MediaConvert: User Guide
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What Is AWS Elemental MediaConvert?

AWS Elemental MediaConvert is a file-based video processing service that provides scalable video processing for content owners and distributors with media libraries of any size. MediaConvert offers advanced features that enable premium content experiences, including:

- professional broadcast codecs that support increased bit depth and HDR content creation
- still graphic overlays
- advanced audio
- digital rights management (DRM)
- closed captioning support

AWS Elemental MediaConvert offers support for various input formats and adaptive bitrate (ABR) packaging output formats for delivering high-quality content from a range of sources onto primary and multiscreen devices.

For simple use cases, you can set up a MediaConvert transcoding job in just a few steps. For instructions, see Getting Started with AWS Elemental MediaConvert (p. 3).

MediaConvert has the following components:

Jobs

A job does the work of transcoding. Each job converts an input file into an output file or files. Inputs and outputs can contain one or more of video, audio, and captions, either together or in separate files. Before you begin creating jobs, make sure that you know what your input files are and what they contain. Also make sure that you know what files you would like to create as outputs and what format you would like them in.

When you create a job, you specify the name of the file that you want to transcode, the names that you want MediaConvert to give to the finished output files, and several other settings.

Queues

A queue allows you to manage the resources that are available to your account for parallel processing of jobs. For more information, see Working with Queues (p. 60).

Presets

A preset is a saved group of encoding settings for a single output. You can create many common outputs by simply selecting a system preset. You can also create your own custom presets, either by duplicating and modifying an existing preset or by creating one from scratch.

When you create a job, you can specify a preset that you want to use, or you can individually specify your encoding settings.

Job templates

A job template specifies all the settings for a complete job, except for your IAM role and those settings that are likely to change for each job, such as the input file location and name, and user metadata that you might tag the job with. You create a job template by specifying all input settings other than input location and file name, and then specifying all the outputs that the job will
generate. You can specify the settings for each output by choosing a preset for the output or by specifying each output setting individually.
Getting Started with AWS Elemental MediaConvert

This Getting Started tutorial shows you how to use the AWS Elemental MediaConvert console to transcode media files in a few basic steps. To get started accessing MediaConvert programmatically, see the following topics in the API reference:

• If you are using one of the AWS SDKs, see Getting Started with the SDKs.
• If you are using the MediaConvert API directly, see Getting Started with the API.

MediaConvert takes in an input file and the information that you provide about that file and turns it into one or more output files, based on the instructions and transcoding settings that you provide.

Note
If you aren’t familiar with jobs, queues, presets, and job templates—the basic concepts behind MediaConvert—we recommend that you take a quick look at What Is AWS Elemental MediaConvert? (p. 1) before you begin the tutorial.

Topics
• Step 1: Sign Up for AWS (p. 3)
• Step 2: Create Storage for Files (p. 3)
• Step 3: Set Up IAM Permissions (p. 4)
• Step 4: (Optional) Get Set Up to Use DRM Encryption (p. 5)
• Step 5: Upload Files for Transcoding (p. 6)
• Step 6: Create a Job (p. 6)

Step 1: Sign Up for AWS

To use AWS Elemental MediaConvert, you need an AWS account. If you don’t already have an account, you are prompted to create one when you sign up. You aren’t charged for any AWS services that you sign up for unless you use them.

To sign up for AWS

2. Follow the online instructions.

Part of the sign-up procedure involves receiving a phone call and entering a verification code on the phone keypad.

Step 2: Create Storage for Files

AWS Elemental MediaConvert transcodes your input files to generate output files. MediaConvert can take in your input files from Amazon S3 or from a server through HTTP or HTTPS. For your output locations, MediaConvert works with Amazon S3 buckets.
To create an Amazon S3 bucket

1. Sign in to the AWS Management Console and open the Amazon S3 console at https://console.aws.amazon.com/s3/.
2. On the Amazon S3 console, choose Create bucket.
3. In the Create bucket dialog box, type a bucket name. If you want to create separate input and output buckets, give the bucket an appropriate name that will help you identify it later.
4. Choose a Region for your bucket. Make sure that you create your Amazon S3 buckets and do your MediaConvert transcoding in the same Region.
5. Choose Create.
6. If you want to create separate buckets for your input files and output files, repeat steps 2 through step 5.

Step 3: Set Up IAM Permissions

To run transcoding jobs with AWS Elemental MediaConvert, first set up an AWS Identity and Access Management (IAM) role to allow MediaConvert access to your input files and the locations where your output files are stored. If you use DRM, your IAM permissions also allow MediaConvert to access your encryption keys through API Gateway.

To set up your MediaConvert role in IAM

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. In the navigation pane of the IAM console, choose Roles, and then choose Create role.
3. Choose the AWS service role type, and then choose the MediaConvert service.
4. Choose the MediaConvert use case for your service. Then choose Next: Permissions. The service has already defined the permissions used by the role. These permissions grant MediaConvert the following permissions:
   • Full access to your Amazon S3 resources
   • API Gateway invoke full access

The only entity that can assume this role is the MediaConvert service.
5. Choose Next: Review.
6. For Role name, enter a name that describes the purpose of the role. If you use the name MediaConvert_Default_Role, then the MediaConvert console will use this role by default when you run jobs.

Role names must be unique within your AWS account. You can use up to 64 characters that are letters, numbers, or any of the following: + = , . @ - _

Because various entities might reference the role, you can't edit the name of the role after it has been created.
7. (Optional) For Role description, edit the description for the new service role.
8. Review the role, and then choose Create role.

Note
When you enable Amazon S3 default encryption, Amazon S3 automatically encrypts your objects as you upload them. You can optionally choose to use AWS Key Management Service (KMS) to manage the master key. This is called SSE-KMS encryption.
If you enable SSE-KMS default encryption on the buckets that hold your AWS Elemental MediaConvert input or output files, you must also add inline policies to this MediaConvert role. Otherwise, MediaConvert can’t read your input files or write your output files. Grant these permissions:

- If your input bucket has SSE-KMS default encryption, grant `kms:Decrypt`.
- If your output bucket has SSE-KMS default encryption, grant `kms:GenerateDataKey`.

This example inline policy (p. 5) grants both permissions.

### Example Inline Policy with `kms:Decrypt` and `kms:GenerateDataKey`

This policy grants permissions for both `kms:Decrypt` and `kms:GenerateDataKey`.

```json
{
   "Version": "2012-10-17",
   "Statement": [
      {
         "Effect": "Allow",
         "Action": ["kms:Decrypt", "kms:GenerateDataKey"],
         "Resource": "*",
         "Condition": {
            "StringLike": {
               "kms:ViaService": "s3.amazonaws.com"
            }
         }
      }
   ]
}
```

### Step 4: (Optional) Get Set Up to Use DRM Encryption

Protect your content from unauthorized use through encryption. Digital rights management (DRM) systems provide keys to AWS Elemental MediaConvert for content encryption, and licenses to supported players and other consumers for decryption.

To encrypt content, you must have a DRM solution provider.

- For an overview, see https://docs.aws.amazon.com/speke/latest/documentation/what-is-speke.html#services-architecture.
- To get set up, see https://docs.aws.amazon.com/speke/latest/documentation/customer-onboarding.html.

The only exception to this requirement is with the Apple HLS streaming protocol, where you can choose to define your own static keys or to use a DRM provider.
Step 5: Upload Files for Transcoding

AWS Elemental MediaConvert can take in your input files from Amazon S3 or from a server through HTTP or HTTPS.

To upload files to an S3 bucket

1. In the Buckets pane, choose the name of your input bucket.
2. Choose Upload.
3. In the Upload dialog box, choose Add files, and then upload a media file that you want to transcode.

HTTP Input Requirements

When your input file source is HTTP(S), you specify the URL rather than an Amazon S3 path. Requirements for using HTTP(S) for input are as follows:

- All input files must be publicly readable.
- The HTTP(S) server must not require authentication.
- The HTTP(S) server must accept both HEAD and range GET requests.
- The URL that you specify must be a direct link to your file; MediaConvert doesn't follow redirects.
- The URL that you specify can't include parameters.

Step 6: Create a Job

A job does the work of transcoding. You specify the name of the file that you want to transcode (the input file), the name that you want MediaConvert to give the transcoded file, the preset that you want MediaConvert to use, and a few other settings. MediaConvert gets the input file from the Amazon S3 location that you specify in your job input settings, transcodes the file, and saves the transcoded file or files in the output location that you specify in the settings of the job output group.

To create a job

2. Choose Get started.
3. Choose Create job.
4. Provide transcode instructions and job settings. For more information, see Setting Up a Job in AWS Elemental MediaConvert (p. 7).
5. Choose Create.
6. If you don't want to keep the transcoded files that you generate during this tutorial, delete them from Amazon S3 to avoid incurring storage charges.

For information about tracking the status of your job, see Using CloudWatch Events with AWS Elemental MediaConvert (p. 166).

For information about the file names and paths for your job outputs, see Output File Names and Paths (p. 171).
Setting Up a Job in AWS Elemental MediaConvert

An AWS Elemental MediaConvert job does the work of transcoding a media file into packages and files in various formats and in different sizes for distribution to end viewers. When you create a job, you specify the information that the service requires to perform the transcoding: which file to transcode, which types of files to create and where to store them, which encoding settings to use, which advanced features to apply, and so on.

To set up a job, you define input files for the service to transcode, and you specify the source for each video, audio, and captions media element. That source might be a specific part of the primary input file, or it might be a separate file. Next, you specify the types of output files and packages that you want AWS Elemental MediaConvert to generate from the input. You also specify the detailed encoding settings to produce the quality and type of output that you want. The following illustration shows these pieces of a job that you set up.

To set up your job, complete the procedures in the following topics.

Topics
- Optional: Pause Your Queues (p. 7)
- Step 1: Specify Your Input Files (p. 8)
- Step 2: Create Input Selectors for Video, Audio, and Captions (p. 9)
- Step 3: Create Output Groups (p. 11)
- Step 4: Create Outputs (p. 12)
- Step 5: Specify Global Job Settings (p. 16)
- Creating and Setting Up Outputs in File Output Groups (p. 17)
- Using Variables in Your Job Settings (p. 19)

Optional: Pause Your Queues

If you are just getting started with AWS Elemental MediaConvert or are experimenting with the MediaConvert console, you might want to pause your queues to avoid accidentally starting a job before you're ready. For more information about queues, see Working with Queues (p. 60).

To pause or reactivate an on-demand queue

2. If you are pausing orreactivating a queue other than the default queue, on the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you created the queue.

The default queue is available in all Regions. Other queues appear only in the Region where you create them.

3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Queues.
5. On the Queues page, choose the name of the queue that you want to pause or reactivate.
6. On the queue’s page, choose the Edit queue button.
7. On the Edit queue page, for Status, choose Paused or Active.
8. Choose Save queue.

Step 1: Specify Your Input Files

The first part of setting up an AWS Elemental MediaConvert job is specifying the location of your input file or files, as shown in the following illustration.
To specify the location of your input

2. On the Create job page, in the Job pane on the left, choose Input 1.
3. In the Input 1 pane, provide the URI to your video input file that is stored in Amazon S3 or on an HTTP(S) server. For Amazon S3 inputs, you can specify the URI directly or choose Browse to select from your Amazon S3 buckets. For HTTP(S) inputs, provide the URL to your input video file. For more information, see HTTP Input Requirements (p. 6).

   **Note**
   If your input audio or captions are in a separate file, don’t create separate inputs for them. You specify these files later in this procedure, within your audio and captions selectors.

4. To join more than one input file into a single asset (input stitching), add another input to the job. To do so, in the Job pane, in the Inputs section, choose Add. For jobs that have multiple input files, AWS Elemental MediaConvert creates outputs by concatenating the inputs in the order that you specify them in the job.

   You can include up to 150 inputs in your job.

   **Tip**
   You can also transcode only portions of your inputs. For more information, see Assembling Multiple Inputs and Input Clips (p. 25).

---

**Step 2: Create Input Selectors for Video, Audio, and Captions**

Next, create input selectors to flag the video, audio, and captions elements from your input that you will use in your outputs. This labels each input element so that you can point to it when you set up your outputs. When you set up input selectors, you also provide the service with information about where to find the data and how to interpret it. The following illustration shows the three types of input selectors.

![AWS Elemental MediaConvert job](image)

**To set up your input selectors**

1. In the Video selector section, specify values for the fields that are applicable to your job.

   You don’t need to create a video selector because AWS Elemental MediaConvert automatically creates a video selector when you begin setting up a job. However, the service doesn’t automatically detect information about the video source. You can provide this information in the Video selector fields. If you leave these settings in their default state, you will create a valid job. For more information about individual settings, choose the Info links on the console.
Note
AWS Elemental MediaConvert doesn't support inputs with multiple video streams, such as Quad 4k. Each input can have only one video selector; therefore, there is no Add video selector button on the console.

2. In the Audio selectors section, under Audio selector 1, specify information about your primary audio asset. You don't need to create an audio selector 1 because the service automatically creates the first audio selector when you begin setting up a job.

Note
An audio asset is often dialogue, background sound, and music together in one track. Tracks often consist of multiple channels. For example, Dolby 5.1 sound has six channels per track.

a. For Selector type, choose the way that your audio assets are identified. Often, this is by track.

b. Provide the identifier (that is, track number, PID, or language code) for your primary audio asset. Your primary audio asset is likely to be track 1.

Note
For most use cases, you associate one input track per input selector. If your use case requires combining multiple tracks into one track, or multiple tracks into one rendition of a streaming package, combine multiple input tracks in one audio selector by typing a comma-separated list. For more information about combining tracks, see More About Audio Tracks and Audio Selectors (p. 10).

c. If your audio is in a separate file from your video, choose the External file slider switch element and provide the URI to your audio input file that is stored in Amazon S3 or on an HTTP(S) server. For Amazon S3 inputs, you can specify the URI directly or choose Browse to select from your Amazon S3 buckets. For HTTP(S) inputs, provide the URL to your input video file. For more information, see HTTP Input Requirements (p. 6).

3. If you have additional audio assets—for example, multiple language tracks—choose Add audio selector and provide information about the next asset as described in the preceding step of this procedure.

4. In the Captions selectors section, choose Add captions selector to create input captions selectors for any sets of captions that you plan to use in an output. For more information about setting up captions for your job, see Setting Up Captions in AWS Elemental MediaConvert Jobs (p. 79).

More About Audio Tracks and Audio Selectors

You use audio selectors to associate input audio with output audio. You can set up a single audio selector to represent one or more tracks from the input. After that, you create audio tracks in the output and associate a single audio selector with each output track.

Associations between input audio tracks, audio selectors, and output audio tracks follow these rules:

- Each input track can be associated with one or more audio selectors
- Each audio selector has one or more input tracks
- Each output track has one audio selector

The following illustration shows these relationships. In the illustration, the input file contains three audio tracks. Audio selector 1 selects input track 1. Audio selector 1 is associated with output audio track 1, so track 1 of the output has the same content as track 1 of the input. The second input audio track is not selected by an audio selector, so it isn't used in the output. Audio selector 2 selects input tracks 1 and 3. Audio selector 2 is associated with output audio track 2, so output track 2 contains the channels from input tracks 1 and 3.
Step 3: Create Output Groups

For workflows that require channel-level control, use the audio channel remix feature, which supports the following workflows:

- Changing the order of channels in an audio track
- Moving audio channels from one or more input tracks to different output tracks
- Combining the audio from multiple channels into a single channel
- Splitting the audio from a single channel into multiple channels
- Adjusting the loudness level of audio channels

Step 3: Create Output Groups

After specifying your input, create output groups. The choices that you make when you set up output groups affect the types of assets that your job produces and which devices can play them. The following illustration shows the two categories of output groups and how outputs and selectors are organized within them.

As shown in the preceding illustration, you can use AWS Elemental MediaConvert to create media assets that fall broadly into two categories:

- **ABR streaming packages.** You can create adaptive bitrate (ABR) packages to allow end viewers to download the asset a little at a time while they watch. Depending on how you set up your outputs, the end viewer’s device can adapt to changes in the available bandwidth by downloading higher- or lower-quality segments. ABR packages are also called ABR stacks, because they are made up of a "stack" of video, audio, and captions components. Each component in the stack or package is called a rendition.

- **Standalone files.** You might create these files and host them in a location where end viewers download the entire file all at once and then view it. You might also create standalone files and then send them to downstream systems for packaging and distribution.

To create an output group

1. In the **Job** pane, in the **Output groups** section, choose **Add**.
2. Choose an output group type, and then choose Select. Create one file output group for all the standalone files that you intend to create. Create one ABR streaming output group for each ABR streaming package that you intend to create. For guidance on which ABR streaming output groups to include in your job, see Choosing Your ABR Streaming Output Groups (p. 34).

3. Optionally, for Custom group name, enter a name for your group. Any name that you provide here appears in the Output groups section of the console but does not affect your outputs.

4. For Destination, specify the URI for the Amazon S3 location where the transcoding service will store your output files. You can specify the URI directly or choose Browse to select from your Amazon S3 buckets.

   **Note**
   You can optionally append a basename to your destination URI. To create the file name of your final asset, the transcoding service uses this basename along with any name modifier that you provide in the individual output settings.
   If you don’t provide a basename with your URI, the transcoding service generates a basename from the Input 1 file name, minus the extension.

5. Specify the values for any additional settings that apply to the entire output group. These settings vary depending on the type of output group that you select. For more information about individual settings, choose the Info links on the console.

---

**Step 4: Create Outputs**

After you create output groups, set up your outputs in each group. How many outputs go in each output group depends on the output group type, as follows:

- For **File** output groups, include all elements of the media asset in one output. This includes any audio or captions that you provide in a separate file.
- For ABR streaming output groups—**CMAF**, **Apple HLS**, **DASH ISO**, and **Microsoft Smooth Streaming**—create a separate output for each media element. That is, one output per video resolution, one output per audio track, and one output per captions language.

From the following list, choose the procedures that correspond to the output group types that you created in Step 3: Create Output Groups (p. 11).

**Topics**

- Creating Outputs in ABR Streaming Output Groups (p. 12)

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**Creating Outputs in ABR Streaming Output Groups**

For each ABR streaming output group that you set up in Step 3: Create Output Groups (p. 11), create and set up an output for each media element that you want in the ABR streaming package, as shown in the following illustration.
Creating Video ABR Streaming Outputs

For each video output that you include in your output group, AWS Elemental MediaConvert creates one video rendition, or set of segmented video files. Multiple video renditions in a streaming package, of varying resolutions and video quality, allow the end viewer's device to adapt the quality of video to the available bandwidth.

Note

Although the job has only one video input selector, ABR streaming output groups often have several video outputs per output group.

To create and set up video ABR streaming outputs

1. On the Create job page, in the Job pane on the left, under Output Groups, below the CMAF, Apple HLS, DASH ISO, or Microsoft Smooth Streaming output group that you want to add outputs to, choose Output 1.

When you create an output group, AWS Elemental MediaConvert automatically populates the output group with output 1, so you don't need to explicitly create the first output.

2. In the Output settings pane, for Name modifier, enter a value.

AWS Elemental MediaConvert appends the name modifier to the file names that it assigns to the files that it creates for this output. Enter a name modifier that will make it easy to identify which files came from which output, such as -video-hi-res.

3. If one of the predefined groups of settings listed under Preset is suitable for your workflow, choose it from the list. If you use a preset, skip the next step of this procedure.

4. Specify your video settings as follows:

   a. In the Output settings section, specify values for any remaining general settings. Depending on the output group type, these settings might include transport stream settings or other container settings. For more information about individual settings, choose the Info links on the console.

   b. In the Stream settings section, specify values for video encoding. The video settings are selected by default, so you don't need to explicitly choose this group of settings. For more information about individual settings, choose the Info links on the console.
Creating ABR Streaming Outputs

Note
There is only one input video selector per job, so you don't need to explicitly choose it when you set up your video outputs.

For more information about individual settings, choose the Info links on the console.

5. If your output includes a group of audio settings by default, delete it as follows:
   a. In the Stream settings section, choose Audio 1.
   b. Choose Remove audio.

6. If you want multiple video renditions in your ABR streaming package, repeat the preceding steps of this procedure to create an additional video output for each one.

Creating Audio ABR Streaming Outputs

For each audio output that you include in your output group, AWS Elemental MediaConvert creates one audio rendition, or set of segmented video files. The most common reason to include multiple audio renditions is to provide multiple language options. If you provide only one language, you probably need only one audio output.

Note
For AAC streaming outputs, the initial segment is longer in duration than the others. This is because, with AAC, the initial segment must contain silent AAC pre-roll samples before the audible part of the segment. MediaConvert accounts for these extra samples in the timestamps, so the audio plays back correctly.

To create and set up audio ABR streaming outputs

1. Create an output for your first audio track. Usually an audio track corresponds to one language.
   
   Note
   If you are working in a CMAF output group, skip this step. The first audio output is created for you.
   
   a. In the Job pane, choose the output group that you're working in.
   b. In the Outputs pane, choose Add output.
   c. Choose the output that you just created.
   d. If your output includes a group of video settings by default, choose Remove video to delete it. This leaves the Audio 1 group of settings displayed.

2. In the Output settings pane, for Name modifier, enter a value.

AWS Elemental MediaConvert appends the name modifier to the file names that it assigns to the files that it creates for this output. Enter a name modifier that will make it easy to identify which files came from which output, such as -audio-english.

3. If one of the predefined groups of settings listed under Preset is suitable for your workflow, choose it from the list. If you use a preset, skip the next step of this procedure.

4. Specify your audio settings as follows:
   a. In the Output settings section, specify values for any remaining general settings. For more information about individual settings, choose the Info links on the console.
   b. Under Stream settings, for Audio source, choose one of the audio selectors that you created in Step 2: Create Input Selectors for Video, Audio, and Captions (p. 9).
   c. In the Stream settings section, specify values for audio encoding. For more information about individual settings, choose the Info links on the console.
5. If you have additional audio assets to include in the ABR streaming package, create an output for each of them as follows:

   a. In the **Job** pane, choose the output group that you're working in.
   b. In the **Outputs** pane, choose **Add output**.
   c. Choose the output that you just created.
   d. If your output includes a group of video settings by default, choose **Remove video** to delete it. This leaves the **Audio 1** group of settings displayed.
   e. Set up the output as described in steps 2 through 4 of this procedure.

### Creating Captions ABR Streaming Outputs

Setting up captions can be complex. For detailed information, see Setting Up Captions in AWS Elemental MediaConvert Jobs (p. 79). For basic instructions, complete the following procedure.

#### To create and set up captions ABR streaming outputs

1. Create an output for your first set of captions. Usually a set of captions corresponds to one language.

   a. In the **Job** pane, choose the output group that you're working in.
   b. In the **Outputs** pane, choose **Add output**.
   c. Choose the output that you just created.
   d. If your output includes groups of video and audio settings by default, choose **Remove video** and **Remove audio** to delete them.
   e. Choose **Add captions** to display a set of captions settings.

2. In the **Output settings** pane, for **Name modifier**, enter a value.

   AWS Elemental MediaConvert appends the name modifier to the file names that it assigns to the files it creates for this output. Enter a name modifier that will make it easy to identify which files came from which output, such as `-captions-english`.

3. Specify your captions settings as follows:

   a. In the **Output settings** section, specify values for any remaining general settings. For more information about individual settings, choose the **Info** links on the console.
   b. Under **Stream settings**, for **Captions source**, choose one of the captions selectors that you created in Step 2: Create Input Selectors for Video, Audio, and Captions (p. 9).
   c. In the **Stream settings** section, specify values for the remaining captions settings.

### Creating Additional Manifests

By default, MediaConvert generates a single top-level manifest for each of your CMAF, DASH ISO, Apple HLS, and Microsoft Smooth Streaming output groups. This default manifest references all the outputs in the output group. Optionally, you can create additional top-level manifests that reference only a subset of the outputs in your output group. For example, you might want to create a manifest that doesn't include HDR outputs, for viewers who don't have a subscription that includes HDR.

**Note**

For CMAF output groups, if you keep the default enabled value for **Write HLS manifest** and **Write DASH manifest**, MediaConvert creates additional manifests in both of those formats. If you disable either of those settings, MediaConvert doesn't create additional manifests in that format.
To create an additional manifest

1. On the Create job page, in the Job pane on the left, choose the output group that you want to create the additional manifest for.
2. In the Additional manifests section on the right, choose Add manifest.
3. For Manifest name modifier, enter the text that you want added to the end of the manifest file name, before the extension. This setting is required, because it ensures that each manifest has a different file name.
4. For Select outputs, choose the outputs that you want the manifest to refer to.
5. Repeat these steps to create up to 10 additional manifests. Each additional manifest must have a different value for Manifest name modifier.

Step 5: Specify Global Job Settings

Global job settings apply to every output that the job creates, as shown in the following illustration.

To specify global job settings

1. In the Job pane, in the Job settings section, choose Settings.
2. For IAM role, choose an IAM role that has permissions to access the Amazon S3 buckets that hold your input and output files. The IAM role must have a trusted relationship with AWS Elemental MediaConvert. For information about creating this role, see Step 3: Set Up IAM Permissions (p. 4).
   
   **Note**
   If your job incorporates audio or captions provided in a separate file from your input, or if you use the graphic overlay (image inserter) feature, it is especially important to get these settings right.
   There are three distinct groups of timecode settings. Global job timecode configuration is one of those three. For more information about the different sets of timecode settings and how AWS Elemental MediaConvert manages timecodes, see Setting Up Timecodes (p. 28).
4. Optionally, specify values for the other job settings and enable global processors. For more information about individual settings, choose the Info links on the console.
Creating and Setting Up Outputs in File Output Groups

With file output groups, each asset that the service creates corresponds to one output, rather than one output group. Each asset contains all video, audio, and captions elements. Therefore, it's simplest to set up by first creating the output, and then setting up all the output selectors.

Create File Outputs

If you created a file output group in Step 3: Create Output Groups (p. 11), create and set up an output in the file output group for each standalone file that you intend to create, as shown in the following illustration.

To create an output in a File output group

1. When you create an output group, AWS Elemental MediaConvert automatically populates the output group with output 1, so you don't need to explicitly create it. If you are creating only one standalone file, skip the rest of this procedure.
2. If you want to create more than one standalone file, create additional outputs as follows:
   a. On the Create job page, in the Job pane on the left, under Output Groups, choose File group.
   b. In the Outputs pane, choose Add output.

Set Up Output Selectors in File Outputs

Next, for each file output you just created, set up output selectors. The following illustration shows the three types of output selectors, all contained in one output.
To set up output selectors in a File output

1. On the Create job page, in the Job pane on the left, under Output Groups, under File group, choose Output 1.
2. In the Output settings pane, for Name modifier, enter a value.

AWS Elemental MediaConvert appends the name modifier to the file names that it assigns to the file that it creates for this output. Enter a name modifier that will make it easy to identify which files came from which output, such as -standalone-hi-res.

3. If one of the predefined groups of settings listed under Preset is suitable for your workflow, choose it from the list. If you use a preset, skip the next step of this procedure.

   **Note**
   Output presets can contain up to one set each of video, audio, and captions settings. Therefore, if your standalone output file contains more than one audio or captions asset, you can't use a preset.

   If you can't use presets in your output, but you want to use the preset settings as a starting point, choose No preset from the Preset dropdown list. This prepopulates your output with the same settings that are in the preset.

4. Specify your output settings as follows:

   a. In the Output settings section, specify values for any remaining general settings. These settings vary depending on the container that you choose. For more information about individual settings, choose the Info links on the console.

   b. In the Stream settings section, specify values for video encoding. For more information about individual settings, choose the Info links on the console.

      **Note**
      The video settings tab is selected by default, so you don't need to explicitly choose this group of settings.

      **Note**
      There is only one input video selector per job, so you don't need to explicitly choose it when you set up your video outputs.

   c. Choose Audio 1 to display the group of encoding settings for the first audio asset. Audio 1 is located on the left side of the Stream settings pane, below Video.

   d. Under Stream settings, for Audio source, choose one of the audio selectors that you created in Step 2: Create Input Selectors for Video, Audio, and Captions (p. 9).

   e. In the Stream settings section, specify values for audio encoding. For more information about individual settings, choose the Info links on the console.

   f. To include captions in the output, choose Add captions to display a group of captions settings. For more information about setting up captions, see Setting Up Captions in AWS Elemental MediaConvert Jobs (p. 79).
Using Variables in Your Job Settings

You can use variables, also called format identifiers, in your job settings. Format identifiers are values that you can put in your job settings that resolve differently in your outputs depending on the characteristics of the input files or the job. They are particularly useful in output presets, job templates, and jobs that you intend to duplicate and re-use.

For example, you might use the date format identifier $d$ for your Destination setting. If you want your outputs organized by the date and time that the job starts, for Destination you might enter s3://mediaconvert-output-bucket/$d$/. For a job that starts June 4, 2020, the service will create your outputs in s3://mediaconvert-output-bucket/20200604/.

For a list of the available format identifiers and examples of how to use them, see the section called “List of Settings Variables with Examples” (p. 19).

For information about format identifiers that function differently in streaming outputs, see the section called “Using Settings Variables with Streaming Outputs” (p. 22).

Topics
- List of Settings Variables with Examples (p. 19)
- Using Settings Variables with Streaming Outputs (p. 22)
- Specifying a Minimum Number of Digits (p. 24)

List of Settings Variables with Examples

The following table provides information about each of the format identifiers that you can use in your AWS Elemental MediaConvert job. For information about format identifiers that function differently in streaming outputs, see the section called “Using Settings Variables with Streaming Outputs” (p. 22).

<table>
<thead>
<tr>
<th>Format Identifier</th>
<th>Value to Put in the Job Setting</th>
<th>Compatible Job Settings</th>
<th>Description and Example</th>
</tr>
</thead>
</table>
| Date and time     | $dt$                            | Destination, Name modifier, Segment modifier | UTC date and time of the start time of the job. Format: YYYYMMDDTHHMMSS
|                   |                                 |                          | Example: For a job that starts at 3:05:28 PM on June 4, 2020, $dt$ resolves to 20200604T150528. |
| Date              | $d$                             | Destination, Name modifier, Segment modifier | UTC date of the start time of the job. Format: YYYYMMDD
<p>|                   |                                 |                          | Example: For a job that starts on June 4, 2020, $d$ resolves to 20200604. |</p>
<table>
<thead>
<tr>
<th>Format Identifier</th>
<th>Value to Put in the Job Setting</th>
<th>Compatible Job Settings</th>
<th>Description and Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>$t$</td>
<td>Destination</td>
<td>UTC start time of the job. Format: HHMMSS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Name modifier</td>
<td>Example: For a job that starts at 3:05:28 PM, $t$ resolves to 150528.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment modifier</td>
<td></td>
</tr>
<tr>
<td>Video bitrate</td>
<td>$rv$</td>
<td>Name modifier</td>
<td>The video bitrate of the output, in kilobits. For QVBR outputs, the service uses video max bitrate, in kilobits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment modifier</td>
<td>Example: If you set Encoding settings, Video, Bitrate (bits/s) to 50000000, $rv$ resolves to 50000.</td>
</tr>
<tr>
<td>Audio bitrate</td>
<td>$ra$</td>
<td>Name modifier</td>
<td>Total of all the audio bitrates in the output, in kilobits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment modifier</td>
<td>Example: If you have an output with a single audio tab and you set Encoding settings, Audio 1, Bitrate (kbit/s) to 256000, $ra$ resolves to 256000.</td>
</tr>
<tr>
<td>Container bitrate</td>
<td>$rc$</td>
<td>Name modifier</td>
<td>Combined audio and video bitrate for the output, in kilobits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment modifier</td>
<td>Example: You have an output with a Video settings tab and Audio 1 settings tab. If you set Encoding settings, Video, Bitrate (bits/s) to 5000000 and you set Encoding settings, Audio, Bitrate (bits/s) to 96000 (96 kilobits), $rc$ resolves to 5096.</td>
</tr>
<tr>
<td>Format Identifier</td>
<td>Value to Put in the Job Setting</td>
<td>Compatible Job Settings</td>
<td>Description and Example</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------</td>
<td>-------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Video frame width</td>
<td>$w$</td>
<td>Name modifier</td>
<td>The frame width, or horizontal resolution, in pixels. Example: If you set Encoding settings, Video, Resolution (w x h) to 1280 x 720, $w$ resolves to 1280.</td>
</tr>
<tr>
<td>Video frame height</td>
<td>$h$</td>
<td>Name modifier</td>
<td>The frame height, or vertical resolution, in pixels. Example: If you set Encoding settings, Video, Resolution (w x h) to 1280 x 720, $h$ resolves to 720.</td>
</tr>
<tr>
<td>Framerate</td>
<td>$f$</td>
<td>Name modifier</td>
<td>Framerate, in frames per second, truncated to the nearest whole number. Example: If your framerate is 59.940, $f$ resolves to 59.</td>
</tr>
<tr>
<td>Input file name</td>
<td>$fn$</td>
<td>Destination</td>
<td>Name of the input file, without the file extension. For jobs that have multiple inputs, this is the first file specified in the job. Example: If Input 1 for your job is s3://mediaconvert-input/my-video.mov, $fn$ resolves to my-video.</td>
</tr>
<tr>
<td>Format Identifier</td>
<td>Value to Put in the Job Setting</td>
<td>Compatible Job Settings</td>
<td>Description and Example</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------------------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Output container file extension</td>
<td>$ex$</td>
<td>Name modifier</td>
<td>Varies depending on the output group. For <strong>File group</strong> outputs, this is the extension of the output container file. For other output groups, this is the extension of the manifest.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment modifier</td>
<td>Example for file group: If you choose <strong>MPEG2-TS</strong> for <strong>Output settings</strong>, <strong>Container</strong>, $ex$ resolves to m2ts.</td>
</tr>
<tr>
<td></td>
<td>$</td>
<td>Name modifier</td>
<td>Example for HLS group: If your output group is HLS, $ex$ resolves to m3u8.</td>
</tr>
<tr>
<td></td>
<td>**</td>
<td>Segment modifier</td>
<td>Escaped $.</td>
</tr>
</tbody>
</table>

Using Settings Variables with Streaming Outputs

Variables in your job settings, also called **format identifiers**, function differently for outputs in Apple HLS and DASH ISO output groups. Here are the differences:

**For Apple HLS Outputs**

When you use the date and time format identifiers ($dt$, $t$, $d$) in the **Segment modifier** setting, these format identifiers resolve to the completion time of each segment, rather than to the start time of the job.
Note
For jobs that use accelerated transcoding, segments might complete at the same time. This means that date and time format identifiers don't always resolve to unique values.

For DASH ISO Outputs
You can use two additional format identifiers in the Name modifier setting. These affect the DASH manifest in addition to the output file name. Here are the identifiers:

$\text{Number}$

In your output file names, $\text{Number}$ resolves to a series of numbers that increment from 1. This replaces the default, nine-digit segment numbering in the segment file names. For example:

- If you specify video_$\text{Number}$ for Name modifier, the service creates segment files named video_1.mp4, video_2.mp4, and so on.
- If you specify only video_ for Name modifier, the service creates segment files named video_000000001.mp4, video_000000002.mp4, and so on.

In your DASH manifest, AWS Elemental MediaConvert includes duration and startNumber inside the SegmentTemplate element, like this:

```xml
<SegmentTemplate timescale="90000" media="main_video_$\text{Number}$.mp4" initialization="main_video_$\text{Number}$init.mp4" duration="3375000"/>
```

Note
If you use the $\text{Number}$ format identifier in an output, you must also use it in every other output of the output group.

$\text{Bandwidth}$

In your output file names, $\text{Bandwidth}$ resolves to the value of Video, Bitrate plus the value of Audio, Bitrate in the output. Regardless of whether you include this format identifier, the service uses nine-digit segment numbering in the segment file names.

For example, suppose you specify these values:

- Video, Bitrate (bits/s): 50000000
- Audio, Bitrate (kbits/s): 96.0 (96,000 bits/s)
- Name modifier: video_$\text{Bandwidth}$

The value for $\text{Bandwidth}$ resolves to 50,096,000. The service creates segment files named video_50096000_000000001.mp4, video_50096000_000000002.mp4, and so on.

In the manifest, AWS Elemental MediaConvert includes duration and startNumber inside the SegmentTemplate element, like this:

```xml
<SegmentTemplate timescale="90000" media="main_video_$\text{Bandwidth}$.mp4" initialization="main_video_$\text{Bandwidth}$init.mp4" duration="3375000"/>
```

$\text{Time}$

In your output file names, $\text{Time}$ resolves to the duration, in milliseconds, of the segment. When you include this format identifier, the service doesn't use the default nine-digit segment numbering in the segment file names.

For example, if you specify video180__$\text{Time}$ for Name modifier, the service creates segment files named video180__345600.mp4, video180__331680.mp4, and so on. In these examples, the segment durations are 345,600 ms and 331,680 ms.

In the manifest, AWS Elemental MediaConvert includes SegmentTimeline inside the SegmentTemplate element, like this:

```xml
<SegmentTimeline/>
```

```xml
<Representation id="5" width="320" height="180" bandwidth="200000" codecs="avc1.4d400c"/>
```
Specifying a Minimum Number of Digits

For format identifiers that return a number, you can specify a minimum number of digits that the format identifier will resolve to. When you do, the service adds padding zeros before any value that would return fewer digits.

Use the following syntax to specify the number of digits: `%%[number of digits]`. Put this value just before the final `$` of the format identifier.

For example, suppose that your video frame height is 720 and you want to specify a minimum of four digits, so that it appears in your file name as 0720. To do that, use the following format identifier: `$h %04$`.

**Note**
Values that are too large to be expressed in the number of digits you specify resolve with more digits.
Assembling Multiple Inputs and Input Clips with AWS Elemental MediaConvert

You can use MediaConvert for *assembly workflows*. An assembly workflow is a MediaConvert job that performs basic input clipping and stitching to assemble output assets from different sources without requiring separate editing software. For example, an assembly workflow might put together a bumper followed by feature content that is interleaved with advertisements. The feature content might have a logo graphic overlay at the beginning of each feature segment.

With these kinds of jobs, you assemble your outputs from multiple inputs (using *input stitching*) or portions of inputs (using *input clipping*). MediaConvert creates all the outputs of a job from this assembly. If you want outputs with different clips of the input files or with different arrangements of the inputs, you must create a separate job for each assembly.

**Topics**
- How MediaConvert Uses Timelines to Assemble Jobs (p. 25)
- Setting Up an Assembly Workflow Job (p. 26)
- Setting Up Timecodes (p. 28)

**How MediaConvert Uses Timelines to Assemble Jobs**

MediaConvert assembles inputs and input clips according to *input timelines* and the *output timeline*. The service constructs these timelines based on your settings, and then assembles your inputs into outputs based on them. The following illustration shows three independent input timelines and an output timeline.
Input Timelines

Each input has its own input timeline. An input timeline is a series of timecodes that MediaConvert generates to represent each frame of the input file.

By default, the input timeline is the same as any timecodes embedded in the input video. You can specify a different starting timecode in the input setting Timecode source. If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is TimecodeSource, located in Settings, Inputs. For more information, see the section called “Adjusting the Input Timeline with the Input Timecode Source” (p. 29).

MediaConvert uses the input timeline for the following:

- Determining when input graphic overlays (inserted images) appear in the video. For more information about the difference between input and output overlays, see Choosing Between Input Overlay and Output Overlay (p. 103).
- Determining when motion graphic overlays (inserted images) appear in the video. For more information about the different types of graphic overlays, see Using Image Inserter (Graphic Overlay) (p. 103).
- Synchronizing your video with sidecar captions that are in a timecode-based format. Sidecar captions are captions that you provide as input files that are separate from the video.
- Interpreting the timecodes that you provide when you specify input clips.

Output Timeline

The output timeline is the series of timecodes that MediaConvert generates to embed in the outputs. MediaConvert also uses the timecodes of the output timeline for features that apply to every output in the job.

By default, the output timeline is the same as any timecodes embedded in the video of your first input file. You can specify a different starting timecode in the job-wide Timecode configuration settings under Job settings. If you use the API or an SDK, you can find these settings in the JSON file of your job. These settings are under Settings, TimecodeConfig. For more information, see Adjusting the Output Timeline with the Job-wide Timecode Configuration (p. 29).

MediaConvert uses the output timeline for the following:

- Determining which timecodes to embed in the output video, when you enable Timecode insertion in your output timecode settings.
- Determining when output overlays (inserted images) appear in the video. For more information about the different types of graphic overlays, see Using Image Inserter (Graphic Overlay) (p. 103).
- Determining how your HLS variant playlists show time.
- Interpreting the timecode that you provide when you specify a value for Anchor timecode.

Setting Up an Assembly Workflow Job

Follow these steps to set up a job that combines assembly workflow features such as input clipping, input stitching, graphic overlay, and sidecar captions sync. Doing these tasks in this order can make setup
Setting Up an Assembly Workflow Job

To set up an assembly workflow job (console)

1. **Specify your video input files.**

   You can have up to 150 inputs in a job. MediaConvert stitches together the inputs in the order that you add them. If you want to use multiple clips from the same input file, and you want them in chronological order without other inputs in between them, specify the input file only once.

   For full instructions, see the section called “Step 1: Specify Input Files” (p. 8).

2. **Set up your audio selectors.**

   In each input, you create audio selectors to map your input audio to your outputs. For instructions, see Step 2: Create Input Selectors for Video, Audio, and Captions (p. 9).

   With sidecar audio files, MediaConvert synchronizes audio and video without regard to timecodes. MediaConvert lines up the start of the audio file with the start of the video file.

   Whether your audio is in a sidecar file or is embedded in the video, you can adjust its sync using the **Offset** setting in the input audio selector. Use a positive number for **Offset** to move the audio later in the input timeline; use a negative number to move it earlier.

3. **Synchronize any sidecar captions.**

   How you set up your sidecar captions sync depends on the input captions format:

   - If your input captions format is timecode-based (for example, SCC or STL), the service synchronizes the timecode in the captions file with the input timeline.
   - If your input captions format is timestamp-based (for example, SRT, SMI, or TTML), the service synchronizes the captions with the video without regard to timecodes.

   Related information

   - About Input Timecode Source and Captions Alignment (p. 83)
   - the section called “Adjusting the Input Timeline with the Input Timecode Source” (p. 29)
   - Setting Up Captions (p. 79)

4. **Set up when you want any graphic overlays or motion graphic overlays to appear.**

   How you specify the time that the overlay appears depends on what kind of overlay you specify:

   - For input still graphic overlays, specify the overlay in the input where you want the overlay to appear. Specify the start and end times with timecodes that match with that input's timeline.
   - For output still graphic overlays, specify when you want the overlay to appear based on the output timeline.
   - For motion graphic overlays, specify when you want the overlay to appear based on the inputs' timelines.

   Related information

   - the section called “Adjusting the Input Timeline with the Input Timecode Source” (p. 29)
   - the section called "Adjusting the Output Timeline with the Job-wide Timecode Configuration" (p. 29)
5. **Specify input clips.**

Unless you want MediaConvert to include the full duration of the input, specify input clips for each input. Specify the start and end times with timecodes that match with that input's timeline.

Set up input clips as follows:

a. On the **Create job** page, in the **Job** pane on the left, choose an input.

b. In the **Input clips** section, choose **Add input clip**.

c. Enter the starting and ending timecodes for the first clip that you want to include. Use the following 24-hour format with a frame number: HH:MM:SS:FF.

   Make sure that you provide timecodes that align with your input timeline. For more information, see **Adjusting the Input Timeline with the Input Timecode Source** (p. 29).

d. Specify any additional clips. Multiple clips must be in chronological order and can't overlap; each **Start timecode** must come after the previous clip's **End timecode**.

   If you specify more than one input clip, they all appear in the output, one after the other, in the order that you specify them.

---

**Setting Up Timecodes**

MediaConvert manages transcoded video frames by their timecode. The service uses the timecodes from the input and output timelines that it constructs to line up the elements of your output assets. For information about which features are affected by each type of timeline, and about how timelines work, see **How MediaConvert Uses Timelines to Assemble Jobs** (p. 25).

There are three distinct groups of timecode settings, located in three different places on the console:

- **Input timecode settings**

  The input setting **Timecode source** affects the input timeline.

- **Job-wide timecode configuration**

  The **Timecode configuration** settings under **Job settings** affect the output timeline.

- **Output timecode settings**

  The timecode settings under **Output** determine whether and how timecode information appears in each output. These settings affect only what is included in the outputs; they don't determine what timecodes are.

To provide frame accuracy, AWS Elemental MediaConvert uses timecodes that specify frames by frame number, not by millisecond. All timecodes are in the following 24-hour format with a frame number: HH:MM:SS:FF. For drop frame, MediaConvert uses a semicolon before the frame number: HH:MM:SS;FF.

**Topics**

- **Adjusting the Input Timeline with the Input Timecode Source** (p. 29)
- **Adjusting the Output Timeline with the Job-wide Timecode Configuration** (p. 29)
- **Putting Timecodes In Your Outputs** (p. 31)
MediaConvert User Guide
Adjusting the Input Timeline
with the Input Timecode Source

Adjusting the Input Timeline with the Input Timecode Source

The value for **Timecode source** that you specify in an input's settings affects the input timeline for that input. For information about which features are affected by the input timeline, see Input Timelines (p. 26).

To adjust the input Timecode source setting (console)

1. On the **Create job** page, in the **Job** pane on the left, choose an input.
2. Under **Video selector**, **Timecode source**, specify whether MediaConvert reads timecodes from the input or generates them. MediaConvert can generate timecodes starting from zero or from a starting timecode that you specify. Here are the options for **Timecode source**:
   - **Embedded**: The service uses any timecodes embedded in the input video. This is the default value.
     
     **Note**
     Don't choose this value unless your input video has embedded timecodes.
   - **Start at 0**: The service sets the timecode of the first frame of the input to 00:00:00:00.
   - **Specified start**: The service sets the timecode of the first frame of the input to the value that you specify in the setting **Start timecode**.

Regardless of the source, timecodes are in the following 24-hour format with a frame number: HH:MM:SS:FF.

To adjust the input **TimecodeSource** (Timecode source) setting (API, SDK, and AWS CLI)

- In your JSON job specification, set a value for **TimecodeSource**, located in **Settings**, **Inputs**.

Choose a value for **TimecodeSource** as follows:

- **EMBEDDED**: The service uses any timecodes embedded in the input video. This is the default value.

  **Note**
  Don't choose this value unless your input video has embedded timecodes.

- **ZEROBASED**: The service sets the timecode of the first frame of the input to 00:00:00:00.

- **SPECIFIEDSTART**: The service sets the timecode of the first frame of the input to the value that you specify in the setting **Start timecode**.

Adjusting the Output Timeline with the Job-wide Timecode Configuration

The values that you specify for the job-wide **Timecode configuration** settings affect the output timeline. For information about which features are affected by the output timeline, see Output Timeline (p. 26).

To adjust the job-wide timecode configuration (console)

1. On the **Create job** page, in the **Job** pane on the left, choose **Settings**.
2. In the **Timecode configuration** section, for **Source**, choose one of the following values:
   - **Embedded**: The service uses any timecodes that are embedded in the video.
Adjusting the Output Timeline with the Job-wide Timecode Configuration

- **Start at 0**: The service ignores any embedded timecodes and assigns the first video frame the timecode 00:00:00:00 (HH:MM:SS:FF).

- **Specified start**: The service ignores any embedded timecodes and assigns the first video frame the value that you provide for **Start Timecode**.

  The **Start Timecode** field appears when you choose **Specified start**.

  If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is **Source**, located inside **Settings, TimecodeConfig**.

  If you don't choose a value for **Source**, the service defaults to **Embedded**.

  **Note**

  If your input video doesn't have embedded timecodes and you set **Source** to **Embedded** or leave **Source** unspecified, your output won't have timecodes. This means that features that require a timecode-based start time, such as sidecar captions and graphic overlays, won't appear in your output.

3. Set a value for **Anchor Timecode**.

  If you use an editing platform that relies on an anchor timecode, use **Anchor timecode** to specify a point at which the input and output frames have the same timecode. Use the following 24-hour format with a frame number: HH:MM:SS:FF. This setting ignores frame rate conversion.

  The system behavior for **Anchor timecode** varies depending on your setting for **Source**:

  - If you choose **Start at 0** for **Source**, the anchor frame is the timecode that you provide in **Anchor timecode**, counting from 00:00:00:00.

    For example, if you set **Anchor timecode** to 01:00:05:00, the anchor frame is one hour and five seconds into the video.

  - If you choose **Embedded** for **Source**, the anchor frame is the timecode that you provide in **Anchor timecode**, counting from the first embedded timecode.

    For example, if your embedded timecodes start at 01:00:00:00 and you set **Anchor timecode** to 01:00:05:00, the anchor frame is five seconds into the video.

  - If you choose **Specified start** for **Source**, the anchor frame is the timecode that you provide in **Anchor timecode**, counting from the timecode that you specify for the first frame.

    For example, if you specify 00:30:00:00 as your start timecode and you set **Anchor timecode** to 01:00:05:00, the anchor frame is thirty minutes and five seconds into the video.

  If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is **Anchor**, located in **Settings, TimecodeConfig**.

  If you don't set a value for **Anchor timecode**, the service doesn't use any anchor timecode.

4. Under **Timestamp offset**, provide a date. This setting applies only to outputs that support a program-date-time stamp. Use **Timestamp offset** to overwrite the timecode date without affecting the time and frame number. This setting has no effect unless you also include the program-date-time stamp in the output.

  If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is **TimestampOffset**, located in **Settings, TimecodeConfig**.
To adjust the job-wide timecode configuration (API, SDK, and AWS CLI)

1. In your JSON job specification, set a value for Source, located inside Settings, TimecodeConfig. Choose one of the following values:
   - EMBEDDED: The service uses any timecodes that are embedded in the video.
   - ZEROBASED: The service ignores any embedded timecodes and assigns the first video frame the timecode 00:00:00:00 (HH:MM:SS:FF).
   - SPECIFIEDSTART: The service ignores any embedded timecodes and assigns the first video frame the value that you provide for Start Timecode.

   The Start Timecode field appears when you choose Specified start.

   If you don't choose a value for Source, the service defaults to Embedded.

   Note
   If your input video doesn't have embedded timecodes and you set Source to EMBEDDED or leave Source unspecified, your output won't have timecodes. This means that features that require a timecode-based start time, such as sidecar captions and graphic overlays, won't appear in your output.

2. Optional. In your JSON job specification, set a value for Anchor, located in Settings, TimecodeConfig.

   If you use an editing platform that relies on an anchor timecode, use Anchor to specify a point at which the input and output frames have the same timecode. Use the following 24-hour format with a frame number: HH:MM:SS:FF. This setting ignores frame rate conversion.

   The system behavior for Anchor varies depending on your setting for Source:
   - If you choose ZEROBASED for Source, the anchor frame is the timecode that you provide in Anchor, counting from 00:00:00:00.
     For example, if you set Anchor to 01:00:05:00, the anchor frame is one hour and five seconds into the video.
   - If you choose EMBEDDED for Source, the anchor frame is the timecode that you provide in Anchor, counting from the first embedded timecode.
     For example, if your embedded timecodes start at 01:00:00:00 and you set Anchor to 01:00:05:00, the anchor frame is five seconds into the video.
   - If you choose SPECIFIEDSTART for Source, the anchor frame is the timecode that you provide in Anchor, counting from the timecode that you specify for the first frame.
     For example, if you specify 00:30:00:00 as your start timecode and you set Anchor to 01:00:05:00, the anchor frame is thirty minutes and five seconds into the video.

3. Optional. In your JSON job specification, set a value for TimestampOffset, located in Settings, TimecodeConfig. Specify the date in the following format: YYYY-MM-DD. For example, 2008-06-26.

   This setting applies only to outputs that support a program-date-time stamp. Use Timestamp offset to overwrite the timecode date without affecting the time and frame number. This setting has no effect unless you also include the program-date-time stamp in the output.

Putting Timecodes In Your Outputs

There are two timecode-related settings that you can adjust differently for each output: Timecode insertion and Timecode burn-in.
Inserting Timecode Metadata

The **Timecode insertion** setting determines whether a given output has timecodes embedded in its metadata. MediaConvert automatically puts this information in the appropriate place, depending on the output codec. For MPEG-2 and QuickTime codecs, such as Apple ProRes, the service inserts the timecodes in the video I-frame metadata. For H.265 (HEVC) and H.264 (AVC), the service inserts the timecodes in the supplemental enhancement information (SEI) picture timing message.

To include timecode metadata in an output (console)
1. On the **Create job** page, in the **Job** pane on the left, choose an output.
2. Under **Stream settings**, **Timecode insertion**, choose **Insert** to include timecode metadata. Choose **Disabled** to omit timecode metadata.

To include timecode metadata in an output (API, SDK, and AWS CLI)
- In your JSON job specification, set a value for **TimecodeInsertion**, located in **Settings**, **OutputGroups**, **Outputs**, **VideoDescription**.
  
  Use **PIC_TIMING_SEI** to include timecode metadata. Use **DISABLED** to omit timecode metadata.

Burning in Timecodes on the Video Frames

The **Timecode burn-in** setting determines whether a given output has visible timecodes inscribed into the video frames themselves. The timecodes are not an overlay, but rather a permanent part of the video frames.

To burn in timecodes in an output (console)
1. On the **Create job** page, in the **Job** pane on the left, choose an output.
2. Under **Stream settings**, **Preprocessors**, choose **Timecode burn-in**.
3. Optionally, provide values for the **Prefix**, **Font size**, and **Position** settings. Even if you don't provide these values, timecodes are burned into your output using these default values:
   
   - **Prefix**: no prefix
   - **Font size**: Extra Small (10)
   - **Position**: Top Center

   For details about each of these settings, choose the **Info** link next to **Timecode burn-in**.

To burn in timecodes in an output (API, SDK, and AWS CLI)
1. In your JSON job specification, include the setting **TimecodeBurnin**. TimecodeBurnin is located in **Settings**, **OutputGroups**, **Outputs**, **VideoDescription**, **VideoPreprocessors**.
2. Optionally, provide values for the settings that are children of **TimecodeBurnin**. If you don't provide these values, timecodes are burned into your output using these default values:
   
   - **Prefix**: no prefix
   - **FontSize**: 10
   - **Position**: TOP_CENTER
Structuring Complex Jobs in AWS Elemental MediaConvert

A single MediaConvert job can create outputs in the form of a standalone file (for example, an .mp4 file), a set of files for adaptive bitrate (ABR) streaming (for example, an Apple HLS package), or combinations of both.

You specify the number and types of files that your job generates by creating output groups and outputs within them.

The topics in this section explain the relationship between output groups, outputs, and the actual output files that MediaConvert produces.

Topics
- How Output Groups Affect Outputs in MediaConvert (p. 33)
- Choosing Your ABR Streaming Output Groups (p. 34)
- HLS Player Version Support (p. 38)

How Output Groups Affect Outputs in MediaConvert

An MediaConvert output functions differently depending on which type of output group it is a part of. In a File output group, each output is a standalone file that contains all the video, audio, and captions together.

In an adaptive bitrate (ABR) streaming output group—CMAF, AppleHLS, DASH ISO, or Microsoft Smooth Streaming—each output is one element of the media. For example, you might have one resolution of video, one audio language track, and one captions language. That is, each output is one rendition in the adaptive bitrate (ABR) stack.

The following illustration shows files created from a streaming output group. Each orange box corresponds to an output within the output group. In this example, there are three resolutions of video, audio in two languages, and captions in two languages. The package contains segmented audio, video, and captions files and manifest files that tell the player which files to download and when to play them.
A single job can generate zero to many standalone files and zero to many streaming packages. To create more than one standalone file, add a single file output group to your job and add multiple outputs to that output group. To create more than one streaming package, add multiple CMAF, Apple HLS, DASH ISO, or Microsoft Smooth Streaming output groups to your job.

The following illustration shows an MediaConvert job that generates two standalone .mp4 files, two Apple HLS packages, and a CMAF package.

Choosing Your ABR Streaming Output Groups

To create media assets for people to stream to their devices, choose one or more of the adaptive bitrate (ABR) output groups: Apple HLS, DASH ISO, Microsoft Smooth Streaming, or CMAF. The type of output group determines which media players can play the files that MediaConvert creates from that output group.

**Note**
When you set up CMAF, DASH ISO, or Microsoft Smooth Streaming output groups, make sure to set your fragment length correctly. For information about setting fragment length, see Setting the Fragment Length for Streaming Outputs (p. 35).

The following table summarizes the relationships between output groups and media players.

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<th>Use this output group...</th>
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<tr>
<td>Apple devices, older</td>
<td>Apple HLS</td>
</tr>
</tbody>
</table>

For information about setting up output groups and outputs within your job, see Setting Up a Job in AWS Elemental MediaConvert (p. 7).
Setting the Fragment Length for Streaming Outputs

For all ABR streaming output groups other than HLS (CMAF, DASH, and Microsoft Smooth Streaming), the value that you specify for Fragment length (FragmentLength) must work with the other output settings that you specify. If you set Fragment length incorrectly, when viewers watch the output video, their player might crash. This can happen because the player expects additional segments at the end of the video and requests segments that don't exist.

Fragment length is constrained by your values for Closed GOP cadence (GopClosedCadence), GOP size (GopSize), and Framerate (FramerateNumerator, FramerateDenominator). For information...
Finding the Settings Related to Fragment Length

about finding these settings on the console and in your JSON job specification, see Finding the Settings Related to Fragment Length (p. 36).

**Note**
When you set your output **Framerate** to **Follow source**, ensure that the framerate of your input video file (which functions as your output framerate) works with the value that you specify for the output **Fragment length**.

**Rule for Fragment Length**

**Fragment length** must be a whole number and must be a multiple of this value:

\[ \text{GOP size} \times \text{Closed GOP cadence} \div \text{Framerate} \]

**Fragment Length Examples**

**Example: Correct settings**

Closed GOP cadence = 1
Framerate = 30
GOP size = 60 frames
Fragment length = 2

**Example: Incorrect settings**

Closed GOP Cadence = 1
Framerate = 50
GOP size = 90 frames
Fragment length = 2

**Finding the Settings Related to Fragment Length**

When you set **Fragment length**, check your values for **Closed GOP cadence**, **GOP size**, and **Framerate**.

**Fragment Length**

You can set the fragment length using either the console or the JSON job specification. The **Fragment length** setting applies to an output group and affects every output in the group.

**To find the Fragment length setting (console)**

1. On the **Create job** page, in the **Job** pane on the left, under **Output groups**, choose the name of your CMAF, DASH ISO, or Microsoft Smooth Streaming output group.
2. In the group settings section on the right, find **Fragment length**.

   The group settings section is titled **CMAF group settings**, **DASH ISO group settings**, or **MS Smooth group settings**.

**To find the Fragment length setting (JSON job specification)**

- Find **FragmentLength** as a child of **OutputGroupSettings**, as in the following example:
Closed GOP Cadence, GOP Size, and Framerate

You can set Closed GOP cadence, GOP size, and Framerate using either the console or the JSON job specification. These settings apply to each output individually. When you set them, make sure that the values you set for each output in the output group work with the value you specify for the output group’s Fragment length.

Note
Your ABR stack has multiple outputs. Make sure to set these values in each output.

To find the encoding settings for an output (console)

1. On the Create job page, in the Job pane on the left, under Output groups, choose the name of your output, such as Output 1, Output 2, and so on.
2. In the Encoding settings section, the Video tab is selected automatically. Find Closed GOP cadence, GOP size, and Framerate on this tab.

To find the encoding settings for an output (JSON job specification)

- Find GopClosedCadence, GopSize, FramerateNumerator, and FramerateDenominator as children of the codec settings, as in the following example. In this example, the codec is H_264, so the parent of the codec settings is H264Settings:

```json
{  
  "Settings": {  
    ...
    "Inputs": [  
      ...
    ],
    "OutputGroups": [  
      {  
        "Name": "DASH ISO",
        "OutputGroupSettings": {  
          "Type": "DASH_ISO_GROUP_SETTINGS",
          "DashIsoGroupSettings": {  
            "SegmentLength": 30,
            "FragmentLength": 2,
            "SegmentControl": "SINGLE_FILE",
            "HbbtvCompliance": "NONE"
          }
        }
      },
    ...
  }
}
```
HLS Player Version Support

Most HLS assets that you create with AWS Elemental MediaConvert are compatible with HLS players version 2 and later. Depending on the features that you use in MediaConvert, some assets require versions of HLS players that are later than version 2, such as versions 3, 4, or 5. MediaConvert automatically sets the player version metadata based on the features that you enable.

This list shows the features that might require updated player support:

**Manifest duration format**: HLS output group > Apple HLS group settings > Advanced > Manifest duration format

- When you set your manifest duration format to **Integer**, viewers can play the asset with HLS players version 2 and later.
- When you set your manifest duration format to **Floating point**, viewers can play the asset with HLS players version 3 and later.

**Segment control**: HLS output group > Apple HLS group settings > Segment control

- When you set segment control to **Single file**, viewers can play the asset with HLS players version 4 and later.
- When you set segment control to **Segmented files**, viewers can play the asset with HLS players version 2 and later.

**Add I-frame only manifest**: HLS Output group > Output > Advanced > Add I-frame only manifest

- When you choose **Include**, viewers can play the asset with HLS players version 4 and later.
- When you choose **Exclude**, viewers can play the asset with HLS players version 2 and later.

**Audio track type**: HLS Output group > Output > Output Settings > Advanced > Audio track type

- When you choose one of the **Alternate audio** options for any of your audio variants, viewers can play the asset with HLS players version 4 and later.
- When you choose **Audio-only variant stream** for **Audio track type** or leave **Audio track type** unselected for all of your audio variants, viewers can play the asset with HLS players version 2 and later.

**DRM encryption method**: HLS output group > DRM encryption > Encryption method

- When you choose **SAMPLE-AES** for **DRM encryption**, **Encryption method**, viewers can play the asset with HLS players version 5 and later.
When you choose any other value for **DRM encryption, Encryption method**, viewers can play the asset with HLS players version 2 and later.
Setting Up Access for Other AWS Accounts to Your AWS Elemental MediaConvert Outputs

When you follow the usual setup for permissions as described in Step 3: Set Up IAM Permissions (p. 4), only users that belong to your AWS account can access your output files.

In some cases, you might want to allow users of other AWS accounts access to the outputs of your jobs. For example, you might run transcoding jobs on behalf of one of your customers, and you might want that customer to have access to the outputs of the jobs. You can do this in one of the following ways:

- **Grant access to your Amazon S3 bucket.**
  When you do this, MediaConvert writes your output files to your bucket, and you grant another account access to your bucket.

- **Have MediaConvert write your output files to a bucket owned by another account.**
  You can have MediaConvert apply an Amazon S3 canned access control list (ACL) to your outputs. A canned ACL is a predefined ACL that includes the necessary permissions.
  When you do this, you still own the output file, but MediaConvert grants access to the outputs to the owner of the bucket.

Topics
- Granting Access to Your Output Amazon S3 Bucket (p. 40)
- Writing Your Outputs to an Amazon S3 Bucket in Another Account (p. 41)

Granting Access to Your Output Amazon S3 Bucket

Suppose that you want the outputs of your MediaConvert jobs to reside in an Amazon S3 bucket that you own, but you want users that belong to another AWS account to have access to them. To grant access, you can add an Amazon S3 bucket policy to your output bucket.

For a tutorial about how to grant this access, see Example 2: Bucket Owner Granting Cross-Account Bucket Permissions in the Amazon Simple Storage Service Developer Guide.

The following example bucket policy grants access to your output bucket:

```json
{
  "Id": "Policy1572454561447",
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Stmt1572454547712",
      "Action": [
        "s3:GetObject"
      ],
```
Writing Your Outputs to an Amazon S3 Bucket in Another Account

When you want the outputs of your MediaConvert jobs to reside in an Amazon S3 bucket that is owned by another AWS account, you work together with the administrator of that account to add a bucket permissions policy that grants you access to write the files and to add an Amazon S3 canned access control list (ACL) to the outputs. Then you set up your MediaConvert job to write to that bucket and to automatically add the canned ACL `bucket-owner-full-control` as it does so.

The result of this setup is that you own the files, but they reside in another account's bucket. The owner of the bucket has full access to the files.

**To write your outputs to a bucket owned by another account**

1. Work with an administrator of the other account to add a bucket policy to the Amazon S3 bucket that you want to write your output files to. For more information, see How Do I Add an S3 Bucket Policy? in the Amazon Simple Storage Service Developer Guide.

The following example bucket policy grants the necessary permissions:

```
{
    "Version": "2012-10-17",
    "Id": "Policy1570060985561",
    "Statement": [
        {
            "Sid": "Stmt1570060984261",
            "Effect": "Allow",
            "Principal": {
                "AWS": [
                    "arn:aws:iam::111122223333:role/MediaConvertRole"
                ]
            },
            "Action": [
                "s3:GetObject",
                "s3:GetObjectAcl",
                "s3:ListBucket",
                "s3:PutObject",
                "s3:PutObjectAcl"
            ],
            "Resource": [
                "arn:aws:s3:::bucket",
                "arn:aws:s3:::bucket/*"
            ]
        }
    ]
}
```
2. For any job that writes outputs to that bucket, apply the **Bucket owner full control** ACL as follows:
   
   a. Set up your job as usual. For more information, see Setting Up a Job (p. 7).
   
   b. Specify the other account’s Amazon S3 bucket for your output **Destination**. On the Create job page, in the **Job** pane on the left, choose an output group. In the group settings section on the right, find **Destination**.
   
   c. Enable **Access control**, and then choose **Bucket owner full control** for **Canned access control list**.
Working with AWS Elemental MediaConvert Jobs

A job does the work of transcoding a media file. When you create a job, you specify the information that MediaConvert requires to perform the transcoding. For example, you specify which files to transcode, what to name the transcoded files and where to save them, which advanced features to apply, and so on.

You can work with your jobs in the following ways:

- **Create job** – When you create a job, you simultaneously submit it to a queue for processing. Processing begins automatically from your queues as resources allow. For information about resource allocation, see How MediaConvert Allocates Resources and Prioritizes Jobs with On-Demand Queues (p. 61).

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</table>

- **View jobs history** – You can view a record of any job that you’ve created within the last three months. This record shows the job settings and the job’s completion status (SUBMITTED, PROGRESSING, COMPLETE, or ERROR). After a job record is three months old, MediaConvert automatically deletes it.

  For instructions about listing and viewing your job history, see Viewing Your Job History (p. 46).

- **Cancel job** – You can cancel a job anytime after you submit it and before the service uploads the job outputs to your output Amazon S3 bucket.

  For instructions about canceling a job, see Canceling a Job (p. 47).

Creating an AWS Elemental MediaConvert Job by Duplicating a Completed Job

To create a job that is similar to one that you ran before, you can duplicate a completed job from your job history, and then modify any settings that you need to change.

**To create a job based on a recently completed job**

2. On the navigation bar of the MediaConvert console, choose the Region where the completed job was created.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Jobs to display the Jobs page.

   **Tip**
   Optionally, from the Status dropdown list, choose Complete to filter your list of jobs to just those that finished successfully.

5. On the Jobs page, from the Job ID column of the job history, choose the job that you want to duplicate.
6. On the Job summary page, choose the Duplicate button.
7. Modify any settings that you want to be different in the new job.

   For more information about each setting, choose the Info link located next to the setting or next to the heading for the group of settings.

   **Tip**
   Settings that are likely to change from job to job include the following: input file location, output destination locations, and output name modifiers. If you are running transcoding jobs for customers of yours who have different AWS accounts from your account, you also must change the IAM role under Job settings.
8. Choose the Create button at the bottom of the page.

### Exporting and Importing AWS Elemental MediaConvert Jobs

Completed MediaConvert jobs remain on the Jobs page for three months. If you want to be able to run a new job based on a completed job more than three months after you run it, export the job after it is complete and save it. Depending on how many jobs that you run, exporting and then importing a job can be simpler than finding a particular job in your list and duplicating it.
To export a completed job

2. On the navigation bar of the MediaConvert console, choose the Region where the job that you want to export was created.

Completed jobs appear only in the Region where they are created.

3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Jobs to display the Jobs page.

   **Tip**

   Optionally, from the Status dropdown list, choose Complete to filter your list of jobs to just those that finished successfully.

5. On the Jobs page, from the Job ID column of the job history, choose the job that you want to export.
6. On the Job summary page, choose the Export JSON button.
7. Choose a file location for your exported JSON job specification on the hard drive of the computer that you use to operate the MediaConvert console, and then save the file.

To create a job by importing a previously exported completed job

2. On the navigation bar of the MediaConvert console, choose the Region where you want to create your new job.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Jobs to display the Jobs page.
5. On the Jobs page, choose the Import job button.
6. Modify any settings that you want to be different in the new job.

   For more information about each setting, choose the Info link located next to the setting or next to the heading for the group of settings.
Tip
Settings that are likely to change from job to job include the following: input file location, output destination locations, and output name modifiers. If you run transcoding jobs for customers of yours who have different AWS accounts from your account, you also must change the IAM role under Job settings.

7. Choose the Create button at the bottom of the page.

Viewing Your AWS Elemental MediaConvert Job History

You can view the recent history of MediaConvert jobs that you created with your AWS account in a given Region. After three months, the service automatically deletes the record of a job.

The Jobs page shows successfully completed jobs and also those that ended in error, were canceled, are currently being processed, and are waiting in the queue. You can filter the job history list by the status and by the queue that the jobs were sent to. You can also choose a specific job from the list to view the job's settings.

To list jobs

2. On the navigation bar of the MediaConvert console, choose the Region your jobs were created in. If you have jobs that were created in more than one Region, you must view them separately by Region.
3. Choose the three-bar icon on the left to access the left navigation pane.
5. Optionally, filter the list by status and queue by choosing from the dropdown lists.
6. To see details for a job, choose the job ID.
Canceling a Job

Canceling an AWS Elemental MediaConvert Job

The following procedure explains how to cancel a job using the AWS Elemental MediaConvert console.

To cancel a job

2. On the navigation bar at the top of the page, choose the Region where you created the job that you want to cancel.
3. (Optional but recommended) If your job has not yet started, pause the queue that contains the job so that the service doesn't start to process it:
   a. Choose the three-bar icon on the left to access the left navigation pane.
   b. Choose Queues.
   c. Choose the name of the queue that you want to pause.
   d. Choose Edit queue.
   e. Under the Status dropdown list, choose Pause.
4. In the left navigation pane of the console, choose Jobs.
5. From the Jobs page, choose the job that you want to cancel by choosing the option (✓) next to it.
6. Choose the Cancel job button.
7. If you paused the queue, make it active again so that it resumes processing jobs:
   a. In the left navigation pane, choose Queues.
   b. Choose the name of the queue that you paused.
   c. Under the Status dropdown list, choose Active.
Working with AWS Elemental MediaConvert Output Presets

Output presets speed up your job setup by providing groups of recommended transcoding settings. Job templates apply to an entire transcoding job; output presets apply to a single output of a transcoding job. For more information about job templates, see Working with Job Templates (p. 54).

You can use a system preset with settings specified for you, or you can create a custom preset with your own settings. You can create a custom preset from scratch, starting with only the default settings, or you can duplicate a system preset, adjust it to suit your workflow, and then save it as a custom preset.

Topics
- Using Output Presets to Specify the Outputs of Your AWS Elemental MediaConvert Job (p. 48)
- Listing and Viewing Output Presets in MediaConvert (p. 49)
- Creating a Custom Preset in MediaConvert (p. 49)
- Creating a Custom Preset Based On a System Preset in MediaConvert (p. 51)
- Modifying Custom Presets in MediaConvert (p. 52)
- Deleting a Custom Preset (p. 53)

Using Output Presets to Specify the Outputs of Your AWS Elemental MediaConvert Job

When you specify the outputs of your MediaConvert job, you can use an output preset instead of choosing each output setting separately.

To specify a job output using an output preset

1. Create a job in the usual way, as described in Step 6: Create a Job (p. 6).
2. Create output groups as described in Step 3: Create Output Groups (p. 11).
   
   Tip
   Many jobs have one output for each type of device that will play the video created by the job.
   
3. On the Create job page, in the Job pane on the left, choose an output. Outputs are listed in the Output groups section, under their output group.
4. In the Output settings pane, choose an output preset from the Preset dropdown list.
   
   Note
   The Preset dropdown list shows only the presets that work with the type of output group that the output is in.
5. For Name modifier, type a set of characters that will distinguish the files created from this output. For example, you might use -DASH-lo-res for the output in your DASH output group that has the lowest resolution.
6. Repeat these steps for each output in your job that you want to specify with a preset.
7. Finish creating the job as described in Step 6: Create a Job (p. 6).
Listing and Viewing Output Presets in MediaConvert

You can list the system presets that are included with MediaConvert and the custom presets that you have added in an AWS Region. You can also view the settings for an individual preset.

To list output presets

2. If you have custom presets, on the navigation bar of the MediaConvert console, choose the region that your custom presets were created in.

The list of system presets is the same regardless of region. Custom presets appear only in the region where they are created.

3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Output presets.
5. In the Output presets pane, from the Presets dropdown list, choose Custom presets or System presets.
6. If you are viewing system presets, you can optionally filter the list of presets by category. Do so by choosing from the Category dropdown list.
7. To display settings for an individual preset, choose the preset name from the list of presets.

Creating a Custom Preset in MediaConvert

Output presets specify the settings that apply to a single output of a transcoding job. System presets have the output settings that are specified for you; custom presets have settings that are specified by you or by another user of your AWS account.
You can create a custom preset by individually specifying the settings, as described in this topic. Or you can create a custom preset by duplicating and modifying an existing preset, as described in Creating a Custom Preset from a System Preset (p. 51).

To create a custom output preset

2. On the navigation bar of the MediaConvert console, choose the region where you want to create the preset.

   System presets are available in all regions. Custom presets appear only in the region where they are created.

3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Output presets.
5. In the Output presets pane, choose the Create preset button.
6. In the Preset settings pane, specify at a minimum the name of the new preset. Optionally, provide a description and a category.

   These values help you find the custom preset later if you list your presets (p. 49) and use the search function on the Output presets pane.

7. In the Preset settings pane, choose the container for the output.

   Tip
   It's important to specify a container that is appropriate to the output type that you intend to create with the preset. When you choose a system or custom preset as part of creating a job, the console displays only the presets that specify a container that is valid for the output group.

8. Choose your output settings.

   For more information about each setting, choose the Info link located next to the setting or next to the heading for the group of settings.

9. Choose the Create button at the bottom of the page.
Creating a Custom Preset Based On a System Preset in MediaConvert

MediaConvert doesn't allow you to modify system presets. If you want a preset that is like a system preset but slightly modified, you can duplicate the system preset, customize the settings, and save it as a custom preset.

To create a custom output preset based on a system preset

2. On the navigation bar of the MediaConvert console, choose the region where you want to create the new preset.

System presets are available in all regions. Custom presets appear only in the region where you created them.

3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Output presets.
5. In the Output presets pane, from the Presets dropdown list, choose System presets.
6. Choose the name of the system preset that is most like the custom preset that you want to create.
7. On the Preset details page, choose Duplicate.
8. On the Create preset page, specify a name for the new preset. Optionally, modify the description and category.

These values help you find the custom preset later if you list your presets (p. 49) and use the search function on the Output presets pane.
9. Modify any output settings.

For more information about each setting, choose the Info link that is located next to the setting or next to the heading for the group of settings.
10. Choose the Create button at the bottom of the page.
Modifying Custom Output Presets

You can adjust the settings and field values in your custom presets. You can't change system presets, but you can duplicate them and modify the duplicate, as described in Creating a Custom Preset from a System Preset (p. 51).

After you modify a preset, jobs that use the preset will run with the new settings, including the following:

- Jobs that directly specify the custom preset.
- Jobs that you create based on a template that uses the custom preset.
- Jobs that you duplicate from your job history that use the custom preset. The original job used the settings in the preset as they were at the time; the new job uses the current settings.

To modify a custom output preset

2. On the navigation bar of the MediaConvert console, choose the region where the preset was created. System presets are available in all regions. Custom presets appear only in the region where they are created.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Output presets.
5. Choose the name of the custom preset that you want to modify.
6. Adjust the settings.
7. Choose Save.
Deleting a Custom Preset

You can delete the custom presets that you added in an AWS Region. You can't delete the system presets.

**To delete a custom preset**

2. On the navigation bar of the MediaConvert console, choose the region where the custom preset you want to delete was created.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose **Output presets**.
5. Choose the name of the custom preset that you want to delete.
6. On the **Preset details** page, choose **Delete preset**.
Working with AWS Elemental MediaConvert Job Templates

Job templates speed up your job setup by providing groups of recommended transcoding settings. Job templates apply to an entire transcoding job; output presets apply to a single output of a transcoding job. For more about output presets, see Working with Output Presets (p. 48).

You can use a system job template with settings specified for you, or you can create a custom job template with your own settings. You can create a custom job template from scratch, starting with only the default settings. Or you can duplicate a system job template, adjust it to suit your workflow, and then save it as a custom job template.

Topics
- Using a Job Template to Create a Job in AWS Elemental MediaConvert (p. 54)
- Listing and Viewing Job Templates in AWS Elemental MediaConvert (p. 55)
- Creating a Custom Job Template in AWS Elemental MediaConvert (p. 56)
- Modifying Custom Job Templates in AWS Elemental MediaConvert (p. 57)
- Deleting a Custom Job Template in AWS Elemental MediaConvert (p. 58)

Using a Job Template to Create a Job in AWS Elemental MediaConvert

Job templates apply to an entire transcoding job and provide values for settings that stay the same across multiple jobs. You specify the input settings and the AWS Identity and Access Management (IAM) service role in the job itself. These values are not saved in the template because they are likely to vary from job to job.

To create a job using a job template

2. On the navigation bar of the MediaConvert console, choose the region where you want to create your job. This is almost always the region where your input files are stored.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose **Job templates**.
5. In the **Job templates** pane, from the **Templates** dropdown list, choose **Custom job templates** or **System job templates**.

   **Note**
   Custom job templates appear only in the region where they are created. When you choose **Custom job templates**, you see only the job templates created in the region you chose at the beginning of this procedure.

6. Choose the name of the job template that you want to use.
7. On the **Job template details** page, choose **Create job**.
8. In the **Inputs** section of the **Job** pane, choose **Add**.
9. Specify your input video, audio, and captions settings.

   **Note**
   Make sure that you specify your audio and captions selectors in a way that corresponds to the outputs that are specified in the job template.

10. In the **Job settings** section of the **Job pane**, choose **Settings**.
11. In the **Job settings** pane, in the **IAM role** dropdown list, choose the service role that you created to grant permissions to MediaConvert to access your resources on your behalf. For instructions on creating this role, see **Getting Started** (p. 3).

### Listing and Viewing Job Templates in AWS

**Elemental MediaConvert**

You can list the system job templates that are included with MediaConvert and the custom job templates that you have added in a region. You can also view the settings for an individual job template.

**To list job templates**

2. If you have custom job templates, on the navigation bar of the MediaConvert console, choose the region that your custom templates were created in.

The list of system job templates is the same regardless of region. Custom job templates appear only in the region where they are created.

3. Choose the three-bar icon on the left to access the left navigation pane.


5. In the Job templates pane, from the Templates dropdown list, choose Custom job templates or System job templates.

6. If you are viewing system job templates, you can optionally filter the list of job templates by category. Do so by choosing from the Category dropdown list.

7. To display settings for an individual job template, choose the job template name from the list of job templates.

Creating a Custom Job Template in AWS Elemental MediaConvert

Job templates specify the settings that apply to all outputs of a transcoding job. System job templates have settings that are specified for you; custom job templates have settings that are specified by you or by another user of your AWS account.

You can create a job template by individually specifying the settings for each output. Or you can create a custom preset by specifying a preset for each output's settings, as described in Using Output Presets (p. 48).

To create a custom job template

2. On the navigation bar of the MediaConvert console, choose the region where you want to create the job template.
System job templates are available in all regions. Custom job templates appear only in the region where you created them.

3. Choose the three-bar icon on the left to access the left navigation pane.
5. In the Job templates pane, choose the Create template button.
6. In the General information pane, specify at a minimum the name of the new job template. Optionally, provide a description and a category.

These values help you find the custom preset later if you list your job templates (p. 55) and use the search function on the Job templates pane.
7. In the Job template pane, add inputs, output groups, outputs, and job-wide settings.

The procedure for this is the same as described in Setting Up a Job (p. 7), except that you don’t specify the location and file name of your input, and you don’t specify the IAM role that the service assumes so that it can access your resources.

**Note**
If you set up outputs by referring to output presets, make sure to specify input audio and captions selectors to correspond with any output audio and captions that are specified in the preset. For example, if you use an output preset with three audio tracks that use audio selectors 1, 2, and 3, make sure that the input that you specify has audio selectors 1, 2, and 3.

**Modifying Custom Job Templates in AWS Elemental MediaConvert**

You can change the settings and field values in your custom job templates. You can't change system job templates, but you can modify the settings in jobs that you start from a system job template, before you create the job.
To modify a custom job template

2. On the navigation bar of the MediaConvert console, choose the region where the job template was created.

System job templates are available in all regions. Custom job templates appear only in the region where they are created.

3. Choose the three-bar icon on the left to access the left navigation pane.
5. Choose the name of the custom job template that you want to modify.

By default, the Job templates page is filtered to show only custom templates.
6. On the Job template details page, choose the Update button.
7. On the Update job template page, adjust the settings in the template, in the same way that you would when setting up a job (p. 7).
8. Choose the Update button at the bottom of the Update job template page.

Deleting a Custom Job Template in AWS Elemental MediaConvert

You can delete any custom job template. You can't delete system job templates.

To delete a job template

2. On the navigation bar of the MediaConvert console, choose the region where the queue you want to delete was created.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose **Job templates**.
5. Choose the name of the custom job template that you want to modify.

   By default, the **Job templates** page is filtered to show only custom templates.
6. On the **Job template details** page, choose the **Delete** button.
Working with AWS Elemental MediaConvert Queues

AWS Elemental MediaConvert queues allow you to manage the resources that are available to your account for parallel processing of jobs. MediaConvert offers two queue types: on-demand and reserved queues.

On-demand queues

With on-demand queues, you don't have to set up anything in advance. You send your jobs to an on-demand queue whenever you want. You pay per minute, billed in increments of .01 minute. Your default queue is an on-demand queue.

Reserved queues

With reserved queues, you pay for the transcoding capacity of the entire queue, regardless of how much or how little you use it. You make a 12-month commitment, which AWS bills you for monthly.

You can set up your job to automatically hop from its original queue to a fallback queue if the wait time in the original queue is too long. For more information, see Setting Up Queue Hopping to Avoid Long Waits (p. 64).

If you use Dolby audio encoding or audio normalization, AWS charges you per-minute billing fees, regardless of which type of queue you use.

The following topics provide more information about how queues work in general, and about each type of queue specifically.

Topics

- How Queues Work in AWS Elemental MediaConvert (p. 60)
- Working with On-Demand Queues in AWS Elemental MediaConvert (p. 67)
- Working with Reserved Queues in AWS Elemental MediaConvert (p. 71)

How Queues Work in AWS Elemental MediaConvert

For both on-demand and reserved queues, AWS Elemental MediaConvert processes the jobs that you submit to a queue in parallel until the resources that are available to the queue are used. When MediaConvert is using all the transcoding resources that are available to the queue, it holds any more jobs that you send to the queue without processing them. When MediaConvert finishes one of the jobs that it's currently processing, it begins processing the next job in the queue. MediaConvert determines the next job by the priority value that you assign when you create the job.

The time that is required to complete a job varies significantly based on the size of the file that you're converting and the job specifications. Accordingly, MediaConvert doesn't always finish jobs in the order that you create them.
You can temporarily stop processing jobs by pausing the queue. When you pause a queue, MediaConvert continues processing any jobs that it already started, but doesn't start any new jobs from that queue. You can still submit jobs to a paused queue and cancel jobs in a paused queue.

You must submit all jobs to a queue. If you don't specify the queue when you create the jobs, AWS Elemental MediaConvert sends them to the default queue. The default queue is an on-demand queue. You can have up to 10 on-demand queues, including your default queue.

Topics
- About On-Demand Queues (p. 61)
- About Reserved Queues in AWS Elemental MediaConvert (p. 62)
- Setting the Priority of a Job (p. 63)
- Setting Up Queue Hopping to Avoid Long Waits (p. 64)

About On-Demand Queues

On-demand queues differ from reserved queues in how AWS Elemental MediaConvert allocates transcoding resources for jobs and in how you pay for your transcoded outputs.

How MediaConvert Allocates Resources and Prioritizes Jobs with On-Demand Queues

There are two ways that you can affect how quickly MediaConvert processes a job that you send to an on-demand queue: the priority that you set in the job's settings and the number of on-demand queues that you set up to process jobs in parallel.

Job Priority

Within a queue, MediaConvert processes jobs in parallel until all the resources available to the queue are used. When a job finishes and resources are again available in the queue, MediaConvert selects the next job to process based on the job's priority. If more than one job has the highest priority, MediaConvert begins the one that you submitted first.

You set the priority of a job when you create it. For more information, see Setting the Priority of a Job (p. 63).

Using Multiple On-Demand Queues

You might want to isolate the resource consumption of some of your jobs from the others. For example, you might run different jobs for different customers. You can isolate resources by creating additional on-demand queues. MediaConvert processes jobs across multiple queues in parallel.

MediaConvert divides the processing capacity available to your account evenly among your on-demand queues. For example, if you have 10 videos that you want to transcode, the transcoding takes the same amount of time if you send them all to the default queue or if you create an additional on-demand queue and send five jobs to each queue, assuming that the videos are of equal length and the transcoding jobs are of equal complexity.

Important
Creating additional queues doesn't increase the transcoding resources that are available to the account. For example, when you create a second queue, you cut in half the resources that are available to your default queue. This is true even when your additional queues are paused.

How You Pay for Transcoding with On-Demand Queues

With on-demand queues, you pay based on what you use. After a job from your on-demand queue successfully finishes, AWS bills you based on the duration of your outputs. You pay a price per minute
of output video, billed at .01 minute increments. The price per minute varies depending on your job configuration and the AWS Region that you choose for transcoding. For pricing details, see AWS Elemental MediaConvert Pricing.

Pricing Tiers Per Output

If you configure your job with multiple outputs, you pay for each output. AWS bills you for the duration of the finished assets, not the transcoding time.

Whether AWS bills you for an output at professional tier rates or basic tier rates depends on your job settings. If you enable a job-wide pro-tier setting, such as accelerated transcoding, all of your outputs are billed at pro-tier rates. If you don't use any job-wide pro-tier features, each output is assessed for billing tier separately.

For example, say that you don't enable job-wide pro-tier features and your input video file is 10 minutes, 30 seconds long (10.5 minutes). You set up your job to create three outputs:

• One low-resolution SD output encoded with AVC, billed at $0.0075 per minute
• One high-resolution HD output using pro-tier features at $0.0630 per minute
• One audio-only output at $0.005 per minute

You pay ($0.0075 x 10.5) + ($0.0630 x 10.5) + ($0.005 x 10.5) = $0.79275.

Say that you run the same job as in the previous example, but you also enable accelerated transcoding. Then your SD AVC output is billed at the pro-tier pricing for AVC outputs. In this case, you pay ($0.024 x 10.5) + ($0.0630 x 10.5) + ($0.005 x 10.5) = $0.966.

These rates are examples only; for actual pricing rates, see the AWS Elemental MediaConvert Pricing page.

About Reserved Queues in AWS Elemental MediaConvert

Reserved queues differ from on-demand queues in how AWS Elemental MediaConvert allocates transcoding resources for jobs and in how you pay for your transcoding.

Note

There are a few features that you can't use with jobs that you send to a reserved queue. For more information, see Feature Limitations with Reserved Queues (p. 71).

How MediaConvert Allocates Resources and Prioritizes Jobs with Reserved Queues

When you set up your reserved queue, you choose how many jobs it can run at once by specifying the number of reserved transcode slots (RTS) in the queue. For example, if you send five jobs to a reserved queue with two RTS, AWS Elemental MediaConvert immediately begins processing the first two jobs that you submit and holds the other three in the queue. When one of the jobs that MediaConvert is processing finishes, the service begins processing the next job.

Each RTS has its own dedicated computing resources. Therefore, when MediaConvert begins to process a job that you send to a reserved queue, it processes just as quickly if you have one RTS or multiple RTS.

When a job in a reserved queue finishes, MediaConvert selects the next job to process based on the job's priority. You set the priority of a job when you create it. If more than one job has the highest priority,
MediaConvert begins the one that you submitted first. For more information, see Setting the Priority of a Job (p. 63).

**How You Pay for Transcoding with Reserved Queues**

With reserved queues, you pay for the capacity in the queue regardless of whether you use it. When you set up a reserved queue, you make a 12-month commitment to a pricing plan. The pricing plan specifies a fixed number of reserved transcode slots (RTS). AWS bills you monthly for your RTS.

*Important*
After you purchase your RTS, you can't cancel your 12-month commitment.

You can purchase additional capacity for a reserved queue that already has RTS. To purchase additional capacity, you extend your existing commitment with a new 12-month commitment for a larger number of RTS. The new commitment begins when you purchase the additional capacity. You can't decrease the number of RTS in your reserved queue.

When your pricing plan term expires, your reserved queue persists. You can still send jobs to it, but AWS Elemental MediaConvert doesn't run them.

**About Auto Renew**

You can set your pricing plan to auto renew. When your pricing plan term ends, AWS Elemental MediaConvert checks the auto renew status. If auto renew is enabled at that time, you automatically commit to another 12-month term for the same number of RTS at the same price. You can change the auto renew status at any time.

You can choose auto renew when you set up your queue. Anytime after that, you can change the auto renew status on the **Edit** page for the queue. For more information, see Creating a Reserved Queue (p. 72) and Editing Reserved Queues (p. 74).

**Setting the Priority of a Job**

You can specify a job's place in a queue by setting its priority in the job settings when you create the job. AWS Elemental MediaConvert processes jobs in each queue in order of priority, starting with the highest number. If more than one job has the highest value for priority, MediaConvert chooses among them by selecting the one that you submitted first.

MediaConvert doesn't stop the current job when you submit a job with a higher priority. When the running job is finished, MediaConvert starts the next job based on its relative priority in the queue.

**To set the priority for a job (console)**

1. Set up your job as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7).
2. On the **Create job** page, in the **Job** pane on the left, in the **Job settings** section, choose **Settings**.
3. In the **Job settings** section on the right, for **Priority**, enter a number from -50 to 50. MediaConvert processes jobs with the highest value for **Priority** first. If you don't specify a value, MediaConvert assigns the default value of 0.

**To set the priority for a job (API, SDK, and AWS CLI)**

1. Set up your JSON job specification. Either manually edit your JSON file, or use the console to generate it as follows:
   a. Follow the previous procedure for the console.
b. In the **Job** pane on the left, under **Job settings**, choose **Show job JSON**.

The JSON job specification has the value for the job's priority in the property `priority`. This property is a direct child of `job`, which is the top level of the JSON job specification. Set the value of `priority` to an integer in the range from -50 to 50, inclusive. The default value is 0.

2. Submit your job according to the instructions in the *AWS Elemental MediaConvert API Reference*.

   - If you're using one of the AWS SDKs or the AWS CLI, see *Getting Started with MediaConvert Using the AWS SDKs or the AWS CLI*.
   - If you're calling the MediaConvert API directly, see *Getting Started with MediaConvert Using the API*.

### Setting Up Queue Hopping to Avoid Long Waits

You can set up your AWS Elemental MediaConvert job to automatically hop from the queue that you originally submit it to over to a different queue when the job waits too long. The queue that you originally submit a job to is its **submission queue**. The queue that a job goes to when it hops queues is the **destination queue**. Regardless of whether a job hops queues, the queue that MediaConvert ultimately executes the job from is the **execution queue**.

A common use case for queue hopping is to set up your jobs to usually go through your reserved queue, except when there is a spike in the use of that queue. For example, you might want your jobs to go through your reserved queue whenever they can do so without waiting in the queue longer than 10 minutes. In this case, you would submit your job to your reserved queue, specify an on-demand queue as your hop destination queue, and set the wait time to 10 minutes.

**Topics**

- Setting Up Queue Hopping (p. 64)
- Job History with Queue Hopping (p. 65)
- Job Priority and Queue Hopping (p. 66)
- Queue Hopping Behavior With Paused Queues (p. 66)

### Setting Up Queue Hopping

When you set up queue hopping, you specify the **submission queue**, the **wait time**, and the **destination queue**. The submission queue is the queue you want the job to go through, assuming that the wait in that queue isn't long. The wait time is the length of time, in minutes, that the job will wait in the submission queue in the SUBMITTED state before hopping over to the destination queue. The destination queue is the queue that the job moves to when it hops queues. In the most common use case, the submission queue is a reserved queue and the destination queue is an on-demand queue.

**To set up queue hopping (console)**

1. On the **Create job** page, in the **Job** pane on the left, under **Job settings**, choose **Settings**.
2. In the **Job settings** section on the right, choose **Queue hopping**.
3. For **Wait minutes**, enter the time, in whole minutes, that you want the job to wait in the submission queue before hopping. You can enter a number from 1 through 1,440.
4. For **Destination queue**, choose the queue that you want your job to hop to if it stays in the submission queue longer than the time you specify for **Wait minutes**.
5. Optional. For **Job priority**, specify the priority for the job within the destination queue. For more information, see **Job Priority and Queue Hopping** (p. 66).
To set up queue hopping (API, SDK, and AWS CLI)

1. Set up your JSON job specification. Either manually edit your JSON file, or use the console to generate it as follows:
   a. Follow the previous procedure for the console.
   b. In the Job pane on the left, under Job settings, choose Show job JSON.

   In the MediaConvert job schema, you can find the settings for queueHopping under hopDestinations.

2. Submit your job according to the instructions in the AWS Elemental MediaConvert API Reference:
   - If you're using one of the AWS SDKs or the AWS CLI, see Getting Started with MediaConvert Using the AWS SDKs or the AWS CLI.
   - If you're calling the MediaConvert API directly, see Getting Started with MediaConvert Using the API.

Job History with Queue Hopping

Viewing the settings values of hopped jobs

When a job hops queues, the values for the settings queue and priority remain how you set them when you created the job. You can see the values for the job's post-hop destination and queue priority in these ways:

- In the console, you can see the values for the job's post-hop destination queue and priority. To see these settings, view the job details and then choose Settings. For more information about viewing the details of your completed jobs, see Viewing Your Job History (p. 46).
- When you send a GetJob request, you can see these values in the response body under queueTransitions.

Billing tags for hopped jobs

If you use tags on your MediaConvert queues to sort your AWS bill, the charges for your jobs are under the submission queue, not the execution queue. For more information about using tags to sort your AWS bill, see Setting Up AWS Elemental MediaConvert Resources for Cost Allocation Through Tagging (p. 182).

Note

Cost allocation based on queue only applies to jobs executed in on-demand queues. When your submission queue is a reserved queue and your job hops to an on-demand queue, the charges for that on-demand job appear in your cost allocation report. If you don't put tags on your reserved queue, those charges appear in the report unsorted.

Listing hopped jobs

When you call ListJobs or when you view your jobs on the console, if you filter by queue, MediaConvert shows you the jobs that you submitted to that queue. For example, if you submit a job to Queue1 and it hops to Queue2, that job appears in lists filtered for Queue1 and not in lists filtered for Queue2.
Job Priority and Queue Hopping

When you set up a job for queue hopping, you can optionally specify the priority for the job in the new queue. If you don't specify a new priority, the job keeps the priority number from its submission queue. If you use different guidelines for choosing the values for priority between the two queues, make sure to specify a new priority value for the job in the destination queue.

For example, say that in your submission queue you use a value of 20 for urgent jobs, 10 for ordinary jobs, and 0 for low-priority jobs. And say that in your destination queue, you use a value of 10 for urgent jobs, 0 for ordinary jobs, and -10 for low-priority jobs. When an ordinary job with a priority of 10 hops from your submission queue to the destination queue, it is scheduled with the destination queue's urgent jobs if you don't provide a new priority value.

For information about setting the job's priority within the submission queue, see Setting the Priority of a Job (p. 63).

In the console, set the priority of the job within the destination queue with the setting Queue hopping, Job priority. For details about finding this setting, see the procedure in the topic Setting Up Queue Hopping (p. 64).

Set the priority of the job within the destination queue directly in your JSON job specification with the field priority, under hopDestinations.

Queue Hopping Behavior With Paused Queues

Jobs don't hop from a queue while it's paused, but they hop freely to paused queues.

Hopping From a Paused Queue

Jobs don't hop from a queue while it's paused. Queue hopping behavior depends on how long the queue is paused. Consider these two situations:

You submit a job to a queue and then pause the queue for longer than the queue hopping wait time.

In this situation, whether the job hops depends on where the job is in the queue. If there are any jobs ahead of it in the queue, the job hops to the destination queue. If there are no jobs ahead of it in the queue, MediaConvert processes without hopping.

For example, say that you submit a job to Queue1 with a wait time of 15 minutes and a destination of Queue2. Five minutes after you submit the job, you pause Queue1. Ten minutes later, the job remains in Queue1. Half an hour after that, you activate Queue1. At that time, there are no jobs ahead of it in Queue1, so the job runs from Queue1.

You submit a job to a queue. You pause the queue and then reactivate it before the wait time passes.

In this situation, the time that the queue is paused doesn't affect queue hopping at all.

For example, say that you submit a job to Queue1 with a wait time of 15 minutes and a destination of Queue2. Five minutes after you submit the job, you pause Queue1. One minute later, you reactivate Queue1. Nine minutes later (15 minutes after you submitted the job), there are still jobs ahead of it in the queue, so the job hops to Queue2, just as if you hadn't paused the queue.

Hopping To a Paused Queue

Jobs hop freely from active queues to paused queues. For example, say that you submit a job to Queue1 with a wait time of 15 minutes and a destination of Queue2. Five minutes after you submit the job, you pause Queue1. Ten minutes later (15 minutes after you submit the job), the job hops to Queue2 and remains there, waiting until you activate the queue.
You can send your AWS Elemental MediaConvert transcoding job to either an on-demand or reserved queue. For high-level information about the difference between the two types, see How Queues Work (p. 60).

With on-demand queues, you don't have to set up anything in advance. You send your jobs to an on-demand queue whenever you want. You pay per minute, billed in increments of .01 minute. Your default queue is an on-demand queue.

**Topics**

- Creating an On-Demand Queue in AWS Elemental MediaConvert (p. 67)
- Pausing and Reactivating On-Demand Queues in AWS Elemental MediaConvert (p. 68)
- Listing and Viewing On-Demand Queues in AWS Elemental MediaConvert (p. 69)
- Deleting an On-Demand Queue in AWS Elemental MediaConvert (p. 70)

## Creating an On-Demand Queue in AWS Elemental MediaConvert

AWS Elemental MediaConvert provides a default queue, which is an on-demand queue. But you can choose to create your own on-demand queues to manage the resources that are available to your account. For information about how queues affect the way that MediaConvert allocates the processing of resources, see How MediaConvert Allocates Resources and Prioritizes Jobs with On-Demand Queues (p. 61).

### To create an on-demand queue

2. On the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you want to create the queue.

A default queue is available in all Regions. Other queues appear only in the Region where they are created.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Queues.
5. On the Queues page, in the On-demand queues section, choose Create queue.
6. Enter a name and a description for the new queue.
7. Choose Create queue.

Pausing and Reactivating On-Demand Queues in AWS Elemental MediaConvert

When you pause a queue, AWS Elemental MediaConvert doesn't start processing any jobs in that queue. MediaConvert finishes processing any job that is already running when you pause it.

The following procedure explains how to pause and reactivate a queue using the console.

To pause or reactivate an on-demand queue

2. If you are pausing or reactivating a queue other than the default queue, on the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you created the queue.

The default queue is available in all Regions. Other queues appear only in the Region where you create them.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Queues.
5. On the Queues page, choose the name of the queue that you want to pause or reactivate.
6. On the queue’s page, choose the Edit queue button.
7. On the Edit queue page, for Status, choose Paused or Active.
8. Choose Save queue.

Listing and Viewing On-Demand Queues in AWS Elemental MediaConvert

You can list the AWS Elemental MediaConvert queues that are associated with your AWS account and view the details about those queues. The following procedure explains how to do so using the MediaConvert console.

To list queues and view queue settings

2. On the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you created the queues that you want to view.

   The default queue is available in all Regions. Other queues appear only in the Region where you create them.
3. Choose the three-bar icon on the left to access the left navigation pane.

4. Choose **Queues**. The **Queues** page lists the on-demand and reserved queues that you have in the Region that you chose at the beginning of this procedure.

5. To display detailed information about a queue, choose a queue name from the list.

**Deleting an On-Demand Queue in AWS Elemental MediaConvert**

You can delete any queue other than the default queue.

**Note**

You can't delete a queue that contains unprocessed jobs.

**To delete an on-demand queue**


2. On the navigation bar of the MediaConvert console, choose the Region where you created the queue that you want to delete.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Queues.
5. On the Queues page, in the On-demand queues section, choose the name of the queue that you want to delete.
6. On the queue's page, choose the Delete queue button.

Working with Reserved Queues in AWS Elemental MediaConvert

You can send your AWS Elemental MediaConvert transcoding job to either an on-demand or reserved queue. For high-level information about the difference between the two types, see How Queues Work (p. 60).

Topics
- Feature Limitations with AWS Elemental MediaConvert Reserved Queues (p. 71)
- Creating a Reserved Queue in AWS Elemental MediaConvert (p. 72)
- Purchasing Additional Capacity for a Reserved Queue in AWS Elemental MediaConvert (p. 73)
- Editing Reserved Queues in AWS Elemental MediaConvert (p. 74)
- Listing and Viewing Reserved Queues in AWS Elemental MediaConvert (p. 75)
- Purchasing Transcoding Capacity for an Existing Reserved Queue (p. 76)
- Deleting a Reserved Queue in AWS Elemental MediaConvert (p. 77)

Feature Limitations with AWS Elemental MediaConvert Reserved Queues

The following features are available only in jobs that you send to an on-demand queue. For jobs that you send to a reserved queue, you must disable these features:
Creating a Reserved Queue in AWS Elemental MediaConvert

Reserved queues allow you to purchase transcoding capacity for a 12-month period, instead of paying per minute for each output.

To create a reserved queue

2. On the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you want to create the queue.

A default, on-demand queue is available in all Regions. Other queues appear only in the Region where you create them.

3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Queues.
5. On the Queues page, in the Reserved queues section, choose Create reserved queue.
6. On the Create reserved queue page, in the General information section, enter a name and a description for the new queue.

7. Optionally, use the Reserved transcode slots (RTS) calculator to help determine how many RTS you need. Specify values as follows:
   - **Turnaround time** - The time frame that you want your content transcoded in. For example, if you need to finish transcoding three films each day, enter 24 for hours and 0 for minutes.
   - **Number of jobs** - The number of jobs that you want to complete within your turnaround time. In the previous example, this value would be 3.
• **Time to run one job** - The amount of time that it takes to transcode a piece of content. The time strongly depends on your transcoding settings. The best way to determine a value for this setting is to run a typical job in an on-demand queue, with **Simulate reserved queue** enabled.

  Find this setting as follows: On the **Create job** page, in the **Job pane** on the left, under **Job settings**, choose **Settings**. In the **Job settings** section on the right, for **Simulate reserved queue**, choose **Enabled**.

8. In the **Commitment to purchase RTS for reserved queue** section, specify the number of reserved transcode slots (RTS) that you want to purchase. A reserved queue can simultaneously process a number of jobs equal to the number of RTS that you purchase for it.

9. Select the **I agree** check box to confirm your intention to make a 12-month commitment. AWS bills you monthly for the RTS.

   **Important**
   After you commit to your pricing plan, you can't cancel it.

10. Choose **Create reserved queue**.

11. On the **Purchase RTS for reserved queue** confirmation page, review the details of your pricing plan, and then choose **Purchase**.

   If you decide later that you want to purchase additional capacity for your reserved queue, you can do so. For more information, see **Purchasing Additional Capacity for a Reserved Queue** (p. 73).

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### Purchasing Additional Capacity for a Reserved Queue in AWS Elemental MediaConvert

If you want to increase the number of jobs that your reserved queue can process at once, you can purchase additional capacity for it. To purchase additional capacity, you extend your existing commitment with a new 12-month commitment for a larger number of RTS. The new commitment begins when you purchase the additional capacity. You can't decrease the number of RTS in your reserved queue.

**To purchase additional capacity for a reserved queue**


2. On the navigation bar of the MediaConvert console, choose the Region where you created the reserved queue.
3. Choose the three-bar icon on the left to access the left navigation pane.

4. Choose **Queues**.

5. On the **Queues** page, in the **Reserved queues** section, choose the option next to the name of the queue that you want to purchase additional capacity for.

6. Choose **Actions**, **Purchase additional capacity**.

7. On the **Purchase additional capacity** page, in the **Commitment to purchase additional capacity** section, specify the new total number of RTS for the queue. This number includes both the original amount of RTS and the new additional capacity.

8. Select the **I agree** check box to confirm your intention to make a 12-month commitment. AWS bills you monthly for the RTS.

   **Important**

   After you commit to your new pricing plan, you can’t cancel it or revert to your original plan.

9. Choose **Purchase additional capacity**.

10. On the **Purchase additional capacity** confirmation page, review the details of your new pricing plan, and then choose **Purchase**.

### Editing Reserved Queues in AWS Elemental MediaConvert

When you edit a queue, you can change the following:

- The description, which helps you identify it in the queue dashboard.
- The auto renew status of the queue's pricing plan for reserved transcode slots (RTS). For more information, see [How You Pay for Transcoding with Reserved Queues](p. 63).
- The paused or active status of the queue. Pausing the queue prevents the service from starting any more jobs until you reactivate the queue.
To edit a queue

2. If you are editing a queue other than the default queue, on the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you created the queue.

   The default queue is available in all Regions. Other queues appear only in the Region where you create them.

   3. Choose the three-bar icon on the left to access the left navigation pane.
   4. Choose Queues.
   5. On the Queues page, choose the name of the queue that you want to edit.
   6. On the queue’s page, choose the Edit queue button.
   7. On the Edit queue page, make the changes that you want for the queue.
   8. Choose Save queue.

Listing and Viewing Reserved Queues in AWS Elemental MediaConvert

You can list the AWS Elemental MediaConvert queues that are associated with your AWS account and view the details about those queues. The following procedure explains how to do so using the MediaConvert console.

To list queues and view queue settings

2. On the navigation bar of the AWS Elemental MediaConvert console, choose the Region where you created the queues that you want to view.

   The default queue is available in all Regions. Other queues appear only in the Region where you create them.
3. Choose the three-bar icon on the left to access the left navigation pane.

4. Choose Queues. The Queues page lists the on-demand and reserved queues that you have in the Region that you chose at the beginning of this procedure.

5. To display detailed information about a queue, choose a queue name from the list.

**Purchasing Transcoding Capacity for an Existing Reserved Queue**

After your initial pricing plan term for reserved transcode slots (RTS) expires, your reserved queue persists without the capacity to run transcoding jobs. You can send jobs to the queue, but AWS Elemental MediaConvert doesn't process them. To begin processing jobs through the queue again, you can set up a new pricing plan, which requires a new 12-month commitment.

**To purchase transcoding capacity for an existing reserved queue**


2. On the navigation bar of the MediaConvert console, choose the Region where you created the reserved queue.
3. Choose the three-bar icon on the left to access the left navigation pane.

4. Choose Queues.

5. On the Queues page, in the Reserved queues section, choose Actions, Purchase additional capacity.

6. On the Purchase additional capacity page, in the Commitment to purchase additional capacity section, specify the total number of RTS for the queue.

7. Select the I agree check box to confirm your intention to make a 12-month commitment. AWS bills you monthly for the RTS.

   **Important**
   After you commit to your pricing plan, you can't cancel it.

8. Choose Purchase additional capacity.

9. On the Purchase additional capacity confirmation page, review the details of your pricing plan, and then choose Purchase.

**Deleting a Reserved Queue in AWS Elemental MediaConvert**

You can delete any queue other than the default queue.

**Note**
You can't delete a reserved queue that has an active pricing plan or that contains unprocessed jobs.

**To delete a reserved queue**


2. On the navigation bar of the MediaConvert console, choose the Region where you created the queue that you want to delete.
3. Choose the three-bar icon on the left to access the left navigation pane.
4. Choose Queues.
5. On the Queues page, in the Reserved queues section, choose the option next to the name of the queue that you want to delete.
6. Choose Actions, Delete reserved queue.
Setting Up Captions in AWS Elemental MediaConvert Jobs

To include captions in your job, follow these steps in the order listed:

1. If your input captions are a timecode-based sidecar captions format, such as SCC or STL, set the timecode source settings. (p. 79)
2. Gather required captions information. (p. 79)
3. Create input captions selectors. (p. 79)
4. Set up captions in outputs. (p. 86)

Specifying the Timecode Source

For your captions to correctly synchronize with your video, you must set up your input timeline to match the timecodes embedded in your captions file. MediaConvert establishes the input timeline based on the value you choose for the input **Timecode source** setting. For more information, see Input Timecode Source and Captions Alignment (p. 83).

For instructions on adjusting the **Timecode source** setting, see Adjusting the Input Timeline with the Input Timecode Source (p. 29).

Gathering Required Captions Information

Before you set up captions in your job, note the following information:

- The **input captions format**. You must have this information ahead of time; MediaConvert does not read this from your input files.
- The **tracks** from the input captions that you intend to use in any of your outputs.
- The **output packages and files** that you intend to create with the job. For information about specifying the output package or file type, see Structuring Complex Jobs in MediaConvert (p. 33).
- The **output captions format** that you intend to use in each output.

For supported output captions based on your input container, input captions format, and output container, see Captions Support Tables by Output Container Type (p. 140).
- The **output captions tracks** that you intend to include for each output. If you pass through teletext-to-teletext, all tracks in the input are available in the output. Otherwise, the tracks that you include in an output might be a subset of the tracks that are available in the input.

Creating Input Captions Selectors

When you set up captions, you begin by creating captions selectors. Captions selectors identify a particular captions asset on the input and associate a label with it. The captions asset is either a single
track or the set of all tracks contained in the input file, depending on your input captions format. For example, you might add Captions selector 1 and associate the French captions with it. When you set up an output to include captions (p. 86), you do so by specifying captions selectors.

**To create input captions selectors**

1. On the Create job page, in the Job pane on the left, choose an input.

   **Note**
   In jobs with multiple inputs, each input must have the same number of captions selectors. For inputs that don't have captions, create empty captions selectors. For these selectors, for Source, choose Empty captions track.

2. In the Captions selectors section, near the bottom of the page, choose Add captions selector.

3. Under Source, choose the input captions format.

4. For most formats, more fields appear. Specify the values for these fields as described in the topic that relates to your input captions format. Choose the appropriate topic from the list that follows this procedure.

5. Create more captions selectors as necessary. The number of captions selectors that you need depends on your input captions format. Choose the appropriate topic from the list that follows this procedure.

**Detailed information by input captions format**

- QuickTime Captions Track or Captions in MXF VANC Data (Ancillary) (p. 80)
- Embedded (CEA/EIA-608, CEA/EIA-708), Embedded+SCTE-20, and SCTE-20+Embedded (p. 81)
- DVB-Sub (p. 82)
- Teletext (p. 82)
- IMSC, SCC, SRT, STL, TTML (Sidecar) (p. 82)
- IMSC (as Part of an IMF Source) (p. 86)

**QuickTime Captions Track or Captions in MXF VANC Data (Ancillary)**

If your input captions are in either of the following formats, the service handles them as "ancillary" data:

- QuickTime captions track (format QTCC)
- MXF VANC data

MediaConvert does not create output captions in these formats, but you can convert them to a supported output format (p. 140).

**For ancillary captions**

- Create one captions selector per track that you will use in your outputs.
- In each captions selector, for Source, choose Ancillary.
- In each captions selector, for CC channel, choose the channel number for the track that is associated with the selector.

For example, the input captions have English in CC channel 1 and Spanish in CC channel 2. To use these captions, create Captions selector 1, and then choose 1 in the CC channel dropdown list. Next, create Captions selector 2, and then choose 2 in the CC channel dropdown list.
Embedded (CEA/EIA-608, CEA/EIA-708), Embedded +SCTE-20, and SCTE-20+Embedded

If your input captions are in any of the following formats, the service handles them as "embedded":

- CEA-608
- EIA-608
- CEA-708
- EIA-708

If your input captions have both embedded captions and SCTE-20 captions, and you want both types in your outputs, set up separate input captions selectors for the SCTE-20 and the embedded captions tracks. Set up the SCTE-20 captions selectors the same way that you set up the embedded selectors.

**Note**
For MXF inputs, your captions are most likely on the ancillary track. Some third-party media analysis tools incorrectly report these captions as 608/708 embedded. For information on setting up ancillary captions, see QuickTime Captions Track or Captions in MXF VANC Data (Ancillary) (p. 80).

**Number of Captions Selectors for Embedded Captions**

- If all of your output captions are also an embedded format, create only one captions selector, even if you want to include multiple tracks in the output. With this setup, MediaConvert automatically extracts all tracks and includes them in the output.
- If all of your outputs are in a format that is not embedded, create one captions selector for each track that you want to include in the output.
- If some of your outputs have captions in an embedded format and some of your outputs have captions in a different format, create one captions selector for the outputs with embedded captions. Also create individual selectors for the outputs with other captions that aren't embedded, one for each track that you want in your outputs.

**Captions Selector Fields for Embedded Captions**

**Source**: Choose Embedded

**CC channel number**: This field specifies the track to extract. Complete as follows:

- If you are doing embedded-to-embedded captions (that is, you create only one captions selector for the input embedded captions), MediaConvert ignores this field, so keep the default value for CC channel number.
- If you are converting embedded captions to another format, (that is, you create several captions selectors, one for each track), specify the captions channel number from the input that holds the track that you want. To do that, select the channel number from the dropdown list. For example, select 1 to choose CC1.

**Note**
MediaConvert doesn't automatically detect which language is in each channel. You can specify that when you set up the output captions, so that MediaConvert passes the language code metadata for the captions channel into the output for downstream use.
DVB-Sub

MediaConvert supports DVB-Sub only in TS inputs.

In most cases, create one captions selector per track. In each selector, specify which track you want by providing the PID or language code.

**Note**

Don't specify the captions in both the PID field and the Language dropdown list. Specify one or the other.

If you are doing DVB-sub-to-DVB-sub and you want to pass through all the captions tracks from the input to the output, create one captions selector for all tracks. In this case, keep the PID field blank and don't choose any language from the Language dropdown list.

Teletext

You can use teletext captions in one of the following ways:

- Teletext can include more data than just captions. If you want to include the entire teletext input, your input and output captions format must be teletext. You can't convert the entire set of teletext data to another captions format.

  MediaConvert supports teletext-to-teletext only in MPEG-2 outputs.

- You can extract and convert individual captions pages to another captions format. You can't extract individual captions pages and keep them in teletext format. If you want to extract individual captions pages, you must convert them to another format.

Number of Captions Selectors for Teletext

- If you are doing teletext-to-teletext captions, create only one captions selector, even if you want to include multiple tracks in the output. In this case, MediaConvert automatically extracts all tracks and includes them in the output.

- If you are doing teletext-to-other, create one captions selector for each track that you want to include in the output.

- If you are doing teletext-to-teletext in some outputs and teletext-to-other in other outputs, create one captions selector for the teletext-to-teletext, and then create individual selectors for the teletext-to-other, one for each track that MediaConvert converts.

Captions Selector Fields for Teletext Captions

- **Source**: Choose **Teletext**.

- **Page**: This field specifies the captions page that you want. Complete as follows:

  - If you are doing teletext-to-teletext captions (that is, you create only one captions selector for the input embedded captions), keep this field blank. MediaConvert ignores any value that you provide.

  - If you are converting teletext to another format (that is, you create several captions selectors, one for each output captions track you want to create), then specify the captions page that you want for each selector. If you keep this field blank, you will get a validation error when you submit the job.

IMSC, SCC, SRT, STL, TTML (Sidecar)

AWS Elemental MediaConvert supports IMSC as an input captions format either as a sidecar file or as part of an IMF source. If your input IMSC captions are part of an IMF package, see IMSC (as Part of an
IMSC, SCC, SRT, STL, and TTML are sidecar captions formats. With these formats, you provide input captions as a separate file. Depending on your output captions settings, the service passes them through to the output in the same format or converts them into another sidecar format.

In all cases, you create one captions selector for each input captions file.

Provide the following values for the captions selector fields:

- **External captions file**: The URI to the captions input file that is stored in Amazon S3 or on an HTTP(S) server. For Amazon S3 inputs, you can specify the URI directly or choose **Browse** to select from your Amazon S3 buckets. For HTTP(S) inputs, provide the URL to your input video file. For more information, see **HTTP Input Requirements (p. 6)**.

- **Time delta**: (Optional) Use this setting if you need to adjust the sync between the captions and the video. For more information, see **Use Cases for Time Delta (p. 84)**.

  Enter a positive or negative number to modify the times in the captions file. For example, type **15** to add 15 seconds to all the times in the captions file. Type **-5** to subtract 5 seconds from the times in the captions file.

  Enter the time delta in seconds, regardless of the format used in your captions file to specify start and end times. The number that you enter for **Time delta** simply delays the captions or makes the captions play earlier, regardless of the timecode formats.

### Synchronizing Sidecar Captions and Video

To make sure that your captions are properly synchronized with your video, check that the value for **Timecode source** in the **Video selector** section matches the timecodes in your captions file. For example, if the timecodes in your captions file start at zero but your video has embedded timecodes starting at 01:00:00:00, change the default value for **Timecode source** from **Embedded** to **Start at 0**. If other aspects of your job prevent that, use the **Time delta** setting to adjust your captions, as described in **Use Cases for Time Delta (p. 84)**.

If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is **TimecodeSource**, located in **Settings**, **Inputs**.

**Note**

MediaConvert handles the alignment of captions with video differently depending on whether the caption format is timecode-based or timestamp-based. For more information, see **Input Timecode Source and Captions Alignment (p. 83)**.

### Input Timecode Source and Captions Alignment

When you adjust your input timeline by setting the input **Timecode source** to **Start at 0** or **Specified start**, MediaConvert behaves as though your input has embedded timecodes that start when you specify. But MediaConvert doesn't change the timecodes or timestamps in your sidecar captions files. Therefore, the way that you align your captions depends on your captions format.

**Timecode-Based Sidecar Formats (SCC, STL)**
Some captions formats, including SCC and STL, define where captions are placed in the video by timecode. With these formats, MediaConvert places each caption on the frames specified in the captions file, according to each frame’s timecode in the input timeline. To adjust your captions to start at a different time than that, use the **Time delta** setting. For more information, see Use Cases for Time Delta (p. 84).

MediaConvert establishes the input timeline based on the value you choose for the input **Timecode source** setting.

For example, if your SCC file specifies that the first caption should appear at 00:05:23:00 and you set **Timecode source** to **Specified start** and **Start timecode** to 00:04:00:00, the first caption will appear in your output one minute and twenty-three seconds into the video. If you set **Timecode source** to **Specified start** and **Start timecode** to 01:00:00:00, you won’t see captions when you expect, because 00:05:23:00 occurs before the start of your video, according to the input timeline.

**Timestamp-Based Sidecar Formats (SRT, SMI, TTML)**

Some captions formats, including SRT, SMI, and TTML, allow for definition of where captions are placed in the video by timestamp. With these, MediaConvert measures the placement of the captions by the distance, in time, from the start of the video. This is true regardless of whether the captions file specifies placement with timecode or timestamp.

Therefore, your captions appear at the time specified in the captions file without regard to the video timecodes. For example, if your SRT file specifies that the first caption should appear at 00:05:23:00 or at 00:05:23,000 and you set **Timecode source** to **Specified start** and **Start timecode** to 00:04:00:00, the first caption will still appear in your output five minutes and twenty-three seconds into the video.

To adjust your captions to start at a different time than that, use the **Time delta** setting. For more information, see Use Cases for Time Delta (p. 84).

**Formats That Embed Captions in the Video Stream (CEA/EIA-608, CEA/EIA-708)**

Some captions formats embed the captions directly in the video frame or the video frame metadata. With these, MediaConvert keeps the captions with the frames that they are embedded in, regardless of the timecode settings.

**Use Cases for Time Delta**

How you use **Time delta** depends on the problem you’re trying to solve and the captions format that you’re working with.

**Adjusting for Different Timecodes Between Video and Captions Files**

With timecode-based captions formats, such as SCC and STL, the timecodes in the captions might be relative to a starting timecode that is different from the starting timecode embedded in the video. You use **Time delta** to adjust for the difference.

**Example problem:** Your video file might have embedded timecodes that start at 00:05:00:00 and the first instance of dialogue that requires captions might be one minute into the video, at timecode 00:06:00:00. Your captions file might be written on the assumption that your video timecodes start at 00:00:00:00, with the first caption starting at 00:01:00:00. If you don’t use **Time delta**, MediaConvert would not include this first caption because it occurs before the start of the video.

**Solution:** Add five minutes to the captions. Enter 300 for **Time delta**.

**Adjusting Captions After Synchronizing Video and Audio**

Your timecode-based (SCC or STL) captions might be aligned with the timecodes that are embedded in your video, but you might need to use the input **Timecode source** setting to align your audio. This creates a difference between the video and captions, which you need to adjust for. You don’t need to make this adjustment with timestamp-based captions formats, such as SRT, SMI, and TTML.
For more information about aligning captions when you use input Timecode source, see Input Timecode Source and Captions Alignment (p. 83).

**Example problem:** Your video file might have embedded timecodes that start at 00:05:00:00 and the first instance of dialogue that requires captions might be one minute into the video, at timecode 00:06:00:00. Your captions file is written to sync correctly, with the first caption starting at 00:06:00:00. But you need to change your embedded captions in your input to sync correctly with your audio file. So you set the input Timecode source to Start at Zero. If you don't use Time delta, MediaConvert would put the first caption in your output at six minutes into the video.

**Solution:** Subtract five minutes from the captions. Enter -300 for Time delta.

### Correcting Slight Errors in Captions Sync

With any type of sidecar format, there might be a small error in your input captions file, so that the captions are consistently a little late or a little early.

**Example problem:** Your video has embedded captions that start at zero. The first instance of dialogue that requires captions is at 00:06:15:00, but the captions appear on the screen three seconds late, at 00:06:18:00.

**Solution:** Subtract three seconds from the captions. Enter -3 for Time delta.

### Converting Dual SCC Input Files to Embedded Captions

If you want to use two SCC files as your captions input and embed the captions as two output captions channels embedded in your output video stream, set up your captions according to this procedure.

**To convert dual SCC to embedded captions**

1. Set up two input captions selectors. Follow the procedure in Creating Input Captions Selectors (p. 79). Specify values as follows:
   - In each captions selector, choose SCC for Source.
   - For Source file, choose one of your input SCC files in each selector.
   - If you want both 608 and 708 captions embedded in your outputs, choose Upconvert for Force 608 to 708 upconvert in both captions selectors.

2. Set up captions in your outputs. Follow the procedure in Setting Up Captions in Outputs (p. 86). Follow these specific choices:
   - Specify the captions in the same output as the video that you want the captions embedded in.
   - Choose Add captions twice, to create Captions 1 and Captions 2 tabs in the Encoding settings section.
   - For Captions source, in each of the captions tabs, choose one of the captions selectors that you created in the preceding step of this procedure.
   - For CC channel number, choose a number for each of the captions tabs that don't share a field. For example, in Captions 1, choose 1 for CC channel number and in Captions 2, choose 3 for CC channel number.
   - Don't choose the combinations 1 and 2 or 3 and 4, because those pairs of channels share the same field.
   - If you chose Upconvert in the preceding step of this procedure, optionally specify a service number for 708 service number. Within an output, each captions tab must specify a different service number.

   If you upconvert and don't specify a value for 708 service number, the service uses the value that you specify for CC channel number as your 708 service number.
IMSC (as Part of an IMF Source)

AWS Elemental MediaConvert supports IMSC as an input captions format either as a sidecar file or as part of an IMF source. If your input IMSC captions are in a sidecar file, see IMSC, SCC, SRT, STL, TTML (Sidecar) (p. 82).

When your input IMSC captions are part of an IMF source, you don't specify the source file for IMSC captions. That information is in the CPL file that you specify for your job input. For restrictions on IMSC support, see IMSC Captions Support in AWS Elemental MediaConvert (p. 91).

Number of Captions Selectors for IMSC

Create one captions selector per track.

Track Number

Specify which captions you want by providing a track number. The track numbers correspond to the order that the tracks appear in the CPL file. For example, if your CPL file lists your French captions first, set Track number to 1 to specify the French captions.

In Your JSON Job Specification

If you use the API or an SDK, you can find these settings in the JSON file of your job. These settings are under Inputs, as in the following example:

```json
"Inputs": [  

  {  

    "CaptionSelectors": {  

      "Captions Selector 1": {  

        "SourceSettings": {  

          "SourceType": "IMSC",  

          "TrackSourceSettings": {  

            "TrackNumber": 1  

          }  

        }  

      },  

      "Captions Selector 2": {  

        "SourceSettings": {  

          "SourceType": "IMSC",  

          "TrackSourceSettings": {  

            "TrackNumber": 4  

          }  

        }  

      }  

    }  

  }  

]  
```

Setting Up Captions in Outputs

The location of the captions in a job depends on your output captions format: Your captions might be in the same output as your video, a separate output in the same output group as your video, or in an entirely separate output group. How you set up multiple captions tracks also depends on the output captions format. The following procedure shows how to set up captions for different outputs.
To set up captions for different outputs

2. Choose Create job.
3. Set up your input, output groups, and outputs for video and audio, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
4. Create input captions selectors as described in the section called "Creating Input Captions Selectors" (p. 79).
5. Determine where in your job to specify the captions. This choice depends on the output captions format. Consult the relevant topic below to look this up.
6. In the left pane of the Create job page, choose the appropriate output from the list of outputs.
7. Under Encoding settings, choose Add caption. This displays a captions settings area under Encoding settings.
8. If your output captions format requires a separate group of captions settings for each track in the output, choose Add captions again until you have one captions group for each track. To determine whether you need one captions settings group for all tracks or one for each track, see the relevant topic below.
9. Under Encoding settings, choose Captions 1 from the list.
10. Under Captions source, choose a captions selector. This selects the track or tracks that you associated with the selector when you set up your input, so that AWS Elemental MediaConvert will include those captions in this output.
11. Under Destination type, choose an output captions format. Check Captions Support Tables by Output Container Type (p. 140) to ensure that you are choosing a supported format.
12. Provide values for any additional fields as described in the relevant topic below.

Details by output captions format

- CEA/EIA-608 and CEA/EIA-708 (Embedded) Output Captions (p. 87)
- DVB-Sub Output Captions (p. 88)
- IMSC, TTML, and WebVTT (Sidecar) Output Captions (p. 89)
- SCC, SRT (Sidecar) Output Captions (p. 90)
- Teletext Output Captions (p. 90)
- Burn-In Output Captions (p. 91)

CEA/EIA-608 and CEA/EIA-708 (Embedded) Output Captions

Where to Specify the Captions

Put your captions in the same output group and the same output as your video.

How to Specify Multiple Captions Tracks

- If your input captions format is embedded (that is, you are passing through embedded-to-embedded), you need to create only one group of captions settings. The captions selector that you choose under Captions source includes all tracks from the input.
- If your input captions are two SCC files, you can create output captions as two output captions channels that are embedded in your output video stream. For more information, see Converting Dual SCC Input Files to Embedded Captions (p. 85).
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DVB-Sub Output Captions

- If your input captions are not embedded or SCC, you can include only one captions track per output. In each output, include one group of captions settings. Under Captions source, choose the selector that is set up for the track that you want to include.

Embedded and Ancillary Captions in MXF Outputs

Whether your MXF output can contain ancillary captions depends on the MXF profile:

- MXF XDCAM HD: This MXF profile specifies ancillary data in the smpte 436 track. With these outputs, MediaConvert copies your embedded captions to the smpte 436 ancillary track in addition to including it in the video stream.
- MXF D-10: This MXF profile specification doesn't allow for ancillary data. Therefore, your MXF D-10 outputs only have captions embedded in the video stream.

MediaConvert determines an output's MXF profile based on the values for the following encoding settings:
- Resolution
- Frame rate
- Video codec profile
- Interlace mode

For information about which values for these settings are valid for which MXF profile, see the relevant specifications. For XDCAM HD, see RDD 9:2009 - SMPTE Standard Doc - MXF Interoperability Specification of Sony MPEG Long GOP Products in the IEEE Xplore Digital Library. For MXF D-10, see ST 356:2001 - SMPTE Standard - For Television — Type D-10 Stream Specifications — MPEG-2 4:2:2P @ ML for 525/60 and 625/50.

DVB-Sub Output Captions

Where to Specify the Captions

Put your captions in the same output group and the same output as your video.

How to Specify Multiple Captions Tracks

- If your input captions are the same format as your output captions (passthrough), you need to create only one group of captions settings. The captions selector that you choose under Captions source includes all tracks from the input.
- If your input captions are in a different format, create one group of captions settings for each track. Put each group of captions settings in the same output. They will appear in the list of settings groups as Captions 1, Captions 2, and so forth. In each group of settings, choose the captions selector under Captions source that is set up for the track that you want to include.

How to Specify the Font Script

AWS Elemental MediaConvert automatically selects the appropriate script for your captions, based on the language that you specify in the output captions settings. If the language that you choose has more than one possible script, specify the script that you want.
To ensure that the service uses the correct font script

1. In the Captions section under Encoding settings, for Language, choose the language of the captions text.
2. If the language that you specify has more than one possible script, use Font script to specify the script.

    For example, if you choose Chinese (ZH) for Language, use Font script to choose either Simplified Chinese or Traditional Chinese. In this case, if you don't specify a value for Font script, the service defaults to simplified Chinese.

    Tip
    In most cases, for Font script you can keep the default value of Automatic. When you do, the service chooses the script based on the language of the captions text.

IMSC, TTML, and WebVTT (Sidecar) Output Captions

If your output captions are IMSC, TTML or WebVTT format, set them up in your outputs according to the following information. For restrictions on IMSC support, see IMSC Captions Support in AWS Elemental MediaConvert (p. 91).

Where to Specify the Captions

Put your captions in the same output group, but a different output from your video.

After you add captions to an output, delete the Video and Audio 1 groups of settings that the service automatically created with the output.

To delete the Video and Audio 1 groups of settings

1. On the Create job page, in the Job pane on the left, under Output groups, choose the output that contains the groups of settings that you want to delete.
2. The Video group of settings is automatically displayed in the Stream settings section. Choose the Remove video selector button.
3. The Audio 1 group of settings is automatically displayed in the Stream settings section. Choose the Remove button.

How to Specify Multiple Captions Tracks

Put each captions track in its own output.

Note
    The captions track that you specify first in your job is signaled as the default track in the HLS manifest.

Sidecar Captions Container Options

Depending on your output group, you can choose the captions container for IMSC and TTML captions outputs.

For DASH ISO output groups, you can choose from these:

- Fragmented MP4 (.fmp4)
- Raw (.xml for IMSC, .ttml for TTML)
For all other output groups, IMSC and TTML files are raw.

To specify the captions container for IMSC and TTML captions in DASH ISO output groups

1. Set up the outputs in your DASH ISO output group as described in Creating Outputs in ABR Streaming Output Groups (p. 12). Put captions in a separate output.
2. On the Create job page, in the Job pane on the left, choose the captions output.
3. In the Output settings section on the right, choose Container settings, and then enable DASH container settings.
4. For Captions container, keep the default Raw or choose Fragmented MPEG-4.

SCC, SRT (Sidecar) Output Captions

Where to Specify the Captions

Put your captions in the same output group, but a different output from your video.

After you add captions to an output, delete the Video and Audio 1 groups of settings that the service automatically created with the output.

To delete the Video and Audio 1 groups of settings

1. On the Create job page, in the Job pane on the left, under Output groups, choose the output that contains the groups of settings that you want to delete.
2. The Video group of settings is automatically displayed in the Stream settings section. Choose the Remove video selector button.
3. The Audio 1 group of settings is automatically displayed in the Stream settings section. Choose the Remove button.

How to Specify Multiple Captions Tracks

Specify all tracks in the same output by creating one group of captions settings for each track. They will appear in the list of settings groups as Captions 1, Captions 2, and so forth. In each group of settings, choose the captions selector under Captions source that is set up for the track that you want to include.

Teletext Output Captions

Where to Specify the Captions

Put your captions in the same output group and the same output as your video.

How to Specify Multiple Captions Tracks

• If your input captions are the same format as your output captions (passthrough), you need to create only one group of captions settings. The captions selector that you choose under Captions source includes all tracks from the input.
• If your input captions are in a different format, create one group of captions settings for each track. Put each group of captions settings in the same output. They will appear in the list of settings groups as Captions 1, Captions 2, and so forth. In each group of settings, choose the captions selector under Captions source that is set up for the track that you want to include.
Burn-In Output Captions

Burn-in is a delivery method rather than a captions format. Burn-in writes the captions directly on your video frames, replacing pixels of video content with the captions. If you want burn-in captions in an output, set the captions up according to the following information.

Where to Specify the Captions

Put your captions in the same output group and the same output as your video.

How to Specify Multiple Captions Tracks

You can burn in only one track of captions in each output.

How to Specify the Font Script

AWS Elemental MediaConvert automatically selects the appropriate script for your captions, based on the language that you specify in the output captions settings. If the language that you choose has more than one possible script, specify the script that you want.

To ensure that the service uses the correct font script

1. In the Captions section under Encoding settings, for Language, choose the language of the captions text.
2. If the language that you specify has more than one possible script, use Font script to specify the script.

For example, if you choose Chinese (ZH) for Language, use Font script to choose either Simplified Chinese or Traditional Chinese. In this case, if you don't specify a value for Font script, the service defaults to simplified Chinese.

Tip

In most cases, for Font script you can keep the default value of Automatic. When you do, the service chooses the script based on the language of the captions text.

IMSC Captions Support in AWS Elemental MediaConvert

Current support for IMSC captions workflows is restricted as follows:

- Text profile is the only supported IMSC profile.
- All output IMSC files are IMSC 1.1.
Using Video Rotation in AWS Elemental MediaConvert

For most inputs, you can choose how AWS Elemental MediaConvert rotates your video. You can either specify the rotation or set the rotation to automatic. Automatic rotation uses any rotation metadata contained in the input files. Some cameras, often those in smartphones, record this rotation metadata when you turn the camera before you begin recording your video. This rotation metadata, sometimes referred to as rotation atoms or boxes, provides rotation metadata to the player device that is used for viewing the video. MediaConvert can automatically detect this rotation metadata and rotate your video during transcoding so that it appears correctly on all players.

**Tip**
If your video outputs are rotated in a way that you don’t expect, a likely cause is that your input video has rotation metadata but your job settings don’t specify that the service should use it. Try setting **Rotate to Automatic**. Find this setting on the Create job page, under Input, in the Video selector section.

**Input file requirements**
You can use rotation for inputs that have the following video characteristics:

- Progressive video
- Chroma subsampling scheme 4:2:2 or 4:2:0

**Topics**
- Specified Rotation (p. 92)
- Automatic Rotation (p. 93)

**Specified Rotation**

When you specify the rotation for your input, AWS Elemental MediaConvert rotates the video from your input clockwise the amount that you specify. This rotation applies to all outputs in the job. You can rotate clockwise by 90, 180, or 270 degrees. The following image shows a video output from a job that specifies a 90-degree rotation.

**Note**
AWS Elemental MediaConvert doesn’t pass through rotation metadata. Regardless of how you set **Rotate**, job outputs don’t have rotation metadata.
To specify the rotation of your video

1. On the Create job page, in the Job pane on the left, in the Inputs section, choose the input that you want to rotate.
2. In the Video selector section on the left, for Rotate, choose the amount of clockwise rotation that you want.

If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is rotate. Find the rotate property in the AWS Elemental MediaConvert API Reference.

Note
AWS Elemental MediaConvert doesn't rotate images and motion graphics that you overlay. If you use the image inserter (graphic overlay) feature or the motion image inserter (motion graphic overlay) feature with the rotate feature, rotate your overlay before you upload it. Specify the position of your overlays as you want them to appear on the video after rotation.

Automatic Rotation

If your video has embedded rotation metadata, AWS Elemental MediaConvert can detect it and automatically rotate your video content so that it's oriented correctly in your outputs.

Note
AWS Elemental MediaConvert doesn't pass through rotation metadata. Regardless of how you set Rotate, job outputs don't have rotation metadata.

Additional input file requirements for automatic rotation

In addition to the general input restrictions for the rotate feature, to use automatic rotation your input file must conform to these limitations:

- Input container: .mov or .mp4
- Rotation metadata specifying 90, 180, or 270-degree rotation

If your rotation metadata is within one degree less or more than the values listed here, the service will round to a supported value.

Note
If your input file has rotation metadata that specifies a rotation other than those listed here, the service defaults to no rotation.

To enable automatic rotation

1. Check that your input container is .mov or .mp4 and that your input has rotation metadata.
2. On the Create job page, in the Job pane on the left, in the Inputs section, choose the input that has rotation metadata.
3. In the Video selector section on the left, for Rotate, choose Automatic.

Note
AWS Elemental MediaConvert doesn't rotate images and motion graphics that you overlay. If you use the image inserter (graphic overlay) feature or the motion image inserter (motion graphic overlay) feature with the rotate feature, rotate your overlay before you upload it. Specify the position of your overlays as you want them to appear on the video after rotation.
Including SCTE-35 Markers in AWS Elemental MediaConvert Outputs

SCTE-35 markers indicate where downstream systems can insert other content (usually advertisements or local programs). You can include SCTE-35 markers in transport stream (TS), DASH, and HLS outputs.

AWS Elemental MediaConvert puts SCTE-35 markers into your outputs in one of two ways:

- The service passes markers through from your input to the output. For more information, see Passing Through SCTE-35 Markers from Your Input (p. 95).
- The service inserts markers at the points that you specify in an Event Signaling and Management (ESAM) XML document. For more information, see Specifying SCTE-35 Markers Using ESAM XML (p. 95).

Regardless of which way you put in the SCTE-35 markers, for outputs that have them, you can optionally do the following:

- You can have the service blank out audio and video during the ad avails indicated by the SCTE-35 markers. For more information, see Enabling Ad Avail Blanking (p. 102).
- For HLS outputs, you can have the service include SCTE-35 information in your output HLS manifest. For more information, see Including SCTE-35 Information in Your HLS Manifest (p. 99).

MediaConvert doesn't write SCTE-35 information to DASH manifests.

**Note**
MediaConvert does not process information from input manifests.

By default, the service doesn't pass through SCTE-35 markers from your input. When you set up your job to pass through markers from the input or from an ESAM document, by default, the service doesn't include SCTE-35 information in HLS manifests or do ad avail blanking.

**Feature Limitations**

Limitations to SCTE-35 support are as follows:

- You can either specify insertion points using ESAM XML or pass through SCTE-35 messages from the input. You can't do both.
- AWS Elemental MediaConvert supports only time_signal messages, not splice_insert messages.
- The service inserts SCTE-35 messages only into the following outputs:
  - Outputs in **File group** output groups with **MPEG-2 Transport Stream** set for **Container**.
  - Outputs in **DASH ISO** output groups.
  - Outputs in **Apple HLS** output groups.
- The service forces IDR (Instantaneous Decoder Refresh) frames at the insertion points specified in your ESAM XML document only in outputs that are encoded with one of the following codecs: MPEG-2, MPEG-4 AVC (H.264), or HEVC (H.265).

Set the container for each output under **Output settings, Container**.

- Outputs in **DASH ISO** output groups.
- Outputs in **Apple HLS** output groups.

Set the codec for each output under **Encoding settings, Video, Video codec**.
Passing Through SCTE-35 Markers from Your Input

You can include time_signal SCTE-35 markers from your input in any output that has a transport stream container. These outputs might be in an HLS package, or they might be standalone files wrapped in an MPEG2 transport stream (M2TS) container.

To pass through SCTE-35 markers from the input to an output (console)

2. Choose Create job.
3. Set up your input, output groups, and outputs for video and audio, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
4. Choose an output under either File group, DASH ISO, or Apple HLS.
5. Under Container settings (for File group outputs), Container settings (for DASH ISO outputs), or Transport stream settings (for Apple HLS outputs), find SCTE-35 source, and then choose Passthrough.
6. Optional. For outputs in a File group output group, when you set Output settings, Container to MPEG-2 Transport Stream (M2TS), you can enter a value for SCTE-35 PID that is different from the default 500.

A PID, or packet identifier, is an identifier for a set of data in an MPEG-2 transport stream container. PIDs are used by downstream systems and players to locate specific information in the container.
7. Optional. For outputs in an Apple HLS output group, you can set up the job to include ad markers in the manifest. For more information, see Including SCTE-35 Information in Your HLS Manifest (p. 99).

Specifying SCTE-35 Markers Using ESAM XML

If your input video doesn't contain SCTE-35 markers, but you need to specify ad insertion points in your outputs, you can provide Event Signaling and Management (ESAM) XML documents in your AWS Elemental MediaConvert job settings. When you do, MediaConvert conditions your outputs with IDR (Instantaneous Decoder Refresh) frames at the insertion points that you specify in the document. In outputs that are also wrapped in MPEG2-TS and HLS containers, MediaConvert inserts SCTE-35 time_signal messages at those points.

For your Apple HLS output groups, you also can optionally provide an HLS manifest conditioning XML document. You can then set up your job to condition the manifests for your HLS outputs accordingly.

Note
To put SCTE-35 markers in your MPEG2-TS outputs, in addition to supplying the ESAM XML documents, you must also enable **ESAM SCTE-35** on each output. For more information, see the console procedure following this overview.
About Timecodes in Your ESAM Documents

Specify the insertion points in your XML documents relative to the timing of the final output, after input clipping and stitching. Start your timing from 00:00:00:00, regardless of your timecode settings. Use the following 24-hour format with a frame number: HH:MM:SS:FF.

For example, a job has the following three inputs: a five-minute preroll, a one-hour film, and a five-minute postroll. You use input clipping to clip just the final 20 minutes of your one-hour input. So your output with preroll and postroll is 30 minutes long. If you want your first insertion point to appear three minutes into the main content, you would specify it at eight minutes—three minutes after your five-minute preroll.

To include ESAM XML documents in your job settings (console)

2. Choose Create new job.
3. Set up your input, output groups, and outputs for video and audio, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
4. In the Job pane on the left, in the Job settings section, choose Settings.
5. In the Ad signaling section, enable Event signaling and messaging (ESAM).
6. For Signal processing notification XML, enter your ESAM signaling XML document as text. For an example, see Example ESAM XML Signal Processing Notification (p. 98).
7. Optionally, if you want to include information about your SCTE-35 markers in your HLS manifests, for Manifest confirm condition notification XML, enter your ESAM manifest conditional XML document as text. MediaConvert doesn't include information about your SCTE-35 markers in your DASH manifests.
8. For each MPEG2-TS output where you want SCTE-35 markers, enable the markers:
   a. In the Job pane on the left, under Output groups, File group, choose the output.
   b. Confirm that it is an MPEG2-TS output. In the Output settings section, make sure that Container is set to MPEG-2 Transport Stream.
   c. Choose Container settings, and then scroll down to find the PID controls section.
   d. For ESAM SCTE-35 choose Enabled.
   e. For SCTE-35 source, keep the default None.
9. Do this step only for any Apple HLS output groups in your job.
   If you want to condition your HLS manifest with your ESAM insertion points, follow the procedure in Including SCTE-35 Information in Your HLS Manifest (p. 99). Otherwise, follow these steps to confirm that the following settings are still in their default state:
   a. Make sure that Manifest confirm condition notification XML, discussed in a previous step of this procedure, is empty.
   b. For each Apple HLS output group in your job, confirm that you have kept Ad Markers unchecked.
      i. In the Job pane on the left, under Output groups, choose Apple HLS.
      ii. In the Apple HLS group settings section, choose Advanced.
      iii. In the Ad markers section, clear the Elemental and SCTE-35 enhanced check boxes.
   c. For each output in your Apple HLS output groups, confirm that SCTE-35 source is set to None:
      i. In the Job pane on the left, under Output groups, Apple HLS, choose an output.
      ii. In the Output settings section, choose Transport stream settings.
iii. For **SCTE-35 source**, choose **None**.

**To include ESAM XML documents in your jobs settings (API, SDK, AWS CLI)**

1. Include the `esam` property and its children at the root of the job settings in your JSON job specification. These properties are shown in the following example.

   a. Include your ESAM signal processing XML specification as a string in the setting `sccXml`.
   
   ```json
   "esam": {
     "responseSignalPreroll": 4000,
     "signalProcessingNotification": {
       "sccXml": "<SignalProcessingNotification ...
       \n<SignalProcessingNotification ...
     },
     "manifestConfirmConditionNotification": {  
       "mccXml": "<ManifestConfirmConditionNotification ...
       \n<ns2:ManifestConfirmConditionNotification ...
     }
   }
   ```

   b. Optionally, include a manifest confirm condition XML notification document as a string in the setting `mccXml`:

2. For each M2TS (MPEG2 Transport Stream) output in your job, set your JSON job specification as shown in the following example. Include the property `scte35Esam`. Set `scte35Source` to **NONE**.

   ```json
   "outputs": [
   {
     "extension": "m2ts",
     "containerSettings": {
       "container": "M2TS",
       "m2tsSettings": {
         ...
         "scte35Esam": {
           "scte35EsamPid": 508
         },
         ...
         "scte35Source": "NONE"
       }
     }
   }
   ```

3. If you want to condition your HLS manifests with SCTE-35 information, for each Apple HLS output group in your job, include the following. These settings are shown in the example at the end of this step:

   - Set `scte35Source` to **PASSTHROUGH**.
   - Include `adMarkers` and list one or both of **ELEMENTAL_SCTE35** or **ELEMENTAL** in an array.

   For sample manifests created with each setting selected, see [Sample Manifest: Elemental Ad Markers (p. 100)](#) and [Sample Manifest: SCTE-35 Enhanced Ad Markers (p. 101)](#).

   If you don't want to condition your HLS manifests with SCTE-35 information, keep the default setting **NONE** for `scte35Source` and don't include `adMarkers`:

   ```json
   "outputGroups": [
   {
     "customName": "apple_hls",
     "outputGroupSettings": {
       "type": "HLS_GROUP_SETTINGS",
   ```
"hlsGroupSettings": { 
   "adMarkers": [ 
      "ELEMENTAL_SCTE35"
   ],
   ...
},
"outputs": [ 
   { 
      "extension": "m3u8",
      "nameModifier": "high",
      "outputSettings": { 
         "hlsSettings": { 
            ...
         },
      
      "containerSettings": { 
         "container": "M3U8",
         "m3u8Settings": { 
            ...
            "scte35Source": "PASSTHROUGH"
         } 
      } 
   }
}

4. Submit your job as usual.

For information about submitting AWS Elemental MediaConvert jobs programmatically, see Getting Started with AWS Elemental MediaConvert Using the AWS SDKs or the AWS CLI and Getting Started with AWS Elemental MediaConvert Using the API.

Example ESAM XML Signal Processing Notification

This ESAM XML block generates two 30-second ad breaks, one at 10 seconds in and the other at 75 seconds in.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<SignalProcessingNotification xmlns="urn:cablelabs:iptvservices:esam:xsd:signal:1"
xmlns:sig="urn:cablelabs:md:xsd:signaling:3.0"
   <common:BatchInfo batchId="1">
      <common:Source xsi:type="content:MovieType" />
   </common:BatchInfo>

   <ResponseSignal acquisitionPointIdentity="ExampleESAM" acquisitionSignalID="1" signalPointID="10.00" action="create">
      <sig:NPTPoint nptPoint="10.00"/>
      <sig:SCTE35PointDescriptor spliceCommandType="06">
         <sig:SegmentationDescriptorInfo segmentEventId="1" segmentTypeId="52" upidType="9" upid="1" duration="PT30S" segmentNumber="1" segmentsExpected="1"/>
      </sig:SCTE35PointDescriptor>
   </ResponseSignal>

   <ConditioningInfo acquisitionSignalIDRef="1" startOffset="PT10S" duration="PT30S"/>

   <ResponseSignal acquisitionPointIdentity="ExampleESAM" acquisitionSignalID="2" signalPointID="40.00" action="create">
      <sig:NPTPoint nptPoint="40.00"/>
      <sig:SCTE35PointDescriptor spliceCommandType="06">
         <sig:SegmentationDescriptorInfo segmentEventId="1" segmentTypeId="53" upidType="9" upid="2"/>
      </sig:SCTE35PointDescriptor>
   </ResponseSignal>
</SignalProcessingNotification>
```
Including SCTE-35 Information in Your HLS Manifest

For outputs in an HLS package, you can have the service include information in the HLS manifest about the SCTE-35 markers that are in each of the outputs.

To include SCTE-35 information in your HLS manifest (console)

2. Choose Create new job.
3. Set up your input, output groups, and outputs for video and audio, following the procedure in Passing Through SCTE-35 Markers from Your Input (p. 95) or Specifying SCTE-35 Markers Using ESAM XML (p. 95).
4. Enable ad markers in each of your Apple HLS output groups.
   a. In the Job pane on the left, under Output groups, choose Apple HLS.
   b. In the Apple HLS group settings section, choose Advanced.
   c. Choose Container settings, then scroll down to find the PID controls section.
   d. In the Ad markers section, choose one or both of Elemental and SCTE-35 enhanced.

   For sample manifests created with each setting selected, see Sample Manifest: Elemental Ad Markers (p. 100) and Sample Manifest: SCTE-35 Enhanced Ad Markers (p. 101).
5. If the source of your ad markers is an ESAM document, set these additional settings:
   a. Make sure that you entered XML for Manifest confirm condition notification XML during the procedure in Specifying SCTE-35 Markers Using ESAM XML (p. 95).
   b. For each output in each of your Apple HLS output groups, set SCTE-35 source to Passthrough.
      i. In the Job pane on the left, under Output groups, Apple HLS, choose an output.
      ii. In the Output settings section, choose Transport stream settings.
      iii. For SCTE-35 source, choose Passthrough.
Sample Manifest: Elemental Ad Markers

To generate the following sample manifest, choose Apple HLS group settings, Advanced, Ad markers, Elemental:

```plaintext
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-TARGETDURATION:12
#EXT-X-MEDIA-SEQUENCE:1
#EXT-X-PLAYLIST-TYPE:VOD
#EXTINF:10.000,
file_60p_1_00001.ts
#EXTINF:2.000,
file_60p_1_00002.ts
#EXTINF:12.000,
file_60p_1_00003.ts
#EXTINF:12.000,
file_60p_1_00004.ts
#EXTINF:4.000,
file_60p_1_00005.ts
#EXTINF:8.000,
file_60p_1_00006.ts
#EXTINF:12.000,
file_60p_1_00007.ts
#EXTINF:12.000,
file_60p_1_00008.ts
#EXTINF:3.000,
file_60p_1_00009.ts
#EXTINF:9.000,
file_60p_1_00010.ts
#EXTINF:12.000,
file_60p_1_00011.ts
#EXTINF:9.000,
file_60p_1_00012.ts
#EXTINF:3.000,
file_60p_1_00013.ts
#EXTINF:12.000,
file_60p_1_00014.ts
#EXTINF:12.000,
file_60p_1_00015.ts
#EXTINF:3.000,
file_60p_1_00016.ts
#EXTINF:9.000,
file_60p_1_00017.ts
#EXTINF:12.000,
file_60p_1_00018.ts
#EXTINF:12.000,
file_60p_1_00019.ts
#EXTINF:12.000,
file_60p_1_00020.ts
#EXTINF:12.000,
file_60p_1_00021.ts
#EXTINF:12.000,
file_60p_1_00022.ts
```

100
Sample Manifest: SCTE-35 Enhanced Ad Markers

To generate the following sample manifest, choose Apple HLS group settings, Advanced, Ad markers, SCTE-35 enhanced:

```m3u
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-TARGETDURATION:12
#EXT-X-MEDIA-SEQUENCE:1
#EXT-X-PLAYLIST-TYPE:VOD
#EXTINF:12.000,
file_60p_1_00001.ts
#EXT-X-OATCLS-SCTE35:/DAnAAAAAAAAAP/wBQb+AA27oAARAg9DVUVJAAAAAX+HCQA0AAE0xUZn
#EXT-X-CUE-OUT:30.000
#EXTINF:2.000,
file_60p_1_00002.ts
#EXT-X-CUE-OUT-CONT:ElapsedTime=2.000,Duration=30,SCTE35=/DAnAAAAAAAAAP/wBQb+AA27oAARAg9DVUVJAAAAAX+HCQA0AAE0xUZn
#EXTINF:12.000,
file_60p_1_00003.ts
#EXT-X-CUE-OUT-CONT:ElapsedTime=14.000,Duration=30,SCTE35=/DAnAAAAAAAAAP/wBQb+AA27oAARAg9DVUVJAAAAAX+HCQA0AAE0xUZn
#EXTINF:12.000,
file_60p_1_00004.ts
#EXT-X-CUE-OUT-CONT:ElapsedTime=26.000,Duration=30,SCTE35=/DAnAAAAAAAAAP/wBQb+AA27oAARAg9DVUVJAAAAAX+HCQA0AAE0xUZn
#EXTINF:4.000,
file_60p_1_00005.ts
#EXT-X-OATCLS-SCTE35:/DAnAAAAAAAAAP/wBQb+ADbugAARAg9DVUVJAAAAAX+HCQA1AA3v5+Q
#EXT-X-CUE-IN
#EXTINF:8.000,
file_60p_1_00006.ts
#EXTINF:12.000,
file_60p_1_00007.ts
#EXTINF:12.000,
file_60p_1_00008.ts
#EXTINF:3.000,
file_60p_1_00009.ts
#EXT-X-OATCLS-SCTE35:/DAnAAAAAAAAAP/wBQb+Agb/MAARAa9DVUVJAAAAAn+HCQA0AALMua1L
#EXT-X-CUE-OUT:30.000
#EXTINF:9.000,
file_60p_1_00010.ts
#EXT-X-CUE-OUT-CONT:ElapsedTime=9.000,Duration=30,SCTE35=/DAnAAAAAAAAAP/wBQb+Agb/MAARA9DVUVJAAAAAn+HCQA0AALMua1L
#EXTINF:12.000,
file_60p_1_00011.ts
#EXT-X-CUE-OUT-CONT:ElapsedTime=21.000,Duration=30,SCTE35=/DAnAAAAAAAAAP/wBQb+Agb/MAARA9DVUVJAAAAAn+HCQA0AALMua1L
#EXTINF:9.000,
file_60p_1_00012.ts
#EXT-X-OATCLS-SCTE35:/DAnAAAAAAAAAP/wBQb+AJAyEAARAg9DVUVJAAAAAn+HCQA1AABStd4A
#EXT-X-CUE-IN
#EXTINF:3.000,
file_60p_1_00013.ts
#EXTINF:12.000,
file_60p_1_00014.ts
#EXTINF:12.000,
```

#EXTINF:12.000,
file_60p_1_00023.ts
#EXTINF:10.067,
file_60p_1_00024.ts
#EXT-X-ENDLIST
```
Enabling Ad Avail Blanking

You can enable ad avail blanking to remove video content, remove any captions, and mute audio during the portions of the output that are marked as available for ads (ad avails).

You set up SCTE-35 markers in each output individually, but you enable or disable ad avail blanking for every output in the job. To use ad avail blanking, you have to both set up SCTE-35 markers and enable ad avail blanking, as described in the following procedure.

To enable ad avail blanking (console)

2. Choose Create new job.
3. Set up your input, output groups, and outputs for video and audio, following the procedure in Passing Through SCTE-35 Markers from Your Input (p. 95) or Specifying SCTE-35 Markers Using ESAM XML (p. 95).
4. In the left navigation pane, under Job settings, choose Settings.
5. Under Global processors, enable Ad avail blanking.
6. Optionally, under Blanking image, provide a URI to an image input file that is stored in Amazon S3 or on an HTTP(S) server. For Amazon S3 inputs, you can specify the URI directly or choose Browse to select from your Amazon S3 buckets. For HTTP(S) inputs, provide the URL to your input video file. For more information, see HTTP Input Requirements (p. 6).

If you specify an image here, the service inserts the image on all video frames inside the ad avail. If you don't specify an image, the service uses a black slate instead.

Blanking images must be .png or .bmp files that are the same size or smaller, in pixels, as the output video resolution.
Using Image Inserter (Graphic Overlay) in AWS Elemental MediaConvert

The image inserter (graphic overlay) feature lets you insert a still image or motion graphic at a specified time and display it as an overlay on the underlying video for a specified duration. This feature includes fade-in and fade-out capability and adjustable opacity.

You can set up an output with multiple overlays. For example, you might include a motion graphic logo in the corner of the video frame throughout the duration of the video, and a still image HDR indicator for only the portions of the file that are HDR. Each overlay is independent of the others, with its own settings for opacity, fade-in and fade-out times, position on the frame, and the length of time that it is on the video. You can set up overlays so that they all appear on the underlying video at the same time and physically overlap each other.

Topics
- Still Graphic Overlays in AWS Elemental MediaConvert (p. 103)
- Motion Image Inserter (Graphic Overlay) in AWS Elemental MediaConvert (p. 108)

Still Graphic Overlays in AWS Elemental MediaConvert

The following topics walk you through how to set up still graphic overlays. To begin, decide where in your job to specify the overlay. This choice affects how the overlay appears in outputs.

Topics
- Choosing Between Input Overlay and Output Overlay (p. 103)
- Placing Your Still Graphic Overlay (p. 105)
- Requirements for the Overlay File (p. 106)
- Setting Up Still Graphic Overlays in Outputs (p. 106)
- Setting Up Still Graphic Overlays in Inputs (p. 106)
- About Sizing Your Overlay to Account for Scaling (p. 107)
- About Specifying the Overlay Layer (p. 107)

Choosing Between Input Overlay and Output Overlay

You can add still image overlays to your inputs, your outputs, or both. Where you specify your graphic overlays affects where in your transcoded assets the overlays appear.
Choosing Between Input Overlay and Output Overlay

The following diagram shows how input and output overlays appear in the video files that are created by a job. Input overlays appear on all outputs, but only in the portions of the outputs that come from the input that has the overlay. Output overlays appear throughout an entire output, but only on the outputs that have the overlay.

**Note**
In this diagram, all overlays are specified for the entire duration of the input or output. You can instead specify a shorter overlay duration within that time.

### Input Overlays

Choose input overlay for the following situations:

- You want the same overlays on every output.
- You want an overlay on only the parts of your outputs that correspond to individual inputs.

These examples are situations where you would use input overlay:

- Some of your inputs already have your logo as an overlay and some of them don't. You want to add the logo only to the inputs that don't already have it.
- Some of your inputs are programming that you want your logo on. Other inputs are advertisements or blank slates that you don’t want your overlay on.
- Your job has only one input and you want your overlay to appear for the entire duration of the video on every output of the job.

### Output Overlays

Choose output overlay for the following situations:

- You want overlays on some outputs but not others.
- You want different overlays on different outputs.
- You have multiple inputs, but you want the same overlay across all of them.

These examples are situations where you would use output overlay:

- You set up one of your outputs with high definition. You want to include an HD indicator in the corner of the frame on this output only.
- You are stitching together several films as separate inputs to create a single-asset film marathon. You want to put a graphic on all of them indicating that they are part of the larger marathon.
Placing Your Still Graphic Overlay

Regardless of whether you specify a still graphic overlay in an input or an output, you set up when it starts and how long it runs by specifying the Start time and Duration. The following image shows how you would specify these settings if you wanted your overlay to start two minutes into the video and to remain on the video for two minutes. If you keep these settings in their default state, the overlay will begin at the first frame of the input or output and remain on the video for the duration of the input or output.

Start time

Provide the timecode for the first frame that you want to have the overlay appear on. If you set up your overlay to fade in, the fade-in begins at the start time.

Make sure that you take the right timeline into account when you provide your start time. This depends on which overlay you’re using:

- For input overlays, Start time is relative to the input timeline. This timeline is affected by the input Timecode source setting.
- For output overlays, Start time is relative to the output timeline. This timeline is affected by the job-wide Timecode configuration, Source setting.

For more information about the input and output timelines, and the timecode settings that affect them, see the section called “How MediaConvert Uses Timelines to Assemble Jobs” (p. 25).

Tip

For simplest setup, specify Start time counting from 00:00:00:00 as the first frame, and set both of the following settings to Start at 0:

- Timecode configuration, Source, under the job-wide settings.
- Timecode source, in the Video selector settings for each input.

Duration

Specify the length of time, in milliseconds, that you want the overlay to remain for. This duration includes fade-in time, but not fade-out time, as the following image shows.

Duration: 120,000 ms (2 min)

Fade in: 40,000 ms (40 sec)  Fade out: 40,000 ms (40 sec)
Requirements for the Overlay File

Set up the image files that you want to insert over your video as follows:

- **File type**: Use .png or .tga.
- **Aspect ratio**: Use any aspect ratio; it doesn’t need to match the aspect ratio of the underlying video.
- **Size in pixels**: Use any size. If the overlaid graphic is larger than the output video frame, the service crops the graphic at the edge of the frame.

**Note**
In jobs that scale the video resolution, whether your overlay scales with your video depends on where you specify the graphic overlay. For more information, see About Sizing Your Overlay to Account for Scaling (p. 107).

Setting Up Still Graphic Overlays in Outputs

Because you are setting up an output overlay, set up image insertion in each output where you want the service to overlay graphics on your video. For information about setting up an overlay that appears on all outputs or on portions that correspond to only one input, see Choosing Between Input Overlay and Output Overlay (p. 103).

If you don’t specify overlay start time and duration, the service puts the overlay on the entire output.

**To set up a still graphic overlay in an output**

2. Set up your output groups and outputs for video and audio, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
3. For each output that you want to have a graphic overlay, do the following:
   a. On the Create job page, in the Job pane on the left, under Output groups, choose the appropriate output.
   b. Under Encoding settings, under the Video tab, find the Preprocessors section.
   c. Choose Image inserter. This displays an Add image button.
   d. For each graphic overlay that you want to include in the output, choose Add image, and then specify the overlay settings.

   For Image location, specify an input file that is stored in Amazon S3 or on an HTTP(S) server. For Amazon S3 inputs, you can specify the URI directly or choose Browse to select from your Amazon S3 buckets. For HTTP(S) inputs, provide the URL to your input video file. For more information, see HTTP Input Requirements (p. 6).

   For details about the more complex output graphic overlay settings, see the following topics:

   About Sizing Your Overlay to Account for Scaling (p. 107)
   About Specifying Layer (p. 107)

Setting Up Still Graphic Overlays in Inputs

Because you are setting up an input overlay, set up image insertion in each input where you want the service to overlay graphics on your video. The overlays that you specify appear in every output. For
information about setting up an overlay that appears on only specific outputs, see Choosing Between Input Overlay and Output Overlay (p. 103).

If you don’t specify overlay start time and duration, the service puts the overlay on the entire part of the output that corresponds to the input.

To set up a still graphic overlay in an output

2. Specify your input files, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7).
3. For each input that you want to have a graphic overlay, do the following:
   a. On the Create job page, in the Job pane on the left, under Inputs, choose the appropriate input.
   b. In the Image inserter section to the right of the Job pane, choose Add image, and then specify the overlay settings.

   For Image location, specify an input file that is stored in Amazon S3 or on an HTTP(S) server. For Amazon S3 inputs, you can specify the URI directly or choose Browse to select from your Amazon S3 buckets. For HTTP(S) inputs, provide the URL to your input video file. For more information, see HTTP Input Requirements (p. 6).

For details about the more complex input graphic overlay settings, see the following topics:

About Sizing Your Overlay to Account for Scaling (p. 107)

About Specifying Layer (p. 107)

About Sizing Your Overlay to Account for Scaling

In jobs that scale the video resolution, whether your overlay scales with your video depends on where you specify the graphic overlay. Motion graphic overlay and input overlays scale with the video; output overlays don’t.

For example, suppose that the input video for your job is 1080 x 1920 and you specify three outputs at 720 x 1280, 480 x 640, and 360 x 480. You want your square logo to be 10% of the width of your frames. You would provide overlay images at the following resolutions:

- For a motion graphic overlay or an input graphic overlay, provide an image that is 108 x 108. The service appropriately sizes each overlay on each output.
- For an output graphic overlay on your 720 x 1280 output, provide an image that is 72 x 72.
- For an output graphic overlay on your 480 x 640 output, provide an image that is 48 x 48.
- For an output graphic overlay on your 360 x 480 output, provide an image that is 36 x 36.

About Specifying the Overlay Layer

The Layer setting specifies how overlapping graphic overlays appear in the video. The service overlays graphics with higher values for Layer on top of overlays with lower values for Layer. Each overlay must have a unique value for Layer; you can’t assign the same layer number to more than one overlay.

The following illustration shows how the value for Layer affects how a graphic overlay appears in relation to other overlays. The triangle has the highest value for Layer and appears on top, obscuring the video frame and all graphic overlays with lower values of Layer.
To specify a value for the Layer setting
1. Set up your graphic overlay as described in Still Graphic Overlay (p. 103).
2. For Layer, enter a whole number from 0 to 99.
   
   **Note**
   
   You can use each number only once. Each graphic overlay must have its own layer.

**Motion Image Inserter (Graphic Overlay) in AWS Elemental MediaConvert**

The following topics walk you through how to set up motion graphic overlays. Motion graphic overlays appear in all outputs.

By default, if you don’t specify an overlay start time or set playback to repeat, the overlay begins at the start of the video and runs for the duration of the motion graphic that you provide.

**Placing Your Motion Graphic Overlay**

When you place a motion graphic overlay, you set up when it starts and how long it runs by specifying the **Start time** and **Playback**. The following image shows how you would specify these settings if you wanted your overlay to start two minutes into the video and to continuously loop over the rest of the video. If you keep **Start time** and **Playback** in their default state, the overlay will begin at the first frame of each output and remain on the video for the duration of the motion graphic played once.

   **Note**
   
   In this example, the motion graphic is three minutes long, but the overlay is set to continue to repeat the motion graphic until the end of the output.

**Start time**

Provide the timecode for the first frame that you want to have the motion overlay appear on. This timecode is relative to your input timeline. For input overlays, **Start time** is relative to the input timeline. This timeline is affected by the input **Timecode source** setting.

For input overlays, **Start time** is relative to the input timeline. This timeline is affected by the input **Timecode source** setting.

For more information about the input and output timelines, and the timecode settings that affect them, see the section called “How MediaConvert Uses Timelines to Assemble Jobs” (p. 25). For jobs with
multiple inputs, MediaConvert places the motion overlay on each input, according to the input timeline for that input. You specify **Start time** once, and MediaConvert applies that value to all inputs.

**Tip**
For simplest setup, specify **Start time** counting from 00:00:00:00 as the first frame, and set both of the following settings to **Start at 0**:

- **Timecode configuration, Source**, under the job-wide settings.
- **Timecode source**, in the Video selector settings for each input.

**Playback**
You can set your overlay to last the duration of the motion graphic played through once, or you can set it to loop the motion graphic continuously from the start time to the end of the output. The duration of a .mov motion graphic is built into the .mov file, which has a set number of frames and a defined frame rate. If your motion graphic is a set of .png images, you determine the duration of the overlay by how many images you provide and the frame rate that you specify. The duration in seconds is the number of frames divided by the frame rate in frames per second. For example, if your frame rate is 30 fps and you provide 600 images, the duration of the motion overlay is 20 seconds.

For jobs with multiple inputs, MediaConvert places the motion overlay on each input at the time that you specify for **Start time**, and then either plays the overlay once or until the end of the input, depending on what you choose for **Playback**. You specify **Playback** once, and MediaConvert applies that value to all inputs.

**Requirements for the Motion Overlay File**

**General requirements for motion graphic files**
Set up the files for your motion graphic as follows:

- **File type**: Use .mov or a set of sequential .png files.
- **Frame rate**: Use any frame rate; it doesn't have to match the frame rate of the underlying video. Frame rate is embedded in .mov files; with a set of .png files you specify the frame rate when you set up the overlay.
- **Aspect ratio**: Use any aspect ratio; it doesn't have to match the aspect ratio of the underlying video.
- **Size in pixels**: Use any size. AWS Elemental MediaConvert scales the motion graphic with any outputs that have video scaling.

**Additional requirements for sets of sequential .png files**
Set up your .png motion image files follows:

- Make sure that the names of the .png files end with sequential numbers that specify the order that they are played in. For example, overlay_000.png, overlay_001.png, overlay_002.png, and so on.
- Pad your initial file name with enough zeros to complete the sequence. For example, if the first image is overlay_0.png, there can be only 10 images in the sequence, with the last image being overlay_9.png. But if the first image is overlay_00.png, there can be 100 images in the sequence.
- Make sure that the number of images in your series matches the frame rate and your intended overlay duration. For example, if you want a 30-second overlay at 30 fps, you should have 900 .png images.

**Setting Up Motion Graphic Overlays**
Because motion graphic overlays apply to every output in the job, you set them up as a processor in the settings that apply to the entire job.
You can set up still graphic overlays that appear only on individual outputs. For information, see Choosing Between Input Overlay and Output Overlay (p. 103).

**To set up a motion graphic overlay**

2. Set up your job, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7).
3. On the Create job page, in the Job pane on the left, under Job settings, choose Settings.
4. In the Global processors section to the right of the Job pane, enable Motion image inserter.
5. For Input, specify your motion graphic file name. If you're using a series of .png files, provide the file name of the first image.
6. Specify values for the other fields. For more information about these fields, choose the Info link on the console next to Motion image inserter.
Using Accelerated Transcoding in AWS Elemental MediaConvert

AWS Elemental MediaConvert jobs that create premium content, such as those that incorporate Ultra High Definition (UHD) and High Dynamic Range (HDR) content, can have high computational requirements and can take longer to complete. To reduce the transcoding time required to run these jobs, you can use accelerated transcoding. Consider using accelerated transcoding for jobs that would otherwise take 10 minutes or longer to run.

For example, jobs that generate the following assets might benefit from accelerated transcoding:

- Ultra High Definition content
- High dynamic range content in HEVC
- Any long-duration, visually complex video

Note

Accelerated transcoding is a Professional tier feature. You pay more per minute of transcoded output for outputs that use Professional tier features. For more information about MediaConvert pricing tiers, see MediaConvert Pricing.

Topics

- Setting Up Accelerated Transcoding in AWS Elemental MediaConvert (p. 111)
- Job Limitations for Accelerated Transcoding in AWS Elemental MediaConvert (p. 112)
- Example Accelerated Transcoding JSON Job for AWS Elemental MediaConvert (p. 114)

Setting Up Accelerated Transcoding in AWS Elemental MediaConvert

You set up accelerated transcoding for your AWS Elemental MediaConvert jobs in the same way that you set up unaccelerated jobs, except that you enable acceleration.

Note

We recommend that you use a dedicated transcoding queue for your accelerated transcoding jobs, to provide isolation between the resources that you use for your accelerated jobs and your other jobs.

To set up your transcoding job with accelerated transcoding (console)

1. Set up your transcoding job as usual. For more information, see Setting Up a Job (p. 7).

   Make sure that your job input files and output settings conform to the limitations and requirements listed in Job Limitations for Accelerated Transcoding in AWS Elemental MediaConvert (p. 112).

2. Change your timecode settings from the default value Embedded to Start at zero.

   a. On the Create job page, in the Job pane on the left, under Job settings, choose Settings.
   b. In the Timecode configuration pane, for Source, choose Start at 0.
   c. On the Create job page, in the Job pane on the left, under Inputs, choose the input.
d. In the Video selector pane, for Timecode source, choose Start at 0.

3. If you don’t already have a dedicated queue for accelerated transcoding jobs, create one. For more information, see Creating an On-Demand Queue in AWS Elemental MediaConvert (p. 67).

4. On the Create job page, in the Job pane on the left, in the Job Settings section, choose Settings.

5. For Acceleration, choose Enabled or Preferred.

With both Enabled and Preferred, if your input files and transcoding settings are compatible with accelerated transcoding, MediaConvert runs the job with accelerated transcoding.

If your input files or transcoding settings aren’t compatible with accelerated transcoding, MediaConvert handles the job differently, depending on the value that you set for Acceleration:

- **Enabled** – The service fails the incompatible job.
- **Preferred** – The service runs the job without accelerated transcoding.

Setting Acceleration to Preferred incurs Professional tier pricing only when MediaConvert runs the job with accelerated transcoding.

For more information about what files and settings are compatible with accelerated transcoding, see Job Limitations for Accelerated Transcoding in AWS Elemental MediaConvert (p. 112).

If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is AccelerationMode, under AccelerationSettings.

---

## Job Limitations for Accelerated Transcoding in AWS Elemental MediaConvert

Before you enable accelerated transcoding, make sure that your job conforms to the following requirements and limitations.

### Video Inputs Supported with Accelerated Transcoding

The following table shows the video input codecs and containers that MediaConvert supports with accelerated transcoding.

<table>
<thead>
<tr>
<th>Container</th>
<th>Video Codecs Supported with Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMF</td>
<td>JPEG 2000 (J2K)</td>
</tr>
<tr>
<td>MPEG Transport Streams</td>
<td>AVC (H.264), HEVC (H.265), MPEG-2, VC-1</td>
</tr>
<tr>
<td>MPEG-4</td>
<td>AVC Intra 50/100, AVC (H.264), HEVC (H.265), MPEG-2</td>
</tr>
<tr>
<td>MXF</td>
<td>Apple ProRes, AVC Intra 50/100, AVC (H.264), JPEG 2000 (J2K), MPEG-2, SonyXDCam, SonyXDCam (as an MPEG-2 variant only)</td>
</tr>
<tr>
<td>QuickTime</td>
<td>Apple ProRes, AVC Intra 50/100, AVC (H.264), JPEG 2000 (J2K), MPEG-2</td>
</tr>
</tbody>
</table>

### Video Outputs Supported with Accelerated Transcoding

---

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The following table shows the video output codecs and containers that MediaConvert supports with accelerated transcoding.

<table>
<thead>
<tr>
<th>Container</th>
<th>Codecs Supported with Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMAF</td>
<td>AV1, AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>DASH</td>
<td>AV1, AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>HLS</td>
<td>AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>MPEG-2 TS</td>
<td>AVC (H.264), HEVC (H.265), MPEG-2</td>
</tr>
<tr>
<td>MPEG-4 (.mp4)</td>
<td>AV1, AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>MPEG-4 Flash (.f4v)</td>
<td>AVC (H.264)</td>
</tr>
<tr>
<td>MXF (.mxf)</td>
<td>MPEG-2</td>
</tr>
<tr>
<td>QuickTime</td>
<td>AVC (H.264), MPEG-2</td>
</tr>
<tr>
<td>Smooth (ISMV)</td>
<td>AVC (H.264)</td>
</tr>
<tr>
<td>Raw (no container)</td>
<td>AVC (H.264), HEVC (H.265), MPEG-2</td>
</tr>
</tbody>
</table>

**Note**
For MPEG-2 TS outputs, to use accelerated transcoding, you must change the default value of CBR for **Transport stream settings > Rate mode** to VBR.

**Output Restrictions**
- Use only supported combinations of container and codec. The preceding table shows the supported video output codecs and containers.
- Use only supported output captions formats. For accelerated transcoding, MediaConvert doesn't support the following output captions formats:
  - Not supported: Burn-in
  - Not supported: SCTE-20

For a list of supported captions formats, see Captions Support Tables by Output Container Type (p. 140).

**Transcoding Features Not Supported with Accelerated Transcoding**
- Avail blanking
- Motion image inserter (Motion graphic overlay)
- Interpolated frame rate conversion
- VBI passthrough
- Timecode passthrough
- SEI timecode
- Timecode anchor
- Telecine output
- Inverse telecine output
- Open GOP outputs
- Embedded timecode source
Note
With accelerated transcoding, you can set the input setting **Timecode source** to **Embedded**, but not the job-wide setting **Source** under **Timecode configuration**.

- Values for Min-I interval other than the default of 0
- ESAM
- SCTE-35 passthrough

**Example Accelerated Transcoding Job for AWS Elemental MediaConvert**

The following example JSON job converts an MP4 file to another MP4 file that is 720p encoded with H.265. To use this example, replace the settings with your values. At minimum, you must provide values for the following settings:

- **Role**: This is the AWS Identity and Access Management (IAM) role that you set up to give AWS Elemental MediaConvert permission to access your input and output Amazon S3 buckets and to access Amazon API Gateway on your behalf. For information about setting up this role, see **Set Up IAM Permissions** in the **AWS Elemental MediaConvert User Guide**.
- **Destination**: The Amazon S3 bucket where you want MediaConvert to store your output file. Make sure to include a trailing backslash, as in the example.
- **InputClippings**: Define the clips that you want transcoded by specifying sets of values for **StartTimecode** and **EndTimecode**. Alternatively, you can remove **InputClippings** entirely to transcode the entire asset.
- **FileInput**: Specify the file name and location for your input file. Your file input can be an Amazon S3 object or an HTTP URL.

Accelerated transcoding is supported with jobs that have only a single input; you can't do input stitching.

```json
{
  "Role": "arn:aws:iam::123456789012:role/MediaConvert_Role",
  "AccelerationSettings": {
    "Mode": "ENABLED"
  },
  "UserMetadata": {
    "job": "Acceleration"
  },
  "Settings": {
    "TimecodeConfig": {
      "Source": "ZEROBASED"
    },
    "OutputGroups": [
      {
        "Name": "File Group",
        "Outputs": [
          {
            "ContainerSettings": {
              "Container": "MP4",
              "Mp4Settings": {
                "CslgAtom": "EXCLUDE",
                "FreeSpaceBox": "EXCLUDE",
                "MoovPlacement": "NORMAL"
              }
            }
          }
        ]
      }
    ]
  }
}
```
"VideoDescription": {
  "Width": 1280,
  "ScalingBehavior": "DEFAULT",
  "Height": 720,
  "VideoPreprocessors": {
    "TimecodeBurnin": {
      "FontSize": 32,
      "Position": "TOP_CENTER"
    }
  },
  "TimecodeInsertion": "DISABLED",
  "AntiAlias": "ENABLED",
  "Sharpness": 50,
  "CodecSettings": {
    "Codec": "H_265",
    "H265Settings": {
      "InterlaceMode": "PROGRESSIVE",
      "ParNumerator": 1,
      "NumberReferenceFrames": 3,
      "FramerateDenominator": 1001,
      "GopClosedCadence": 1,
      "AlternateTransferFunctionSei": "DISABLED",
      "HdrBufferInitialFillPercentage": 90,
      "GopSize": 48,
      "Slices": 4,
      "GopReference": "ENABLED",
      "HdrBufferSize": 20000000,
      "SlowPal": "DISABLED",
      "ParDenominator": 1,
      "SpatialAdaptiveQuantization": "ENABLED",
      "TemporalAdaptiveQuantization": "ENABLED",
      "FlickerAdaptiveQuantization": "DISABLED",
      "Bitrate": 10000000,
      "FramerateControl": "INITIALIZE_FROM_SOURCE",
      "RateControlMode": "CBR",
      "CodecProfile": "MAIN_MAIN",
      "Tiles": "ENABLED",
      "Telecine": "NONE",
      "FramerateNumerator": 24000,
      "MinIInterval": 0,
      "AdaptiveQuantization": "HIGH",
      "CodecLevel": "LEVEL_5",
      "SceneChangeDetect": "ENABLED",
      "QualityTuningLevel": "SINGLE_PASS_HQ",
      "FramerateConversionAlgorithm": "DUPLICATE_DROP",
      "UnregisteredSeiTimecode": "DISABLED",
      "GopSizeUnits": "FRAMES",
      "ParControl": "SPECIFIED",
      "NumberBFramesBetweenReferenceFrames": 3,
      "TemporalIds": "DISABLED",
      "SampleAdaptiveOffsetFilterMode": "ADAPTIVE"
    }
  },
  "AfdSignaling": "NONE",
  "DropFrameTimecode": "ENABLED",
  "RespondToAfd": "NONE",
  "ColorMetadata": "INSERT"
},
"AudioDescriptions": [
  {
    "AudioTypeControl": "FOLLOW_INPUT",
    "CodecSettings": {
      "Codec": "AAC",
      "AacSettings": {
        "AudioDescriptionBroadcasterMix": "NORMAL",
        "Bitrate": 160000,
      }
    }
  }
]
"RateControlMode": "CBR",
"CodecProfile": "LC",
"CodingMode": "CODING_MODE_2_0",
"RawFormat": "NONE",
"SampleRate": 48000,
"Specification": "MPEG4"
},
"LanguageCodeControl": "FOLLOW_INPUT",
"AudioType": 0
],
"Extension": "mp4",
"NameModifier": "1280x720"
],
"OutputGroupSettings": {
"Type": "FILE_GROUP_SETTINGS",
"FileGroupSettings": {
"Destination": "s3://mediaconvert-outputs/accelerated/

"AdAvailOffset": 0,
"Inputs": [
{
"InputClippings": [
{
"EndTimecode": "01:00:00:00",
"StartTimecode": "00:00:00:00"
}
],
"AudioSelectors": {
"Audio Selector 1": {
"Offset": 0,
"DefaultSelection": "DEFAULT",
"ProgramSelection": 1
}
},
"VideoSelector": {
"ColorSpace": "FOLLOW"
},
"FilterEnable": "AUTO",
"PsiControl": "USE_PSI",
"FilterStrength": 0,
"DeblockFilter": "DISABLED",
"DenoiseFilter": "DISABLED",
"TimecodeSource": "ZEROBASED",
"FileInput": "s3://mediaconvert-inputs/SampleVideo_h264_StereoAudio.mp4"
}]}
Using the QVBR Rate Control Mode

The rate control mode that you choose for your output determines whether the encoder uses more data for complex parts of your video or maintains a constant amount of data per frame. This chapter provides guidance for choosing the right rate control mode for your asset, depending on how you plan to distribute it. In general, you get the best video quality for a given file size using quality-defined variable bitrate (QVBR) for your rate control mode.

Comparison of QVBR with Other Rate Control Modes

The rate control mode that you choose depends on the way that you will distribute your asset. AWS Elemental MediaConvert offers the following choices for bit rate mode:

Quality-Defined Variable Bitrate (QVBR) Mode

Choose this mode for distribution over the internet (OTT) and for video on-demand (VOD) download. For best video quality for your file size, always choose this mode except in the following cases:

- You need your bit rate to be constant, for example, for distribution over fixed-bandwidth networks
- You need your total file size to not drop below the size that you specify, for example, to comply with contractual or regulatory requirements

When you choose QVBR, the encoder determines the right number of bits to use for each part of the video to maintain the video quality that you specify. You can use the same QVBR settings for all your assets; the encoder automatically adjusts the file size to suit the complexity of the video. For more information, see Guidelines for Using QVBR (p. 118).

Constant Bitrate (CBR) Mode

Choose CBR only if you need the asset's bit rate to remain constant over time. For example, you might need a constant bit rate if you distribute your assets over limited, fixed bandwidth networks.

When you choose CBR, the encoder caps the file size and quality with the value that you set for Bitrate. The encoder uses the same number of bits for all parts of the video.

Variable Bitrate Mode (VBR)

Choose VBR if you distribute your asset over a network that allows for a changing bit rate, like the internet, but you need to specify the total file size of your asset.

Note

With QVBR, if you set up your output for multi-pass encoding, you can optionally specify a maximum average bit rate that caps the total file size of your output. Only choose VBR if your file size can't be smaller than the size you specify.

With VBR, you specify the asset's average bit rate; the encoder allocates bits so that more bits go to complex parts of the video. The total file size (excluding container, packaging, and audio data) works out to the average bit rate that you specify (in bits per second) times the length of the asset (in seconds).

When you use VBR, you get best results if you adjust your average bit rate to suit the complexity of each asset.
The following graph illustrates how the varying bit rate modes (QVBR and VBR) save unnecessary bits and provide better quality compared to CBR. The graph shows QVBR versus CBR, but the same principle applies to VBR.

In the parts of the graph where the QVBR line is above the CBR line, as in the part labeled Area 1, the CBR capped bit rate limits video quality below that of other scenes, so QVBR gives you more consistent quality. In the parts where the QVBR line drops below the CBR line, as in the part labeled Area 2, a low bit rate is sufficient for the same video quality, so QVBR saves bits and provides the opportunity for cost savings in storage and distribution through your content delivery network (CDN).

Guidelines for Using Quality-Defined Variable Bitrate Mode

When you use QVBR, you specify the quality level for your output and the maximum peak bit rate. For reasonable values of those settings, the encoder chooses how many bits to use for each part of the video. When you apply the same settings to several assets, your job outputs for simpler assets (such as cartoons) have smaller file sizes than your outputs for visually complex assets (such as high-motion sports with brightly dressed crowds in the background).

This section provides information about the QVBR settings. The following table provides a set of recommended values to get started with. Specify your values for these settings when you create your outputs, as described in Setting Up a Job (p. 7). For more information about each setting, choose a topic from the list that follows the table.

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Width</th>
<th>Height</th>
<th>QVBR Quality Level</th>
<th>Max Bit Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1080p</td>
<td>1920</td>
<td>1080</td>
<td>9</td>
<td>6000000</td>
</tr>
<tr>
<td>720p</td>
<td>1280</td>
<td>720</td>
<td>8</td>
<td>4000000</td>
</tr>
<tr>
<td>720p</td>
<td>1280</td>
<td>720</td>
<td>7</td>
<td>2000000</td>
</tr>
<tr>
<td>480p</td>
<td>640</td>
<td>480</td>
<td>7</td>
<td>1000000</td>
</tr>
<tr>
<td>360p</td>
<td>480</td>
<td>360</td>
<td>7</td>
<td>700000</td>
</tr>
<tr>
<td>240p</td>
<td>352</td>
<td>240</td>
<td>7</td>
<td>350000</td>
</tr>
</tbody>
</table>
With all resolutions, don’t specify a value for **Max average bitrate** unless you need to guarantee a total file size cap. When you specify a maximum average bit rate, it reduces the benefit that QVBR provides in video quality to file size ratio. To use **Max average bitrate**, you have to first set **Quality tuning level** to **Multi-pass HQ**.

If you aren’t using **Max average bitrate**, and you don’t need multi-pass encoding for other reasons, set **Quality tuning level** to **Single-pass HQ**.

**Note**
Multi-pass encoding is a professional tier feature. For more information about MediaConvert pricing tiers, see MediaConvert Pricing.

### Setting QVBR Quality Tuning Level

You can specify the **QVBR quality level** on a scale between 1 and 10. The encoder determines the right number of bits to use for each part of the video to maintain the video quality that you specify.

The best value for an output depends on how the output will be viewed. In general, set **QVBR quality level** as shown in the following table.

<table>
<thead>
<tr>
<th>Intended Viewing Device</th>
<th>Recommended QVBR Quality Level for 720p/1080p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large-screen TV</td>
<td>8 or 9</td>
</tr>
<tr>
<td>PC or tablet</td>
<td>7</td>
</tr>
<tr>
<td>Smartphone</td>
<td>6</td>
</tr>
</tbody>
</table>

The following graph shows how changing the quality level affects the bit rate that the encoder uses for different parts of the video. While the lines for both level 7 and level 9 spike and drop in the same places, the encoder uses more bits total when the quality is set higher.
Creating Dolby Vision Outputs with AWS Elemental MediaConvert

Dolby Vision video uses an extended color palette and contrast range with dynamic, per-frame metadata. With AWS Elemental MediaConvert, you can create profile 5 Dolby Vision outputs from MXF and IMF sources that contain mastering information as frame-interleaved Dolby Vision metadata.

Topics

• Setting Up a Dolby Vision Job (p. 120)
• Dolby Vision Job Limitations (p. 120)

Setting Up a Dolby Vision Job

You can use AWS Elemental MediaConvert to create profile 5 Dolby Vision outputs.

To set up a Dolby Vision job

2. Choose Create job.
3. For your input file or files, choose an MXF file or an IMF package that has frame-interleaved Dolby Vision metadata.
   
   If your input is an IMF package, specify a CPL file for your input. If your CPL is from an incomplete IMP, choose Supplemental IMPs to specify the location of your supplemental IMPs.
4. Set up your input audio and video as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7). Make sure to keep the input color space set to the default value Follow.
   
   Find the input color space setting as follows: On the Create job page, in the Job pane on the left, choose the input. In the Video selector section on the right, find Color space.
5. Set up your output groups, outputs, and video output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
6. For each output that you want processed with Dolby Vision, do the following:

   • Make sure that your output settings conform to the limitations listed in Dolby Vision Job Limitations and Requirements (p. 120).
   
   • Enable the Dolby Vision preprocessor:
     
     On the Create job page, in the Job pane on the left, choose the output. At the bottom of the Encoding settings section on the right, choose Dolby Vision.
7. Choose an on-demand queue. Your default queue is on-demand.

   Find the Queue setting as follows: On the Create job page, in the Job pane on the left, choose Settings. In the Job settings section on the right, find Queue.

Dolby Vision Job Limitations

Note the following restrictions and requirements in the AWS Elemental MediaConvert implementation of Dolby Vision:
Job limitations:

- You can create only Dolby Vision profile 5 outputs.
- You must keep the **Motion image inserter** global processor disabled.
- You can send Dolby Vision jobs only to on-demand queues. You can't send them to reserved queues.

Input requirements:

- Your input format must be IMF or MXF.
- Your input must contain frame-interleaved Dolby Vision metadata.
- All of your inputs must have the same frame rate. Frame rate conversion is not supported.
- You must keep **Image inserter** disabled.

Output settings requirements:

- You must set **Audio Codec** to HEVC (H.265).
- Your output container must be supported with the HEVC (H.265) codec. For a list of supported output containers and codecs, see Supported Output Codecs and Containers (p. 137).
- You must set your output resolution no higher than 4096x4096.
- For **Color metadata**, you must keep the default setting **Insert**.
- For **Respond to AFD**, you must keep the default setting **None**.
- For **Frame rate**, you must keep the default setting **Follow source**. Frame rate conversion is not supported.
- You must set the codec **Profile** to either **Main10/Main** or **Main10/High**.
- You must keep the **Image inserter** preprocessor disabled.
- You must keep the **Color corrector** preprocessor disabled.
- You must keep the **Timecode burn in** preprocessor disabled.
- You must keep the **Noise reducer** preprocessor disabled.
- You must choose an output captions format other than **Burn in**.
Creating Dolby Atmos Outputs with AWS Elemental MediaConvert

Dolby Atmos provides an immersive audio experience in cinemas and home theaters. With the right audio input files, you can use AWS Elemental MediaConvert to create Dolby Atmos outputs. You can create streaming outputs that end viewers can experience in their home theaters or file outputs that you can use in your professional workflows.

AWS Elemental MediaConvert can create Dolby Digital Plus with Atmos outputs by either encoding channel-based immersive audio content that you provide as 9.1.6 PCM mono channels, or by passing through already encoded Dolby Digital Plus with Atmos content.

**Note**
MediaConvert doesn't support ADM or DAMF input.

**Topics**
- Using Dolby Atmos Passthrough with AWS Elemental MediaConvert (p. 122)
- Using Dolby Atmos Encoding with AWS Elemental MediaConvert (p. 123)

Using Dolby Atmos Passthrough with AWS Elemental MediaConvert

AWS Elemental MediaConvert can create Dolby Digital Plus with Atmos outputs by either encoding audio in 9.1.6 PCM mono channels, or by passing through already encoded Dolby Digital Plus with Atmos content.

You set up your job to pass through Dolby Digital Plus with Atmos content in the same way that you pass through Dolby Digital and Dolby Digital Plus content.

**To set up a Dolby Atmos job, passing through finished audio content**

2. Choose **Create job**.
3. Set up your input audio and video as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7).
4. Set up your output groups, outputs, and video output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33). Choose supported containers as listed in Supported Output Codecs and Containers (p. 137).
5. Create audio output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).

Set them up as follows:

a. In the **Job** pane on the left, choose an output that includes audio.
b. In the **Encoding settings** section, choose **Audio 1**.
c. For **Audio codec**, choose **Passthrough**.
Feature Restrictions for Dolby Atmos Passthrough

Note the following restrictions in the AWS Elemental MediaConvert implementation of Dolby Atmos passthrough:

- **Output codec**: You can create Dolby Atmos audio outputs encoded with only the Dolby Digital Plus (EAC3) codec.
- **Output containers**: For file outputs, you can create Dolby Atmos audio in only one of the video containers that supports Dolby Digital Plus: MPEG-4, MPEG-2 Transport Stream, or QuickTime.

Using Dolby Atmos Encoding with AWS Elemental MediaConvert

AWS Elemental MediaConvert can encode Dolby Digital Plus with Atmos channel-based, immersive audio input channels.

**Note**
Understanding Dolby Atmos is required prerequisite knowledge for using this feature. Your input audio channels must already be set up as 16 mono PCM channels intended for Dolby Atmos playback. For more information about Dolby Atmos, see the Dolby online documentation.

Input File Requirements for Dolby Atmos Encoding

To encode Dolby Atmos, you must have 16 input channels of PCM audio, either in individual .wav files or as tracks in a single container.

**Note**
AWS Elemental MediaConvert doesn’t support ADM or DAMF input.

Feature Restrictions for Dolby Atmos Encoding

Note the following restrictions in the AWS Elemental MediaConvert implementation of Dolby Atmos encoding:

- **Channel-based immersive only**: AWS Elemental MediaConvert supports only channel-based immersive (CBI) content. MediaConvert doesn’t read any Atmos metadata in the input audio files or in sidecar metadata files.
- **Output codec**: You can create Dolby Atmos audio outputs encoded with only the Dolby Digital Plus (EAC3) codec.
- **Output containers**: For file outputs, you can create Dolby Atmos audio in only one of the video containers that supports Dolby Digital Plus: MPEG-4, MPEG-2 Transport Stream, or QuickTime.
- **Output packages**: For adaptive bitrate (ABR) outputs, you can create Dolby Atmos audio in any of the AWS Elemental MediaConvert output group types: CMAF, Apple HLS, DASH ISO, or Microsoft Smooth Streaming.

Setting Up a Job for Dolby Atmos Encoding

To encode Dolby Atmos, provide 16 input channels of PCM audio, either in individual .wav files or as tracks in a single container.

If you provide input audio as individual .wav files, you specify them in order in your input. You specify them as **Audio selector 1**, **Audio selector 2**, and so on, up to **Audio selector 16**. If you provide your
audio as a single file containing 16 tracks, you specify the file in your input as **Audio selector 1**, and then you specify the tracks individually within that audio selector.

**Important**
Regardless of whether they are in separate files or a single file, you must set up the channels in the following order: L, R, C, LFE, Ls, Rs, Lrs, Rrs, Lw, Rw, Ltf, Rtf, Ltm, Rtm, Ltr, Rtr.

For more details about setting up your job for Dolby Atmos encoding, see one of the following procedures:

**Procedure with separate audio input files**

**Procedure with a single audio input file**

**To set up a Dolby Atmos job, with audio inputs as 16 individual .wav files**

2. Choose **Create job**.
3. Set up your input video as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7).
4. Set up your input audio selectors as follows:
   a. On the **Create job** page, in the **Job** pane on the left, choose **Input**.
   b. On the right, in the **Audio selectors** section, under **Audio selector 1**, choose **External file**.
   c. For **External file**, provide the path and file name to the .wav file for your first channel. For **Audio selector 1**, this channel must be L.
      **Important**
      You must set up the channels in the following order: L, R, C, LFE, Ls, Rs, Lrs, Rrs, Lw, Rw, Ltf, Rtf, Ltm, Rtm, Ltr, Rtr.
      That is, if your input audio is in separate .wav files, **Audio selector 1** must point to the L channel, **Audio selector 2** must point to the R channel, and so on.
   d. At the top of the **Audio selectors** section, choose **Add audio selector** to create **Audio selector 2**.
   e. Under **Audio selector 2**, choose **External file**.
   f. Specify the path and file name to the .wav file for your second channel. For **Audio selector 2**, this channel must be R.
   g. Repeat the steps to create an audio selector for the rest of your 16 channels. Choose the following channels for each selector:
      - **Audio selector 3**: C
      - **Audio selector 4**: LFE
      - **Audio selector 5**: Ls
      - **Audio selector 6**: Rs
      - **Audio selector 7**: Lrs
      - **Audio selector 8**: Rrs
      - **Audio selector 9**: Lw
      - **Audio selector 10**: Rw
      - **Audio selector 11**: Ltf
      - **Audio selector 12**: Rtf
      - **Audio selector 13**: Ltm
      - **Audio selector 14**: Rtm
      - **Audio selector 15**: Ltr
      - **Audio selector 16**: Rtr
5. Create an input **Audio selector group** as follows:
   a. In the **Audio selector groups** section, choose **Add audio selector group**.
   b. For **Group name**, enter a descriptive name, such as **Dolby Atmos Audio Group**.
   c. For **Select audio selectors**, choose each audio selector that you created earlier in this procedure.
      Choose them in order, starting with **Audio selector 1**.

6. Set up your output groups, outputs, and video output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33). Choose supported containers as listed in Feature Restrictions for Dolby Atmos Encoding (p. 123).

7. Create audio output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).

   Set them up as follows:
   a. In the **Job** pane on the left, choose an output that includes audio.
   b. In the **Encoding settings** section, choose **Audio 1**.
   c. For **Audio codec**, choose **Dolby Digital Plus JOC (Atmos)**.
      
      For **Audio source**, choose the audio selector group that you created earlier in this procedure, such as **Dolby Atmos Audio Group**.
   d. For the audio encoding settings, choose values that are suitable for your workflow. For more information, see the Dolby documentation for the Dolby Digital Plus Atmos encoding library.

   **Note**
   AWS Elemental MediaConvert automatically performs audio normalization on Dolby Digital Plus Atmos outputs. Therefore, there is no **Dialnorm** setting under audio encoding settings.

To set up a Dolby Atmos job, with audio input as a single file with 16 tracks

2. Choose **Create job**.
3. Set up your input video as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7).
4. Set up your input audio selectors as follows:
   a. On the **Create job** page, in the **Job** pane on the left, choose **Input**.
   b. On the right, in the **Audio selectors** section, under **Audio selector 1**, choose **External file**.
   c. For **External file**, provide the path and file name to the .wav file.
   d. For **Selector type**, choose **Track**.
   e. For **Tracks**, list your 16 PCM mono tracks in a comma-separated list. Specify them in the following order: L, R, C, LFE, Ls, Rs, Lrs, Rs, Lr, Rw, Rtf, Rtm, Ltr, Rtr.
      
      • If the tracks of your input audio file are already in that order, then list them that way: `1, 2, 3, ... 16`.
      • If the tracks of your input audio file are in a different order, list them according to the specified order. For example, if your L channel is in track 3, then list 3 first.

5. Set up your output groups, outputs, and video output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33). Choose supported containers as listed in Feature Restrictions for Dolby Atmos Encoding (p. 123).
6. Create audio output selectors as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
Set them up as follows:

a. In the Job pane on the left, choose an output that includes audio.
b. In the Encoding settings section, choose Audio 1.
c. For Audio codec, choose Dolby Digital Plus JOC (Atmos).

For Audio source, keep the default Audio selector 1.
d. For the audio encoding settings, choose values that are suitable for your workflow. For more information, see the Dolby documentation for the Dolby Digital Plus Atmos encoding library.

**Note**
AWS Elemental MediaConvert automatically performs audio normalization on Dolby Digital Plus Atmos outputs. Therefore, there is no Dialnorm setting under audio encoding settings.
Setting Up a Job for HDR in AWS Elemental MediaConvert

You can create HDR content with AWS Elemental MediaConvert in the following ways:

Passing Through HDR Content

You can pass through HDR content by using an HDR input and creating outputs in the same format, with the same metadata. To do that, you keep the color space default settings, choose HEVC for your codec, and choose a 10-bit profile. MediaConvert automatically reads the HDR metadata, including color space, from the video source. For detailed instructions, see the section called “Passing Through HDR Content” (p. 129).

Correcting Inaccurate or Missing HDR Metadata

To provide HDR 10 metadata that is not present in your input, or to correct metadata that is wrong, add it or overwrite it in the input video settings. This doesn't change the video content and is different from the color space conversion that you can do in your output video settings. For detailed instructions, see the section called “Replacing Inaccurate or Missing HDR Metadata” (p. 129).

Converting from an HDR Format to a Different HDR Format

You can convert your input color space to a different output color space. You do that by choosing the output color space in the output Color corrector settings. For detailed instructions, see the section called “Converting the Color Space” (p. 130).

Changing SDR Input to HDR Format

If your input is SDR, you can convert the color space to an HDR format. This process creates output that is formatted as HDR and automatically converts the metadata to match. You do that by choosing the output color space in the output Color corrector settings. For detailed instructions, see the section called “Converting the Color Space” (p. 130).

Note

This process doesn't upgrade the dynamic range of the video content. These outputs will play on HDR player devices, and they will appear generally brighter than the original SDR content. But the results are not the same as content that has been remastered from SDR to HDR by a color grader.

Topics

- HDR Support in AWS Elemental MediaConvert (p. 127)
- Passing Through HDR Content (p. 129)
- Replacing Inaccurate or Missing HDR Metadata (p. 129)
- Converting the Color Space (p. 130)

HDR Support in AWS Elemental MediaConvert

AWS Elemental MediaConvert supports HDR with HEVC video assets in the following outputs: MPEG2-TS, DASH, and CMAF.

You can set up your CMAF outputs to be compatible with Apple HLS player devices. For more information, see the section called “Creating HDR HLS Outputs That Comply with the Apple Specification” (p. 128).
Supported Formats and Color Spaces

MediaConvert ingests and outputs video in the following HDR formats:

- HDR10 (rec. 2020 color space)
- HLG (rec. 2020 color space)

MediaConvert ingests and outputs video in the following standard formats:

- SDR (rec. 601 color space)
- SDR (rec. 709 color space)

Supported Color Space Conversions

Your input color space is set by your input video or by the values that you set for Color space and Color space usage in your input settings. For more information about the input color space settings, see Replacing Inaccurate or Missing HDR Metadata (p. 129).

For information about how to convert the color space, see Converting the Color Space (p. 130).

MediaConvert supports the following color space conversions:

- From any supported HDR format to any other supported HDR format
- From any supported SDR color space to any other supported SDR color space
- From any supported SDR color space to any supported HDR format

Note

Converting from SDR to HDR doesn't upgrade the dynamic range of the video content itself. Therefore, the output is formatted as HDR but looks the same as it would if you created it as an SDR output.

- From any supported HDR format to any supported SDR color space

Note

When professional color graders convert an asset from HDR to SDR, they make artistic decisions about where to map colors from the larger space that don't exist in the smaller space. There is no standard formula to map these values automatically. The tone mapping technology that MediaConvert uses to do automatic conversion from HDR to SDR approximates the outcome of manually regrading from HDR to SDR. This automatic conversion works well with most content, but we recommend that you review your outputs to confirm the tone mapping results.

Creating HDR HLS Outputs That Comply with the Apple Specification

For information about which Apple devices play back HDR content, see Find and watch movies with 4K, HDR, Dolby Vision, or Dolby Atmos in the Apple support documentation.

To create HDR outputs that comply with the Apple specification, you must make specific choices for your encoding settings. In the Encoding settings section for your output, specify these video settings as follows:

- Video codec – Choose HEVC (H.265).
- MP4 packaging type – HVC1.
• **Profile** – Choose **Main10/High**.
• **Level** – Choose **5**.

**Tip**
The simplest way to find specific encoding settings in the console is to use your web browser’s search on page function. For many browsers, this search is case sensitive.

### Passing Through HDR Content

By default, AWS Elemental MediaConvert sets your color space to **Follow**, which means that your output color space is the same as your input color space, even if the color space changes over the course of the video. Also by default, MediaConvert sets the output setting **Color metadata** to **Insert**, so that any color metadata is included in the output. If you want your output HDR to be the same as your input video, keep this setting and make sure that you choose HEVC for your codec and a 10-bit profile.

**To pass through HDR content**

1. Set up your transcoding job as usual. For more information, see *Setting Up a Job (p. 7)*.
2. Make sure that the input **Color space** is set to the default value **Follow**.
   a. On the **Create job** page, in the **Job** pane on the left, choose **Input 1**.
   b. In the **Video selector** section on the right, for **Color space**, choose **Follow**.
3. For each HDR output, choose an appropriate codec and profile and make sure that **Color metadata** is set to the default value **Insert**.
   a. On the **Create job** page, in the **Job** pane on the left, choose the output, such as **Output 1**.
   b. In the **Encoding settings** section on the right, specify these video settings as follows:

   **Tip**
The simplest way to find specific encoding settings in the console is to use your web browser’s search on page function. For many browsers, this search is case sensitive.

   - **Video codec** – Choose **HEVC (H.265)**.
   - **Profile** – Choose one of the 10-bit profiles: **Main10/Main**, **Main10/High**, **Main 4:2:2 10-bit/Main**, or **Main 4:2:2 10-bit/High**.
   - **Color metadata** – Choose **Insert**.

### Replacing Inaccurate or Missing HDR Metadata

If your input video is missing HDR metadata, or has HDR metadata that is wrong, you can add it or overwrite it in the input video settings. For HLG and HDR 10, you can specify the correct color space. For HDR 10, you can also specify accurate master display information.

**Note**
You use the input settings to supply metadata that is wrong or missing from your input files. Use output settings to do color space conversion.

**To replace inaccurate or missing HDR metadata**

1. Set up your transcoding job as usual. For more information, see *Setting Up a Job (p. 7)*.
2. On the **Create job** page, in the **Job** pane on the left, choose your input.
3. In the **Video selector** section on the right, for **Color space**, choose the accurate color space for your input video.
4. For **Color space usage**, choose how AWS Elemental MediaConvert handles precedence between the input metadata and the value that you specify for **Color space**:

- Choose **Force** if you want MediaConvert to use the color space that you specify for **Color space** regardless of whether it is specified in the input video metadata.
- Choose **Fallback** if you want MediaConvert to use the color space that you specify for **Color space** only when the color space isn’t present in the input video metadata.

   This option is useful when you reuse job settings with different input files, for example, when you use output presets or when you duplicate a job.

5. If your input is HDR 10, specify values for **HDR master display information** settings. MediaConvert displays these settings when you set **Color space** to **HDR 10**.

   These settings represent HDR 10 static metadata as specified in the standard SMPTE ST 2086 Mastering Display Color Volume. MediaConvert includes the values that you specify here in the metadata of your HDR 10 outputs.

   **Note**
   - Get your values for **HDR master display information** from a color grader. Appropriate values for these settings depend on the video content and are different for each input.

---

### Converting the Color Space

If you want your output video to use a different color space than your input video, use color space conversion. Set up color space conversion in the output **Color corrector** settings.

**To convert the color space**

1. Confirm that MediaConvert supports the conversion that you want to do. See the section called “Supported Color Space Conversions” (p. 128).
2. Set up your transcoding job as usual. For more information, see *Setting Up a Job* (p. 7).
3. On the **Create job** page, in the **Job** pane on the left, choose your HDR output.
4. At the bottom of the **Encoding settings** section on the right, choose **Preprocessors**.
5. Choose **Color corrector** to display the color correction settings.
6. For **Color space conversion**, choose the color space that you want for your output.
7. If you are converting to HDR 10, specify values for the **HDR master display information** settings.

   These values don’t affect the pixel values that are encoded in the video stream. They are intended to help the downstream video player display content in a way that reflects the intentions of the content creator.
Using AWS Elemental MediaConvert to Create Outputs with Only Audio

You can use AWS Elemental MediaConvert to create outputs that contain only audio, without video. With audio-only outputs, MediaConvert supports a more limited number of codec and container combinations for input and output files.

**Note**
The restrictions and procedures in this chapter apply to outputs that don’t have video in the container. This includes the following:

- Outputs in **File** output groups that don’t have video included
- Streaming **HLS** output groups that contain only audio outputs

When you set up streaming output packages that contain audio, video, and captions, you create separate outputs for each element inside the output package. These are not audio-only outputs as described in this chapter. For more information about setting up streaming outputs, see Creating Outputs in ABR Streaming Output Groups (p. 12).

**Topics**

- Setting Up Audio-Only Outputs (p. 131)
- Supported Codecs and Containers for Audio-Only Outputs (p. 132)
- Feature Limitations (p. 133)

### Setting Up Audio-Only Outputs

You set up an audio-only output in the same way that you set up an output that contains video, except that you don’t include video or captions.

For jobs with audio-only outputs in a **File** output group, MediaConvert generates one separate audio-only file for each output. For jobs with audio-only outputs in an **HLS** output group, MediaConvert creates a single rendition in the ABR stack for each output.

**Note**
For AAC streaming outputs, the initial segment is longer in duration than the others. This is because, with AAC, the initial segment must contain silent AAC pre-roll samples before the audible part of the segment. MediaConvert accounts for these extra samples in the timestamps, so the audio plays back correctly.

**To create an audio-only output (console)**

1. To confirm that MediaConvert supports your input files, consult the input table in Supported Codecs and Containers for Audio-Only Outputs (p. 132).
2. Set up your job as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7), but with the following differences:
   - Put all of your outputs in a **File** output group, or put all of your outputs in an **HLS** output group.
• Remove the Video tab in the Encoding settings section of your output.
• Choose a supported output container and audio codec from the output table in Supported Codecs and Containers for Audio-Only Outputs (p. 132).
• Include only one group of audio settings per output. That is, don’t choose Add audio to create an Audio 2 tab under Encoding settings.

3. If your outputs are in an HLS output group, choose a container for the audio-only output.
   
   Under Output settings, in the Audio section, for Container for audio-only output, choose MPEG-2 Transport Stream to create a file in an MPEG2-TS container. Keep the default value Automatic to create a raw audio-only file with no container.

To create an audio-only output (API, SDK, and AWS CLI)

1. To confirm that MediaConvert supports your input files, consult the input table in Supported Codecs and Containers for Audio-Only Outputs (p. 132).
2. Set up your JSON job specification. Either manually edit your JSON file, or use the console to generate it as follows:
   
   a. Follow the previous procedure for the console.
   b. In the Job pane on the left, under Job settings, choose Show job JSON.
   
   The JSON job specification for audio-only jobs differs from standard jobs as follows:
   
   • Exclude each instance of VideoDescription and its children from the Outputs portion of your job JSON.
   • For each output, include only one child group of audio settings under AudioDescriptions.
   • For audio-only outputs in an HLS output group, specify a container for the audio-only output. Under Outputs, OutputSettings, HlsSettings include the property HlsAudioOnlyContainer. Set it to M2TS to create a file in an MPEG2-TS container. Set it to AUTOMATIC to create a raw audio-only file with no container. AUTOMATIC is the default behavior.

Supported Codecs and Containers for Audio-Only Outputs

Input Codecs and Containers Supported for Audio-Only

MediaConvert supports the following combinations of input container and codec for audio-only outputs.

<table>
<thead>
<tr>
<th>Container</th>
<th>Audio Codecs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPEG-1 Layer 3 (.mp3)</td>
<td>MP3</td>
</tr>
<tr>
<td>MPEG-2 TS (.ts, m2ts)</td>
<td>MP2, PCM</td>
</tr>
<tr>
<td>MPEG-4 (.mp4)</td>
<td>AAC</td>
</tr>
<tr>
<td>QuickTime (.mov)</td>
<td>PCM</td>
</tr>
<tr>
<td>WAV (.wav)</td>
<td>PCM</td>
</tr>
</tbody>
</table>
Output Codecs and Containers Supported for Audio-Only

MediaConvert supports the following combinations of output container and codec for creating audio-only outputs.

<table>
<thead>
<tr>
<th>Container</th>
<th>Audio Codecs</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLS (.ts)</td>
<td>AAC, Dolby Digital (AC3)</td>
</tr>
<tr>
<td>MPEG-1 Layer 3 (.mp3)</td>
<td>MP3</td>
</tr>
<tr>
<td>MPEG-2 TS (.ts, .m2ts)</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3), MP2</td>
</tr>
<tr>
<td>MPEG-4 (.mp4)</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
</tbody>
</table>

Feature Limitations

In any job that contains audio-only outputs, you can't use these features:

- Job progress status update
- Input clipping

In any audio-only output, you can't use these features:

- Captions
- Still or motion graphic overlay (image inserter, motion image inserter)
Supported Input Codecs and Containers

AWS Elemental MediaConvert accepts input files in the following combinations of codecs and containers. For outputs that contain only audio inside the output container, MediaConvert supports a smaller set of input containers and codecs. For more information, see Supported Codecs and Containers for Audio-Only Outputs (p. 132).

### Video

MediaConvert supports the following combinations of input containers and video codecs.

<table>
<thead>
<tr>
<th>Container</th>
<th>Video Codecs Supported with Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Container</td>
<td>DV/DVCPRO, AVC (H.264), HEVC (H.265), MPEG-1, MPEG-2</td>
</tr>
<tr>
<td>3G2</td>
<td>AVC (H.264), H.263, MPEG-4 part 2</td>
</tr>
<tr>
<td>3GP</td>
<td>AVC (H.264), H.263, MPEG-4 part 2</td>
</tr>
<tr>
<td>Audio Video Interleave (AVI)</td>
<td>Uncompressed, Canopus HQ, DivX/Xvid, DV/DVCPRO</td>
</tr>
<tr>
<td>Adobe Flash</td>
<td>AVC (H.264), Flash 9 File, H.263</td>
</tr>
<tr>
<td>Matroska</td>
<td>AVC (H.264), PCM, MPEG-2, MPEG-4 part 2, VC-1</td>
</tr>
<tr>
<td>IMF</td>
<td>Apple ProRes, JPEG 2000 (J2K)</td>
</tr>
<tr>
<td>MPEG Transport Streams</td>
<td>AVC (H.264), HEVC (H.265), MPEG-2, VC-1</td>
</tr>
<tr>
<td>MPEG-1 System Streams</td>
<td>MPEG-1, MPEG-2</td>
</tr>
<tr>
<td>MPEG-4</td>
<td>Uncompressed, AVC Intra 50/100, DivX/Xvid, H.261, H.262, H.263, AVC (H.264), HEVC (H.265), JPEG 2000, MPEG-2, MPEG-4 part 2, VC-1</td>
</tr>
<tr>
<td>MXF</td>
<td>Uncompressed, Apple ProRes (supported types (p. 136)), AVC Intra 50/100, DNxHD, DV/DVCPRO, DV25, DV50, DVCPRO HD, AVC (H.264), JPEG 2000 (J2K), MPEG-2, Panasonic P2, SonyXDCam, SonyXDCam MPEG-4 Proxy</td>
</tr>
<tr>
<td>QuickTime</td>
<td>Uncompressed, Apple ProRes (supported types (p. 136)), AVC Intra 50/100, DivX/Xvid, DV/DVCPRO, H.261, H.262, H.263, AVC (H.264), HEVC (H.265), JPEG 2000 (J2K), MPEG, MPEG-2, MPEG-4 part 2, QuickTime Animation (RLE)</td>
</tr>
<tr>
<td>Container</td>
<td>Video Codecs Supported with Container</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>WebM</td>
<td>VP8, VP9</td>
</tr>
<tr>
<td>WMV/ASF</td>
<td>VC-1</td>
</tr>
</tbody>
</table>

**Note**
MediaConvert doesn't support external reference MOV or MXF input files. MediaConvert doesn't currently support HLS inputs.

---

**Audio**

MediaConvert supports the following combinations of input containers and audio codecs.

**Note**
For outputs that contain only audio inside the output container, MediaConvert supports a smaller set of input containers and codecs. For more information, see Supported Codecs and Containers for Audio-Only Outputs (p. 132).

<table>
<thead>
<tr>
<th>Container</th>
<th>Audio Codecs</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Container</td>
<td>PCM</td>
</tr>
<tr>
<td>3G2</td>
<td>AAC</td>
</tr>
<tr>
<td>3GP</td>
<td>AAC</td>
</tr>
<tr>
<td>Audio Video Interleave (AVI)</td>
<td>Dolby Digital (AC3), Dolby Digital Plus (EAC3), Dolby E frames carried in PCM streams, MP3, MPEG Audio, PCM</td>
</tr>
<tr>
<td>Adobe Flash</td>
<td>AAC</td>
</tr>
<tr>
<td>IMF</td>
<td>PCM</td>
</tr>
<tr>
<td>Matroska</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3), WMA, WMA2</td>
</tr>
<tr>
<td>MPEG Transport Streams</td>
<td>AAC, AIFF, Dolby Digital (AC3), Dolby Digital Plus (EAC3), Dolby E frames carried in PCM streams, MPEG Audio, PCM, WMA, WMA2</td>
</tr>
<tr>
<td>MPEG-1 System Streams</td>
<td>AAC, AIFF, Dolby Digital (AC3), Dolby Digital Plus (EAC3), MPEG, Audio PCM</td>
</tr>
<tr>
<td>MPEG-1 Layer 3 (MP3)</td>
<td>MP3</td>
</tr>
<tr>
<td>MPEG-4</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3), PCM, WMA, WMA2</td>
</tr>
<tr>
<td>MXF</td>
<td>AAC, AIFF, Dolby E frames carried in PCM streams, MPEG Audio, PCM</td>
</tr>
<tr>
<td>QuickTime</td>
<td>AAC, MP3, PCM</td>
</tr>
<tr>
<td>WebM</td>
<td>Opus, Vorbis</td>
</tr>
</tbody>
</table>
Audio-Only

MediaConvert supports the following combinations of input container and codec for audio-only outputs.

<table>
<thead>
<tr>
<th>Container</th>
<th>Audio Codecs</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMV/ASF</td>
<td>WMA, WMA2</td>
</tr>
</tbody>
</table>

Supported Types for Apple ProRes Inputs

AWS Elemental MediaConvert supports the following types of Apple ProRes inputs:

- Apple ProRes 4444 XQ
- Apple ProRes 4444
- Apple ProRes 422 HQ
- Apple ProRes 422
- Apple ProRes LT
- Apple ProRes Proxy
Outputs Supported by AWS Elemental MediaConvert

The following sections provide support tables for AWS Elemental MediaConvert outputs.

Topics
- Supported Output Codecs and Containers (p. 137)
- Supported Output Resolution Maximums By Codec (p. 139)

Supported Output Codecs and Containers

AWS Elemental MediaConvert supports the following combinations of codecs and containers.

Video

MediaConvert supports the following combinations of output containers and video codecs.

<table>
<thead>
<tr>
<th>Container</th>
<th>Codecs Supported with Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMAF</td>
<td>AV1, AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>DASH</td>
<td>AV1, AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>HLS</td>
<td>AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>MPEG-2 TS</td>
<td>AVC (H.264), HEVC (H.265), MPEG-2</td>
</tr>
<tr>
<td>MPEG-4 (.mp4)</td>
<td>AV1, AVC (H.264), HEVC (H.265)</td>
</tr>
<tr>
<td>MPEG-4 Flash (.f4v)</td>
<td>AVC (H.264), MPEG-2</td>
</tr>
<tr>
<td>MXF (.mxf)</td>
<td>MPEG-2</td>
</tr>
<tr>
<td>QuickTime</td>
<td>AVC (H.264), MPEG-2, Apple ProRes (supported types (p. 138))</td>
</tr>
</tbody>
</table>

**Note**
If your output container is QuickTime and your output video codec is Apple ProRes, you must use AIFF for your output audio codec.

| Smooth (ISMV)  | AVC (H.264)                                                        |
| Raw (no container) | AVC (H.264), HEVC (H.265), MPEG-2                              |

**Note**
MediaConvert doesn't support external reference MOV or MXF input files.
Audio

MediaConvert supports the following combinations of output containers and audio codecs.

**Note**
For outputs that contain only audio inside the output container, MediaConvert supports a different set of containers and codecs. For more information, see Audio-Only (p. 138).

<table>
<thead>
<tr>
<th>Container</th>
<th>Codecs Supported with Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMAF</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
<tr>
<td>DASH</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
<tr>
<td>HLS</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
<tr>
<td>MPEG-2 TS</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3), MP2, PCM/WAV</td>
</tr>
<tr>
<td>MPEG-4 (.mp4)</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
<tr>
<td>MPEG-4 Flash (.f4v)</td>
<td>AAC</td>
</tr>
<tr>
<td>MXF (.mxf)</td>
<td>PCM/WAV</td>
</tr>
<tr>
<td>QuickTime</td>
<td>AAC, with H.264 and MPEG-2; AIFF, with Apple ProRes; Dolby Digital (AC3), with H.264 and MPEG-2; Dolby Digital Plus (EAC3), with H.264 and MPEG-2; WAV (with H.264 and MPEG-2)</td>
</tr>
<tr>
<td>Smooth (ISMV)</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
<tr>
<td>Raw (no container)</td>
<td>AAC, AIFF, Dolby Digital (AC3), Dolby Digital Plus (EAC3), PCM/WAV</td>
</tr>
</tbody>
</table>

Audio-Only

MediaConvert supports the following combinations of output container and codec for creating audio-only outputs.

<table>
<thead>
<tr>
<th>Container</th>
<th>Audio Codecs</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLS (.ts)</td>
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</tr>
<tr>
<td>MPEG-1 Layer 3 (.mp3)</td>
<td>MP3</td>
</tr>
<tr>
<td>MPEG-2 TS (.ts, .m2ts)</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3), MP2</td>
</tr>
<tr>
<td>MPEG-4 (.mp4)</td>
<td>AAC, Dolby Digital (AC3), Dolby Digital Plus (EAC3)</td>
</tr>
</tbody>
</table>

Supported Types for Apple ProRes Outputs

AWS Elemental MediaConvert supports the following types of Apple ProRes outputs:

- Apple ProRes 422 HQ
Supported Output Resolution Maximums By Codec

The following table shows the maximum output resolution AWS Elemental MediaConvert supports for each output codec.

<table>
<thead>
<tr>
<th>Codec</th>
<th>Maximum Resolution (pixels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEVC (H.265)</td>
<td>8192x4320 or 4320x8192</td>
</tr>
<tr>
<td>AVC (H.264)</td>
<td>4096x2160 or 2160x4096</td>
</tr>
<tr>
<td>Apple ProRes</td>
<td>4096x4096</td>
</tr>
<tr>
<td>MPEG-2</td>
<td>1920x1152</td>
</tr>
</tbody>
</table>

8k Output Resolution Job Restrictions

When your MediaConvert job has outputs with 8k (8192x4320) resolutions, your job is restricted in these ways:

- You can't create Dolby Vision outputs.
- You must send your job to an on-demand queue. Reserved queues can't run 8k jobs.
Captions Support Tables by Output Container Type

Tables by output container
- CMAF Output Container (p. 140)
- DASH Output Container (p. 141)
- HLS Output Container (p. 145)
- MS Smooth (MSS) Output Container (p. 148)
- MP4 Output Container (p. 150)
- MPEG2-TS File Output Container (p. 152)
- MXF Output Container (p. 156)
- QuickTime Output Container (p. 158)
- No Output Container (p. 160)

CMAF Output Container

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

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<thead>
<tr>
<th>Input Captions Container</th>
<th>Input Captions Format</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MP4 Container</td>
<td>Embedded</td>
<td>IMSC (as sidecar .fmp4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WebVTT</td>
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<tr>
<td></td>
<td>SCTE-20</td>
<td>IMSC (as sidecar .fmp4)</td>
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<td>WebVTT</td>
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<td>MXF Container</td>
<td>Embedded</td>
<td>IMSC (as sidecar .fmp4)</td>
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<td>WebVTT</td>
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<td>IMSC (as sidecar .fmp4)</td>
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<td>WebVTT</td>
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### DASH Output Container

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<tbody>
<tr>
<td>Raw Container</td>
<td>IMSC1 text profile</td>
<td>IMSC (as sidecar .fmp4)</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>SRT</td>
<td>IMSC (as sidecar .fmp4)</td>
<td>WebVTT</td>
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<tr>
<td>TTML</td>
<td>IMSC (as sidecar .fmp4)</td>
<td>WebVTT</td>
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<tr>
<td>STL</td>
<td>IMSC (as sidecar .fmp4)</td>
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</tr>
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<td>SMI</td>
<td>IMSC (as sidecar .fmp4)</td>
<td>WebVTT</td>
</tr>
<tr>
<td>MPEG2-TS Container</td>
<td>Embedded</td>
<td>IMSC (as sidecar .fmp4)</td>
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<td></td>
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<td>WebVTT</td>
</tr>
<tr>
<td></td>
<td>SCTE-20</td>
<td>IMSC (as sidecar .fmp4)</td>
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<tr>
<td></td>
<td>Teletext</td>
<td>IMSC (as sidecar .fmp4)</td>
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<td>WebVTT</td>
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</table>

**Embedded** captions formats include:
- CEA-608
- EIA-608
- CEA-708
- EIA-708

**Ancillary** captions include:
- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data
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<th>Input Captions Format</th>
<th>Supported Output Captions Formats</th>
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<tr>
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<td>Note</td>
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<td>IMSC (as sidecar .fmp4)</td>
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<tr>
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<td>IMSC (as sidecar .xml)</td>
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<td>TTML (as sidecar .fmp4)</td>
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<td>TTML (as sidecar .ttml)</td>
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<td>MP4 Container</td>
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<td>DASH Output Container</td>
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<td>IMSC (as sidecar .fmp4) IMSC (as sidecar .xml) TTML (as sidecar .fmp4) TTML (as sidecar .ttml)</td>
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<td>MXF Container</td>
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<td>Ancillary</td>
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<td>Raw Container</td>
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HLS Output Container

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

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<td>Input Captions Format</td>
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<td>Note</td>
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<td>Specify the CPL to define your input.</td>
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<td>Embedded plus SCTE-20</td>
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### Embedded captions formats include:
- CEA-608
- EIA-608
- CEA-708
- EIA-708

### Ancillary captions include:
- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data

## MS Smooth (MSS) Output Container

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

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<th>Supported Output Captions Formats</th>
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<td>TTML</td>
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<td>SCTE-20</td>
<td>Burn in</td>
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<td>SCTE-20 plus embedded</td>
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<td>Input Captions Format</td>
<td>Supported Output Captions Formats</td>
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</tr>
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### Input Captions Format
### Supported Output Captions Formats

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**Embedded** captions formats include:
- CEA-608
- EIA-608
- CEA-708
- EIA-708

**Ancillary** captions include:
- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data

---

### MP4 Output Container

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

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</table>

**Embedded** captions formats include:

- CEA-608
- EIA-608
- CEA-708
- EIA-708

**Ancillary** captions include:

- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data

**MPEG2-TS File Output Container**

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

**Note**
AWS Elemental MediaConvert has the following limitations with Teletext in outputs:

- The service doesn't support captions formatting and positioning
You can use only **Teletext level 1.5** languages

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**Embedded** captions formats include:
- CEA-608
- EIA-608
- CEA-708
- EIA-708
Ancillary captions include:

- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data

## MXF Output Container

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

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**Embedded** captions formats include:
- CEA-608
- EIA-608
- CEA-708
- EIA-708

**Ancillary** captions include:
- Captions in the QuickTime Captions Track
Captions in the MXF container VANC data

## QuickTime Output Container

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

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- EIA-608
- CEA-708
- EIA-708

**Ancillary** captions include:

- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data

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**No Output Container**

The following table lists supported output captions formats for this output container, sorted by the input captions container and input captions format.

**Note**

You can create sidecar captions outputs only as part of a job that also generates a video output.

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- EIA-608
- CEA-708
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**Ancillary** captions include:
- Captions in the QuickTime Captions Track
- Captions in the MXF container VANC data
Monitoring AWS Elemental MediaConvert

Monitoring the Progress of Your AWS Elemental MediaConvert Jobs

You can track the status, phase, and percent completion of your jobs. For information about status and phase, see How AWS Elemental MediaConvert Jobs Progress (p. 166).

You can monitor the status of your jobs and their percent completion in these places:

- **AWS Elemental MediaConvert Jobs page**

  On the console, you can see your job status and the overall percent completion of your jobs. For more granular information, such as percent completion of the probing, transcoding, and uploading phase, use Amazon CloudWatch Events, discussed in the following bullet.

  Access the Jobs page by opening the AWS Elemental MediaConvert console and choosing Jobs in the navigation pane. If the navigation pane is closed, choose the menu icon (the three-bar icon) in the upper-left corner of the console to open it.

  Optionally, you can filter to see only jobs that are progressing. From the Any status filter, choose Progressing.

- **Amazon CloudWatch Events**

  With CloudWatch Events, you can get more detailed information about the progress of your jobs, including percent completion of the probing, transcoding, and uploading phases. AWS Elemental MediaConvert sends these STATUS_UPDATE events to the CloudWatch Events service. You can subscribe to these events to receive job notifications programmatically or through Amazon SNS.

  For more information about using the STATUS_UPDATE event, see Using CloudWatch Events with AWS Elemental MediaConvert (p. 166).

Monitoring Your AWS Resources, Applications, and API Calls

The following AWS services help you stay on top of your resources and the activity on your account:

- **Amazon CloudWatch** monitors your AWS resources and the applications that you run on AWS in real-time. You can collect and track metrics, create customized dashboards, and set alarms that notify you or that take actions when a specified metric reaches a threshold that you specify. For example, you can have CloudWatch track the number of successful jobs over a specified period of time. For more information, see the Amazon CloudWatch User Guide. For a list of the MediaConvert metrics that CloudWatch tracks, see Using CloudWatch Metrics to View Metrics for AWS Elemental MediaConvert Resources (p. 179).

- **AWS CloudTrail** captures API calls and related events made by or on behalf of your AWS account and delivers the log files to an Amazon S3 bucket that you specify. You can identify which users and accounts called AWS, the source IP address from which the calls were made, and when the calls occurred. For more information, see Logging MediaConvert API Calls with AWS CloudTrail (p. 188).

Topics

- How AWS Elemental MediaConvert Jobs Progress (p. 166)
How AWS Elemental MediaConvert Jobs Progress

Job Status

A job's status tells you, at the highest level, what is happening with your job. Successful jobs go through the following statuses, in this order:

1. SUBMITTED: Your job status is SUBMITTED when you submit it by choosing the Create button on the console or by sending a CreateJob request through the API or an SDK.
2. PROGRESSING: Your job status is PROGRESSING when the service begins processing it until all of your job outputs are saved to your output Amazon S3 bucket, or until the job ends in an error.
3. COMPLETE: Your job status is COMPLETE when all of your job outputs are saved to your output Amazon S3 bucket.

Unsuccessful jobs have an ERROR status. When you cancel a job, its status becomes CANCELED.

Job Phase

A job's phase tells you at a finer level of detail what is happening while the job's status is PROGRESSING. While a job is progressing, it goes through the following phases, in this order:

1. PROBING: When your job is in the PROBING phase, AWS Elemental MediaConvert reads the information from your input files that the service needs for transcoding.
2. TRANSCODING: When your job is in the TRANSCODING phase, the service demuxes, decodes, encodes, and remuxes your content. In some jobs, the service begins uploading outputs to your output Amazon S3 bucket during this phase. The phase ends when all transcoding is complete.
3. UPLOADING: When your job is in the UPLOADING phase, the service uploads your transcoded outputs to your output Amazon S3 bucket. In the case of outputs that the service begins to upload during the TRANSCODING phase, the UPLOADING phase begins when the transcoding is done and continues until all uploads are finished.

Using CloudWatch Events with AWS Elemental MediaConvert

You can use Amazon CloudWatch Events to monitor your AWS Elemental MediaConvert jobs. Here are some examples of what you can do with CloudWatch Events:

• Monitor the progress of your job.

STATUS_UPDATE events provide information about what phase your job is in (PROBING, TRANSCODING, and UPLOADING). For some jobs, AWS Elemental MediaConvert provides an estimate of how far your job has progressed, shown as a percentage of the total time from when your job leaves its queue to when your output files appear in your output Amazon S3 bucket.

For more information about STATUS_UPDATE events, see the table of event types in Events That AWS Elemental MediaConvert Sends to CloudWatch (p. 178).

For information about adjusting the frequency of status updates, see Adjusting the Status Update Interval (p. 179).
• **Set up email notifications for any failed jobs.**

For a tutorial on setting up this CloudWatch Events event rule, see *Tutorial: Setting Up Email Notifications for Failed Jobs* (p. 168).

This is a specific example of setting up a CloudWatch Events event rule to find out about changes to your job status. For a list of all job status change notifications that you can set up event rules for, see *Events That AWS Elemental MediaConvert Sends to CloudWatch* (p. 178).

• **Get details about your job outputs.**

AWS Elemental MediaConvert provides details about your job outputs in the notification for the COMPLETE event. This information includes the location and file names of the job's media files and manifests. For details, see *Output File Names and Paths* (p. 171).

• **Automatically initiate post-processing with an AWS Lambda function.**

You can set up CloudWatch Events so that a Lambda function initiates your post-processing code after your job finishes. For more information about using AWS Lambda with AWS Elemental MediaConvert, see one of these resources:

- For experienced cloud architects, see the *Video on Demand on AWS* post on the *AWS Answers* blog.
- For developers new to MediaConvert and Lambda, see the *Automating MediaConvert Jobs with Lambda* tutorial on GitHub. This tutorial is part of the Simple VOD Workflow series of tutorials on using MediaConvert to create video on demand (VOD).

**Topics**

- *Setting Up CloudWatch Event Rules* (p. 167)
- *Tutorial: Setting Up Email Notifications for Failed Jobs* (p. 168)
- *Output File Names and Paths* (p. 171)
- *Events That AWS Elemental MediaConvert Sends to CloudWatch* (p. 178)

**Setting Up CloudWatch Event Rules**

To set up CloudWatch event rules, you create a rule that links AWS Elemental MediaConvert and the service that responds to your job status change, such as Amazon Simple Notification Service (SNS) or AWS Lambda. The following illustration shows these two parts of CloudWatch Events rules.

For a tutorial on setting up a CloudWatch rule with AWS Elemental MediaConvert, see *Tutorial: Setting Up Email Notifications for Failed Jobs* (p. 168).

For a list of the events that MediaConvert sends in the CloudWatch Events event stream, see *Events That AWS Elemental MediaConvert Sends to CloudWatch* (p. 178).
For more general information about using CloudWatch Events, see the Amazon CloudWatch Events User Guide.

**Tutorial: Setting Up Email Notifications for Failed Jobs**

In this tutorial, you configure a CloudWatch Events event rule that captures events when a job status changes to `ERROR` and then notifies you about the event. To do this, you first create a topic in Amazon SNS that will send you an email notification about the failed job. Next, you create a rule in CloudWatch Events by defining an event source and referencing the Amazon SNS topic (the “target”), as shown in the following illustration.

Topics

- Prerequisites (p. 168)
- Step 1: Create a Topic in Amazon SNS (p. 168)
- Step 2: Specify an Event Source in a CloudWatch Events Rule (p. 169)
- Step 3: Add the Amazon SNS Topic and Finish Your Rule (p. 170)
- Step 4: Test Your Rule (p. 170)

**Prerequisites**

This tutorial assumes that you already know how to create AWS Elemental MediaConvert transcoding jobs. For information about creating jobs, see Setting Up a Job in AWS Elemental MediaConvert (p. 7). At the end of this tutorial, you can submit a job that you designed to fail, to test that you configured your Amazon SNS email notifications correctly.

**Step 1: Create a Topic in Amazon SNS**

The first part of setting up a CloudWatch Events rule is preparing the rule target. In this case, that means creating and subscribing to an Amazon SNS topic.
To create an Amazon SNS topic

2. In the navigation pane, choose Topics, and then choose Create new topic.
3. For Topic name, enter MediaConvertJobErrorAlert, and then choose Create topic.
5. On the Topic details: MediaConvertJobErrorAlert page, in the Subscriptions section, choose Create subscription.
6. For Protocol, choose Email. For Endpoint, enter the email address that you want Amazon SNS to send the notification to.
7. Choose Create subscription.
8. You will receive a notification email from Amazon SNS. When you receive it, choose the Confirm subscription link in the email.

Step 2: Specify an Event Source in a CloudWatch Events Rule

Next, specify your event source in a CloudWatch Events rule to capture only events that are generated by a job status that changes to ERROR.

To set up an event source in a CloudWatch Events rule

2. In the navigation pane, choose Events, and then choose Create rule.
3. In the Event Source section, choose Event Pattern, and then choose the element labeled Build event pattern to match events by service. From the resulting dropdown list, choose Custom event pattern.
4. In the **Build custom event pattern** box, replace the existing code with the following code:

```json
{
  "source": [
    "aws.mediaconvert"
  ],
  "detail": {
    "status": [
      "ERROR"
    ]
  }
}
```

This code defines a CloudWatch Events event rule that matches any event where the job status changes to *ERROR*. For more information about event patterns, see [Events and Event Patterns](#) in the *Amazon CloudWatch User Guide*.

**Step 3: Add the Amazon SNS Topic and Finish Your Rule**

Next, add the target (the Amazon SNS topic) that you created in step 1 to the CloudWatch Events rule that you started in step 2.

**To add the SNS topic and finish the CloudWatch Events rule**

1. In the **Targets** section, choose **Add targets**, and then change the default **Lambda function** to **SNS topic**.
2. For **Topic**, choose **MediaConvertJobErrorAlert**.
3. Choose the **Configure details** button.
4. For **Rule definition**, enter a name and description for your rule, and then choose **Create rule**.

**Step 4: Test Your Rule**

To test your rule, submit a job that you know will cause an error. For example, specify an input location that does not exist. If you configured your event rule correctly, you should receive an email with the event text message in a few minutes.

**To test the rule**

2. Submit a new MediaConvert job. For more information, see [Setting Up a Job in AWS Elemental MediaConvert](p. 7).
3. Check the email account that you specified when you set up your Amazon SNS topic. Confirm that you received an email notification for the job error.

Output File Names and Paths

The CloudWatch Events job complete notification includes the JobResult response in JSON. This information includes the file names and paths for the outputs of the job—including manifests as well as the media assets.

The files that AWS Elemental MediaConvert creates depends on the output groups that you set up in the job. For example, DASH ISO packages contain an .mpd manifest and .mp4 media fragment files.

You can find output file name and path information in the JobResult response information, in the following properties:

playlistFilePaths

A list of the Amazon S3 file paths to the top-level manifests.

outputFilePaths

The file path to either the media or the manifest, depending on the output group type.

type

The type of output group, which determines what files are listed in the playlistFilePaths and outputFilePaths.

The following table summarizes the values for these properties, depending on the output group type.

<table>
<thead>
<tr>
<th>type</th>
<th>playlistFilePaths</th>
<th>outputFilePaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILE_GROUP (standard output)</td>
<td>not returned</td>
<td>File name and path of the media file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Example: s3://bucket/file/file.mp4</td>
</tr>
<tr>
<td>FILE_GROUP (with additional frame capture output)</td>
<td>not returned</td>
<td>File name and path of the final captured image</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Example: s3://bucket/frameoutput/file.0000036.jpg</td>
</tr>
<tr>
<td>HLS_GROUP</td>
<td>File name and path of the top-level manifest</td>
<td>File name and path of the manifests for the individual outputs</td>
</tr>
<tr>
<td></td>
<td>Example: s3://bucket/hls/main.m3u8</td>
<td>Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• s3://bucket/hls/mainv1.m3u8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• s3://bucket/hls/mainv2.m3u8</td>
</tr>
<tr>
<td>DASH_ISO_GROUP</td>
<td>File name and path of the manifest</td>
<td>not returned</td>
</tr>
<tr>
<td>type</td>
<td>playlistFilePaths</td>
<td>outputFilePaths</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Example: s3://bucket/dash/1.mpd</td>
<td></td>
</tr>
<tr>
<td>CMAF_GROUP</td>
<td>File name and path for each of the top-level manifests</td>
<td>not returned</td>
</tr>
<tr>
<td></td>
<td>Examples:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• s3://bucket/cmaf/1.mpd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• s3://bucket/cmaf/1.m3u8</td>
<td></td>
</tr>
<tr>
<td>MS_SMOOTH_GROUP</td>
<td>File name and path of the server-side manifest</td>
<td>File name and path of the video manifests for each of the individual outputs</td>
</tr>
<tr>
<td></td>
<td>Example: s3://bucket/smooth/1.ism</td>
<td>Examples:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• s3://bucket/smooth/1_va.ismv</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• s3://bucket/smooth/2_va.ismv</td>
</tr>
</tbody>
</table>

For sample JobResult responses in JSON for each output group type, see the following topics:

**Topics**

- File Group (p. 172)
- File Group with a Frame Capture Output (p. 173)
- Apple HLS Group (p. 174)
- DASH ISO Group (p. 175)
- CMAF Group (p. 176)
- Microsoft Smooth Streaming Group (p. 177)

**File Group**

```json
{
    "account": "111122223333",
    "region": "us-west-2",
    "detail": {
        "status": "COMPLETE",
        "outputGroupDetails": [
            {
                "outputDetails": [
                    {
                        "outputFilePaths": [
                            "s3://bucket/frameoutput/file.0000036.jpg"
                        ],
                        "durationInMs": 185000,
                        "videoDetails": {
                            "widthInPx": 1280,
                            "heightInPx": 534
                        }
                    }
                ],
                "type": "FILE_GROUP"
            }
        ]
    }
}```
File Group with a Frame Capture Output

A frame capture output is an output that you set up to create .jpeg still images of each I-frame in your video. You set it up like a regular File group output group, except that you remove the audio component, choose No container for the container, and then choose Frame capture to JPEG for the video codec.

**Note**
You can create frame capture outputs only in jobs that also have a regular audio and video output. MediaConvert doesn't support jobs that consist only of a frame capture output.

When you create a frame capture output, the JobResult includes the outputFilePaths property, which tells you the file name and path of the final captured image.

**Tip**
Because the service includes automatic numbering in the frame capture file names, you can infer all the image names from the final one. For example, if your outputFilePaths value is s3://bucket/frameoutput/file.0000036.jpg, you can infer that there are 35 other images in the same location, named file.0000001, file.0000002, and so on.

The following example shows a CloudWatch Events JobResult notification, with output file path information, for a file group with a frame capture output.

```json
{
    "account": "111122223333",
    "region": "us-west-2",
    "detail": {
        "status": "COMPLETE",
        "outputGroupDetails": [ {
```
Apple HLS Group

The following example shows a CloudWatch Events JobResult notification, with output file path information, for an Apple HLS group.

```json
{
    "account": "111122223333",
    "region": "us-west-2",
    "detail": {
        "status": "COMPLETE",
        "outputGroupDetails": [
            {
                "outputDetails": [
                    {
                        "outputFilePaths": [
                            "s3://bucket/hls/mainv2.m3u8"
                        ],
                        "durationInMs": 180041,
                        "videoDetails": {
                            "widthInPx": 1280,
                            "heightInPx": 534
                        }
                    }
                ],
                "type": "FILE_GROUP"
            }
        ],
        "timestamp": 1536962166536,
        "jobId": "1536962115049-g58xc4",
        "userMetadata": {},
        "accountId": "111122223333"
    }
}
```
DASH ISO Group

The following example shows a CloudWatch Events JobResult notification, with output file path information, for a DASH ISO group.

```json
{
    "account": "111122223333",
    "region": "us-west-2",
    "detail": {
        "status": "COMPLETE",
        "outputGroupDetails": [
            {
                "outputDetails": [
                    {
                        "durationInMs": 180041,
                        "videoDetails": {
                            "widthInPx": 1280,
                            "heightInPx": 534
                        }
                    },
                    {
                        "durationInMs": 180053
                    }
                ],
                "type": "HLS_GROUP",
                "playlistFilePaths": [
                    "s3://bucket/hls/main.m3u8"
                ]
            }
        ],
        "timestamp": 1536962071281,
        "jobId": "1536961999428-kxngbl",
        "userMetadata": {},
        "accountId": "111122223333"
    },
    "detail-type": "MediaConvert Job State Change",
    "source": "aws.mediaconvert",
    "version": "0",
    "time": "2018-09-14T21:54:31Z",
    "id": "63ea01c2-3e65-8996-9588-a9d18a3d63fe",
    "resources": [
    ]
}
```
CMAF Group

The following example shows a CloudWatch Events JobResult notification, with output file path information, for a CMAF group.

```json
{
    "account": "111122223333",
    "region": "us-west-2",
    "detail": {
        "status": "COMPLETE",
        "outputGroupDetails": [
            {
                "outputDetails": [
                    {
                        "durationInMs": 180041,
                        "videoDetails": {
                            "widthInPx": 1280,
                            "heightInPx": 534
                        }
                    },
                    {
                        "durationInMs": 180053
                    },
                    {
                        "durationInMs": 180041,
                        "videoDetails": {
                            "widthInPx": 1280,
                            "heightInPx": 534
                        }
                    }
                ],
                "type": "CMAF_GROUP",
                "playlistFilePaths": [
                    "s3://bucket/cmaf/1.mpd",
                    "s3://bucket/cmaf/1.m3u8"
                ]
            }
        ],
        "timestamp": 1536964429367,
        "jobId": "1536964369162-gl6ur1",
    }
}
```
"userMetadata": {},
"accountId": "111122223333"
},
"detail-type": "MediaConvert Job State Change",
"source": "aws.mediaconvert",
"version": "0",
"time": "2018-09-14T22:33:49Z",
"id": "9eb9aaa-797c-6d93-4258-3dfa6f845d64",
"resources": [
]
}

Microsoft Smooth Streaming Group

{
  "account": "111122223333",
  "region": "us-west-2",
  "detail": {
    "status": "COMPLETE",
    "outputGroupDetails": [
      {
        "outputDetails": [
          {"outputFilePaths": ["s3://bucket/smooth/1_va.ismv"],
          "durationInMs": 180041,
          "videoDetails": {
            "widthInPx": 1280,
            "heightInPx": 534
          }
        },
        {"outputFilePaths": ["s3://bucket/smooth/2_va.ismv"],
          "durationInMs": 180041,
          "videoDetails": {
            "widthInPx": 1280,
            "heightInPx": 534
          }
        }
      },
      "type": "MS_SMOOTH_GROUP",
      "playlistFilePaths": [
        "s3://bucket/smooth/1.ism"
      ]
    ]
  },
  "timestamp": 1536964409174,
  "jobId": "1536964355034-rqbv0o",
  "userMetadata": {},
  "accountId": "111122223333"
},
"detail-type": "MediaConvert Job State Change",
"source": "aws.mediaconvert",
"version": "0",
"time": "2018-09-14T22:33:29Z",
"id": "7569da66-f500-1af4-082b-da6c756e6813",
"resources": [
]
# Events That AWS Elemental MediaConvert Sends to CloudWatch

AWS Elemental MediaConvert sends change events about the status of jobs to CloudWatch Events. You can create CloudWatch Events rules for any of the following events.

<table>
<thead>
<tr>
<th>Event</th>
<th>Sent When</th>
<th>Contains</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROGRESSING</td>
<td>A job moves from the SUBMITTED state to the PROGRESSING state.</td>
<td>Time in queue.</td>
</tr>
</tbody>
</table>
| STATUS_UPDATE    | Approximately one minute has elapsed since MediaConvert began processing the job. By default, updates are sent approximately every minute after that, until the service finishes transcoding or encounters an error. You can optionally specify a different update frequency in your job, with the Status update interval setting. For more frequent updates than the default, you can choose 10, 12, 15, 20, or 30 seconds. For less frequent updates than the default, you can choose anywhere from 2 to 10 minutes, in increments of one minute. | The phase your job is in, and, when available, job and phase percent completion. Job phases are as follows:  
- During PROBING, the service reads information about the input in preparation to begin transcoding.  
- During TRANSCODING, the service demuxes, decodes, encodes, and remuxes your content. In some jobs, the service begins uploading outputs to your output Amazon S3 bucket during this phase as well. The phase ends when all transcoding is complete.  
- During UPLOADING, the service uploads the remaining transcoded outputs to your Amazon S3 bucket. |
| COMPLETE         | A job completes successfully. MediaConvert generated all outputs without errors. | Warnings and output information about the completed job.                 |
| ERROR            | A job has an error. At least one output has an error.                      | The error code or codes and any messages, as well as warnings or any other ephemeral job information about the job's error status. |
| NEW_WARNING      | A warning condition arises. Warning conditions don't stop the job from running. | The submission queue ARN, the job ID, and a warning message. Warning messages inform you about conditions that don't stop the job but may indicate that the job is not progressing as you planned. |
Using CloudWatch Metrics to View Metrics for AWS Elemental MediaConvert Resources

AWS Elemental MediaConvert sends the following metrics to CloudWatch every time the status of a job changes.
<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AudioOutputDuration</td>
<td>The number of seconds of audio-only output for a queue.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td></td>
<td>Unit: Seconds</td>
</tr>
<tr>
<td>SDOutputDuration</td>
<td>The number of seconds of standard definition (SD) output for a queue.</td>
</tr>
<tr>
<td></td>
<td>For the definition of each video resolution category, see the AWS Elemental MediaConvert Pricing page.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td></td>
<td>Unit: Seconds</td>
</tr>
<tr>
<td>HDOutputDuration</td>
<td>The number of seconds of high-definition (HD) output for a queue.</td>
</tr>
<tr>
<td></td>
<td>For the definition of each video resolution category, see the AWS Elemental MediaConvert Pricing page.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td></td>
<td>Unit: Seconds</td>
</tr>
<tr>
<td>UHDOutputDuration</td>
<td>The number of seconds of ultra-high-definition (UHD) output for a queue.</td>
</tr>
<tr>
<td></td>
<td>For the definition of each video resolution category, see the AWS Elemental MediaConvert Pricing page.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td></td>
<td>Unit: Seconds</td>
</tr>
<tr>
<td>8KOutputDuration</td>
<td>The number of seconds of 8K output for a queue.</td>
</tr>
<tr>
<td></td>
<td>For the definition of each video resolution category, see the AWS Elemental MediaConvert Pricing page.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td></td>
<td>Unit: Seconds</td>
</tr>
<tr>
<td>JobsCompletedCount</td>
<td>The number of jobs completed in this queue.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td></td>
<td>Unit: Count</td>
</tr>
<tr>
<td>JobsErroredCount</td>
<td>The number of jobs that failed because of invalid inputs, such as a request to transcode a file that is not in the specified input bucket.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td>Metric</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>StandbyTime</td>
<td>The number of seconds before AWS Elemental MediaConvert starts transcoding a job.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
<tr>
<td>TranscodingTime</td>
<td>The number of seconds for AWS Elemental MediaConvert to complete transcoding.</td>
</tr>
<tr>
<td></td>
<td>Valid dimensions: Queue</td>
</tr>
</tbody>
</table>

### Dimensions for AWS Elemental MediaConvert Metrics

AWS Elemental MediaConvert metrics use the `MediaConvert` namespace and provides metrics for the following dimensions.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queue</td>
<td>CloudWatch shows information for the specified queue.</td>
</tr>
<tr>
<td>Job</td>
<td>CloudWatch shows information only for a single job.</td>
</tr>
<tr>
<td>Operation</td>
<td>CloudWatch shows information only for a single operation parameter, such as a job ID.</td>
</tr>
</tbody>
</table>
Tagging AWS Elemental MediaConvert Resources

A tag is a label that you assign or that AWS assigns to an AWS resource. Each tag consists of a key and a value. For tags that you assign, you define the key and value. For example, you might define the key as “stage” and the value as “test.” Tags help you to identify and organize your AWS resources. Tags that you assign to AWS Elemental MediaConvert jobs, job templates, queues, and presets are integrated with tags across AWS services.

Popular use cases for these tags are as follows:

- You can use the AWS Resource Groups Tagging API to tag and group your MediaConvert resources with other tagged AWS resources. For more information, see the Resource Groups Tagging API Reference.
- You can activate these tags on the AWS Billing and Cost Management dashboard, and then set up a monthly cost allocation report. For more information, see Setting Up Resources for Cost Allocation Through Tagging (p. 182).
- You can allow or deny resource-level access to your resources using AWS Identity and Access Management (IAM). For more information, see Controlling Access to AWS Resources Using Resource Tags in the IAM User Guide.

Note
You can use two types of tags on your MediaConvert jobs: standard AWS tags (tags) and metadata tags (user:Metadata). Standard AWS tags integrate with AWS Billing and Cost Management, the AWS Resource Groups Tagging API, and IAM resource-based permissions. Metadata tags aren’t integrated with other AWS services. Unless you have existing integrations or workflows that rely on metadata tags, we recommend that you use standard AWS tags for both automatic integration with AWS services and for custom integrations and workflows. For information, see Using Metadata Tags with AWS Elemental MediaConvert Jobs (p. 186).

The following topics apply only to standard AWS tags.

Topics
- Setting Up AWS Elemental MediaConvert Resources for Cost Allocation Through Tagging (p. 182)
- Adding Tags When You Create an AWS Elemental MediaConvert Resource (p. 183)
- Adding Tags to an Existing AWS Elemental MediaConvert Resource (p. 184)
- Viewing Tags on an AWS Elemental MediaConvert Resource (p. 185)
- Editing Tags on an AWS Elemental MediaConvert Resource (p. 185)
- Removing Tags from an AWS Elemental MediaConvert Resource (p. 185)
- Restrictions for Tags on AWS Elemental MediaConvert Resources (p. 186)
- Using Metadata Tags with AWS Elemental MediaConvert Jobs (p. 186)

Setting Up AWS Elemental MediaConvert Resources for Cost Allocation Through Tagging

For all outputs that you produce using an on-demand queue, you can use the AWS Billing and Cost Management dashboard to set up a monthly cost allocation report. This report shows what AWS charges...
you for transcoding, sorted by resource. You can set up your jobs so that your job outputs are sorted by
tags on the job or on a resource that you use to create the job. That is, you can sort your bill by the tags
that you put on the job, on the queue that you submit the job to, on the job template that you create the
job from, or on the output presets that you use to set up the individual outputs of the job.

**To set up cost allocation through tagging for your AWS Elemental MediaConvert charges**

1. Tag the resources that you intend to sort your bill by. For instructions, see the other topics in this
chapter.
2. Create your transcoding jobs, specifying how you want your costs allocated as follows:
   a. On the Create job page, in the Job pane on the left, under Job settings, choose Settings.
   b. In the Job settings section on the right, for Billing tag source, choose which tags you want to
      use to sort the job's outputs. You can choose to sort by tags on a resource that you use to create
      the job—job template, output preset, or queue. Or you can choose Job to sort by the tags on
      the job itself.

      **Note**
      Jobs, and the tags on them, persist for only 90 days. If your workflow references tags
over longer periods of time, use tags on the queue, job template, or output preset
rather than tags on the job.
3. Activate these tags on the AWS Billing and Cost Management dashboard. For more information, see
4. Set up your report. For more information, see Monthly Cost Allocation Report in the Billing and Cost
   Management User Guide.

**Adding Tags When You Create an AWS Elemental MediaConvert Resource**

The following procedures show you how to add tags to your MediaConvert queues, job templates, and
output presets when you create them.

**Topics**

**Adding Tags When Creating a Resource (Console)**

You can add tags when you create a queue, job template, or output preset.

**To add tags when you create a queue, job template, or output preset (console)**

1. Follow the steps in one of the following procedures to begin creating the resource, but don't save
the resource:
   - Setting Up a Job (p. 7)
   - Creating an On-Demand Queue (p. 67)
   - Creating a Custom Preset from Scratch (p. 56)
   - Creating a Custom Preset from Scratch (p. 49)
   - Creating a Custom Preset from a System Preset (p. 51)
2. Find the Tags section in the relevant location:
   - For jobs – on the Create job page, after you choose Settings from the Job section on the left
Adding Tags When Creating a Resource (API and AWS CLI)

When you create a job, job template, output preset, or queue using the AWS Elemental MediaConvert API or the AWS CLI, submit your JSON specification for the resource as usual. Include tags as shown in the following JSON example, in tags:

```json
{
   "name": "Job Template Test with Resource Tags",
   "description": "Job Template Test",
   "tags":{
      "Company": "Banana",
      "Stage": "Production"
   },
   "settings":{
      ...
   }
}
```

Adding Tags to an Existing AWS Elemental MediaConvert Resource

The following procedure shows you how to add tags to existing job templates, output presets, or queues using the AWS Elemental MediaConvert console. You can add tags to jobs only when creating them.

For information about adding tags using the API, see the POST method in the Tags endpoint section of the MediaConvert API Reference.

**Note**
Tags on your MediaConvert resources don't appear in the JSON response to a GET request on the resource. Instead, send a GET request to the Tags endpoint. If you send your request directly to the API, rather than using an SDK, you must URL encode the resource ARN.

**To add tags to job templates, output presets, and queues (console)**

2. Choose the three-bar icon on the left to access the left navigation pane.
3. Choose Job templates, Output presets, or Queues.
4. Choose the name of the specific resource that you want to add a tag to.
5. Choose the Update, Edit queue, or Update preset button in the upper right.
6. In the Tags section at the bottom of the page, choose Add.
7. For Tag key, enter a name for the tag. For Tag value, enter a value for the tag.
8. Choose Save.
Viewing Tags on an AWS Elemental MediaConvert Resource

The following procedure shows you how to view tags on existing queues, job templates, and output presets using the AWS Elemental MediaConvert console.

To do this using the API, see the GET method in the Tags arn endpoint section of the MediaConvert API Reference. If you send your request directly to the API, rather than using an SDK, you must URL encode the resource ARN.

To view tags for queues, job templates, and output presets (console)
2. Choose the three-bar icon on the left to access the left navigation pane.
3. Choose Job templates, Output presets, or Queues.
4. Choose the name of the specific resource that has tags that you want to view.
5. View the tags for the resource in the Tags section at the bottom of the page.

Editing Tags on an AWS Elemental MediaConvert Resource

The following procedure shows you how to edit tags on existing job templates, output presets, and queues using the AWS Elemental MediaConvert console. You can't edit tags on existing jobs.

To do this using the API, see the POST method in the Tags endpoint section of the MediaConvert API Reference.

To edit tags for job templates, output presets, and queues (console)
2. Choose the three-bar icon on the left to access the left navigation pane.
3. Choose Job templates, Output presets, or Queues.
4. Choose the name of the specific resource that has tags that you want to change.
5. Choose the Update, Edit queue, or Update preset button in the upper right.
6. In the Tags section at the bottom of the page, edit any values for Tag key and Tag values that you want to change.
7. Choose Save.

Removing Tags from an AWS Elemental MediaConvert Resource

The following procedure shows you how to remove tags from existing job templates, output presets, and queues using the AWS Elemental MediaConvert console.

To do this using the API, see the PUT method in the Tags endpoint section of the MediaConvert API Reference.
To remove tags from a job template, output preset, or queue (console)

2. Choose the three-bar icon on the left to access the left navigation pane.
3. Choose Job templates, Output presets, or Queues.
4. Choose the name of the specific resource that has tags that you want to change.
5. Choose the Update, Edit queue, or Update preset button in the upper right.
6. Next to any tag that you want to delete, choose Remove.
7. Choose Save.

Restrictions for Tags on AWS Elemental MediaConvert Resources

The following basic restrictions apply to tags:

- Maximum number of tags per resource – 50.
- Maximum Key length – 128 Unicode characters.
- Maximum Value length – 256 Unicode characters.
- Valid values for Key and Value – Uppercase and lowercase letters in the UTF-8 character set, numbers, space, and the following characters: _ . : / = + - and @.
- Tag keys and values are case sensitive.
- Don't use the aws: prefix for either keys or values. It’s reserved for AWS use.

Using Metadata Tags with AWS Elemental MediaConvert Jobs

Unless you have existing integrations or workflows that rely on metadata (userMetadata) tags, we recommend that you use standard AWS tags for both automatic integration with AWS services and for custom integrations and workflows. For more information, see Tagging AWS Elemental MediaConvert Resources (p. 182).

A tag is a label that you assign or that AWS assigns to an AWS resource. Each tag consists of a key and a value. For tags that you assign, you define the key and value. For example, you might define the key as "stage" and the value as "test." Tags help you to identify and organize your AWS resources. Metadata tags that you assign to AWS Elemental MediaConvert jobs appear in Amazon CloudWatch Events notifications.

You add metadata tags to jobs in one of the following ways:

- Through the MediaConvert console on the Job settings page, in the Metadata pane.
- Through the MediaConvert API in your job settings JSON payload. Include tags as shown in the following JSON snippet, in userMetadata. For more information, see the Jobs endpoint section of the MediaConvert API Reference.

```json
{
    "name": "Job Template Test with Resource Tags",
    "description": "Job Template Test",
    "userMetadata": {
        "Company": "Banana",
    },
}
AWS Elemental MediaConvert Job Tag Restrictions

The following basic restrictions apply to tags on jobs:

- Maximum number of tags per job – 10.
- Maximum **Key** length – 128 Unicode characters.
- Maximum **Value** length – 256 Unicode characters.
- Valid values for **Key** and **Value** – Uppercase and lowercase Unicode letters in any language, numbers, space, and the following characters: _ . : / = + - and @.
- Tag keys and values are case sensitive.
- Don’t use the **aws** : prefix for either keys or values. It’s reserved for AWS use.
Logging MediaConvert API Calls with AWS CloudTrail

MediaConvert is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in MediaConvert. CloudTrail captures all API calls for MediaConvert as events, including calls from the MediaConvert console and from code calls to the MediaConvert APIs. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for MediaConvert. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in Event history. Using the information collected by CloudTrail, you can determine the request that was made to MediaConvert, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, see the AWS CloudTrail User Guide.

MediaConvert Information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When activity occurs in MediaConvert, that activity is recorded in a CloudTrail event along with other AWS service events in Event history. You can view, search, and download recent events in your AWS account. For more information, see Viewing Events with CloudTrail Event History.

For an ongoing record of events in your AWS account, including events for MediaConvert, create a trail. A trail enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all regions. The trail logs events from all regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see:

- Overview for Creating a Trail
- CloudTrail Supported Services and Integrations
- Configuring Amazon SNS Notifications for CloudTrail
- Receiving CloudTrail Log Files from Multiple Regions and Receiving CloudTrail Log Files from Multiple Accounts

All MediaConvert actions are logged by CloudTrail and are documented in the AWS Elemental MediaConvert API Reference. For example, calls to the DeleteQueue, CreateQueue, and TagResource operations generate entries in the CloudTrail log files.

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or IAM user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another AWS service.

For more information, see the CloudTrail userIdentity Element.
Understanding MediaConvert Log File Entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files are not an ordered stack trace of the public API calls, so they do not appear in any specific order.

The following examples show CloudTrail log entries that demonstrate the `DeleteQueue`, `CreateQueue`, and `TagResource` actions.

**Example log entry: DeleteQueue**

```json
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "AIDACKCEVSQ6C2EXAMPLE",
        "arn": "arn:aws:iam::111122223333:user/testuser",
        "accountId": "111122223333",
        "accessKeyId": "AIDACKCEVSQ6C2EXAMPLE",
        "userName": "testuser",
        "sessionContext": {
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2018-07-10T14:01:57Z"
            }
        },
        "invokedBy": "signin.amazonaws.com"
    },
    "eventTime": "2018-07-10T15:36:29Z",
    "eventSource": "mediaconvert.amazonaws.com",
    "eventName": "DeleteQueue",
    "awsRegion": "eu-west-1",
    "sourceIPAddress": "203.0.113.0.186",
    "userAgent": "signin.amazonaws.com",
    "requestParameters": {
        "name": "8"
    },
    "responseElements": null,
    "requestID": "03691738-8457-11e8-a138-2b67258eef82",
    "eventId": "e7d85e26-6c96-4242-80f8-6c8074c26253",
    "readOnly": false,
    "eventType": "AwsApiCall",
    "recipientAccountId": "111122223333"
}
```

**Example log entry: CreateQueue**

```json
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "AIDACKCEVSQ6C2EXAMPLE",
        "arn": "arn:aws:iam::111122223333:user/jeremyj",
        "accountId": "111122223333",
        "accessKeyId": "AIDACKCEVSQ6C2EXAMPLE",
        "userName": "testUser",
        "sessionContext": {
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2018-07-10T14:01:57Z"
            }
        },
        "invokedBy": "signin.amazonaws.com"
    },
    "eventTime": "2018-07-10T15:36:29Z",
    "eventSource": "mediaconvert.amazonaws.com",
    "eventName": "CreateQueue",
    "awsRegion": "eu-west-1",
    "sourceIPAddress": "203.0.113.0.186",
    "userAgent": "signin.amazonaws.com",
    "requestParameters": {
        "name": "8"
    },
    "responseElements": null,
    "requestID": "03691738-8457-11e8-a138-2b67258eef82",
    "eventId": "e7d85e26-6c96-4242-80f8-6c8074c26253",
    "readOnly": false,
    "eventType": "AwsApiCall",
    "recipientAccountId": "111122223333"
}
```
Example log entry: TagResource

```json
{}
```

```
"eventVersion": "1.05",
"userIdentity": {
  "type": "IAMUser",
  "principalId": "AIDACKCEVSQ6C2EXAMPLE",
  "arn": "arn:aws:iam::111122223333:user/testuser",
  "accountId": "111122223333",
  "accessKeyId": "AIDACKCEVSQ6C2EXAMPLE",
  "userName": "testuser"
},
"eventTime": "2018-07-10T18:44:27Z",
"eventSource": "mediaconvert.amazonaws.com",
"eventName": "TagResource",
"awsRegion": "eu-west-1",
"sourceIPAddress": "203.0.113.0.186",
"userAgent": "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/67.0.3396.99 Safari/537.36",
"requestParameters": {
  "arn": "arn:aws:mediaconvert:eu-west-1:111122223333:queues/1",
  "tags": {
    "CostCenter": "BU-Test"
  }
}
```
"responseElements": null,
"requestID": "462fd283-8471-11e8-b353-03144533ee8a",
"eventID": "3364cb1b-79c8-4081-9aa0-1b0677349d5e",
"readOnly": false,
"eventType": "AwsApiCall",
"recipientAccountId": "111122223333"}
# AWS Elemental MediaConvert Error Codes

MediaConvert returns error codes when transcoding jobs run into problems. You can use CloudWatch Events to track the error codes that the service returns.

This table provides more detailed information about the error codes and messages that the MediaConvert encoding engine returns, with possible solutions.

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Message</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1010</td>
<td>Input Error</td>
<td>The service can't open one or more of your input files. Possible causes are as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The file is corrupted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• There's a problem with your IAM permissions. Check the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The permissions of the IAM role the service assumes (p. 4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The IAM permissions of the person logged in to the service who creates the job</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The input file type isn't supported. See Supported Input Codecs and Containers (p. 134).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The specified path to your Amazon S3 input file has a mistake. The easiest way to make sure that your file path is correct is to choose the Browse button on the console to select your file from your Amazon S3 bucket.</td>
</tr>
<tr>
<td>1020</td>
<td>Video Error</td>
<td>The service can't find any video in your input stream. The service was able to open and read your input file, but couldn't find a video elementary stream. Possible causes are as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• There's a problem with the input file.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The wrong input file was specified.</td>
</tr>
<tr>
<td>Error Code</td>
<td>Message</td>
<td>Details</td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
</tbody>
</table>
| 1021       | Audio Error | The service can't find any audio in your input stream. The service was able to open and read your input file, but couldn't find an audio elementary stream. Possible causes are as follows:  
- There's a problem with the input file.  
- The wrong input file was specified. |
<p>| 1030       | Unsupported Codec | The service doesn't support the codec or container of the input file. See Supported Input Codecs and Containers (p. 134). |
| 1040       | Settings Error | One or more of the job's encoding settings aren't supported in the combination specified. Or, the encoding settings aren't compatible with the input. |
| 1041       | Acceleration Settings Error | Your job settings aren't compatible with accelerated transcoding. See Job Limitations for Accelerated Transcoding in AWS Elemental MediaConvert (p. 112). |
| 1042       | Job Doesn't Require Enough Processing Power for Accelerated Transcoding | This job doesn't require enough processing power to benefit from accelerated transcoding. Consider using accelerated transcoding for jobs that would otherwise take 10 minutes or longer to run. |
| 1050       | Disk Full | Write error, disk full. Try reducing the number of outputs in the job, or reducing the length of the output. |</p>
<table>
<thead>
<tr>
<th>Error Code</th>
<th>Message</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1056</td>
<td>File Open Error</td>
<td>The service can't open an input or output file. Possible causes are as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- A file is corrupted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- There's a problem with your IAM permissions. Check the following:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The permissions of the IAM role the service assumes (p. 4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The IAM permissions of the person logged in to the service who creates the job</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The input or output file type isn't supported. See Supported Input Codecs and Containers (p. 134).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The specified path to your Amazon S3 input file has a mistake. The easiest way to make sure that your file path is correct is to choose the Browse button on the console to select your file from your Amazon S3 bucket.</td>
</tr>
<tr>
<td>1060</td>
<td>Clipping Error</td>
<td>The start and end timecodes specified for an input clip don't exist in the associated input stream. A possible cause is that the input clipping timecodes are specified starting from zero, but the embedded timecodes start at a time other than 00:00:00:00. The simplest way to solve this is to set both the input Timecode source and the Timecode configuration Source under Job settings to Start at 0.</td>
</tr>
<tr>
<td>1075</td>
<td>Demuxer Parse Error</td>
<td>The transcoder couldn't recover from a problematic file when demuxing. Verify that you have provided a supported input (p. 134). If AWS Elemental MediaConvert supports your input, open a case with AWS Support.</td>
</tr>
<tr>
<td>Error Code</td>
<td>Message</td>
<td>Details</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1076</td>
<td>Source Read Error</td>
<td>The transcoder couldn't read from one of the input files. The file might have an unexpected end of file. Verify that your input file is valid and that it's truncated properly.</td>
</tr>
<tr>
<td>1080</td>
<td>MXF Output Error</td>
<td>There is a problem in the way the MXF output settings are configured in your job. Check that these settings are correct and valid per specification.</td>
</tr>
</tbody>
</table>
| 1091       | Encryption Error   | There was an error encrypting one or more of the job outputs. Verify that the IAM role that you chose in your AWS Elemental MediaConvert job settings provides access to invoke API Gateway.  
For more information about setting up this IAM role, see Set Up IAM Permissions (p. 4) in this guide. |
| 1401       | Permissions Issue  | Amazon S3 denied access to a file or bucket. Check the bucket policies on your input and output locations. Also check that the job has the right IAM role specified and that the role has the necessary permissions.  
For more information, see the following:  
• Using Bucket Policies and User Policies in the Amazon S3 User Guide  
• Set Up IAM Permissions (p. 4) in this guide |
<table>
<thead>
<tr>
<th>Error Code</th>
<th>Message</th>
<th>Details</th>
</tr>
</thead>
</table>
| 1404       | File Open Error | AWS Elemental MediaConvert could not find a file or Amazon S3 bucket. Check that the S3 bucket and input files exist and that they are specified correctly in the job. Also check that MediaConvert has permissions to access them. For more information, see the following:  
  - Working with Amazon S3 Buckets in the Amazon S3 Developer Guide  
  - Using Bucket Policies and User Policies in the Amazon S3 User Guide  
  - Set Up IAM Permissions (p. 4) in this guide |
<p>| 1432       | IAM Role Error | The role specified in your AWS Elemental MediaConvert job settings doesn't have the necessary permissions or has another problem. Check that the job has the right IAM role specified and that the role has the correct permissions. For more information about setting up this IAM role, see Set Up IAM Permissions (p. 4) in this guide. |
| 1433       | IAM Role Error | The role specified in your AWS Elemental MediaConvert job settings doesn't exist. Check that the job has the right IAM role specified. For more information about setting up this IAM role, see Set Up IAM Permissions (p. 4) in this guide. |</p>
<table>
<thead>
<tr>
<th>Error Code</th>
<th>Message</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1434</td>
<td>IAM Role Error</td>
<td>The role specified in your AWS Elemental MediaConvert job settings doesn't have the necessary permissions. Check that the job has the right IAM role specified and that the role has AWS Elemental MediaConvert as a trusted entity. For more information about setting up this IAM role, see Set Up IAM Permissions (p. 4) in this guide.</td>
</tr>
<tr>
<td>1507</td>
<td>Disk Full</td>
<td>Write error, disk full. Try reducing the number of outputs in the job, or reducing the length of the output.</td>
</tr>
<tr>
<td>1515</td>
<td>IAM Role Error</td>
<td>The role specified in your AWS Elemental MediaConvert job settings doesn't have the necessary permissions or is malformed. Check that the job has the right IAM role specified and that the role has the correct permissions. For more information about setting up this IAM role, see Set Up IAM Permissions (p. 4) in this guide.</td>
</tr>
<tr>
<td>1550</td>
<td>Acceleration Fault</td>
<td>There is an unexpected error with the accelerated transcoding of this job. Contact AWS Support.</td>
</tr>
<tr>
<td>1999</td>
<td>Unknown Error</td>
<td>There is an unexpected transcoding error. Contact AWS Support.</td>
</tr>
<tr>
<td>3401</td>
<td>HTTP File Access Not Authorized</td>
<td>You specified an HTTP(S) URL for an input file that requires authentication. MediaConvert doesn't pass authentication credentials to the HTTP server. Either change the permissions for your file on the HTTP server, or upload your file to Amazon S3 and specify the Amazon S3 location instead. For more information, see HTTP Input Requirements (p. 6).</td>
</tr>
<tr>
<td>Error Code</td>
<td>Message</td>
<td>Details</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3403</td>
<td>HTTP Access Forbidden</td>
<td>You specified an HTTP URL for an input file, but the HTTP server refuses the request. Check that you have specified the correct URL. If you have, contact the team that is responsible for maintaining the HTTP server that hosts your file.</td>
</tr>
<tr>
<td>3404</td>
<td>HTTP File Not Found</td>
<td>You specified an HTTP URL for an input file, but the HTTP server doesn't have the file. Check that you have specified the correct URL.</td>
</tr>
<tr>
<td>3408</td>
<td>HTTP Upload Error</td>
<td>You specified an HTTP URL for an input file, but the upload failed for a reason that is unrelated to errors 3401, 3403, and 3404. Contact AWS Support.</td>
</tr>
<tr>
<td>3450</td>
<td>HTTP Server Error</td>
<td>You specified an HTTP URL for an input file, but the HTTP server returned an error or failed. Contact the team that is responsible for maintaining the HTTP server that hosts your file.</td>
</tr>
<tr>
<td>3451</td>
<td>HTTP Server Connection Error</td>
<td>You specified an HTTP URL for an input file, but MediaConvert couldn't connect to the HTTP server. Check that you have specified the correct URL.</td>
</tr>
<tr>
<td>3999</td>
<td>HTTP Unknown Error</td>
<td>There was an unexpected error related to retrieving your input file from an HTTP server. Check that you can download your file manually from your HTTP host. If you can, contact AWS Support. If you can't, contact the team that is responsible for maintaining the HTTP server that hosts your file.</td>
</tr>
</tbody>
</table>
Security in AWS Elemental MediaConvert

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between AWS and you. The shared responsibility model describes this as security of the cloud and security in the cloud:

- **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS compliance programs. To learn about the compliance programs that apply to AWS Elemental MediaConvert, see AWS Services in Scope by Compliance Program.

- **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your company’s requirements, and applicable laws and regulations.

This documentation helps you understand how to apply the shared responsibility model when using MediaConvert. The following topics show you how to configure MediaConvert to meet your security and compliance objectives. You also learn how to use other AWS services that help you to monitor and secure your MediaConvert resources.

**Topics**
- Data Protection for AWS Elemental MediaConvert (p. 199)
- Authentication and Access Control for AWS Elemental MediaConvert (p. 208)
- Learning More about AWS Identity and Access Management (p. 217)
- Compliance Validation for AWS Elemental MediaConvert (p. 223)
- Resilience in AWS Elemental MediaConvert (p. 224)
- Infrastructure Security in AWS Elemental MediaConvert (p. 224)

Data Protection for AWS Elemental MediaConvert

Use encryption to protect your content from unauthorized access. You can use any combination of these encryption options with AWS Elemental MediaConvert:

- **Client-side encryption**: Encrypt your input files before you upload them to Amazon S3 to protect them in transit.

- **Server-side encryption**: Keep your output files secure in the Amazon S3 buckets that AWS Elemental MediaConvert reads from and writes to.

- **Digital rights management (DRM)**: Make sure that, once you distribute your content, only authorized viewers can watch it.

The following illustration shows these encryption options.
Implementing Client-Side Encryption

Client-side encryption is one of the three encryption options that you can use with AWS Elemental MediaConvert. With client-side encryption, you encrypt your input files before you upload them to Amazon S3.

You can use client-side encryption in conjunction with the other two options. The following illustration shows the three options.

When you set up client-side encryption, you use multiple AWS services, as shown in the following diagram.
To use client-side encryption with AWS Elemental MediaConvert

1. Use AWS Key Management Service (AWS KMS) to create a customer managed customer master key (CMK). For procedures, see Creating Keys in the AWS Key Management Service Developer Guide. For an overview, see Customer Master Keys in the same guide.

2. Create a data key to use to encrypt your content. Use the AWS KMS Encrypt operation to encrypt the data key under your customer managed CMK. You must use this encryption context:

   ```json
   {"service": "mediaconvert.amazonaws.com"}
   ```

   You can create and encrypt your data key in one of the following ways:

   - Create a data key using AWS Key Management Service (AWS KMS) by calling KMS GenerateDataKey. For the KeyId parameter, specify the Amazon Resource Name (ARN) of the CMK that you created in the first step of this procedure. This operation returns a plaintext copy of the data key and a copy that is encrypted under the CMK.
   - Use an encryption library, such as OpenSSL, to create an Advanced Encryption Standard (AES) key. Then, encrypt the key by calling AWS KMS Encrypt. Include the CMK that you created in the first step of this procedure as the KeyId when you make this call.

   For more information about creating an AES key using OpenSSL, see the OpenSSL documentation.

   For more information, see data keys in the AWS Key Management Service Concepts topic of the AWS Key Management Service Developer Guide.

3. Use the plaintext data key that you created in the preceding step to encrypt your content as follows:

   - Use one of the following AES encryption modes: CTR, CBC, or GCM.
   - Use a 16-byte initialization vector with any encryption mode. Or, use a 12-byte initialization vector with GCM or CTR.
For more information about using OpenSSL, see the OpenSSL documentation.

**Note**
AWS Elemental MediaConvert doesn't support files encrypted by using the Amazon S3 encryption client.

4. Specify AWS Elemental MediaConvert decryption settings for each encrypted input as follows:
   a. On the **Create job** page, in the **Job** pane on the left, choose an **Input**.
   b. In the **Input** section on the right, choose **Decryption settings**.
   c. For **Decryption mode**, choose the AES encryption mode that you used to encrypt your content in an earlier step of this procedure.
   d. For **Encrypted data key**, enter the *encrypted* version of your data key that the AWS KMS GeneratedDataKey or Encrypt operation returned.

   Make sure that you provide the encrypted version of your data key. Providing the data key in plaintext exposes it in transit between your system and MediaConvert, making your content vulnerable. Also, if you provide your plaintext data key, your job will fail.
   e. For **Initialization vector**, provide the 16-byte or 12-byte initialization vector that you used to encrypt your content in an earlier step of this procedure.

   **Note**
   You must provide your initialization vector encoded in base64. You can do base64-encoding with an online conversion tool, or at the Linux command line with the following command: `echo -n "string-to-be-encoded-here" | base64`. The `--n` flag excludes any newline character from the end of the string that you pass in.
   f. If the AWS Region that you used for AWS KMS when you generated your data key is different from the Region that you are currently using to run your AWS Elemental MediaConvert job, specify that Region for **AWS Region for decryption key**.

5. Grant **kms:Decrypt** permissions to your AWS Elemental MediaConvert AWS Identity and Access Management (IAM) role. Use an IAM inline policy. To learn more, see these topics:
   - For more information about setting up an IAM role for AWS Elemental MediaConvert to assume, see Step 3: Set Up IAM Permissions (p. 4) in the Getting Started chapter of this guide.
   - For more information about granting IAM permissions using an inline policy, see the procedure To embed an inline policy for a user or role in Adding IAM Identity Permissions (Console) in the IAM User Guide.
   - For examples of IAM policies that grant AWS KMS permissions, including decrypting encrypted content, see Customer Managed Policy Examples in the AWS Key Management Service Developer Guide.

### Implementing Server-Side Encryption

Server-side encryption with Amazon S3 is one of the three encryption options that you can use with AWS Elemental MediaConvert. You can use it in conjunction with the other two options. The following illustration shows the three options.
You can protect your input and output files at rest by using server-side encryption with Amazon S3:

- To protect your input files, set up server-side encryption as you would for any object in an Amazon S3 bucket. For more information, see Protecting Data Using Server-Side Encryption in the Amazon Simple Storage Service Developer Guide.

- To protect your output files, specify in your AWS Elemental MediaConvert job that Amazon S3 encrypts your output files as MediaConvert uploads them. By default, your output files are not encrypted. The rest of this topic provides more information about setting up your job to encrypt your output files.

When you set up an AWS Elemental MediaConvert job output for server-side encryption, Amazon S3 encrypts it with a data key. As an additional security measure, the data key itself is encrypted with a master key.

You choose whether Amazon S3 encrypts the data key by using the default S3 master key or a customer master key that is managed by AWS Key Management Service (AWS KMS). Using the default S3 master key is simplest to set up. If you prefer more control over your master key, use an AWS KMS customer master key. For more information about the different types of CMKs managed with AWS KMS, see Customer Master Keys (CMKs) in the AWS Key Management Service Developer Guide.

If you choose to use an AWS KMS CMK, you can specify a customer managed CMK in your AWS account. Otherwise, AWS KMS uses the AWS managed CMK for S3, which has the alias aws/s3.

**To set up your job outputs for server-side encryption**

2. Choose **Create job**.
3. Set up your input, output groups, and outputs for video and audio, as described in Setting Up a Job in AWS Elemental MediaConvert (p. 7) and Structuring Complex Jobs in AWS Elemental MediaConvert (p. 33).
4. For each output group that has outputs that you want encrypted, set up server-side encryption:
   a. In the **Job** pane on the left, choose the output group.
   b. In the group settings section on the right, choose **Server-side encryption**. If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is S3EncryptionSettings.
   c. For **Encryption key management**, choose the AWS service that protects your data key. If you use the API or an SDK, you can find this setting in the JSON file of your job. The setting name is S3ServerSideEncryptionType.
If you choose Amazon S3, Amazon S3 encrypts your data key with a master key that Amazon S3 stores securely. If you choose AWS KMS, Amazon S3 encrypts your data key with a CMK that AWS Key Management Service (AWS KMS) stores and manages.

d. If you chose AWS KMS in the preceding step, optionally specify the ARN of one of your customer managed CMKs. If you do, AWS KMS will use that CMK to encrypt the data key that Amazon S3 uses to encrypt your media files.

If you don't specify a CMK for AWS KMS, Amazon S3 uses the AWS managed CMK in your AWS account that is used exclusively for Amazon S3.

e. If you chose AWS KMS for Encryption key management, grant kms:Encrypt and kms:GenerateDataKey permissions to your AWS Elemental MediaConvert AWS Identity and Access Management (IAM) role. This allows MediaConvert to encrypt your output files. If you also want to be able to use these outputs as inputs to another MediaConvert job, also grant kms:Decrypt permissions. To learn more, see these topics:

- For more information about setting up an IAM role for AWS Elemental MediaConvert to assume, see Step 5: Set Up IAM Permissions (p. 4) in the Getting Started chapter of this guide.
- For more information about granting IAM permissions using an inline policy, see the procedure To embed an inline policy for a user or role in Adding IAM Identity Permissions (Console) in the IAM User Guide.
- For examples of IAM policies that grant AWS KMS permissions, including decrypting encrypted content, see Customer Managed Policy Examples in the AWS Key Management Service Developer Guide.

5. Run your AWS Elemental MediaConvert job as usual. If you chose AWS KMS for Encryption key management, remember to grant kms:Decrypt permissions to any user or role that you want to be able to access your outputs.

Implementing Digital Rights Management (DRM)

DRM is one of the three encryption options that you can use with AWS Elemental MediaConvert. You can use it in conjunction with the other two options. The following illustration shows the three options.

Protect your content from unauthorized use through encryption. Digital rights management (DRM) systems provide keys to AWS Elemental MediaConvert for content encryption, and licenses to supported players and other consumers for decryption.

**Note**

To encrypt content, you must have a DRM solution provider.

- For an overview, see https://docs.aws.amazon.com/speke/latest/documentation/what-is-speke.html#services-architecture.
• To get set up, see https://docs.aws.amazon.com/speke/latest/documentation/customer-onboarding.html.

The only exception to this requirement is with the Apple HLS streaming protocol, where you can choose to either define your own static keys or use a DRM provider.

Topics
• Encrypting Content (p. 205)
• Using Encrypted Content Keys with DRM (p. 206)
• Troubleshooting DRM Encryption (p. 207)

Encrypting Content

Use the following procedure to enable content encryption in CMAF, DASH ISO, Apple HLS, and MS Smooth output groups.

To use this procedure, you should be comfortable working with output groups. For more information, see the section called “Step 3: Create Output Groups” (p. 11).

To encrypt content

1. Set up your transcoding job as usual. For more information, see Setting Up a Job (p. 7).
2. On the Create job page, in the Job pane on the left, under Output groups, choose an output group that you want to enable encryption for.
3. Turn on DRM encryption.
4. For CMAF and Apple HLS output groups, choose the encryption method. Make sure that you choose an encryption method that works with the DRM system that you use.

For DASH ISO and MS Smooth output groups, you don't specify the encryption method. MediaConvert always uses AES-CTR (AES-128) encryption with these output groups.

5. For CMAF and Apple HLS output groups, choose the source for the content encryption key. For Key provider type, choose SPEKE to encrypt using a key provided by your DRM solution provider, or choose Static key to enter your own key.

For DASH ISO and MS Smooth output groups, you don't specify the source for the content encryption key. With these output groups, MediaConvert does DRM only with a SPEKE-compliant key provider.

• For SPEKE, fill in the encryption parameter fields. For more information, see the section called “SPEKE Encryption Parameters” (p. 205).
• For Static Key, see the section called “Static Key Encryption Parameters” (p. 206).

SPEKE Encryption Parameters

When you request encryption, you provide input parameters that allow the service to locate your DRM solution provider's key server, to authenticate you as a user and to request the proper encoding keys. Some options are available only for particular output groups.

Enter the SPEKE encryption parameters as follows:

• For Resource ID, enter an identifier for the content. The service sends this to the key server to identify the current endpoint. How unique you make this depends on how fine-grained you want access controls to be. The service does not allow you to use the same ID for two simultaneous encryption processes. The resource ID is also known as the content ID.
Implementing Digital Rights Management (DRM)

The following example shows a resource ID.

```
MovieNight20171126093045
```

- For **System ID**, enter unique identifiers for your streaming protocol and DRM system. The number of system IDs that you can specify varies depending on the output group type:
  - CMAF – For **System IDs signaled in DASH**, specify at least one and up to three IDs. For **System ID signaled in HLS**, specify one ID.
  - DASH – For **System ID**, specify at least one and up to two IDs.
  - Apple HLS – For **System ID**, specify one ID.

If you provide more than one system ID in a single field, enter them on separate lines, and don’t separate them with commas or any other punctuation.

For a list of common system IDs, see DASH-IF System IDs. If you don’t know your IDs, ask your DRM solution provider.

- For **URL**, enter the URL of the API Gateway proxy that you set up to talk to your key server. The API Gateway proxy must reside in the same AWS Region as MediaConvert.

The following example shows a URL.

```
https://1wm2dx1f33.execute-api.us-west-2.amazonaws.com/SpekeSample/copyProtection
```

- (Optional) For **Certificate ARN**, enter a 2048 RSA certificate ARN to use for content key encryption. Use this option only if your DRM key provider supports content key encryption. If you use this and your key provider doesn’t support it, the request fails.

To enter a certificate ARN here, you must have already imported the corresponding certificate into AWS Certificate Manager, entered the certificate ARN from ACM into the MediaConvert **Certificates** pane, and associated it with MediaConvert. For more information, see the section called “Using Encrypted Content Keys with DRM” (p. 206).

The following example shows a certificate ARN.

```
arn:aws:acm:region:123456789012:certificate/97b4deb6-8983-4e39-918e-ef1378924e1e
```

**Additional Configuration Options for Apple HLS and CMAF**

- (Optional) For **Constant initialization vector** enter a 128-bit, 16-byte hex value represented by a 32-character string, to be used with the key for encrypting content.

**Static Key Encryption Parameters**

The following options are for static key encryption:

- **Static key value** – A valid string for encrypting content.
- **URL** – The URL to include in the manifest so that player devices can decrypt the content.

**Using Encrypted Content Keys with DRM**

For the most secure DRM encryption solution, use encrypted content keys in addition to encrypted content. To use encrypted content keys, you must import suitable certificates into AWS Certificate
Manager (ACM), and then prepare them for use with AWS Elemental MediaConvert. For information about ACM, see the AWS Certificate Manager User Guide.

Run AWS Certificate Manager in the same Region as you run AWS Elemental MediaConvert.

**To prepare a certificate for DRM content key encryption**

1. Obtain a 2048 RSA, SHA-512-signed certificate.
2. Open the ACM console at https://console.aws.amazon.com/acm/.
3. Import the certificate into ACM according to the instructions at Importing Certificates into AWS Certificate Manager. Note the resulting certificate ARN because you will need it later.
   
   For use in DRM encryption, your certificate must have a status of **Issued** in ACM.
5. In the navigation pane, under **Certificates**, enter your certificate ARN, and then choose **Associate certificate**.

**To find certificates that are associated with AWS Elemental MediaConvert**

In the ACM console, list and display your certificates to find the ones that you have associated with MediaConvert. In the **Details** section of the certificate's description, you can see the MediaConvert association and retrieve the certificate ARN. For more information, see List ACM–Managed Certificates and Describe ACM Certificates.

**To use a certificate in AWS Elemental MediaConvert**

When you use DRM encryption, provide one of your associated certificate ARNs in the SPEKE encryption parameters. This enables content key encryption. You can use the same certificate ARN for multiple jobs. For information, see the section called “Encrypting Content” (p. 205).

**To renew a certificate**

To renew a certificate that you have associated with AWS Elemental MediaConvert, reimport it in AWS Certificate Manager. The certificate renews without any disruption of its use in MediaConvert.

**To delete a certificate**

To delete a certificate from AWS Certificate Manager, you must first dissociate it from any other service. To dissociate a certificate from AWS Elemental MediaConvert, copy its certificate ARN from ACM, navigate to the MediaConvert **Certificates** pane, enter the certificate ARN, and then choose **Dissociate certificate**.

**Troubleshooting DRM Encryption**

If the DRM system key server is unavailable when AWS Elemental MediaConvert requests keys, the console displays the following message: Key Server Unavailable.

Content key encryption adds another layer of complexity to your jobs. If you run into problems on a job that has content key encryption enabled, remove the certificate ARN from your job settings and troubleshoot the job using clear key delivery. When you have that working, reenter the certificate ARN, and then try the job again.

If you contact the AWS Support Center for troubleshooting purposes, have the following information available:

- Region that the job was run in
Authentication and Access Control

AWS Identity and Access Management (IAM) is an AWS service that helps an administrator securely control access to AWS Elemental MediaConvert resources. Administrators use IAM to control who is authenticated (signed in) and authorized (has permissions) to use MediaConvert resources. IAM is a feature of your AWS account offered at no additional charge.

When you use AWS Elemental MediaConvert, you typically interact with two different kinds of resources:

- **Media files** – The media files that are inputs to and outputs from AWS Elemental MediaConvert are Amazon S3 resources, not MediaConvert resources. The MediaConvert service must have permissions to access these files, but the user submitting the job doesn’t need permissions to access them.

- **MediaConvert resources** – The AWS Elemental MediaConvert service uses resources such as jobs, queues, output presets, and job templates to transcode your media files. MediaConvert implicitly has permissions to these resources. The person creating and submitting MediaConvert jobs must have explicit permissions to access them.

To use AWS Elemental MediaConvert, you must set up a minimum of two IAM entities:

- **User** – The person setting up and submitting the job signs on to AWS Elemental MediaConvert as an IAM user. To access your MediaConvert resources, the user must belong to your AWS account.

  You set up this user identity and grant it permissions when you are signed on to IAM as your account root user or as a user with administrative privileges. For more information about the permissions that you need to grant to this MediaConvert user, see Permissions Required to Use the AWS Elemental MediaConvert Console (p. 210).

- **Service role** – The AWS Elemental MediaConvert service assumes an IAM role in order to access your input media files and to write your output media files. Depending on how you use MediaConvert, you might also need to grant some permissions to your Amazon API Gateway and AWS Key Management Service (AWS KMS) resources. You create this service role in your AWS account while signed on to IAM as your account root user or as a user with administrative privileges. You choose this role when you are signed on to MediaConvert as a user.

  For information about creating this service role, see Step 3: Set Up IAM Permissions (p. 4) of the Getting Started chapter of this guide.

  For general information about service roles, see Creating a Role to Delegate Permissions to an AWS Service in the IAM User Guide.

Topics

- Introduction to Authorization and Access Control (p. 209)
- Permissions Required (p. 210)
- Understanding How AWS Elemental MediaConvert Works with IAM (p. 212)
- Troubleshooting Authentication and Access Control (p. 214)
Introduction to Authorization and Access Control

To work with AWS services and resources, you need both authentication and access control.

Authentication – To sign in to AWS, you must use credentials: root user credentials (not recommended), IAM user credentials, or temporary credentials using IAM roles. To learn more about these entities, see What is Authentication? (p. 217).

Access control – AWS administrators use policies to control access to AWS resources, such as an AWS Elemental MediaConvert job. To learn more, see What is Access Control? (p. 218) and What are Policies? (p. 221).

Important

All resources in an account are owned by the account, regardless of who created those resources. A user must be granted access to create a resource. However, just because a user creates a resource doesn’t mean that the user automatically has full access to that resource. An administrator must explicitly grant permissions for each action that each user wants to perform. That administrator can also revoke these permissions at any time.

Ownership of Media Files and AWS Elemental MediaConvert Jobs

When you use your AWS account to create an AWS Elemental MediaConvert job and to create Amazon S3 buckets for your input and output files, your AWS account is the owner of the job and the output files created by the job. This has the following implications:

• Any user in your account with permissions to access your Amazon S3 objects can access the output files of your job.
• Only an administrator on your account can grant permissions to access these output files.
• Only users in your account can receive permissions to access the job object.

If you want to set up your workflow so that the outputs of your job are owned by another account—for example, by the account of one of your customers—then the administrator of the other account must grant you cross-account permissions to write to their Amazon S3 bucket. In this setup, your AWS account owns the job resource, but not the outputs of the job. For more information, see Access Management in the IAM User Guide.

Understanding the Basics of IAM

To help you understand the basics of how IAM works, review the following terms:

• Resources – AWS services, such as AWS Elemental MediaConvert, Amazon S3, and IAM, are made up of objects called resources. You can create, manage, and delete these resources from the service. IAM resources include users, groups, roles, and policies:
  • Users – An IAM user represents the person or application that uses its credentials to interact with AWS. A user consists of a name, a password to sign in to the AWS Management Console, and up to two access keys that can be used with the AWS CLI or AWS API.
  • Groups – An IAM group is a collection of IAM users. You can use groups to specify permissions for its member users. This makes it easier for you to manage permissions for multiple users.
  • Roles – An IAM role doesn’t have any long-term credentials (password or access keys) associated with it. A role can be assumed by anyone who has the right permissions. An IAM user can assume a role to temporarily take on different permissions for a specific task. Federated users can assume a role by using an external identity provider that is mapped to the role. Some AWS services can assume a service role to access AWS resources on your behalf.
• **Policies** – Policies are JSON policy documents that define the permissions for the object that they are attached to. AWS supports *identity-based policies* that you attach to identities (users, groups, or roles). Some AWS services allow you to attach *resource-based policies* to resources to control what a principal (person or application) can do with that resource. AWS Elemental MediaConvert does not support resource-based policies.

• **Identities** – Identities are IAM resources for which you can define permissions. These include users, groups, and roles.

• **Entities** – Entities are IAM resources that you use for authentication. These include users and roles.

• **Principals** – In AWS, a principal is a person or application that uses an entity to sign in and make requests to AWS. As a principal, you can use the AWS Management Console, the AWS CLI, or the AWS API to perform an operation (such as deleting a job). This creates a request for that operation. Your request specifies the action, resource, principal, principal account, and any additional information about your request. All of this information provides AWS with context for your request. AWS checks all the policies that apply to the context of your request. AWS authorizes the request only if each part of your request is allowed by the policies.

To view a diagram of the authentication and access control process, see Understanding How IAM Works in the IAM User Guide. For details about how AWS determines whether a request is allowed, see Policy Evaluation Logic in the IAM User Guide.

## Permissions Required

To use AWS Elemental MediaConvert or to manage authorization and access control for yourself or others, you must have the correct permissions.

### Permissions Required to Use the AWS Elemental MediaConvert Console

To access the AWS Elemental MediaConvert console, you must have a minimum set of permissions that allows you to list and view details about the AWS Elemental MediaConvert resources in your AWS account. If you create an identity-based permissions policy that is more restrictive than the minimum required permissions, the console won't function as intended for entities with that policy.

The following sample policy grants the IAM user permissions to all AWS Elemental MediaConvert actions (such as ListJobs, CreateJob, and so on) on all MediaConvert resources (such as jobs, queues, and output presets). It also grants the IAM actions required for the user to specify the service role that MediaConvert will assume in order to run the job. It also grants Amazon S3 actions that allow the user to use the Browse button to choose input and output locations. The Amazon S3 permissions aren't required to run the job; without them, the user can specify the URL of the bucket instead. You can attach this policy to a user as described in the Creating Policies on the JSON Tab topic of the IAM User Guide.

```json
{
   "Version": "2012-10-17",
   "Statement": [{
       "Sid": "mediaconvertActions",
       "Effect": "Allow",
       "Action": [
           "mediaconvert:*",
       ],
       "Resource": "arn:aws:mediaconvert::*:*"
   },
   {
       "Sid": "iamActions",
       "Effect": "Allow",
       "Action": [
   ```
```json
```
Permissions Required for Authorization Management

To manage your own credentials, such as your password, access keys, and multi-factor authentication (MFA) devices, your administrator must grant you the required permissions.

As an AWS administrator, you need full access to IAM so that you can create and manage users, groups, roles, and policies in IAM. You should use the AdministratorAccess AWS managed policy that includes full access to all of AWS. This policy does not provide access to the AWS Billing and Cost Management console or allow tasks that require root user credentials. For more information, see AWS Tasks That Require AWS Account Root User Credentials in the AWS General Reference.

**Warning**
Only an administrator user should have full access to AWS. Anyone with this policy has permission to fully manage authentication and access control, in addition to modifying every resource in your AWS account.

Permissions Required for Access Control

If your administrator provided you with IAM user credentials, they attached policies to your IAM user identity to control what resources you can access. To view the policies attached to your user identity in the AWS Management Console, you must have the following permissions:

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "ViewOwnUserInfo",
      "Effect": "Allow",
      "Action": [
        "iam:GetUserPolicy",
        "iam:ListGroupsForUser",
        "iam:ListAttachedUserPolicies",
        "iam:ListUserPolicies",
        "iam:GetUser"
      ],
      "Resource": [
        "arn:aws:iam::*:user/${aws:username}"
      ]
    },
    {
      "Sid": "s3Actions",
      "Effect": "Allow",
      "Action": [
        "s3:ListBucket",
        "s3:GetBucketLocation",
        "s3:ListAllMyBuckets"
      ],
      "Resource": [
        "arn:aws:s3:::*"
      ]
    }
  ]
}
```
"Sid": "ListUsersViewGroupsAndPolicies",
"Effect": "Allow",
"Action": [
  "iam:GetGroupPolicy",
  "iam:GetPolicyVersion",
  "iam:GetPolicy",
  "iam:ListAttachedGroupPolicies",
  "iam:ListGroupPolicies",
  "iam:ListPolicyVersions",
  "iam:ListPolicies",
  "iam:ListUsers"
],
"Resource": "*"
}

If you need additional permissions, ask your administrator to update your policies to allow you to access the actions that you require.

Understanding How AWS Elemental MediaConvert Works with IAM

AWS services can work with IAM in several ways. AWS Elemental MediaConvert supports the following ways:

- **Actions** – AWS Elemental MediaConvert supports using actions in a policy. This allows an administrator to control whether an entity can complete an operation in MediaConvert. For example, to allow an entity to update a job template by performing the `UpdateJobTemplate` AWS API operation, an administrator must attach a policy that allows the `iam:UpdateJobTemplate` action.

- **Resource-level permissions** – AWS Elemental MediaConvert supports resource-level permissions. Resource-level permissions allow you to specify individual resources in the policy. For example, you can grant permissions for a user to submit jobs only to a particular queue, or to use only job templates that have a particular ID in their name.

  For an example IAM policy that grants resource-level permissions, see Example Policy: Resource-Level Access Control (p. 215).

  For more information about limiting access at the resource level, see Controlling Access to Resources in the IAM User Guide.

- **Authorization based on tags** – AWS Elemental MediaConvert supports authorization based on tags. This feature allows you to use resource tags in the condition of a policy.

  For example, you might create a policy that allows the user access to all actions on all MediaConvert resources in the account, unless the resource or resources are tagged with the tag key `access` and either the value of `denied` or beginning with the string `deny`. You do this by using the condition key `aws:RequestTag/<tag-key>`.

  For an example IAM policy that grants these permissions, see Example Policy: Tag-based Access Control Using Resource Tags (p. 216).

  For information about putting tags on your AWS Elemental MediaConvert resources, see Tagging AWS Elemental MediaConvert Resources (p. 182).

  For more information about using tags to restrict access to your resources, see Controlling Access Using Tags in the IAM User Guide.

- **Temporary credentials** – AWS Elemental MediaConvert supports temporary credentials. This feature allows you to sign in with federation, assume an IAM role, or assume a cross-account role. You
obtain temporary security credentials by calling AWS STS API operations such as AssumeRole or GetFederationToken.

- **Service roles** – AWS Elemental MediaConvert supports service roles. This feature allows a service to assume a service role on your behalf. This role allows the service to access resources in other services to complete an action on your behalf. Service roles appear in your IAM account and are owned by the account. This means that an IAM administrator can change the permissions for this role. However, this might break the functionality of the service. For information about creating this role, see Step 3: Set Up IAM Permissions (p. 4) in the Getting Started chapter of this guide.

AWS Elemental MediaConvert doesn’t support the following ways of interacting with IAM:

- **Resource-based policies** – AWS Elemental MediaConvert does not support resource-based policies. Resource-based policies allow you to attach a policy to a resource within the service. Resource-based policies include a Principal element to specify which IAM identities can access that resource.

- **Service-linked roles** – AWS Elemental MediaConvert does not support service-linked roles. This feature allows a service to assume a service-linked role on your behalf. This role allows the service to access resources in other services to complete an action on your behalf. Service-linked roles appear in your IAM account, and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.

**AWS Elemental MediaConvert Resources and Operations**

In AWS Elemental MediaConvert, the primary resource is a job. In a policy, you use an Amazon Resource Name (ARN) to identify the resource that the policy applies to.

The resources in the following table have unique ARNs associated with them.

<table>
<thead>
<tr>
<th>Name in MediaConvert Console</th>
<th>ARN Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job</td>
<td>arn:partition:mediaconvert:region:account:jobs/JobId</td>
</tr>
<tr>
<td>Queue</td>
<td>arn:partition:mediaconvert:region:account:queues/QueueName</td>
</tr>
<tr>
<td>Output preset</td>
<td>arn:partition:mediaconvert:region:account:presets/PresetName</td>
</tr>
<tr>
<td>Job template</td>
<td>arn:partition:mediaconvert:region:account:jobTemplates/JobTemplateName</td>
</tr>
</tbody>
</table>

AWS Elemental MediaConvert provides a set of operations to work with MediaConvert resources. For a list of available operations for each resource, follow the links to the AWS Elemental MediaConvert API Reference in the preceding table.

To allow or deny access to a subset of AWS Elemental MediaConvert resources, include the ARN of the resource in the Resource element of your policy. The ARNs for MediaConvert have the following format:

`arn:partition:mediaconvert:account:resource/ID`

Replace the `partition`, `account`, `resource`, and `ID` variables with valid values. Valid values can be the following:

- **partition**: The partition for your AWS Region. For most Regions, the partition is "aws."
Troubleshooting Authentication and Access Control

Use the following information to help you diagnose and fix common issues that you might encounter when working with IAM.

Topics
- I'm not authorized to perform an action in AWS Elemental MediaConvert (p. 214)
- I'm an administrator and want to allow others to access AWS Elemental MediaConvert (p. 214)
- I want to understand IAM without becoming an expert (p. 214)

I'm not authorized to perform an action in AWS Elemental MediaConvert

If you receive an error in the AWS Management Console that tells you that you're not authorized to perform an action, then you must contact the administrator that provided you with your user name and password.

The following example error occurs when an IAM user named my-user-name tries to use the console to perform the GetJob action, but does not have permissions:

```
User: arn:aws:iam::123456789012:user/my-user-name is not authorized to perform: MediaConvert:GetJob on resource: my-example-job-arn
```

For this error, ask your administrator to update your policies to allow you to access the my-example-job-arn resource using the MediaConvert:GetJob action.

I'm an administrator and want to allow others to access AWS Elemental MediaConvert

To allow others to access AWS Elemental MediaConvert, you must create an IAM entity (user or role) for the person or application that needs access. They will use the credentials for that entity to access AWS. You must then attach a policy to the entity that grants them the correct permissions in MediaConvert.

I want to understand IAM without becoming an expert

To learn more about IAM terms, concepts, and procedures, see the following pages:

- What is Authentication? (p. 217)
- What is Access Control? (p. 218)
- What are Policies? (p. 221)
Example Policies

Use these example IAM policies to grant access to your resources, or modify them to suit your use case. For information about how to attach a policy to an IAM user, see Creating Policies on the JSON Tab in the IAM User Guide.

Example Policy: Basic MediaConvert User Policy

The following example policy grants the basic permissions that a user needs to operate AWS Elemental MediaConvert. If you are using encryption, or if your Amazon S3 buckets have default encryption enabled, you need additional permissions. For more information, see Data Protection for AWS Elemental MediaConvert (p. 199).

```json
{
   "Version": "2012-10-17",
   "Statement": [{
       "Sid": "mediaconvertActions",
       "Effect": "Allow",
       "Action": [ "mediaconvert:*" ],
       "Resource": "arn:aws:mediaconvert::*::*"
   },
   { "Sid": "iamActions",
       "Effect": "Allow",
       "Action": [ "iam:PassRole", "iam:ListRoles" ],
       "Resource": [ "arn:aws:iam::*:role/*" ]
   },
   { "Sid": "s3Actions",
       "Effect": "Allow",
       "Action": [ "s3:ListBucket", "s3:GetBucketLocation", "s3:ListAllMyBuckets" ],
       "Resource": [ "arn:aws:s3:::*" ]
   }
}
```

Example Policy: Resource-Level Access Control

The following example policy grants permissions to certain AWS Elemental MediaConvert resources in your account. In this example, the account number is 012345678910. It allows the following actions, in any partition and Region:

- View the details of all queues in the account at once.
- View all the jobs that have been submitted to the queue "myQueue" at once.
- Create a job and submit it to the queue "myQueue", referencing any presets with names that start with "allow" and referencing any job template.
• Create a job template referencing the queue "myQueue" and any presets with names that start with "allow".

**Note**
You can't grant cross-account permissions to AWS Elemental MediaConvert resources, such as queues, output presets, and jobs. You can grant cross-account permissions to your input and output media files stored in Amazon S3.

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Sid": "AllowListQueues",  
      "Effect": "Allow",  
      "Action": "mediaconvert:ListQueues",  
      "Resource": "*"  
    },  
    {  
      "Sid": "AllowListJobsInQueue",  
      "Effect": "Allow",  
      "Action": "mediaconvert:ListJobs",  
      "Resource": "arn:*:mediaconvert:*:012345678910:queues/myQueue"  
    },  
    {  
      "Sid": "AllowCreateLimitedJobs",  
      "Effect": "Allow",  
      "Action": [  
        "mediaconvert:CreateJob",  
        "mediaconvert:CreateJobTemplate"  
      ],  
      "Resource": [  
        "arn:*:mediaconvert:*:012345678910:queues/myQueue",  
        "arn:*:mediaconvert:*:012345678910:presets/allow***",  
        "arn:*:mediaconvert:*:012345678910:jobTemplates/**"  
      ]  
    }  
  ]  
}
```

**Example Policy: Tag-based Access Control Using Resource Tags**

The following policy grants the user access to all actions on all AWS Elemental MediaConvert resources in the account, unless the resource or resources are tagged with the key `access` and value `denied` or a value that starts with the string "deny".

**Note**
This policy demonstrates the IAM principle that, in the case where user policies both allow and deny action on a resource, the denial takes precedence. Therefore, the user with this attached policy can't use the denied resources, even though they have general permissions to all AWS Elemental MediaConvert resources.

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {  
      "Sid": "AllowAllMediaConvert",  
      "Effect": "Allow",  
      "Action": [  
        "mediaconvert:ListQueues",  
        "mediaconvert:ListJobs",  
        "mediaconvert:CreateJob",  
        "mediaconvert:CreateJobTemplate"  
      ],  
      "Resource": [  
        "arn:*:mediaconvert:*:012345678910:queues/myQueue",  
        "arn:*:mediaconvert:*:012345678910:presets/allow***",  
        "arn:*:mediaconvert:*:012345678910:jobTemplates/**"  
      ]  
    }  
  ]  
}
```
## Learning More about AWS Identity and Access Management

*Authentication and Access Control for AWS Elemental MediaConvert (p. 208)* provides information about identity and access management as it relates to AWS Elemental MediaConvert. These topics provide more detailed information about the AWS Identity and Access Management (IAM) service generally.

### Topics
- What is Authentication? (p. 217)
- What is Access Control? (p. 218)
- What are Policies? (p. 221)

### What is Authentication?

Authentication is how you sign in to AWS using your credentials.

As a principal, you must be authenticated (signed in to AWS) using an entity (root user, IAM user, or IAM role) to send a request to AWS. An IAM user can have long-term credentials such as a user name and password or a set of access keys. When you assume an IAM role, you are given temporary security credentials.

To authenticate from the AWS Management Console as a user, you must sign in with your user name and password. To authenticate from the AWS CLI or AWS API, you must provide your access key and secret key or temporary credentials. AWS provides SDK and CLI tools to cryptographically sign your request using your credentials. If you don’t use AWS tools, you must sign the request yourself. Regardless of the authentication method that you use, you might also be required to provide additional security information. For example, AWS recommends that you use multi-factor authentication (MFA) to increase the security of your account.

As a principal, you can sign in to AWS using the following entities (users or roles):
What is Access Control?

After you sign in (are authenticated) to AWS, your access to AWS resources and operations is controlled using policies. Access control is also known as authorization.
During authorization, AWS uses values from the request context to check for policies that apply. It then uses the policies to determine whether to allow or deny the request. Most policies are stored in AWS as JSON documents and specify the permissions that are allowed or denied for principals. For more information about the structure and contents of JSON policy documents, see What are Policies? (p. 221).

Policies let an administrator specify who has access to AWS resources, and what actions they can perform on those resources. Every IAM entity (user or role) starts with no permissions. In other words, by default, users can do nothing, not even view their own access keys. To give a user permission to do something, an administrator must attach a permissions policy to a user. Or they can add the user to a group that has the intended permissions. When an administrator then give permissions to a group, all users in that group get those permissions.

You might have valid credentials to authenticate your requests, but unless an administrator grants you permissions you can’t create or access AWS Elemental MediaConvert resources. For example, you must have explicit permissions to create an AWS Elemental MediaConvert job.

As an administrator, you can write a policy to control access to the following:

- **AWS for Principals (p. 219)** – Control what the user, account, or service making the request (the principal) is allowed to do.
- **IAM Identities (p. 219)** – Control which IAM identities (groups, users, and roles) can be accessed and how.
- **IAM Policies (p. 220)** – Control who can create, edit, and delete customer managed policies, and who can attach and detach all managed policies.
- **AWS Resources (p. 220)** – Control who has access to resources using an identity-based policy or a resource-based policy.
- **AWS Accounts (p. 220)** – Control whether a request is allowed only for members of a specific account.

### Controlling Access for Principals

Permissions policies control what you, as a principal, are allowed to do. An administrator must attach an identity-based permissions policy to the identity (user, group, or role) that provides your permissions. Permissions policies allow or deny access to AWS. Administrators can also set a permissions boundary for an IAM entity (user or role) to define the maximum permissions that the entity can have. Permissions boundaries are an advanced IAM feature. For more information about permissions boundaries, see Permissions Boundaries for IAM Identities in the [IAM User Guide](/iam/userguide).

For more information and an example of how to control AWS access for principals, see Controlling Access for Principals in the [IAM User Guide](/iam/userguide).

### Controlling Access to Identities

Administrators can control what you can do to an IAM identity (user, group, or role) by creating a policy that limits what can be done to an identity, or who can access it. Then attach that policy to the identity that provides your permissions.

For example, an administrator might allow you to reset the password for three specific users. To do this, they attach a policy to your IAM user that allows you to reset the password for only yourself and users with the ARN of the three specified users. This allows you to reset the password of your team members but not other IAM users.

For more information and an example of using a policy to control AWS access to identities, see Controlling Access to Identities in the [IAM User Guide](/iam/userguide).
What is Access Control?

Controlling Access to Policies

Administrators can control who can create, edit, and delete customer managed policies, and who can attach and detach all managed policies. When you review a policy, you can view the policy summary that includes a summary of the access level for each service within that policy. AWS categorizes each service action into one of four access levels based on what each action does: List, Read, Write, or Permissions management. You can use these access levels to determine which actions to include in your policies. For more information, see Understanding Access Level Summaries Within Policy Summaries in the IAM User Guide.

Warning
You should restrict Permissions Management access-level permissions in your account. Otherwise, your account members can create policies for themselves with more permissions than they should have. Or they can create separate users with full access to AWS.

For more information and an example of how to control AWS access to policies, see Controlling Access to Policies in the IAM User Guide.

Controlling Access to Resources

Administrators can control access to resources using an identity-based policy or a resource-based policy. In an identity-based policy, you attach the policy to an identity and specify what resources that identity can access. In a resource-based policy, you attach a policy to the resource that you want to control. In the policy, you specify which principals can access that resource.

Note
AWS Elemental MediaConvert doesn't support resource-based policies.

For more information, see Controlling Access to Resources in the IAM User Guide.

Resource Creators Do Not Automatically Have Permissions

All resources in an account are owned by the account, regardless of who created those resources. The AWS account root user is the account owner, and therefore has permission to perform any action on any resource in the account.

Important
We strongly recommend that you do not use the root user for your everyday tasks, even the administrative ones. Instead, adhere to the best practice of using the root user only to create your first IAM user. Then securely lock away the root user credentials and use them to perform only a few account and service management tasks. To view the tasks that require you to sign in as the root user, see AWS Tasks That Require Root User.

Entities (users or roles) in your account must be granted access to create a resource. But just because they create a resource does not mean they automatically have full access to that resource. You must explicitly grant permissions for each action. Additionally, you can revoke those permissions at any time, as long as you have access to manage user and role permissions.

Controlling Access to Principals in a Different Account

Administrators can use AWS resource-based policies, IAM cross-account roles, or the AWS Organizations service to allow principals in another account to access resources in your account.

For some AWS services, you can grant cross-account access to your resources. To do this, you attach a policy directly to the resource that you want to share, instead of using a role as a proxy. If the service supports this policy type, then the resource that you want to share must also support resource-based policies. Unlike a user-based policy, a resource-based policy specifies who (in the form of a list of AWS
What are Policies?

You control access in AWS by creating policies and attaching them to IAM identities or AWS resources.

A policy is an object in AWS that, when associated with an entity or resource, defines their permissions. AWS evaluates these policies when a principal, such as a user, makes a request. Permissions in the policies determine whether the request is allowed or denied. Most policies are stored in AWS as JSON documents.

IAM policies define permissions for an action regardless of the method that you use to perform the operation. For example, if a policy allows the GetUser action, then a user with that policy can get user information from the AWS Management Console, the AWS CLI, or the AWS API. When you create an IAM user, you can set up the user to allow console or programmatic access. The IAM user can sign in to the console using a user name and password. Or they can use access keys to work with the CLI or API.

The following policy types, listed in order of frequency, can affect whether a request is authorized. For more details, see Policy Types in the IAM User Guide.

- **Identity-based policies** – You can attach managed and inline policies to IAM identities (users, groups to which users belong, and roles).
- **Resource-based policies** – You can attach inline policies to resources in some AWS services. The most common examples of resource-based policies are Amazon S3 bucket policies and IAM role trust policies. AWS Elemental MediaConvert does not support resource-based policies.
- **Organizations SCPs** – You can use an AWS Organizations service control policy (SCP) to apply a permissions boundary to an AWS Organizations organization or organizational unit (OU). Those permissions are applied to all entities within the member accounts.
- **Access control lists (ACLs)** – You can use ACLs to control which principals can access a resource. ACLs are similar to resource-based policies, although they are the only policy type that does not use the JSON policy document structure. AWS Elemental MediaConvert does not support ACLs.

These policies types can be categorized as permissions policies or permissions boundaries.

- **Permissions policies** – You can attach permissions policies to a resource in AWS to define the permissions for that object. Within a single account, AWS evaluates all permissions policies together. Permissions policies are the most common policies. You can use the following policy types as permissions policies:
  - **Identity-based policies** – When you attach a managed or inline policy to an IAM user, group, or role, the policy defines the permissions for that entity.
• **Resource-based policies** – When you attach a JSON policy document to a resource, you define the permissions for that resource. The service must support resource-based policies.

• **Access control lists (ACLs)** – When you attach an ACL to a resource, you define a list of principals with permission to access that resource. The resource must support ACLs.

• **Permissions boundaries** – You can use policies to define the permissions boundary for an entity (user or role). A permissions boundary controls the maximum permissions that an entity can have. Permissions boundaries are an advanced AWS feature. When more than one permissions boundary applies to a request, AWS evaluates each permissions boundary separately. You can apply a permissions boundary in the following situations:

  • **Organizations** – You can use an AWS Organizations service control policy (SCP) to apply a permissions boundary to an AWS Organizations organization or organizational unit (OU).

  • **IAM users or roles** – You can use a managed policy for a user or role's permissions boundary. For more information, see Permissions Boundaries for IAM Entities in the *IAM User Guide*.

**Topics**

- Identity-based Policies (p. 222)
- Resource-based Policies (p. 222)
- Policy Access Level Classifications (p. 223)

**Identity-based Policies**

You can attach policies to IAM identities. For example, you can do the following:

• **Attach a permissions policy to a user or a group in your account** – To grant a user permissions to create an AWS Elemental MediaConvert resource, such as a job, you can attach a permissions policy to a user or a group to which the user belongs.

• **Attach a permissions policy to a role (grant cross-account permissions)** – You can attach an identity-based permissions policy to an IAM role to grant cross-account permissions. For example, the administrator in account A can create a role to grant cross-account permissions to another AWS account (for example, account B) or an AWS service as follows:

  1. Account A administrator creates an IAM role and attaches a permissions policy to the role that grants permissions on resources in account A.

  2. Account A administrator attaches a trust policy to the role identifying account B as the principal who can assume the role.

  3. Account B administrator can then delegate permissions to assume the role to any users in account B. Doing this allows users in account B to create or access resources in account A. The principal in the trust policy can also be an AWS service principal if you want to grant an AWS service permissions to assume the role.

For more information about using IAM to delegate permissions, see Access Management in the *IAM User Guide*.

For more information about users, groups, roles, and permissions, see Identities (Users, Groups, and Roles) in the *IAM User Guide*.

**Resource-based Policies**

Resource-based policies are JSON policy documents that you attach to a resource. These policies allow you to specify what actions a specified principal can perform on that resource and under what conditions. The most commonly known resource-based policy is an Amazon S3 bucket. Resource-based policies are inline policies that exist only on the resource. There are no managed resource-based policies.
Granting permissions to members of other AWS accounts using a resource-based policy has some advantages over an IAM role. For more information, see How IAM Roles Differ from Resource-based Policies in the IAM User Guide.

AWS Elemental MediaConvert does not support resource-based policies.

Policy Access Level Classifications

In the IAM console, actions are grouped using the following access level classifications:

- **List** – Provide permission to list resources within the service to determine whether an object exists. Actions with this level of access can list objects but cannot see the contents of a resource. Most actions with the List access level can't be performed on a specific resource. When you create a policy statement with these actions, you must specify All resources ("*”).

- **Read** – Provide permission to read but not edit the contents and attributes of resources in the service. For example, the Amazon S3 actions GetObject and GetBucketLocation have the Read access level.

- **Write** – Provide permission to create, delete, or modify resources in the service. For example, the Amazon S3 actions CreateBucket, DeleteBucket and PutObject have the Write access level.

- **Permissions management** – Provide permission to grant or modify resource permissions in the service. For example, most IAM and AWS Organizations policy actions have the Permissions management access level.

  **Tip**
  To improve the security of your AWS account, restrict or regularly monitor policies that include the Permissions management access level classification.

- **Tagging** – Provide permission to create, delete, or modify tags that are attached to a resource in the service. For example, the Amazon EC2 CreateTags and DeleteTags actions have the Tagging access level.

Compliance Validation for AWS Elemental MediaConvert

Third-party auditors assess the security and compliance of AWS Elemental MediaConvert as part of multiple AWS compliance programs. These include SOC, PCI, FedRAMP, HIPAA, and others.

For a list of AWS services in scope of specific compliance programs, see AWS Services in Scope by Compliance Program. For general information, see AWS Compliance Programs.

You can download third-party audit reports using AWS Artifact. For more information, see Downloading Reports in AWS Artifact.

Your compliance responsibility when using AWS Elemental MediaConvert is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- **Security and Compliance Quick Start Guides** – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on AWS.

- **Architecting for HIPAA Security and Compliance Whitepaper** – This whitepaper describes how companies can use AWS to create HIPAA-compliant applications.

- **AWS Compliance Resources** – This collection of workbooks and guides might apply to your industry and location.
Resilience in AWS Elemental MediaConvert

The AWS global infrastructure is built around AWS Regions and Availability Zones. AWS Regions provide multiple physically separated and isolated Availability Zones, which are connected with low-latency, high-throughput, and highly redundant networking. With Availability Zones, you can design and operate applications and databases that automatically fail over between Availability Zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information about AWS Regions and Availability Zones, see AWS Global Infrastructure.

Infrastructure Security in AWS Elemental MediaConvert

As a managed service, AWS Elemental MediaConvert is protected by the AWS global network security procedures that are described in the Amazon Web Services: Overview of Security Processes whitepaper.

You use AWS published API calls to access AWS Elemental MediaConvert through the network. Clients must support Transport Layer Security (TLS) 1.0 or later. We recommend TLS 1.2 or later. Clients must also support cipher suites with perfect forward secrecy (PFS) such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Ephemeral Diffie-Hellman (ECDHE). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an IAM principal. Or you can use the AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.

You can call these API operations from any network location, but AWS Elemental MediaConvert does support resource-based access policies, which can include restrictions based on the source IP address.
Example Job Settings

The provided job settings are recommended values that should work well for most jobs. Adapt them as necessary to suit your specific workflow.

To use these examples, replace the following placeholder values with actual values:

- ROLE HERE
- s3://INPUT HERE
- s3://OUTPUT HERE

Examples

- Example—mp4 Output (p. 225)
- Example—ABR Output (p. 227)

Example—mp4 Output

```json
{
   "UserMetadata": {},
   "Role": "ROLE ARN",
   "Settings": {
      "OutputGroups": [
         {
            "Name": "File Group",
            "OutputGroupSettings": {
               "Type": "FILE_GROUP_SETTINGS",
               "FileGroupSettings": {
                  "Destination": "s3://bucket/out"
               }
            }
         },
         "Outputs": [
            {
               "VideoDescription": {
                  "ScalingBehavior": "DEFAULT",
                  "TimecodeInsertion": "DISABLED",
                  "AntiAlias": "ENABLED",
                  "Sharpness": 50,
                  "CodecSettings": {
                     "Codec": "H_264",
                     "H264Settings": {
                        "InterlaceMode": "PROGRESSIVE",
                        "NumberReferenceFrames": 3,
                        "Syntax": "DEFAULT",
                        "Softness": 0,
                        "GopClosedCadence": 1,
                        "GopSize": 48,
                        "Slices": 1,
                        "GopBReference": "DISABLED",
                        "SlowPal": "DISABLED",
                        "SpatialAdaptiveQuantization": "ENABLED",
                        "TemporalAdaptiveQuantization": "ENABLED",
                        "FlickerAdaptiveQuantization": "DISABLED",
                        "EntropyEncoding": "CABAC",
                        "Bitrate": 4500000,
                        "FramerateControl": "SPECIFIED",
               }
```
"RateControlMode": "CBR",
"CodecProfile": "HIGH",
"Telecine": "NONE",
"MinIInterval": 0,
"AdaptiveQuantization": "HIGH",
"CodecLevel": "LEVEL_4_1",
"FieldEncoding": "PAFF",
"SceneChangeDetect": "ENABLED",
"QualityTuningLevel": "SINGLE_PASS_HQ",
"FramerateConversionAlgorithm": "DUPLICATE_DROP",
"UnregisteredSeiTimecode": "DISABLED",
"GopSizeUnits": "FRAMES",
"ParControl": "INITIALIZE_FROM_SOURCE",
"NumberBFramesBetweenReferenceFrames": 3,
"RepeatPps": "DISABLED",
"HrdBufferSize": 9000000,
"HrdBufferInitialFillPercentage": 90,
"FramerateNumerator": 24000,
"FramerateDenominator": 1001
},
"AfdSignaling": "NONE",
"DropFrameTimecode": "ENABLED",
"RespondToAfd": "NONE",
"ColorMetadata": "INSERT",
"Width": 1920,
"Height": 1080
],
"AudioDescriptions": [
{
 "AudioTypeControl": "FOLLOW_INPUT",
 "CodecSettings": {
 "Codec": "AAC",
 "AacSettings": {
 "AudioDescriptionBroadcasterMix": "NORMAL",
 "Bitrate": 96000,
 "RateControlMode": "CBR",
 "CodecProfile": "LC",
 "CodingMode": "CODING_MODE_2_0",
 "RawFormat": "NONE",
 "SampleRate": 48000,
 "Specification": "MPEG4"
 }
 },
 "LanguageCodeControl": "FOLLOW_INPUT"
 }
],
"ContainerSettings": {
 "Container": "MP4",
 "Mp4Settings": {
 "CslgAtom": "INCLUDE",
 "FreeSpaceBox": "EXCLUDE",
 "MoovPlacement": "PROGRESSIVE_DOWNLOAD"
 }
 }
],
"AdAvailOffset": 0,
"Inputs": [
 {
 "AudioSelectors": {
 "Audio Selector 1": {
 "Tracks": [ 1
Example—ABR Output

```json
{
    "UserMetadata": {},
    "Role": "ROLE ARN",
    "Settings": {
        "OutputGroups": [
            {
                "Name": "Apple HLS",
                "Outputs": [
                    {
                        "ContainerSettings": {
                            "Container": "M3U8",
                            "M3u8Settings": {
                                "AudioFramesPerPes": 2,
                                "PcrControl": "PCR_EVERY_PES_PACKET",
                                "PmtPid": 480,
                                "PrivateMetadataPid": 503,
                                "ProgramNumber": 1,
                                "PmtInterval": 100,
                                "PmtInterval": 100,
                                "VideoPid": 481,
                                "AudioPids": [482,
                                              483,
                                              484,
                                              485,
                                              486,
                                              487,
                                              488,
                                              489]}
                        }
                    }
                ]
            }
        ]
    }
}
```
"VideoDescription": {
  "Width": 1920,
  "Height": 1080,
  "VideoPreprocessors": {
    "Deinterlacer": {
      "Algorithm": "INTERPOLATE",
      "Mode": "DEINTERLACE"
    }
  },
  "AntiAlias": "ENABLED",
  "Sharpness": 100,
  "CodecSettings": {
    "Codec": "H_264",
    "H264Settings": {
      "InterlaceMode": "PROGRESSIVE",
      "ParNumerator": 1,
      "NumberReferenceFrames": 3,
      "Softness": 0,
      "FramerateDenominator": 1001,
      "GopClosedCadence": 1,
      "GopSize": 90,
      "Slices": 1,
      "HrdBufferSize": 1250000,
      "ParDenominator": 1,
      "SpatialAdaptiveQuantization": "ENABLED",
      "TemporalAdaptiveQuantization": "DISABLED",
      "FlickerAdaptiveQuantization": "DISABLED",
      "EntropyEncoding": "CABAC",
      "Bitrate": 8500000,
      "FramerateControl": "SPECIFIED",
      "RateControlMode": "CBR",
      "CodecProfile": "HIGH",
      "Telecine": "NONE",
      "FramerateNumerator": 30000,
      "MinIInterval": 0,
      "AdaptiveQuantization": "MEDIUM",
      "CodecLevel": "LEVEL_4",
      "SceneChangeDetect": "ENABLED",
      "QualityTuningLevel": "SINGLE_PASS_HQ",
      "GopSizeUnits": "FRAMES",
      "ParControl": "SPECIFIED",
      "NumberBFramesBetweenReferenceFrames": 3,
      "HrdBufferInitialFillPercentage": 90,
      "Syntax": "DEFAULT"
    }
  }
},
"AfdSignaling": "NONE",
"DropFrameTimecode": "ENABLED",
"RespondToAfd": "NONE",
"ColorMetadata": "INSERT"
},
"AudioDescriptions": [
  {
    "AudioTypeControl": "FOLLOW_INPUT",
    "AudioSourceName": "Audio Selector 1",
    "CodecSettings": {
      "Codec": "AAC",
      "AacSettings": {
        "Bitrate": 128000,
        "RateControlMode": "CBR",
        "CodecProfile": "HIGH",
        "Telecine": "NONE",
        "FramerateNumerator": 30000,
        "MinIInterval": 0,
        "AdaptiveQuantization": "MEDIUM",
        "CodecLevel": "LEVEL_4",
        "SceneChangeDetect": "ENABLED",
        "QualityTuningLevel": "SINGLE_PASS_HQ",
        "GopSizeUnits": "FRAMES",
        "ParControl": "SPECIFIED",
        "NumberBFramesBetweenReferenceFrames": 3,
        "HrdBufferInitialFillPercentage": 90,
        "Syntax": "DEFAULT"
      }
    }
  }
]
"CodecProfile": "LC",
"CodingMode": "CODING_MODE_2_0",
"SampleRate": 48000
}
,"LanguageCodeControl": "FOLLOW_INPUT"
},
"NameModifier": "_high"
},
{
"VideoDescription": {
"ScalingBehavior": "DEFAULT",
"TimecodeInsertion": "DISABLED",
"AntiAlias": "ENABLED",
"Sharpness": 50,
"CodecSettings": {
"Codec": "H_264",
"H264Settings": {
"InterlaceMode": "PROGRESSIVE",
"NumberOfReferenceFrames": 3,
"Syntax": "DEFAULT",
"Softness": 0,
"GopClosedCadence": 1,
"GopSize": 90,
"Slices": 1,
"GopBReference": "DISABLED",
"SlowPal": "DISABLED",
"SpatialAdaptiveQuantization": "ENABLED",
"TemporalAdaptiveQuantization": "ENABLED",
"FlickerAdaptiveQuantization": "DISABLED",
"EntropyEncoding": "CABAC",
"Bitrate": 7500000,
"FramerateControl": "INITIALIZE_FROM_SOURCE",
"RateControlMode": "CBR",
"CodecProfile": "MAIN",
"Telecine": "NONE",
"MinIInterval": 0,
"AdaptiveQuantization": "HIGH",
"CodecLevel": "AUTO",
"FieldEncoding": "PAFF",
"SceneChangeDetect": "ENABLED",
"QualityTuningLevel": "SINGLE_PASS",
"FramerateConversionAlgorithm": "DUPLICATE_DROP",
"UnregisteredSeiTimecode": "DISABLED",
"GopSizeUnits": "FRAMES",
"ParControl": "INITIALIZE_FROM_SOURCE",
"NumberBFramesBetweenReferenceFrames": 2,
"RepeatPps": "DISABLED"
}
},
"AfdSignaling": "NONE",
"DropFrameTimecode": "ENABLED",
"RespondToAfd": "NONE",
"ColorMetadata": "INSERT",
"Width": 1280,
"Height": 720
},
"AudioDescriptions": [
{
"AudioTypeControl": "FOLLOW_INPUT",
"CodecSettings": {
"Codec": "AAC",
"AacSettings": {
"AudioDescriptionBroadcasterMix": "NORMAL",
"Bitrate": 96000,
}
"RateControlMode": "CBR",
"CodecProfile": "LC",
"CodingMode": "CODING_MODE_2_0",
"RawFormat": "NONE",
"SampleRate": 48000,
"Specification": "MPEG4"
}

"LanguageCodeControl": "FOLLOW_INPUT"
}

"OutputSettings": {
"HlsSettings": {
"AudioGroupId": "program_audio",
"AudioRenditionSets": "program_audio",
"IFrameOnlyManifest": "EXCLUDE"
}

"ContainerSettings": {
"Container": "M3U8",
"M3u8Settings": {
"AudioFramesPerPes": 4,
"PcrControl": "PCR_EVERY_PES_PACKET",
"PmtPid": 480,
"PrivateMetadataPid": 503,
"ProgramNumber": 1,
"PatInterval": 0,
"PmtInterval": 0,
"Scte35Source": "NONE",
"Scte35Pid": 500,
"TimedMetadata": "NONE",
"TimedMetadataPid": 502,
"VideoPid": 481,
"AudioPids": [482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492]
}

"NameModifier": "_med"
}

"VideoDescription": {
"ScalingBehavior": "DEFAULT",
"TimecodeInsertion": "DISABLED",
"AntiAlias": "ENABLED",
"Sharpness": 100,
"CodecSettings": {
"Codec": "H_264",
"H264Settings": {
"InterlaceMode": "PROGRESSIVE",
"NumberReferenceFrames": 3,
"Syntax": "DEFAULT",
"Softness": 0,
"GopClosedCadence": 1,
"GopSize": 90,
"Slices": 1,
"GopBReference": "DISABLED",
"SlowPal": "DISABLED",
"SpatialAdaptiveQuantization": "ENABLED",
"TemporalAdaptiveQuantization": "ENABLED",
"FlickerAdaptiveQuantization": "DISABLED",
"EntropyEncoding": "CABAC",
"Bitrate": 3500000,
"FramerateControl": "INITIALIZE_FROM_SOURCE",
"RateControlMode": "CBR",
"CodecProfile": "MAIN",
"Telecine": "NONE",
"MinIInterval": 0,
"AdaptiveQuantization": "HIGH",
"CodecLevel": "LEVEL_3_1",
"FieldEncoding": "PAFF",
"SceneChangeDetect": "ENABLED",
"QualityTuningLevel": "SINGLE_PASS_HQ",
"FramerateConversionAlgorithm": "DUPLICATE_DROP",
"UnregisteredSeiTimecode": "DISABLED",
"GopSizeUnits": "FRAMES",
"ParControl": "INITIALIZE_FROM_SOURCE",
"NumberBFramesBetweenReferenceFrames": 2,
"RepeatPps": "DISABLED"
"AfdSignaling": "NONE",
"DropFrameTimecode": "ENABLED",
"RespondToAfd": "NONE",
"ColorMetadata": "INSERT",
"Width": 960,
"Height": 540
"AudioDescriptions": [
{
"AudioTypeControl": "FOLLOW_INPUT",
"CodecSettings": {
"Codec": "AAC",
"AacSettings": {
"AudioDescriptionBroadcasterMix": "NORMAL",
"Bitrate": 96000,
"RateControlMode": "CBR",
"CodecProfile": "LC",
"CodingMode": "CODING_MODE_2_0",
"RawFormat": "NONE",
"SampleRate": 48000,
"Specification": "MPEG4"
"LanguageCodeControl": "FOLLOW_INPUT"

"OutputSettings": {
"HlsSettings": {
"AudioGroupId": "program_audio",
"AudioRenditionSets": "program_audio",
"IFrameOnlyManifest": "EXCLUDE"

"ContainerSettings": {
"Container": "M3U8",
"M3u8Settings": {
"AudioFramesPerPes": 4,
"PcrControl": "PCR_EVERY_PES_PACKET",
"PmtPid": 480,
"PrivateMetadataPid": 503,
"ProgramNumber": 1,
"PatInterval": 0,
"PmtInterval": 0,
"Scte35Source": "NONE",
"Scte35Pid": 500,
"TimedMetadata": "NONE",
"TimedMetadataPid": 502,
"VideoPid": 481,
"AudioPids": [ 482,
  483,
  484,
  485,
  486,
  487,
  488,
  489,
  490,
  491,
  492
]
}

"NameModifier": "_low"

"OutputGroupSettings": {
  "Type": "HLS_GROUP_SETTINGS",
  "HlsGroupSettings": {
    "ManifestDurationFormat": "INTEGER",
    "SegmentLength": 10,
    "TimedMetadataId3Period": 10,
    "CaptionLanguageSetting": "OMIT",
    "Destination": "s3://bucket/hls1/master",
    "TimedMetadataId3Frame": "PRIV",
    "CodecSpecification": "RFC_4281",
    "OutputSelection": "MANIFESTS_AND_SEGMENTS",
    "ProgramDateTimePeriod": 600,
    "MinSegmentLength": 0,
    "DirectoryStructure": "SINGLE_DIRECTORY",
    "ProgramDateTime": "EXCLUDE",
    "SegmentControl": "SEGMENTED_FILES",
    "ManifestCompression": "NONE",
    "ClientCache": "ENABLED",
    "StreamInfResolution": "INCLUDE"
  }
}

"AdAvailOffset": 0,
"Inputs": [
  {
    "AudioSelectors": {
      "Audio Selector 1": {
        "Tracks": [ 1
          ],
        "Offset": 0,
        "DefaultSelection": "DEFAULT",
        "SelectorType": "TRACK",
        "ProgramSelection": 1
      },
      "Audio Selector 2": {
        "Tracks": [ 2
          ],
        "Offset": 0,
"DefaultSelection": "NOT_DEFAULT",
"SelectorType": "TRACK",
"ProgramSelection": 1
}
},
"VideoSelector": {
  "ColorSpace": "FOLLOW"
},
"FilterEnable": "AUTO",
"PsiControl": "USE_PSI",
"FilterStrength": 0,
"DeblockFilter": "DISABLED",
"DenoiseFilter": "DISABLED",
"TimecodeSource": "EMBEDDED",
"FileInput": "s3://INPUT"
]}
}
AWS Elemental MediaConvert Postman Collection Files

Use these collections with Postman for simple access to MediaConvert through the REST API. Copy the collections and save them as JSON files, then import them into Postman.

Topics
- MediaConvert List Resources Collection (p. 234)
- MediaConvert Create Resources Collection (p. 238)
- MediaConvert Resource Tagging Collection (p. 246)

MediaConvert List Resources Collection

```json
{
  "id": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
  "name": "AWS Elemental MediaConvert GET Request",
  "description": "AWS Elemental MediaConvert GET Request",
  "order": [
    "bc671df5-4a85-54b6-f137-19cb70516fd2",
    "85318a0b-c490-3718-62eb-2a737de83af0",
    "1fd40def-ca4b-1842-c99a-778f62269010",
    "8c5ee49e-3eb0-5b9f-ae03-f6ce59763c93",
    "abedbb9c-4b97-6596-ae4c-dc1ff83f1e59",
    "0348eabe-0893-6996-718d-e819e699b34c"
  ],
  "folders": [],
  "folders_order": [],
  "timestamp": 0,
  "owner": "2332976",
  "public": false,
  "requests": [
    {
      "id": "0348eabe-0893-6996-718d-e819e699b34c",
      "headers": "Content-Type: application/json\n",
      "headerData": [
        {
          "key": "Content-Type",
          "value": "application/json",
          "description": "",
          "enabled": true
        }
      ],
      "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/presets/<name-of-preset>",
      "folder": null,
      "queryParams": [],
      "preRequestScript": null,
      "pathVariables": {},
      "pathVariableData": [],
      "method": "GET",
      "data": null
    }
  ]
}
```
"dataMode": "params",
"tests": null,
"currentHelper": "awsSigV4",
"helperAttributes": {
  "accessKey": "AccessKey",
  "secretKey": "SecretKey",
  "region": "supported-region",
  "service": "mediaconvert",
  "saveToRequest": true
},
"time": 1530559387196,
"name": "List of Job Presets",
"description": "",
"collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
"responses": []},
{
  "id": "1fd40def-ca4b-1842-c99a-778f62269010",
  "headers": "Content-Type: application/json",
  "headerData": [
    {
      "key": "Content-Type",
      "value": "application/json",
      "description": "",
      "enabled": true
    }
  ],
  "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/
    queues",
  "folder": null,
  "queryParams": [],
  "preRequestScript": null,
  "pathVariables": {},
  "pathVariableData": [],
  "method": "GET",
  "data": null,
  "dataMode": "params",
  "tests": null,
  "currentHelper": "awsSigV4",
  "helperAttributes": {
    "accessKey": "AccessKey",
    "secretKey": "SecretKey",
    "region": "supported-region",
    "service": "mediaconvert",
    "saveToRequest": true
  },
  "time": 1530558971036,
  "name": "List All Queues",
  "description": "",
  "collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
  "responses": []},
{
  "id": "85318a0b-c490-3718-62eb-2a737de83af0",
  "headers": "Content-Type: application/json",
  "headerData": [
    {
      "key": "Content-Type",
      "value": "application/json",
      "description": "",
      "enabled": true
    }
  ],
  "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/
    queues/<QUEUE-NAME-HERE>",
  "folder": null,
"queryParams": [],
"preRequestScript": null,
"pathVariables": {},
"pathVariableData": [],
"method": "GET",
"data": null,
"dataMode": "params",
"tests": null,
"currentHelper": "awsSigV4",
"helperAttributes": {
  "accessKey": "AccessKey",
  "secretKey": "SecretKey",
  "region": "supported-region",
  "service": "mediaconvert",
  "saveToRequest": true
},
"time": 1530558975692,
"name": "Specific Queue Details",
"description": "",
"collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
"responses": []
},
{
  "id": "8c5ee49e-3eb0-5b9f-ae03-f6ce59763c93",
  "headers": "Content-Type: application/json",
  "headerData": [
    {
      "key": "Content-Type",
      "value": "application/json",
      "description": "",
      "enabled": true
    }
  ],
  "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobTemplates/<job-template-name>",
  "folder": null,
  "queryParams": [],
  "preRequestScript": null,
  "pathVariables": {},
  "pathVariableData": [],
  "method": "GET",
  "data": null,
  "dataMode": "params",
  "tests": null,
  "currentHelper": "awsSigV4",
  "helperAttributes": {
    "accessKey": "AccessKey",
    "secretKey": "SecretKey",
    "region": "supported-region",
    "service": "mediaconvert",
    "saveToRequest": true
  },
  "time": 1530559427717,
  "name": "Specific Job Template",
  "description": "",
  "collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
  "responses": []
},
{
  "id": "abedbb9c-4b97-6596-ae4c-dc1ff83f1e59",
  "headers": "Content-Type: application/json",
  "headerData": [
    {
      "key": "Content-Type",
      "value": "application/json",
      "description": "",
      "enabled": true
    }
  ],
  "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobTemplates/<job-template-name>",
  "folder": null,
  "queryParams": [],
  "preRequestScript": null,
  "pathVariables": {},
  "pathVariableData": [],
  "method": "GET",
  "data": null,
  "dataMode": "params",
  "tests": null,
  "currentHelper": "awsSigV4",
  "helperAttributes": {
    "accessKey": "AccessKey",
    "secretKey": "SecretKey",
    "region": "supported-region",
    "service": "mediaconvert",
    "saveToRequest": true
  },
  "time": 1530559427717,
  "name": "Specific Job Template",
  "description": "",
  "collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
  "responses": []
},
{
  "id": "abedbb9c-4b97-6596-ae4c-dc1ff83f1e59",
  "headers": "Content-Type: application/json",
  "headerData": [
    {
      "key": "Content-Type",
      "value": "application/json",
      "description": "",
      "enabled": true
    }
  ],
  "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobTemplates/<job-template-name>",
  "folder": null,
  "queryParams": [],
  "preRequestScript": null,
  "pathVariables": {},
  "pathVariableData": [],
  "method": "GET",
  "data": null,
  "dataMode": "params",
  "tests": null,
  "currentHelper": "awsSigV4",
  "helperAttributes": {
    "accessKey": "AccessKey",
    "secretKey": "SecretKey",
    "region": "supported-region",
    "service": "mediaconvert",
    "saveToRequest": true
  },
  "time": 1530559427717,
  "name": "Specific Job Template",
  "description": "",
  "collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
  "responses": []
}
GET Collection

"enabled": true
}
]
"url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobTemplates",
"queryParams": [],
"pathVariables": {},
"pathVariableData": [],
"preRequestScript": null,
"method": "GET",
"collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
"data": null,
"dataMode": "params",
"name": "List of Job Templates",
"description": "",
"descriptionFormat": "html",
"time": 1530559135843,
"version": 2,
"responses": [],
"tests": null,
"currentHelper": "awsSigV4",
"helperAttributes": {
"accessKey": "AccessKey",
"secretKey": "SecretKey",
"region": "supported-region",
"service": "mediaconvert",
"saveToRequest": true
}
},
{
"id": "bc671df5-4a85-54b6-f137-19cb70516fd2",
"headers": "Content-Type: application/json",
"headerData": [ {
"key": "Content-Type",
"value": "application/json",
"description": "",
"enabled": true
}
],
"url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobs/<job-id>",
"folder": null,
"queryParams": [],
"preRequestScript": null,
"pathVariables": {},
"pathVariableData": [],
"method": "GET",
"data": null,
"dataMode": "params",
"tests": null,
"currentHelper": "awsSigV4",
"helperAttributes": { 
"accessKey": "AccessKey",
"secretKey": "SecretKey",
"region": "supported-region",
"service": "mediaconvert",
"saveToRequest": true
},
"time": 1530558979699,
"name": "Specific Job ID",
"description": "",
"collectionId": "87fac2df-dd0f-b54a-b1f9-5b138cb4147f",
"responses": []}
MediaConvert Create Resources Collection

```
{
  "id": "f1b8f50a7-df20-f8c6-0180-9fe2eab4e285",
  "name": "AWS Elemental MediaConvert POST Request",
  "description": "",
  "order": [
    "18510e9e-cc88-8c19-5b28-64606a24bb03",
    "b4a440ea-e235-fefa-636f-d0f5da8143f5",
    "dbad1515-df7d-fbc7-84ad-bd97688ee0dd",
    "37896178-5574-1b03-858f-8c3dd362c231",
    "3a129a9e-e437-2a47-b8e1-eb51e121311c"
  ],
  "folders": [],
  "folders_order": [],
  "timestamp": 0,
  "owner": "2332976",
  "public": false,
  "requests": [
    {
      "id": "18510e9e-cc88-8c19-5b28-64606a24bb03",
      "headers": "Content-Type: application/json",
      "headerData": [
        {
          "key": "Content-Type",
          "value": "application/json",
          "description": "",
          "enabled": true
        }
      ],
      "url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobs",
      "queryParams": [
        {
          "key": "AWS_Region",
          "value": "eu-west-1",
          "equals": false,
          "description": "",
          "enabled": false
        },
        {
          "key": "AWS_Access_Key",
          "value": "KEY",
          "equals": false,
          "description": "",
          "enabled": false
        },
        {
          "key": "AWS_Secret_Key",
          "value": "KEY",
          "equals": false,
          "description": "",
          "enabled": false
        }
      ],
      "preRequestScript": "",
      "pathVariables": {},
      "pathVariableData": [],
      "method": "POST",
      "data": []
    }
  ]
}
```
"dataMode": "raw",
"tests": "",
"currentHelper": "awsSigV4",
"helperAttributes": {
"accessKey": "AccessKey",
"secretKey": "SecretKey",
"region": "supported-region",
"service": "mediaconvert",
"saveToRequest": true
},
"time": 1530561471298,
"name": "Submit MP4 Job (No Preset)",
"description": "",
"collectionId": "7f8f50a7-df20-f8c6-0180-9fe2e4b0e285",
"responses": [],
"rawModeData": "{\r\n  "userMetadata": {},\r\n  "role": "ROLE ARN HERE",\r\n  "name": "File Group\r\n  "outputs": [\r\n    {\r\n      "container": "MP4",\r\n      "cslgAtom": "INCLUDE",\r\n      "freeSpaceBox": "EXCLUDE",\r\n      "moovPlacement": "PROGRESSIVE_DOWNLOAD",\r\n      "videoDescription": {\r\n        "scalingBehavior": "DEFAULT",\r\n        "antiAlias": "ENABLED",\r\n        "sharpness": 50,\r\n        "codecSettings": {\r\n          "codec": "H_264",\r\n          "interlaceMode": "PROGRESSIVE",\r\n          "numberReferenceFrames": 1,\r\n          "syntax": "DEFAULT",\r\n          "softness": 0,\r\n          "gopClosedCadence": 1,\r\n          "gopSize": 90,\r\n          "gopSizeUnits": "FRAMES",\r\n          "parControl": "INITIALIZE_FROM_SOURCE",\r\n          "unregisteredSeiTimecode": "DISABLED",\r\n          "gopSizeUnits": "",\n          "repeatPps": "DISABLED",\r\n          "flickerAdaptiveQuantization": "ENABLED",\r\n          "entropyEncoding": "CABAC",\r\n          "framerateControl": "INITIALIZE_FROM_SOURCE",\r\n          "framerateMode": "CBR",\r\n          "codecProfile": "MAIN",\r\n          "adaptiveQuantization": "MEDIUM",\r\n          "framerateConversionAlgorithm": "DUPLICATE_DROP",\r\n          "unregisteredSeiTimecode": "DISABLED",\r\n          "gopSizeUnits": "",\n          "parControl": "INITIALIZE_FROM_SOURCE",\r\n          "numberBFramesBetweenReferenceFrames": 2,\r\n          "qualityTuningLevel": "SINGLE_PASS",\r\n          "fieldEncoding": "PAFF",\r\n          "sceneChangeDetect": "ENABLED",\r\n          "framerateMode": "CBR",\r\n          "adaptivityMode": "";
```
{ "id": "37896178-5574-1b03-858f-8c3dd362c231", "headers": { "Content-Type": "application/json", "Host": <custom-account-id>.mediaconvert.<region>.amazonaws.com", "Content-Length": "5274", "X-Amz-Date": "20180702T200725Z", 

Authorization: AWS4-HMAC-SHA256 Credential=AccessKey/20180702/supported-region/mediaconvert/aws4_request, SignedHeaders=content-length;content-type;host;x-amz-date, Signature=345d7d8d77bb9b227f6044a64b1c9cc76f0556f0365526cb2931a9fabc4d13b" }, 

"headerData": [ 

{ "key": "Content-Type", "value": "application/json", "description": "", "enabled": true },

{ "key": "Host", "value": <custom-account-id>.mediaconvert.<region>.amazonaws.com", "description": "", "enabled": true },

{ "key": "Content-Length", "value": "5274", "description": "", "enabled": true },

{ "key": "X-Amz-Date", "value": "20180702T200725Z", "description": "", "enabled": true },

{ "key": "Authorization", "value": "AWS4-HMAC-SHA256 Credential=AccessKey/20180702/supported-region/mediaconvert/aws4_request, SignedHeaders=content-length;content-type;host;x-amz-date, Signature=345d7d8d77bb9b227f6044a64b1c9cc76f0556f0365526cb2931a9fabc4d13b" },

"url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/jobTemplates", "queryParams": [ 

{ "key": "AWS_Region", "value": "eu-west-1", "equals": false, "description": "", "enabled": false },

{ "key": "AWS_Access_Key", "value": "KEY", "equals": false, "description": "", "enabled": false },

{ "key": "AWS_Secret_Key", "value": "KEY", "equals": false, "description": "", "enabled": false }

] }


"preRequestScript": "",
"pathVariables": {},
"pathVariableData": [],
"method": "POST",
"data": [],
"dataMode": "raw",
"tests": [],
"currentHelper": "awsSigV4",
"helperAttributes": {
  "accessKey": "AccessKey",
  "secretKey": "SecretKey",
  "region": "supported-region",
  "service": "mediaconvert",
  "saveToRequest": true
},
"time": 1530563456504,
"name": "Create Job Template",
"description": "",
"collectionId": "7f8f50a7-df20-f8c6-0180-9fe2eab4e285",
"responses": [],
"rawModeData": "{\"name\": \"Job Template Test\",\"description\": \"Job Template Test\",\"settings\":{\n  \"outputGroups\": [{\n    \"name\": \"File Group\",\n    \"outputs\": [{\n      \"container\": \"MP4\",\n      \"mp4Settings\": {\n        \"cslgAtom\": \"INCLUDE\",\n        \"freeSpaceBox\": \"EXCLUDE\",\n        \"moovPlacement\": \"PROGRESSIVE_DOWNLOAD\"  
    }],
    \"width\": 640,\n    \"height\": 480,\n    \"videoDescription\": {\n      \"mode\": \"DEINTERLACE\",\n      \"control\": \"NORMAL\"  
    },\n    \"antiAlias\": \"ENABLED\",\n    \"timecodeInsertion\": \"DISABLED\",\n    \"sharpness\": 50,\n    \"codecSettings\": {\n      \"H_264\": {\n        \"parNumerator\": 1,\n        \"syntax\": \"DEFAULT\",\n        \"numberReferenceFrames\": 3,\n        \"framerateDenominator\": 1001,\n        \"gopClosedCadence\": 1,\n        \"gopSize\": 2,\n        \"slice\": 1,\n        \"gopSizeReference\": \"ENABLED\",\n        \"hrdBufferSize\": 3000000,\n        \"slowPal\": \"DISABLED\",\n        \"parDenominator\": 1,\n        \"spatialAdaptiveQuantization\": \"ENABLED\",\n        \"temporalAdaptiveQuantization\": \"ENABLED\",\n        \"flickerAdaptiveQuantization\": \"ENABLED\",\n        \"entropyEncoding\": \"CABAC\",\n        \"framerateControl\": \"SPECIFIED\",\n        \"rateControlMode\": \"CBR\",\n        \"telecine\": \"NONE\",\n        \"main\": \"LEVEL_3\",\n        \"fieldEncoding\": \"PAFF\",\n        \"qualityTuningLevel\": \"MULTI_PASS_HQ\",\n        \"sceneChangeDetect\": \"ENABLED\",\n        \"minIInterval\": 0,\n        \"adaptiveQuantization\": \"HIGH\",\n        \"codecProfile\": \"MAIN\",\n        \"framerateConversionAlgorithm\": \"DUPLICATE_DROP\",\n        \"unregisteredseiTimecode\": \"DISABLED\",\n        \"gopSizeUnits\": \"SECONDS\",\n        \"parControl\": \"SPECIFIED\",\n        \"numberBFramesBetweenReferenceFrames\n        \"repeatPps\": \"DISABLED\",\n        \"afdsignaling\": \"NONE\n        \"dropFrameTimecode\": \"ENABLED\"
      }
    }
  }
],
  \"containerSettings\": {
    \"freeSpaceBox\": \"EXCLUDE\",\n    \"cslgAtom\": \"INCLUDE\",
    \"moovPlacement\": \"PROGRESSIVE_DOWNLOAD\" 
  }
}

"respondToAfd": "NONE",
"colorMetadata": "INSERT",

"audioDescriptions": [

{"audioSourceName": "Audio Selector 1",
"codec": "AAC",
"aacSettings": {
"audioDescriptionBroadcasterMix": "NORMAL",
"bitrate": 160000,
"rateControlMode": "CBR",
"codingMode": "CODING_MODE_2_0",
"rawFormat": "NONE",
"sampleRate": 48000,
"specification": "MPEG4"}
},

"languageCodeControl": "FOLLOW_INPUT",
"audioType": 0
]

"nameModifier": "_settings",

"preset": "System-Generic_Hd_Mp4_Hevc_Aac_16x9_1920x1080p_50Hz_6Mbps",
"nameModifier": "_preset"
]

"outputGroupSettings": {
"type": "FILE_GROUP_SETTINGS",
"fileGroupSettings": {}
}

"adAvailOffset": 0
}

"id": "3a124a9e-e437-2a47-b8e1-eb51e121311c",
"headers": "Content-Type: application/json",
"headerData": [
{
"key": "Content-Type",
"value": "application/json",
"description": 
"enabled": true
}
],

"url": "https://<custom-account-id>.mediaconvert.<region>.amazonaws.com/2017-08-29/presets",
"queryParams": [
{
"key": "AWS_Region",
"value": "eu-west-1",
"equals": false,
"description": 
"enabled": false
}
],

"preRequestScript": 
"currentHelper": "awsSigV4",
"helperAttributes": {
"accessKey": "AccessKey",
"secretKey": "SecretKey",
"region": "supported-region",
"service": "mediaconvert",
"saveToRequest": true
},
"time": 1530562249778,
"name": "Create Job Preset",
"description": "",
"collectionId": "7f8f50a7-df20-f8c6-0180-9fe2eab4e285",
"responses": [],
"rawModeData": "{"name": "Test Preset", "description": "Test Preset",
  "settings": {
    "videoDescription": {
      "width": 1280,
      "height": 720,
      "scalingBehavior": "DEFAULT",
      "videoPreprocessors": {
        "deinterlacer": {
          "algorithm": "INTERPOLATE",
          "mode": "DEINTERLACE",
          "control": "NORMAL",
          "parNumerator": 1,
          "numberReferenceFrames": 3,
          "syntax": "DEFAULT",
          "softness": 0,
          "framerateDenominator": 1001,
          "gopSize": 2,
          "slices": 1,
          "gopReference": "ENABLED",
          "hrdBufferSize": 9000000,
          "slowPal": "DISABLED",
          "parBufferSize": 9000000,
          "parDenominator": 1,
          "spatialAdaptiveQuantization": "ENABLED",
          "framerateControl": "SPECIFIED",
          "rateControlMode": "CBR",
          "codecProfile": "HIGH",
          "framerateConversionAlgorithm": "DUPLICATE_DROP",
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Tagging Collection

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MediaConvert User Guide
Tagging Collection
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AWS Elemental MediaConvert
Related Information

Find links to code samples, tutorials, and other helpful information for getting started with AWS Elemental MediaConvert.

Code samples and tutorials for AWS Elemental MediaConvert VOD solutions

Find code samples and tutorials for automating video on demand (VOD) workflows:

- **VOD Automation Toolkit** – Sample code and AWS CloudFormation scripts on GitHub for automating video on demand (VOD) workflows on AWS.
- **Video on Demand at AWS** – Sample code, deployment guide, and AWS CloudFormation template in AWS Solutions. The workflow in this solution ingests source videos, processes the videos for playback on a wide range of devices, and stores the transcoded media files for on-demand delivery to end users through Amazon CloudFront.

Find code for a complete VOD workflow from ingest through delivery in Video on Demand at AWS in AWS Solutions.

AWS Elemental video basics

Learn the basics about AWS Media Services, video compression, and video delivery. Register for any of our free 30-minute online training courses:

- **Introduction to AWS Media Services**
- **AWS Elemental Foundations - Video Compression Basics**
- **AWS Elemental Foundations - Video Delivery Basics**

AWS learning resources

Explore the places to learn about using AWS services:

- **Classes & Workshops** – Links to role-based and specialty courses as well as self-paced labs to help sharpen your AWS skills and gain practical experience.
- **AWS Developer Tools** – Links to developer tools, SDKs, IDE toolkits, and command line tools for developing and managing AWS applications.
- **AWS Whitepapers** – Links to a comprehensive list of technical AWS whitepapers, covering topics such as architecture, security, and economics and authored by AWS Solutions Architects or other technical experts.
- **AWS Support Center** – The hub for creating and managing your AWS Support cases. Also includes links to other helpful resources, such as forums, technical FAQs, service health status, and AWS Trusted Advisor.
- **AWS Support** – The primary web page for information about AWS Support, a one-on-one, fast-response support channel to help you build and run applications in the cloud.
- **Contact Us** – A central contact point for inquiries concerning AWS billing, account, events, abuse, and other issues.
- **AWS Site Terms** – Detailed information about our copyright and trademark; your account, license, and site access; and other topics.
## Document History for User Guide

The following table describes important additions to the AWS Elemental MediaConvert documentation. We also update the documentation frequently to address the feedback that you send us.

- **API version:** 2017-08-29
- **Latest documentation update:** June 20, 2018

<table>
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<th>update-history-change</th>
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</tr>
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<tr>
<td>Queue hopping (p. 64)</td>
<td>Learn about the AWS Elemental MediaConvert queue hopping feature. This feature lets you set up a job to automatically move to a different queue after waiting a specified length of time in the queue that you originally submitted it to.</td>
<td>April 8, 2020</td>
</tr>
<tr>
<td>You can now convert from HDR to SDR with automatic tone mapping (p. 128)</td>
<td>Learn about how AWS Elemental MediaConvert uses tone mapping to automatically convert from HDR formats to SDR color spaces.</td>
<td>March 6, 2020</td>
</tr>
<tr>
<td>8k output support in AWS Elemental MediaConvert (p. 139)</td>
<td>MediaConvert now supports up to 8k output resolution. Find more information about resolution maximums by output codec.</td>
<td>November 25, 2019</td>
</tr>
<tr>
<td>Use accelerated transcoding with slow PAL (p. 112)</td>
<td>You can now use accelerated transcoding for slow PAL jobs.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>Set up access for other AWS accounts to your MediaConvert outputs (p. 40)</td>
<td>You can now grant cross-account access by writing your AWS Elemental MediaConvert outputs to an Amazon S3 bucket owned by another AWS account and applying a canned access control list (ACL) to your outputs. This chapter also provides information about the alternative method for setting up access—granting other accounts access to your output bucket in Amazon S3.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>New supported input format (p. 134)</td>
<td>Updated reference tables to reflect new input format support. MediaConvert now supports HEVC (H.265) in QuickTime containers as input files.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>New supported captions format (p. 140)</td>
<td>Updated reference tables to reflect new captions support. IMSC sidecar output captions now available in <strong>CMAF, DASH ISO</strong>, and <strong>File group</strong> output groups. You can generate these from the following input captions formats: Ancillary, Embedded, IMSC, Teletext, TTML, SCC, SCTE-20, SMI, SRT, and STL.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>ESAM support in DASH outputs (p. 95)</td>
<td>You can now specify ad insertion points in DASH outputs by including Event Signaling and Management (ESAM) XML documents as strings inside your AWS Elemental MediaConvert job settings.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>Doc-only update: Synchronizing sidecar captions and audio in jobs that use input clipping and stitching (p. 25)</td>
<td>Learn about using the MediaConvert input and output timelines to synchronize your video, audio, captions, and overlays in assembly workflow jobs.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>Create additional top-level manifests (p. 15)</td>
<td>You can now set up your ABR streaming packages in AWS Elemental MediaConvert with additional top-level manifests that specify different subsets of your outputs.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>Create Dolby Vision outputs (p. 120)</td>
<td>Learn how to create Dolby Vision outputs with AWS Elemental MediaConvert.</td>
<td>November 15, 2019</td>
</tr>
<tr>
<td>Use integrated AWS tags on AWS Elemental MediaConvert resources (p. 182)</td>
<td>You can now use standard AWS tags with MediaConvert jobs the same way that you do with queues, templates, and presets. You can use these tags to sort your billing report for cost allocation purposes, to include your MediaConvert resources in resource groups with other AWS resources, and to control access to specific resources.</td>
<td>October 9, 2019</td>
</tr>
<tr>
<td>Use accelerated transcoding with frame capture (p. 112)</td>
<td>You can now use accelerated transcoding for jobs that include frame capture outputs.</td>
<td>October 9, 2019</td>
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<td>Have AWS Elemental MediaConvert automatically choose accelerated transcoding for jobs that are compatible (p. 111)</td>
<td>You can now set accelerated transcoding to PREFERRED, to have the service fall back to standard transcoding when your inputs or job settings aren't compatible with accelerated transcoding.</td>
<td>October 9, 2019</td>
</tr>
<tr>
<td>Doc-only update, use cases for Time delta (p. 84)</td>
<td>Learn about using the <strong>Time delta</strong> setting to synchronize sidecar captions with your video. See use case examples that illustrate common captions sync problems that you can fix with this setting.</td>
<td>September 6, 2019</td>
</tr>
<tr>
<td>Choose the encryption method for DRM in CMAF output groups (p. 205)</td>
<td>You can now choose between AES-CTR and AES-CBC subsample encryption types when you enable DRM for CMAF output groups. Learn how to set up DRM encryption.</td>
<td>September 6, 2019</td>
</tr>
<tr>
<td>Align sidecar captions with your video after using the Timecode source setting (p. 83)</td>
<td>When you use the input setting <strong>Timecode source</strong> to align your sidecar audio file with your video, make sure that your sidecar captions still line up. Learn which sidecar captions formats require adjustment and how to make any necessary adjustments.</td>
<td>September 6, 2019</td>
</tr>
<tr>
<td>Multi-system SPEKE DRM for CMAF (p. 205)</td>
<td>When you work with SPEKE-compliant DRM partners to enable DRM on your CMAF outputs, you can now signal up to three system IDs in your DASH manifest and one in your HLS manifest. Learn about setting up this SPEKE encryption parameter in your AWS Elemental MediaConvert job.</td>
<td>August 12, 2019</td>
</tr>
<tr>
<td>Export and import jobs (p. 44)</td>
<td>Learn how to export MediaConvert jobs and how to create new jobs by importing one.</td>
<td>August 9, 2019</td>
</tr>
<tr>
<td>Specify the priority of your jobs (p. 63)</td>
<td>Learn how to set the relative priority of your jobs when you create them.</td>
<td>July 30, 2019</td>
</tr>
<tr>
<td>Convert two SCC input files to embedded captions (p. 85)</td>
<td>Learn about converting dual SCC input captions to embedded format.</td>
<td>July 30, 2019</td>
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<tr>
<td>Update</td>
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<tr>
<td>Create audio-only outputs (p. 131)</td>
<td>Learn how to create MediaConvert outputs that contain only audio, without video.</td>
<td></td>
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<tr>
<td>HTTP Inputs to AWS Elemental MediaConvert (p. 6)</td>
<td>You can now specify an HTTP(S) URL for your primary inputs to MediaConvert transcoding jobs. Learn about HTTP(S) input requirements.</td>
<td></td>
</tr>
<tr>
<td>Monitor output file upload progress (p. 165)</td>
<td>Using CloudWatch Events, you can now monitor the progress of your job with finer granularity, because AWS Elemental MediaConvert now reports percentage completion of the job phases PROBING, UPLOADING, and TRANSCODING, in addition to reporting overall job progress in percent completion.</td>
<td></td>
</tr>
<tr>
<td>Doc-only update, format identifiers (p. 19)</td>
<td>Learn how to use format identifiers as variables in your job settings. For example, you can use a format identifier to represent your input file name in a job template or output preset, so that AWS Elemental MediaConvert uses the input file name in the file path for your output.</td>
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<tr>
<td>You can now cancel an in-progress job. (p. 43)</td>
<td>AWS Elemental MediaConvert now allows you to cancel jobs that are already in progress.</td>
<td></td>
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<tr>
<td>Monitor job progress (p. 165)</td>
<td>Using CloudWatch Events, you can now monitor the progress of your AWS Elemental MediaConvert jobs by viewing the percentage of job completion.</td>
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<tr>
<td>Added client-side and server-side encryption (p. 199)</td>
<td>You can now encrypt your input files before you upload them to Amazon S3. AWS Elemental MediaConvert decrypts them before transcoding. You can also now set up your MediaConvert jobs so that Amazon S3 encrypts your job outputs as they are saved to Amazon S3.</td>
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<tr>
<td>Feature Description</td>
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<td>Find information about the new rotate feature. (p. 92)</td>
<td>For most inputs, you can now use the rotate feature to specify how the service rotates your video from input to output. You can also specify whether the service follows any rotation metadata in the input. Find information and instructions for setting rotation.</td>
<td>February 19, 2019</td>
</tr>
<tr>
<td>ESAM support (p. 95)</td>
<td>You can now specify ad insertion points by including Event Signaling and Management (ESAM) XML documents as strings inside your AWS Elemental MediaConvert job settings.</td>
<td>February 13, 2019</td>
</tr>
<tr>
<td>Code samples, sample workflows, and other related information (p. 253)</td>
<td>Find links to code samples, tutorials, and other helpful information for getting started with AWS Elemental MediaConvert.</td>
<td>February 13, 2019</td>
</tr>
<tr>
<td>New supported captions formats (p. 140)</td>
<td>Updated reference tables to reflect new support for the following captions formats. On input: SMI, SCTE-20. On output: SCTE-20 + embedded, Embedded + SCTE-20, SMI.</td>
<td>November 19, 2018</td>
</tr>
<tr>
<td>Find information about the new image inserter features (p. 103)</td>
<td>You can now use the image inserter to overlay still graphics on individual inputs as well as outputs. You can also overlay motion graphics. Find information and instructions for setting up these overlays.</td>
<td>November 19, 2018</td>
</tr>
<tr>
<td>Added content key encryption to DRM encryption (p. 206)</td>
<td>Added the option to encrypt content keys. Prior to this, AWS Elemental MediaConvert supported plaintext key delivery only. To use content key encryption, your DRM key provider must support encrypted content keys. If you enable this feature for a key provider that doesn’t handle content key encryption, the operation fails.</td>
<td>November 19, 2018</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Date</td>
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<td>Reserved queues (p. 60)</td>
<td>Learn about the AWS Elemental MediaConvert new pricing option, reserved queues. With reserved queues, you pay for the transcoding capacity of the entire queue, regardless of how much or how little you use it. If you continuously or frequently run transcoding jobs, you might find considerable cost savings with a reserved queue.</td>
<td>September 27, 2018</td>
</tr>
<tr>
<td>Find output file names and paths in your CloudWatch Events notifications (p. 171)</td>
<td>Use CloudWatch Events with AWS Elemental MediaConvert jobs to receive output file names and paths, including manifest and media file outputs.</td>
<td>September 18, 2018</td>
</tr>
<tr>
<td>Set up cost allocation reports to sort your AWS bill by the tags that you apply to AWS Elemental MediaConvert resources (p. 182)</td>
<td>You can use the tags you apply to AWS Elemental MediaConvert queues, job templates, and output presets as cost allocation tags. First activate them in the AWS Billing and Cost Management dashboard, and then set up a billing report to view your AWS charges by resource.</td>
<td>September 7, 2018</td>
</tr>
<tr>
<td>Quality-defined variable bitrate (QVBR) mode now available (p. 117)</td>
<td>You can now use the QVBR rate control mode to get better video quality for the same file size, or to reduce your file sizes while maintaining video quality. Get information about how to set it up.</td>
<td>August 13, 2018</td>
</tr>
<tr>
<td>Use AWS Elemental MediaConvert tags for cost allocation through tagging (p. 182)</td>
<td>You can now activate tags on AWS Elemental MediaConvert queues, job templates, and output presets in the AWS Billing and Cost Management dashboard, and then set up a monthly cost allocation report.</td>
<td>July 31, 2018</td>
</tr>
<tr>
<td>Tagging AWS Elemental MediaConvert resources on the console (p. 182)</td>
<td>You can now work with tags on existing AWS Elemental MediaConvert queues, job templates, and output presets in the MediaConvert console.</td>
<td>July 31, 2018</td>
</tr>
<tr>
<td>CloudTrail changes (p. 188)</td>
<td>Updated the MediaConvert documentation to reflect changes in AWS CloudTrail behavior.</td>
<td>July 19, 2018</td>
</tr>
</tbody>
</table>
Tagging AWS Elemental MediaConvert resources initial release (p. 182)
You can now tag MediaConvert resources when you create them using the MediaConvert console, the MediaConvert API, or the AWS CLI. You can list the tags on an existing MediaConvert resource, and add and remove tags on existing MediaConvert resources, through the MediaConvert API and AWS CLI.

July 16, 2018

Doc-only update, Setting up a job (p. 11)
Added step-by-step procedures for setting up a job to transcode input media files into files and packages for playing on multiple device types.

June 20, 2018

Doc-only update, "working with" procedures (p. 43)
Added step-by-step procedures for creating, listing, editing, and deleting templates, presets, queues, and jobs.

May 29, 2018

CMAF support (p. 33)
MediaConvert adds support for common media application format (CMAF) outputs.

May 4, 2018

New MediaConvert service release (p. 1)
Initial documentation for the MediaConvert service.

November 27, 2017

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 MediaConvert 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 MediaConvert 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.mppegla.com.

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AWS glossary

For the latest AWS terminology, see the AWS glossary in the AWS General Reference.