-yyyy-yyyy-yyyy-yyyy-...` (case-sensitive).

**Include Program Date Time**

Indicates if `EXT-X-PROGRAM-DATE-TIME` tags are included in the manifest.

When you select **Include Program Date Time**, Delta inserts `EXT-X-PROGRAM-DATE-TIME` tags in the output manifest. If the source content is HLS and it contains `EXT-X-PROGRAM-DATE-TIME` tags, the source time is used as the value. Otherwise, the time that Delta processes the source segment is the value.

If you don’t select **Include Program Date Time**, Delta doesn’t insert these tags in the manifest.

**Program Date Time Interval**

The interval for Delta to insert `EXT-X-PROGRAM-DATE-TIME` tags in the output manifest.

---

**CMAF Stream Sets**

The stream sets specify the video, audio, and subtitles or captions for the output.
• If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

You can skip the remainder of this section.

Note
Subtitle and captions tracks are not automatically assigned to stream sets. If you're using subtitles or captions, follow the instructions in this section to manually create the stream set.

• If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck Use Default Stream Sets.
  2. Choose New Stream Set.
  3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you're manually creating a stream set.

Stream Set Information

These are the settings for the overall stream set.

Announced Bitrate

Bit rate for this stream set. Delta uses this value when creating an adaptive bitrate (ABR) manifest. If you don't enter a value, Delta auto-detects the bitrate from the incoming stream.

I-Frames Only

In stream sets with a single video track, indicates if Delta will include an additional I-frame-only stream in the manifest.

When you select I-Frames Only, Delta inserts an EXT-X-I-FRAMES-ONLY tag in the manifest, and then compiles and includes an I-frames-only playlist in the output stream. This playlist enables player functionality like fast forward and rewind.

If you don't select I-Frames Only, Delta won't include the I-frame tag or extra playlist.

Rendition Group

For audio tracks, enter a unique a name to set this stream up as a rendition group. If you leave the field empty, Delta puts the track in a regular stream set.

When you create a rendition group, it is applied to all existing video tracks that don't already have an audio group selected.

Index

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Audio Rendition Group

Which audio rendition group this video track will use.

Available options:

• (default) — selects the earliest created audio rendition group. Delta assigns the default to a video track before you make a selection.

• Group names — all audio rendition groups are listed. Select the one that this track will use.
• **<None>** — means that this video track doesn’t use an audio rendition group. Typically, use this when the audio is combined with the video, making additional audio tracks unnecessary.

**Warning**
Some players fail if some of your stream sets have an audio group selected and others are set to None. If this is your configuration, make sure that your player supports a combination of stream sets that use audio rendition groups and some that don’t.

### Track Information

These are the settings for the tracks in the stream set.

**Index**

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

**Name**

Name of the track once it’s created.

### Rules for Stream Sets

CMAF stream sets cannot be muxed: each stream set can have only one track, unless it’s a rendition group. A rendition group is intended to bundle together all media of one type (all audio or all subtitles). A video track in the filter can work with any or all of the tracks in the selected rendition group.

A single CMAF output can contain:

• 0 or more video streams (each in its own regular stream set).
• 0 or more rendition groups.

Note that audio and subtitle tracks can only exist inside rendition groups.

A rendition group can contain:

• 1 or more audio tracks.
• Or, 1 or more subtitle tracks.

**Note**
Only the CMAF and HLS package output filters use “rendition groups”.

### Dynamic Adaptive Streaming over HTTP (DASH) ISO Output Filter

Create a DASH-ISO output filter to package live or VOD content for devices that support the DASH-ISO adaptive bitrate (ABR) streaming protocol.

**Topics**

• DASH-ISO Package Settings (p. 55)
• DASH-ISO Stream Sets (p. 56)
DASH-ISO Package Settings

These are the fields on the Settings tab of the DASH-ISO output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

\[
\text{http://<Delta IP address>/out/u/custom_url_text.mpd}
\]

Child manifest names include the custom URL text with a sequential number appended:

- `custom_url_text_1`
- `custom_url_text_2`

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Fragment Duration

The duration (in seconds) of each fragment. If the value that you type here is different from the input fragment size, Delta rounds fragments to the nearest multiple of the input fragment duration.

Index Duration

Length of time (in seconds) in the manifest for live content. Default is 60.

DASH Profile

The DASH profile that Delta uses for the output.

Available options:

- **None** — the output doesn't use a DASH profile.
- **HbbTV 1.5** — the output is compliant with HbbTV.
- **Hybridcast 2.0** — the output is compliant with IPTV Forum Japan's Hybridcast system.

Use Multiple Periods

When enabled, AWS Elemental Delta creates multiple media presentation description (MPD) periods and inserts them in the output manifest. Periods are determined by SCTE-35 ad markers from the source input. These are markers are also passed through to both single- and multi-period DASH manifests.

**Important**

Ad replace is not supported with multi-period DASH manifests due to duration inconsistencies between the source and ad content. If you're using a downstream system
that requires SCTE markers, don't use the ad replace feature in AWS Elemental Delta. Instead, rely on the downstream system to perform ad replace functions.

**Minimum Update Period**

The minimum amount of time (in seconds) that the player should wait before requesting manifest updates. A lower value means that manifests are updated more frequently, but a lower value also contributes to request and response network traffic.

**Minimum Buffer Time**

The minimum amount of content (measured in seconds) that a player must keep in the buffer. If network conditions interrupt playback, the player has additional buffered content before playback fails, allowing for recovery time before the viewer's experience is affected.

**Suggested Presentation Delay**

The amount of time (in seconds) that the player should be from the end of the manifest. This sets the content start point back \( x \) seconds from the end of the manifest (the point where content is live). For example, with a 35-second presentation delay, requests at 5:30 receive content from 5:29:25.

## DASH-ISO Stream Sets

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

  You can skip the remainder of this section.

  **Note**
  
  Subtitle and captions tracks are not automatically assigned to stream sets. If you're using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck Use Default Stream Sets.
  2. Choose New Stream Set.
  3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you're manually creating a stream set.

### Stream Set Information

These are the settings for the overall stream set.

**Index**

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

### Track Information

These are the settings for the tracks in the stream set.
Index

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Name

Name of the track once it's created.

Rules for Stream Sets

The output filter can contain more than one stream set and each stream set can specify different media.

A single DASH output can contain 1 stream set.

The stream set can contain:

- 0 or more video tracks.
- 0 or more audio tracks.
- 0 or more subtitle tracks.

Therefore, create one stream set containing all desired video tracks, audio tracks, and subtitle or captions tracks. The playback device will present the audio and subtitle options to the viewer according to the device's capabilities.

If you do create two stream sets (which is allowed in Delta), they will all be merged in the manifest created by Delta.

HTTP Dynamic Streaming (HDS) Output Filter

Create an HDS output filter to package live or VOD content for devices that support Adobe HTTP Dynamic Streaming.

Topics

- HDS Package Settings (p. 57)
- HDS Stream Sets (p. 59)

HDS Package Settings

These are the fields on the Settings tab of the HDS output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.
The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.mp
```

**Description**

Any descriptive text that helps you to identify the endpoint later. This information is also useful for creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

**Fragment Duration**

The duration (in seconds) of each fragment. If the value that you type here is different from the input fragment size, Delta rounds fragments to the nearest multiple of the input fragment duration.

**Index Duration**

Length of time (in seconds) in the manifest for live content. Default is 60.

**Enable External Bootstrap**

How the bootstrap is delivered to the player.

When you select Enable External Bootstrap, Delta emits the bootstrap as a separate file. Some HDS players require external bootstrap files.

If you don't select Enable External Bootstrap, Delta embeds the bootstrap in the manifest file.

**Avail Trigger**

Specifies which type of ad avail SCTE-35 messages prompt Delta to include cueInfos in the output manifest. Typically, select the trigger to match the ad avail type that the input stream uses.

Available options:

- **All** — the input uses splice inserts to indicate ad avails.
- **Placement Opportunity** — the input contains time signals of the Placement opportunity segmentation type.

In either case, the input may also contain messages for other events such as chapters or programs, which also result in cueInfos.

**Ad Markers**

How Delta includes ad markers in the packaged content.

Available options:

- **None** — copy the SCTE-35 messages directly from the input stream to the output manifest.
- **SCTE-35 Enhanced** — generate ad markers and blackout tags based on the SCTE-35 messages from the input stream.
- **Passthrough** — omit all SCTE-35 ad markers from the output.

**Broadcast Time**

How ID3 timed metadata messages appear in the output manifest.

When you select Broadcast Time, Delta generates messages every 5 seconds and inserts them in the output manifest with the content ingest time. Otherwise, Delta doesn't insert these messages in the output manifest.

**Ignore "Web Delivery Allowed"**

What Delta does when the input stream has segmentation descriptors with web_delivery_allowed set to 0.
When you select **Ignore "Web Delivery Allowed"** and these segmentation descriptors are present, Delta ignores them and doesn't insert blackouts or avails into the output manifest. Otherwise, Delta honors the segmentation descriptors and does insert blackouts or avails.

**Ignore "No Regional Blackout"**

What Delta does when the input stream has segmentation descriptors with `no_regional_blackout` set to 0.

When you select **Ignore "No Regional Blackout"** and these segmentation descriptors are present, Delta ignores them and doesn't insert blackouts or avails into the output manifest. Otherwise, Delta honors the segmentation descriptors and does insert blackouts or avails.

**Absolute Timestamps**

The base time that Delta uses to determine the HDS timestamp. This timestamp specifies the time (in milliseconds) relative to the base time that Delta ingested the corresponding segment.

When you select **Absolute Timestamps**, the base time is the epoch (00:00:00 UTC, Thursday, 1 January 1970). Otherwise, the base time is the start of the stream.

---

**HDS Stream Sets**

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the **Use Default Stream Sets** box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

You can skip the remainder of this section.

**Note**
Subtitle and captions tracks are not automatically assigned to stream sets. If you're using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck **Use Default Stream Sets**.
  2. Choose **New Stream Set**.
  3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you're manually creating a stream set.

**Stream Set Information**

These are the settings for the overall stream set.

**Index**

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

**Track Information**

These are the settings for the tracks in the stream set.
Index

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Name

Name of the track once it's created.

Rules for Stream Sets

The stream set rules for HDS output vary by if the player supports the "late-binding audio" feature or not.

Late-Binding Audio is supported

The output can contain 1 or more stream sets. Each stream set can contain:

- 1 or more video tracks.
- 0 or more audio tracks. The tracks can be different languages.
- 0 subtitle tracks.

Therefore, with players that support late-binding audio, create several stream sets, each containing one video track and all corresponding audio tracks. The playback device will select the appropriate video and then present the audio options to the viewer according to the device's capabilities.

Late-Binding Audio is not supported

The output can contain 1 or more stream sets. All of the stream sets must contain the same language in their audio. Each stream set can contain:

- 1 video track.
- 0 or 1 audio tracks.
- 0 subtitle tracks.

Therefore, with players that don't support late-binding audio, you must create a separate HDS Package output filter for each audio language you want to support. Then in each filter, create several stream sets, one for each video track and each with the same language in the audio track.

It is a good idea to name the output filter package to identify the language in its stream sets.

HTTP Live Streaming (HLS) Output Filter

Create an HLS output filter to package live or VOD content for devices that support Apple HTTP Live Streaming.

Topics

- HLS Package Settings (p. 61)
HLS Package Settings

These are the fields on the Settings tab of the HLS output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.m3u8

Child manifest names include the custom URL text with a sequential number appended:

custom_url_text_1
custom_url_text_2

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Segment Duration

The duration (in seconds) of each segment. If the value that you type here is different from the input segment size, Delta rounds segments to the nearest multiple of the input segment duration.

Index Duration

Length of time (in seconds) in the manifest for live content. Default is 60.

Playlist Type

On VOD content or live to VOD content, specifies the type of playlist in the output manifest. This type is represented in the value of the EXT-X-PLAYLIST-TYPE tag in the manifest.

Available options:

- EVENT — Delta inserts EXT-X-PLAYLIST-TYPE:EVENT in the output manifest. Indicates that the playlist is initially left open (doesn't include an EXT-X-ENDLIST tag. New content as it's available is added to the end of the playlist.
• **VOD** — Delta inserts `EXT-X-PLAYLIST-TYPE:VOD` in the output manifest. Indicates that the playlist holds the entire duration of the content. New content isn't added to the playlist.

• **None** — Delta doesn't insert `EXT-X-PLAYLIST-TYPE` tags in the output manifest.

**Avail Trigger**

Specifies which type of ad avail SCTE-35 messages prompt Delta to include cueInfos in the output manifest. Typically, select the trigger to match the ad avail type that the input stream uses.

Available options:

• **All** — the input uses splice inserts to indicate ad avails.

• **Placement Opportunity** — the input contains time signals of the Placement opportunity segmentation type.

In either case, the input may also contain messages for other events such as chapters or programs, which also result in cueInfos.

**Ad Markers**

How Delta includes ad markers in the packaged content.

Available options:

• **None** — copy the SCTE-35 messages directly from the input stream to the output manifest.

• **SCTE-35 Enhanced** — generate ad markers and blackout tags based on the SCTE-35 messages from the input stream.

• **Passthrough** — omit all SCTE-35 ad markers from the output.

**Broadcast Time**

How ID3 timed metadata messages appear in the output manifest.

When you select **Broadcast Time**, Delta generates messages every 5 seconds and inserts them in the output manifest with the content ingest time. Otherwise, Delta doesn't insert these messages in the output manifest.

**Ignore "Web Delivery Allowed"**

What Delta does when the input stream has segmentation descriptors with `web_delivery_allowed` set to 0.

When you select **Ignore "Web Delivery Allowed"** and these segmentation descriptors are present, Delta ignores them and doesn't insert blackouts or avails into the output manifest. Otherwise, Delta honors the segmentation descriptors and does insert blackouts or avails.

**Ignore "No Regional Blackout"**

What Delta does when the input stream has segmentation descriptors with `no_regional_blackout` set to 0.

When you select **Ignore "No Regional Blackout"** and these segmentation descriptors are present, Delta ignores them and doesn't insert blackouts or avails into the output manifest. Otherwise, Delta honors the segmentation descriptors and does insert blackouts or avails.

**Enable Blackout**

What Delta does with SCTE-35 Network Start and End segmentation descriptors from the input stream.

When you select **Enable Blackout**, Delta adds blackout tags to the output manifest based on these markers. This has no effect on the video content itself. This option requires the Network ID (in the **Network End Blackout** field), which is matched against the SCTE-35 message to determine the blackout state.
If you don't select **Enable Blackout**, Delta won't add blackout tags to the output manifest.

**Network End Blackout**

The Entertainment Identifier Registry (EIDR) ID of the network. Network end events with this ID will trigger blackout. Must be in the format 10. nnnn/xxxx-xxxx-xxxx-xxxx-xxxx-c (case-sensitive).

**Include Program Date Time**

Indicates if EXT-X-PROGRAM-DATE-TIME tags are included in the manifest.

When you select **Include Program Date Time**, Delta inserts EXT-X-PROGRAM-DATE-TIME tags in the output manifest. If the source content is HLS and it contains EXT-X-PROGRAM-DATE-TIME tags, the source time is used as the value. Otherwise, the time that Delta processes the source segment is the value.

If you don't select **Include Program Date Time**, Delta doesn't insert these tags in the manifest.

**Program Date Time Interval**

The interval for Delta to insert EXT-X-PROGRAM-SDATE-TIME tags in the output manifest.

**HLS Stream Sets**

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

You can skip the remainder of this section.

**Note**

Subtitle and captions tracks are not automatically assigned to stream sets. If you're using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck **Use Default Stream Sets**.
  2. Choose **New Stream Set**.
  3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you're manually creating a stream set.

**Topics**

- Stream Set Behavior (p. 63)
- Stream Set Information (p. 65)
- Track Information (p. 66)
- Rules for Stream Sets (p. 66)

**Stream Set Behavior**

With environment variables, you can control how HLS stream sets behave.

**Important**

If you manually set any environment variables, upon upgrade or downgrade, you will lose those variables. If you change versions, set the variables again when the upgrade or downgrade process is complete.
Default Stream Set Behavior

On HLS outputs, you can define the default stream set behavior. The available options are:

- Use the true default. AWS Elemental Delta muxes the audio tracks with the video tracks. There are no audio rendition groups. This is the Delta defined behavior so you don't need to do anything extra if this is the behavior that works for you.
- Manually set environment variables so that Delta groups the audio tracks into rendition groups. Each video track is in its own stream set and can use audio tracks from any of the rendition groups.

Delta creates the audio rendition groups based on the following logic:

- Each rendition group has codecs with a common codec.
- Each rendition group has only one track of a particular language. Each track with the same codec and language combination is put into a different rendition group. For example, if you have AAC English tracks at two different bitrates, each track will be in its own rendition group.
- When there are multiple rendition groups for the same codec, the first rendition group contains the highest bitrate stream for each available language. The second rendition group holds the second-highest bitrate, and so on.

See Changing Environment Variables for steps to change the default behavior.

Other Stream Set Configuration Options

You can set the following options in any combination and with either of the default stream set behaviors from the previous section.

- I-frame-only playlist: In stream sets with a single video track, Delta includes an additional I-frame-only playlist in the manifest.
- DVB-SUB captions handling: Rather than Delta putting DVB-SUB captions in a rendition group (default behavior), the captions are handled as ID3 metadata tags.
- Audio-only playlist: For UDP input content, Delta uses the first audio track to create an audio-only playlist. Since Delta doesn't support audio-only ingest of UDP content, you must enable this option if you require an audio-only playlist on output.

See the following section for steps to use any of these options.

Changing Environment Variables

To change any of the stream set behaviors discussed in this topic, set the appropriate environment variables. Note that any variables you set manually are overridden if you perform an upgrade or downgrade. You will need to re-set the variables once the process is complete.

To change environment variables

1. Edit /etc/init.d/elemental_se and /etc/init.d/httpd and add the following lines of text based on what manifest options you're using. Enter the text before the start() function:
   
   - Change the default behavior so that Delta puts audio tracks in rendition groups:

     ```
     export USE_DEFAULT_AUDIO_RENDITION_GROUPS=true
     ```
   
   - Enable Delta to create an I-frame-only playlist:

     ```
     export CREATE_DEFAULT_IFRAME_TRACK=true
     ```
**HLS Output Filter**

- Treat DVB-SUB captions as ID3 tags. This variable needs to be added to `/etc/init.d/httpd` only:
  
  ```
  export USE_DEFAULT_ID3_CAPTIONS=true
  ```

- Enable Delta to create an audio-only playlist:
  
  ```
  export CREATE_AUDIO_ONLY_STREAMSET_FOR_UDP=true
  ```

  For example, you could add it immediately following the comment `# User specific aliases and functions`.

2. Restart `httpd` with the following command:

   ```
   sudo service httpd restart
   ```

3. If you made a change to `/etc/init.d/elemental_se`, restart `elemental_se` with the following command:

   ```
   sudo service elemental_se restart
   ```

**Stream Set Information**

These are the settings for the overall stream set.

**Announced Bitrate**

Bit rate for this stream set. Delta uses this value when creating an adaptive bitrate (ABR) manifest. If you don't enter a value, Delta auto-detects the bitrate from the incoming stream.

**I-Frames Only**

In stream sets with a single video track, indicates if Delta will include an additional I-frame-only stream in the manifest.

When you select **I-Frames Only**, Delta inserts an `EXT-X-I-FRAMES-ONLY` tag in the manifest, and then compiles and includes an I-frames-only playlist in the output stream. This playlist enables player functionality like fast forward and rewind.

If you don't select **I-Frames Only**, Delta won't include the I-frame tag or extra playlist.

**Rendition Group**

For audio tracks, enter a unique a name to set this stream up as a rendition group. If you leave the field empty, Delta puts the track in a regular stream set.

When you create a rendition group, it is applied to all existing video tracks that don't already have an audio group selected.

**Index**

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

**Audio Rendition Group**

Which audio rendition group this video track will use.
Available options:
- **(default)** — selects the earliest created audio rendition group. Delta assigns the default to a video track before you make a selection.
- **Group names** — all audio rendition groups are listed. Select the one that this track will use.
- **<None>** — means that this video track doesn’t use an audio rendition group. Typically, use this when the audio is combined with the video, making additional audio tracks unnecessary.

**Warning**
Some players fail if some of your stream sets have an audio group selected and others are set to None. If this is your configuration, make sure that your player supports a combination of stream sets that use audio rendition groups and some that don’t.

**Track Information**

These are the settings for the tracks in the stream set.

**Index**

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

**Name**

Name of the track once it’s created.

**Rules for Stream Sets**

HLS outputs involve two types of stream sets: “regular” stream sets and “rendition groups”.

**Note**
Only the CMAF and HLS package output filter uses “rendition groups”.

A single HLS output can contain:

- 0 or more regular stream sets with any combination of the following:
  - 0 or 1 video tracks.
  - 0 or more audio tracks.

A regular stream set is intended to contain a bundle of different media that “goes together”. For example, one video track and its single corresponding audio track. Or just one audio track with no video.

Note that subtitle tracks can only exist inside rendition groups (below).

- 0 or more rendition groups that can contain either of the following:
  - 1 or more audio tracks.
  - Or, 1 or more subtitle tracks.

A rendition group is intended to bundle together all media of one type (all audio or all subtitles). A video track in the filter can work with any or all of the tracks in the rendition group. See below for typical uses.

A stream set can contain one audio rendition group or one subtitle rendition group or one audio and one subtitle rendition group. It cannot contain two audio rendition groups or two subtitle rendition groups.
Typical Configurations without Rendition Groups

Regular stream sets can be mixed-and-matched in many ways. For example:

- One or more regular stream sets, each containing one video track and one audio track.
- One or more regular stream sets, each containing one video track and one audio track, plus a set that contains only audio.
- One or more regular stream sets, each containing one video track.

The following configuration is probably not a good idea:

One regular stream set containing one video track and two or more audio tracks. Note that you can set up this combination but most players will not be able to detect the multiple audio tracks "embedded" in the single stream set.

Typical Configurations with Rendition Groups

Regular stream sets and rendition groups can be mixed-and-matched in many ways. For example:

- One or more regular stream sets, each containing one video track, plus one or more rendition groups containing one or more audio tracks.
- Three regular stream sets each with one video (each with a different bit rate), and one rendition group containing three audios, and another rendition group containing three subtitles (perhaps one for each language).
- One or more regular stream sets, each containing one video track and one audio track, plus one rendition group containing one or more audio tracks. The regular stream set might contain the video and default audio, while the rendition group contains other audio (perhaps other languages).
- One audio regular stream set containing one audio track, and one rendition group containing subtitle tracks or containing audio tracks.
- One rendition group containing audio tracks and another rendition group containing subtitle tracks.

The following configuration is probably not a good idea:

One regular stream set with one video track and one audio track, and other regular stream sets each with only one video, and other rendition groups, each with one or more audio tracks. Note that you can set up this combination but most players will not be able to handle it.

MPEG-4 (MP4) Output Filter

Create an MP4 output filter to package VOD content in the MP4 (file) format for access via HTTP progressive download.

If you select multiple bitrates in stream sets on the output filter, then multiple .mp4 files are produced, one for each bitrate stream. The index of each track is appended to the filename, such as 59_1.mp4, 59_2.mp4.

Topics

- MP4 Package Settings (p. 67)
- MP4 Stream Sets (p. 68)

MP4 Package Settings

These are the fields on the Settings tab of the MP4 output filter.
Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.mp4

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Major Brand

The four-letter code used to identify the specification that stream complies to. If present, this value overrides the Major Brand field from the input.

Include CSLG

Determines what additional information is included in the output manifest.

When you select Include CSLG, Delta inserts information to improve compatibility with Apple players and tools. Configuration specifics include:

- File composition starts at zero.
- Composition times in the ctts box for B-frames are negative.
- A CSLG box is included per ISO 14496-1 amendment 1.

If you don't select Include CSLG, Delta creates a stream that's compliant with ISO MPEG-4.

MP4 Stream Sets

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

You can skip the remainder of this section.

Note

Subtitle and captions tracks are not automatically assigned to stream sets. If you're using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck Use Default Stream Sets.
  2. Choose New Stream Set.
3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you're manually creating a stream set.

Stream Set Information

These are the settings for the overall stream set.

Index

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Track Information

These are the settings for the tracks in the stream set.

Index

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Name

Name of the track once it's created.

Rules for Stream Sets

A single MP4 output can contain 1 or more stream sets.

The stream set can contain:

- 1 video track.
- 0 or 1 audio tracks.
- 0 subtitle tracks.

Therefore, create several stream sets, each containing one video track and one audio track. You must create one stream set for each desired combination of video and audio. For example, 1280x720 video and English audio, 960x540 video and English audio, 1280x720 video and French audio, 960x540 video and French audio.

The playback device will present the options to the viewer according to the device's capabilities.

MPEG Transport Stream (MPEG-TS) Output Filter

Create an MPEG-TS output filter to package VOD content in the MPEG-TS (file) format for access via HTTP progressive download.
If you select multiple bitrates in stream sets on the output filter, then multiple .ts files are produced, one for each track. The index of each track is appended to the filename, such as 59_1.mp4, 59_2.mp4.

Topics
- MPEG-TS Package Settings (p. 70)
- MPEG-TS Stream Sets (p. 71)

MPEG-TS Package Settings
These are the fields on the Settings tab of the MPEG-TS output filter.

Enable Endpoint
Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL
Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.ts

Description
Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Bitrate
The output bitrate of the transport stream, in bits per second. Leaving this box empty lets the muxer automatically determine the appropriate bitrate. Other common values are 3750000, 7500000, and 15000000.

VBR
Indicates if the bitrate is variable or constant.

When you select VBR, the stream is a variable bitrate (VBR) and the bitrate setting acts as the maximum bitrate. Null packets aren't inserted in the transport stream to fill the specified bitrate.

If you don't select VBR, the transport stream maintains a constant bitrate to match the bitrate setting. Null packets are inserted into transport stream to fill the specified bitrate.

DVB Compliant
The digital television broadcast standard this stream uses for digital audio.

When you select DVB Compliant, Delta uses the Digital Television Broadcasting (DVB) buffer model for Dolby Digital audio. Otherwise, Delta uses the Advanced Television Systems Committee (ATSC) model.
Audio Packets per PES

The number of audio packets for Delta to insert for each Packetized Elementary Stream (PES) header. Default is 2.

PCR Every PES

How Delta handles program clock reference (PCR) values.

When you select PCR Every PES, Delta inserts a PCR for every Packetized Elementary Stream (PES) header. This parameter is effective only when the PCR program identifier (PID) is the same as the video or audio elementary stream.

If you don’t select PCR Every PES, Delta inserts a PCR, but not for every PES header.

PCR Period

Nominal time in milliseconds between PCR values in the transport stream.

Default is 40.

PAT Interval

Milliseconds between program association tables (PATs) in the output.

PMT Interval

Milliseconds between program map tables (PMTs) in the output.

MPEG-TS Stream Sets

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

You can skip the remainder of this section.

Note

Subtitle and captions tracks are not automatically assigned to stream sets. If you’re using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck Use Default Stream Sets.
  2. Choose New Stream Set.
  3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you’re manually creating a stream set.

Stream Set Information

These are the settings for the overall stream set.

Index

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.
Track Information

These are the settings for the tracks in the stream set.

Index

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Name

Name of the track once it's created.

Rules for Stream Sets

A single MPEG-TS output can contain 1 or more stream sets.

The stream set can contain:

- 0 or 1 video tracks.
- 0 or more audio tracks.
- 0 subtitle tracks.

Therefore, create several stream sets, each containing one video track and one audio track. You must create one stream set for each desired combination of video and audio. For example, 400 kB bitrate video and English audio, 750 kB bitrate video and English audio, 400 kB video and French audio, 750 kB video and French audio.

The playback device will present the options to the viewer according to the device's capabilities.

Microsoft Smooth Streaming (MSS) Output Filter

Create an MSS output filter to package live or VOD content for devices that support Microsoft Smooth Streaming.

Topics

- MSS Package Settings (p. 72)
- MSS Stream Sets (p. 73)

MSS Package Settings

These are the fields on the Settings tab of the MSS output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).
Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.ism or .isml

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Fragment Duration

The duration (in seconds) of each fragment. If the value that you type here is different from the input fragment size, Delta rounds fragments to the nearest multiple of the input fragment duration.

Index Duration

Length of time (in seconds) in the manifest for live content. Default is 60.

Look Ahead Count

Number of fragments that Delta keeps in the buffer. If there are network issues, content can be played from the buffer, giving the network time to recover before playback is interrupted.

Applies to live content only.

Enable Events

Where the Events tag is embedded.

When you select Enable Events, Delta embeds the tags in the URL field of the manifest. Otherwise, Delta embeds the tags in the manifest itself.

MSS Stream Sets

The stream sets specify the video, audio, and subtitles or captions for the output.

- If an upstream system such as AWS Elemental Live is responsible for creating the final desired stream sets, place a check in the Use Default Stream Sets box. Delta will automatically parse the stream sets in the input and create corresponding stream sets in the output.

  You can skip the remainder of this section.

  **Note**

  Subtitle and captions tracks are not automatically assigned to stream sets. If you’re using subtitles or captions, follow the instructions in this section to manually create the stream set.

- If Delta is creating the final desired stream sets, create the stream sets manually:
  1. Uncheck Use Default Stream Sets.
  2. Choose New Stream Set.
  3. Place a checkmark next to the tracks that are to be included in the stream set.

The following sections describe the settings on stream sets and the rules to remember when you’re manually creating a stream set.
Stream Set Information

These are the settings for the overall stream set.

Index

A number that you set to define the order that stream sets are presented to playback devices.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Track Information

These are the settings for the tracks in the stream set.

Index

If the stream set contains more than one track of the same type (audio, video, or captions and subtitles), enter a number to define the order of the tracks in the stream set.

A lower number puts the stream set higher in the list, so that a stream set with an index of 2 is presented before a stream set with an index of 3. Numbers can be skipped, so that if you later remove a stream set from the filter, there is no need to renumber the other stream sets.

Name

Name of the track once it's created.

Rules for Stream Sets

A single MSS output can contain 1 stream sets.

The stream set can contain:

• 0 or more video tracks.
• 0 or more audio tracks.
• 0 or more subtitle tracks.

Therefore, create one stream set containing all desired video tracks, audio tracks, and subtitle tracks.

The playback device will present the options to the viewer according to the device's capabilities.

Passthrough Output Filter

Create a new Passthrough package output filter in the specified Content, in order to serve the asset as it was formatted by the upstream system.

Note

A Passthrough filter can be created on HLS (Live and VOD) content, MP4 content, and pre-encrypted HLS content.

In general, do not use the Passthrough package output filter with Delta-encrypted HLS content; the filter will point to decryption key URLs (on Delta) that are not accessible by a downstream system.

The passthrough output filter must be a top-level filter (have no parent) and cannot have any child output filters.
The passthrough output filter is particularly useful when you do not want to convert the ingested HLS or MP4 content (so you do not need a package output filter) and you do not want to add any other filter to the content. You need to have at least one output filter in the output tree, in order to support an endpoint. The passthrough filter serves this purpose.

When HLS content is ingested, a passthrough package output filter is automatically created. Note that it is possible to delete this filter.

**Topics**
- Passthrough Package Settings (p. 75)
- Passthrough Stream Sets (p. 75)

**Passthrough Package Settings**

**Enable Endpoint**

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

**Custom URL**

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

**Description**

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

** Passthrough Stream Sets**

Since the passthrough output filter keeps the same settings as the input stream, there are no stream set settings to modify.

**Creating Access Restriction Output Filters**

“Access restriction” output filters are those that control the downstream player's ability to access the output content. These filters include:

**Topics**
- Digital Rights Management (DRM) Output Filters (p. 76)
- Authentication Output Filters (p. 101)
- Blacklist and Whitelist Output Filters (p. 104)
Digital Rights Management (DRM) Output Filters

DRM filters contain encryption information so that access to the content can be controlled by a DRM solution.

Once a DRM output filter is inserted, it applies to the endpoint on this filter (if that endpoint is enabled) and on all filters downstream of this filter. In other words, all downstream endpoints will have encrypted content.

Encryption is applied to the content at the requesting endpoint if the player that is accessing this endpoint requests encryption.

These are the DRM filters available in Delta:

**Common Encryption**

Applies Common Encryption (CENC) DRM/encryption algorithm to output content.

Applies to DASH live or VOD content.

**Flash Access**

Applies Flash Access, protected HDS (pHDS), or protected HLS (pHLS) encryption to output content. If the content is Delta-encrypted HLS, the content is unencrypted and then re-encrypted.

Applies to:
- HDS live or VOD content.
- HLS live or VOD content.
- Delta-encrypted HLS live or VOD content.

**HLS Encryption**

Applies a DRM/encryption algorithm to output content. If the content is Delta-encrypted HLS, the content is unencrypted and then re-encrypted.

Applies to:
- CMAF live or VOD content.
- HLS live or VOD content.
- Delta-encrypted HLS live or VOD content.

**PlayReady**

Applies Playready DRM to output content.

Applies to MSS live or VOD (unencrypted) content.

For information on the DRM technology providers, key providers (DRM implementers), players, encryption mode and key rotation supported with each DRM filter, see [AWS Elemental Delta Supported DRM Solutions](#).

**Topics**

- Common Encryption Output Filter (p. 77)
- Flash Access Output Filter (p. 80)
- HLS Encryption Output Filter (p. 82)
- PlayReady Output Filter (p. 97)
Common Encryption Output Filter

These are the settings for a Common Encryption output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

custom_url_text_1
custom_url_text_2

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

PSSH Version

The specification version that Delta uses for the protection system specific header (PSSH). The version determines how the PSSH data is formatted coming out of Delta.

Key Provider

Who is providing your encryption keys.

See the following sections for settings for each provider.

Common Encryption Generic Key Provider Settings

Key Value

16-byte hex value of the encryption key.

KID

16-byte hex value of the key ID.
PSSH

Protection System Specific Header (PSSH) is a base64-encoded string.

Protection UUID

Unique identifier for the content protection system.

Common Encryption Irdeto Key Provider Settings

Service URL

The location of the Irdeto server.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Account ID

Your account on the Irdeto Control server.

Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

Request Common Encryption Key

Place a check to receive Common Encryption PSSH data from the key server.

Required if Request PlayReady Key is not selected.

Request PlayReady Key

Place a check to receive PlayReady PSSH data from the key server.

Required if Request Common Encryption Key is not selected.

Common Encryption Nagra Key Provider Settings

Content ID

Identifies the Delta content in the Nagra server. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

Nagra Server

Location of the Nagra server.

Common Encryption SPEKE Key Provider Settings

The SPEKE key server provides uniform key exchange between AWS Elemental Delta and DRM solution providers. To use a SPEKE server to encrypt content, you must have a SPEKE-compliant DRM solution provider. To get set up, see .

Content ID

Identifies the Delta content in the key server. Each Content ID value you assign in Delta should be unique for this key server.
System IDs

The system ID is a unique identifier for the DRM solution provider. For a list of common system IDs, see https://dashif.org/identifiers/content_protection/. If you need help determining your system ID, contact your DRM solution provider.

SPEKE URI

The URL for your DRM provider.

Username

The username for your DRM provider if authentication is required.

Password

The password for your DRM provider if authentication is required.

Common Encryption Widevine Key Provider Settings

License URL

The URL for the license acquisition Web service.

Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

Provider ID

The “signer” for the key provider requests.

Provider Key

AES key for signing keyprovider requests. This is a 256-bit hex value represented by a 64-character string.

Provider IV

AES Initialization Vector (IV) for signing keyprovider requests. This is a 128-bit hex value represented by a 32-character string.

Key Rotation Count

Number of segments before requesting a new key from the keyprovider. Set to 0 to use the same key for the duration of the content.

Reuse Last Key

Determines what Delta does if the key provider becomes unreachable.

- Place a check to encrypt the stream using the last key obtained from the key provider.
- Leave unchecked to make the request to encrypt fail and make content unavailable to playback devices.

Request Widevine Key

Place a check to receive a Widevine key from the Widevine key provider.

Required if Request PlayReady Key is not selected.

Request PlayReady Key

Place a check to receive a PlayReady key from the Widevine key provider. The key provider must support PlayReady keys.

Required if Request Common Encryption Key is not selected.
Flash Access Output Filter

These are the settings for the Flash Access output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Flash Access

The type of Flash Access to apply.

- **Protected** (default): enable Protected HDS (when applied to HDS content) or Protected HLS (when applied to HLS content).
- **Full**: apply full Flash Access encryption using the server specified in the License Server field.

See the following sections for field information specific to each access type.

Encrypt Audio

Place a check to encrypt audio data.

At least one of encrypt audio, encrypt data, or encrypt data must be enabled.

Encrypt Data

Place a check to encrypt stream metadata.

Encrypt Video

Place a check to encrypt video data.
Video Encrypt Level

Specify the degree of partial encryption to apply.
- Low (default) implies the lowest amount of partial encryption should be applied. A subset of the samples (like video keyframes) are encrypted.
- Medium implies a medium amount of partial encryption should be applied.
- High implies full encryption.

Protected Flash Access Settings

The following fields are available when Protected Flash Access is selected.

Policy File

Path to the file that contains the policy file.

SWF Whitelist File

Path to a file of hashes of SWF players that are players that you have approved as valid players for this content. Use the Adobe Media Server whitelist tool to generate this file.

Full Flash Access Settings

The following fields are available when Full Flash Access is selected.

Generate CEK

Determines how the content encryption key (CEK) is generated.
- Checked (default) means the content encryption key and content ID are combined to generate a unique Content Encryption Key (CEK). The content encryption key can be a file of arbitrary length.
- Unchecked means the content encryption key is used directly as the CEK. This key must be 16 bytes (128 bits) long.

Content ID

Complete only if a common key is in use. The content ID is used with the Content Encryption Key tag to generate a content encryption key.

Packager Credential

Path to the credentials for the Adobe packager.

Packager Credential Password

Password for the credential file identified in Packager Credential.

Transport Certificate

The transport certificate, in DER format.

License Server

The URL of the Adobe Access license server used for protecting content.

Policy File

Path to the file that contains the policy file.

SWF Whitelist File

Path to a file of hashes of SWF players that are players that you have approved as valid players for this content. Use the Adobe Media Server whitelist tool to generate this file.
Key Server Certificate
Path to the certificate required to support an embedded (non-chained) license with Remote Key Delivery.
Must be accessible to the Apache user.

License Server Certificate
Path to the unique certificate file obtained from Adobe which identifies the license server, in DER format.

Recipient Certificate
Path to the certificate that uniquely identifies the recipient machine and client instance.

License Server Credential
Path and name for the credential file for the Adobe Access license server.

License Server Credential Password
Password and name for the credential file for the Adobe Access license server.

Content Encryption Key
The path and filename for the cryptographic key used to encrypt the content.

HLS Encryption Output Filter
These are the settings for the HLS Encryption output filter.

Enable Endpoint
Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL
Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

custom_url_text_1
custom_url_text_2

Warning
CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.
Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Encryption Type

Type of encryption. Either AES-128 or SAMPLE-AES.

Keyprovider

Keyprovider type. Options vary based on selected encryption type.

Settings specific to each keyprovider are found in the following sections.

AES-128

- Conax
- Discretix
- Generic Keyprovider
- Irdeto
- Nagra
- Piksel
- Secure Media
- Self-generated
- SPEKE
- Verimatrix
- VOSP

SAMPLE-AES

- 1Mainstream
- CastLabs
- Generic
- Irdeto
- SPEKE
- Static

HLS Encryption 1Mainstream Settings

Key Format

The format of the key value. You can either:
- Leave empty to indicate "identity"
- Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:
- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Constant IV

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.
Channel Secret

The string that signs key requests sent to the 1Mainstream server.

Video ID

Identifies the Delta content to the 1Mainstream server. Each Video ID you assign in Delta should be unique for this 1Mainstream server.

Channel Code

Identifies the Delta content to the 1Mainstream server. Each channel code that you assign in Delta should be unique for this 1Mainstream server.

Base URL

Location of the 1Mainstream server.

HLS Encryption CastLabs Settings

Key Format

The format of the key value. You can either:
- Leave empty to indicate "identity"
- Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:
- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Constant IV

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

Content ID

Provides the CastLabs server with an ID to identify the Delta content. Delta generates the encryption key for this content ID and provides it in the key request.

To avoid key/content collisions, each Content ID value you assign in Delta should be unique for this CastLabs server. If it is not unique, then a validation error is received and the filter is not created. If duplicate content IDs are unavoidable, then use the key seed option.

Key Seed

Contains the base64 key seed that you retrieved from the CastLabs admin interface. When a key seed is provided, Delta does not generate an encryption key and instead includes the key seed in the key request. The key seed allows for unavoidable duplicate content IDs, such as with output templates.

Required on VOD output templates.

Keyprovider Server

The location of the Conax server. A URL and login credentials are required.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.
Merchant ID

A merchant ID, provided by DRMtoday.

HLS Encryption Conax Settings

Key Format

The format of the key value. You can either:
  • Leave empty to indicate "identity
  • Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:
  • A single positive integer version value (for example, 1)
  • Or a slash delimited list of version values (for example, 1/2/3).

Repeat EXT-X-KEY

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

Constant IV

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

Content ID

Identifies the Delta content in the Conax server. Each Content ID value you assign in Delta should be unique for this Conax server.

Conax Server

Specifies the location of the Conax server. A URL and login credentials are required.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Resource Type

Conax resource type. Use either:
  • VOD for output VOD content or after Live to VOD output filters
  • DTV for output live content

HLS Encryption Discretix Settings

Key Format

The format of the key value. You can either:
  • Leave empty to indicate "identity
  • Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:
  • A single positive integer version value (for example, 1)
• Or a slash delimited list of version values (for example, 1/2/3).

Key Source

The source for your key and related information. Use either:
• Static: You will provide Key ID, Key Seed, and Service ID.
• Key Server: Those values are fetched from the Discretix server.

See below for more information about each source.

Discretix Static Key Settings

Key ID

Valid GUID for the key.

Key Seed

Contains the base64 key seed that you retrieved from Discretix. When a key seed is provided, Delta does not generate an encryption key and instead includes the key seed in the key request. The key seed allows for unavoidable duplicate content IDs, such as with output templates.

Required on VOD output templates.

Service ID

Valid GUID for the service.

License URL

The URL for the license acquisition Web service.

Discretix Key Server Settings

Content ID

Identifies the Delta content in the Discretix server. Each Content ID value you assign in Delta should be unique for this Discretix server.

License URL

The URL for the license acquisition Web service.

URI

URI used for retrieving the keys from the keyprovider.

API Key

API key required to access the key server.

API Secret

API secret required to access the key server.

HLS Encryption Generic Key Provider Settings

Key Format

The format of the key value. You can either:
• Leave empty to indicate "identity
• Or enter a reverse DNS string, such as com.example.sample
Key Format Version

The version of the key format that the key server supports. Can be either:
- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Key Rotation Count

The AES-128 encryption key will rotate after this many segments.

Set to 0 to use the same key throughout the entire encoding session.

Repeat EXT-X-KEY

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

IV Follows Segment #

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.
- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

Constant IV

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

Resource ID

Used by the key provider to identify the content.

Keyprovider Server

The location of the Discretix server.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Reuse Last Key

Determines what Delta does if the key provider becomes unreachable.
- Place a check to encrypt the stream using the last key obtained from the key provider.
- Leave unchecked to make the request to encrypt fail and make content unavailable to playback devices.

Resource Type

Use either:
- VOD for output VOD content or after Live to VOD output filters
- DTV for output live content

HLS Encryption (AES-128) Irdeto Settings

Key Format

The format of the key value. You can either:
• Leave empty to indicate "identity
• Or enter a reverse DNS string, such as com.example.sample

**Key Format Version**

The version of the key format that the key server supports. Can be either:
• A single positive integer version value (for example, 1)
• Or a slash delimited list of version values (for example, 1/2/3).

**Repeat EXT-X-KEY**

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

**IV Follows Segment #**

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.
• Checked (default) causes the IV to change every segment (to match the segment number).
• Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Key Source**

The source for your key and related information. Use either:
• Static: You will provide Key ID, Key Seed, and Service ID.
• Key Server: Key values are fetched from the Irdeto server.
• SKE Key Server: Key values are fetched from the Irdeto server using Secure Key Exchange (SKE).
• CA Key Server: Key values are fetched from the Irdeto server with the CA protection type.

See below for more information about each source.
• CA Key Server: Key values are fetched from the Irdeto server with the CA protection type.

**AES-128 Static Key Source Settings**

**Key ID**

Valid GUID for the key.

**Key Seed**

Contains the base64 key seed that you retrieved from Irdeto. When a key seed is provided, Delta does not generate an encryption key and instead includes the key seed in the key request. The key seed allows for unavoidable duplicate content IDs, such as with output templates.

Required on VOD output templates.

**Domain Service ID**

Valid GUID of the domain service.

**Account ID**

Your account on the Irdeto Control server.
Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

Sub Content Type

The sub-content type to be associated with the output manifest.

License Acquisition URL

The URL for the license acquisition Web service.

AES-128 Key Server Source Settings

Service URL

Specifies the location of the Irdeto server.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Account ID

Your account on the Irdeto Control server.

Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

Content Key

When a new key should be generated. Use one of these:

- Generate New Key: generate a key at the start of encoding.
- Use Last Key: the encoding session should use the last key.

Use HTTPS

Protocol that Delta uses in requests to the license acquisition URL. HTTP is default.

Sub Content Type

The sub-content type to be associated with the output manifest.

AES-128 SKE Key Server Settings

Service URL

The location of the Irdeto server.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Account ID

Your account on the Irdeto Control server.
Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

AES-128 CA Key Server Settings

Important

This feature is beta in this release.

Service URL

The location of the Irdeto server.

KMS Username

Used to authenticate the AWS Elemental Delta request to the key management system (KMS).

KMS Password

The password to authenticate to the key management system (KMS).

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Account ID

Your account on the Irdeto Control server.

Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

HLS Encryption (SAMPLE-AES) Irdeto Settings

Key Format

The format of the key value. You can either:

- Leave empty to indicate "identity
- Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:

- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Repeat EXT-X-KEY

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

IV Follows Segment #

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
• Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Service URL**

Specifies the location of the Irdeto server.

**Username**

Used to authenticate to the keyprovider.

**Password**

The password to authenticate to the keyprovider.

**Account ID**

Your account on the Irdeto Control server.

**Content ID**

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

**HLS Encryption Nagra Settings**

**Key Format**

The format of the key value. You can either:

- Leave empty to indicate "identity
- Or enter a reverse DNS string, such as com.example.sample

**Key Format Version**

The version of the key format that the key server supports. Can be either:

- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

**Repeat EXT-X-KEY**

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

**IV Follows Segment #**

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Content ID**

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.
Nagra Server

Location of the Nagra server.

HLS Encryption Piksel Settings

Key Format

The format of the key value. You can either:

- Leave empty to indicate "identity"
- Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:

- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Repeat EXT-X-KEY

Repeat the EXT-X-KEY directive for every media segment.
This may result in an increase in client requests to the DRM server.

IV Follows Segment #

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

Constant IV

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

Content ID

Identifies the Delta content in the Piksel server. Each Content ID value you assign in Delta should be unique for this Piksel server.

Piksel Server

Location of the Piksel server.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

HLS Encryption Secure Media Settings

Key Format

The format of the key value. You can either:

- Leave empty to indicate "identity"
- Or enter a reverse DNS string, such as com.example.sample
**Key Format Version**

The version of the key format that the key server supports. Can be either:

- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

**Key Rotation Count**

The AES-128 encryption key will rotate after this many segments.

Set to 0 to use the same key throughout the entire encoding session.

**Repeat EXT-X-KEY**

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

**IV Follows Segment #**

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Resource ID**

Used by the key provider to identify the content. For the Secure Media resource id, must be a number between 0 and 4294967295

**Secure Media URI**

The Secure Media server that will provide the keys.

**Username**

Used to authenticate to the keyprovider.

**Password**

The password to authenticate to the keyprovider.

**Reuse Last Key**

Determines what Delta does if the key provider becomes unreachable.

- Place a check to encrypt the stream using the last key obtained from the key provider.
- Leave unchecked to make the request to encrypt fail and make content unavailable to playback devices.

**HLS Encryption Self-generated Settings**

**Key Format**

The format of the key value. You can either:

- Leave empty to indicate "identity"
- Or enter a reverse DNS string, such as com.example.sample
**Key Format Version**

The version of the key format that the key server supports. Can be either:

- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

**Key Rotation Count**

The AES-128 encryption key will rotate after this many segments.

Set to 0 to use the same key throughout the entire encoding session.

**Repeat EXT-X-KEY**

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

**IV Follows Segment #**

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Key Prefix**

A partial URI prefix that will be prepended to the key filenames in the output manifest. The prefix should point to the final publishing destination for the keys.

**Common Key**

When checked, the same key will be used for all bitrates associated with this content. Otherwise, different keys are generated for each bitrate.

**HLS Encryption SPEKE Key Provider Settings**

The SPEKE key server provides uniform key exchange between AWS Elemental Delta and DRM solution providers. To use a SPEKE server to encrypt content, you must have a SPEKE-compliant DRM solution provider. To get set up, see .

**Content ID**

Identifies the Delta content in the key server. Each Content ID value you assign in Delta should be unique for this key server.

**System IDs**

The system ID is a unique identifier for the DRM solution provider. For a list of common system IDs, see https://dashif.org/identifiers/content_protection/. If you need help determining your system ID, contact your DRM solution provider.

**SPEKE URI**

The URL for your DRM provider.

**Username**

The username for your DRM provider if authentication is required.
Password

The password for your DRM provider if authentication is required.

HLS Encryption Static Settings

Key Format

The format of the key value. You can either:
- Leave empty to indicate “identity
- Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:
- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Repeat EXT-X-KEY

Repeat the EXT-X-KEY directive for every media segment.
This may result in an increase in client requests to the DRM server.

IV Follows Segment #

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.
- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

Constant IV

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

Key

The Fairplay key. This is a 128-bit hex value represented by a 32-character string.

SKD

The Fairplay skd/uri, formatted as skd://

HLS Encryption Verimatrix Settings

Key Format

The format of the key value. You can either:
- Leave empty to indicate “identity
- Or enter a reverse DNS string, such as com.example.sample

Key Format Version

The version of the key format that the key server supports. Can be either:
- A single positive integer version value (for example, 1)
- Or a slash delimited list of version values (for example, 1/2/3).

Key Rotation Count

The AES-128 encryption key will rotate after this many segments.
Set to 0 to use the same key throughout the entire encoding session.

**Repeat EXT-X-KEY**

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

**IV Follows Segment #**

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
- Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Resource ID**

Used by the key provider to identify the content.

**Verimatrix URI**

The Verimatrix server that will provide the keys.

**Username**

Used to authenticate to the key provider.

**Password**

The password to authenticate to the key provider.

**Reuse Last Key**

Determines what Delta does if the key provider becomes unreachable.

- Place a check to encrypt the stream using the last key obtained from the key provider.
- Leave unchecked to make the request to encrypt fail and make content unavailable to playback devices.

**Resource Type**

Verimatrix resource type. Use either:

- VOD for output VOD content or after Live to VOD output filters
- DTV for output live content

**HLS Encryption VOSP Settings**

**Repeat EXT-X-KEY**

Repeat the EXT-X-KEY directive for every media segment.

This may result in an increase in client requests to the DRM server.

**IV Follows Segment #**

The IV (Initialization Vector) is a 128-bit number used in conjunction with the key for encrypting blocks.

- Checked (default) causes the IV to change every segment (to match the segment number).
• Unchecked means the value in Constant IV will be used.

**Constant IV**

Required if IV Follows Segment # is unchecked.

A 128-bit, 16-byte hex value represented by a 32-character string, used as the IV for encryption.

**Server URL**

The URL to query for the VOSP content key.

**Service ID**

The VOSP Service ID.

**License URL**

The URL for the license acquisition Web service.

**UI License URL**

The URL for the non-silent license acquisition Web service.

**Key ID**

Valid GUID for the key.

**Content Key (Base 64)**

Contains a base64-encoded content key. See Content Key Hex for details.

**Content Key (Hex)**

Contains a hexadecimal-encoded content key. This value is intended for testing purposes, and allows you to use a key without contacting the server.

To use for testing, enter a value in this tag or in. Do not enter a value in both tags.

To generate a content key by contacting the server, leave both these tags blank and enter a value in Server URL.

**Custom Attributes**

Custom information you want to attach. The downstream system will not act on this data.

---

**PlayReady Output Filter**

These are the settings for a PlayReady output filter.

**Enable Endpoint**

Indicates if content is playable from this filter.

When you select **Enable Endpoint**, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in **Endpoints on Output Filters (p. 36).**

**Custom URL**

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:
When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

**Warning**

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

**Description**

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

**Initial IV**

Initial value of the initialization vector (IV).

Default is 1.

**Key Provider**

Who is providing your encryption keys.

See the following sections for settings for each provider.

**PlayReady Conax Settings**

**Content ID**

Identifies the Delta content in the Conax server. Each Content ID value you assign in Delta should be unique for this Conax server.

**Conax Server**

Specifies the location of the Conax server. A URL and login credentials are required.

**Username**

Used to authenticate to the keyprovider.

**Password**

The password to authenticate to the keyprovider.

**Resource Type**

Conax resource type. Use either:

- VOD for output VOD content or after Live to VOD output filters
- DTV for output live content

**PlayReady Custom Settings**

**Key ID**

Valid GUID for the key.
Key Seed

Contains the base64 key seed that you retrieved from Discretix. When a key seed is provided, Delta does not generate an encryption key and instead includes the key seed in the key request. The key seed allows for unavoidable duplicate content IDs, such as with output templates.

Required on VOD output templates.

Content Key

A base64-encoded content key. Required unless Key Seed is specified.

License URL

The URL for the license acquisition Web service.

UI License URL

The URL for the non-silent license acquisition Web service.

Custom Attributes

Custom information you want to attach. The downstream system will not act on this data.

PlayReady Irdeto Settings

Service URL

The location of the Irdeto server.

Username

Used to authenticate to the keyprovider.

Password

The password to authenticate to the keyprovider.

Account ID

Your account on the Irdeto Control server.

Content ID

Identifies the Delta content in Irdeto Control. Each Content ID value you assign in Delta should be unique for this Irdeto Control.

Use HTTPS

Protocol that Delta uses in requests to the license acquisition URL. HTTP is default.

Sub Content Type

The sub-content type to be associated with the output manifest.

UI License URL

The URL for the non-silent license acquisition Web service.

Custom Attributes

Custom information you want to attach. The downstream system will not act on this data.

PlayReady Microsoft Settings

Program ID

Unique identifier associated with a set of keys. It is passed to the keyprovider URI (uri parameter).
**URI**
- URI used for retrieving the keys from the keyprovider.

**Username**
- Used to authenticate to the keyprovider.

**Password**
- The password to authenticate to the keyprovider.

**UI License URL, ir**
- The URL for the non-silent license acquisition Web service.

**Custom Attributes**
- Custom information you want to attach. The downstream system will not act on this data.

**PlayReady Piksel Settings**

**Content ID**
- Identifies the Delta content in the Piksel server. Each Content ID value you assign in Delta should be unique for this Piksel server.

**Piksel Server**
- Location of the Piksel server.

**Username**
- Used to authenticate to the keyprovider.

**Password**
- The password to authenticate to the keyprovider.

**Custom Attributes**
- Custom information you want to attach. The downstream system will not act on this data.

**PlayReady SPEKE Key Provider Settings**

The SPEKE key server provides uniform key exchange between AWS Elemental Delta and DRM solution providers. To use a SPEKE server to encrypt content, you must have a SPEKE-compliant DRM solution provider. To get set up, see .

**Content ID**
- Identifies the Delta content in the key server. Each Content ID value you assign in Delta should be unique for this key server.

**System IDs**
- The system ID is a unique identifier for the DRM solution provider. For a list of common system IDs, see https://dashif.org/identifiers/content_protection/. If you need help determining your system ID, contact your DRM solution provider.

**SPEKE URI**
- The URL for your DRM provider.

**Username**
- The username for your DRM provider if authentication is required.
Password

The password for your DRM provider if authentication is required.

PlayReady VOSP Settings

Server URL

The URL to query for the VOSP content key.

Service ID

The VOSP Service ID.

License URL

The URL for the license acquisition Web service.

UI License URL

The URL for the non-silent license acquisition Web service.

Key ID

Valid GUID for the key.

Content Key (Base 64)

Contains a base64-encoded content key. See Content Key Hex for details.

Content Key (Hex)

Contains a hexadecimal-encoded content key. This value is intended for testing purposes, and allows you to use a key without contacting the server.

To use for testing, enter a value in this tag or in. Do not enter a value in both tags.

To generate a content key by contacting the server, leave both these tags blank and enter a value in Server URL.

Custom Attributes

Custom information you want to attach. The downstream system will not act on this data.

Authentication Output Filters

Authentication output filters contain authentication information so that the content can be handled by an authentication mechanism.

Topics

- Akamai G2O Authentication Output Filter (p. 101)
- Cisco URL Signing Output Filter (p. 103)

Akamai G2O Authentication Output Filter

The Akamai G2O Authentication filter contains data used by Delta to validate content requests from the Akamai edge server. Delta will only serve content from this filter when requested from an Akamai edge server with the authentication headers that are specified in the parameters of this filter.

This filter can be used on any type of content.

These are the settings for an Akamai G2O Authentication output filter.
Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Clear Data Header Name

Un-encrypted HTTP header containing clear G2O settings.

Default: X-Akamai-G2O-Auth-Data

Encrypted Data Header Name

Encrypted HTTP header containing G2O signature.

Default: X-Akamai-G2O-Auth-Data

Request Validity Window

Amount of time in seconds to consider a G2O request valid. Default is 30. Allows the user to correct for time differences between the Delta node and Akamai edge servers.

Nonce/Key Pairs

The Nonce/Key Pair is used for signature validation. These must be set to equal the nonce and key pair in the Akamai edge configuration.

- Nonce: A key used for generating the signature
- Key: Encryption key used for generating the signature.

If the edge configuration changes, a new Nonce/Key Pair should be added and the previous one should be retained until the transition to the new key is complete.
Whitelist IP Range

An array of IP addresses for client players (or other downstream requester) that can bypass Akamai G2O authentication. Can be either:

- A single static IP address, or
- A range of IP addresses in CIDR notation.

Cisco URL Signing Output Filter

The Cisco URL Signing filter contains data required by Delta to generate URL signatures compatible with a Cisco Internet Streamer CDS. Delta supports only symmetric keys. Delta generates the URL signatures and appends them to the bitrate playlist URLs inside the HLS manifest. Delta does not play any role in validating URL signatures.

This filter can be used on CMAF, HLS, and Delta-encrypted HLS content.

These are the settings for a Cisco URL Signing output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

URL Prefix

Prefix of URL to be signed. This should correspond to the public URL the content will be accessed from.
Client IP Address

Client IP address to generate signature for.

- If the CDS is configured to require client IP validation, enter a valid IP address.
- If the CDS has disabled client IP validation, you must still enter an IP address: enter 1.2.3.4.

Expiration Window

- If the Internet Streaming CDS is configured to validate expiry, enter a number of seconds. If this number of seconds pass between the time the URL signature is created and the time the CDS validates the request, then the validation will fail.
- If the Internet Streaming CDS is configured to ignore expiry (via the exclude validation attribute), then enter any number.

Key Owner ID

ID number for the owner of the encryption key specified in key tag. The Internet Streamer CDS must already be configured with this key owner ID.

Key Number ID

Key ID number for the encryption key specified in key tag. The Internet Streamer CDS must already be configured with this key ID number.

Range: 1-16

Key

Key that will be used to generate the URL signatures. The Internet Streamer CDS must already be configured with this key.

Exclude Domain

Determines if the domain is included in the URL signature or not.

- Checked: Select true if the CDS is configured to exclude the domain. The domain will be omitted from the URL signature.
- Unchecked: Select false if the CDS is configured to include the domain. The domain will be included in the URL signature.

Version

Version of signature algorithm.

- 0: MD5 hash algorithm.
- 1: SHA-1 hash algorithm.
- 2: SHA-1 hash algorithm with the protocol removed from the beginning of the URL (without schema).

Blacklist and Whitelist Output Filters

The whitelist and blacklist output filters restrict what IP addresses can receive content from the endpoint.

- IP Whitelist makes it so that only playback devices within the specified range have access to content.
- IP Blacklist makes it so that only playback devices outside the specified range have access to content.

Both filters work with all types of content and apply to content requested from the whitelist or blacklist output filter as well as any downstream endpoints.

These are the settings for a whitelist or blacklist output filter.
Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

`http://<Delta IP address>/out/u/custom_url_text.<extension>`

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

IP Address Range

Range of IP addresses that are restricting traffic.

For Whitelist, enter one of these:

- The IP address of the single client player that can access the content.
- A range of IP addresses in CIDR notation that can access the content. All the IP addresses in the range (including the first and last) will be able to access the content.

For Blacklist, enter one of these:

- The IP address of the single client player that cannot access the content.
- A range of IP addresses in CIDR notation that cannot access the content. None of the IP addresses in the range (including the first and last) will be able to access the content.

User Agent Output Filter

The User Agent output filter makes it so only specific types of user agents have access to the content, effectively creating a whitelist of user agents. The User Agent output filter works with CMAF and HLS live and VOD content and applies to content requested from this output filter as well as any downstream endpoints.
User Agent Use Cases

There are two use cases for user agent filters. For each use case, you set up the filter tree differently.

Restricting Access to a Specific Set of Devices

You may want to allow only specific devices to access content, but want that content to be identical for all these devices.

In this case, you create the filter tree as usual, including creating an HLS or CMAF package output filter. You then create a user agent filter to identify the user agents that apply to the content.

Restricting Access by Content and Devices

You may want to create slightly different variations in a specified content and set up so that different devices can access each variation.

For example, you may want one of these:

- The content to have one set of ads when it is served to one type or types of devices, and another set of ads when it is served to other types of devices.
- The content to offer one set of tracks or stream sets when it is served to one type of device and another set when it is served to other types of devices.

In these cases, you branch the filter tree to create each variation. You then create a user agent filter as the last filter in each branch, to identify the user agents that apply to that branch. You must assign the same name to all the related user agent filters. In this way, identical manifests (endpoint addresses) are created for each branch. When a device hits the endpoint address, Delta checks the user agent information in the request and directs the request to the correct content.

The next section provides more detail about using the User Agent output filter with content variations.

Content Variations

The content variations could involve any other output filter or combination of applicable DRM, Authentication, or Processing output filters, except the Bitrate Selector filter.

In this example, the first branch might contain one set of ads, Flash Access, and be set up for one set of devices. The second branch might have a different set of ads, the same encryption, and be set up for the same set of devices. The third branch might have the same ads and devices as the first branch, but with HLS encryption.

Content Variations and the Bitrate Selector Filter

As discussed on Bitrate Selector Output Filter (p. 111), the bitrate selector filter is not a mechanism for permanently removing bitrates, so it should not be used to create content variations. Instead, to vary content by bitrates, you should create separate stream sets. This involves creating separate package output filters, which means the filter tree would look like the following.

In this example, each branch has different stream sets in the HLS package output filters but the same ads. The devices would be those that are appropriate for the different bitrates (as defined by the stream sets).

User Agent Output Filter Settings

These are the settings for a User Agent output filter.
Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/\texttt{custom\_url\_text}.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

\texttt{custom\_url\_text\_1}
\texttt{custom\_url\_text\_2}

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

User Agent Preset IDs

Each user agent preset is a regular expression that identifies valid values for the user agent data in the request from the device (user agent) to Delta. When a request from a device matches this regex, Delta declares a match on the branch of the filter tree where this user agent filter is located, and delivers the content represented by this branch.

Creating Processing Output Filters

Processing output filters modify the output content in a variety of ways. Processing output filters include the following:

Topics

- Ad Removal Output Filter (p. 108)
- Ad Replace Output Filter (p. 109)
- Bitrate Selector Output Filter (p. 111)
- Blackout Output Filter (p. 112)
- Cache Settings Output Filter (p. 113)
- File Copy Output Filter (p. 114)
- Live to VOD Output Filter (p. 115)
Ad Removal Output Filter

The Ad Removal output filter removes all ad content from the media stream and takes out all ad markers from the manifest. To identify the ads to be removed, the original content must be decorated with either of the following ad markers:

- #EXT-CUE-OUT and #EXT-CUE-IN markers in the manifest
- SCTE-35 markers in the stream

This filter works with CMAF and HLS VOD content, and Delta-encrypted HLS content.

**Note**
Removing content shortens the length of the media stream.

These are the settings for an Ad Removal output filter.

**Enable Endpoint**
Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

**Custom URL**
Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

**Warning**
CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

**Description**
Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.
Ad Replace Output Filter

The Ad Replace output filter replaces existing content from the ingested asset with content stored on Delta or from a VAST server.

**Note**
Delta doesn't support personalized VAST content (different content for different playback request instances).

This filter affects content in the stream: it identifies and automatically enables ad replacement. This is different from packaging filters, which modify the manifest through ad tags. To stop ad replacement, remove the output filter. There is no way to maintain the Ad Replace filter but disable replacement.

To identify the ads to be removed, the original content must be decorated with either of the following ad markers:

- `#EXT-CUE-OUT` and `#EXT-CUE-IN` markers in the manifest (for HLS and CMAF content)
- SCTE-35 markers in the stream (for TS content)

The Ad Replace filter works with CMAF and HLS live or VOD content, Delta-encrypted HLS content, and TS content.

**Important**
Ad replace is not supported with multi-period DASH manifests due to duration inconsistencies between the source and ad content. If you're using a downstream system that requires SCTE markers, don't use the ad replace feature in AWS Elemental Delta. Instead, rely on the downstream system to perform ad replace functions.

These are the settings for an Ad Removal output filter.

**Enable Endpoint**
Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

**Custom URL**
Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

**Warning**
CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.
Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Ad Mode

Determines how content is added to the ingested asset. Choose one of these:

- **Insert** — VOD content only. The ad block starts playing at the #EXT-CUE-OUT ad marker in the original content and the entire ad block plays. Delta ignores the #EXT-X-CUE-IN ad markers and the duration. When the block is finished, the non-ad content in the video asset returns.

- **Replace** — live or VOD content. The ad content is inserted into the asset at ad markers, replacing the original content. The implicit or explicit duration of the ad markers is handled like this:
  - If an ad has not finished at the #EXT-X-CUE-IN ad marker (the ad is longer than the duration of the ad break), the duration is observed and the ad is cut off. In the next ad break, this ad is the first to play and it will play in its entirety.
  - If the ad block is shorter than the duration, the first ad in the block plays again and will be cut off at the #EXT-X-CUE-IN if it is not finished.

Ad Source Type

The source of the ad content. Content is from one of these:

- **Static**: the ad content is from Delta.
- **VAST**: the ad content is from a VAST server.

See below for settings based on each ad source.

Ad Replace Static Source Type

Ad Sources

A comma-separated list of the IDs (from the id tag) or aliases (from the alias tag) of Delta Content to use as ad content.

Advertising content should be VOD content formatted to match ad avail timing. For example, if ad avails are 60 seconds, ad content should be in 15, 30, or 60 second intervals.

Delta will move through the list of content as ad avails appear in the stream. Once all specified sources have been inserted into the stream once, Delta will restart at the beginning of the list.

Ad Replace VAST Source Type

Ad Sources

A list of ad content (as for static content) that is used only if the VAST server cannot be reached.

Advertising content should be VOD content formatted to match ad avail timing. For example, if ad avails are 60 seconds, ad content should be in 15, 30, or 60 second intervals.

Delta will move through the list of content as ad avails appear in the stream. Once all specified sources have been inserted into the stream once, Delta will restart at the beginning of the list.

VAST Server

The location of the VAST server.
Campaign ID

The campaign ID on the VAST server.

Bitrate Selector Output Filter

The Bitrate Selector output filter is an advanced filter that's intended as a way of temporarily restricting the bitrates that are being served. The output filter displays the set of adaptive bitrate streams (ABR) available in the ingested content. The bitrates that you don't select are not available to be served to the playback device and are not included in the manifest.

You might use the Bitrate Selector if you're experiencing network issues and want to disable the highest bitrate temporarily until they're resolved.

The bitrate selector filter is not intended as a way to permanently restrict the bitrates. A better way to permanently remove tracks from a filter is via stream sets: create stream sets that only include the desired bitrates. See the stream sets section for the applicable output filter. For a list of filters, see Creating Package Output Filters (p. 48).

The Bitrate Selector filter works with any content.

These are the settings for a Bitrate Selector output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

custom_url_text_1
custom_url_text_2

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.
### Bitrates
Bitrates that you can enable (check) or disable (uncheck) on the output. If a bitrate is not included in the list, it’s disabled by default.

### Blackout Output Filter
The Blackout output filter replaces existing content from the ingested asset with content stored on Delta. When the ingested asset is packaged for delivery, the content that you specify in the Blackout output filter is used in place of content that’s marked as a network blackout. You can enable or disable blackout from the output filter, as needed.

The Blackout filter works with any content.

These are the settings for a Blackout output filter.

#### Enable Endpoint
Indicates if content is playable from this filter.

When you select **Enable Endpoint**, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

#### Custom URL
Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

**Warning**
CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

#### Description
Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

#### Content IDs
A comma-separated list of Content IDs for standard Delta content that has been ingested via any input filter. This is the content that is played during network blackout.

#### Enabled
When selected, blackout is enabled on the output content. When de-selected, blackout is not enabled and any network cues in the stream remain in the stream.
Cache Settings Output Filter

The Cache Settings output filter modifies the cache time for output content by overriding all of the max-age HTTP headers for all endpoints in this filter chain. The headers are replaced either with a value that you specify, or with a default value if you haven’t specified one.

The Cache Settings filter works with any content.

These are the settings for a Cache Settings output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/<custom_url_text>.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

custom_url_text_1
custom_url_text_2

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Max Age VOD Variant Manifest

The time (in seconds) that a downstream server or content distribution network (CDN) should cache the VOD variant manifest.

This setting applies to top-level HLS and HDS VOD content manifests, or after a completed Live to VOD filter.

Max Age VOD Bitrate Manifest

The time (in seconds) that a downstream server or CDN should cache the VOD bitrate manifest.

This setting applies to top-level MSS and DASH manifests, HLS and DASH bitrate manifests VOD content, or after a completed Live to VOD filter.
Max Age Live Variant Manifest

The time (in seconds) that a downstream server or CDN should cache the live variant manifest.

This setting applies to top-level HLS and HDS live content manifests.

Max Age Live Bitrate Manifest

The time (in seconds) that a downstream server or CDN should cache the live bitrate manifest.

This setting applies to top-level MSS and DASH manifests and HLS and HDS bitrate live content manifests.

Max Age Content Files

The time (in seconds) that a downstream server or CDN should cache content files.

File Copy Output Filter

The File Copy output filter copies content to a directory that you specify. You can insert this filter in these cases:

- The ingested asset is file-oriented content (such as MP4).
- The output content will be in adaptive bitrate (ABR) format (such as that from DASH-ISO and HLS package output filters).
- There is a file-oriented packaging filter upstream (such as an MP4 or MPEG-TS package output filter).

The File Copy filter works with all content from MP4, MPEG-TS, CMAF, HLS, and DASH package output filters.

These are the settings for a File Copy output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Path Type

The location for the saved files. Available options:

- Local — content is stored to a folder that the Delta node has access to.
- S3 — content is stored in an Amazon S3 bucket.

Local or S3 Path

The path where files are to be saved.

- `<directory>`/: files will be named with the filter ID and saved in this directory. The directory will be created if it does not yet exist.
Live to VOD Output Filter

The Live to VOD output filter creates a VOD asset from a portion of a live stream. The filter specifies the start and stop time where the VOD asset will be extracted from.

The start and stop are specified as a clock time, for example, start at 12:15:10 a.m. and end at 12:23:19 a.m. The filter must exist by the time the desired content enters the content window (specified in the Content Window Type field as described in the section specific to the input filter). Once the content has been removed from the content window, the filter will have no effect.

These are the settings for a Live to VOD output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select Enable Endpoint, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

custom_url_text_1
custom_url_text_2

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.
Allow URL Start/End Params

This tag controls a feature that allows the start and end times to be taken from the content request URL, rather than being hard-coded into the filter via the End and Start fields.

- Checked: Enable this feature. In this case, any values in End and Start are ignored.
- Unchecked: Disable this feature.

See following section for more information.

Not available with frame accuracy.

Live Manifest Scope

Control playback behavior during the live to VOD window. This tag has no effect after the end time of the window.

- Default: Playback will start at the current time (live point). The manifest grows as time passes.
- Start Over: During the live to VOD window, playback will start at the beginning of the window. The manifest grows as time passes and contains full content from when the live to VOD window started to the live point.
- Index Duration: Playback starts at the live point. The manifest is fixed length equal to the package filter's index duration.

If you downgrade from Delta version 2.2 and the manifest scope is set to Default or Index Duration, then playback assumes the default behavior. If it's set to Start Over, then playback starts over at the beginning of the VOD window.

Frame Accurate

Select to indicate the frame within the specified start and end seconds when the VOD clip will start and end.

See Live to VOD Frame Accuracy (p. 119) for more information.

Not available with URL start/end parameters.

Start

Calendar date/time to start. See End for the rules.

Times entered are based on the time source selected on the input filter.

End

Date/time to end, formatted according to the ISO 8601 standard:

```
yyyy-mm-dd <space> hh:mm:ss <space> <offset>
```

Where <offset> is the offset for the desired timezone.

If no offset is entered, the offset for the timezone specified in the Delta settings is assumed.

The time you enter here is converted to UTC and then converted back to the ISO 8601 standard with the offset always set to the timezone specified in Delta.

So if, for example, you enter a different timezone when you create the filter, when you GET the filter, the time will be adjusted. For example, you are in the -0700 timezone but you enter “20:00 -0500”. If you then you do a GET, the time will be shown as “18:00 -0700”.

Times entered are based on the time source selected on the input filter.

Start Frame

Available when Frame Accurate is selected.
Indicates the frame within the specified start second that the VOD asset should start.

**End Frame**

Indicates the frame within the specified end second that the VOD asset should end.

**Implementing URL Start/End Times**

URL start and end time parameters allow the content requesting system to request a custom manifest using specified segment start and end times in the request URL. This URL remains valid until the content window specified in the input filter expires.

If Allow URL Start/End Params is not checked, then the segment window is defined by the start and end times indicated in the output filter.

Times can be specified as:

- ISO 8601 dates. Example: 2016-04-27T17:29:22+00:00
- POSIX time. Example: 1430171563

The request URL must be formatted according to the packaging output filter, as described in the following sections.

**CMAF URL Start/End Times**

Start and end parameters in the URL request for HLS content can use standard parameter notation, or can be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

**Example Query parameter notation**

Start and end parameters are included at the end of the request URL.

```text
http://10.24.34.2/out/i/2704.m3u8?end=1430760432
```

**Example Path elements**

Start and end parameters are included in the path of the request URL.

```text
http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/end/2016-05-15T18:30:55:+00:00/i/2704.m3u8
```

**DASH URL Start/End Times**

Start and end parameters in the URL request for DASH content can use standard parameter notation, or can be included as path elements in the request URL. Both start and end times are required in the URL.

**Example Query parameter notation**

Start and end parameters are included at the end of the request URL.

```text
http://10.24.34.2/out/i/2704.mpd?start=1430759758&end=1430760432
```
Example Path elements
Start and end parameters are included in the path of the request URL.

```
http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/end/2016-05-15T18:30:55:+00:00/i/2704.mpd
```

HDS URL Start/End Times
Start and end parameters in the URL request for HDS content must be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Path elements
Start and end parameters are included in the path of the request URL.

```
http://10.24.34.2/out/start/1430759758/i/2704.f4m
```

HLS URL Start/End Times
Start and end parameters in the URL request for HLS content can use standard parameter notation, or can be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Query parameter notation
Start and end parameters are included at the end of the request URL.

```
http://10.24.34.2/out/i/2704.m3u8?end=1430760432
```

Example Path elements
Start and end parameters are included in the path of the request URL.

```
http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/end/2016-05-15T18:30:55:+00:00/i/2704.m3u8
```

MSS URL Start/End Times
Start and end parameters in the URL request for MSS content must be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Path elements
Start and end parameters are included in the path of the request URL.
Live to VOD Frame Accuracy

Frame accuracy for Live to VOD provides greater precision by allowing you to indicate the exact frame that the VOD clip starts and ends.

Note that:

- Frame Accuracy is supported only when Delta is used with Elemental Live encoders that are running version 2.13.
- You can use h.264/AVC encoded streams with frame accuracy. H.265 is not currently supported.
- Some older players do not support frame accuracy. The HLS player provided in Delta is older and may not end on the correct frame.
- When upgrading existing content to frame accuracy (after the content window has passed), the content window may not include the exact frames due to content cleanup.
- Encoding high bitrates/resolutions may cause player issues due to longer buffering times at the start and end of the clip.

Setup

To use frame accuracy, ensure the following:

- On the input filter, the time source is selected. Embedded (UTC) provides the greatest accuracy. Ingest Time can be used but may be inaccurate up to 2 seconds.
- On the Live to VOD output filter:
  - Frame Accurate is selected.
  - In the Start Frame and End Frame fields, indicate the specific frames within the specified seconds (in Start and End) that the clip will begin and end.

  When Frame Accurate is selected, the lowest framerate of all the input video streams is displayed on the output filter. Any frame within this framerate (from 0 to the last frame in the second) can be selected for the VOD start or end.

Live to VOD Catalog Output Filter

The Live to VOD Catalog output filter creates a VOD Catalog asset from a portion of a live stream.

The Live to VOD Catalog filter works with all live content but a VOD Catalog output template must be specified on the input filter. For more information about VOD Catalog, see Working with VOD Catalog Assets in AWS Elemental Delta.

Note

VOD Catalog does not support frame accuracy.

These are the settings for a Live to VOD Catalog output filter.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.
Start

Calendar date/time to start. See End for the rules.

Times entered are based on the time source selected on the input filter.

End

Date/time to end, formatted according to the ISO 8601 standard:

```
yyyy-mm-dd <space> hh:mm:ss <space> <offset>
```

Where <offset> is the offset for the desired timezone.

If no offset is entered, the offset for the timezone specified in the Delta settings is assumed.

The time you enter here is converted to UTC and then converted back to the ISO 8601 standard with the offset always set to the timezone specified in Delta.

So if, for example, you enter a different timezone when you create the filter, when you GET the filter, the time will be adjusted. For example, you are in the -0700 timezone but you enter “20:00 -0500”. If you then you do a GET, the time will be shown as “18:00 -0700”.

Times entered are based on the time source selected on the input filter.

Expire

Calendar date/time that the asset will be promoted to a VOD Catalog asset. See End for the rules.

The Live to VOD Catalog filter is removed upon expiration.

Promote on Expiration

What happens to the content after the live to VOD window.

- Checked (default): the specified Live to VOD window will be promoted to VOD Catalog upon expiration.
- Unchecked: the content within the specified window is removed.

Name

A unique name for the VOD Catalog content. When using replacement tokens, the Name value replaces all instances of $name$ on output filters at egress.

Alias

Optional alternative reference for the content. If you use an alias with a custom name, you get a fully custom endpoint URL that has neither the content ID nor the filter ID in it. The alias is added to the VOD Catalog content at promotion. The aliased endpoint takes the following formats:

- Aliased default endpoint URI: `http://<delta IP>:8080/out/vod/valias/<alias>/i/<filter>.<extension>`
- Aliased custom endpoint URI: `http://<delta IP>:8080/out/vod/v1/<alias>/u/<filter>.<extension>`

The alias must meet these requirements:

- Must be unique. Since the alias is viewable on the VOD Catalog content after promotion, you must know if any other pending assets are using the same alias. If an alias is duplicated, VOD Catalog promotion fails.
- Must contain a combination of numbers, letters, dashes, and underscores only. Any other characters are disallowed.
- Cannot contain the word “valias.” Since valias is used in the URL construction, it is a reserved word and can’t be used as an alias.
Resource ID

The Resource ID value replaces all instances of $resourceid$ on encryption output filters at egress. This allows you flexibility in the output template so that you can provide a unique value for DRM and encryption settings on each endpoint.

For more information, see Output Template Replacement Tokens (p. 43).

Alternate Resource ID

The Alternate Resource ID value replaces all instances of $resourceid_alt$ on encryption output filters at egress. It works the same way as Resource ID (above) and acts as an additional unique value on encryption output filters.

For more information, see Output Template Replacement Tokens (p. 43).

Preroll and Postroll Ad Insertion Output Filters

The Preroll Ad Insertion and Postroll Ad Insertion output filters insert an ad before the content starts playing (for preroll) or after it has finished (for postroll). These output filters do not rely on ad markers for ad insertion. Instead, the ad block starts based on when the content starts or ends.

The ad content can be stored on Delta or from a VAST server.

**Note**

Delta doesn't support personalized VAST content (different content for different playback request instances).

The Preroll Ad Insertion and Postroll Ad Insertion filters work with all VOD content.

These are the settings for a Preroll Ad Insertion or Postroll Ad Insertion output filter.

Enable Endpoint

Indicates if content is playable from this filter.

When you select **Enable Endpoint**, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/<custom_url_text>.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

**Warning**

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.
Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Ad Source Type

The source of the ad content. Content is from one of these:

• Static: the ad content is from Delta.
• VAST: the ad content is from a VAST server.

See below for settings based on each ad source.

Preroll and Postroll Ad Insertion Static Source Type

Ad Sources

A comma-separated list of the IDs (from the id tag) or aliases (from the alias tag) of Delta Content to use as ad content.

Advertising content should be VOD content formatted to match ad avail timing. For example, if ad avails are 60 seconds, ad content should be in 15, 30, or 60 second intervals.

Delta will move through the list of content as ad avails appear in the stream. Once all specified sources have been inserted into the stream once, Delta will restart at the beginning of the list.

Preroll and Postroll Ad Insertion VAST Source Type

Ad Sources

A list of ad content (as for static content) that is used only if the VAST server cannot be reached.

Advertising content should be VOD content formatted to match ad avail timing. For example, if ad avails are 60 seconds, ad content should be in 15, 30, or 60 second intervals.

Delta will move through the list of content as ad avails appear in the stream. Once all specified sources have been inserted into the stream once, Delta will restart at the beginning of the list.

VAST Server

The location of the VAST server.

Campaign ID

The campaign ID on the VAST server.

Time Delay Output Filter

The Time Delay output filter delays the availability of packaged content.

This filter is useful if, for example, a feed comes in from a different time zone and is intended to be played at 9:00 p.m. local time, perhaps three hours after the time that the feed was received.

The Time Delay filter works with all live content.

Note

When you're using an embedded time source, the time must be in UTC for the Time Delay filter to work correctly.
These are the settings for a Time Delay output filter.

**Enable Endpoint**

Indicates if content is playable from this filter.

When you select **Enable Endpoint**, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).

**Custom URL**

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

```
http://<Delta IP address>/out/u/custom_url_text.<extension>
```

When applicable, child manifest names include the custom URL text with a sequential number appended:

```
custom_url_text_1
custom_url_text_2
```

**Warning**

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

**Description**

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

**Time Delay**

Number of seconds to wait from when content is received to when it can be played back.

---

**VOD Clip Output Filter**

The VOD Clip output filter creates a smaller VOD asset from a portion of a VOD asset. The filter specifies the start and stop time for the clip relative to the start and stop time of the ingested asset.

The VOD Clip filter works with all VOD content.

These are the settings for a VOD Clip output filter.

**Enable Endpoint**

Indicates if content is playable from this filter.

When you select **Enable Endpoint**, downstream players can access content through this filter. Otherwise, content has to be accessed from a filter further out on the output filter branch.

When enabled, Delta provides you a playback URL in the following format described in Endpoints on Output Filters (p. 36).
Custom URL

Text to add to the endpoint URL to create a unique path to this endpoint.

The custom endpoint URL is in this format:

http://<Delta IP address>/out/u/custom_url_text.<extension>

When applicable, child manifest names include the custom URL text with a sequential number appended:

- custom_url_text_1
- custom_url_text_2

Warning

CMAF and HLS output filter endpoints use the same manifest file extension (.m3u8). If you have both types of endpoints on the same content and use custom URLs, make sure that the URLs that you define are unique. Otherwise, you may encounter playback issues.

Description

Any descriptive text that helps you to identify the endpoint later. This information is also useful creating a cross-reference to data in your content management system (CMS). Additionally, it helps to distinguish between multiple endpoints of the same type, each with different output characteristics.

Allow URL Start/End Params

This tag controls a feature that allows the start and end times to be taken from the content request URL, rather than being hard-coded into the filter via the End and Start fields.

- Checked: Enable this feature. In this case, any values in End and Start are ignored.
- Unchecked: Disable this feature.

See following section for more information.

Start

Start time in seconds.

End

End time in seconds.

Implementing URL Start/End Times

URL start and end time parameters allow the content requesting system to request a custom manifest using specified segment start and end times in the request URL. This URL remains valid until the content window specified in the input filter expires.

If Allow URL Start/End Params is not checked, then the segment window is defined by the start and end times indicated in the output filter.

Times must be specified as an offset relative to 0. Example: 123s or 2m3s

The request URL must be formatted according to the packaging output filter, as described in the following sections.
CMAF URL Start/End Times

Start and end parameters in the URL request for HLS content can use standard parameter notation, or can be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Query parameter notation

Start and end parameters are included at the end of the request URL.

http://10.24.34.2/out/i/2704.m3u8?end=1430760432

Example Path elements

Start and end parameters are included in the path of the request URL.

http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/end/2016-05-15T18:30:55:+00:00/i/2704.m3u8

DASH URL Start/End Times

Start and end parameters in the URL request for DASH content can use standard parameter notation, or can be included as path elements in the request URL. Both start and end times are required in the URL.

Example Query parameter notation

Start and end parameters are included at the end of the request URL.

http://10.24.34.2/out/i/2704.mpd?start=1430759758&end=1430760432

Example Path elements

Start and end parameters are included in the path of the request URL.

http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/end/2016-05-15T18:30:55:+00:00/i/2704.mpd

HDS URL Start/End Times

Start and end parameters in the URL request for HDS content must be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Path elements

Start and end parameters are included in the path of the request URL.

http://10.24.34.2/out/start/1430759758/i/2704.f4m
HLS URL Start/End Times

Start and end parameters in the URL request for HLS content can use standard parameter notation, or can be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Query parameter notation

Start and end parameters are included at the end of the request URL.

http://10.24.34.2/out/i/2704.m3u8?end=1430760432

Example Path elements

Start and end parameters are included in the path of the request URL.

http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/end/2016-05-15T18:30:55:+00:00/i/2704.m3u8

MSS URL Start/End Times

Start and end parameters in the URL request for MSS content must be included as path elements in the request URL. You can specify start time, end time, or both in the request.

- If a start time is not defined, the segment starts at the beginning of the content window.
- If an end time is not defined, it is considered “never” to end.

Example Path elements

Start and end parameters are included in the path of the request URL.

http://10.24.34.2/out/start/2016-05-15T18:00:55:+00:00/i/2704.ism/Manifest
Managing Resources in AWS Elemental Delta

The following sections describe how to perform actions against existing resources in Delta.

Topics
- Working with Input Users in AWS Elemental Delta (p. 127)
- Working with Input Filters in AWS Elemental Delta (p. 128)
- Working with Content Entities in AWS Elemental Delta (p. 128)
- Working with Output Filters in AWS Elemental Delta (p. 131)
- Working with Output Templates in AWS Elemental Delta (p. 132)
- Working with Stream Sets in AWS Elemental Delta (p. 133)

Working with Input Users in AWS Elemental Delta

The following sections provide instruction for managing existing input users.

View Input User Details

1. In the menu bar, choose Input and then Input Users to display the Input Users page.
2. In the pane that lists the input users, click the user to be displayed.

   The input user is displayed in detail, including the input filters that it's used on.

Modify Input User Details

You can change the username or the password of an input user.

1. Display the input user as described in the steps for viewing an input user's details.
2. With the input user's page displayed, choose Edit.
3. Make edits as needed and save them by choosing Update.

Delete an Input User

You can't delete an input user if it is in-use on an input filter.

1. Display the input user as described in the steps for viewing an input user's details.
2. With the input user's page displayed, choose Delete.
3. In the confirmation dialog, click Delete.

   The input user can no longer be used on input filters and Delta will deny access to any streams passing this input user's.
Working with Input Filters in AWS Elemental Delta

The following sections provide instruction for managing existing input filters.

View an Input Filter

1. In the menu bar, choose Input and then Input Filters to display the Input Filters page.
2. In the pane that lists the input filters, click the filter to be displayed.

   The input filter and its settings is displayed, including logging information on UDP input filters.

Modify an Input Filter

1. Display the input filter as described in the steps for viewing an input filter.
2. With the input filter displayed, choose Edit.
3. Make edits as needed and save them by choosing Update.

   For assistance with the fields on the input filter, see Forming Input Filters in AWS Elemental Delta (p. 10).

Delete an Input Filter

Delete the input filter with the specified ID.

The content associated with the input filter is not deleted. The content is still functional, but no new video will be ingested into this content.

Before deleting the input filter, take steps so that the upstream encoder is no longer delivering the asset.

There is no requirement to delete the Content entity (except with a UDP input filter, in which case you must delete both the filter and the Content entity).

You may want to retain the Content entity. Or you may want to delete the Content entity (Delete a Content Entity (p. 130)).

To delete an input filter

1. Display the input filter as described in the steps for viewing an input filter.
2. With the input filter displayed, choose Delete.
3. In the confirmation dialog, click Delete.

   The input filter is removed.

Working with Content Entities in AWS Elemental Delta

The following sections provide instruction for managing existing Contents entities.

Topics
View Content Entities

To view the list of existing Content entities, in the menu bar, choose Contents. Contents details are broken into three tabs, based on content type: live, VOD, and VOD Catalog. The following sections describe how to view details for each content type.

Viewing Live and VOD Content Details

The following steps apply to content that was ingested as live or VOD.

1. On the Contents screen, click either Live Contents or VOD Contents, depending on the type of content that was ingested.
2. Locate the content that you want to view. To simplify the search, you can:
   - Filter results by entering criteria in one or more of the column heading search fields (such as Name, Alias, ID, and so on). You can filter by a full or partial name or alias, but you can only enter a single integer for ID. Pre-defined values are available for type and status.
   - Sort results by clicking the ascend or descend arrows next to a column heading.
3. When you locate the Content entity, you can see summary detail about the content such as the number of output filters. A key icon is displayed on incoming content that's encrypted. On live content, you can see the status of the content. To view more information about a content, click one of these places:
   - On the linked name to view the output filters that are on this Content entity. For information about the output filters screen, see Working with Output Filters in AWS Elemental Delta (p. 131).
   - On the stats (graph) icon to view content statistics.
   - Anywhere but on the linked name or icons provides further information about the content. The information is across three tabs:
     - Details shows manifest and file information.
     - Endpoints shows information about output filters that have endpoints enabled, and includes the default and custom endpoint URIs that you use in playback requesting devices. You can also preview the stream by clicking the play button or QR code.
     - Streams shows information about the incoming streams to the Content entity.

Viewing VOD Catalog Content Details

The following steps apply to content that was ingested as VOD Catalog or promoted from VOD or live content to VOD Catalog.

1. On the Contents screen, click VOD Catalog.
2. Locate the content that you want to view. To simplify the search, you can:
   - Filter results by entering criteria in one or more of the column heading search fields (such as Name, Alias, Path, and so on). You can filter by a full or partial name or alias.
   - Sort results by clicking the ascend or descend arrows next to a column heading.
3. When you locate the Content entity, you can see summary detail about the content such as the VOD Catalog output template that's applied to the Content entity. A key icon is displayed on incoming content that's encrypted. To view more information, click one of these places:
Modify a Content Entity

1. Display the Content entity as described in the steps for viewing the details of a live, VOD, or VOD Catalog Content entity.
2. Make a selection to begin edits. To:
   - Modify output filters associated to the content, click the content's name and see Working with Input Filters in AWS Elemental Delta (p. 128).
   - Modify the content's name or alias, click the edit (pencil) icon. Go to the next step.
3. In the Edit Content window, make required modifications to the name and/or alias and click Save.

   Changing the name does not automatically update the alias. If a different alias is required, you must manually modify it. For more information about content aliases, see the AWS Elemental Delta 2.3 API Guide.

Delete a Content Entity

Delete the specified Content entity. Deleting the content also deletes all output filters, filter settings, stream sets, endpoints, statistics. It also deletes the stored content. It does not delete the associated input filter.

There are two general cases for deleting a Content entity:

- If you want to delete both the Content entity and its associated input filter because you are no longer interested in ingesting the asset.

  In this case, you should take steps so that the upstream encoder is no longer delivering the asset, then delete the input filter first, then delete the Content entity.

  **Note**
  In some cases, there will be unexpected results if you do not deal with the upstream encoder, the input filter and the Content entity in this order.

- If you want to delete the Content entity but retain the input filter because you may want to re-activate the input filter at a later date (to start ingesting the asset again), but you do not want to retain the current stored content.

  In this case, you should take steps so that the upstream encoder is no longer delivering the asset, then delete the Content entity.
Note
With a UDP input filter, you cannot delete the Content entity but retain the input filter.

To delete a Content entity
1. Display the Content entity as described in the steps for viewing the details of a live, VOD, or VOD Catalog Content entity.
2. With the Content entity displayed, choose Delete.
3. In the confirmation dialog, click Delete.
   The Content entity is removed.

Working with Output Filters in AWS Elemental Delta

The following sections provide instruction for managing existing output filters.

View Output Filters

You can view output filters from the Output Filters screen of a Content entity, or from the output template that the filters are on.

The Output Filters screen shows the output filters as well as information about the incoming streams and how many filters and endpoints are attached to the content. Click the detail headers (Type, Output Filters, Endpoints, and so on) to see statistics about the content.

To view details about the output filters
1. Display the output filters in one of these ways:
   • On live and VOD Content entities, click the linked name, as described in View Content Entities (p. 129). This takes you to the output filters that are applied to the content.
   • On VOD Catalog Content entities, click the linked VOD Catalog output template name. This takes you to the output template that's applied to the content.
2. Locate and select the output filter that you want to view.
   
   The filter and its settings are displayed. For information about output filter settings, see Forming Output Filters in AWS Elemental Delta (p. 46).

   For information about the stream sets tab on the output filter, see Working with Stream Sets in AWS Elemental Delta (p. 133).

Modify Output Filters

1. Display the output filter as described in the steps for viewing the details of an output filter.
2. Make your changes and choose Update to save changes. If you need help with the filter settings, see Forming Input Filters in AWS Elemental Delta (p. 10).
Delete Output Filters

Delete the specified output filter from the specified content.

The specified output filter and all its child output filters are deleted.

No other components of the content are deleted. In a package output filter, the stream sets in the filter are deleted but the tracks in the content are not deleted.

To delete an output filter

1. Display the output filter as described in the steps for viewing the details of an output filter.
2. Choose Delete.
3. In the confirmation dialog, click Delete.

The output filter is removed.

Working with Output Templates in AWS Elemental Delta

The following sections provide instruction for managing existing output templates.

View Output Templates

Display information about output templates and VOD Catalog output templates.

1. Access an output template in one of the following ways:
   • In the menu bar, choose Output Templates and choose the output template you want to view from the list of templates.
   • On VOD Catalog Content entities, click the linked VOD Catalog output template name.

   Summary information about the output template is displayed, such as the number of filters and endpoints, and the alias for VOD Catalog output templates.

2. Choose Manage Filters to see the output filters on this template.

Modify Output Templates

1. Display the output template as described in the steps for viewing the details of an output template.
2. On the template, click the edit (pencil) icon next to the Name or Alias field to be modified.
3. Make changes and choose Update.

   If you need to make changes to the output filters on the template, see Working with Output Filters in AWS Elemental Delta (p. 131).

Delete Output Templates

1. Display the output template as described in the steps for viewing the details of an output template.
2. In the confirmation dialog, click Delete.
Working with Stream Sets in AWS Elemental Delta

The following sections provide instruction for managing stream sets on an output filter.

**View Stream Sets**

1. To view stream set details, access the Output Filters screen and click on the packaging output filter that has the stream set to be viewed. For assistance, see View Output Filters (p. 131).
2. On the output filter, choose the Stream Sets tab.
3. Choose a stream to see its details. Information such as the codec, frames per second (FPS) for video, and bitrate for audio and video is shown.

**Preview an Output Stream**

The output stream can be previewed from all output filters that have an endpoint enabled. To preview the stream, do one of these:

- Display the output filter (as described in View Output Filters (p. 131)) and choose the play button near the endpoint URI.
- Display the Endpoints tab on the Content entity (as described in View Content Entities (p. 129) and choose the play button near the endpoint URI.

**Modify Stream Sets**

1. Display the stream sets tab as described in the steps for viewing the details of a stream set.
2. Uncheck the box for Use Default Stream Sets.
3. Click the edit (pencil) icon and make the required edits. For rules about stream sets, see stream set information by package filter in Forming Output Filters in AWS Elemental Delta (p. 46).
4. Choose Update.

**Delete Stream Sets**

1. Display the stream sets tab as described in the steps for viewing the details of a stream set.
2. Uncheck the box for Use Default Stream Sets.
3. Choose the delete (trash) icon to delete one stream set, or Delete to remove them all.
   - If you accidentally choose delete on the wrong stream set, prior to applying the update, you can click refresh (arrow) icon to reverse the deletion.
4. Choose Update.
Monitoring AWS Elemental Delta

Delta offers ways to monitor your node's health and statistics. The following sections describe these monitoring services.

Viewing Usage and Health Statistics in AWS Elemental Delta

The Statistics screen on the Delta web interface shows monitoring and usage information. The following sections describe where you can go to view statistics about the performance and health of your Delta node.

Health Page
View usage graphs for Delta health and usage.

Alerts Page
View the alerts that have been raised on the node. An alert provides feedback on a problem that must be fixed. When the problem is fixed, the alert is automatically cleared (is removed from the list).

Alerts can also be suppressed and edited by using the applicable button on the right of the alert. Suppressed alerts can be viewed and unsuppressed from the All Alerts page.

Messages Page
View the messages that have been raised on the node. Messages address several types of feedback.

Messages are not cleared: they remain in the list indefinitely.

There are three types of alerts:
- **Message - Audit** — informational messages that you do not need to react to. Often, these messages are feedback to actions you performed.
- **Message - Warning** — messages that advise you that there is a risk that a future activity will fail unless you take action to prevent it.
- **Message - Error** — messages that indicate that a planned activity has failed or an unexpected system error has occurred.

Logs Page
View the logs that Delta produces. Logs are also stored on the server at:

```
/opt/elemental_se/web/log
```

Viewing Content Statistics in AWS Elemental Delta

View content and output filter statistics by clicking the stats (graph) icon on the content entity on the Contents screen.
Viewing Node Pave Process in AWS Elemental Delta

When the leader AWS Elemental Delta node fails over to the secondary node, the new-secondary node performs a self-pave when it rejoins the cluster. This process can take a while to complete. If the node is restarted before the pave is complete, the node will become unusable until you contact AWS Elemental Support to fix the database. You can view the status of the pave on the Nodes screen of the web interface.

For more information about what happens during a failover, see Delta Cluster Failover Procedure.

Healthz and AWS Elemental Delta

Healthz is used for clustered Delta nodes, and monitors how long database replication takes between the leader and secondary nodes. If the delay is too long, the node is considered unhealthy. Your load balancer can then be configured not to send requests to the node until you have investigated the problem.

For information about specifying the maximum allowed replication delay, see the Cluster Management Configuration section of AWS Elemental Delta 2.3 Cluster Standard Configuration Guide.
Alerts in AWS Elemental Delta

These are the alerts that AWS Elemental Delta emits.

System-level Alerts

Node *Delta_hostname* is deactivated

The elemental_se service on the specified node has been stopped.

CPU Alert: > <threshold>%

The aggregate system CPU usage is over the user-defined threshold.

Disk Alert: > <threshold>%

The disk is over the user-defined threshold full. The /, /data, /opt, and /data/server partitions are included in this alert.

ERROR: Mount failed! <failure text>

Mounting a network drive failed. The text contains details on the failure.

License validation failed

The license is invalid.

License has expired, the service will shutdown on %s

Timed license is expired. You are in your grace period before the node will shut down.

License will expire on %s.

Timed license will expire soon.

Exceeded live channel count, %u in use, licensed for %u.

You are using more live channels than your license allows.

Exceeded live to VOD count, %u in use, licensed for %u.

You are using more live to VOD filters than your license allows.

node failed and it has no applicable failure rule(s). Running state unknown

Your AWS Elemental Delta node failed in an unidentified manner.

<error message> <node identifier> has failed

The specified AWS Elemental Delta node failed with the specified error.

Node <hostname> has incompatible version <version number>

The nodes you’re trying to cluster have different AWS Elemental Delta version numbers.

Node <hostname> missed heartbeats for <N> seconds

The specified node that you’re clustered with isn’t responding and will be removed.
**Input Filter Alerts**

<IDR|EBP> Marker not found in last 60 seconds from <URI>

The input stream did not contain a segmentation point. This indicates corrupt input.

Could not delete storage location for Input Filter <ID>. Files at the filter's storage location must be deleted manually. See logs for details.

Error starting watchfolders

The watch folder poller service process failed to start.

Could not delete storage location for Input Filter <id>: <error message>

Segment [%u] time [%s] comes before previous segment time [%s], diff [%f]

- RTMP – segments received out of order.
- HLS – ingest issue.

Content [%u]: Alias [%s] already exists

For SMIL file ingest. Duplicate or conflicting ingest.

Segment [%u] time [%s] does not follow previous segment time [%s], diff [%f]

For TS file ingest. Segment timing isn’t what was anticipated.

Child playlist [%u] contains a negative sequence number which is invalid

HLS manifest ingest issue.

Child playlist [%u] has large sequence gap which may cause playback to fail

HLS manifest ingest issue.

Stopped receiving input on <stream> <error>

UDP ingest. Stream stopped.

Failed to attach to shared ingest for MPTS input

Multi-Program Transport Stream (MPTS) ingest failed to initialize.

**Content Alerts**

Content #<content id> is stale

We stopped receiving or processing new segments for the specified content ID.

Template <template id> could not be applied to Content <id>.

The specified output template won't work on the specified content.

Content deletion has not run in more than <N> seconds

This indicates that the AWS Elemental Delta system is under stress and falling behind. Eventually the disk might fill up.

Failed promotion to VOD Catalog. Retrying.

VOD content couldn't be promoted to VOD Catalog. AWS Elemental Delta retries promotion.

Failed promotion to VOD Catalog. Non-recoverable. Not retrying.

VOD content couldn't be promoted to VOD Catalog. AWS Elemental Delta can’t retry promotion.
Failed promotion to VOD Catalog. Alias [%s] already in use
VOD content couldn't be promoted to VOD Catalog because the content alias is already being used.

Output Filter Alerts

Filter [<id>]: Invalid Ad Content ID [<ad ID>]
The ad replace output filter is unable to find ad content to splice into the stream.

Filter [<id>]: Content ID [<content ID>] does not contain a matching <audio|video> track for Stream Set [<id>]
The ad replace output filter is unable to find a suitable matching track in the ad content to substitute into the stream.

Error generating <filename>
For File Copy, MP4, or MPEG-TS output filters – filter failed to generate the output file.

Error creating directories [%s]
For File Copy, MP4, or MPEG-TS output filters – filter failed to create output folder(s).

Couldn't open file: %s
Failed to open an ingested file during output playlist generation.

Amazon S3 Related Alerts

S3 Bucket[<bucket name>] Exception [<exception name>] Message [<message>]
Failed to retrieve the region for the specified bucket.
Unable to create S3 Client
Failed to initialize our interactions with Amazon S3.
S3 GetObject error: Exception[<exception>] Message [<message>]
Failed to retrieve an object from Amazon S3.
S3 PutObject error: Exception[<exception>] Message [<message>]
Failed to write an object to Amazon S3.
S3 MultiPart error: Exception[<exception>] Message [<message>]
Failed to begin a multi-part upload to Amazon S3.
S3 UploadPart error: Exception[<exception>] Message [<message>]
Failed to complete a multi-part upload to Amazon S3.
Failed to delete files in bucket [%s]: Exception[<exception>] Message [<message>]
Failed to remove a set of objects from Amazon S3.
Failed to delete file [%s]: Exception[<exception>] Message [<message>]
Failed to remove a single object from Amazon S3.
Invalid access key [%s] or secret key [%s]
Wrong access credentials specified for the Amazon S3 bucket being accessed.
DRM Related Alerts


The encryption output filter is unable to reach the keyserver.
KeyProviderEKE::RequestKeys: failed: <error message>

Failed to retrieve DRM key from SPEKE server.
HTTP Request Failed When Fetching DRM Encryption Keys
Error Creating DRM Encryption Key Pool

Key pool creation failed (for non-SPEKE DRM providers).
Failed To Retrieve DRM Encryption Settings From Server
Unable To Parse DRM Encryption Key Server Response
Common Media Application Format (CMAF) Reference

The following sections provide guidelines for working with Common Media Application Format (CMAF) content in AWS Elemental Delta.

Topics
- HEVC Required Minimum Operating System (p. 140)
- CMAF HDR Assistance (p. 140)

HEVC Required Minimum Operating System

The minimum operation system required for HEVC CMAF content playback are as follows:
- Mac OS High Sierra and higher
- Apple TV 4K and up
- Mobile devices with iOS 11.1 and higher

CMAF HDR Assistance

AWS Elemental Delta supports CMAF HDR on ingested WebDAV/UDP-TS content that's HEVC with HDR. For playback, this content requires certain software and hardware supported by Apple. For updates on the latest supported systems, see https://support.apple.com/en-us/HT207949.

The following section provides settings suggestions for events in AWS Elemental Live for sending HDR content to Delta.

HDR Settings in Events

Use the following settings in an event in AWS Elemental Live that will serve HDR content to Delta and be output as CMAF HDR.

Input settings

Expand the Advanced section of the input in the event and use these settings:
- Color Space: HDR10
- Force Color: selected
- Max Luminance: if known, enter the value. Otherwise, enter 1000000.
- Min Luminance: if known, enter the value. Otherwise, enter 1000.
- MaxCLL: if known, enter the value. Otherwise, leave empty.
- MaxFALL: if known, enter value. Otherwise, leave empty.

Note that the luminance settings are best practice general range for HDR10 that doesn't already have specific ranges applied.
Stream video settings

Add a new stream to the UDP/TS output group and use these settings:

- **Video Codec**: HEVC
- In Advanced, **Insert Color Metadata**: selected
- In Advanced, **Profile**: Main.
- In Advanced, **Level**: Auto

Use your standard settings for the remaining fields on the stream.

**Settings for Upgrading non-HDR Content**

Use the following settings to upgrade non-HDR content to HDR in AWS Elemental Live prior to sending the content to Delta.

In **Advanced** section of the video stream settings, choose **Preprocessors** use these settings:

- **Color Corrector**: ON
- **Color Space Conversion**: Force HDR10
- Complete the **HDR Master Display Information**, or accept the defaults. Note that if you use defaults, the colors on the output might not be correct for your content. **Color Corrector**: ON
Creating AWS Elemental Delta-encrypted Content

HLS content that is output by AWS Elemental Live can be encrypted using Delta as the key provider. The content can then be ingested by that same instance of Delta. Because Delta is the key provider, it can unencrypt the content “behind the scenes”, which means that nearly every filter that applies to unencrypted HLS content can also be applied to encrypted HLS content. The only filter that cannot be applied is the Passthrough package output filter.

If you encrypt the HLS content in some other way (not using Delta as the key provider), the encrypted content is much more restricted; many filters cannot be applied to it.

To encrypt content using Elemental Live with Delta as the key provider, follow this procedure.

1. In AWS Elemental Live, go to the event or profile.
2. In the HLS output group section, click Advanced. The screen expands to show a new section.
3. Go to the Encryption field at the end of the new section and choose AES-128.
4. In Keyprovider, choose Generic Keyprovider.
5. Use these values in the fields:
   - **Key Rotation Count** — a suitable value
   - **Show IV** — check
   - **IV Follows Segment #** — check
   - **Key Format** — leave empty
   - **Key Format Version** — 1
   - **Resource ID** — any text. For example, DeltaAES128.
   - **Keyprovider Server** — enter the URL of the Delta node’s key-server endpoint. This node must be the Delta node where you plan to ingest the content. Use the format http://<Delta IP>/keyserver.
   - **Reuse Last Key** — check or uncheck, as desired

You can now ingest this HLS content using a suitable input filter. The content will be ingested and stored in encrypted form. Whenever Delta needs to “read” the content in unencrypted form, it will automatically unencrypt the content. It can unencrypt because it encrypted it.
Document History for User Guide

The following table describes the documentation for this release of AWS Elemental Delta.

- **API version:** 2.3.x
- **Latest documentation update:** January 2019

<table>
<thead>
<tr>
<th>Change</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updates for 2.3 release.</td>
<td>Documented new features for Delta 2.3 release. See AWS Elemental Delta 2.3 Release Notes for a comprehensive list of new features.</td>
<td>January 2019</td>
</tr>
</tbody>
</table>

**Note**

- The AWS Media Services are not designed or intended for use with applications or in situations requiring fail-safe performance, such as life safety operations, navigation or communication systems, air traffic control, or life support machines in which the unavailability, interruption or failure of the services could lead to death, personal injury, property damage or environmental damage.

- A component of Delta is licensed under the AVC patent portfolio license for the personal and non-commercial use of a consumer to (i) encode video in compliance with the AVC standard (“AVC video”) and/or (ii) decode AVC video that was encoded by a consumer engaged in a personal and non-commercial activity and/or was obtained from a video provider licensed to provide AVC video. No license is granted or shall be implied for any other use. A component of Delta is licensed under the mpeg-4 patent portfolio license for the personal and non-commercial use of a consumer for (i) encoding video in compliance with the mpeg-4 visual standard (“mpeg-4 video”) and/or (ii) decoding mpeg-4 video that was encoded by a consumer engaged in a personal and non-commercial activity and/or was obtained from a video provider licensed to provide AVC video. No license is granted or shall be implied for any other use. Additional information may be obtained from MPEG-LA, LLC. See [http://www.mpegla.com](http://www.mpegla.com).

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