User Guide

AWS Elemental MediaPackage v2

AWS Elemental MediaPackage v2: User Guide

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What is AWS Elemental MediaPackage?

AWS Elemental MediaPackage (MediaPackage) is a just-in-time video packaging and origination service that runs in the AWS Cloud. With MediaPackage, you can deliver highly secure, scalable, and reliable video streams to a wide variety of playback devices and content delivery networks (CDNs).

MediaPackage offers a broadcast-grade viewing experience for viewers, while allowing you the flexibility to control and protect your content. Additionally, the built-in resiliency and scalability of MediaPackage means that you have the right amount of resources at the right time, with no manual intervention required.

Note

This user guide is intended for creating MediaPackage resources in MediaPackage Version 2 (v2) starting from May 2023. To get started with MediaPackage v2, create your MediaPackage resources. There isn't an automated process to migrate your resources from MediaPackage v1 to MediaPackage v2.

The names of the entities that you use to access your MediaPackage resources, like URLs and ARNs, all include "mediapackagev2", to distinguish from the prior version. If you used MediaPackage prior to this release, you can't use the MediaPackage v2 AWS CLI or the MediaPackage v2 API to access any MediaPackage v1 resources.

If you created resources in MediaPackage v1, use video on demand (VOD) workflows, and aren't looking to migrate to MediaPackage v2 yet, see the AWS Elemental MediaPackage v1 User Guide.

Topics

- Pricing for MediaPackage
- Regions for MediaPackage

Are you a first-time user of MediaPackage?

If you're a first-time user of MediaPackage, we recommend that you begin by reading the following sections:

- AWS Elemental MediaPackage concepts and terminology
- How MediaPackage works
- Supported features of AWS Elemental MediaPackage
- Getting started with AWS Elemental MediaPackage

AWS Elemental MediaPackage concepts and terminology

The following are AWS Elemental MediaPackage concepts and terms to be familiar with.

Channel group

A *channel group* is the top-level resource that consists of channels and origin endpoints that are associated with it and that provides predictable URLs for stream delivery. All channels and origin endpoints within the channel group are guaranteed to share the DNS.

Channel

A *channel* represents the entry point for a content stream into MediaPackage. Upstream encoders such as AWS Elemental MediaLive send content to the channel. When MediaPackage receives a content stream, it packages the content and outputs the stream from an endpoint that you create on the channel. There's one channel for each incoming set of adaptive bitrate (ABR) streams.

Endpoint

An *endpoint* is part of a channel and represents the packaging aspect of MediaPackage. When you create an endpoint on a channel, you indicate what streaming format, packaging parameters, and features the output stream will use. Downstream devices request content from the endpoint. A channel can have multiple endpoints.

Just-in-time packaging

MediaPackage performs *just-in-time packaging* (JITP). When a playback device requests content, MediaPackage dynamically customizes the live video streams and creates a manifest in a format that's compatible with the requesting device.

Origination service

MediaPackage is considered an *origination service* because it's the point of distribution for media content delivery.

Packager

A *packager* prepares output streams for access by different types of players. The packager type specifies the streaming format that MediaPackage delivers from the endpoint (either Apple HLS, DASH-ISO, Microsoft Smooth Streaming, or Common Media Application Format [CMAF]). Additional packager settings include buffer and update durations and manifest tag handling instructions.

A packager is a part of an origin endpoint. Each endpoint must have one, and only one, packager. To use different packager types for the same content, create multiple endpoints on the channel.

Source Content

Source contents are live streams and video files that MediaPackage ingests.

- For live video, source content comes from an upstream encoder, such as AWS Elemental MediaLive. MediaPackage supports HLS source content.

Stream

A *stream* refers to the content input and output of MediaPackage.

For live workflows, an upstream encoder sends a live stream as an input to MediaPackage to the channel. When a downstream device requests playback of the content, MediaPackage dynamically packages the stream (including specifying the packager type, adding encryption, and configuring track outputs) and delivers it to the requesting device as an output of the endpoint. An endpoint can produce multiple streams.

Track

Tracks make up the output content stream. MediaPackage includes selected video, audio, and subtitles or captions tracks in the output stream. The stream delivers the tracks to the player (either directly or through a CDN), and the player plays back the tracks based on player logic or network conditions (such as available bandwidth).

Supported inputs and outputs

This section describes the input types, input codecs, and output codecs that AWS Elemental MediaPackage supports for live content.

Topics

The following sections describe supported input types and codecs for live streaming content.

Supported input types

Use the following input types to push streams from an external source or encoder (such as AWS Elemental MediaLive) using the HTTPS protocol:

- HLS
- CMAF

The following are additional input requirements:

- You must define a channel policy to enable content to flow into your channel from sources outside of your account.
- Media segments must not be encrypted.
- Streams can contain either muxed video and audio tracks, or unmuxed tracks.
- The input must contain at least one video track. MediaPackage doesn't support inputs that contain no video track.

Supported input codecs

These are the video, audio, and subtitles codecs that MediaPackage supports for source content streams.

Input type	Media container	Video codecs	Audio codecs	Subtitles/ captions format
HLS	• Video: TS • Audio: TS, AAC, AC3, or EC3	• H.264 (AVC) • H.265 (HEVC) with HDR-10 or Dolby Vision Profile 8.1 support	• AAC • Dolby Digital • Dolby Digital Plus	• WebVTT • CEA-608 and CEA-708 closed captions
CMAF	CMAF	• H.264 (AVC) • H.265 (HEVC) with HDR-10 or Dolby Vision Profile 8.1 support • AV1	• AAC • Dolby Digital • Dolby Digital Plus	• TTML • CEA-608 and CEA-708 closed captions

Supported output codecs

These are the video, audio, and subtitles codecs that MediaPackage supports when delivering live content.

Note

The AV1 video codec is supported only with CMAF endpoint types. If you configure a TS endpoint on a channel with AV1 streams those streams won't show up on the endpoint.

Endpoint type	Manifest format	Media container	Video codecs	Audio codecs	Subtitles /captions format
TS	HLS	• Video: TS • Audio: TS or AAC	• H.264 (AVC) • H.265 (HEVC) with HDR-10 or Dolby Vision Profile 8.1 support	• AAC • Dolby Digital • Dolby Digital Plus	• WebVTT
CMAF	HLS, DASH	CMAF	• H.264 (AVC) • H.265 (HEVC) with HDR-10 or Dolby Vision Profile 8.1 support • AV1	• AAC • Dolby Digital • Dolby Digital Plus	• WebVTT • CEA-608 and CEA-708 closed captions • TTML

How MediaPackage works

AWS Elemental MediaPackage uses just-in-time format conversion to deliver over-the-top (OTT) video from a single source to a wide variety of playback devices or content delivery networks (CDNs).

In the processing flow for live content, encoders send live HLS streams to MediaPackage. MediaPackage then packages the content, formatting it in response to playback requests from downstream devices.

The following sections describe the live processing flows.

Topics

- General AWS Elemental MediaPackage live processing flow
- Live input redundancy AWS Elemental MediaPackage processing flow

General AWS Elemental MediaPackage live processing flow

The following outlines the general flow of live content in MediaPackage:

1. An upstream encoder (such as AWS Elemental MediaLive) sends an HLS live stream using AWS Signature Version 4 to authorize request to your origin and your IAM channel policy. If you're using input redundancy, the encoder sends two identical HLS live streams to MediaPackage, one to each ingest domain on the channel. MediaPackage uses the stream from one ingest URL as the source content. If MediaPackage stops receiving content on the active ingest URL, it automatically switches to the other ingest URL for source content. Additionally, AWS scales resources up and down to handle the incoming traffic.

   For more information, see Live input redundancy AWS Elemental MediaPackage processing flow.

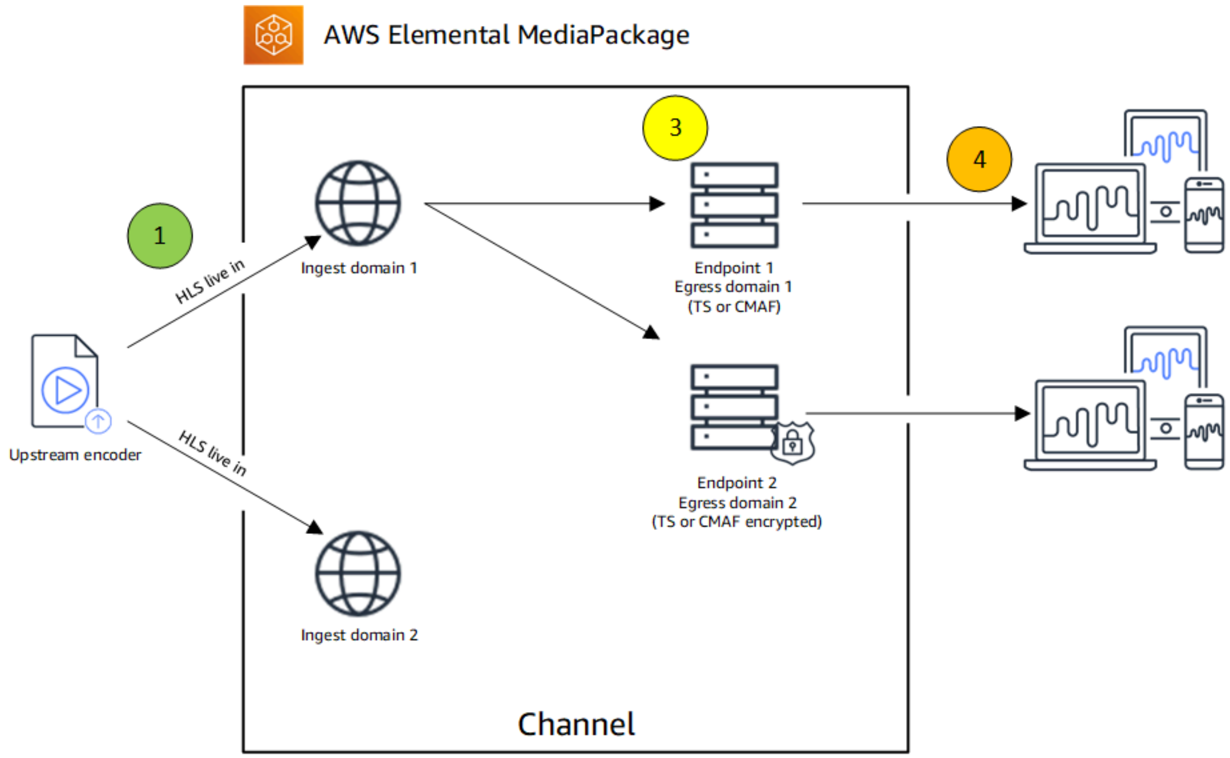
   > **Note**
   >
   > To permit support for features like time-shifted viewing, MediaPackage stores all received content for a limited time. This stored content is only available for playback if it falls within the **startover window** that's defined on the endpoint. Stored content isn't available for playback if it's outside the startover window, or if you haven't defined a window on the endpoint. For more information, see Time-shifted viewing with AWS Elemental MediaPackage.

2. A downstream device requests content from MediaPackage through the endpoint egress domain. A downstream device is either a video player or a CDN. The egress domain is associated with a channel group and an endpoint for a specific streaming format (either TS or CMAF).
3. When MediaPackage receives the playback request from the downstream device, it dynamically packages the stream according to the settings that you specified on the origin endpoint. Packaging can include adding encryption and configuring audio, video, and subtitles or captions track outputs.

4. MediaPackage delivers the output stream over HTTPS to the requesting device. As with input, AWS scales resources up and down to handle changes in traffic.

Throughout the content input and output processes, MediaPackage detects and mitigates potential infrastructure failures before they become a problem for viewers.

The following illustration shows the overall process.



Live input redundancy AWS Elemental MediaPackage processing flow

Achieve input redundancy in AWS Elemental MediaPackage by sending two streams to separate ingest domains on a channel in MediaPackage. One of the streams becomes the primary, active source of content for the endpoints, while the other continues to passively receive content. If MediaPackage stops receiving content from the active stream, it switches over to the other ingest stream so that content playback isn't interrupted.

If you use MediaPackage with AWS Elemental MediaLive (for example), here's the flow of input redundancy:

1. You create a channel group in MediaPackage, as described in Creating a channel group in AWS Elemental MediaPackage. When MediaPackage provisions the channel group, it creates an egress domain for all channels and origin endpoints within the channel group.

2. You create a channel within the channel group as described in Creating a channel in AWS Elemental MediaPackage. When MediaPackage provisions the channel, it creates two ingest domains for the channel. If you're not using input redundancy, you can send a stream to either ingest domain. There's no requirement that you send content to both domains.
3. You create an origin endpoint within the channel as described in Creating an origin endpoint in AWS Elemental MediaPackage.

> ⚠ **Important**
>
> If you use short output segments, depending on your playback device, you might see buffering when MediaPackage switches inputs. You can reduce buffering by using the time delay feature on the endpoint. Be aware that using a time delay introduces latency to end-to-end delivery of the content. For information about enabling time delay, see Creating an origin endpoint in AWS Elemental MediaPackage.

4. You create an input and channel in AWS Elemental MediaLive, and you add a MediaPackage output group to the channel in MediaLive. For more information, see Creating a Channel from Scratch in the *AWS Elemental MediaLive User Guide*.

   If you use an HLS output group in AWS Elemental MediaLive, the input loss action on the HLS group's settings must be set to pause the output if the service doesn't receive input. If MediaLive sends a black frame or some other filler frame when it's missing input, then MediaPackage can't tell when segments are missing, and subsequently can't perform failover. For more information about setting the input loss action in MediaLive, see Fields for the HLS Group in the *AWS Elemental MediaLive User Guide*.

> ⚠ **Important**
>
> If you use a different encoder (not AWS Elemental MediaLive) and you send two separate streams to the same channel in MediaPackage, the streams must have identical encoder settings and manifest names. Otherwise, input redundancy might not work correctly and playback could be interrupted if the inputs switch.

5. You start the channel in AWS Elemental MediaLive to send the streams to MediaPackage.
6. MediaPackage receives content on both of the ingest URLs, but only one of the streams is used for source content at a time. If the active stream is missing any segments, then MediaPackage

automatically fails over to the other stream. MediaPackage continues to use this stream until failover is needed again.

The formula that's used to determine if an input is missing segments is based on the segment lengths on the inputs and the endpoints. If an input is missing segments and quickly recovers, an endpoint with longer segment lengths won't switch inputs. This might result in different endpoints on the channel using different inputs (if one endpoint switches and the other doesn't). This is expected behavior and should not affect the content workflow.

Supported features of AWS Elemental MediaPackage

MediaPackage supports the following features.

Audio

MediaPackage supports multi-language audio inputs and the following audio codecs:

- AAC stereo
- Dolby AC3 and E-AC3 (Dolby Digital and Dolby Digital+)

MediaPackage accepts these codecs from the input source and passes them through to the output stream.

> ⚠ **Important**
>
> MediaPackage doesn't support audio-only inputs. The stream configuration from the encoder must include at least one video track.

Captions

Your embedded source captions can be CEA-608 captions, CEA-708 captions, or both CEA-608 and CEA-708. MediaPackage will pass through these captions in the media segments on TS and CMAF origin endpoints, and generate the appropriate manifest signaling.

> ⚠ **Important**
>
> Your input HLS playlist must include captions signaling tags. If not present, MediaPackage will not be able to generate the corresponding output manifest signaling.

DRM

MediaPackage supports content protection through digital rights management (DRM). For information, see Content encryption and DRM in AWS Elemental MediaPackage.

HLS Rendition Groups

MediaPackage supports rendition groups for incoming and outgoing HLS content. For information about output rendition groups, see AWS Elemental MediaPackage rendition groups reference.

Input Redundancy

Input redundancy is available with only live workflows in MediaPackage.

MediaPackage creates two ingest URLs on every channel group so that you can create input redundancy by sending two identical streams to the same channel. For information about how input redundancy works, see Live input redundancy AWS Elemental MediaPackage processing flow.

Low-latency streaming

MediaPackage supports Apple low-latency HLS, which is a technology aimed at reducing the delay between the time content is captured and the time it is displayed on the viewer's screen. The goal is to achieve minimal end-to-end delay (or "glass-to-glass" delay) by using techniques such as parallel delivery and reduced buffering. This technology enables a more seamless and immersive real-time viewing experience for users, particularly in applications such as live video streaming, teleconferencing, and online gaming.

Subtitles

MediaPackage supports input WebVTT text-based subtitles and passes through the subtitles.

Time-shift Viewing

Time-shift viewing is available with only live workflows in MediaPackage.

MediaPackage supports playback of a stream at a time earlier than the current time. Start-over, catch-up TV, and time delay are all supported. For more information about setting up time-shift capabilities, see Time-shifted viewing with AWS Elemental MediaPackage.

Video

MediaPackage supports the input H.264 video codec and passes it through to the output stream. CMAF endpoints in MediaPackage also support H.265/HEVC and HDR-10, following the Apple specification to applicable playback devices.

> ⚠ **Important**
>
> MediaPackage requires at least one video track to be present in the stream configuration from the encoder. The service doesn't support audio-only ingest.

Services related to AWS Elemental MediaPackage

You might use the following services when using MediaPackage.

- **Amazon CloudWatch** is a monitoring service for AWS Cloud resources and the applications that you run on AWS. Use CloudWatch to track metrics such as content input and output request counts. For more information, see Amazon CloudWatch.
- **AWS Elemental MediaLive (MediaLive)** is a live video processing service that encodes high-quality live video streams for broadcast television and multi-screen devices. Use MediaLive to encode content streams and send them to MediaPackage for packaging. For more information about how encoders (such as MediaLive) work with MediaPackage, see How MediaPackage works.
- **AWS Elemental MediaTailor (MediaTailor)** is a scalable ad insertion service that runs in the AWS Cloud. Use MediaTailor to serve targeted ads to viewers. For more information, see AWS Elemental MediaTailor.
- **AWS Identity and Access Management (IAM)** is a web service that helps you securely control access to AWS resources for your users. Use IAM to control who can use your AWS resources (authentication) and what resources users can use in which ways (authorization). For more information, see *Setting up MediaPackage*.

Accessing MediaPackage

You can access MediaPackage using any of the following methods.

- **AWS Management Console** - The procedures throughout this guide explain how to use the AWS Management Console to perform tasks for MediaPackage.

```
https://console.aws.amazon.com/mediapackage/
```

- **AWS Command Line Interface** - For more information, see the AWS Command Line Interface User Guide.

```
aws mediapackagev2
```

- **MediaPackage API** - For information about API actions and about how to make API requests, see the AWS Elemental MediaConnect API Reference.

```
https://mediapackagev2.region.amazonaws.com
```

- **AWS SDKs** - If you're using a programming language that AWS provides an SDK for, you can use an SDK to access MediaPackage. SDKs simplify authentication, integrate easily with your development environment, and provide easy access to MediaPackage commands. For more information, see Tools for Amazon Web Services.
- **AWS Tools for Windows PowerShell** - For more information, see the AWS Tools for Windows PowerShell User Guide.

Pricing for MediaPackage

As with other AWS products, there are no contracts or minimum commitments for using MediaPackage. You're charged only for AWS resources that your account uses. Pricing is pay-as-you-go and consists of the following:

- A per GB charge for received content
- A per GB charge for content that's streamed out of MediaPackage

  Content that's cached and served from a content delivery network (CDN) doesn't incur this per GB charge.

For detailed pricing information, see MediaPackage Pricing.

Regions for MediaPackage

To reduce latency in your applications, MediaPackage offers a regional endpoint for your requests. To view the list of AWS Regions where MediaPackage is available, see MediaPackage Regions.

AWS opt-in Regions

Although most AWS Regions are active by default for your AWS account, certain Regions are activated only when you manually select them. This document refers to those Regions as *opt-in Regions*. In contrast, Regions that are active by default, as soon as your AWS account is created, are referred to as *commercial Regions*, or simply, *Regions*.

The term *opt-in* has a historical basis. Any AWS Regions introduced after March 20, 2019 are considered to be opt-in Regions. Opt-in Regions have higher security requirements than commercial Regions, regarding the sharing of IAM data through accounts that are active in opt-in Regions. All of the data managed through the IAM service is considered identity data, including users, groups, roles, policies, identity providers, their associated data (for example, X.509 signing certificates or context-specific credentials), and other account-level settings, such as password policy and the account alias.

You can activate opt-in Regions automatically during channel setup, by selecting them. Your channel becomes active in all selected Regions.

If you choose to select an opt-in Region as for your MediaPackage resources, enable it first by following the steps in Enabling a Region, when signed in to the AWS Management Console.

MediaPackage is available in the following AWS opt-in Regions:

- Middle East (UAE) Region, me-central-1
- Asia Pacific (Hyderabad) Region, ap-south-2
- Asia Pacific (Melbourne) Region, ap-southeast-4

Setting up MediaPackage

This section provides procedures to set up your organization to use AWS Elemental MediaPackage. It also providers information about determining the IAM permissions that users and other AWS identities require. These permissions let you impose restricted controls on users and other AWS identities, in conformance with the security policies and procedures of your organization.

Topics

- Signing up for AWS
- Set up additional IAM permissions
- Allowing MediaPackage to access other AWS services
- Download tools

Signing up for AWS

Topics

- Sign up for an AWS account
- Create a user with administrative access

Sign up for an AWS account

If you do not have an AWS account, complete the following steps to create one.

To sign up for an AWS account

1. Open https://portal.aws.amazon.com/billing/signup.
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.

   When you sign up for an AWS account, an *AWS account root user* is created. The root user has access to all AWS services and resources in the account. As a security best practice, assign administrative access to a user, and use only the root user to perform tasks that require root user access.

AWS sends you a confirmation email after the sign-up process is complete. At any time, you can view your current account activity and manage your account by going to https://aws.amazon.com/ and choosing **My Account**.

Create a user with administrative access

After you sign up for an AWS account, secure your AWS account root user, enable AWS IAM Identity Center, and create an administrative user so that you don't use the root user for everyday tasks.

Secure your AWS account root user

1. Sign in to the AWS Management Console as the account owner by choosing **Root user** and entering your AWS account email address. On the next page, enter your password.

   For help signing in by using root user, see Signing in as the root user in the *AWS Sign-In User Guide*.

2. Turn on multi-factor authentication (MFA) for your root user.

   For instructions, see Enable a virtual MFA device for your AWS account root user (console) in the *IAM User Guide*.

Create a user with administrative access

1. Enable IAM Identity Center.

   For instructions, see Enabling AWS IAM Identity Center in the *AWS IAM Identity Center User Guide*.

2. In IAM Identity Center, grant administrative access to a user.

   For a tutorial about using the IAM Identity Center directory as your identity source, see Configure user access with the default IAM Identity Center directory in the *AWS IAM Identity Center User Guide*.

Sign in as the user with administrative access

- To sign in with your IAM Identity Center user, use the sign-in URL that was sent to your email address when you created the IAM Identity Center user.

For help signing in using an IAM Identity Center user, see Signing in to the AWS access portal in the *AWS Sign-In User Guide*.

Assign access to additional users

1. In IAM Identity Center, create a permission set that follows the best practice of applying least-privilege permissions.

   For instructions, see Create a permission set in the *AWS IAM Identity Center User Guide*.
2. Assign users to a group, and then assign single sign-on access to the group.

   For instructions, see Add groups in the *AWS IAM Identity Center User Guide*.

Set up additional IAM permissions

By default, users and roles don't have permission to create or modify MediaPackage resources. They also can't perform tasks by using the AWS Management Console, AWS Command Line Interface (AWS CLI), or AWS API. To grant users permission to perform actions on the resources that they need, an IAM administrator can create IAM policies. The administrator can then add the IAM policies to roles, and users can assume the roles.

To learn how to create an IAM identity-based policy by using these example JSON policy documents, see Create IAM policies (console) in the *IAM User Guide*.

For details about actions and resource types defined by MediaPackage, including the format of the ARNs for each of the resource types, see Actions, resources, and condition keys for AWS Elemental MediaPackage in the *Service Authorization Reference*.

This section describes the permissions that you must assign to users and other AWS identities so that they can work with MediaPackage and other AWS services that your workflows use. After you have identified the required permissions, you will be able to design and create the relevant policies, and attach those policies to groups of users or to roles.

This section assumes that you have already performed these tasks:

- You have signed up for MediaPackage and created an administrator.
- You have read the recommendations in Identity and Access Management for AWS Elemental MediaPackage about how to create administrators, users, and other AWS identities.

Topics

Create a role in the IAM console

Create a role in the IAM console for each policy that you create. This allows users to assume a role rather than attaching individual policies to each user.

To create a role in the IAM console

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. Under **Select trusted entity**, choose **AWS account**.
4. Under **An AWS account**, select the account with the users that will be assuming this role.
    - If a third-party will be accessing this role, it's best practice to select **Require external ID**. For more information about external IDs, see Using an external ID for third-party access in the *IAM User Guide*.
    - It's best practice to require multi-factor authentication (MFA). You can select the check box next to **Require MFA**. For more information about MFA, see Multi-factor authentication (MFA) in the *IAM User Guide*.
5. Choose **Next**.
6. Under **Permissions policies**, search for and add the policy with the appropriate MediaPackage permissions level.
    - For access to live functionality, choose one of the following options:
        - Use **AWSElementalMediaPackageFullAccess** to allow the user to perform all actions on all live resources in MediaPackage.
        - Use **AWSElementalMediaPackageReadOnly** to provide the user read-only rights for all live resources in MediaPackage.

7. Add policies to allow the MediaPackage console to make calls to Amazon CloudWatch on the user's behalf. Without these policies, the user is able to use the service's API only (not the console). Choose one of the following options:

   - Use **ReadOnlyAccess** to allow MediaPackage to communicate with CloudWatch, and also provide the user read-only access to all AWS services on your account.
   - Use **CloudWatchReadOnlyAccess**, **CloudWatchEventsReadOnlyAccess**, and **CloudWatchLogsReadOnlyAccess** to allow MediaPackage to communicate with CloudWatch, and limit the user's read-only access to CloudWatch.

8. (Optional) Set a permissions boundary. This is an advanced feature that is available for service roles, but not service-linked roles.

   1. Expand the **Permissions boundary** section and choose **Use a permissions boundary to control the maximum role permissions**. IAM includes a list of the AWS managed and customer managed policies in your account.
   2. Select the policy to use for the permissions boundary or choose **Create policy** to open a new browser tab and create a new policy from scratch. For more information, see Creating IAM policies in the *IAM User Guide*.
   3. After you create the policy, close that tab and return to your original tab to select the policy to use for the permissions boundary.

9. Verify that the correct policies are added to this group, and then choose **Next**.

10. If possible, enter a role name or role name suffix to help you identify the purpose of this role. Role names must be unique within your AWS account. They are not distinguished by case. For example, you cannot create roles named both **`PRODROLE`** and **`prodrole`**. Because various entities might reference the role, you cannot edit the name of the role after it has been created.

11. (Optional) For **Description**, enter a description for the new role.

12. Choose **Edit** in the **Step 1: Select trusted entities** or **Step 2: Select permissions** sections to edit the use cases and permissions for the role.

13. (Optional) Add metadata to the user by attaching tags as key-value pairs. For more information about using tags in IAM, see Tagging IAM resources in the *IAM User Guide*.

14. Review the role and then choose **Create role**.

Assume the role from the IAM console or AWS CLI

View the following resources for learning about granting permissions for users to assume the role and how users can switch to the role from the IAM console or AWS CLI.

- For more information about granting a user permissions to switch roles, see Granting a user permissions to switch roles in the *IAM User Guide*.
- For more information about switching roles (console), see Switching to a role (console) in the *IAM User Guide*.
- For more information about switching roles (AWS CLI), see Switching to an IAM role (AWS CLI) in the *IAM User Guide*.

Add permissions for tagging

When users create channel groups, channels, or origin endpoints, they can optionally attach tags to the resource during creation. Typically, your organization has a policy to tag or to omit tags. There are two services that control permissions for tagging, for two different scenarios:

- The ability to tag during channel creation is controlled by actions within MediaPackage.
- The ability to modify tags in existing resources is controlled by actions within Resource Group Tagging. See Working with Tag Editor in Getting Started with the AWS Management Console.

Allowing MediaPackage to access other AWS services

Some features require you to allow MediaPackage to access other AWS services, such as Amazon S3 and AWS Secrets Manager (Secrets Manager). To allow this access, create an IAM role and policy with the appropriate permissions. The following steps describe how to create roles and policies for MediaPackage features.

Topics

Step 1: Create a policy

The IAM policy defines the permissions that AWS Elemental MediaPackage (MediaPackage) requires to access other services.

- For live-to-VOD workflows, create a policy that allows MediaPackage to read from the Amazon S3 bucket and store the live-to-VOD asset in it.

The following sections describe how to create these policies.

Topics

- Policy for live-to-VOD workflows

Policy for live-to-VOD workflows

If you use MediaPackage to harvest a live-to-VOD asset from a live stream, you need a policy that allows you to do these things in Amazon S3:

- `PutObject`: MediaPackage can save the VOD asset in the bucket.
- `GetBucketLocation`: MediaPackage can retrieve the Region for the bucket. The bucket must be in the same AWS Region as the MediaPackage VOD resources.

To use the JSON policy editor to create a policy

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 on the left, choose **Policies**.

   If this is your first time choosing **Policies**, the **Welcome to Managed Policies** page appears. Choose **Get Started**.
3. At the top of the page, choose **Create policy**.
4. In the **Policy editor** section, choose the **JSON** option.
5. Enter the following JSON policy document:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Action": [
                "s3:PutObject",
                "s3:ListBucket",
                "s3:GetBucketLocation"
            ],
            "Resource": [
                "arn:aws:s3:::bucket_name/*",
                "arn:aws:s3:::bucket_name"
            ],
            "Effect": "Allow"
        }
    ]
}
```

6. Choose **Next**.

> **Note**
>
> You can switch between the **Visual** and **JSON** editor options anytime. However, if you make changes or choose **Next** in the **Visual** editor, IAM might restructure your policy to optimize it for the visual editor. For more information, see Policy restructuring in the *IAM User Guide*.

7. On the **Review and create** page, enter a **Policy name** and a **Description** (optional) for the policy that you are creating. Review **Permissions defined in this policy** to see the permissions that are granted by your policy.

8. Choose **Create policy** to save your new policy.

Step 2: Create a role

An IAM role is an IAM identity that you can create in your account that has specific permissions. An IAM role is similar to an IAM user in that it is an AWS identity with permissions policies that determine what the identity can and cannot do in AWS. However, instead of being uniquely associated with one person, a role is intended to be assumable by anyone who needs it. Also, a role does not have standard long-term credentials such as a password or access keys associated with it. Instead, when you assume a role, it provides you with temporary security credentials for your role session. Create a role that AWS Elemental MediaPackage assumes when ingesting source content from Amazon S3.

When you create the role, you choose Amazon Elastic Compute Cloud (Amazon EC2) as the trusted entity that can assume the role because MediaPackage isn't available for selection. In Step 3: Modify the trust relationship, you change the trusted entity to MediaPackage.

For information about creating a service role, see Creating a Role to Delegate Permissions to an AWS Service in the *IAM User Guide*.

Step 3: Modify the trust relationship

The trust relationship defines what entities can assume the role that you created in the section called “Step 2: Create a role”. When you created the role and established the trusted relationship, you chose Amazon EC2 as the trusted entity. Modify the role so that the trusted relationship is between your AWS account and AWS Elemental MediaPackage.

To change the trust relationship to MediaPackage

1. Access the role that you created in Step 2: Create a role.

   If you're not already displaying the role, in the navigation pane of the IAM console, choose **Roles**. Search for and choose the role that you created.
2. On the **Summary** page for the role, choose **Trust relationships**.
3. Choose **Edit trust relationship**.
4. On the **Edit Trust Relationship** page, in the **Policy Document**, change `ec2.amazonaws.com` to `mediapackage.amazonaws.com`.

   The policy document should now look like this:

   ```
   {
     "Version": "2012-10-17",
     "Statement": [
       {
         "Sid": "",
         "Effect": "Allow",
         "Principal": {
           "Service": "mediapackage.amazonaws.com"
         },
         "Action": "sts:AssumeRole"
       }
     ]
   }
   ```

If you're using MediaPackage and related services in an opt-in Region, the Region must be listed in the `Service` section of the policy document. For example, if you're using services in the Asia Pacific (Melbourne) Region, the policy document looks like this:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "",
      "Effect": "Allow",
      "Principal": {
        "Service": "mediapackage.amazonaws.com","mediapackage.ap-
southeast-4.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

For a list of opt-in Regions, see AWS opt-in Regions.

5. Choose **Update Trust Policy**.
6. On the **Summary** page, make a note of the value in **Role ARN**. You use this ARN when you ingest source content for video on demand (VOD) workflows. The ARN looks like this:

   `arn:aws:iam::`*`111122223333`*`:role/`*`role-name`*

   In the example, *111122223333* is your AWS account number.

Download tools

The AWS Management Console includes a console for MediaPackage, but if you want to access the services programmatically, see the following:

- The API guides document the operations that the services support and provide links to the related SDK and CLI documentation:
  - AWS Elemental MediaPackage API Reference
- To call an API without having to handle low-level details like assembling raw HTTP requests, you can use an AWS SDK. The AWS SDKs provide functions and data types that encapsulate the

functionality of AWS services. To download an AWS SDK and access installation instructions, see the applicable page:

  - Go
  - JavaScript
  - .NET
  - Node.js
  - Python
  - Ruby

  For a complete list of AWS SDKs, see Tools for Amazon Web Services.

- You can use the AWS Command Line Interface (AWS CLI) to control multiple AWS services from the command line. You can also automate your commands using scripts. For more information, see AWS Command Line Interface.
- AWS Tools for Windows PowerShell supports these AWS services. For more information, see AWS Tools for PowerShell Cmdlet Reference.

Getting started with AWS Elemental MediaPackage

This tutorial describes how to get started with MediaPackage, using the console to create a channel and endpoints for streaming live videos.

Topics

Prerequisites

Before you can use MediaPackage, you need an AWS account and the appropriate permissions to access, view, and edit MediaPackage components. Make sure that your system administrator has completed the steps in Setting up MediaPackage, and then return to this tutorial.

For supported live inputs and codecs, see Supported inputs and outputs.

Step 1: Access MediaPackage

Using your IAM credentials, sign in to the AWS Elemental MediaPackage console:

```
https://console.aws.amazon.com/mediapackage/
```

Step 2: Create a channel group

A channel group is the top-level resource that streamlines the organization of multiple channels and origin endpoints associated with it.

To create a channel group

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.

2. On the **Channel groups** page, choose **Create channel group**.
3. Enter a unique name that describes the channel group and, optionally, a description.
4. Choose **Create**.

   MediaPackage displays the new channel group's details page.

Step 3: Create a channel

The channel represents the input to MediaPackage for incoming live content from an encoder such as AWS Elemental MediaLive. The channel receives content, and after packaging it, outputs it through an endpoint to downstream devices (such as video players or CDNs) that request the content.

MediaPackage does not require that you supply any customer data. There are no fields in channels where there is an expectation that you will provide customer data.

To create a channel

1. Access the channel group that the channel will be associated with.
2. In the **Channel group details** page, under **Channels**, choose **Create channel**.
3. Enter a unique name that describes the channel and, optionally, a description.
4. Choose your channel's IAM policy that defines the permissions of your channel.
5. Choose **Create**.

   MediaPackage displays the new channel's details page. The channel is active and can start receiving content as soon as it's created.

Step 4: Create an endpoint

The endpoint is attached to a channel, and represents the output of the live content. You can associate multiple endpoints to a single channel. Each endpoint gives players and downstream CDNs (such as Amazon CloudFront) access to the content for playback.

To create an endpoint

1. On the **Channels** page, choose the channel that the endpoint will be associated with.
2. On the details page for the channel, under **Origin endpoints**, choose **Create endpoint**.

3. Enter a unique name that describes the endpoint and, optionally, a description.
4. Choose the container type and define the corresponding settings.
5. Choose your origin endpoint's IAM policy that defines the permissions of your endpoint.
6. Define the manifests emitted from the origin endpoint.
7. Choose **Save**.

   MediaPackage displays the channel's details page, including the endpoint that you just created.

Step 5: Clean up

To avoid extraneous charges, be sure to delete all unnecessary channel groups, channels, and endpoints. You must delete the channels and endpoints before you can delete the channel group.

1. Delete the endpoint as described in Deleting an endpoint in AWS Elemental MediaPackage.
2. Delete a channel as described in Deleting a channel in AWS Elemental MediaPackage.
3. Delete the channel group as described in Deleting a channel group from AWS Elemental MediaPackage.

Access control best practices for AWS Elemental MediaPackage

MediaPackage provides a variety of security features and tools. The following topics describe some tools and settings that you might want to use to help control access when performing certain tasks or operating in specific environments. Proper application of these tools can help maintain the integrity of your data and help ensure that your resources are accessible to the intended users.

Topics

Creating new resources

When creating new resources, you should apply the following tools and settings to help ensure that your MediaPackage resources are protected.

Grant access with IAM identities

When setting up accounts for new team members who require MediaPackage access, use IAM users and roles to ensure least privileges. You can also implement a form of IAM multi-factor authentication (MFA) to support a strong identity foundation. Using IAM identities, you can grant unique permissions to users and specify what resources they can access and what actions they can take. IAM identities provide increased capabilities, including the ability to require users to enter login credentials before accessing shared resources and apply permission hierarchies to different objects within a single bucket.

For more information, see Identity and Access Management for AWS Elemental MediaPackage.

Resource policies

With resource policies, you can personalize channel and origin endpoint access to help ensure that only those users you have approved can access resources and perform actions within them. In addition to resource policies, you should use resource-level Block Public Access settings to further limit public access to your data.

For more information, see Resource-based policy examples.

When creating policies, avoid the use of wildcard characters in the `Principal` element because it effectively allows anyone to access your MediaPackage resources. It's better to explicitly list users or groups that are allowed to access the resource. Rather than including a wildcard for their actions, grant them specific permissions when applicable.

To further maintain the practice of least privileges, `Deny` statements in the `Effect` element should be as broad as possible and `Allow` statements should be as narrow as possible. `Deny` effects paired with the "`mediapackagev2:*`" action are another good way to implement opt-in best practices for the users included in policy condition statements.

Sharing resources

There are several different ways that you can share resources with a specific group of users. You can use the following tools to share a set of documents or other resources to a single group of users, department, or an office. Although they can all be used to accomplish the same goal, some tools might pair better than others with your existing settings.

User policies

You can share resources with a limited group of people using IAM groups and user policies. When creating a new IAM user, you are prompted to create and add them to a group. However, you can create and add users to groups at any point. If the individuals you intend to share these resources with are already set up within IAM, you can add them to a common group and share the bucket with their group within the user policy. You can also use IAM user policies to share individual objects within a bucket.

For more information, see Identity-based policy examples for MediaPackage.

Tagging

If you use object tagging to categorize storage, you can share objects that have been tagged with a specific value with specified users. Resource tagging allows you to control access to objects based on the tags associated with the resource that a user is trying to access. To do this, use the `ResourceTag/key-name` condition within an IAM user policy to allow access to the tagged resources.

For more information, see Controlling access to AWS resources using resource tags in the *IAM User Guide*.

Protecting data

Use the following tools to help protect data in transit and at rest, both of which are crucial in maintaining the integrity and accessibility of your data.

Signing methods

AWS Signature Version 4 is the process of adding authentication information to AWS requests sent by HTTP. For security, most requests to AWS must be signed with an access key, which consists of an access key ID and secret access key. These two keys are commonly referred to as your security credentials. For more information, see Authenticating Requests (AWS Signature Version 4) and Signing AWS API requests in the *IAM User Guide*.

Delivering live content from AWS Elemental MediaPackage

AWS Elemental MediaPackage uses the following resources for live content:

- A *channel group* is the top-level resource that consists of channels and origin endpoints that are associated with it and that provides predictable URLs for stream delivery. All channels and origin endpoints within the channel group are guaranteed to share the DNS.
- A *channel* is the entry point for your live streams from upstream encoders.

  For supported live inputs and codecs, see Supported inputs and outputs.
- An *origin endpoint* tells MediaPackage how to package outbound content. Endpoints are associated with channels and hold encryption, stream, and packaging settings.

The following sections describe how to use these resources to manage live content in MediaPackage.

Topics

Working with channel groups in AWS Elemental MediaPackage

A channel group is the top-level resource that consists of channels and origin endpoints associated with it. After you create a channel group, MediaPackage provides a fixed egress domain for its lifetime, regardless of any failures or upgrades that might occur. All channels and origin endpoints belonging to this channel group use the same egress domain. Direct your CDNs to this domain for stream delivery from MediaPackage.

For each channel group, you add channels that define the entry point for a content stream into MediaPackage. You then add origin endpoints to the channels that define the packaging options for the output stream.

Topics

- Creating a channel group in AWS Elemental MediaPackage
- Viewing channel group details in AWS Elemental MediaPackage
- Editing a channel group in AWS Elemental MediaPackage
- Deleting a channel group from AWS Elemental MediaPackage

Creating a channel group in AWS Elemental MediaPackage

This guide shows how to create a channel group as a holder for your channels and origin endpoints. You can provide high-level information about your channel group and can add a certain number of channel groups for each account. After you create a channel group, you can add channels to the channel group.

You can use the MediaPackage console, MediaPackage API, or AWS Command Line Interface (AWS CLI) to create a channel group. When you're creating a channel group, don't put sensitive identifying information like customer account numbers into free-form fields such as the name or description field. MediaPackage doesn’t require that you supply any customer data. This includes when you work with MediaPackage using the MediaPackage console, MediaPackage API, AWS CLI, or AWS SDKs. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or Amazon CloudWatch Events.

To create a channel group

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Choose **Create channel group** from the **Channel groups** list.
3. For **Name**, enter a name that describes the channel group. This is the name that you use for API and console interactions. The name is the primary identifier for the channel group, and must be unique for your account in the AWS Region. Supported characters are **A-Z**, **a-z**, **0-9**, **_** (underscore), and **-** (hyphen) with a length of 1–256 characters. You can't use spaces in the name, and you can't change the name after you create the channel group.
4. (Optional) For **Description**, enter any descriptive text that helps you to identify the channel group.
5. Choose **Create**.

   MediaPackage displays the new channel group's details page.

After you create a channel group, MediaPackage provides an egress domain URL that is fixed for the lifetime of the channel group. This domain remains regardless of any failures or upgrades that might happen over time.

All channels and origin endpoints that belong to this channel group will use the same domain URL. For stream delivery from MediaPackage, direct your CDNs to this domain.

When you create a channel group, if you exceed the quotas on the account, you'll receive an error. The error will be similar to Too many requests, please try again. Resource limit exceeded. This error means that either you exceeded the API request quotas, or that you reached the maximum number of channel groups that your account permits.

You can add channels to a channel group to do the following:

- Permit a live content stream from a source such as AWS Elemental MediaLive or another encoder.
- Permit downstream video players and content delivery networks (CDNs) to start requesting content playback.

For instructions on adding channels to a channel group from the MediaPackage console, see the section called “Working with channels”.

Viewing channel group details in AWS Elemental MediaPackage

This guide shows how to view all channel groups that are configured in AWS Elemental MediaPackage. You can also view the details of a specific channel group. This includes the channels and origin endpoints that are associated with it. You can use the MediaPackage console, MediaPackage API, or AWS CLI to view channel group details.

To view a channel group

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.

   The console shows all existing channel groups that are configured in MediaPackage.
2. (Optional) To adjust your viewing preferences, choose **Preferences**. For example, you can adjust the page size and properties that you want to view.
3. To view more information about a specific channel group, select that channel group from the **Channel groups** list.

MediaPackage displays important information such as the values for egress domain, when the channel group was created, the ARN, and any channels that are associated with the channel group.

Editing a channel group in AWS Elemental MediaPackage

This guides shows how to edit the description on a channel group for easier identification later from the AWS Elemental MediaPackage console. You can't edit the name of the channel group.

You can use the MediaPackage console, MediaPackage API, or AWS CLI to edit a channel group. When you're editing a channel group, don't put sensitive identifying information like customer account numbers into free-form fields such as the name or description field. MediaPackage doesn’t require that you supply any customer data. This includes when you work with MediaPackage using the MediaPackage console, MediaPackage API, AWS CLI, or AWS SDKs. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or Amazon CloudWatch Events.

To edit a channel group

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.

   The console shows all existing channel groups that are configured in MediaPackage.
2. Select the name of the channel group that you want to edit.
3. On the channel group's details page, choose **Edit**.
4. Edit the description for easier identification later.
5. Choose **Edit**.

Deleting a channel group from AWS Elemental MediaPackage

This guides shows how to delete a channel group to stop AWS Elemental MediaPackage from receiving content. Before you can delete the channel group, you must delete the channel group's channels and endpoints. For instructions, see Deleting a channel in AWS Elemental MediaPackage and Deleting an endpoint in AWS Elemental MediaPackage. You can use the MediaPackage console, MediaPackage API, or AWS CLI to delete a channel group.

⚠ **Warning**

If you delete a channel group, you'll lose access to the egress domain URL. If that happens, you must create a new channel group to replace it.

To delete a channel group

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.

   The console shows all existing channel groups that are configured in MediaPackage.
2. Select the name of the channel group that you want to delete.
3. Choose **Delete**.
4. Choose **Delete** in the confirmation dialog box.

Working with channels in AWS Elemental MediaPackage

A channel is part of a channel group and represents the entry point for a content stream into MediaPackage. After you create a channel, MediaPackage provides ingest endpoint domains for its lifetime, regardless of any failures or upgrades that might occur.

Upstream encoders such as AWS Elemental MediaLive send content to the channel. When MediaPackage receives a content stream, it packages the content and outputs the stream from an origin endpoint that you create on the channel. Each incoming set of adaptive bitrate (ABR) streams has one channel. A channel group can have multiple channels.

For supported live inputs and codecs, see Supported inputs and outputs.

Topics

Creating a channel in AWS Elemental MediaPackage

This guide shows how to create a channel in MediaPackage to start receiving content streams. Later, you add an origin endpoint to the channel. This endpoint is the access point for content playback requests. We recommend that you spread out channels between channel groups, such as putting redundant channels in the same AWS Region in different channel groups.

You can use the MediaPackage console, MediaPackage API, or AWS CLI to create a channel. When you're creating a channel, don't put sensitive identifying information like customer account numbers into free-form fields such as the name or description field. MediaPackage doesn't require that you supply any customer data. This includes when you work with MediaPackage using the MediaPackage console, MediaPackage API, AWS CLI, or AWS SDKs. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or Amazon CloudWatch Events.

To create a channel

1. Access the channel group that the channel will be associated with, as described in Viewing channel group details in AWS Elemental MediaPackage.
2. Choose **Create channel** from the **Channels** list.
3. For **Name**, enter a name that describes the channel. The name is the primary identifier for the channel, and must be unique for your account in the AWS Region and channel group. Supported characters are **A-Z**, **a-z**, **0-9**, **_** (underscore), and **-** (hyphen) with a length of 1 to 256 characters. You can't use spaces in the name, and you can't change the name after you create the channel.

   The name is the primary identifier for the channel, and it must be unique for your account in the AWS Region and channel group.
4. (Optional) For **Description**, enter descriptive text to help you identify the channel.
5. Choose the **Input type** that you want to use for your channel:

   - **HLS** input type requires your live encoder to produce HLS with TS streams and to ingest it onto MediaPackage using plain HTTP PUT requests.
   - **CMAF** requires your live encoder to follow the DASH-IF Live Media Ingest Protocol version 1.2, producing and ingesting CMAF streams using Interface-1 (CMAF Ingest, described in section 6).

     MediaPackage CMAF Ingest has currently been tested with MediaLive and the AWS Elemental Live encoder. A detailed specification of the MediaPackage encoder requirements for CMAF ingest is available upon request to live-encoder manufacturers who would want to validate interoperability of their solution with MediaPackage CMAF Ingest.

> ⚠ **Important**
>
> Once you will have created your channel, you will not be able to change its input type. Certain features, like cross-region failover support, are available only on channels using CMAF ingest - and more upcoming features will also be available only with CMAF ingest. We advise you to leverage CMAF Ingest if you can.

6. (Optional) If you're using CMAF inputs, make your selections for **Media quality confidence score (MQCS) settings**.

   - To allow MediaPackage to switch inputs based on the quality score from AWS Elemental MediaLive, choose **Enable input switch based on MQCS**.
   - To include the MQCS in the outputs from your endpoints on this channel, choose **Enable MQCS publishing in Common Media Server Data (CMSD)**.

   You can choose one, both, or neither of the settings.

   For information about MQCS, including workflow set up requirements, see Leveraging media quality scores with AWS Elemental MediaPackage. For information about CMSD headers, see CMSD headers from AWS Elemental MediaPackage.

7. Choose your channel's IAM policy settings from the following options:

   - **Don't attach a policy** – Restrict access to only those who have access to this account's credentials.

     Choose this option if you're using AWS Elemental MediaLive in the same account as MediaPackage.
   - **Attach a custom policy** – Define your own policy and restrict access to as few or as many accounts and resources you want. Enter a valid JSON object with the same structure as other IAM policies. The policy should follow the standard security advice of granting least privilege, or granting only the permissions required to perform a task.

     If you're not using MediaLive, choose this option and define your policy.

For more information about policies, see Resource-based policy examples.

8. Choose **Create**.

   MediaPackage displays the new channel's details page.

   After you create a channel, MediaPackage provides two ingest endpoint domain URLs that are fixed for the lifetime of the channel. The channel is active and can start receiving content as soon as it's created. Provide this information for the upstream encoder stream destination settings. MediaPackage dynamically adjusts resources to increase capacity for your traffic.

   If you're using input redundancy and one of the inputs stops sending content, then MediaPackage automatically switches to the other input for the source content. For more information about how input redundancy works, see Live input redundancy AWS Elemental MediaPackage processing flow.

   While you create a channel, if you exceed the quotas on the account, you'll receive an error. The error will be similar to Too many requests, please try again. Resource limit exceeded. This error means that either you exceeded the API request quotas, or that you reached the maximum number of channels that your account permits.

To permit downstream video players and content delivery networks (CDNs) to request content playback from MediaPackage, you must add an origin endpoint to a channel.

For instructions on adding endpoints to a channel from the MediaPackage console, see the section called “Working with endpoints”.

Viewing channel details in AWS Elemental MediaPackage

This guide shows how to view all channels that are configured in AWS Elemental MediaPackage. You can view specific channel details, including the origin endpoints that are associated with it. You can use the MediaPackage console, the AWS Command Line Interface (AWS CLI), or the MediaPackage API to view channel details.

To view a channel

1. Access the channel group that the channel is associated with, as described in Viewing channel group details in AWS Elemental MediaPackage.

The console shows all existing channels that are configured in MediaPackage.

2. (Optional) To adjust your viewing preferences, choose **Preferences**. For example, you can adjust the page size and properties that you want to view.
3. To view more information about a specific channel, select that channel from the **Channels** list.

MediaPackage displays important information such as the values for ingest endpoint domain URLs, ARN, and the channel policy.

Editing a channel in AWS Elemental MediaPackage

This guides shows how to edit the description on a channel in MediaPackage and your channel's policy settings. You can't edit the name of the channel.

You can use the MediaPackage console, MediaPackage API, or AWS CLI to edit a channel. When you're editing a channel, don't put sensitive identifying information like customer account numbers into free-form fields such as the name or description field. MediaPackage doesn’t require that you supply any customer data. This includes when you work with MediaPackage using the MediaPackage console, MediaPackage API, AWS CLI, or AWS SDKs. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or Amazon CloudWatch Events.

To edit a channel

1. Access the channel group that the channel is associated with, as described in Viewing channel group details in AWS Elemental MediaPackage.
2. To edit a specific channel, select that channel from the **Channels** list.
3. On the channel's details page, choose **Edit**.
4. Make the changes that you want.
5. Choose **Update**.

Deleting a channel in AWS Elemental MediaPackage

This guide shows how to delete a channel to stop AWS Elemental MediaPackage from receiving further content. Before you can delete the channel, you must delete the channel's origin endpoints as described in Deleting an endpoint in AWS Elemental MediaPackage. You can use the MediaPackage console, the AWS CLI, or the MediaPackage API to delete a channel.

To delete a channel

1. Access the channel group that the channel is associated with, as described in Viewing channel group details in AWS Elemental MediaPackage.
2. Select the name of the channel that you want to delete.
3. Choose **Delete**.
4. Choose **Delete** in the confirmation dialog box.

Working with origin endpoints in AWS Elemental MediaPackage

An origin endpoint is part of a channel and represents the packaging aspect of MediaPackage. When you create an endpoint on a channel, you indicate what streaming format, packaging parameters, and features the output stream will use. Downstream devices request content from the endpoint. Direct your CDNs to the channel group egress domain for stream delivery from MediaPackage. A channel can have multiple endpoints.

Additionally, the endpoint holds information about digital rights management (DRM) and encryption integration, stream bitrate presentation order, and more.

Topics

Creating an origin endpoint in AWS Elemental MediaPackage

This guides shows how to create an origin endpoint (endpoint) on a channel to define how MediaPackage prepares content for delivery. Content can't be served from a channel until it has an endpoint. If you're using input redundancy, each endpoint receives content from one ingest URL at a time. If MediaPackage performs a failover on the inputs for one ingest input URL, the endpoints automatically start receiving content from the other ingest URL. For more information about input redundancy and failover, see Live input redundancy AWS Elemental MediaPackage processing flow.

You can use the MediaPackage console, MediaPackage API, or AWS CLI to create an origin endpoint. When you're creating an origin endpoint, don't put sensitive identifying information like customer account numbers into free-form fields such as the name or description field. MediaPackage doesn’t require that you supply any customer data. This includes when you work with MediaPackage using the MediaPackage console, MediaPackage API, AWS CLI, or AWS SDKs. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or Amazon CloudWatch Events.

To create an endpoint

1. Access the channel that the endpoint will be associated with, as described in Viewing channel details in AWS Elemental MediaPackage.
2. Choose **Create endpoint** from the **Origin endpoints** list.
3. Complete the fields as described in the following topics:

   - Endpoint settings fields
   - Segment settings fields
   - Encryption fields
   - Endpoint policy fields
   - Manifest fields
4. Choose **Create**.

   When you're creating an endpoint, you will receive an error if you exceed the quotas on the account. An error similar to Too many requests, please try again. Resource limit exceeded means that either you've exceeded the API request quotas, or you've already reached the maximum number of endpoints permitted on this channel.

Endpoint settings fields

The endpoint settings fields hold general information about the endpoint.

1. For **Name**, enter a name that describes the origin endpoint. This is the name that you use for API and console interactions. The name is the primary identifier for the endpoint and must be unique for your account in the AWS Region and channel. Supported characters are **A-Z**, **a-z**, **0-9**, **_** (underscore), and **-** (hyphen) with a length of 1 to 256 characters. You can't use spaces in the name, and you can't change the name after you create the endpoint.
2. (Optional) For **Description**, enter any descriptive text that helps you to identify the origin endpoint.

3. For **Container type**, choose the type of container to attach to this origin endpoint. The container type you choose impacts the segment settings, encryption methods, and manifests you can choose.

   The container type options are:

   - TS (available for HLS and LL-HLS manifests)
   - CMAF (available for HLS, LL-HLS, and DASH manifests)

4. For **Startover window (sec.)**, enter the size of the window (in seconds) to create a window of the live stream that's available for on-demand viewing. Viewers can start-over or catch-up on content that falls within the window. The maximum startover window is 1,209,600 seconds (14 days). For more information about implementing start-over and catch-up TV, see Time-shifted viewing.

   You must define a startover window if you're using some settings in the **Filter configuration** fields in the Manifest fields.

5. For **Force endpoint error configuration**, choose the types of problematic situations where you want MediaPackage to return a 404 response on manifests and segments requests:

   - **Stale Manifests**: MediaPackage stops receiving ingest streams on its input, indicating the encoder or network path have failed. This results in output stale manifests that don’t get updated any more, which results in playback sessions stopping.
   - **Incomplete Manifests**: MediaPackage is receiving ingest segments, but there are gaps in the timeline. This results in manifests presenting an incomplete timeline for some renditions, potentially generating playback problems.
   - **Missing DRM Keys**: MediaPackage was unable to retrieve an encryption key on a key-rotation operation. This results in the old encryption key still being used after the key-rotation time. While it will not affect playback, it could be problematic from a business or content-rights-entitlement perspective.
   - **Slate Input**: MediaPackage detects that the ingest stream(s) are flagged as including a significant proportion of slate contents (black video frames, audio silence). While playback continues, no content will be displayed by the players, which is a valid reason to failover to a different MediaPackage origin.

   When MediaPackage is configured to react to these problems, it will return 404 responses until it can present a consistent timeline in the manifests - meaning that all problematic segments will need to be evicted from the exposed DVR window in the manifest.

⚠ **Important**

Triggering such forced 404 responses is an optional behavior that should be used only if you want to implement CDN-driven failover between multiple MediaPackage origins. For more information on this types of workflow, see Cross-region failover.

Segment settings fields

The segment settings fields hold general information about the segment.

1. For **Segment name**, enter a name that describes the segment. The name is the base name of the segment used in all content manifests inside of the endpoint. Supported characters are **A-Z**, **a-z**, **0-9**, **_** (underscore), and **-** (hyphen) with a length of 1 to 256 characters. You can't use spaces in the name.
2. For **Segment duration (sec.)**, enter the duration (in seconds) of each segment. Enter a value equal to, or a multiple of, the input segment duration. The maximum segment duration is 30 seconds. If the value that you enter is different from the input segment duration, MediaPackage rounds segments to the nearest multiple of the input segment duration.
3. Select **Include IFrame-only stream** to include an additional I-frame only stream along with the other tracks in the manifest. MediaPackage generates an I-frame only stream from the first rendition in the manifest. The service inserts `EXT-I-FRAMES-ONLY` tags in the output manifest, and then generates and includes an I-frames only playlist in the stream. This playlist enables player functionality like fast forward and rewind.
4. For TS containers only, select **Use audio rendition group** to group all audio tracks into a single rendition group. All other tracks in the stream can be used with any audio rendition from the group. For more information about rendition groups, see AWS Elemental MediaPackage rendition groups reference.
5. For TS containers only, select **Include DVB subtitles** to pass through digital video broadcasting (DVB) subtitles into the output. By default, MediaPackage excludes all DVB subtitles from the output.
6. Select **Enable SCTE support** to include SCTE configuration options. If you select this, you can further define your SCTE configuration in additional fields.

7. For **SCTE filtering**, choose the SCTE-35 message types that will be ad markers in the output. If you don't make a selection here, by default, MediaPackage inserts all ad markers in the output manifest.
   - Splice insert
   - Break
   - Provider advertisement
   - Distributor advertisement
   - Provider placement opportunity
   - Distributor placement opportunity
   - Provider overlay placement opportunity
   - Distributor overlay placement opportunity
   - Program

Encryption fields

Protect your content from unauthorized use through content encryption and digital rights management (DRM). MediaPackage uses the AWS Secure Packager and Encoder Key Exchange (SPEKE) API to facilitate content encryption and decryption by a DRM provider. Using SPEKE, the DRM provider supplies encryption keys to MediaPackage through the SPEKE API. The DRM provider also supplies licenses to supported media players for decryption. For more information about how SPEKE is used with services and features running in the cloud, see AWS cloud-based architecture in the *Secure Packager and Encoder Key Exchange API Specification guide*.

> **Note**
>
> To encrypt content, you must have a DRM provider, and be set up to use encryption. For information, see the section called “Content encryption and DRM”.

1. Choose **Encrypt content** to serve content with copyright protection.
2. For **Encryption method**, choose the encryption method to use. If you don't see your preferred encryption method, confirm you choose the correct container type. The encryption method you choose impacts the DRM system providers you can choose. For supported encryption methods and DRM system providers, see Container and DRM system support with SPEKE.
   - The valid encryption methods for TS container types are:

    - AES-128
    - Sample AES
  - The valid encryption methods for CMAF container types are:
    - CENC
    - CBCS

3. For **DRM systems**, choose the DRM system providers you're using to protect your content during distribution. You can choose more than one. If you don't see your DRM system provider, confirm you choose the correct container type and encryption method. For supported DRM system providers, see [Container and DRM system support with SPEKE](#).

   The valid DRM systems for TS container types are:

   - Fairplay (Sample AES only)
   - Clear Key AES-128 (AES-128 only)

   The valid DRM systems for CMAF container types are:

   - PlayReady
   - Widevine
   - Irdeto (CENC only)
   - Fairplay (CBCS only)

4. 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 permit you to use the same ID for two simultaneous encryption processes. The resource ID is also known as the content ID.

   The following example shows a resource ID.

   ```
   MovieNight20171126093045
   ```

5. For **Key server 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 MediaPackage.

   The following example shows a URL.

   ```
   https://1wm2dx1f33.execute-api.us-west-2.amazonaws.com/SpekeSample/copyProtection
   ```

6. For **Role ARN**, enter the Amazon Resource Name (ARN) of the IAM role that provides you access to send your requests through API Gateway. Get this from your DRM solution provider.

   The following example shows a role ARN.

   ```
   "arn:aws:iam::accountID:role/SpekeAccess
   ```

7. For **Video encryption preset** and **Audio encryption preset**, select the preset for encryptiong audio and video. For information about presets, see Encryption presets in AWS Elemental MediaPackage.

8. (Optional) For **Constant initialization vector** enter a 128-bit, 16-byte hex value represented by a 32-character string, used in conjunction with the key for encrypting content. If you don't specify a value, then MediaPackage creates the constant initialization vector (IV).

9. For **Key rotation interval (sec.)**, enter the frequency (in seconds) of key changes for live workflows, in which content is streamed real time. The service retrieves content keys before the live content begins streaming, and then retrieves them as needed over the lifetime of the workflow. By default, key rotation is 300 seconds (5 minutes), the minimum rotation interval, which is equivalent to setting it to `300`. The maximum key rotation interval is 31,536,000 seconds (1 year). If you don't enter an interval, content keys aren't rotated.

   The following example setting causes the service to rotate keys every thirty minutes.

   ```
   1800
   ```

   For information about key rotation, see AWS Elemental MediaPackage key rotation behavior.

Endpoint policy fields

You must assign a channel policy to enable content to flow into your channel from sources outside of your account.

1. Under **Endpoint policy**, choose an endpoint policy to enable content to flow into your channel from sources outside of your account. For more information about policies, see Resource-based policy examples.

   - **Don't attach a policy** - Restrict access to only those who have access to this account's credentials.

- **Attach a custom policy** - Define your own policy and restrict access to as few or as many as you want. Enter a valid JSON object with the same structure as other IAM policies. The policy should follow the standard security advice of granting least privilege, or granting only the permissions required to perform a task.
- **Attach a public policy** - Accept all incoming client requests to a channel's output. Enter a valid JSON object with the same structure as other IAM policies.

Manifest fields

The manifests fields hold general information about the manifest. You must attach at least one manifest to an origin endpoint. You can attach up to twenty five manifests to a single origin endpoint, and request a quota increase if necessary.

Choose the type of manifest to use. You can choose an HLS manifest, LL-HLS manifest, or DASH manifest.

Topics

Create an HLS or LL-HLS manifest

To create an HLS or LL-HLS manifest

1. For **Manifest name** enter a short string that will be appended to the endpoint URL. The manifest name creates a unique path to this endpoint. If you don't enter a value, MediaPackage uses the default manifest name, *index*. MediaPackage automatically inserts the format extension, such as .m3u8. Supported characters are **A-Z**, **a-z**, **0-9**, and **-** (hyphen). You can't use underscores in the name.
2. (Optional) For **Child manifest name** enter a short string that will be appended to the endpoint URL. The child manifest name creates a unique path to this endpoint. Supported characters are **A-Z**, **a-z**, **0-9**, and **-** (hyphen). You can't use underscores in the name.
3. For **Manifest window (sec.)** enter the total duration (in seconds) of the manifest's content. The maximum manifest window is 900 seconds (15 minutes).

4. For **Program date/time interval (sec.)** enter the interval (in seconds) for MediaPackage to insert the EXT-X-PROGRAM-DATE-TIME tags in the manifest. Program date time (PDT) is optional when using HLS manifests, but is required when using low-latency HLS manifests.

   The maximum PDT interval is 1,209,600 seconds (14 days). If you don't enter an interval, EXT-X-PROGRAM-DATE-TIME tags aren't included in the manifest.

   The EXT-X-PROGRAM-DATE-TIME tag holds the time of the segment. When PDT information is available in the source content, MediaPackage uses this same information on the output content. Otherwise, MediaPackage uses Coordinated Universal Time (UTC) for the PDT.

   The PDT information helps downstream players to synchronize the stream to the wall clock, enabling functionality like viewer seek in the playback timeline and time display on the player.

5. Choose **Enable start tag** to insert an EXT-X-START tag in your manifest. Set the offset for when the tag appears, and indicate if this is a precise offset. MediaPackage adds EXT-X-START tags to the output manifest based on your specified offset settings.

   - If the offset is *positive*, it must be less than the configured manifest duration, minus three times the configured segment target duration (in accordance with the HLS specification).
   - If the offset is *negative*, the absolute value must be three times the configured segment target duration and it must be smaller than the configured manifest duration.

6. If you chose **Enable SCTE support**, for **Ad markers**, choose how ad markers are included in the packaged content. If you include ad markers in the content stream in your upstream encoders, then you need to inform MediaPackage what to do with the ad markers in the output. If you don't see this field, select **Enable SCTE support** in the origin endpoint segment settings. Choose from the following options:

   - **Daterange –** Insert EXT-X-DATERANGE tags to signal ads and program transition events in TS and CMAF output manifests. If you choose daterange, you *must* also enter a **Program date/time interval (sec.)** value of 1 or greater.

7. Select **Enable filter configuration** if you want to optionally add filters and settings to modify manifests. These filters apply to all manifests that originate from this endpoint.

   To automatically fill these values from an existing query string, choose **Import from query string**. For example, this string provides the following filters: `aws.manifestfilter=video_codec:h265;audio_language:fr,en-US,de&start=2023-10-20T12:20:50Z&end=2023-10-20T13:20:50Z&time_delay=10`

Filter key `video_codec`, **Filter value** `h265`, **Filter key** `audio_language`, **Filter value** `fr,en-US`, **Start time** `2023-10-20T12:20:50Z`, **End time** `2023-10-20T13:20:50Z`, and **Time delay** `10` seconds.

> **Note**
>
> When you include a Manifest filter, you cannot use matching query parameters for the manifest's endpoint URL. If you do, you will receive a `404` HTTP error code instead. For example, if you include a Manifest filter with a `audio_sample_rate` Filter key and `44100` Filter value, and you make an HTTP request for `https://<example-url>/?aws.manifestfilter=audio_sample_rate:44100`, you will receive a `404` error.

Manifest filter

Optionally specify one or more manifest filters for all of your manifest egress requests.

You enter a **Filter key** and **Filter value** pair for each manifest filter. Your filter values can be a range, single value, or combination of both.

For a list of supported keys and values, see Manifest filtering query parameters.

Start time and End time

Optionally specify the start or end time for all of your manifest egress requests. To use this setting, you must have a startover window defined.

For more information about start and end times, see Start and end parameters.

If you enter a start or end time using the API, or import using **Import from query string** in the MediaPackage console, enter dates in an ISO-8601 format.

Time delay

Optionally specify the time delay (in seconds) for all of your manifest egress requests. To use this setting, you must have a startover window defined.

For more information about using time delays, see Time delay.

Clip start time data and time

When using a time delay, optionally specify the clip start time for all of your manifest egress requests. This option specifies the earliest content that can be included in the manifest. Content ingested before the clip start time will not be included in the manifest. Cannot be used with start time or end time filters. To use this setting, you must have a startover window defined.

For more information about clip start and time delay, see Using clip start with time delay.

> ⚠ **Important**
>
> If you're using this setting to limit content playback for contractual reasons, this parameter should be set at your CDN, and not at the client.

Create a DASH manifest

To create a DASH manifest

1. For **Manifest name**, enter a short string that will be appended to the endpoint URL. The manifest name creates a unique path to this endpoint. If you don't enter a value, MediaPackage uses the default manifest name, *index*. MediaPackage automatically inserts the format extension, such as .mpd. Supported characters are **A-Z**, **a-z**, **0-9**, and **-** (hyphen). You can't use underscores in the name.
2. For **Manifest window (sec.)** enter the total duration (in seconds) of the manifest's content. The maximum manifest window is 900 seconds (15 minutes). You can request a quota increase if necessary.
3. For **Min update period (sec.)**, enter the minimum amount of time (in seconds) that the player should wait before requesting manifest updates. A lower value means that manifests are updated more frequently, but a lower value also contributes to request and response network traffic.
4. For **Min buffer time (sec.)**, enter the minimum amount of time (in seconds) that a player must keep in the buffer. If network conditions interrupt playback, the player will have additional buffered content before playback fails, allowing for recovery time before the viewer's experience is affected.

5. For **Suggested presentation delay (sec.)**, enter the amount of time (in seconds) that the player should be from the end of the manifest. This sets the content start point back x seconds from the end of the manifest (the point where content is live). For example, with a 35-second presentation delay, requests at 5:30 receive content from 5:29:25. When used with time delay, MediaPackage adds the suggested presentation delay to the time delay duration.

6. For **Segment template format**, choose how MediaPackage and playback requests refer to each segment.

   - For **Number with timeline**, MediaPackage uses the `$Number$` variable to refer to the segment in the `media` attribute of the `SegmentTemplate` tag. The value of the variable is the sequential number of the segment. `SegmentTimeline` is included in each segment template.

7. For **UTC timing**, select the method that the player uses to synchronize to coordinated universal time (UTC) wall clock time. This enables the player and MediaPackage to run on the same UTC wall clock time. This is a requirement, otherwise playback timing or synchronization issues can occur. Choose from the following options:

   - UTC Direct
   - HTTP Head
   - HTTP Iso
   - HTTP Xsdate

8. For **UTC timing source**, specify a URI to use for UTC synchronization. This is the URI used to fetch the timing data according to the scheme defined by **UTC timing**. This value is only valid if **UTC timing** is not `NONE` or `UTC DIRECT`. This value will be set as the `@value` attribute for the `UTCTiming` element. For information about `@value`, see DASH, DASH UTC Timing Schemes, 5.8.5.7.

9. For **DASH period triggers**, choose how MediaPackage creates media presentation description (MPD) periods in the DASH output manifest. For more information, see Multi-period DASH in AWS Elemental MediaPackage. Choose from the following options:

   - **Avails** – Avails that pass the `ScteFilter` will create new periods.
   - **DRM key rotation** – Encryption key rotation will create new periods.
   - **Source changes** – Changes in the stream set will create new periods.
   - **Source disruptions** – Gaps in all content streams will create new periods.
   - **None** – MediaPackage formats the manifest as a single period. It doesn't create additional periods, unless DRM settings change.

> **Note**
>
> New periods will always be created on DRM settings changes, independently of the DASH period triggers that you configure.

10. For **Ad markers**, choose how ad markers are signaled in the output manifests. All the non-ad markers that you include in the content stream in your upstream encoders will also be present in the output manifests. Choose from the following options:

    - **Binary** – The SCTE-35 marker is expressed as a hex-string (Base64 string) rather than full XML.
    - **XML** – The SCTE marker is expressed fully in XML.

11. Select **Enable filter configuration** if you want to optionally add filters and settings to modify manifests. These filters apply to all manifests that originate from this endpoint.

    To automatically fill these values from an existing query string, choose **Import from query string**. For example, this string provides the following filters: `aws.manifestfilter=video_codec:h265;audio_language:fr,en-US,de&start=2023-10-20T12:20:50Z&end=2023-10-20T13:20:50Z&time_delay=10`

    Filter key `video_codec`, **Filter value** `h265`, **Filter key** `audio_language`, **Filter value** `fr,en-US`, **Start time** `2023-10-20T12:20:50Z`, **End time** `2023-10-20T13:20:50Z`, and **Time delay** `10` seconds.

    > **Note**
    >
    > When you include a Manifest filter, you cannot use matching query parameters for the manifest's endpoint URL. If you do, you will receive a `404` HTTP error code instead. For example, if you include a Manifest filter with a `audio_sample_rate` Filter key and `44100` Filter value, and you make an HTTP request for `https://<example-url>/?aws.manifestfilter=audio_sample_rate:44100`, you will receive a `404` error.

    Manifest filter

    Optionally specify one or more manifest filters for all of your manifest egress requests.

    You enter a **Filter key** and **Filter value** pair for each manifest filter. Your filter values can be a range, single value, or combination of both.

For a list of supported keys and values, see Manifest filtering query parameters.

Start time and End time

Optionally specify the start or end time for all of your manifest egress requests. To use this setting, you must have a startover window defined.

For more information about start and end times, see Start and end parameters.

If you enter a start or end time using the API, or import using **Import from query string** in the MediaPackage console, enter dates in an ISO-8601 format.

Time delay

Optionally specify the time delay (in seconds) for all of your manifest egress requests. To use this setting, you must have a startover window defined.

For more information about using time delays, see Time delay.

Clip start time data and time

When using a time delay, optionally specify the clip start time for all of your manifest egress requests. This option specifies the earliest time that the content can result in a manifest. Content ingested before the clip start time will not be included in the manifest. Cannot be used with start time or end time filters. To use this setting, you must have a startover window defined.

For more information about clip start and time delay, see Using clip start with time delay.

> ⚠ **Important**
>
> If you're using this setting to limit content playback for contractual reasons, this parameter should be set at your CDN, and not at the client.

Viewing an origin endpoint in AWS Elemental MediaPackage

This guide shows how to view all origin endpoints that are configured in AWS Elemental MediaPackage. You can view the details about a specific endpoint to obtain its playback URL, the packaging settings, and the manifests within the endpoint. You can use the MediaPackage console, the AWS CLI, or the MediaPackage API to view the details of an endpoint.

To view an origin endpoint

1. Access the channel that the endpoint is associated with, as described in Viewing channel details in AWS Elemental MediaPackage.

   The console shows all existing origin endpoints that are configured in MediaPackage.
2. (Optional) To adjust your viewing preferences, choose **Preferences**. For example, you can adjust the page size and properties that you want to view.
3. To view more information about a specific origin endpoint, select that origin endpoint from the **Origin Endpoints** list. For downstream device requests, you must provide the endpoint URL from the **Endpoint URL** field or the CloudFront CDN URL.

Editing an endpoint in AWS Elemental MediaPackage

Edit the packaging preferences on an endpoint in MediaPackage to optimize the viewing experience. You can't change the container type after you save an endpoint or greyed-out fields. To serve content with a different packager, create a different endpoint.

Any edits you make that impact the video output may not be reflected for a few minutes.

You can use the MediaPackage console, MediaPackage API, or AWS CLI to edit an origin endpoint. When you're editing an origin endpoint, don't put sensitive identifying information like customer account numbers into free-form fields such as the name or description field. MediaPackage doesn’t require that you supply any customer data. This includes when you work with MediaPackage using the MediaPackage console, MediaPackage API, AWS CLI, or AWS SDKs. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or Amazon CloudWatch Events.

To edit an endpoint

1. Access the channel that the endpoint is associated with, as described in Viewing channel details in AWS Elemental MediaPackage.

   The console shows all existing origin endpoints that are configured in MediaPackage.
2. Under **Origin endpoints**, choose the endpoint that you want to edit and then choose **Edit endpoint**.
3. Edit the endpoint options that you want to change.
4. Choose **Edit**.

Deleting an endpoint in AWS Elemental MediaPackage

Endpoints in MediaPackage can serve content until they're deleted. This guide shows how to delete the endpoint if it should no longer respond to playback requests. You must delete all endpoints from a channel before you can delete the channel.

> ⚠ **Warning**
>
> If you delete an endpoint, the playback URL stops working.

You can use the MediaPackage console, the AWS CLI, or the MediaPackage API to delete an endpoint.

To delete an endpoint

1. Access the channel that the endpoint is associated with, as described in Viewing channel details in AWS Elemental MediaPackage.

   The console shows all existing origin endpoints that are configured in MediaPackage.
2. Under **Origin endpoints**, choose the endpoint that you want to delete.
3. Choose **Delete**.
4. In the **Delete endpoints** confirmation dialog box, choose **Delete**.

Previewing a manifest from AWS Elemental MediaPackage

Preview an endpoint's manifest to ensure that MediaPackage is receiving the content stream and can package it. The preview is helpful for avoiding playback failures after the endpoint is published and for troubleshooting later if there are any playback issues.

You can use the MediaPackage console to preview playback from the endpoint.

To preview an endpoint's playback

1. Access the channel that the endpoint is associated with, as described in Viewing channel details in AWS Elemental MediaPackage.
2. Under **Origin endpoints**, select the endpoint that you want to preview.
3. To preview playback, do one of the following:

- Choose **Preview** to play content with the embedded player.
- Choose **QR code** to view and scan the QR code for playback on a compatible device.

Delivering VOD content from AWS Elemental MediaPackage

At this time, MediaPackage v2 doesn't support video on demand (VOD) workflows. If you're looking to support VOD workflows, see the AWS Elemental MediaPackage v1 User Guide.

Creating live-to-VOD assets with MediaPackage

You can use the AWS Elemental MediaPackage v2 live-to-VOD harvester to extract portions of live video streams and save them as Video on Demand (VOD) assets. This feature is useful for creating highlight reels from live sports events, archiving broadcasts, or any other scenario where you need to convert live content into on-demand assets.

The following topics provide more information about live-to-VOD assets in MediaPackage v2.

Topics

Requirements

When creating live-to-VOD assets in MediaPackage v2, keep the following requirements in mind:

Endpoint requirements

- The endpoint must be a MediaPackage v2 endpoint. MediaPackage v1 endpoints are not compatible.
- The endpoint must grant MediaPackage v2 `GetObject` and `HarvestObject` access. For more information, see MediaPackage L2V Harvester.

Live-to-VOD asset requirements

- The start time of the harvest job must be in the past.
- The maximum job duration is 24 hours.
- Any harvested manifest must not include start, end, or clip start time in the manifest filter configuration.

What is a harvest job?

A harvest job represents a request to extract a live-to-VOD asset from an endpoint for a specific timeframe. MediaPackage uses information from the harvest job to determine the start and end times of the asset, and where to store it after the harvest job is complete.

A harvest job runs only once after it's created. MediaPackage keeps a record of the job on your account for reference only. You can't modify or delete a record after you create the harvest job.

Harvest job features

- Multiple manifests can be harvested in a single request.
- Real-time harvesting is supported for ongoing streams.
- Rendition filtering is available through a combination of `ManifestFilter` in `FilterConfiguration` (in `OriginEndpoint` configuration) and `HarvestedManifests` (in `HarvestJob` configuration).
- All included segments across different manifests will be de-duplicated to be moved to your S3 bucket only once. (The segments are shared between different manifests.)

How live-to-VOD works

In the processing flow for live-to-VOD (video on demand) content, MediaPackage v2 extracts a clip of video from a live content stream. MediaPackage saves this clip as a live-to-VOD asset in Amazon S3. You can use the VOD content processing functionality in MediaPackage to deliver the asset to playback devices, or you can use a VOD encoding service that supports HLS or DASH inputs.

The following sections provide an overview of the live-to-VOD processes.

Live-to-VOD `HarvestJob`

You can schedule a harvest job to take place at a specified timeframe in your live content stream.

The process looks like this:

1. You create a channel group, channel, and origin endpoint in MediaPackage v2 to ingest and package your live stream.
2. You must grant the MediaPackage v2 service principal access to `PutObject` in your S3 bucket policy and `HarvestObject` in your MediaPackage v2 endpoint.

3. You create a harvest job using the `CreateHarvestJob` API operation or the AWS Management Console. This job defines the live-to-VOD asset you want to extract from the live stream.
4. MediaPackage v2 processes the harvest job, extracting the specified timeframe from the live stream.
5. The harvested asset is saved to the S3 bucket that you specified in the harvest job configuration.
6. The live-to-VOD asset is now available in your S3 bucket for further processing or delivery.

Live-to-VOD `HarvestObject`

You can specify a packaged manifest or segments to harvest from your live content stream. For information about the `HarvestObject` API operation, see HarvestObject.

The process looks like this:

1. You create a channel group, channel, and origin endpoint in MediaPackage v2 to ingest and package your live stream.
2. You must grant the MediaPackage v2 service principal access to `PutObject` in your S3 bucket policy and `HarvestObject` in your MediaPackage v2 endpoint.
3. You harvest a packaged live-to-VOD asset using the `HarvestObject` dataplane API operation. This request specifies the manifest or segments that you want to save and indicates where they should be saved.
4. MediaPackage v2 processes the request and saves the asset to the S3 bucket that you specified.
5. The live-to-VOD asset is now available in your S3 bucket for further processing or delivery.

Creating a harvest job

Create a harvest job to extract a live-to-VOD asset from an encrypted or clear (unencrypted) live HLS or DASH stream.

> ⚠ **Important**
>
> To run a harvest job and save the live-to-VOD asset, MediaPackage must have permissions to write to the S3 bucket where the asset will be stored. MediaPackage must also have `GetObject` and `HarvestObject` access to the MediaPackage v2 endpoint where the asset will be harvested from.

You can use the MediaPackage console, the AWS CLI, or the MediaPackage API to create a harvest job. For information, see the MediaPackage V2 Live API Reference.

When you're creating a harvest job, don't put sensitive identifying information like account numbers into free-form fields, such as the ID field. Any data that you enter into MediaPackage might get picked up for inclusion in diagnostic logs or CloudWatch Events.

To create a harvest job

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Choose **Channel group**.
3. Choose a channel.
4. Choose the **Harvest jobs** table in the channel view.
5. Choose **Create harvest job**.
6. Enter a **Harvest job name**. You can reuse the name after the harvest job expires from your account. The harvest job expires within 15 days of job creation.
7. For **Channel group name**, select the channel group that serves the live stream that you're harvesting the live-to-VOD asset from. By default, you can have up to 10 active harvest jobs within a channel group.
8. For **Channel name**, select the channel that serves the live stream that you're harvesting the live-to-VOD asset from.
9. For **Origin endpoint name**, select the endpoint that serves the live stream that you're harvesting the live-to-VOD asset from. Note the following considerations:

   - Your harvest job start time must fall within your MediaPackage endpoint's startover window. The startover window determines the time frame that assets can be harvested from your endpoint. For example, if your endpoint has a startover window of three days, you can harvest your asset anytime within that time frame. To adjust your endpoint's startover window, see Viewing an origin endpoint in AWS Elemental MediaPackage.
   - Your harvested live-to-VOD asset can have a maximum duration of 24 hours.
   - Your endpoint must serve either clear (unencrypted) or encrypted DASH, HLS, or CMAF content.
10. For **Harvested manifest name**, select the endpoint that serves the live stream that you're harvesting the live-to-VOD asset from. You can set up the manifest filter in your filter configuration, but not clip start time, start time, end time, or time delay seconds. For more information, see FilterConfiguration in the *MediaPackage V2 Live API Reference*.

11. For **Schedule configuration**, select a **Start date and time** and **End date and time**. The maximum time range is 24 hours.

    - Select a date and time for **When the live-to-VOD asset starts**. The asset's begin time must be at the same time or after the live event started, and it must be in the past. The start time must also be within the startover window on the endpoint. If the endpoint has a window of 5 hours and the start time is 6 hours ago, the harvest job fails.
    - Select a date and time for **When the live-to-VOD asset ends**. The length of the asset can't exceed the startover window on the endpoint. The end time can be in the future.

12. For **Destination**, select the **S3 bucket name** in which to store the live-to-VOD asset. The bucket must be in the same AWS Region that MediaPackage is harvesting from.
13. For **S3 destination path**, enter the path to the asset in the bucket. Include the file name for the parent manifest of the asset. If the directory structure doesn't already exist in the bucket, MediaPackage creates it.
14. Choose **Create harvest job**.

Viewing harvest jobs

You can view all harvest jobs that you created within the last 15 days. After that, harvest jobs expire from your account.

To view a harvest job

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Choose **Channel group**.
3. Choose a channel.
4. Choose the **Harvest jobs** tab.
5. Choose a harvest job name to view the details.

Error messages for failed jobs will be returned in the `ErrorMessage` field.

Canceling a harvest job

You can cancel a harvest job that is in `Queued` or `In progress` status. This stops MediaPackage from moving content into your S3 bucket.

To cancel a harvest job

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Choose **Channel group**.
3. Choose a channel.
4. Choose the **Harvest jobs** tab.
5. Choose a harvest job that is in `Queued` or `In progress` status.
6. Choose **Cancel harvest job**.

AWS Elemental MediaPackage features and functionality

The following sections describe the configurations that are available in AWS Elemental MediaPackage and how they work.

Topics

Content encryption and DRM in AWS Elemental MediaPackage

Protect your content from unauthorized use through content encryption and digital rights management (DRM). AWS Elemental MediaPackage uses the AWS Secure Packager and Encoder Key Exchange (SPEKE) API to facilitate content encryption and decryption by a DRM provider. Using SPEKE, the DRM provider supplies encryption keys to MediaPackage through the SPEKE API. The DRM provider also supplies licenses to supported media players for decryption. For more information about how SPEKE is used with services and features running in the cloud, see AWS cloud-based architecture in the *Secure Packager and Encoder Key Exchange API Specification guide*.

Limitations and requirements

When implementing content encryption for MediaPackage, refer to the following limitations and requirements:

- Use the AWS Secure Packager and Encoder Key Exchange (SPEKE) API to facilitate integration with a digital rights management (DRM) system provider. For information about SPEKE, see What is Secure Packager and Encoder Key Exchange?
- Your DRM system provider must support SPEKE. For a list of DRM providers that support SPEKE, see the Get on board with a DRM platform provider topic in the *AWS Elemental MediaPackage User Guide*. Your DRM provider can help you set up DRM encryption use in MediaPackage.
- Use MediaPackage to encrypt live content.

Container and DRM system support with SPEKE

MediaPackage supports SPEKE Version 2.0 which uses multiple, distinct encryption keys for audio and video tracks and uses Content Protection Information Exchange (CPIX) Version 2.3. For more information about SPEKE Version 2.0 encryption configurations, see Encryption presets in AWS Elemental MediaPackage.

Supported containers and DRM systems

The following table lists the different containers and digital rights management (DRM) systems that SPEKE Version 2.0 supports.

SPEKE Version 2.0 – Support matrix for container and DRM system	Apple FairPlay	ClearKey AES-128	Google Widevine	Microsoft PlayReady	Irdeto
TS container	√ Supports SAMPLE-AES	√ Supports AES-128	Not supported	Not supported	Not supported
CMAF container	√ Supports cbcs encryption	Not supported	√ Supports cbcs and cenc encryption	√ Supports cbcs and cenc encryption	√ Supports cenc encryption

Supported DRM system IDs

The following table lists the different DRM system IDs that MediaPackage supports.

System IDs – Support matrix for DRM system	Apple FairPlay	ClearKey AES-128	Google Widevine	Microsoft PlayReady	Irdeto
	94ce86fb-07ff-4f43-adb8-93d2fa968ca2	3ea8778f-7742-4bf9-b18b-e834b2acbd47	edef8ba9-79d6-4ace-a3c8-27dcd51d21ed	9a04f079-9840-4286-ab92-e65be0885f95	80a6be7e-1448-4c37-9e70-d5aebe04c8d2

Deploying SPEKE

Your digital rights management (DRM) system provider can help you get set up to use DRM encryption in MediaPackage. Generally, the provider gives you a SPEKE gateway to deploy in your AWS account in the same AWS Region where MediaPackage is running. For information about configuring encryption settings for your endpoint, see encryption fields.

If you must build your own API Gateway to connect MediaPackage to your key service, you can use the SPEKE Reference Server available on GitHub as a starting point.

The following sections provide guidance on how to implement content encryption using SPEKE for MediaPackage.

Topics

- AWS Elemental MediaPackage key rotation behavior
- Encryption presets in AWS Elemental MediaPackage

AWS Elemental MediaPackage key rotation behavior

When you enable key rotation on live content from TS and CMAF origin endpoints, AWS Elemental MediaPackage retrieves content keys before the live content begins. As the content progresses, MediaPackage retrieves new keys at the interval that you set on the origin endpoint, as described in Encryption fields.

If MediaPackage is unable to retrieve the content key, it takes the following actions:

- If MediaPackage successfully retrieved a content key for this endpoint before, it uses the last key that it fetched. This ensures that endpoints that worked previously continue to work.
- If MediaPackage has *not* successfully retrieved a content key for this endpoint before, MediaPackage responds to the playback request with error 404.

Encryption presets in AWS Elemental MediaPackage

SPEKE Version 2.0 supports the use of multiple, distinct encryption keys for audio and video tracks. MediaPackage uses **presets** to configure the encryption. The MediaPackage API defines these presets, and they appear in the MediaPackage console in the **Video encryption preset** and **Audio encryption preset** menus of the **Package Encryption endpoints configuration** section. The presets map encryption keys to specific audio or video tracks, based on the number of channels for audio tracks, and based on the video resolution for video tracks. MediaPackage uses specific combinations of audio and video encryption presets to support three different encryption scenarios:

- Scenario 1: Unencrypted tracks and encrypted tracks
- Scenario 2: Single encryption key for all audio and video tracks
- Scenario 3: Multiple encryption keys for audio and video tracks

Scenario 1: Unencrypted tracks and encrypted tracks

You can choose *not* to encrypt the audio or the video tracks by selecting the **UNENCRYPTED** preset in the **Video encryption preset** or the **Audio encryption preset** menus. You can't select **UNENCRYPTED** for both audio and video presets, because doing so would mean that you don't intend to encrypt any of the tracks at all. Also, you can't combine **UNENCRYPTED** and **SHARED** presets for audio and video, because **SHARED** is a special preset. For more information, see Scenario 2: Single encryption key for all audio and video tracks.

The following list describes valid combinations of **UNENCRYPTED** presets:

- **UNENCRYPTED** for audio tracks, and any video preset with a name that starts with `PRESET-VIDEO-`
- **UNENCRYPTED** for video tracks, and any audio preset with a name that starts with `PRESET-AUDIO-`

Scenario 2: Single encryption key for all audio and video tracks

The SPEKE Version 2.0 **SHARED** preset uses a single encryption key for all audio and video tracks, as in SPEKE Version 1.0. When you select the **SHARED** preset, select it for both audio and video encryption.

Scenario 3: Multiple encryption keys for audio and video tracks

When you use a preset with a name that starts with `PRESET-VIDEO-` or `PRESET-AUDIO-`, MediaPackage encrypts the audio tracks and video tracks with the number of encryption keys that the specific preset defines. The following tables show how many keys MediaPackage requests from the key server and how those keys map to tracks. If no track matches the criteria for a particular key, MediaPackage does not use that key to encrypt any track.

MediaPackage encrypts I-frame only trickplay tracks with the key corresponding to their resolution.

In the following table, the **Key name** value is the value of the `ContentKeyUsageRule@IntendedTrackType` attribute that MediaPackage uses in the CPIX document. This is sent to the SPEKE server for a specific content key.

Video encryption presets

Preset name	Number of keys	Key name	Minimum resolution	Maximum resolution
PRESET-VIDEO-1	1	VIDEO	No minimum or maximum resolution. MediaPackage encrypts all tracks with the same key.	
PRESET-VIDEO-2	2	SD	No minimum	<= 1024x576
		HD	> 1024x576	No maximum
PRESET-VIDEO-3	3	SD	No minimum	<= 1024x576
		HD	> 1024x576	<= 1920x1080
		UHD	> 1920x1080	No maximum
PRESET-VIDEO-4	4	SD	No minimum	<= 1024x576

Preset name	Number of keys	Key name	Minimum resolution	Maximum resolution
		HD	> 1024x576	<= 1920x1080
		UHD1	> 1920x1080	<= 4096x2160
		UHD2	> 4096x2160	No maximum
PRESET-VIDEO-5	5	SD	No minimum	<= 1024x576
		HD1	> 1024x576	<= 1280x720
		HD2	> 1280x720	<= 1920x1080
		UHD1	> 1920x1080	<= 4096x2160
		UHD2	> 4096x2160	No maximum
PRESET-VIDEO-6	4	SD	No minimum	<= 1024x576
		HD1	> 1024x576	<= 1280x720
		HD2	> 1280x720	<= 1920x1080
		UHD	> 1920x1080	No maximum
PRESET-VIDEO-7	3	SD+HD1	No minimum	<= 1280x720
		HD2	> 1280x720	<= 1920x1080
		UHD	> 1920x1080	No maximum
PRESET-VIDEO-8	4	SD+HD1	No minimum	<= 1280x720
		HD2	> 1280x720	<= 1920x1080
		UHD1	> 1920x1080	<= 4096x2160
		UHD2	> 4096x2160	No maximum

Preset name	Number of keys	Key name	Minimum resolution	Maximum resolution
SHARED	1	ALL	No minimum or maximum resolution. MediaPackage encrypts all video and audio tracks with the same key.	
UNENCRYPTED	0	*N/A*	MediaPackage does not encrypt any video track.	

In the following table, the **Key name** value is the value of the `ContentKeyUsageRule@IntendedTrackType` attribute that MediaPackage uses in the CPIX document. This is sent to the SPEKE server for a specific content key.

Audio encryption presets

Preset name	Number of keys	Key name	Minimum number of channels	Maximum number of channels
PRESET-AUDIO-1	1	AUDIO	No minimum or maximum number of channels. MediaPackage encrypts all audio and video tracks with the same key.	
PRESET-AUDIO-2	2	STEREO_AUDIO	No minimum	2
		MULTICHANNEL_AUDIO	> 2	No maximum
PRESET-AUDIO-3	3	STEREO_AUDIO	No minimum	2
		MULTICHANNEL_AUDIO_3_6	> 2	<= 6
		MULTICHANNEL_AUDIO_7	> 6	No maximum

Preset name	Number of keys	Key name	Minimum number of channels	Maximum number of channels
SHARED	1	ALL	No minimum or maximum number of channels. MediaPackage encrypts all audio and video tracks with the same key.	
UNENCRYPTED	0	*N/A*	MediaPackage does not encrypt any audio track.	

Now you know how MediaPackage supports SPEKE Version 2.0 presets for unencrypted tracks and encrypted tracks. With these presets, you can use a single encryption key for all audio and video tracks, and multiple encryption keys for audio and video tracks.

CMSD headers from AWS Elemental MediaPackage

AWS Elemental MediaPackage uses Common Media Server Data (CMSD) HTTP response headers to provide downstream systems with information about content coming from an endpoint. These headers are defined by the Consumer Technology Association's CTA-5006 specification that establishes a uniform method for media servers and services to communicate data about media objects.

Media servers such as AWS Elemental MediaPackage use CMSD headers in responses to content requests. The headers can include data about the content, such as the type of content, playback duration, and quality scores. Servers receiving these headers can use the information for things like input switching and logging analysis.

The following sections describe keys that MediaPackage uses in CMSD headers.

Common CMSD keys

The following table describes common CMSD keys that MediaPackage uses. For a full of list of keys, see the Consumer Technology Association's Common Media Server Data CTA-5006 specification.

Key name	Value	CMSD header example
`n`	The identifier for the MediaPackage origin endpoint of this object.	`CMSD-Static: n="MediaPackage:<region>:<channelGroup>:<channel>:<endpoint>"`
`st`	The type of content being returned. Supported values are: - `l` = live content - `v` = VOD content	`CMSD-Static: st=l`
`sf`	The streaming format of the response. Supported values are: - `d h` = MP4 - `h` = TS	`CMSD-Static: sf=(d h)`
`ot`	The media role of the object being returned. Supported values are: - `m` = text file (manifest or playlist) - `a` = audio only - `v` = video only - `av` = muxed audio and video - `i` = init segment - `c` = caption or subtitle	`CMSD-Static: ot=v`

Key name	Value	CMSD header example
	- `tt` = ISOBMFF timed text track - k = cryptographic key, license, or certificate - o = other	
`br`	The average encoded bitrate of the object.	`CMSD-Static: br=1000000`
`ht`	The amount of time that MediaPackage waited to send this response to CloudFront. Measured in milliseconds.	`CMSD-Static: ht=1000`
d	The playback duration of the object. Measured in milliseconds.	`CMSD-Static: d=2000`
`at`	The wallclock time that the first byte of this object became available to the server. Measured in integer milliseconds since the Unix Epoch.	`CMSD-Static: at=1656703938470`

AWS custom CMSD keys

The following table describes custom AWS keys that MediaPackage uses.

AWS custom key name	Value	CMSD header example
`com.amazonaws-mqcs`	The media quality confidence score (MQCS) rating for the segment.	`CMSD-Static: com.amazonaws-mqcs="90"`
`com.amazonaws-mqcs-seq`	The aggregate of MQCS ratings for all segments in the sequence. Value is from 1-100.	`CMSD-Static: com.amazonaws-mqcs-seq="100"`
`com.amazonaws-mqcs-seq-tracks`	The aggregate of MQCS ratings for all segments in the sequence, by object type. Value is from 1-100.	`CMSD-Static: com.amazonaws-mqcs-seq-tracks="v:100;a:90;s:50;m:60"`

Working with cross-region failover in AWS Elemental MediaPackage

MediaPackage supports workflows where a CDN transparently fails over between multiple MediaPackage Live v2 origins located in different AWS regions. The mechanism also works in a single region, but such a configuration would not protect against regional failures. The purpose of such failover architectures is to force CDN requests to be forwarded to one or more backup origins if the stream on the primary origin is not considered healthy. In order to be transparent, the failover needs all the MediaPackage origins to produce symmetric streams. This requirement can be satisfied through the combination of multiple requirements at different levels in the workflow:

- **Encoding**: The live encoders need to send aligned ingest streams to all involved MediaPackage channels. This is achieved through the use of epoch-locked CMAF ingest streamsets, where segmentation is using a regular cadence, and the indexing of the segments is based on the epoch time. This can be configured in MediaLive and AWS Elemental Live using the CMAF Ingest output group. For more details about the configuration and the input timecode requirements, see Creating CMAF Ingest Output Groups in the *MediaLive user guide*.

  The encoding settings and CMAF Ingest output group settings must be identical across multiple encoders. However, it’s possible to use heterogeneous MediaLive channel types in different regions, for example a standard MediaLive channel in region A and a single pipeline MediaLive channel in region B.

  > **Important**
  >
  > Please note that your encoder configuration, or re-configuration, must adhere to some restrictions:
  >
  > - All video framerates in the CMAF output group need to be consistent. They should be either all fractional framerates, or all integer framerates, not a mix of the two. The combined use of framerates that are multiples of one another, like 25fps and 50fps or 29.97fps and 59.94fps, is allowed.
  > - The transition from fractional framerates to integer framerates (or the other way around) across two encoding sessions is not allowed. The two framerates also need to be multiples of one another: 25fps to 50fps or 50fps to 25fps are allowed transitions, but 25fps to 30fps or 30fps to 25fps are not.
  > - The output segments sequence numbers should not go back in the past across two encoding sessions. The segment duration should not increase and the reference Epoch time should not change after the first encoding session.

- **Packaging/Origination**: All involved MediaPackage Live v2 channels and endpoints need to be configured with strictly identical configuration settings, such as URL path, segmentation parameters, and encryption parameters. The channel input type needs to be CMAF. If the channel input type is HLS, the alignment of the output streams will not be guaranteed. Finally, the MediaPackage channel that will act as the primary origin in the CDN origin group needs to include a **Force endpoint error configuration** that will have MediaPackage return 404 responses to the CDN in some problematic situations, like missing or incomplete ingest, failed key rotations, or slate input (resulting from the upstream encoder having lost its contribution source). For more information, see Endpoint settings fields. We recommend to set the primary

MediaPackage origin settings with aggressive **Force endpoint error configuration** settings (at least Stale manifests, incomplete manifest and Slate input). These settings should not be activated on the backup MediaPackage origin, in order to maximize chances of a successful origin failover at the CDN level.

- **CDN**: The CDN distribution should be configured to trigger origin failovers on network connection errors and 404 Not Found response codes returned by the origin. Other 4xx/5xx response codes can also be used as failover triggers, on top of the 404 code, to cover a wider range of problems that are not related to the MediaPackage endpoint error configuration. For more information, see Optimize high availability with CloudFront origin failover.

Provided that your workflow respects these requirements, origin failovers should be seamless for your viewers and not generate live-stream-playback disruptions.

DASH manifest options in AWS Elemental MediaPackage

This section describes the options that AWS Elemental MediaPackage offers for modifying live output DASH manifests.

Default DASH manifest

The following is a truncated example of a DASH manifest with no treatments:

```
<MPD>
  <Period>
    <AdaptationSet>
      <SegmentTemplate>
        <SegmentTimeline>
          <S />
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation>
      </Representation>
    </AdaptationSet>
    .
    .
  </Period>
</MPD>
```

The elements of the DASH manifest are nested within the `MPD` (media presentation description) object. These are the elements of the manifest:

- `Period` - The entire manifest is nested in one period.
- `AdaptationSet` - Groups together representations of the same type (video, audio, or captions). There are one or more `AdaptationSets` in the `Period`.
- `SegmentTemplate` - Defines properties of the `AdaptationSet`, such as the timescale and access URLs for media and initialization segments.
- `SegmentTimeline` - Describes when each segment is available for playback. There is one `SegmentTimeline` for each `SegmentTemplate`.
- `S` - Describes when the segment is available (`t` value), the duration of the segment (`d` value), and a count of how many additional consecutive segments have this same duration (`r` value). There are one or more segments in the `SegmentTimeline`.
- `Representation` - Describes an audio, video, or captions track. There are one or more `Representations` in each `AdaptationSet`. Each representation is a track.

MediaPackage can modify how some of these elements are presented in the output manifest. You can use the following treatment options on the output live manifest:

- Separate the manifest into multiple periods, to permit ad breaks. See Multi-period DASH in AWS Elemental MediaPackage.

Multi-period DASH in AWS Elemental MediaPackage

The ability to insert multiple periods in DASH manifests for live is available in AWS Elemental MediaPackage.

A period is a chunk of content in the DASH manifest, defined by a start time and duration. MediaPackage can partition the DASH manifest into multiple periods to indicate boundaries between changes in the content. MediaPackage can signal new periods based on several triggers including:

- DRM configuration changes
- Avails
- DRM key rotation
- Source stream changes
- Source disruptions

MediaPackage will always create a period at the beginning of content and whenever DRM configuration changes. The other triggers can be configured per DASH manifest, and have the following effects:

- **Avails** - MediaPackage will create a new period whenever it detects a SCTE-35 message which matches the Segment SCTE Filter configuration as an ad. All SCTE-35 messages will be signaled in the DASH manifest, whether it triggers a new period or not.
- **DRM key rotation** - MediaPackage will create a new period whenever the underlying DRM key rotates. This setting allows MediaPackage to signal the `default_KID` and `pssh` values in the manifest when key rotation is enabled. If this period trigger is not enabled, endpoints with DRM key rotation will not show the `default_KID` and `pssh` values in the manifest.
- **Source stream changes** - MediaPackage will create a new period when it detects stream set changes, allowing all streams to be signaled in the manifest, rather than just those available at manifest publish time.
- **Source disruptions** - MediaPackage will create a new period after source input has been lost and restored, enabling the gap in content to be signaled to the player.

Manifest filtering from AWS Elemental MediaPackage

With manifest filtering, AWS Elemental MediaPackage dynamically produces client manifests based on filter parameters that you specify. This enables you to do things such as restrict viewer access to premium 4K HEVC content, or target specific device types and audio sample rate ranges, all from a single endpoint.

With manifest filtering, the resulting manifest from MediaPackage includes only the audio and video streams that match the characteristics that you specify in your filters. If no manifest filter is used, then all of the ingested streams are present in the endpoint output stream. The exception to this is if you have set stream filters for the endpoint, such as minimum video bitrate. In that case, the manifest filter is applied after the stream filter, which could skew your output, and is not recommended.

Manifest filtering can be used on all origin endpoint types supported by MediaPackage.

To use manifest filtering, you can do one of the following:

- Apply filters to all manifests that originate from an endpoint: Set the filters on the origin endpoint through the MediaPackage console or API. For console instructions, see Creating an origin endpoint.

- Apply filters dynamically across requests: Ensure that downstream video players include the appropriate query parameters in their manifest requests. For information about using query parameters, see Manifest filtering query parameters.

> **Note**
>
> When configuring Manifest filters as part of the Filter Configuration for your endpoint, be aware that using corresponding query parameters in the manifest's endpoint URL can lead to issues. Specifically, if you include a Manifest filter in your Filter Configuration and then attempt to use matching query parameters in the endpoint URL, you will encounter a `404` HTTP error code. For example, if your Filter Configuration includes a Manifest filter with an `audio_sample_rate` key set to `44100`, and you subsequently make an HTTP request to `https://<example-url>/?aws.manifestfilter=audio_sample_rate:44100` this will result in a `404` error. The Filter Configuration applies universally to all egress requests for your endpoint, and duplicating these settings in the URL query can lead to conflicts and errors. For more information about Manifest filters, see Manifest filtering from AWS Elemental MediaPackage.

The following topics describe how manifest filtering works with MediaPackage.

Topics

Manifest filtering query parameters in AWS Elemental MediaPackage

To use manifest filtering query parameters, append `aws.manifestfilter` to your playback request to MediaPackage. MediaPackage evaluates the query, and serves a client manifest based on those query parameters. Manifest queries are *not* case-sensitive and can be up to 1024 characters long. If the query is malformed, or if it there aren't streams that match the query parameters, MediaPackage returns an incomplete or empty manifest. For query syntax, see the following section.

> **Note**
>
> If you are using TS or CMAF origin endpoints, special conditions apply. For information about these conditions, see Special conditions for TS and CMAF manifests in MediaPackage.

Query syntax

The base query parameter is `aws.manifestfilter`, which is followed by optional parameter name and value pairs. To construct the query, append `?aws.manifestfilter=` to the end of the MediaPackage endpoint URL, followed by parameter names and values. For a list of all of the available parameters, see Manifest filtering query parameters in AWS Elemental MediaPackage.

An Apple HLS filter query might look like this:

```
https://example-mediapackage-endpoint.mediapackage.us-
west-2.amazonaws.com/out/v1/examplemediapackage/index.m3u8?
aws.manifestfilter=audio_sample_rate:0-44100;video_bitrate:0-2147483647;video_co
US,de
```

The query syntax is listed in the following table.

> **Note**
>
> If you use Amazon CloudFront as your CDN, you might need to set additional configurations. For more information, see Configure cache behavior for all endpoints.

Query string component	Description
`?`	A restricted character that marks the beginning of a query.
`aws.manifestfilter =`	The base query, which is followed by parameters constructed of name and value pairs. For a list of all of the available parameters, see Manifest filtering query parameters in AWS Elemental MediaPackage.
`:`	Used to associate the parameter name with a value. For example, *`parameter_name`* `:`*`value`*.

Query string component	Description
;	Separates parameters in a query that contains multiple parameters. For example, *parameter1_name:value* ;*parameter2_name:minValue-maxValue* . When used in a list of parameters for the same query, implies an AND operation.
,	Separates a list of values. For example, parameter_name: *value1*,*value2*,*value3*. Comma-separated values in a list imply an OR relationship.
-	Used to define a parameter's minimum - maximum value range. For example, audio_sample_rate:0-44100 . When a numerical value is used in a range, it is included in the range definition. This means that streams must be greater than or equal to the minimum value, and less than or equal to the maximum value. With ranges, the minimum and maximum values are mandatory. The supported range values are 0 - 2147483647 .

Query value formats

The following query parameters support expanded value formats:

- audio_bitrate
- audio_channels
- audio_sample_rate
- trickplay_height
- video_bitrate
- video_framerate
- video_height

For all of these parameters, you can format your values as single values or ranges, one or more ranges, or a combination of both.

Individual values and ranges

Filter manifests by single values or ranges.

Syntax

- Individual single values: `aws.manifestfilter=`*`parameter`*`:`*`value`*
- Individual range: `aws.manifestfilter=`*`parameter`*`:`*`min1-max1`*

Example individual value

The following example filters for videos with a bitrate of 8000000 bps.

```
stream.mpd?aws.manifestfilter=video_bitrate:8000000
```

> **Note**
>
> When you filter for a single `video_framerate` value, MediaPackage uses an approximate equals comparison with an epsilon tolerance of 0.0005. MediaPackage uses this tolerance because the query allows only up to three decimal places, and there could be a small difference in accuracy between the stored framerates and the specified framerate.
> For example, if your filter is `video_framerate:30.000`, MediaPackage matches framerates in the range of 29.9995 to 30.0005.

Multiple values and ranges

Filter manifests by multiple single values or multiple ranges.

Syntax

- Multiple single values: `aws.manifestfilter=`*`parameter`*`:`*`value`*`,`*`value`*
- Multiple ranges: `aws.manifestfilter=`*`parameter`*`:`*`min1-max1`*`,`*`min2-max2`*

Example multiple ranges

The following example filters for videos that are either 240p-360p OR 720p-1080p.

```
stream.mpd?aws.manifestfilter=video_height:240-360,720-1080
```

Combination

Filter manifests by a combination of ranges and values.

Syntax

- Multiple ranges and single values: `aws.manifestfilter=`*`parameter`*`:`*`min1-max1`*`,`*`min2-max2`*`,`*`value1`*`,`*`value2`*

Example multiple ranges and values

The following example filters for videos that are either 240p-360p, 720p-1080p, 1440p, OR 2160p.

```
stream.mpd?aws.manifestfilter=video_height:240-360,720-1080,1440,2160
```

Query parameters

MediaPackage supports the following query parameters.

You can set one or more filters. For example, to restrict all manifests from this endpoint to 0 to 44000 Hz audio sample rate, 0 to 2147483647 video bitrate, H265 video codec, and French and English languages, enter the following key and value pairs on the origin endpoint:

Filter key `audio_sample_rate` **| Filter value**: `0-44100`

Filter key `video_bitrate` **| Filter value**: `0-2147483647`

Filter key `video_codec` **| Filter value**: `H265`

Filter key `audio_language` **| Filter value**: `fr,en-US`

Category	Name	Description	Example
Audio	`audio_bitrate`	• The audio bitrate in bits per second. • **Accepted values**: Two integers aggregated with a dash that define an inclusive range. The supported range values are `0` - `2147483647` . Individual integers within that range are also allowed.	`stream.mpd?aws.manifestfilter=audio_bitrate:0-2147483647`

Category	Name	Description	Example
Audio	`audio_channels`	- The number of audio channels. - **Accepted values**: Two integers aggregated with a dash that define an inclusive range. The supported range values are 1 - 32767. Individual integers within that range are also allowed.	`stream.mpd?aws.manifestfilter=audio_channels:1-8`
Audio	`audio_codec`	- The audio codec type. - **Accepted values**: `AACL`, `AACH`, `AC-3`, `EC-3`. You must include the `-` for `AC-3` and `EC-3`. The values are *not* case-sensitive.	`stream.mpd?aws.manifestfilter=audio_codec:AACL,AC-3`
Audio	`audio_language`	- Audio languages or functional codes derived from encoder passthrough. - **Accepted values**: Arbitrary strings, such as two or four character [ISO-639-1](https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes) language codes. You must use the same language strings that are set for your encoder. The values are *not* case-sensitive.	`stream.mpd?aws.manifestfilter=audio_language:fr,en-US,de`
Audio	`audio_sample_rate`	- The audio sample rate in Hz. - **Accepted values**: Two integers aggregated with a dash that define an inclusive range. The supported range values are `0` - `2147483647` . Individual integers within that range are also allowed.	`stream.mpd?aws.manifestfilter=audio_sample_rate:0-44100`

Category	Name	Description	Example
Subtitle	`subtitle_language`	- The subtitle language or functional codes derived from encoder passthrough. - **Accepted values**: Arbitrary strings, such as two or four character ISO-639-1 language codes. You must use the same language strings that are set for your encoder. The values are *not* case-sensitive.	`stream.mpd?aws.manifestfilter=subtitle_language:en-US, hi`
Video	`trickplay_height`	- The height of the trick-play image in pixels. This applies to both I-frame only and image-based trick-play. **Note** If you're using this parameter with I-frame only trick-play, `trickplay_height` and `video_height` should have similar values. If the values are not the same, I-frame only tracks might be removed from a manifest. - **Accepted values**: Two integers aggregated with a dash that define an inclusive range. The supported range values are 1 - `2147483647` . Individual integers within that range are also allowed.	`stream.mpd?aws.manifestfilter=trickplay_height:200-1200`

Category	Name	Description	Example
Video	`trickplay_type`	- The trickplay track type. - **Accepted values**: `iframe`, `image`, `none`. The values are *not* case-sensitive.	`stream.mpd?aws.manifestfilter=trickplay_type:iframe`

Category	Name	Description	Example
Video	`video_bitrate`	• The video bitrate in bits per second. **Note:** If you're using this parameter, we recommend that you use only the `video_bitrate` filter parameter to set the video bitrate. Don't also set the minimum and maximum video bitrate via the MediaPackage console or AWS CLI. The `video_bitrate` filter applies to the video bitrate settings created at the endpoint. If you use the parameter and set the bitrate in the console or AWS CLI, your output might be skewed. • **Accepted values**: Two integers aggregated with a dash that define an inclusive range. The supported range values are `0` - `2147483647` . Individual integers within that range are also allowed. • **Note:** You can't use this parameter with trick-play streams.	`stream.mpd?aws.manifestfilter=video_bitrate:0-2147483647`

Category	Name	Description	Example
Video	`video_codec`	• The video codec type. • **Accepted values**: `H264`, `H265`, `AV1`. The values are *not* case-sensitive.	`stream.mpd?aws.manifestfilter=video_codec:h264`
Video	`video_dynamic_range`	• The video dynamic range. • **Accepted values**: `dv`, `hdr10`, `hlg`, `sdr`. The values are *not* case-sensitive. You can use the `dv` value to filter for Dolby Vision streams.	`stream.mpd?aws.manifestfilter=video_dynamic_range:hdr10`
Video	`video_framerate`	• The video frame rate range in the NTSC format. • **Accepted values**: Two floating-point numbers aggregated with a dash that define an inclusive range. Each number can have up to three optional fractional values. For example, `29.97` or `29.764`. The supported range values are 1 - `999.999`. Individual integers within that range are also allowed.	`stream.mpd?aws.manifestfilter=video_framerate:23.976-30`

Category	Name	Description	Example
Video	`video_height`	• The height of the video in pixels. **Note** If you're using this parameter with I-frame only trick-play, `trickplay_height` and `video_height` should have similar values. If the values are not the same, I-frame only tracks might be removed from a manifest. • **Accepted values**: Two integers aggregated with a dash that define an inclusive range. The supported range values are 1 - 32767. Individual integers within that range are also allowed.	`stream.mpd?aws.manifestfilter=video_height:720-1080`

Special conditions for TS and CMAF manifests in MediaPackage

If you are using TS or CMAF manifests for MediaPackage, these special conditions apply.

- For TS manifests, we strongly recommend that you use audio rendition groups to avoid removing the video streams that are multiplexed with the audio streams that are filtered out. For more information about rendition groups, see AWS Elemental MediaPackage rendition groups reference.
- In TS and CMAF manifests, the audio sample rate is not signaled, so it's not easy to visually check the original or filtered manifests for this setting. To verify the audio sample rate, check the audio sample rate at the encoder level and output level.
- In TS and CMAF manifests, the `BANDWIDTH` attribute for a variant associates the bandwidth of the audio track with the video track, whether it is multiplexed with the video track, or if it is an audio rendition track referenced by the video track. Therefore, you can't visually inspect the

original and filtered manifests to confirm the `video_bitrate` filter has worked. To verify the filter, check the video bitrate at the encoder level and output level.

- For TS and CMAF manifests, request parameters appended to bitrate playlists or segments result in an HTTP 400 error.

Manifest filtering examples in AWS Elemental MediaPackage

These are MediaPackage manifest filtering examples.

Example 1: Include only videos with specific heights

You want to include only videos with heights that the most popular playback devices support. You set the `video_height` to filter out video streams that don't meet one of these height requirements: 240p through 360p, 720p through 1080p, 1440, or 2160p.

```
?aws.manifestfilter=video_height:240-360,720-1080,1440,2160
```

Example 2: Target a player that supports AVC and a 44.1k audio sample rate

The viewer is playing content on a device that can only support AVC and a 44.1k audio sample rate. You set the `video_codec` and `audio_sample_rate` to filter out streams that don't fit these requirements.

```
?aws.manifestfilter=audio_sample_rate:0-44100;video_codec:h264
```

Example 3: Restrict 4k HEVC content

Your 4K HEVC stream is 15 Mbps, and all your other streams are less than 9 Mbps. To exclude the 4K stream from the stream set, you set a threshold of 9,000,000 bits per second to filter out the higher bitrate.

```
?aws.manifestfilter=video_bitrate:0-9000000
```

Example 4: Include video between 23.976 and 30 frames per second

To only include video within a certain frame rate range, use `video_framerate`. This parameter accepts floating-point numbers with up to three optional decimal values.

```
?aws.manifestfilter=video_framerate:23.976-30
```

AWS Elemental MediaPackage manifest filtering error conditions

Common error conditions for manifest filtering with MediaPackage are listed in the following table.

Error condition	Example	HTTP status code
A list parameter is not found and is not part of a constrained list	`?aws.manifestfilter=audio_language:dahlia`	200
Only subtitle streams are present in the stream	`?aws.manifestfilter=audio_sample_rate:0-1;video_bitrate=0-1`	200
Duplicate filter parameter	`?aws.manifestfilter=audio_sample_rate:0-48000;aws.manifestfilter=audio_sample_rate:0-48000`	400
Invalid parameter	`?aws.manifestfilter=donut_type:rhododendron`	400
Invalid range parameter	`?aws.manifestfilter=audio_sample_rate:300-0`	400
Invalid range value (more than `INT_MAX`)	`?aws.manifestfilter=audio_sample_rate:0-2147483648`	400
Malformed query string	`?aws.manifestfilter=audio_sample_rate:is:0-44100`	400

Error condition	Example	HTTP status code
Parameter string is greater than 1024 characters	`?aws.manifestfilter=audio_language:abcdef....`	400
Query parameters on an TS or CMAF bitrate manifest	`index_1.m3u8?aws.manifestfilter=video_codec:h264`	400
Query parameters on a segment request	`..._1.[ts|mp4|vtt..]?aws.manifestfilter=video_codec:h264`	400
Repeated query parameter	`?aws.manifestfilter=audio_sample_rate:0-48000;aws.manifestfilter=video_bitrate:0-1`	400
Application of the filter results in an empty manifest (content has no streams that meet the conditions defined in the query string)	`?aws.manifestfilter=audio_sample_rate:0-1;video_bitrate=0-1`	400

Leveraging media quality scores with AWS Elemental MediaPackage

Streaming media quality is influenced by many factors. To ensure the highest quality viewing experience, services in the video streaming workflow must have awareness of, and ability to act on, indicators of quality down to the segment level in a stream. MediaPackage uses media quality confidence score (MQCS) functionality to receive, act on, calculate, and communicate quality scores of live streaming content. When adopted into your entire workflow, MQCS provides an automated operation to ensure that you provide the optimum viewing experience to your customers.

The following sections describe how MediaPackage leverages media quality scores from stream inputs and through origin outputs to continuously monitor video quality, correct for errors in the live streaming workflow, and help facilitate debugging through increased visibility.

MQCS is available with CMAF ingest, and is enabled by default. To adjust settings, select the MQCS settings on your CMAF channels. For more information about channel settings, see Creating a channel in AWS Elemental MediaPackage.

How MQCS works

The following is a high-level explanation of how MediaPackage uses quality scores from its inputs and in its outputs. For a more detailed explanation about quality scores and how to set up your quality-aware workflow, see the blog Improve your viewers' live streaming experience with Media Quality-Aware Resiliency.

MQCS with inputs to MediaPackage

MQCS in input streams to MediaPackage builds on live input redundancy functionality. With input redundancy, MediaPackage receives two input streams to a channel. If the active stream is missing any segments, MediaPackage automatically switches to the other stream. MediaPackage continually monitors the streams and switches between them as needed based on segment availability.

With MQCS, the upstream encoder (MediaLive) calculates a quality score for the stream at the ABR-level, based on the health of the source bitstream or elementary, error recovery, and segment errors. The encoder communicates this score to MediaPackage. When the input streams have identical health (segment availability and latency), MediaPackage determines which stream to use for source content based on which has the highest quality score. MediaPackage can effectively provide dynamic segment replacement as it receives content from the encoder.

You can also use MQCS to aid in Cross-region failover when you enable MediaPackage to include quality scores in responses to requests from downstream systems, such as CDNs (CloudFront). The next section describes how MQCS works with outputs from MediaPackage.

MQCS with outputs from MediaPackage

As MediaPackage receives streams from the encoder, it re-calculates the quality score for each segment and track type. It also calculates an average quality score for all segments in the media sequence. MediaPackage communicates this score through CMSD headers in its responses to downstream systems, such as CDNs (CloudFront) and other quality-monitoring systems.

Downstream systems can use the quality scores from MediaPackage to determine from which origin to serve content, failing over between origins to provide the highest quality viewing experience. CloudFront uses the quality scores as an input to its media quality-aware resiliency functionality (MQAR). For information about MQAR, see Media quality-aware resiliency in the *Amazon CloudFront Developer Guide*.

Requirements for using MQCS

Your workflow must meet these requirements to use MQCS:

- To enable CDN failover based on quality scores, you must have two identical channels in MediaPackage, with identical origin endpoints.
- Your CDN must support common media server data (CMSD) HTTP headers. If you're using CloudFront, see Use real-time logs in the *Amazon CloudFront Developer Guide* for more information about CMSD and CMCD headers in logs.
- For resiliency against Region failures, you must set up cross-Region failover. For details and instructions, see the blog Build a resilient cross-Region live streaming architecture in AWS.

Passing through metadata from AWS Elemental MediaPackage

AWS Elemental MediaPackage automatically passes through ID3 metadata from a channel's input to the channel's output stream. You don't need to adjust your endpoint's configuration to enable metadata passthrough.

ID3 metadata considerations

Timed ID3 metadata is a general-purpose mechanism that adds synchronized metadata to streams. The metadata is used for a variety of purposes, ranging from interactive applications to audience measurement.

Supported MediaPackage endpoint types

MediaPackage supports ID3 metadata passthrough for the following endpoint types:

- Live TS and CMAF origin endpoints

Metadata carriage

Here is how ID3 is carried as metadata in the following specifications:

- TS - Metadata is carried in the elementary stream. For more information, see section 2.0 of the Apple *Timed Metadata for HTTP Live Streaming* reference.
- CMAF - Metadata is carried in the Event Message box version 1. For more information, see Carriage of ID3 Timed Metadata in CMAF. Event Message boxes include a `scheme_id_uri` field set to `https://aomedia.org/emsg/ID3` and a `value` field set to `0`.

Metadata signaling

DASH manifests include a `<InbandEventStream schemeIdUri="https://aomedia.org/emsg/ID3" value="0"/>` element in AdaptationSets that include tracks with ID3 metadata.

HLS manifests don't have specific metadata signaling.

MediaLive configuration

You can produce ID3 metadata in AWS Elemental MediaLive MediaPackage output groups either by passing through ID3 metadata, or inserting ID3 metadata using the schedule.

AWS Elemental MediaPackage rendition groups reference

Rendition groups are used in TS and CMAF outputs from MediaPackage. A rendition group collects all subtitle or audio tracks and makes them available for all video renditions in the stream. When you enable rendition groups, MediaPackage pulls together all audio variants (such as different languages or codecs) and groups them for use with any video rendition. MediaPackage automatically puts subtitles into a rendition group.

Audio and subtitles tracks are required to be in their own rendition groups for CMAF outputs.

The following sections further describe when you can use rendition groups.

> **Note**
>
> DASH doesn't use rendition groups. This is because all audio, video, and subtitle or caption tracks are presented individually to the player, and the player determines which are used during playback.

When to use rendition groups

Rendition groups are used only in TS and CMAF outputs. Rendition groups are most beneficial when you have multiple languages or multiple audio codecs in your streams. Rendition groups should be used in the following use cases:

- With CMAF outputs, if there are any audio or subtitle tracks

  CMAF requires all audio tracks in one rendition group, and all subtitles in another. Audio or subtitles can't be muxed with video tracks.
- One or more video tracks with multiple audio languages or codecs

  When rendition groups are enabled, MediaPackage pulls all audio renditions together for shared use between the video tracks. In this way, you don't have to duplicate all the audio options across all the video tracks.
- Multiple audio-only tracks and multiple subtitle tracks

  When both the audio tracks and subtitle tracks are in rendition groups, all the audio options can be combined with any subtitle track.
- One audio-only track and multiple subtitle tracks

  MediaPackage automatically pulls subtitle tracks into a rendition group so that the audio track can be used with any subtitle. Because there is only one audio and the subtitles are already grouped, you don't need to tell MediaPackage to use rendition groups in this case.

When not to use rendition groups

Rendition groups can't or shouldn't be used in the following use cases:

- Multiple video tracks in the stream, but only one language or codec is used for the audio. If the same audio is used with multiple video tracks, and rendition groups are also used, then your rendition group will have duplicates of the same audio track (one for each video).

  Keep the audio and video muxed in the stream, and do not use a rendition group.
- DASH outputs. These protocols do not support rendition groups. Instead, the output stream includes all tracks, and the player determines which to play based on rules from the player side or from the manifest (such as language or bitrate selection).

To limit the tracks available to a player, use the stream selection options from the MediaPackage console or the MediaPackage API.

SCTE-35 message options in AWS Elemental MediaPackage

This section describes the options that AWS Elemental MediaPackage offers for configuring how SCTE-35 messages are handled in live TS and CMAF outputs.

SCTE-35 messages accompany video in your source content. These messages signal where MediaPackage should insert ad markers when it packages the content for output. By default, MediaPackage inserts markers for the following message types in the source content:

- Splice insert
- Break
- Provider advertisement
- Distributor advertisement
- Provider placement opportunity
- Distributor placement opportunity
- Provider overlay placement opportunity
- Distributor overlay placement opportunity
- Program

When these commands are present, MediaPackage inserts corresponding ad markers in the output manifests:

- For daterange in HLS manifests on TS and CMAF origin endpoints, MediaPackage inserts `EXT-X-DATERANGE` tags.
- For DASH manifests on CMAF origin endpoints, MediaPackage inserts `EventStream` tags to create multiple periods, when you have multi-period manifests enabled.

The following sections describe how you can modify MediaPackage SCTE-35 message handling behavior.

Topics

- How SCTE-35 messages work in AWS Elemental MediaPackage works
- SCTE-35 settings in MediaPackage
- HLS EXT-X-DATERANGE ad markers in AWS Elemental MediaPackage
- DASH ad markers in AWS Elemental MediaPackage

How SCTE-35 messages work in AWS Elemental MediaPackage works

The **Ad markers** and **SCTE filtering** settings work together to determine what MediaPackage does with SCTE-35 messages from the source content.

When there are SCTE-35 messages in the source content, MediaPackage takes the following actions based on the value that you selected in **Ad markers**:

- For **Daterange**, MediaPackage inserts `EXT-X-DATERANGE` tags to signal ads and program transition events in HLS output manifests.
- For **XML** or **Binary**, MediaPackage inserts EventStream elements in the DASH manifests, with the selected signaling type, and create new periods when detecting markers defined as Ad markers.

⚠ **Important**

MediaPackage will also signal SCTE-35 markers present in the source that are not ad markers, in both HLS and DASH manifests. As regards DASH manifests specifically, these markers will not create a new period but will be placed in the period corresponding to the marker timing.

SCTE-35 settings in MediaPackage

You can modify how MediaPackage interacts with SCTE-35 messages from your source content. Configure the following settings on your origin endpoints. For more information, see the following:

- For the MediaPackage console, see the section called "Creating an origin endpoint".
- For the MediaPackage API, see CreateOriginEndpoint in the *AWS Elemental MediaPackage Live API Reference*.

⚠ **Important**

To modify how MediaPackage handles SCTE-35 messages, you should be familiar with the SCTE-35 standard. You can view the most recent standards here: SCTE Standards Catalog. You should also be familiar with how SCTE-35 is implemented in your source content.

The SCTE configuration is achieved through settings available both at the segment level and at the manifest level.

Enable SCTE support

This setting is available on TS and CMAF origin endpoints, in the Segment settings parameters group. When enabled, it allows to define the SCTE configuration options in both the Segment settings and Manifest definitions parameters groups.

SCTE filtering

This setting is available on TS and CMAF origin endpoints.

SCTE filtering identifies which SCTE-35 message types MediaPackage treats as ads in the output manifest.

If you don't change this setting, MediaPackage treats these message types as ads:

- Splice insert
- Break
- Provider advertisement
- Distributor advertisement
- Provider placement opportunity
- Distributor placement opportunity
- Provider overlay placement opportunity
- Distributor overlay placement opportunity
- Program

Ad markers

This setting is available for both HLS and DASH manifests, in the SCTE configuration section of the Manifest definitions parameters group.

Ad markers allows you to specify what MediaPackage does when it detects SCTE-35 messages. These are the options for HLS manifests:

- **Daterange –** Insert `EXT-X-DATERANGE` tags to signal ads and program transition events in TS and CMAF output manifests. If you choose daterange, you *must* also enter a **Program date/ time interval (sec.)** value of 1 or greater.

For DASH manifests on CMAF endpoints, these are the options:

- **XML** - inserts EventStream elements with the `urn:scte:scte35:2013:xml` scheme
- **Binary** - inserts EventStream elements with the `urn:scte:scte35:2014:xml+bin` scheme

HLS EXT-X-DATERANGE ad markers in AWS Elemental MediaPackage

Daterange ad markers are used to signal ads and program transitions in live HLS manifests. When you enable daterange ad markers on your origin endpoint, MediaPackage inserts `EXT-X-DATERANGE` tags into the manifest where there are SCTE-35 `time_signal` or `splice_insert` tags present. `EXT-X-DATERANGE` is used in concert with `EXT-X-PROGRAM-DATE-TIME` tags.

For information about the `EXT-X-DATERANGE` and `EXT-X-PROGRAM-DATE-TIME` tags for HLS, see the HTTP Live Streaming 2nd Edition Specification.

Enabling daterange via the console

To enable daterange ad markers when creating or editing an origin endpoint, in the MediaPackage console, under the HLS or LL-HLS manifest settings, **SCTE configuration**, **Ad markers**, choose **Daterange**.

If you choose daterange, you *must* also enter a **Program date/time interval (sec.)** value of 1 or greater. The program date/time interval is set in the same manifest fields as the ad marker settings.

Enabling daterange via the AWS CLI

To enable daterange ad markers for your origin endpoint, run the following command in the AWS CLI replacing *`region`* with your own information:

```
  aws --endpoint=https://mediapackagev2.region.amazonaws.com mediapackage --
region region create-origin-endpoint --channel-id test_channel --id hlsmuxed
```

```
  --hls-package "{\"ProgramDateTimeIntervalSeconds\":60,\"AdMarkers\":\"DATERANGE\"}"
```

Important

You must set a `ProgramDateTimeIntervalSeconds` value that's greater than 0 (zero).

Enabling daterange via the MediaPackage API or AWS SDK

To learn how to enable daterange ad markers for TS and CMAF origin endpoints via the MediaPackage live API or AWS SDK, see the following:

- MediaPackage Live API reference
- AWS SDK

Example HLS manifest showing SCTE-35 EXT-X-DATERANGE signaling

This example shows a HLS manifest generated by MediaPackage using `EXT-X-DATERANGE` and `EXT-X-PROGRAM-DATE-TIME` tags to signal events in the live stream.

Note

The `DURATION`, `PLANNED-DURATION`, and `END-DATE` attributes of the `EXT-X-DATERANGE` tag are optional. If these attributes aren't present in the SCTE-35 input, or aren't set when you create your origin endpoint via the MediaPackage API, then they are omitted from the generated manifests.

```
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-TARGETDURATION:8
#EXT-X-MEDIA-SEQUENCE:11
#EXT-X-DATERANGE:ID="2415919105",START-DATE="2020-05-03T00:01:00.018Z",PLANNED-
DURATION=29.988,SCTE35-
OUT=0xFC303000000002CDE400FFF00506FE00526C14001A021843554549900000017FC00000292EA80A04ABCD00013
#EXT-X-DATERANGE:ID="2147483649",START-DATE="2020-05-03T00:00:30.030Z",PLANNED-
DURATION=90.006,SCTE35-
CMD=0xFC303000000002CDE400FFF00506FE00293D6C001A021843554549800000017FFF00007B9ABC0A04ABCD00011
```

```
#EXT-X-PROGRAM-DATE-TIME:2020-05-03T00:01:08.040Z
#EXTINF:7.560,
index_1_11.ts?m=1588607409
#EXTINF:7.560,
index_1_12.ts?m=1588607409
#EXTINF:6.846,
index_1_13.ts?m=1588607409
#EXT-X-DATERANGE:ID="2415919105",START-DATE="2020-05-03T00:01:00.018Z",END-
DATE="2020-05-03T00:01:30.006Z",DURATION=29.988
#EXTINF:0.714,
index_1_14.ts?m=1588607409
#EXTINF:7.560,
index_1_15.ts?m=1588607409
#EXTINF:7.560,
index_1_16.ts?m=1588607409
#EXTINF:7.560,
index_1_17.ts?m=1588607409
#EXTINF:6.636,
index_1_18.ts?m=1588607409
#EXT-X-DATERANGE:ID="2147483649",START-DATE="2020-05-03T00:00:30.030Z",END-
DATE="2020-05-03T00:02:00.036Z",DURATION=90.006,SCTE35-
CMD=0xFC304A00000002CDE400FFF00506FE00A4D82800340218435554549800000017FC000000000000A04ABCD00011
#EXT-X-DATERANGE:ID="2147483650",START-DATE="2020-05-03T00:02:00.036Z",PLANNED-
DURATION=90.006,SCTE35-
CMD=0xFC304A00000002CDE400FFF00506FE00A4D82800340218435554549800000017FC000000000000A04ABCD00011
#EXTINF:0.924,
index_1_19.ts?m=1588607409
#EXTINF:7.560,
index_1_20.ts?m=1588607409
#EXT-X-PROGRAM-DATE-TIME:2020-05-03T00:02:08.520Z
#EXTINF:7.560,
index_1_21.ts?m=1588607409
#EXT-X-ENDLIST
```

DASH ad markers in AWS Elemental MediaPackage

DASH EventStream elements are used to signal all SCTE-35 `time_signal` or `splice_insert` markers present in the source. When you configure the ad markers to use the XML signaling, all the SCTE-35 markers parameters will be described through multiple nested XML elements inside the Event element. When you configure the Ad markers to use the Binary signaling, all the SCTE-35 markers parameters will be described through a Signal element including a binary base64-encoded representation of the SCTE marker, nested inside the Event element.

For more information about the XML and Binary signaling schemes for DASH, see section 5.5.2 of the DASH Industry Forum IOP Guidelines v5.

The following table describes how to enable DASH ad markers in MediaPackage.

Console

To enable DASH ad markers when creating or editing an origin endpoint, in the MediaPackage console, under the DASH manifest settings, **SCTE configuration**, **Ad markers**, choose **XML** or **Binary**.

AWS CLI

To enable DASH ad markers for your origin endpoint, run one of the following commands in the AWS CLI replacing *region* with your own information:

```
aws --endpoint=https://mediapackagev2.region.amazonaws.com mediapackage --region
 region create-origin-endpoint --channel-id test_channel --id test
_endpoint  --dash-package "{\"AdMarkerDash\":\"XML\"}"
```

or

```
aws --endpoint=https://mediapackagev2.region.amazonaws.com mediapackage --region
 region create-origin-endpoint --channel-id test_channel --id test
_endpoint  --dash-package "{\"AdMarkerDash\":\"BINARY\"}"
```

API and SDK

To learn how to enable DASH ad markers for DASH manifests on CMAF origin endpoints via the MediaPackage live API or AWS SDK, see the following:

- MediaPackage Live API reference
- AWS SDK

Example DASH manifest showing SCTE-35 EXT-X-DATERANGE signaling

This example shows a DASH manifest generated by MediaPackage using XML signal approach to signal a `splice_insert` event in the live stream.

```
<MPD id="0" profiles="urn:mpeg:dash:profile:isoff-live:2011"
 type="dynamic" minimumUpdatePeriod="PT2S" minBufferTime="PT5S"
 timeShiftBufferDepth="PT3M28.267S" suggestedPresentationDelay="PT10S"
 availabilityStartTime="2024-01-01T00:00:00.000000+00:00" xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance" xmlns:scte35="urn:scte:scte35:2013:xml"
 xmlns="urn:mpeg:dash:schema:mpd:2011" xmlns:mspr="urn:microsoft:playready"
 xsi:schemaLocation="urn:mpeg:dash:schema:mpd:2011 http://standards.iso.org/
ittf/PubliclyAvailableStandards/MPEG-DASH_schema_files/DASH-MPD.xsd"
 publishTime="2024-04-06T15:19:18.000806+00:00">
  <Period id="1712416567334" start="PT2319H16M7S" duration="PT30S">
    <EventStream schemeIdUri="urn:scte:scte35:2013:xml" timescale="90000">
      <Event presentationTime="2013000" duration="2700000">
        <scte35:SpliceInfoSection duration="2700000" protocolVersion="0"
 ptsAdjustment="207000" tier="4095">
          <scte35:SpliceInsert spliceEventId="99" spliceEventCancelIndicator="false"
 outOfNetworkIndicator="true" spliceImmediateFlag="false" uniqueProgramId="1"
 availNum="1" availsExpected="1">
            <scte35:Program>
              <scte35:SpliceTime ptsTime="1806000"/>
            </scte35:Program>
            <scte35:BreakDuration autoReturn="true" duration="2700000"/>
          </scte35:SpliceInsert>
        </scte35:SpliceInfoSection>
      </Event>
    </EventStream>
    <AdaptationSet id="415376840" contentType="video" mimeType="video/mp4"
 segmentAlignment="true">
      <SegmentTemplate timescale="60000" media="segment_$RepresentationID$_$Number
$.mp4" initialization="segment_$RepresentationID$_0_init.mp4" startNumber="6"
 presentationTimeOffset="1342000">
        <SegmentTimeline>
          <S t="1342000" d="56000"/>
          <S t="1398000" d="240000" r="6"/>
          <S t="3078000" d="60000"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="1" bandwidth="200000" frameRate="30/1" codecs="avc1.42C01E"
 width="360" height="240"/>
    </AdaptationSet>
    <AdaptationSet id="415406662" contentType="video" mimeType="video/mp4"
 segmentAlignment="true">
      <SegmentTemplate timescale="60000" media="segment_$RepresentationID$_$Number
$.mp4" initialization="segment_$RepresentationID$_0_init.mp4" startNumber="6"
 presentationTimeOffset="1342000">
```

```
        <SegmentTimeline>
          <S t="1342000" d="56000"/>
          <S t="1398000" d="240000" r="6"/>
          <S t="3078000" d="60000"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="2" bandwidth="400000" frameRate="30/1" codecs="avc1.42C01E"
 width="480" height="360"/>
    </AdaptationSet>
    <AdaptationSet id="972192134" contentType="audio" mimeType="audio/mp4"
 segmentAlignment="true" lang="und">
      <Label>und</Label>
      <SegmentTemplate timescale="48000" media="segment_$RepresentationID$_$Number
$.mp4" initialization="segment_$RepresentationID$_0_init.mp4" startNumber="6"
 presentationTimeOffset="1073600">
        <SegmentTimeline>
          <S t="1076032" d="44032"/>
          <S t="1120064" d="192512"/>
          <S t="1312576" d="191488"/>
          <S t="1504064" d="192512"/>
          <S t="1696576" d="191488"/>
          <S t="1888064" d="192512"/>
          <S t="2080576" d="191488"/>
          <S t="2272064" d="192512"/>
          <S t="2464576" d="48128"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="3" bandwidth="98709" codecs="mp4a.40.2"
 audioSamplingRate="48000">
        <AudioChannelConfiguration
 schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2"/>
      </Representation>
      <Representation id="4" bandwidth="98709" codecs="mp4a.40.2"
 audioSamplingRate="48000">
        <AudioChannelConfiguration
 schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2"/>
      </Representation>
    </AdaptationSet>
    <SupplementalProperty schemeIdUri="urn:scte:dash:utc-time"
 value="2024-04-06T15:16:07.334Z"/>
  </Period>
</MPD>
```

This example shows a DASH manifest generated by MediaPackage using Binary signal approach to signal a `splice_insert` event in the live stream.

```
<MPD id="0" profiles="urn:mpeg:dash:profile:isoff-live:2011"
 type="dynamic" minimumUpdatePeriod="PT2S" minBufferTime="PT5S"
 timeShiftBufferDepth="PT54.400S" suggestedPresentationDelay="PT10S"
 availabilityStartTime="2024-01-01T00:00:00.000000+00:00" xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance" xmlns:scte35="urn:scte:scte35:2013:xml"
 xmlns="urn:mpeg:dash:schema:mpd:2011" xmlns:mspr="urn:microsoft:playready"
 xsi:schemaLocation="urn:mpeg:dash:schema:mpd:2011 http://standards.iso.org/
ittf/PubliclyAvailableStandards/MPEG-DASH_schema_files/DASH-MPD.xsd"
 publishTime="2024-04-12T17:44:20.000866+00:00">
  <Period id="1712943821467" start="PT2465H43M41S" duration="PT30S">
    <EventStream schemeIdUri="urn:scte:scte35:2014:xml+bin" timescale="90000">
      <Event presentationTime="2013000" duration="2700000">
        <Signal xmlns="http://www.scte.org/schemas/35/2016">
          <Binary>/DAlAAAAAyiYAP/wFAUAAABjAOCAABuOsIAAKTLgAAEBAQAAbK+RAw==</Binary>
        </Signal>
      </Event>
    </EventStream>
    <AdaptationSet id="415376840" contentType="video" mimeType="video/mp4"
 segmentAlignment="true">
      <SegmentTemplate timescale="60000" media="segment_$RepresentationID$_$Number
$.mp4" initialization="segment_$RepresentationID$_0_init.mp4" startNumber="5"
 presentationTimeOffset="1342000">
        <SegmentTimeline>
          <S t="1342000" d="56000"/>
          <S t="1398000" d="240000" r="6"/>
          <S t="3078000" d="60000"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="1" bandwidth="200000" frameRate="30/1" codecs="avc1.42C01E"
 width="360" height="240"/>
    </AdaptationSet>
    <AdaptationSet id="415406662" contentType="video" mimeType="video/mp4"
 segmentAlignment="true">
      <SegmentTemplate timescale="60000" media="segment_$RepresentationID$_$Number
$.mp4" initialization="segment_$RepresentationID$_0_init.mp4" startNumber="5"
 presentationTimeOffset="1342000">
        <SegmentTimeline>
          <S t="1342000" d="56000"/>
          <S t="1398000" d="240000" r="6"/>
          <S t="3078000" d="60000"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="2" bandwidth="400000" frameRate="30/1" codecs="avc1.42C01E"
 width="480" height="360"/>
    </AdaptationSet>
    <AdaptationSet id="972192134" contentType="audio" mimeType="audio/mp4"
 segmentAlignment="true" lang="und">
      <Label>und</Label>
      <SegmentTemplate timescale="48000" media="segment_$RepresentationID$_$Number
$.mp4" initialization="segment_$RepresentationID$_0_init.mp4" startNumber="5"
 presentationTimeOffset="1073600">
        <SegmentTimeline>
          <S t="1073856" d="44032"/>
          <S t="1117888" d="192512"/>
          <S t="1310400" d="191488"/>
          <S t="1501888" d="192512"/>
          <S t="1694400" d="191488"/>
          <S t="1885888" d="192512"/>
          <S t="2078400" d="191488"/>
          <S t="2269888" d="192512"/>
          <S t="2462400" d="48128"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="3" bandwidth="96446" codecs="mp4a.40.2"
 audioSamplingRate="48000">
        <AudioChannelConfiguration
 schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2"/>
      </Representation>
      <Representation id="4" bandwidth="96446" codecs="mp4a.40.2"
 audioSamplingRate="48000">
        <AudioChannelConfiguration
 schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2"/>
      </Representation>
    </AdaptationSet>
    <SupplementalProperty schemeIdUri="urn:scte:dash:utc-time"
 value="2024-04-12T17:43:41.467Z"/>
  </Period>
</MPD>
```

Time-shifted viewing with AWS Elemental MediaPackage

Time-shifted viewing is available with live workflows in AWS Elemental MediaPackage.

Time-shifted viewing means that viewers can start watching a live stream at a time earlier than "now," permitting them to join from the beginning a show that's already in progress or to watch a show that's already completed. Time-shifted viewing effectively makes live events available for viewing on demand. MediaPackage supports time-shifted viewing for content that's up to 336 hours (14 days) old. You can enable time-shifted viewing for some or all of this content by defining the **startover window** on the endpoint. Manifests from within the startover window can be time shifted.

The following steps describe time-shift options and how to set them up. In these steps, "now" is determined either by the program date time (PDT) present in the source content from the encoder or, if this PDT information is not included, by the MediaPackage ingest time of the most recent segment.

⚠ **Important**

When using time-shifted viewing, we recommend using consistent playback windows across player sessions, rather than generating a unique start or end time for each viewer. This yields better caching at the CDN, and will avoid running into potential throttling related to those requests, on the MediaPackage level.

Step 1: Set the startover window

To create time-shifted manifests, you must define the live content that will be made available to view on demand. In MediaPackage, this eligible content is identified in your startover window. The startover window can be up to 24 hours long. You can set the window on the endpoint object, either through the MediaPackage console or MediaPackage API.

You might notice that the manifest lags behind real time when you initially create a startover window on an endpoint. This is because MediaPackage starts filling the manifest from the start of the window, and works up to "now." So, if you have a 24-hour startover window, MediaPackage fills the manifest starting 24 hours ago and working up to "now."

Step 2: Choose time-shifted options

You can apply time-shifted options to all manifests that originate from a MediaPackage endpoint by configuring the option on the endpoint. Alternatively, you can apply these options dynamically at the time of the content playback request by including query parameters.

You can choose from the following time-shifted options:

- Delay content availability: Set a delay for availability of live content.
- Define a manifest start and end: Set the time blocks of content are available from within the startover window. These blocks are defined by times provided in the start and end parameters.
- Limit a manifest duration : blocks of content with the specified duration are available within the startover window. The blocks are defined by the duration (in seconds) of the content and can come from different places in the startover window.

To use time shifting on all manifests that originate from an endpoint, set the filter configuration in the manifest settings of the endpoint. For more information, see Manifest fields.

To use time shifting dynamically across requests, append query parameters to playback requests. For more information, see Time-shifted query parameters.

Learn more about these options in the following topics.

Topics

Time-shifted query parameters in AWS Elemental MediaPackage

To use time-shifted viewing query parameters, append `aws.manifestsettings` to your playback request to MediaPackage. MediaPackage evaluates the query, and serves a client manifest based on those query parameters. Manifest queries are *not* case-sensitive and can be up to 1024 characters long. If the query is malformed, MediaPackage returns an error. For query syntax, see the following section.

Query syntax

The base query parameter for time-shifted viewing is `aws.manifestsettings`, which is followed by optional parameter name and value pairs. To construct the query, append ?

aws.manifestsettings= to the end of the MediaPackage endpoint URL, followed by parameter names and values. For a list of all of the available parameters, see Query parameters.

An Apple HLS filter query might look like this:

```
https://example-mediapackage-endpoint.mediapackage.us-west-2.amazonaws.com/
out/v1/examplemediapackage/index.m3u8?aws.manifestsettings=
```

The query syntax is listed in the following table.

Note

If you use Amazon CloudFront as your CDN, you might need to set additional configurations. For more information, see Configure cache behavior for all endpoints.

Query string component	Description
?	A restricted character that marks the beginning of a query.
aws.manifestsettings=	The base query, which is followed by parameters constructed of name and value pairs. For a list of all of the available parameters, see Query parameters.
:	Used to associate the parameter name with a value. For example, *parameter_name* :*value*.
;	Separates parameters in a query that contains multiple parameters. For example, *parameter1_name:value* ;*parameter2_name:minValue-maxValue* . When used in a list of parameters for the same query, implies an AND operation.

Date and time format requirements

In all cases, the date and time must be notated in one of the following formats:

- ISO 8601 dates, such as 2017-08-18T21:18:54+00:00. Where -08:00 is the timezone UTC -08:00.
- POSIX (or Epoch) time, such as 1503091134

DASH parameter rules

Start and end parameters in the URL request for DASH content can use standard parameter notation, or can be included as path elements in the URL.

- Query parameter notation – start and end parameters are included at the end of the request URL

  Example

  ```
  https://cf98fa7b2ee4450e.mediapackagev2.us-east-1.amazonaws.com/out/
  v1/997cbb27697d4863bb65488133bff26f/sports.mpd?start=1513717228&end=1513720828
  ```

- Path elements – start and end parameters are included in the path of the request URL

  Example

  ```
  https://cf98fa7b2ee4450e.mediapackagev2.us-east-1.amazonaws.com/out/
  v1/997cbb27697d4863bb65488133bff26f/start/2017-12-19T13:00:28-08:00/end/
  2017-12-19T14:00:28-08:00/sports.mpd
  ```

TS and CMAF parameter rules

Start and end parameters in the URL request for TS content can use standard parameter notation.

- Query parameter notation – start and end parameters are included at the end of the request URL

  Example TS

  ```
  https://cf98fa7b2ee4450e.mediapackagev2.us-east-1.amazonaws.com/out/
  v1/064134724fd74667ba294657a674ae72/
  comedy.m3u8?start=2017-12-19T13:00:28-08:00&end=2017-12-19T14:00:28-08:00
  ```

  Example CMAF

  ```
  https://cf98fa7b2ee4450e.mediapackagev2.us-east-1.amazonaws.com/out/
  v1/064134724fd74667ba294657a674ae72/manifest_id/
  news.m3u8?start=2018-04-04T01:14:00-08:00&end=2018-04-04T02:15:00-08:00
  ```

Query parameters

Playback devices can append the following time-shifted viewing query parameters to their requests to MediaPackage. Responses to requests with one or more of these parameters will include manifests that adhere to the specified time-shifted query parameters.

If you want all manifests served from this origin endpoint to be time shifted, enable the settings on the endpoint, as described in Creating an origin endpoint in AWS Elemental MediaPackage.

> **Note**
>
> The `manifest_window_seconds` option is available only as a query parameter on a session initialization URL, and not as a setting on the endpoint. This is because the `manifest_window_seconds` query parameter modifies the standard length of the manifest that's configured through the **Manifest window** setting on the endpoint. For more information about manifest window relationships, see Window duration.

Name	Description	Example
`clip_start_time`	• With a time delay manifest, defines the earliest content that should be available in this manifest. • **Accepted values**: Epoch or ISO 8601 timestamp that represents the earliest date and time that live content is available in the manifest. ◦ `clip_start_time` can't be combined with `start` or end parameters. ◦ `clip_start_time` query parameters can't be combined with **Clip start time** settings on the origin endpoint.	`stream.mpd?aws.manifestsettings=subtitle_language:en-US, hi;clip_start_time:1720246778`

Name	Description	Example
manifest_window_seconds	- Used to request a manifest that's shorter than manifest window for this request. - **Accepted values**: Integer that represents the desired manifest window in seconds. - At minimum, the value provided must be greater than or equal to double the length of the segment target duration. This is to ensure that the window includes at least two segments. - At maximum, the value provided must be less than the configured manifest window in the manifest settings for the origin endpoint.	stream.mpd?aws.manifestsettings=manifest_window_seconds:30
start	- Used to denote the beginning of a time-shifted manifest. For more information, see Define manifest start and end times from AWS Elemental MediaPackage. - **Accepted values**: Epoch or ISO 8601 timestamp that represents the start date and time for content in the manifest.	stream.mpd?aws.manifestsettings=start:1732285823

Name	Description	Example
`end`	• Used to denote the end of a time-shifted manifest. For more information, see [Define manifest start and end times from AWS Elemental MediaPackage](). • **Accepted values**: Epoch or ISO 8601 timestamp that represents the start date and time for content in the manifest.	`stream.mpd?aws.manifestsettings=end:1732300175`
`time_delay`	• Used to redefine the live point for this request. For more information, see [Define manifest start and end times from AWS Elemental MediaPackage]().	`stream.mpd?aws.manifestsettings=time_delay:320`

Delay content availability from AWS Elemental MediaPackage

You can specify a duration (in seconds) for MediaPackage to delay when content is available to players. The minimum time is 0 seconds. The following rules determine the maximum time:

- If `startoverwindow` is equal to `0`, the maximum time is 86,400 seconds (24 hours).
- If `startoverwindow` is not equal to `0`, the maximum time is the value of `startoverwindow`.

Use `time_delay` to redefine the live point and make content available at a time that equals "now" minus the delay specified. With a 60-second `time_delay`, content that MediaPackage receives at 12:20 isn't available until 12:21. Requests for playback at 12:20 will be served with content from 12:19. Likewise, if you're serving content across time zones, you can set a `time_delay` equal to the time zone difference to make content available at, for example, 8:00 local time.

The time delay duration must be less than the startover window duration.

Tip

Use a `time_delay` to help reduce buffering during input switching when you're using input redundancy with short output segments. Note that the delay can increase latency in content playback.

Using clip start with time delay

When you use the time delay function in MediaPackage, content availability is delayed by the specified amount. As content progresses, the manifest grows to your specified manifest window (seconds). Until the manifest has reached that window size with new content, content from before the start time can be available.

For example, one event ends at 925, and the other starts at 930. You set the time delay for the 930 event so that content is available at 932, and you defined your manifest window as 900 seconds (15 minutes). A viewer starts watching the event at 935, which is 3 minutes into the event. The manifest is 15 minutes long, so there is still another 12 minutes of content available from before the event started, so the viewer can see content from the event that ended at 925.

Depending on your contractual obligations, you might not want viewers to have access to the earlier content. To mitigate these concerns, you can use the clip start functionality in MediaPackage. With clip start, you can specify the earliest available content in the manifest. In the previous example, you could set the clip start time to 930 to ensure that viewers can't see content from before the current event.

You can enable the clip start setting on this endpoint so that all manifests that originate from this endpoint will include the clipped time. For information about adding clip start to an endpoint, see Creating an origin endpoint in AWS Elemental MediaPackage.

Alternatively, manifest requests that include the `aws.manifestsettings=clip_start_time:` query parameter will be clipped so that content from before the specified time is not available. Requests to this endpoint that don't include the query parameter will receive a standard manifest, as defined by the endpoint's settings. MediaPackage returns an error to the requesting device if the clip start is set on the endpoint and included in request query parameters.

A note about start parameters

Clip start can't be used with *start* and *end* parameters.

Clip start and start parameters offer similar functionality, but have different practical purposes.

- Clip start is used to ensure that content before the set time is blocked. The manifest continues to grow, up to the defined window duration.
- Start is used to ensure that content before the set time is blocked. If used with an *end* parameter, the returned manifest ends at the specified time. If not used with an *end* parameter, the returned manifest continues to grow up to the value of the startover window.

Define manifest start and end times from AWS Elemental MediaPackage

MediaPackage accepts requests for up to 24 hours of content.

When requests with start and end parameters that are within the startover window are sent to this endpoint, MediaPackage generates a manifest for the requested timeframe. If the start parameter is outside of the startover window, or if the end parameter is before the startover window, the playback request fails. If no start and end parameters are used, the service generates a standard manifest.

Start and end parameters denote the beginning and end of a time-shifted manifest from MediaPackage. The playback device can append parameters to the end of a manifest request. Alternatively, the start and end parameters can be specified for the manifest through Filter Configuration parameters. For more information, see step 7 in Manifest fields.

For packager-specific rules about how you can notate the parameters, see Time-shifted query parameters.

The start and end parameters determine the time boundaries of the manifest. These are the expected behaviors based on request start and end parameters:

- If both start and end parameters are specified, the resulting manifest has a fixed start and end time that correspond to the specified start and end parameters.
- If the end time is in the future, the tags in the manifest are consistent with an event manifest. The manifest will continue to grow until it reaches the end time, at which point it will become a VOD manifest.
- If start or end parameters are used that are before the first segment is ingested, or after the last segment is ingested, the playback duration won't match the manifest duration as requested through the query parameters.

  - If the start time is specified and the value is earlier than when the first segment is ingested, MediaPackage uses the actual time that the first segment is ingested as the start of the manifest.
  - If the end time is specified and is later than when the last segment is ingested, MediaPackage uses the actual time that the last segment is ingested as the end of the manifest.
- If a start parameter is specified without an end parameter, the resulting manifest will have a fixed start time corresponding to the specified start parameter, while the end of the manifest will grow as the live content progresses.

> **Note**
>
> For TS output, many playback devices start playback at the current time ("now"). To view the content from the actual start time of the playback window, viewers can seek back on the playback progress bar.

- If no start time or end time parameters are specified, the service will generate a standard manifest.

Limit manifest duration from AWS Elemental MediaPackage

To dynamically request shorter manifests than the manifest window that's configured on the endpoint, use the `?aws.manifestsettings=manifest_window_seconds:` query parameter. When used at session initialization, the resulting manifest will conform to the number of seconds that you specify in the parameter. With `manifest_window_seconds`, you can serve manifests that are a variety of lengths, all from the same endpoint.

If `aws.manifestsettings=manifest_window_seconds:` isn't included in the request query parameters, MediaPackage serves a manifest the length of the window that's configured through **Manifest window (sec)** in the manifest settings when the endpoint was created.

Query parameters in the `aws.manifestsettings` namespace provide additional session-level time manipulation options. See Time-shifted query parameters for an overview.

To filter session-level manifests by audio, video, and subtitle formats, see Manifest filtering.

Time-shifted viewing examples in AWS Elemental MediaPackage

These are MediaPackage time-shifted viewing examples.

Start parameters use case

I need content to start playing from where the customer left off.

Solution: Include the `start` parameter in the playback request URL. Program your playback device to record the time that they customer stopped the stream, then use this timestamp as the value for the `start` parameter.

Example

```
...stream.mpd?aws.manifestsettings=start:1732285823
```

End parameters use case

I need to define when the live content ends. Content is available for playback after this point, but live content won't be added.

Solution: Ensure the **startover window** on the endpoint accurately reflects how long you want the live content to be available for playback (up to 14 days). In playback requests, include the `end` parameter and use the time that live content ends as the parameter value.

Example

```
...stream.mpd?aws.manifestsettings=end:1732300175
```

Manifest window use case

I need to serve manifests of varying length from the same manifest URL because my customers use a variety of devices that have different limitations on manifest window lengths.

Solution: Include the `manifest_window_seconds` parameter in playback request URLs. Use the length limitations from each device as the value of for the `manifest_window_seconds` parameter.

Example

```
...stream.mpd?aws.manifestsettings=manifest_window_seconds:30
```

```
...stream.mpd?aws.manifestsettings=manifest_window_seconds:120
```

Enabling trick-play in AWS Elemental MediaPackage

Trick-play, sometimes called trick mode, provides a visual cue to viewers as they rewind, fast-forward, or seek through content in a digital video player. This helps the person using the video player to visualize where they are in the content timeline.

MediaPackage supports the following trick-play types:

Supported trick-play types for live workflows

Streaming protocol	I-frame only	Image-based
HLS with TS segments	√	√
HLS with CMAF segments	√	√
DASH	√	√

The following sections describe how to enable trick play in MediaPackage.

Topics

- Using I-frame playlists to enable in AWS Elemental MediaPackage trick-play
- Using image media playlists to enable trick-play in AWS Elemental MediaPackage

Using I-frame playlists to enable in AWS Elemental MediaPackage trick-play

MediaPackage supports live trick-play by creating an I-frame playlist from an existing live stream. The I-frame playlist contains the I-frame only video segments that your player uses for the image thumbnails. For information about I-frame playlists, see the HTTP Live Streaming 2nd Edition specification.

To use an I-frame playlist to enable trick-play for HLS

- In the MediaPackage console, choose **Include Iframe-only stream** in the Segment settings when creating or editing an endpoint. MediaPackage generates I-frame only streams for each rendition in the parent playlist.

This example HLS parent playlist generated by MediaPackage uses `EXT-X-I-FRAME-STREAM-INF` tags for each rendition and includes the `"index_1_iframe.m3u8"` and `"index_2_iframe.m3u8"` child playlist URIs.

```
#EXTM3U
#EXT-X-VERSION:4
#EXT-X-INDEPENDENT-SEGMENTS
#EXT-X-STREAM-INF:CODECS="avc1.42001f,mp4a.40.2",AVERAGE-
BANDWIDTH=1000,RESOLUTION=1920x1080,VIDEO-RANGE=SDR,FRAME-
RATE=30.0,BANDWIDTH=2000,CLOSED-CAPTIONS="CC"
index_1.m3u8
#EXT-X-STREAM-INF:CODECS="avc1.42001f,mp4a.40.2",AVERAGE-
BANDWIDTH=2000,RESOLUTION=1920x1080,VIDEO-RANGE=SDR,FRAME-
RATE=30.0,BANDWIDTH=3000,CLOSED-CAPTIONS="CC"
index_2.m3u8
#EXT-X-STREAM-INF:CODECS="mp4a.40.2",AVERAGE-BANDWIDTH=1000,BANDWIDTH=2000
index_3.m3u8
#EXT-X-I-FRAME-STREAM-
INF:CODECS="avc1.42001f,mp4a.40.2",RESOLUTION=1920x1080,VIDEO-
RANGE=SDR,BANDWIDTH=1000,URI="index_1_iframe.m3u8"
#EXT-X-I-FRAME-STREAM-
INF:CODECS="avc1.42001f,mp4a.40.2",RESOLUTION=1920x1080,VIDEO-
RANGE=SDR,BANDWIDTH=1000,URI="index_2_iframe.m3u8"
```

MediaPackage also inserts `EXT-I-FRAMES-ONLY` tags in the child playlist, and then generates and includes an I-frame only playlist in the stream. This playlist enables player functionality like fast forward and rewind.

This example HLS child playlist generated by MediaPackage uses the `EXT-X-I-FRAMES-ONLY` tag and includes the `index_1_iframe_0.ts` segment URI.

```
#EXTM3U
#EXT-X-VERSION:4
#EXT-X-INDEPENDENT-SEGMENTS
#EXT-X-TARGETDURATION:6
#EXT-X-MEDIA-SEQUENCE:0
#EXT-X-DISCONTINUITY-SEQUENCE:0
#EXT-X-I-FRAMES-ONLY
#EXT-X-PROGRAM-DATE-TIME:2021-12-07T10:00:00Z
#EXTINF:6.0,
index_1_iframe_0.ts
```

To use an I-frame playlist to enable trick-play for DASH

- MediaPackage supports live trick-play by creating an I-frame representation from an existing live stream. The I-frame representation contains the I-frame only video segments that your player uses for the image thumbnails.

  For information about I-frame playlists with DASH, see the DASH-IF Interoperability Points specification, v4.3, section 3.2.9.

  In the MediaPackage console, choose **Include Iframe-only stream** in the Segment settings, when creating or editing an endpoint. MediaPackage generates I-frame only streams for each rendition in the DASH manifest.

  This example DASH manifest generated by MediaPackage uses a specific AdaptationSet that includes a `<EssentialProperty schemeIdUri="http://dashif.org/guidelines/trickmode" />` element and Representation elements including both a frameRate and a maxPlayoutRate attributes, which values are representative of trickplay track properties.

```
<MPD id="0" profiles="urn:mpeg:dash:profile:isoff-live:2011"
 type="dynamic" minimumUpdatePeriod="PT2S" minBufferTime="PT5S"
 timeShiftBufferDepth="PT1M4.559S" suggestedPresentationDelay="PT10S"
 availabilityStartTime="2024-01-01T00:00:00.000000+00:00"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns="urn:mpeg:dash:schema:mpd:2011" xmlns:mspr="urn:microsoft:playready"
 xsi:schemaLocation="urn:mpeg:dash:schema:mpd:2011 http://standards.iso.org/
ittf/PubliclyAvailableStandards/MPEG-DASH_schema_files/DASH-MPD.xsd"
 publishTime="2024-04-02T17:05:14.000894+00:00">
  <Period id="1712019690992" start="PT2209H1M30S">
    <AdaptationSet id="1170682507" contentType="video" mimeType="video/mp4"
 segmentAlignment="true" codingDependency="false">
      <EssentialProperty schemeIdUri="http://dashif.org/guidelines/trickmode"
 value="2137622408"/>
      <SegmentTemplate timescale="48000" media="cmaf-segment_$RepresentationID
$_$Number$.mp4" initialization="cmaf-segment_$RepresentationID$_8005_init.mp4"
 startNumber="23393" presentationTimeOffset="831120">
        <SegmentTimeline>
          <S t="6589849554" d="180179"/>
          <S t="6590029734" d="180179"/>
          <S t="6590209914" d="180179"/>
          <S t="6590390094" d="180179"/>
          <S t="6590570274" d="180179"/>
          <S t="6590750454" d="180179"/>
          <S t="6590930634" d="180179"/>
          <S t="6591110814" d="180179"/>
          <S t="6591290994" d="180179"/>
          <S t="6591471174" d="180179"/>
          <S t="6591651354" d="180179"/>
          <S t="6591831534" d="180179"/>
          <S t="6592011714" d="180179"/>
          <S t="6592191894" d="180179"/>
          <S t="6592372074" d="180179"/>
          <S t="6592552254" d="180179"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="1_iframe" bandwidth="1048" frameRate="24000/90090"
 codecs="avc1.4D401F" width="1280" height="720" maxPlayoutRate="90"/>
      <Representation id="2_iframe" bandwidth="1572" frameRate="24000/90090"
 codecs="avc1.4D401F" width="1920" height="1080" maxPlayoutRate="90"/>
    </AdaptationSet>
    <AdaptationSet id="2137622408" contentType="video" mimeType="video/mp4"
 segmentAlignment="true">
      <SegmentTemplate timescale="48000" media="cmaf-segment_$RepresentationID
$_$Number$.mp4" initialization="cmaf-segment_$RepresentationID$_8005_init.mp4"
 startNumber="23393" presentationTimeOffset="831120">
        <SegmentTimeline>
          <S t="6589849554" d="180179"/>
          <S t="6590029734" d="180179"/>
          <S t="6590209914" d="180179"/>
          <S t="6590390094" d="180179"/>
          <S t="6590570274" d="180179"/>
          <S t="6590750454" d="180179"/>
          <S t="6590930634" d="180179"/>
          <S t="6591110814" d="180179"/>
          <S t="6591290994" d="180179"/>
          <S t="6591471174" d="180179"/>
          <S t="6591651354" d="180179"/>
          <S t="6591831534" d="180179"/>
          <S t="6592011714" d="180179"/>
          <S t="6592191894" d="180179"/>
          <S t="6592372074" d="180179"/>
          <S t="6592552254" d="180179"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="1" bandwidth="2000000" frameRate="24000/1001"
 codecs="avc1.4D401F" width="1280" height="720"/>
      <Representation id="1" bandwidth="5000000" frameRate="24000/1001"
 codecs="avc1.4D401F" width="1920" height="1080"/>
    </AdaptationSet>
    <AdaptationSet id="972192134" contentType="audio" mimeType="audio/mp4"
 segmentAlignment="true" lang="und">
      <Label>und</Label>
      <SegmentTemplate timescale="48000" media="cmaf-segment_$RepresentationID
$_$Number$.mp4" initialization="cmaf-segment_$RepresentationID$_8005_init.mp4"
 startNumber="23393" presentationTimeOffset="831120">
        <SegmentTimeline>
          <S t="6589853020" d="180224" r="1"/>
          <S t="6590213469" d="180224" r="1"/>
          <S t="6590573917" d="179200"/>
          <S t="6590753117" d="180224"/>
          <S t="6590933342" d="180224" r="3"/>
          <S t="6591654239" d="180224" r="1"/>
          <S t="6592014688" d="180224" r="3"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="6" bandwidth="191522" codecs="mp4a.40.2"
 audioSamplingRate="48000">
        <AudioChannelConfiguration
 schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2"/>
      </Representation>
    </AdaptationSet>
    <SupplementalProperty schemeIdUri="urn:scte:dash:utc-time"
 value="2024-04-02T17:04:13.680Z"/>
  </Period>
</MPD>
```

Using image media playlists to enable trick-play in AWS Elemental MediaPackage

To use image-based trickplay, in your upstream encoder you create an HLS *image media playlist* that contains JPEG image segments. MediaPackage automatically passes through the image segments to the output. These segments are the thumbnail images and image metadata that the video player uses for visual cues. These segments must conform to the Image Media Playlist specification, version 0.4. The service supports the time-based implementation of the specification.

For information about how to configure your upstream encoder to generate an image media playlist, see Configuring your upstream encoder to generate image media playlists.

Input source requirements

Your HLS source content must meet the following requirements:

- The HLS parent playlist that references the image playlist must include the `EXT-X-IMAGE-STREAM-INF` tag.
- The image playlist must include An `EXT-X-IMAGES-ONLY` tag above the segment list.

> **Note**
>
> We recommend that you use decimal durations in the `EXT-INF` and `EXT-X-TILES` tags to help MediaPackage give players the most accurate image durations.

- You must use image segments that are valid JPEG image files less than 20 MB.
- Each JPEG must contain only one image segment. The encoder must produce image segments and video segments at the same cadence.

You can use AWS Media Services to generate an HLS source in your upstream encoder that complies with the Image Media Playlist specification, version 0.4. For more information, see the following section Configuring your upstream encoder to generate image media playlists.

Limitations

Keep in mind the following limitations when using image-based trick-play for MediaPackage:

- MediaPackage doesn't combine image segments for packaging configurations. For example, if the service ingests a live stream with an image asset with a 2 second segment duration, and you specify a segment output duration of 6 seconds, we combine the video and audio segments to be 6 seconds long, but image segments will remain 2 seconds.
- Depending on your HLS player requirements, the use of `EXT-X-PROGRAM-DATE-TIME` tags might be necessary to display the trick-play image.

Configuring your upstream encoder to generate image media playlists

Your HLS source must conform to the Image Media Playlist specification, version 0.4. You can use the following AWS Media Services to create an HLS stream that complies with the specification. For more information, see the following documentation:

- Trick-play track via the Image Media Playlist specification in the *Elemental Live User Guide*.
- Trick-play track via the Image Media Playlist specification in the *AWS Elemental MediaLive User Guide*.

To use an image media playlist to enable trick-play for HLS

- MediaPackage supports live trick-play by creating an image media playlist from an existing live stream. Your source HLS content must conform to the Image Media Playlist specification, version 0.4.

  If your source content includes one or more image media playlists, your HLS output will also include the same image media playlists, with the corresponding signaling in the parent playlist.

  This example HLS parent playlist generated by MediaPackage uses a `EXT-X-IMAGE-STREAM-INF` tag for the image-based trickplay rendition and includes the `"variant-hls_6.m3u8"` child playlist URI. child playlist URIs.

```
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-INDEPENDENT-SEGMENTS
#EXT-X-
MEDIA:LANGUAGE="und",AUTOSELECT=YES,CHANNELS="2",FORCED=NO,TYPE=AUDIO,URI="variant-
hls_5.m3u8",GROUP-ID="audio_0",DEFAULT=YES,NAME="und"
#EXT-X-STREAM-INF:CODECS="mp4a.40.2,avc1.4D4028",AVERAGE-
BANDWIDTH=5500000,RESOLUTION=1920x1080,VIDEO-RANGE=SDR,FRAME-
RATE=30.0,BANDWIDTH=5931112,AUDIO="audio_0"
variant-hls_1.m3u8
#EXT-X-STREAM-INF:CODECS="mp4a.40.2,avc1.4D401F",AVERAGE-
BANDWIDTH=3300000,RESOLUTION=1280x720,VIDEO-RANGE=SDR,FRAME-
RATE=30.0,BANDWIDTH=3643112,AUDIO="audio_0"
variant-hls_2.m3u8
#EXT-X-STREAM-INF:CODECS="mp4a.40.2,avc1.4D401F",AVERAGE-
BANDWIDTH=1650000,RESOLUTION=960x540,VIDEO-RANGE=SDR,FRAME-
RATE=30.0,BANDWIDTH=1927083,AUDIO="audio_0"
variant-hls_3.m3u8
```

```
#EXT-X-STREAM-INF:CODECS="mp4a.40.2,avc1.4D401E",AVERAGE-
BANDWIDTH=825000,RESOLUTION=640x360,VIDEO-RANGE=SDR,FRAME-
RATE=30.0,BANDWIDTH=1069069,AUDIO="audio_0"
variant-hls_4.m3u8
#EXT-X-IMAGE-STREAM-
INF:CODECS="jpeg",RESOLUTION=312x176,BANDWIDTH=131436,URI="variant-hls_6.m3u8"
```

MediaPackage also inserts `EXT-X-IMAGES-ONLY` tags in the child playlist, and then generates and includes an image media playlist in the stream. This playlist enables player functionality like fast forward and rewind.

This example HLS child playlist generated by MediaPackage uses the `EXT-X-IMAGES-ONLY` tag and includes the `segment_6_4595218.jpg` segment URI.

```
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-INDEPENDENT-SEGMENTS
#EXT-X-TARGETDURATION:6
#EXT-X-MEDIA-SEQUENCE:4595218
#EXT-X-DISCONTINUITY-SEQUENCE:22
#EXT-X-IMAGES-ONLY
#EXT-X-PROGRAM-DATE-TIME:2024-04-18T19:16:56.833Z
#EXTINF:6.0,
segment_6_4595218.jpg
#EXT-X-PROGRAM-DATE-TIME:2024-04-18T19:17:02.833Z
#EXTINF:6.0,
segment_6_4595219.jpg
#EXT-X-PROGRAM-DATE-TIME:2024-04-18T19:17:08.833Z
#EXTINF:6.0,
segment_6_4595220.jpg
#EXT-X-PROGRAM-DATE-TIME:2024-04-18T19:17:14.833Z
#EXTINF:6.0,
segment_6_4595221.jpg
#EXT-X-PROGRAM-DATE-TIME:2024-04-18T19:17:20.833Z
```

To use an image media playlist to enable trick-play for DASH

- MediaPackage supports live trick-play by creating an image media playlist from an existing live stream. Your source HLS content must conform to the Image Media Playlist specification, version 0.4.

If your source content includes one or more image media playlists, your DASH output will also include an image-based AdaptationSet and the corresponding image Representations. When MediaPackage outputs content from a DASH packaging configuration or endpoint, the service outputs thumbnails based on the DASH-IF Interoperability Points specification, v4.3, section 6.2.6.

This example DASH manifest generated by MediaPackage uses a specific AdaptationSet in which the representation includes a `<EssentialProperty schemeIdUri="http://dashif.org/guidelines/thumbnail_tile" value="1x1"/>` element indicating that each image represents a discrete image, and not a tiled thumbnails image that includes multiple thumbnails.

```
<MPD id="0" profiles="urn:mpeg:dash:profile:isoff-live:2011"
 type="dynamic" minimumUpdatePeriod="PT2S" minBufferTime="PT5S"
 timeShiftBufferDepth="PT1M4.079S" suggestedPresentationDelay="PT10S"
 availabilityStartTime="2024-01-01T00:00:00.000000+00:00"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns="urn:mpeg:dash:schema:mpd:2011" xmlns:mspr="urn:microsoft:playready"
 xsi:schemaLocation="urn:mpeg:dash:schema:mpd:2011 http://standards.iso.org/
ittf/PubliclyAvailableStandards/MPEG-DASH_schema_files/DASH-MPD.xsd"
 publishTime="2024-04-02T16:57:17.000063+00:00">
  <Period id="1712019690992" start="PT2209H1M30S">
    <AdaptationSet id="2137622408" contentType="video" mimeType="video/mp4"
 segmentAlignment="true">
      <SegmentTemplate timescale="48000" media="cmaf-segment_$RepresentationID
$_$Number$.mp4" initialization="cmaf-segment_$RepresentationID$_21187_init.mp4"
 startNumber="36447" presentationTimeOffset="831120">
        <SegmentTimeline>
          <S t="6566786514" d="180179"/>
          <S t="6566966694" d="180179"/>
          <S t="6567146874" d="180179"/>
          <S t="6567327054" d="180179"/>
          <S t="6567507234" d="180179"/>
          <S t="6567687414" d="180179"/>
          <S t="6567867594" d="180179"/>
          <S t="6568047774" d="180179"/>
          <S t="6568227954" d="180179"/>
          <S t="6568408134" d="180179"/>
          <S t="6568588314" d="180179"/>
          <S t="6568768494" d="180179"/>
          <S t="6568948674" d="180179"/>
          <S t="6569128854" d="180179"/>
          <S t="6569309034" d="180179"/>
          <S t="6569489214" d="180179"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="1" bandwidth="2000000" frameRate="24000/1001"
 codecs="avc1.4D401F" width="1280" height="720"/>
    </AdaptationSet>
    <AdaptationSet id="515700000" contentType="image" mimeType="image/jpeg"
 segmentAlignment="true">
      <SegmentTemplate timescale="60000" media="cmaf-segment_$RepresentationID
$_$Number$.jpg" initialization="cmaf-segment_$RepresentationID$_21187_init.jpg"
 startNumber="36447" presentationTimeOffset="1038900">
        <SegmentTimeline>
          <S t="8208483142" d="225224"/>
          <S t="8208708367" d="225224"/>
          <S t="8208933592" d="225224"/>
          <S t="8209158817" d="225224"/>
          <S t="8209384042" d="225224"/>
          <S t="8209609267" d="225224"/>
          <S t="8209834492" d="225224"/>
          <S t="8210059717" d="225224"/>
          <S t="8210284942" d="225224"/>
          <S t="8210510167" d="225224"/>
          <S t="8210735392" d="225224"/>
          <S t="8210960617" d="225224"/>
          <S t="8211185842" d="225224"/>
          <S t="8211411067" d="225224"/>
          <S t="8211636292" d="225224"/>
          <S t="8211861517" d="225224"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="3" bandwidth="28608" codecs="jpeg" width="320"
 height="174">
        <EssentialProperty schemeIdUri="http://dashif.org/guidelines/
thumbnail_tile" value="1x1"/>
      </Representation>
    </AdaptationSet>
    <AdaptationSet id="972192134" contentType="audio" mimeType="audio/mp4"
 segmentAlignment="true" lang="und">
      <Label>und</Label>
      <SegmentTemplate timescale="48000" media="cmaf-segment_$RepresentationID
$_$Number$.mp4" initialization="cmaf-segment_$RepresentationID$_21187_init.mp4"
 startNumber="36447" presentationTimeOffset="831120">
```

```
        <SegmentTimeline>
          <S t="6566792949" d="180224" r="1"/>
          <S t="6567153398" d="180224" r="3"/>
          <S t="6567874295" d="180224" r="1"/>
          <S t="6568234744" d="180224" r="3"/>
          <S t="6568955641" d="180224" r="2"/>
          <S t="6569496313" d="179200"/>
        </SegmentTimeline>
      </SegmentTemplate>
      <Representation id="6" bandwidth="191522" codecs="mp4a.40.2"
 audioSamplingRate="48000">
        <AudioChannelConfiguration
 schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="2"/>
      </Representation>
    </AdaptationSet>
    <SupplementalProperty schemeIdUri="urn:scte:dash:utc-time"
 value="2024-04-02T16:56:13.200Z"/>
  </Period>
</MPD>
```

Working with data plane APIs in AWS Elemental MediaPackage

MediaPackage uses three data plane actions for ingesting and egressing video content. MediaPackage does not use these actions to configure Channel Group, Channel, or Origin Endpoint resources.

PutObject

During ingest, uploads video segments from an encoder into a MediaPackage channel.

To call `PutObject`, perform an HTTP `GET` request to the ingest URL for a channel.

For more information about video format requirements for `PutObject`, see Supported input types.

GetObject

Download video segments from an origin endpoint in MediaPackage.

To call `GetObject`, perform an HTTP `GET` request to an egress URL on an origin endpoint.

GetHeadObject

Retrieves just the HTTP headers of the video content.

To call `GetHeadObject`, perform an HTTP `HEAD` request to an egress URL on an origin endpoint.

You can dynamically produce client manifests by appending parameters to the playback request. The following topics provide information about the available query parameters:

- To use query parameters to filter manifests based on audio, subtitle, and video values, see Manifest filtering from AWS Elemental MediaPackage.
- To use query parameters to make live streams available for on-demand viewing for up to 14 days, see Time-shifted query parameters in AWS Elemental MediaPackage.

HarvestObject

During egress, creates a live-to-VOD asset by packaging the specified manifest or segment and uploading it to a bucket in Amazon S3. For information about harvesting live-to-VOD assets in MediaPackage, see Creating live-to-VOD assets with MediaPackage.

To call `HarvestObject`, perform an HTTP POST request to an egress URL, including the manifest or segment path. In the request body, include a JSON block with the S3 bucket destination.

Example

```
POST /channelGroup/ChannelGroupName/channel/ChannelName/
originEndpoint/OriginEndpointName/manifest_or_segment_path HTTP/1.1
X-Amz-Source-Account: 111122223333
X-Amz-Source-Arn: arn:aws:mediapackagev2:region:account:channelGroup/test/*
Content-type: application/json

{
  "S3Destination": "s3://amzn-s3-demo-bucket/path"
}
```

Security in AWS Elemental MediaPackage

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that's 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 MediaPackage, 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 MediaPackage. The following topics show you how to configure MediaPackage to meet your security and compliance objectives. You also learn how to use other AWS services that help you to monitor and secure your MediaPackage resources.

Topics

Data protection in AWS Elemental MediaPackage

The AWS shared responsibility model applies to data protection in AWS Elemental MediaPackage. As described in this model, AWS is responsible for protecting the global infrastructure that runs all of the AWS Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. You are also responsible for the security configuration and management tasks for the AWS services that you use. For more information about data privacy, see the Data Privacy FAQ. For information about data protection in Europe, see the AWS Shared Responsibility Model and GDPR blog post on the *AWS Security Blog*.

For data protection purposes, we recommend that you protect AWS account credentials and set up individual users with AWS IAM Identity Center or AWS Identity and Access Management (IAM). That way, each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We require TLS 1.2 and recommend TLS 1.3.
- Set up API and user activity logging with AWS CloudTrail. For information about using CloudTrail trails to capture AWS activities, see Working with CloudTrail trails in the *AWS CloudTrail User Guide*.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing sensitive data that is stored in Amazon S3.
- If you require FIPS 140-3 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see Federal Information Processing Standard (FIPS) 140-3.

We strongly recommend that you never put confidential or sensitive information, such as your customers' email addresses, into tags or free-form text fields such as a **Name** field. This includes when you work with MediaPackage or other AWS services using the console, API, AWS CLI, or AWS SDKs. Any data that you enter into tags or free-form text fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

Topics

Implementing DRM with AWS Elemental MediaPackage

Use encryption to protect your content from unauthorized access. MediaPackage supports digital rights management (DRM). With DRM, you can make sure that once you distribute your content, only authorized viewers can watch it.

For information about using DRM with MediaPackage, see Content encryption and DRM in AWS Elemental MediaPackage.

Identity and Access Management for AWS Elemental MediaPackage

AWS Identity and Access Management (IAM) is an AWS service that helps an administrator securely control access to AWS resources. IAM administrators control who can be *authenticated* (signed in) and *authorized* (have permissions) to use MediaPackage resources. IAM is an AWS service that you can use with no additional charge.

Topics

Audience

How you use AWS Identity and Access Management (IAM) differs, depending on the work that you do in MediaPackage.

Service user – If you use the MediaPackage service to do your job, then your administrator provides you with the credentials and permissions that you need. As you use more MediaPackage features to do your work, you might need additional permissions. Understanding how access is managed can help you request the right permissions from your administrator. If you cannot access a feature in MediaPackage, see Troubleshooting MediaPackage identity and access.

Service administrator – If you're in charge of MediaPackage resources at your company, you probably have full access to MediaPackage. It's your job to determine which MediaPackage features and resources your service users should access. You must then submit requests to your IAM administrator to change the permissions of your service users. Review the information on this page to understand the basic concepts of IAM. To learn more about how your company can use IAM with MediaPackage, see How AWS Elemental MediaPackage works with IAM.

IAM administrator – If you're an IAM administrator, you might want to learn details about how you can write policies to manage access to MediaPackage. To view example MediaPackage identity-based policies that you can use in IAM, see Identity-based policy examples for MediaPackage.

Authenticating with identities

Authentication is how you sign in to AWS using your identity credentials. You must be *authenticated* (signed in to AWS) as the AWS account root user, as an IAM user, or by assuming an IAM role.

You can sign in to AWS as a federated identity by using credentials provided through an identity source. AWS IAM Identity Center (IAM Identity Center) users, your company's single sign-on authentication, and your Google or Facebook credentials are examples of federated identities. When you sign in as a federated identity, your administrator previously set up identity federation using IAM roles. When you access AWS by using federation, you are indirectly assuming a role.

Depending on the type of user you are, you can sign in to the AWS Management Console or the AWS access portal. For more information about signing in to AWS, see How to sign in to your AWS account in the *AWS Sign-In User Guide*.

If you access AWS programmatically, AWS provides a software development kit (SDK) and a command line interface (CLI) to cryptographically sign your requests by using your credentials. If you don't use AWS tools, you must sign requests yourself. For more information about using the recommended method to sign requests yourself, see AWS Signature Version 4 for API requests in the *IAM User Guide*.

Regardless of the authentication method that you use, you might 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. To learn more, see Multi-factor authentication in the *AWS IAM Identity Center User Guide* and AWS Multi-factor authentication in IAM in the *IAM User Guide*.

AWS account root user

When you create an AWS account, you begin with one sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account *root user* and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you don't use the root user for your everyday tasks. Safeguard your root user credentials and use them to perform the tasks that only the root user can perform. For the complete list of tasks that require you to sign in as the root user, see Tasks that require root user credentials in the *IAM User Guide*.

Federated identity

As a best practice, require human users, including users that require administrator access, to use federation with an identity provider to access AWS services by using temporary credentials.

A *federated identity* is a user from your enterprise user directory, a web identity provider, the AWS Directory Service, the Identity Center directory, or any user that accesses AWS services by using credentials provided through an identity source. When federated identities access AWS accounts, they assume roles, and the roles provide temporary credentials.

For centralized access management, we recommend that you use AWS IAM Identity Center. You can create users and groups in IAM Identity Center, or you can connect and synchronize to a set of users and groups in your own identity source for use across all your AWS accounts and applications. For information about IAM Identity Center, see What is IAM Identity Center? in the *AWS IAM Identity Center User Guide*.

IAM users and groups

An *IAM user* is an identity within your AWS account that has specific permissions for a single person or application. Where possible, we recommend relying on temporary credentials instead of creating IAM users who have long-term credentials such as passwords and access keys. However, if you have specific use cases that require long-term credentials with IAM users, we recommend that you rotate access keys. For more information, see Rotate access keys regularly for use cases that require long-term credentials in the *IAM User Guide*.

An *IAM group* is an identity that specifies a collection of IAM users. You can't sign in as a group. You can use groups to specify permissions for multiple users at a time. Groups make permissions easier to manage for large sets of users. For example, you could have a group named *IAMAdmins* and give that group permissions to administer IAM resources.

Users are different from roles. A user is uniquely associated with one person or application, but a role is intended to be assumable by anyone who needs it. Users have permanent long-term credentials, but roles provide temporary credentials. To learn more, see Use cases for IAM users in the *IAM User Guide*.

IAM roles

An *IAM role* is an identity within your AWS account that has specific permissions. It is similar to an IAM user, but is not associated with a specific person. To temporarily assume an IAM role in the AWS Management Console, you can switch from a user to an IAM role (console). You can assume a role by calling an AWS CLI or AWS API operation or by using a custom URL. For more information about methods for using roles, see Methods to assume a role in the *IAM User Guide*.

IAM roles with temporary credentials are useful in the following situations:

- **Federated user access** – To assign permissions to a federated identity, you create a role and define permissions for the role. When a federated identity authenticates, the identity is associated with the role and is granted the permissions that are defined by the role. For information about roles for federation, see Create a role for a third-party identity provider (federation) in the *IAM User Guide*. If you use IAM Identity Center, you configure a permission set. To control what your identities can access after they authenticate, IAM Identity Center correlates the permission set to a role in IAM. For information about permissions sets, see Permission sets in the *AWS IAM Identity Center User Guide*.
- **Temporary IAM user permissions** – An IAM user or role can assume an IAM role to temporarily take on different permissions for a specific task.
- **Cross-account access** – You can use an IAM role to allow someone (a trusted principal) in a different account to access resources in your account. Roles are the primary way to grant cross-account access. However, with some AWS services, you can attach a policy directly to a resource (instead of using a role as a proxy). To learn the difference between roles and resource-based policies for cross-account access, see Cross account resource access in IAM in the *IAM User Guide*.
- **Cross-service access** – Some AWS services use features in other AWS services. For example, when you make a call in a service, it's common for that service to run applications in Amazon EC2 or

store objects in Amazon S3. A service might do this using the calling principal's permissions, using a service role, or using a service-linked role.

  - **Forward access sessions (FAS)** – When you use an IAM user or role to perform actions in AWS, you are considered a principal. When you use some services, you might perform an action that then initiates another action in a different service. FAS uses the permissions of the principal calling an AWS service, combined with the requesting AWS service to make requests to downstream services. FAS requests are only made when a service receives a request that requires interactions with other AWS services or resources to complete. In this case, you must have permissions to perform both actions. For policy details when making FAS requests, see Forward access sessions.
  - **Service role** – A service role is an IAM role that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see Create a role to delegate permissions to an AWS service in the *IAM User Guide*.
  - **Service-linked role** – A service-linked role is a type of service role that is linked to an AWS service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your AWS account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.
- **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see Use an IAM role to grant permissions to applications running on Amazon EC2 instances in the *IAM User Guide*.

Managing access using policies

You control access in AWS by creating policies and attaching them to AWS identities or resources. A policy is an object in AWS that, when associated with an identity or resource, defines their permissions. AWS evaluates these policies when a principal (user, root user, or role session) makes a request. Permissions in the policies determine whether the request is allowed or denied. Most policies are stored in AWS as JSON documents. For more information about the structure and contents of JSON policy documents, see Overview of JSON policies in the *IAM User Guide*.

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

By default, users and roles have no permissions. To grant users permission to perform actions on the resources that they need, an IAM administrator can create IAM policies. The administrator can then add the IAM policies to roles, and users can assume the roles.

IAM policies define permissions for an action regardless of the method that you use to perform the operation. For example, suppose that you have a policy that allows the `iam:GetRole` action. A user with that policy can get role information from the AWS Management Console, the AWS CLI, or the AWS API.

Identity-based policies

Identity-based policies are JSON permissions policy documents that you can attach to an identity, such as an IAM user, group of users, or role. These policies control what actions users and roles can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see Define custom IAM permissions with customer managed policies in the *IAM User Guide*.

Identity-based policies can be further categorized as *inline policies* or *managed policies*. Inline policies are embedded directly into a single user, group, or role. Managed policies are standalone policies that you can attach to multiple users, groups, and roles in your AWS account. Managed policies include AWS managed policies and customer managed policies. To learn how to choose between a managed policy or an inline policy, see Choose between managed policies and inline policies in the *IAM User Guide*.

Resource-based policies

Resource-based policies are JSON policy documents that you attach to a resource. Examples of resource-based policies are IAM *role trust policies* and Amazon S3 *bucket policies*. In services that support resource-based policies, service administrators can use them to control access to a specific resource. For the resource where the policy is attached, the policy defines what actions a specified principal can perform on that resource and under what conditions. You must specify a principal in a resource-based policy. Principals can include accounts, users, roles, federated users, or AWS services.

Resource-based policies are inline policies that are located in that service. You can't use AWS managed policies from IAM in a resource-based policy.

Access control lists (ACLs)

Access control lists (ACLs) control which principals (account members, users, or roles) have permissions to access a resource. ACLs are similar to resource-based policies, although they do not use the JSON policy document format.

Amazon S3, AWS WAF, and Amazon VPC are examples of services that support ACLs. To learn more about ACLs, see Access control list (ACL) overview in the *Amazon Simple Storage Service Developer Guide*.

Other policy types

AWS supports additional, less-common policy types. These policy types can set the maximum permissions granted to you by the more common policy types.

- **Permissions boundaries** – A permissions boundary is an advanced feature in which you set the maximum permissions that an identity-based policy can grant to an IAM entity (IAM user or role). You can set a permissions boundary for an entity. The resulting permissions are the intersection of an entity's identity-based policies and its permissions boundaries. Resource-based policies that specify the user or role in the `Principal` field are not limited by the permissions boundary. An explicit deny in any of these policies overrides the allow. For more information about permissions boundaries, see Permissions boundaries for IAM entities in the *IAM User Guide*.
- **Service control policies (SCPs)** – SCPs are JSON policies that specify the maximum permissions for an organization or organizational unit (OU) in AWS Organizations. AWS Organizations is a service for grouping and centrally managing multiple AWS accounts that your business owns. If you enable all features in an organization, then you can apply service control policies (SCPs) to any or all of your accounts. The SCP limits permissions for entities in member accounts, including each AWS account root user. For more information about Organizations and SCPs, see Service control policies in the *AWS Organizations User Guide*.
- **Resource control policies (RCPs)** – RCPs are JSON policies that you can use to set the maximum available permissions for resources in your accounts without updating the IAM policies attached to each resource that you own. The RCP limits permissions for resources in member accounts and can impact the effective permissions for identities, including the AWS account root user, regardless of whether they belong to your organization. For more information about Organizations and RCPs, including a list of AWS services that support RCPs, see Resource control policies (RCPs) in the *AWS Organizations User Guide*.
- **Session policies** – Session policies are advanced policies that you pass as a parameter when you programmatically create a temporary session for a role or federated user. The resulting session's

permissions are the intersection of the user or role's identity-based policies and the session policies. Permissions can also come from a resource-based policy. An explicit deny in any of these policies overrides the allow. For more information, see Session policies in the *IAM User Guide*.

Multiple policy types

When multiple types of policies apply to a request, the resulting permissions are more complicated to understand. To learn how AWS determines whether to allow a request when multiple policy types are involved, see Policy evaluation logic in the *IAM User Guide*.

How AWS Elemental MediaPackage works with IAM

Before you use IAM to manage access to MediaPackage, learn what IAM features are available to use with MediaPackage.

IAM features you can use with MediaPackage

IAM feature	MediaPackage support
Identity-based policies	Yes
Resource-based policies	Yes
Policy actions	Yes
Policy resources	Yes
Policy condition keys (service-specific)	Yes
ACLs	No
ABAC (tags in policies)	Yes
Temporary credentials	Yes
Principal permissions	Yes
Service roles	Yes
Service-linked roles	No

To get a high-level view of how MediaPackage and other AWS services work with most IAM features, see AWS services that work with IAM in the *IAM User Guide*.

Identity-based policies for MediaPackage

Supports identity-based policies: Yes

Identity-based policies are JSON permissions policy documents that you can attach to an identity, such as an IAM user, group of users, or role. These policies control what actions users and roles can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see Define custom IAM permissions with customer managed policies in the *IAM User Guide*.

With IAM identity-based policies, you can specify allowed or denied actions and resources as well as the conditions under which actions are allowed or denied. You can't specify the principal in an identity-based policy because it applies to the user or role to which it is attached. To learn about all of the elements that you can use in a JSON policy, see IAM JSON policy elements reference in the *IAM User Guide*.

Identity-based policy examples for MediaPackage

To view examples of MediaPackage identity-based policies, see Identity-based policy examples for MediaPackage.

Resource-based policies within MediaPackage

Supports resource-based policies: Yes

Resource-based policies are JSON policy documents that you attach to a resource. Examples of resource-based policies are IAM *role trust policies* and Amazon S3 *bucket policies*. In services that support resource-based policies, service administrators can use them to control access to a specific resource. For the resource where the policy is attached, the policy defines what actions a specified principal can perform on that resource and under what conditions. You must specify a principal in a resource-based policy. Principals can include accounts, users, roles, federated users, or AWS services.

To enable cross-account access, you can specify an entire account or IAM entities in another account as the principal in a resource-based policy. Adding a cross-account principal to a resource-based policy is only half of establishing the trust relationship. When the principal and the resource are in different AWS accounts, an IAM administrator in the trusted account must also grant the principal entity (user or role) permission to access the resource. They grant permission by attaching an identity-based policy to the entity. However, if a resource-based policy grants access to a principal in the same account, no additional identity-based policy is required. For more information, see Cross account resource access in IAM in the *IAM User Guide*.

Policy actions for MediaPackage

Supports policy actions: Yes

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

The `Action` element of a JSON policy describes the actions that you can use to allow or deny access in a policy. Policy actions usually have the same name as the associated AWS API operation. There are some exceptions, such as *permission-only actions* that don't have a matching API operation. There are also some operations that require multiple actions in a policy. These additional actions are called *dependent actions*.

Include actions in a policy to grant permissions to perform the associated operation.

To see a list of MediaPackage actions, see Actions defined by AWS Elemental MediaPackage in the *Service Authorization Reference*.

Policy actions in MediaPackage use the following prefix before the action:

```
mediapackagev2
```

To specify multiple actions in a single statement, separate them with commas.

```
"Action": [
      "mediapackagev2:action1",
      "mediapackagev2:action2"
         ]
```

You can specify multiple actions using wildcards (*). For example, to specify all actions that begin with the word `Describe`, include the following action:

```
"Action": "mediapackagev2:Describe*"
```

To view examples of MediaPackage identity-based policies, see Identity-based policy examples for MediaPackage.

Policy resources for MediaPackage

Supports policy resources: Yes

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

The `Resource` JSON policy element specifies the object or objects to which the action applies. Statements must include either a `Resource` or a `NotResource` element. As a best practice, specify a resource using its Amazon Resource Name (ARN). You can do this for actions that support a specific resource type, known as *resource-level permissions*.

For actions that don't support resource-level permissions, such as listing operations, use a wildcard (*) to indicate that the statement applies to all resources.

```
"Resource": "*"
```

MediaPackage has the following resource ARNs:

```
arn:${Partition}:mediapackagev2:${Region}:${Account}:channelGroup/${channelGroupName}
arn:${Partition}:mediapackagev2:${Region}:${Account}:channelGroup/${channelGroupName}/
channel/${channelName}
arn:${Partition}:mediapackagev2:${Region}:${Account}:channelGroup/${channelGroupName}/
channel/${channelName}/originEndpoint/${endpointName}
```

For more information about the format of ARNs, see Amazon Resource Names (ARNs) and AWS Service Namespaces.

For example, to specify the `9a6b3953e242400eb805f324d95788e3` channel in your statement, use the following ARN:

```
"Resource": "arn:aws:mediapackagev2:us-
east-1:111122223333:channelGroup/channelGroupName/
channel/9a6b3953e242400eb805f324d95788e3"
```

To specify all instances that belong to a specific account, use the wildcard (*):

```
"Resource": "arn:aws:mediapackagev2:us-east-1:111122223333:channelGroup/channelGroupName/channel/*"
```

Some MediaPackage actions, such as those for creating resources, can't be performed on a specific resource. In those cases, you must use the wildcard (*).

```
"Resource": "*"
```

To see a list of MediaPackage resource types and their ARNs, see Resources defined by AWS Elemental MediaPackage in the *Service Authorization Reference*. To learn with which actions you can specify the ARN of each resource, see Actions defined by AWS Elemental MediaPackage.

To view examples of MediaPackage identity-based policies, see Identity-based policy examples for MediaPackage.

Policy condition keys for MediaPackage

Supports service-specific policy condition keys: Yes

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

The Condition element (or Condition *block*) lets you specify conditions in which a statement is in effect. The Condition element is optional. You can create conditional expressions that use condition operators, such as equals or less than, to match the condition in the policy with values in the request.

If you specify multiple Condition elements in a statement, or multiple keys in a single Condition element, AWS evaluates them using a logical AND operation. If you specify multiple values for a single condition key, AWS evaluates the condition using a logical OR operation. All of the conditions must be met before the statement's permissions are granted.

You can also use placeholder variables when you specify conditions. For example, you can grant an IAM user permission to access a resource only if it is tagged with their IAM user name. For more information, see IAM policy elements: variables and tags in the *IAM User Guide*.

AWS supports global condition keys and service-specific condition keys. To see all AWS global condition keys, see AWS global condition context keys in the *IAM User Guide*.

To see a list of MediaPackage condition keys, see Condition keys for AWS Elemental MediaPackage in the *Service Authorization Reference*. To learn with which actions and resources you can use a condition key, see Actions defined by AWS Elemental MediaPackage.

To view examples of MediaPackage identity-based policies, see Identity-based policy examples for MediaPackage.

ACLs in MediaPackage

Supports ACLs: No

Access control lists (ACLs) control which principals (account members, users, or roles) have permissions to access a resource. ACLs are similar to resource-based policies, although they do not use the JSON policy document format.

ABAC with MediaPackage

Supports ABAC (tags in policies): Yes

Attribute-based access control (ABAC) is an authorization strategy that defines permissions based on attributes. In AWS, these attributes are called *tags*. You can attach tags to IAM entities (users or roles) and to many AWS resources. Tagging entities and resources is the first step of ABAC. Then you design ABAC policies to allow operations when the principal's tag matches the tag on the resource that they are trying to access.

ABAC is helpful in environments that are growing rapidly and helps with situations where policy management becomes cumbersome.

To control access based on tags, you provide tag information in the condition element of a policy using the `aws:ResourceTag/key-name`, `aws:RequestTag/key-name`, or `aws:TagKeys` condition keys.

If a service supports all three condition keys for every resource type, then the value is **Yes** for the service. If a service supports all three condition keys for only some resource types, then the value is **Partial**.

For more information about ABAC, see Define permissions with ABAC authorization in the *IAM User Guide*. To view a tutorial with steps for setting up ABAC, see Use attribute-based access control (ABAC) in the *IAM User Guide*.

Using temporary credentials with MediaPackage

Supports temporary credentials: Yes

Some AWS services don't work when you sign in using temporary credentials. For additional information, including which AWS services work with temporary credentials, see AWS services that work with IAM in the *IAM User Guide*.

You are using temporary credentials if you sign in to the AWS Management Console using any method except a user name and password. For example, when you access AWS using your company's single sign-on (SSO) link, that process automatically creates temporary credentials. You also automatically create temporary credentials when you sign in to the console as a user and then switch roles. For more information about switching roles, see Switch from a user to an IAM role (console) in the *IAM User Guide*.

You can manually create temporary credentials using the AWS CLI or AWS API. You can then use those temporary credentials to access AWS. AWS recommends that you dynamically generate temporary credentials instead of using long-term access keys. For more information, see Temporary security credentials in IAM.

Cross-service principal permissions for MediaPackage

Supports forward access sessions (FAS): Yes

When you use an IAM user or role to perform actions in AWS, you are considered a principal. When you use some services, you might perform an action that then initiates another action in a different service. FAS uses the permissions of the principal calling an AWS service, combined with the requesting AWS service to make requests to downstream services. FAS requests are only made when a service receives a request that requires interactions with other AWS services or resources to complete. In this case, you must have permissions to perform both actions. For policy details when making FAS requests, see Forward access sessions.

Service roles for MediaPackage

Supports service roles: Yes

A service role is an IAM role that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see Create a role to delegate permissions to an AWS service in the *IAM User Guide*.

⚠ **Warning**

Changing the permissions for a service role might break MediaPackage functionality. Edit service roles only when MediaPackage provides guidance to do so.

Choosing an IAM role in MediaPackage

When you create an asset resource in MediaPackage, you must choose a role to allow MediaPackage to access Amazon S3 on your behalf. If you previously created a service role or service-linked role, MediaPackage provides you with a list of roles to choose from. It's important to choose a role that allows access to read from the Amazon S3 bucket and retrieve content.

Service-linked roles for MediaPackage

Supports service-linked roles: No

A service-linked role is a type of service role that is linked to an AWS service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your AWS account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.

For details about creating or managing service-linked roles, see AWS services that work with IAM. Find a service in the table that includes a `Yes` in the **Service-linked role** column. Choose the **Yes** link to view the service-linked role documentation for that service.

Identity-based policy examples for MediaPackage

By default, users and roles don't have permission to create or modify MediaPackage resources. They also can't perform tasks by using the AWS Management Console, AWS Command Line Interface (AWS CLI), or AWS API. To grant users permission to perform actions on the resources that they need, an IAM administrator can create IAM policies. The administrator can then add the IAM policies to roles, and users can assume the roles.

To learn how to create an IAM identity-based policy by using these example JSON policy documents, see Create IAM policies (console) in the *IAM User Guide*.

For details about actions and resource types defined by MediaPackage, including the format of the ARNs for each of the resource types, see Actions, resources, and condition keys for AWS Elemental MediaPackage in the *Service Authorization Reference*.

Topics

Policy best practices

Identity-based policies determine whether someone can create, access, or delete MediaPackage resources in your account. These actions can incur costs for your AWS account. When you create or edit identity-based policies, follow these guidelines and recommendations:

- **Get started with AWS managed policies and move toward least-privilege permissions** – To get started granting permissions to your users and workloads, use the *AWS managed policies* that grant permissions for many common use cases. They are available in your AWS account. We recommend that you reduce permissions further by defining AWS customer managed policies that are specific to your use cases. For more information, see AWS managed policies or AWS managed policies for job functions in the *IAM User Guide*.
- **Apply least-privilege permissions** – When you set permissions with IAM policies, grant only the permissions required to perform a task. You do this by defining the actions that can be taken on specific resources under specific conditions, also known as *least-privilege permissions*. For more information about using IAM to apply permissions, see Policies and permissions in IAM in the *IAM User Guide*.
- **Use conditions in IAM policies to further restrict access** – You can add a condition to your policies to limit access to actions and resources. For example, you can write a policy condition to specify that all requests must be sent using SSL. You can also use conditions to grant access to service actions if they are used through a specific AWS service, such as AWS CloudFormation. For more information, see IAM JSON policy elements: Condition in the *IAM User Guide*.
- **Use IAM Access Analyzer to validate your IAM policies to ensure secure and functional permissions** – IAM Access Analyzer validates new and existing policies so that the policies adhere to the IAM policy language (JSON) and IAM best practices. IAM Access Analyzer provides more than 100 policy checks and actionable recommendations to help you author secure and functional policies. For more information, see Validate policies with IAM Access Analyzer in the *IAM User Guide*.
- **Require multi-factor authentication (MFA)** – If you have a scenario that requires IAM users or a root user in your AWS account, turn on MFA for additional security. To require MFA when API

operations are called, add MFA conditions to your policies. For more information, see Secure API access with MFA in the *IAM User Guide*.

For more information about best practices in IAM, see Security best practices in IAM in the *IAM User Guide*.

Using the MediaPackage console

To access the AWS Elemental MediaPackage console, you must have a minimum set of permissions. These permissions must allow you to list and view details about the MediaPackage resources in your AWS account. If you create an identity-based policy that is more restrictive than the minimum required permissions, the console won't function as intended for entities (users or roles) with that policy.

You don't need to allow minimum console permissions for users that are making calls only to the AWS CLI or the AWS API. Instead, allow access to only the actions that match the API operation that they're trying to perform.

To ensure that users and roles can still use the MediaPackage console, also attach the MediaPackage *ReadOnly* AWS managed policy to the entities. For more information, see Adding permissions to a user in the *IAM User Guide*.

```
AWSElementalMediaPackageReadOnly
```

Allow users to view their own permissions

This example shows how you might create a policy that allows IAM users to view the inline and managed policies that are attached to their user identity. This policy includes permissions to complete this action on the console or programmatically using the AWS CLI or AWS API.

```
{
    "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": "NavigateInConsole",
            "Effect": "Allow",
            "Action": [
                "iam:GetGroupPolicy",
                "iam:GetPolicyVersion",
                "iam:GetPolicy",
                "iam:ListAttachedGroupPolicies",
                "iam:ListGroupPolicies",
                "iam:ListPolicyVersions",
                "iam:ListPolicies",
                "iam:ListUsers"
            ],
            "Resource": "*"
        }
    ]
}
```

Resource-based policy examples

A resource policy is an access policy option available for granting permission to your MediaPackage resources. Resource-based policies are JSON policy documents.

The topics in this section describe the key policy language elements, with focus on MediaPackage–specific details, and provide example resource policies. We recommend that you first review the introductory topics that explain the basic concepts and options available for you to manage access to your MediaPackage resources.

To learn how to attach a resource-based policy to a channel, see **Creating a channel in AWS Elemental MediaPackage**.

Topics

- Ingest authorization
- Origin endpoint authorization

Policies and Permissions in MediaPackage

This page provides an overview of resource policies in MediaPackage and describes the basic elements of a policy. Each listed element links to more details about that element and examples of how to use it.

For a complete list of MediaPackage actions, resources, and conditions, see Actions, resources, and condition keys for AWS Elemental MediaPackage in the *AWS General Reference*.

In its most basic sense, a policy contains the following elements:

- **Resources** - Channels and origin endpoints are the MediaPackage resources for which you can allow or deny permissions. In a policy, you use the Amazon Resource Name (ARN) to identify the resource. For more information, see MediaPackage resources.
- **Actions** - For each resource, MediaPackage supports a set of operations. You identify resource operations that you will allow (or deny) by using action keywords. For more information, see IAM JSON Policy Elements: Action.
- **Effect** - This determines what the effect will be when the user requests the specific action. This can be either *allow* or *deny*.

  If you do not explicitly grant access to (allow) a resource, access is implicitly denied. You can also explicitly deny access to a resource. You might do this to make sure that a user can't access the resource, even if a different policy grants access. For more information, see IAM JSON Policy Elements: Effect.
- **Principal** - The account or user who is allowed access to the actions and resources in the statement. In a resource policy, the principal is the user, account, service, or other entity that is the recipient of this permission. For more information, see Principals and AWS JSON Policy Elements: Principal.
- **Condition** - These are the conditions for when a policy is in effect. You can use AWS-wide keys and MediaPackage-specific keys to specify conditions in an MediaPackage access policy. For more information, see IAM JSON Policy Elements: Condition.

To illustrate, consider the following `Allow` policy. With this policy in effect, Jane Doe has `mediapackagev2:GetObject` and `mediapackagev2:GetHeadObject` permissions on all objects from the specified origin endpoint under the condition that the request are made over HTTPS.

```
{
 "Version": "2012-10-17",
 "Statement": [
     {
   "Sid": "AllowJaneDoe",
   "Effect": "Allow",
   "Principal": { "AWS": "arn:aws:iam::accountID:user/JaneDoe" },
   "Action": ["mediapackagev2:GetObject","mediapackagev2:GetHeadObject"],
   "Resource": "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName/originEndpoint/OriginEndpointName",
   "Condition": {
    "Bool": { "aws:SecureTransport": "true" }
   }
  }
 ]
}
```

Resource policies are specific to the resources to which they are applied. Applying a policy to a particular origin endpoint that allows anonymous `GetObject` doesn't automatically apply `GetObject` to other endpoints even if the ARN matches. For instance, if you apply a policy to origin endpoint `abcdef01234567890`, it only applies to that endpoint and not to another endpoint with a similar ARN, like `021345abcdef6789`. This means that the policy is not automatically applied to any other resource with a matching ARN, and you must apply the policy explicitly to each resource that requires it.

For more, see the topics below. For complete policy language information, see Policies and Permissions and IAM JSON Policy Reference in the *IAM User Guide*.

Topics

- Principals
- Actions, resources, and condition keys in MediaPackage

Principals

The `Principal` element specifies the user, account, service, or other entity that is allowed or denied access to a resource. For more information, see Principal in the *IAM User Guide*.

Grant permissions to an AWS account

To grant permissions to an AWS account, identify the account using the following format.

```
"AWS":"account-ARN"
```

The following are examples.

```
"Principal":{"AWS":"arn:aws:iam::AccountIDWithoutHyphens:root"}
```

```
"Principal":{"AWS":
["arn:aws:iam::AccountID1WithoutHyphens:root","arn:aws:iam::AccountID2WithoutHyphens:root"]}
```

Grant permissions to an IAM user

To grant permission to an IAM user within your account, you must provide an `"AWS":"user-ARN"` name-value pair.

```
"Principal":{"AWS":"arn:aws:iam::account-number-without-hyphens:user/username"}
```

> **Note**
>
> If an IAM identity is deleted after you update your resource policy, the resource policy will show a unique identifier in the principal element instead of an ARN. These unique IDs are never reused, so you can safely remove principals with unique identifiers from all of your policy statements. For more information about unique identifiers, see IAM identifiers in the *IAM User Guide*.

Grant anonymous permissions

To grant permission to everyone, also referred as anonymous access, you set the wildcard (`"*"`) as the `Principal` value. For example, if you want to use clients with no AWS authorization to their origin endpoints.

```
"Principal":"*"
```

```
"Principal":{"AWS":"*"}
```

Using `"Principal": "*"` with an `Allow` effect in a resource-based policy allows anyone, even if they're not signed in to AWS, to access your resource.

Using `"Principal" : { "AWS" : "*" }` with an `Allow` effect in a resource-based policy allows any root user, IAM user, assumed-role session, or federated user in any account in the same partition to access your resource.

For anonymous users, these two methods are equivalent. For more information, see All principals in the *IAM User Guide*.

You cannot use a wildcard to match part of a principal name or ARN.

⚠ **Important**

Because anyone can create an AWS account, the **security level** of these two methods is equivalent, even though they function differently.

⚠ **Warning**

Use caution when granting anonymous access to your MediaPackage origin endpoints. When you grant anonymous access, anyone in the world can access your bucket. We highly recommend that you never grant any kind of anonymous write access to your origin endpoints.

Actions, resources, and condition keys in MediaPackage

AWS Elemental MediaPackage (service prefix: `mediapackagev2`) provides service-specific resources, actions, and condition context keys for use in IAM permission policies. For the full list, see Actions, resources, and condition keys for AWS Elemental MediaPackage in the *AWS General Reference*.

MediaPackage Actions

MediaPackage defines a set of permissions that you can specify in a policy. These are keywords, each of which maps to a specific MediaPackage operation. When you use an action in a policy, you usually allow or deny access to the API operation or CLI command with the same name. However, in some cases, a single action controls access to more than one operation. Alternatively, some operations require several different actions.

MediaPackage resources

The following common Amazon Resource Name (ARN) format identifies resources in AWS:

```
arn:${Partition}:mediapackagev2:${Region}:${AccountID}:channelGroup/
${ChannelGroupName}/channel/${ChannelName}/originEndpoint/${OriginEndpointName}
```

For information about ARNs, see Amazon Resource Names (ARNs) in the *AWS General Reference*.

For information about resources, see IAM JSON Policy Elements: Resource in the *IAM User Guide*.

A MediaPackage ARN includes the following:

- **Partition** - `aws` is a common partition name. If your resources are in the China (Beijing) Region, `aws-cn` is the partition name.
- **Region** - The AWS Region.
- **AccountID** - Your AWS account number.
- **ChannelGroupName** - The name of the channel group.
- **ChannelName** - The name of the channel.
- **OriginEndpointName** - The name of the origin endpoint.

MediaPackage Conditions keys

The access policy language enables you to specify conditions when granting permissions. To specify conditions for when a policy is in effect, you can use the optional Condition element, or Condition block, to specify conditions for when a policy is in effect. You can use predefined AWS-wide keys and MediaPackage-specific keys to specify conditions in an MediaPackage access policy. In the Condition element, you build expressions in which you use Boolean operators (equal, less than, etc.) to match your condition against values in the request.

Ingest authorization

MediaPackage ingest requests usually originate from a video encoder.

Topics

AWS Elemental MediaLive

This example illustrates a channel policy that permits MediaLive to ingest MediaPackage.

```
{
 "Version": "2012-10-17",
 "Id": "AllowMediaLiveChannelToIngestToEmpChannel",
 "Statement": [
  {
   "Sid": "AllowMediaLiveRoleToAccessEmpChannel",
   "Effect": "Allow",
   "Principal": {
    "AWS": "arn:aws:iam::AccountID:role/MediaLiveAccessRole"
   },
   "Action": "mediapackagev2:PutObject",
   "Resource": "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName"
  }
 ]
}
```

AWS Elemental Live

If you provide Elemental Live with an access key ID and secret access key, it can request access as an IAM identity. To grant your Elemental Live encoder access to your MediaPackage channel, you can apply the following `Allow` policy.

1. In IAM, create an IAM user such as `ElementalLiveMediaPackageUser` with **Programmatic access**.
2. In MediaPackage, create or edit a channel to include the following channel policy.

```
{
 "Version": "2012-10-17",
 "Id": "AllowIamUser",
 "Statement": [
  {
   "Sid": "AllowIamUserToEmpChannel",
   "Effect": "Allow",
   "Principal": {
    "AWS": "arn:aws:iam::AccountID:user/ElementalLiveMediaPackageUser"
   },
   "Action": "mediapackagev2:PutObject",
   "Resource":
 "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName"
  }
 ]
}
```

3. In IAM, create an access key for `ElementalLiveMediaPackageAccessUser`. Save the access key .csv file in a secure location to retain a permanent record of the access key ID and secret access key.

   The access key ID looks like this: AKIAIOSFODNN7EXAMPLE

   The secret access key looks like this: wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY

   For more information, see Programmatic access in the *AWS General Reference*.
4. Share the access key ID and the secret access key with the Elemental Live operator. Do *not* give the username and password to the operator.

By following these steps, you'll create an AWS user with the necessary permissions required to allow Elemental Live to make requests to MediaPackage. When the operator sets up the output with MediaPackage as the destination, they will enter the access key ID and secret access key. During the Elemental Live event, Elemental Live sends these two IDs to the AWS service instead of the username and password, providing authorization to AWS for the Elemental Live node to make requests to MediaPackage.

Third-party encoders

Third-party encoders that support AWS authorization operate similarly to Elemental Live, as described earlier. To grant access, create an IAM user and a MediaPackage channel resource policy that permits the user to call `PutObject`. On the encoder's side, use the IAM user access key ID and secret access key to sign the requests.

Origin endpoint authorization

MediaPackage egress requests usually originate from CDNs, but they may also come from other sources such as customer-owned monitoring scripts or operators using web browsers like Safari or Chrome to view the video stream and identify any issues.

Topics

- MediaPackage L2V Harvester
- Third-party CDNs that support AWS authorization
- Clients that don't support AWS authorization

MediaPackage L2V Harvester

To allow MediaPackage harvest jobs to get content from your origin endpoint, create or edit an origin endpoint with the following endpoint policy. For more information about harvest jobs, see Creating live-to-VOD assets with MediaPackage.

```
{
    "Version": "2012-10-17",
    "Id": "MediaPackageHarvesterAccessPolicy",
    "Statement": [
        {
            {
                "Sid": "AllowMediaPackageHarvestObjectAccess",
                "Effect": "Allow",
                "Principal": {
                    "Service": "mediapackagev2.amazonaws.com"
                },
                "Condition": {
                    "StringEquals": {
                        "AWS:SourceAccount": "AccountID"
                    }
                },
                "Action": [
                    "mediapackagev2:HarvestObject",
                    "mediapackagev2:GetObject"
                ],
                "Resource":
 "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName/originEndpoint/OriginEndpointName
            }
        }
    ]
}
```

Third-party CDNs that support AWS authorization

To authorize an external CDN that supports AWS authorization, you need to create a specific IAM user for the CDN, allow access in their origin endpoint policy, and provide the CDN with the AWS access key ID and secret access key for the IAM user. For example, if you want to give your CDN provider access to your MediaPackage origin endpoint, you can follow the following procedure.

1. In IAM, create an IAM user such as `CDNProviderMediaPackageAccessUser` with **Programmatic access**.
2. In MediaPackage, create or edit an origin endpoint to include the following endpoint policy.

```
{
 "Version": "2012-10-17",
 "Id": "PolicyForCDNProviderPrivateContent",
 "Statement": [
  {
   "Sid": "AllowCDNProviderUser",
   "Effect": "Allow",
   "Principal": { "AWS": "arn:aws:iam::AccountID:user/
CDNProviderMediaPackageAccessUser" },
   "Action": "mediapackagev2:GetObject",
   "Resource":
 "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName/originEndpoint/OriginEndpointName"
  }
 ]
}
```

3. In IAM, create an access key for `CDNProviderMediaPackageAccessUser`. Save the access key .csv file in a secure location to retain a permanent record of the access key ID and secret access key.

   The access key ID looks like this: AKIAIOSFODNN7EXAMPLE

   The secret access key looks like this: wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY

   For more information, see Programmatic access in the *AWS General Reference*.
4. Follow the instructions in your CDN provider's documentation for authenticating with AWS access keys.

By following these steps, you'll create an AWS user with the necessary permissions required to allow the external CDN make requests to MediaPackage. When the CDN provider sets up the output with MediaPackage as the destination, they will enter the access key ID and secret access key. During the event, the provider sends these two IDs to the AWS service instead of the username and password, providing authorization to make requests to MediaPackage.

Clients that don't support AWS authorization

Clients without AWS authorization support can be granted access to origin endpoints either by enabling anonymous access or by restricting access to specific IP ranges using the `aws:SourceIp` condition key. This is useful for clients such as external CDNs that don't support AWS authorization, as well as monitoring scripts and human operators who may use web browsers to visually inspect a video stream. For information about condition keys, see IAM JSON Policy Elements: Condition.

Anonymous access

Consider the following `Allow` policy. With this policy in effect, MediaPackage allows anonymous access to the `mediapackagev2:GetObject` action on the channel resource in the policy.

```
{
 "Version": "2012-10-17",
 "Id": "AnonymousAccessPolicy",
 "Statement": [
  {
   "Sid": "AllowAnonymousAccess",
   "Effect": "Allow",
   "Principal": "*",
   "Action": "mediapackagev2:GetObject",
   "Resource": "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName/originEndpoint/OriginEndpointName"
  }
 ]
}
```

MediaPackage doesn't support anonymous access for `PutObject` API calls.

Cross-account access

Consider the following `Allow` policy. With this policy in effect, MediaPackage allows, across accounts (`accountID` and `differentAccountID`), the `mediapackagev2:GetObject` action on the channel resource in the policy.

```
{
 "Version": "2012-10-17",
 "Statement": [
  {
   "Sid": "AllowCrossAccountAccess",
   "Effect": "Allow",
   "Principal": {"AWS":  "arn:aws:iam::DifferentAccountID:root"},
   "Action": "mediapackagev2:GetObject",
   "Resource": "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName"
  }
 ]
}
```

Restrict access by IP range

Consider the following Allow policy. With this policy in effect, MediaPackage restricts access to IP addresses in the range 203.0.113.0 to 203.0.113.255 using the aws:SourceIp condition key. For information about condition keys, see IAM JSON Policy Elements: Condition.

```
{
 "Version": "2012-10-17",
 "Id": "IpRangePolicy",
 "Statement": [
  {
   "Sid": "RestrictByIpRange",
   "Effect": "Allow",
   "Principal": "*",
   "Action": "mediapackagev2:GetObject",
   "Resource": "arn:aws:mediapackagev2:Region:AccountID:channelGroup/ChannelGroupName/
channel/ChannelName/originEndpoint/OriginEndpointName",
   "Condition": {
    "IpAddress": { "aws:SourceIp": "203.0.113.0/24" }
   }
  }
 ]
}
```

AWS managed policies for AWS Elemental MediaPackage

An AWS managed policy is a standalone policy that is created and administered by AWS. AWS managed policies are designed to provide permissions for many common use cases so that you can start assigning permissions to users, groups, and roles.

Keep in mind that AWS managed policies might not grant least-privilege permissions for your specific use cases because they're available for all AWS customers to use. We recommend that you reduce permissions further by defining customer managed policies that are specific to your use cases.

You cannot change the permissions defined in AWS managed policies. If AWS updates the permissions defined in an AWS managed policy, the update affects all principal identities (users, groups, and roles) that the policy is attached to. AWS is most likely to update an AWS managed policy when a new AWS service is launched or new API operations become available for existing services.

For more information, see AWS managed policies in the *IAM User Guide*.

AWS managed policy: AWSElementalMediaPackageV2FullAccess

This policy grants contributor permissions that allow all actions on all live resources in MediaPackage.

You can attach the `AWSElementalMediaPackageV2FullAccess` policy to your IAM identities.

```
{
    "Version": "2012-10-17",
    "Statement": {
        "Effect": "Allow",
        "Action": "mediapackagev2:*",
        "Resource": "*"
    }
}
```

AWS managed policy: AWSElementalMediaPackageV2ReadOnly

This policy grants contributor permissions that allow read-only actions on all live resources in MediaPackage.

You can attach the `AWSElementalMediaPackageV2ReadOnly` policy to your IAM identities.

```
{
    "Version": "2012-10-17",
    "Statement": {
        "Effect": "Allow",
        "Action": [
            "mediapackagev2:List*",
            "mediapackagev2:Get*"
        ],
        "Resource": "*"
    }
}
```

MediaPackage updates to AWS managed policies

View details about updates to AWS managed policies for MediaPackage since this service began tracking these changes. For automatic alerts about changes to this page, subscribe to the RSS feed on the MediaPackage Document history page.

Change	Description	Date
`AWSElementalMediaPackageV2FullAccess` – New policy	MediaPackage added a new full-access policy for live resources.	July 25, 2023

Change	Description	Date
	This policy allows all actions on all live resources in MediaPackage.	
`AWSElementalMediaPackageV2ReadOnly` – New policy	MediaPackage added a new read-only pollicy for live resources. This policy allows read-only actions on all live resources in MediaPackage.	July 25, 2023
MediaPackage started tracking changes	MediaPackage started tracking changes for its AWS managed policies.	July 25, 2023

Authenticating Requests (AWS Signature Version 4)

Every interaction with MediaPackage is either authenticated or anonymous. This section explains request authentication with the AWS Signature Version 4 algorithm.

Note

If you use the AWS SDKs or AWS CLI to send your requests, you don't need to read this section because these tools authenticate your requests by using access keys that you provide. You must only sign AWS API requests as described in this documentation if you do not use an AWS SDK or AWS CLI to send AWS API requests.

When you send API requests to AWS, you must sign them so that AWS can identify the sender. For security, most requests are signed using your AWS security credentials.

When MediaPackage receives an authenticated request, it recreates the signature using the authentication information contained in the request. If the signatures match, MediaPackage processes the request. Otherwise, it rejects the request.

AWS Signature Version 4 is the AWS signing protocol. AWS also supports an extension, Signature Version 4A, which supports signatures for multi-Region API requests.

For additional information about AWS Signature Version 4, see:

- Signing AWS API requests in the *IAM User Guide*
- Authenticating Requests (AWS Signature Version 4) in the *Amazon Simple Storage Service API Reference*

Creating a signed AWS API request

For steps to create a signed AWS API request, see:

- Create a signed AWS API request in the *IAM User Guide*
- Signature Calculations for the Authorization Headers: Transferring Payload in a Single Chunk in the *Amazon Simple Storage Service API Reference*

Troubleshooting signed AWS API requests

For troubleshooting help with your signed requests, see Troubleshoot signed requests for AWS APIs in the *IAM User Guide*.

Cross-service confused deputy prevention

The confused deputy problem is a security issue where an entity that doesn't have permission to perform an action can coerce a more-privileged entity to perform the action. In AWS, cross-service impersonation can result in the confused deputy problem. Cross-service impersonation can occur when one service (the *calling service*) calls another service (the *called service*). The calling service can be manipulated to use its permissions to act on another customer's resources in a way it should not otherwise have permission to access. To prevent this, AWS provides tools that help you protect your data for all services with service principals that have been given access to resources in your account.

We recommend using the `aws:SourceArn` and `aws:SourceAccount` global condition context keys in resource policies to limit the permissions that AWS Elemental MediaPackage gives another service to the resource. Use `aws:SourceArn` if you want only one resource to be associated with the cross-service access. Use `aws:SourceAccount` if you want to allow any resource in that account to be associated with the cross-service use.

The most effective way to protect against the confused deputy problem is to use the `aws:SourceArn` global condition context key with the full ARN of the resource. If you don't know the full ARN of the resource or if you are specifying multiple resources, use the `aws:SourceArn` global context condition key with wildcard characters (*) for the unknown portions of the ARN. For example, `arn:aws:servicename:*:123456789012:*`.

If the `aws:SourceArn` value does not contain the account ID, such as an Amazon S3 bucket ARN, you must use both global condition context keys to limit permissions.

The following example shows how you can use the `aws:SourceArn` and `aws:SourceAccount` global condition context keys in MediaPackage to prevent the confused deputy problem.

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Sid": "ConfusedDeputyPreventionExamplePolicy",
    "Effect": "Allow",
    "Principal": {
      "Service": "mediapackage.amazonaws.com"
    },
    "Action": "sts:AssumeRole",
    "Condition": {
      "ArnLike": {
        "aws:SourceArn": "arn:aws:mediapackage:*:123456789012:harvest_jobs/*"
      },
      "StringEquals": {
        "aws:SourceAccount": "123456789012"
      }
    }
  }
}
```

Troubleshooting MediaPackage identity and access

Use the following information to help you diagnose and fix common issues that you might encounter when working with MediaPackage and IAM.

Topics

- I'm not authorized to perform an action in MediaPackage
- I'm not authorized to perform iam:PassRole

- I want to allow people outside of my AWS account to access my MediaPackage resources

I'm not authorized to perform an action in MediaPackage

If you receive an error that you're not authorized to perform an action, your policies must be updated to allow you to perform the action.

The following example error occurs when the `mateojackson` IAM user tries to use the console to view details about a fictional *`my-example-widget`* resource but doesn't have the fictional `mediapackagev2:`*`GetWidget`* permissions.

```
User: arn:aws:iam::123456789012:user/mateojackson is not authorized to perform:
 mediapackagev2:GetWidget on resource: my-example-widget
```

In this case, the policy for the `mateojackson` user must be updated to allow access to the *`my-example-widget`* resource by using the `mediapackagev2:`*`GetWidget`* action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

I'm not authorized to perform iam:PassRole

If you receive an error that you're not authorized to perform the `iam:PassRole` action, your policies must be updated to allow you to pass a role to MediaPackage.

Some AWS services allow you to pass an existing role to that service instead of creating a new service role or service-linked role. To do this, you must have permissions to pass the role to the service.

The following example error occurs when an IAM user named `marymajor` tries to use the console to perform an action in MediaPackage. However, the action requires the service to have permissions that are granted by a service role. Mary does not have permissions to pass the role to the service.

```
User: arn:aws:iam::123456789012:user/marymajor is not authorized to perform:
 iam:PassRole
```

In this case, Mary's policies must be updated to allow her to perform the `iam:PassRole` action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

I want to allow people outside of my AWS account to access my MediaPackage resources

You can create a role that users in other accounts or people outside of your organization can use to access your resources. You can specify who is trusted to assume the role. For services that support resource-based policies or access control lists (ACLs), you can use those policies to grant people access to your resources.

To learn more, consult the following:

- To learn whether MediaPackage supports these features, see How AWS Elemental MediaPackage works with IAM.
- To learn how to provide access to your resources across AWS accounts that you own, see Providing access to an IAM user in another AWS account that you own in the *IAM User Guide*.
- To learn how to provide access to your resources to third-party AWS accounts, see Providing access to AWS accounts owned by third parties in the *IAM User Guide*.
- To learn how to provide access through identity federation, see Providing access to externally authenticated users (identity federation) in the *IAM User Guide*.
- To learn the difference between using roles and resource-based policies for cross-account access, see Cross account resource access in IAM in the *IAM User Guide*.

Learn More

For more information about identity and access management for MediaPackage, continue to the following pages:

- How AWS Elemental MediaPackage works with IAM
- Identity-based policy examples for MediaPackage
- Cross-service confused deputy prevention
- Troubleshooting MediaPackage identity and access

Compliance validation for AWS Elemental MediaPackage

To learn whether an AWS service is within the scope of specific compliance programs, see AWS services in Scope by Compliance Program and choose the compliance program that you are interested in. 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 services 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 Compliance & Governance – These solution implementation guides discuss architectural considerations and provide steps for deploying security and compliance features.
- HIPAA Eligible Services Reference – Lists HIPAA eligible services. Not all AWS services are HIPAA eligible.
- AWS Compliance Resources – This collection of workbooks and guides might apply to your industry and location.
- AWS Customer Compliance Guides – Understand the shared responsibility model through the lens of compliance. The guides summarize the best practices for securing AWS services and map the guidance to security controls across multiple frameworks (including National Institute of Standards and Technology (NIST), Payment Card Industry Security Standards Council (PCI), and International Organization for Standardization (ISO)).
- Evaluating Resources with Rules in the *AWS Config Developer Guide* – The AWS Config service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- AWS Security Hub – This AWS service provides a comprehensive view of your security state within AWS. Security Hub uses security controls to evaluate your AWS resources and to check your compliance against security industry standards and best practices. For a list of supported services and controls, see Security Hub controls reference.
- Amazon GuardDuty – This AWS service detects potential threats to your AWS accounts, workloads, containers, and data by monitoring your environment for suspicious and malicious activities. GuardDuty can help you address various compliance requirements, like PCI DSS, by meeting intrusion detection requirements mandated by certain compliance frameworks.

- AWS Audit Manager – This AWS service helps you continuously audit your AWS usage to simplify how you manage risk and compliance with regulations and industry standards.

Resilience in AWS Elemental MediaPackage

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 MediaPackage

As a managed service, AWS Elemental MediaPackage is protected by AWS global network security. For information about AWS security services and how AWS protects infrastructure, see AWS Cloud Security. To design your AWS environment using the best practices for infrastructure security, see Infrastructure Protection in *Security Pillar AWS Well‐Architected Framework*.

You use AWS published API calls to access MediaPackage through the network. Clients must support the following:

- Transport Layer Security (TLS). We require TLS 1.2 and recommend TLS 1.3.
- Cipher suites with perfect forward secrecy (PFS) such as DHE (Ephemeral Diffie-Hellman) or ECDHE (Elliptic Curve Ephemeral Diffie-Hellman). 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.

Logging and monitoring in MediaPackage

Monitoring is an important part of maintaining the reliability, availability, and performance of MediaPackage and your other AWS solutions. AWS provides the following monitoring tools to watch MediaPackage, report when something is wrong, and take automatic actions when appropriate:

- *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 take actions when a specified metric reaches a threshold that you specify. For example, you can have CloudWatch track CPU usage or other metrics of your Amazon EC2 instances and automatically launch new instances when needed. For more information, see the Amazon CloudWatch User Guide.
- *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 the AWS CloudTrail User Guide.

Topics

Monitoring AWS Elemental MediaPackage with Amazon CloudWatch metrics

You can monitor MediaPackage using CloudWatch, which collects raw data and processes it into readable, near real-time metrics. These statistics are kept for 15 months, so that you can access historical information and gain a better perspective on how your web application or service is performing. You can also set alarms that watch for certain thresholds, and send notifications or take actions when those thresholds are met. For more information, see the Amazon CloudWatch User Guide.

MediaPackage console

MediaPackage displays metrics throughout the console.

To view metrics using the MediaPackage console

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Navigate to the appropriate page to view metrics:
   - For metrics on all channel groups, go to the **Channel groups** page.
   - For metrics on all channels and origin endpoints associated with your channel group in the AWS Region, go to the channel group's details page.
   - For metrics on a specific channel and all of its origin endpoints, go to the channel's details page.
   - For metrics on a specific origin endpoint, go to the origin endpoint's details page.
3. (Optional) To refine the metrics view, choose **Open in CloudWatch**.

CloudWatch console

Metrics are grouped first by the service namespace, and then by the various dimension combinations within each namespace.

To view metrics using the CloudWatch console

1. Sign in to the AWS Management Console and open the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. In the navigation pane, choose **Metrics**.
3. Under **All metrics**, choose the **AWS/MediaPackage** namespace.
4. Choose the metric dimension to view the metrics (for example, choose `channel` to view metrics per channel).

AWS CLI

To view metrics using the AWS CLI

At a command prompt, enter the following command:

-
  ```
  aws cloudwatch list-metrics --namespace "AWS/MediaPackage"
  ```

MediaPackage live content metrics

The AWS/MediaPackage namespace includes the following metrics for live content. MediaPackage publishes metrics to CloudWatch every minute, if not sooner.

Metric	Description
ChannelMQCS	Segment-level quality score as calculated by MediaPackage for the active input to this channel. Units: Numeric Valid statistics: • Average – Average bytes (Sum/SampleCount) that MediaPackage outputs over the configured interval. • Maximum – Largest individual output request (in bytes) made to MediaPackage. • Minimum – Smallest individual output request (in bytes) made to MediaPackage. • SampleCount – Number of requests that's used in the statistical calculation. • Sum – Total number of bytes that MediaPackage outputs over the configured interval. Valid dimensions: • ChannelGroup • Combination of ChannelGroup and Channel

Metric	Description
	• Combination of ChannelGroup , Channel, and TrackType • No dimension
ChannelMQCSSequence	Aggregated quality score for all segments in the sequence for the active input to this channel, as calculated by MediaPackage. Units: Numeric Valid statistics: • Average – Average bytes (Sum/SampleCount) that MediaPackage outputs over the configured interval. • Maximum – Largest individual output request (in bytes) made to MediaPackage. • Minimum – Smallest individual output request (in bytes) made to MediaPackage. • SampleCount – Number of requests that's used in the statistical calculation. • Sum – Total number of bytes that MediaPackage outputs over the configured interval. Valid dimensions: • ChannelGroup • Combination of ChannelGroup and Channel • No dimension

Metric	Description
EgressBytes	Number of bytes that MediaPackage successfully sends for each request. If MediaPackage doesn't receive any requests for output in the specified interval, then no data is given. Units: Bytes Valid statistics: • Average – Average bytes (Sum/SampleCount) that MediaPackage outputs over the configured interval. • Maximum – Largest individual output request (in bytes) made to MediaPackage. • Minimum – Smallest individual output request (in bytes) made to MediaPackage. • SampleCount – Number of requests that's used in the statistical calculation. • Sum – Total number of bytes that MediaPackage outputs over the configured interval. Valid dimensions: • ChannelGroup • RequestType • Combination of ChannelGroup and Channel • Combination of ChannelGroup , Channel, and RequestType • Combination of ChannelGroup , Channel, and OriginEndpoint • Combination of ChannelGroup , Channel, OriginEndpoint , and RequestType

Metric	Description
	• No dimension

Metric	Description
`EgressRequestCount`	Number of content requests that MediaPackage receives. If MediaPackage doesn't receive any requests for output in the specified interval, then no data is given. Units: Count Valid statistics: • `Sum` – Total number of output requests that MediaPackage receives. Valid dimensions: • `ChannelGroup` • `RequestType` • `StatusCodeRange` • `OuputType` and `StatusCodeRange` • Combination of `ChannelGroup` and `RequestType` • Combination of `ChannelGroup` and `StatusCodeRange` • Combination of `ChannelGroup` , `RequestType` , and `StatusCodeRange` • Combination of `ChannelGroup` and `Channel` • Combination of `ChannelGroup` , `Channel`, and `RequestType` • Combination of `ChannelGroup` , `Channel`, and `OriginEndpoint` • Combination of `ChannelGroup` , `Channel`, and `StatusCodeRange`

Metric	Description
	- Combination of `ChannelGroup` , `Channel`, `OriginEndpoint` , and `RequestType` - Combination of `ChannelGroup` , `Channel`, `RequestType` , and `StatusCodeRange` - Combination of `ChannelGroup` , `Channel`, `OriginEndpoint` , and `StatusCodeRange` - Combination of `ChannelGroup` , `Channel`, `OriginEndpoint` , `RequestType` , and `StatusCodeRange` - No dimension

Metric	Description
EgressResponseTime	The time that it takes MediaPackage to process each output request. If MediaPackage doesn't receive any requests for output in the specified interval, then no data is given. Units: Milliseconds Valid statistics: • Average – Average amount of time (Sum/SampleCount) that it takes MediaPackage to process output requests over the configured interval. • Maximum – Longest amount of time (in milliseconds) that it takes MediaPackage to process an output request and provide a response. • Minimum – Shortest amount of time (in milliseconds) that it takes MediaPackage to process an output request and provide a response. • SampleCount – Number of requests that's used in the statistical calculation. • Sum – Total amount of time that it takes MediaPackage to process output requests over the configured interval. Valid dimensions: • ChannelGroup • RequestType • Combination of ChannelGroup and Channel

Metric	Description
	- Combination of ChannelGroup , Channel, and RequestType - Combination of ChannelGroup , Channel, and OriginEndpoint - Combination of ChannelGroup , Channel, OriginEndpoint , and RequestType - No dimension

Metric	Description
`IngressBytes`	Number of bytes of content that MediaPackage receives for each input request. If MediaPackage doesn't receive any requests for input in the specified interval, then no data is given. Units: Bytes Valid statistics: • `Average` – Average bytes (`Sum`/`SampleCount`) that MediaPackage receives over the configured interval. • `Maximum` – Largest individual input request (in bytes) made to MediaPackage. • `Minimum` – Smallest individual input request (in bytes) made to MediaPackage. • `SampleCount` – Number of requests that's used in the statistical calculation. • `Sum` – Total number of bytes that MediaPackage receives over the configured interval. Valid dimensions: • `ChannelGroup` • Combination of `ChannelGroup` and `Channel` • Combination of `ChannelGroup` , `Channel`, and `IngestEndpoint` • No dimension

Metric	Description
`IngressMQCS`	Segment-level quality score as communicated by AWS Elemental MediaLive for this input. Units: Numeric Valid statistics: • `Average` – Average bytes (`Sum/SampleCount`) that MediaPackage outputs over the configured interval. • `Maximum` – Largest individual output request (in bytes) made to MediaPackage. • `Minimum` – Smallest individual output request (in bytes) made to MediaPackage. • `SampleCount` – Number of requests that's used in the statistical calculation. • `Sum` – Total number of bytes that MediaPackage outputs over the configured interval. Valid dimensions: • `ChannelGroup` • Combination of `ChannelGroup` and `Channel` • Combination of `ChannelGroup` , `Channel`, and `IngestEndpoint` • Combination of `ChannelGroup` , `Channel`, `IngestEndpoint` , and `TrackType` • No dimension

Metric	Description
`IngressMQCSSequence`	Aggregated quality scores for all segments in the sequence, as communicated by AWS Elemental MediaLive. Units: Numeric Valid statistics: • `Average` – Average bytes (`Sum/SampleCount`) that MediaPackage outputs over the configured interval. • `Maximum` – Largest individual output request (in bytes) made to MediaPackage. • `Minimum` – Smallest individual output request (in bytes) made to MediaPackage. • `SampleCount` – Number of requests that's used in the statistical calculation. • `Sum` – Total number of bytes that MediaPackage outputs over the configured interval. Valid dimensions: • `ChannelGroup` • Combination of `ChannelGroup` and `Channel` • Combination of `ChannelGroup` , `Channel`, and `IngestEndpoint` • No dimension

Metric	Description
`IngressRequestCount`	Number of input requests that MediaPackage receives. If MediaPackage doesn't receive any requests for input in the specified interval, then no data is given. Units: Count Valid statistics: - `Sum` – Total number of input manifest requests that MediaPackage receives. Valid dimensions: - `ChannelGroup` - `StatusCodeRange` - Combination of `ChannelGroup` and `StatusCodeRange` - Combination of `ChannelGroup` and `Channel` - Combination of `ChannelGroup` , `Channel`, and `IngestEndpoint` - Combination of `ChannelGroup` , `Channel`, and `StatusCodeRange` - Combination of `ChannelGroup` , `Channel`, `IngestEndpoint` , and `StatusCodeRange` - No dimension

Metric	Description
`IngressResponseTime`	The time that it takes MediaPackage to process each input request. If MediaPackage doesn't receive any requests for input in the specified interval, then no data is given. Units: Milliseconds Valid statistics: • `Average` – Average amount of time (`Sum/SampleCount`) that it takes MediaPackage to process input requests over the configured interval. • `Maximum` – Longest amount of time (in milliseconds) that it takes MediaPackage to process an input request and provide a response. • `Minimum` – Shortest amount of time (in milliseconds) that it takes MediaPackage to process an input request and provide a response. • `SampleCount` – Number of requests that's used in the statistical calculation. • `Sum` – Total amount of time that it takes MediaPackage to process input requests over the configured interval. Valid dimensions: • `ChannelGroup` • Combination of `ChannelGroup` and `Channel` • Combination of `ChannelGroup` , `Channel`, and `IngestEndpoint`

Metric	Description
	- No dimension

MediaPackage live dimensions

You can filter the `AWS/MediaPackage` data using the following dimensions.

Dimension	Description
No Dimension	Metrics are aggregated and shown for all channels, endpoints, or status codes.
`Channel`	Metrics are shown only for the specified channel. Value: The auto-generated name of the channel. Can be used alone or with other dimensions: - Alone to show metrics for only the specified channel. - With the `originEndpoint` dimension to show metrics for the specified endpoint that's associated with the specified channel.
`ChannelGroup`	Metrics are shown only for the specified channel group. Value: The name of the channel group. Can be used alone or with other dimensions: - Alone to show metrics only for the specified channel group. - With the `channel` dimension to show metrics for the specified channel that's associated with the specified channel group.

Dimension	Description
	• With the `statusCodeRange` dimension to show metrics for the specified status code ranges that are associated with the specified channel group.
`IngestEndpoint`	Metrics are shown only for the specified ingest endpoint on a channel. Value: The auto-generated GUID of the ingest endpoint. Can be used with the following dimensions: • With the `channel` dimension to show metrics for the specified ingest endpoint that's associated with the specified channel. • With the `originEndpoint` dimension to show metrics for the specified ingest endpoint that's associated with the specified endpoint.
`OriginEndpoint`	Metrics are shown for the specified channel and endpoint combination. Value: The auto-generated name of the endpoint. Must be used with the `channel` dimension.

Dimension	Description
`RequestType`	Metrics are shown only for the specified request type. Value: Either `manifest` or `segment`, signifying the type of content being filtered in the metric. Can be used alone or with other dimensions: • Alone to show metrics only for the specified request type. • With the `statusCodeRange` dimension to show metrics for the specified request type that's associated with the specified status code range. • With the `originEndpoint` dimension to show metrics for the specified request type that's associated with the specified origin endpoint.

Dimension	Description
`StatusCodeRange`	Metrics are shown for the specified status code range. Value: `2xx`, `3xx`, `4xx`, or `5xx`. Can be used alone or with other dimensions: • Alone to show all output requests for the specified status range. • With the `channel` dimension to show output requests for all endpoints that are associated with the specified channel, with the specified status code range. • With the `channel` and `originEndpoint` dimensions to show output requests with a specific status code range on the specified endpoint that's associated with the specified channel.
`TrackType`	Metrics are shown for the specified track type. Value: `Video`, `Audio`, or `Subtitle`. Can be used alone or with other dimensions: • Alone to show quality scores for the specified track type. • With the `channel` dimension to show quality scores for all track types that are associated with the specified channel, with the specified track type. • With the `channel` and `IngestEndpoint` dimensions to show quality scores with a specific track type on the specified ingest endpoint that's associated with the specified channel.

Logging AWS Elemental MediaPackage API calls with AWS CloudTrail

Logging is available with only live workflows in MediaPackage.

MediaPackage is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in MediaPackage. CloudTrail captures all API calls for MediaPackage as events. These include calls from the MediaPackage console and code calls to the MediaPackage API operations. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for MediaPackage. 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 MediaPackage, 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.

MediaPackage information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When activity occurs in MediaPackage, 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 account. For more information, see Viewing events with CloudTrail event history.

For an ongoing record of events in your account, including events for MediaPackage, 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 AWS Regions. The trail logs events from all AWS 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 the following:

- 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 MediaPackage actions are logged by CloudTrail and are documented in the MediaPackage Live API reference . For example, calls to the `CreateChannel`, `CreateOriginEndpoint`, and `RotateIngestEndpointCredentials` 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 user 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 MediaPackage 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 aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the `UpdateChannel` operation:

```
{
    "eventVersion": "1.08",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "ABCDEFGHIJKL123456789",
        "arn": "arn:aws:sts::444455556666:assumed-role/Admin/testUser",
        "accountId": "444455556666",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "sessionContext": {
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2023-03-17T00:50:58Z"
            },
            "sessionIssuer": {
                "type": "Role",
                "principalId": "ABCDEFGHIJKL123456789",
                "arn": "arn:aws:iam::444455556666:role/Admin",
                "accountId": "444455556666",
                "userName": "Admin"
            }
        }
    },
    "eventTime": "2023-03-17T00:50:59Z",
    "eventSource": "mediapackagev2.amazonaws.com",
    "eventName": "UpdateChannel",
    "awsRegion": "us-west-2",
    "sourceIPAddress": "203.0.113.17",
    "userAgent": "aws-cli/1.18.147 Python/3.6.5 Darwin/17.7.0 botocore/1.10.70",
    "requestParameters": {
        "description": "updated cloudtrail description",
        "id": "cloudtrail-test"
    },
    "responseElements": {
        "description": "updated cloudtrail description",
        "hlsIngest": {
            "ingestEndpoints": [
                {
                    "username": "***",
                    "url": "https://mediapackagev2.us-west-2.amazonaws.com/in/
v2/8d0ca97840d94b18b37ad292c131bcad/8d0ca97840d94b18b37ad292c131bcad/channel",
                    "password": "***",
                    "id": "8d0ca97840d94b18b37ad292c131bcad"
                },
                {
                    "username": "***",
                    "url": "https://mediapackagev2.us-west-2.amazonaws.com/in/
v2/8d0ca97840d94b18b37ad292c131bcad/9c17f979598543b9be24345d63b3ad30/channel",
                    "password": "***",
                    "id": "9c17f979598543b9be24345d63b3ad30"
                }
            ]
        },
        "id": "cloudtrail-test",
        "arn": "arn:aws:mediapackagev2:us-
west-2:444455556666:channelGroup/ChannelGroupName/
channel/8d0ca97840d94b18b37ad292c131bcad"
    },
    "requestID": "fc158262-025e-11e9-8360-6bff705fbba5",
    "eventID": "e9016b49-9a0a-4256-b684-eed9bd9073ab",
    "readOnly": false,
    "eventType": "AwsApiCall",
    "managementEvent": true,
    "recipientAccountId": "444455556666",
    "eventCategory": "Management"
}
```

Access logging

AWS Elemental MediaPackage v2 provides access logs that capture detailed information about requests sent to your channels. MediaPackage generates two log types:

- Ingress access logs are for requests sent to the channel's input endpoints
- Egress access logs are for requests sent to the channel's endpoints or packaging group's assets

Each log contains information such as the time the request was received, the client's IP address, latencies, request paths, and server responses. You can use these access logs to analyze service performance and troubleshoot issues. They can also help you learn about your customer base and understand your MediaPackage bill.

Access logging is an optional feature of MediaPackage that's disabled by default. After you enable access logging, MediaPackage captures the logs and sends them to a destination. Amazon CloudWatch vending log charges apply. For more information, see CloudWatch pricing.

Topics

Permissions

MediaPackage uses CloudWatch vended logs to deliver access logging. To deliver access logs, you need permissions to the logging destination that you specify.

To see the required permissions for each logging destination, choose from the following AWS services in the *Amazon CloudWatch Logs User Guide*.

- Amazon CloudWatch Logs
- Amazon Simple Storage Service (Amazon S3)
- Amazon Data Firehose

To create, view, or modify logging configuration in MediaPackage, you must have the required permissions. Your IAM role must include the following minimum permissions to manage access logging in the MediaPackage console.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "ServiceLevelAccessForLogDelivery",
            "Effect": "Allow",
            "Action": ["mediapackagev2:AllowVendedLogDeliveryForResource"],
            "Resource": "arn:aws:mediapackagev2:region:123456789012:channelGroup/*"
        }
    ]
}
```

For more information about permissions to manage access logging, see Enable logging from AWS services in the *Amazon CloudWatch Logs User Guide*.

Enable access logging

After you set up permissions to the logging destination, you can enable access logging for MediaPackage.

For each log type, you can configure up to 3 log deliveries.

To enable access logs for an existing channel (console)

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Select your channel group from the list of channel groups.
3. Under **Access Logging**, do the following:

    a. For **Log deliveries – Egress Access Logs** or **Log deliveries – Ingress Access Logs**, choose **Add**, and then do the following:

    b. Choose one of the following logging destinations.

- Amazon CloudWatch Logs
- Amazon S3
- Firehose

> **Tip**
>
> - If you choose Amazon S3 or Firehose, you can deliver your logs to a **Cross account** or **In current account**.
> - To enable cross-account delivery, both AWS accounts must have the required permissions. For more information, see the Cross-account delivery example in the *Amazon CloudWatch Logs User Guide*.

4. For the **Delivery destination ARN**, choose or enter the ARN. If you don't have one already, follow the prompts to create one.
5. For **Additional settings - *optional***, choose the following:

   a. For **Field selection**, select the log fields to include in each log record.

   b. For **Output format**, choose the output format for the log.

   c. For **Field delimiter**, choose how to separate each log field.

   d. (Amazon S3) For **Suffix**, specify the suffix path to partition your data. You can use the following fields: {accountid}, {region}, {channel_group_id}, {yyyy}, {MM}, {dd}, {HH}

   e. (Amazon S3) For **Hive-compatible**, choose **Enable** if you want to use Hive-compatible S3 paths.
6. To apply your changes to all log types, choose **Apply to all log types**.
7. To create another log destination, repeat steps 3 – 5.
8. Follow the prompts to update your channel group.

You can also use the CloudWatch API to enable access logs for your channel groups.

To enable access logs for an existing channel (API)

1. After you a create a channel group by using either the MediaPackage v2 API or the MediaPackage v2 console, get the Amazon Resource Name (ARN) of the channel group.

You can find the ARN from the **Channel groups** page in the MediaPackage console or you can use the GetChannel API operation. A channel group ARN follows this format: `arn:aws:mediapackagev2:region:123456789012:channelGroup/channelGroupName`

2. Next, use the CloudWatch PutDeliverySource API operation to create a delivery source for the channel group.

   a. Pass the `resourceArn`.

   b. For `logType`, specify `ACCESS_LOGS` as the type of logs that are collected. `ACCESS_LOGS` track the current status of files during an ingestion job.

```
{
    "logType": "ACCESS_LOGS",
    "name": "my-channel-group-source",
    "resourceArn":
 "arn:aws:mediapackagev2:region:123456789012:channelGroup/channelGroupName"
}
```

3. Use the PutDeliveryDestination API operation to configure where to store your logs. You can choose either CloudWatch Logs, Amazon S3, or Firehose as the destination. You must specify the ARN of one of the destination options for where your logs will be stored. You can choose the `outputFormat` of the logs to be one of the following: json, plain, w3c, raw, parquet.

   The following is an example of configuring logs to store in an Amazon S3 bucket and in JSON format.

```
{
   "deliveryDestinationConfiguration": {
      "destinationResourceArn": "arn:aws:s3:::amzn-s3-demo-bucket-name"
   },
   "name": "string",
   "outputFormat": "json",
   "tags": {
      "key" : "value"
   }
}
```

> **Note**
>
> If you're delivering logs cross-account, you must use the `PutDeliveryDestinationPolicy` API to assign an AWS Identity and Access Management (IAM) policy to the destination account. The IAM policy allows delivery from one account to another account.

4. Use the CreateDelivery API operation to link the delivery source to the destination that you created in the previous steps. This API operation associates the delivery source with the end destination.

```
{
   "deliveryDestinationArn": "string",
   "deliverySourceName": "string",
   "tags": {
      "string" : "string"
   }
}
```

Manage and disable access logging

Follow these procedures to manage or disable access logging for MediaPackage.

To manage access logging for a channel (console)

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Select your channel group from the list of channel groups.
3. In the **Access Logging** section, select the destination and choose **Edit**.
4. Modify the log configuration as needed and then choose **Update**.

> **Note**
>
> You can't modify the logging destination. If you need to change the logging destination, delete the current configuration and create a new logging destination.

You can disable access logs for your MediaPackage channel at any time.

To disable access logging for a channel (console)

1. Open the MediaPackage console at https://console.aws.amazon.com/mediapackage/.
2. Select your channel group from the list of channel groups.
3. In the **Access Logging** section, select the destination to disable and choose **Remove**.
4. Review your changes and then choose **Delete**.

Read access logs

MediaPackage v2 uses ingestion hub to deliver your access logs.

If you're using CloudWatch Logs as the destination, you can use CloudWatch Logs Insights to read the access logs. Typical CloudWatch Logs charges apply. For more information, see Analyzing Log Data with CloudWatch Logs Insights in the *AWS CloudWatch Logs User Guide*.

> **Note**
>
> Access logs can take a few minutes to appear in your destination. If you don't see the logs, wait a few minutes and try again.

Access log format

The access log files consist of a sequence of formatted log records, where each log record represents one request. The order of the fields within the log can vary.

Example Example: Ingress access log

```
{
    "event_timestamp": "2020-07-13T18:59:56.293656Z",
    "resource_arn": "arn:aws:mediapackagev2:us-east-1:007862077394:123456789012/
my_channel_group",
    "client_ip": "192.0.2.0/24",
    "time_to_first_byte": 0.445,
    "status_code": "200",
    "received_bytes": 468,
    "sent_bytes": 2587370,
    "method": "GET",
    "request": "https://aabbcc-1.ingest.eeffgg.mediapackagev2.us-
east-1.amazonaws.com:443/in/v1/my_channel_group/1/my_channel/manifest.m3u8",
    "protocol": "HTTP/1.1",
    "user_agent": "sabr/3.0 Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US)
 AppleWebKit/528.18 (KHTML, like Gecko) Version/4.0 Safari/528.17",
    "account": "123456789012",
    "channel_id": "my_channel",
    "channel_arn": "arn:aws:mediapackage:us-west-2:111122223333:channels/
ExampleChannelID",
    "domain_name": "aaabbbcccdddee.mediapackage.us-east-1.amazonaws.com",
    "request_id": "aaaAAA111bbbBBB222cccCCC333dddDDD",
    "channel_group_id": "my_channel_group",
    "input_type": "HLS",
    "input_index": "1"
}
```

Example Example: Egress access log

```
{
    "event_timestamp": "2020-07-13T18:59:56.293656Z",
    "resource_arn": "arn:aws:mediapackagev2:us-east-1:007862077394:123456789012/
my_channel_group",
    "client_ip": "192.0.2.0/24",
    "time_to_first_byte": 0.445,
    "status_code": "200",
    "received_bytes": 468,
    "sent_bytes": 2587370,
    "method": "GET",
    "request": "https://aabbcc.egress.eeffgg.mediapackagev2.us-
east-1.amazonaws.com:443/out/v1/my_channel_group/my_channel/my_endpoint/index.mpd?
param1=value1&param2=value2",
    "request_query_params": "param1=value1&param2=value2",
    "protocol": "HTTP/1.1",
    "user_agent": "sabr/3.0 Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US)
 AppleWebKit/528.18 (KHTML, like Gecko) Version/4.0 Safari/528.17",
    "account": "111122223333",
    "channel_id": "my_channel",
    "channel_arn": "arn:aws:mediapackage:us-west-2:123456789012:channels/
ExampleChannelID",
    "domain_name": "aaabbbcccdddee.mediapackage.us-east-1.amazonaws.com",
    "request_id": "aaaAAA111bbbBBB222cccCCC333dddDDD",
    "endpoint_id": "my_endpoint",
    "endpoint_arn": "arn:aws:mediapackage:us-west-2:123456789012:origin_endpoints/
ExampleEndpointID",
    "channel_group_id": "my_channel_group",
    "manifest_name": "index",
    "manifest_type": "DASH"
}
```

The following list describes the log record fields, in order:

event_timestamp

The time of day when the request was received. The value is `ISO-8601` date time and is based on the system clock of the host that served the request.

resource_arn

The Amazon Resource Name (ARN) of the channel group that received the request.

client_ip

The IP address of the requesting client.

time_to_first_byte

The number of seconds that MediaPackage spent processing your request. This value is measured from the time the last byte of your request was received until the time the first byte of the response was sent.

status_code

The numeric HTTP status code of the response.

received_bytes

The number of bytes in the request body that the MediaPackage server receives.

sent_bytes

The number of bytes in the response body that the MediaPackage server sends. This value often is the same as the value of the `Content-Length` header that's included with server responses.

method

The HTTP request method that was used for the request: DELETE, GET, HEAD, OPTIONS, PATCH, POST, or PUT.

request

The request URL.

protocol

The type of protocol used for the request, such as HTTP.

user_agent

A user-agent string that identifies the client that originated the request, enclosed in double quotes. The string consists of one or more product identifiers, product/version. If the string is longer than 8 KB, it is truncated.

account

The AWS account ID of the account that was used to make the request.

channel_id

The ID of the channel that received the request.

channel_arn

The Amazon Resource Name (ARN) of the channel that received the request.

domain_name

The server name indication domain provided by the client during the TLS handshake, enclosed in double quotes. This value is set to - if the client doesn't support SNI or the domain doesn't match a certificate and the default certificate is presented to the client.

request_id

A string that's generated by MediaPackage to uniquely identify each request.

endpoint_id

The ID of the endpoint that received the request.

endpoint_arn

The Amazon Resource Name (ARN) of the endpoint that received the request.

input_type

The ingest file formats and protocol.

input_index

The input source index.

manifest_name

The name of the egress request manifest request. Remains empty for segment egress request.

manifest_type

The type of the egress request manifest request. Remains empty for segment egress request.

request_query_params

The manifest filtering query parameter names and values.

Examples

The following are queries that you can use to read MediaPackage debug log data.

Example View the HTTP status code responses for a channel

Use this query to view the responses by HTTP status code for a channel. You can use this to view HTTP error code responses to help you to troubleshoot issues.

```
fields @timestamp, @message
                | filter channelId like my-channel
                | stats count() by statusCode
```

Example Get the number of requests per endpoint on a channel

```
fields @timestamp, @message
                | filter channelId like my-channel
                | stats count() by endpointId
```

Monitoring manifest update time in AWS Elemental MediaPackage

MediaPackage playback responses include the following custom headers that indicate when MediaPackage last modified the manifest in non-dynamic ad insertion workflows. These headers are helpful when troubleshooting issues related to stale manifests.

X-Amzn-Mediapackage-Manifest-Last-Part

This is only provided on requests for low-latency HLS manifests, and is the highest part sequence number in the manifest.

X-MediaPackage-Manifest-Last-Sequence

This is the highest segment sequence number in the manifest.

For HLS and CMAF, this is the highest segment number in the media playlist.

See the following section for manifest example.

X-MediaPackage-Manifest-Last-Updated

The epoch timestamp in milliseconds when MediaPackage generates the segment referred to in `X-MediaPackage-Manifest-Last-Sequence`.

HLS manifest example

HLS manifest

MediaPackage determines the `X-MediaPackage-Manifest-Last-Sequence` value from the last segment in the manifest. For example, in the following manifest `index_1_3.ts` is the highest segment sequence number, so the value of `X-MediaPackage-Manifest-Last-Sequence` is 3. The value of `X-MediaPackage-Manifest-Last-Updated` corresponds to the epoch timestamp in milliseconds when MediaPackage generates the last segment in the manifest.

```
#EXTM3U
#EXT-X-VERSION:3
#EXT-X-TARGETDURATION:8
#EXT-X-MEDIA-SEQUENCE:0
#EXTINF:7.500,
index_1_0.ts?m=1583172400
#EXTINF:7.500,
index_1_1.ts?m=1583172400
#EXTINF:7.500,
index_1_2.ts?m=1583172400
#EXTINF:7.500,
index_1_3.ts?m=1583172400
#EXT-X-ENDLIST
```

MediaPackage response headers

Use the following AWS Elemental MediaPackage response headers to help you build your workflows. For more information about response headers associated with manifest monitoring, see Monitoring manifest update time.

Header name	Value	Description
`CMSD-Static`	For accepted key/value pairs, see [CMSD headers from AWS Elemental MediaPackage]().	A variety of Common Media Server Data (CMSD) information about the manifests and segment response objects.
`X-Amzn-Mediapackage-Active-Input`	1 or 2	The active input pipeline when MediaPackage serves a given media segment.
`X-Amzn-Mediapackage-Channel-Id`	The channel-name value in the API.	Use separately from, or in addition to, `X-Amzn-MediaPackage-Channel-UniqueId` , to identify a given channel in the CDN logs. Channel names are unique only within a given region.
`X-Amzn-Mediapackage-Channel-UniqueId`	The unique identifier of the channel.	Use separately from, or in addition to, `X-Amzn-MediaPackage-Channel-Id` , to identify a given channel in the CDN logs. Channel names are unique only within a given region. Using `X-Amzn-Mediapackage-Channel-UniqueId` is also helpful for support requests.
`X-Amzn-Mediapackage-Endpoint-Id`	The manifest-name value in the API.	Use separately from, or in addition to, `X-Amzn-Mediapackage-Endpoint-UniqueId` , to identify a given endpoint in the CDN

Header name	Value	Description
		logs. Endpoint names are unique only within a given channel and region.
`X-Amzn-Mediapackage-Endpoint-UniqueId`	The unique identifier of the endpoint.	Use separately from, or in addition to, `X-Amzn-MediaPackage-Endpoint-Id` , to identify a given endpoint in the CDN logs. Endpoint names are unique only within a given channel and region. Using `X-Amzn-Mediapackage-Endpoint-UniqueId` is also helpful for support requests.
`X-Amzn-RequestId`	The unique identifier of the request.	Equivalent to `X-Amzn-MediaPackage-Request-Id` in MediaPackage V1. Using `X-Amzn-RequestId` is helpful for support requests.

Tagging AWS Elemental MediaPackage resources

A tag is a label that you assign to an AWS resource. Each tag consists of a *key* and a *value*, both of which you define. For example, the key might be "stage" and the value might be "test". You can use tags for a variety of purposes. One common use is to control access to AWS resources using tags. For information, see the Controlling access to AWS resources using tags topic in the *IAM User Guide*.

Another common use of tags is to categorize and track your MediaPackage costs. When you apply cost allocation tags to MediaPackage channels, endpoints, and packaging configurations, AWS generates a cost allocation report as a comma-separated value (CSV) file with your usage and costs aggregated by your tags. You can apply tags that represent business categories (such as cost centers, application names, or owners) to organize your costs across multiple services. For more information about using tags for cost allocation, see Using cost allocation tags in the AWS Billing User Guide.

Tag restrictions

The following restrictions apply to tagging AWS Elemental MediaPackage resources:

- Cost allocation tagging is only available for channel, endpoint, and packaging configuration resources. You can't use cost allocation tags for asset or packaging group resources.
- Maximum number of tags that you can assign to a resource – 50.
- Maximum key length – 128 Unicode characters.
- Maximum value length – 256 Unicode characters.
- Valid characters for key and value – a-z, A-Z, 0-9, space, and the following characters: _ . : / = + - and @.
- Keys and values are case sensitive.
- Don't use `aws:` as a prefix for keys; it's reserved for AWS use.
- Can't be used for harvested live-to-VOD assets.

Managing tags

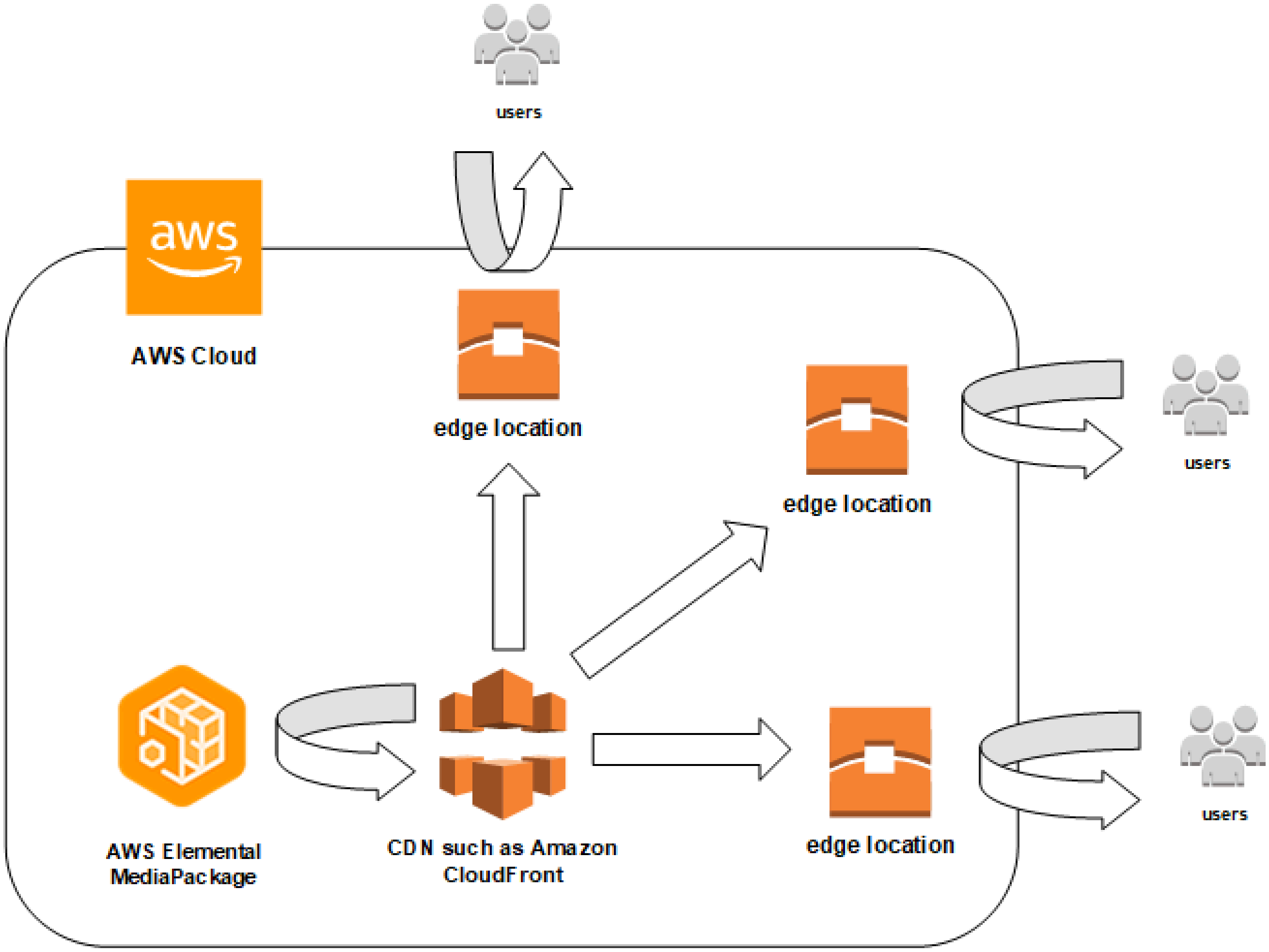
You can use the AWS Elemental MediaPackage API or the AWS CLI to add, edit, or delete the values for these properties.

For more information, see the actions related to tags in the following reference documentation:

- Tags resource-arn in the *AWS Elemental MediaPackage live API reference*.
- tag-resource in the AWS CLI *MediaPackage reference*.

Working with AWS Elemental MediaPackage and CDNs

You can use a content delivery network (CDN) such as Amazon CloudFront to serve the content that you store in AWS Elemental MediaPackage. A CDN is a globally distributed set of servers that caches content such as videos. When a user requests your content, the CDN routes the request to the edge location that provides the lowest latency. If your content is already cached in that edge location, the CDN delivers it immediately. If your content is not currently in that edge location, the CDN retrieves it from your origin (in this case, the MediaPackage endpoint) and distributes it to the user. The following illustration shows this process.



CDN configuration recommendations

To configure your CDN distributions for delivering Apple HLS and low-latency HLS (LL-HLS) streams with MediaPackage, we suggest using the following approach. Ensure that all your usual default parameters in the CDN distribution configuration are compatible with the delivery of HLS and LL-HLS streams with MediaPackage.

Honor MediaPackage 'cache-control: max-age' values

MediaPackage defines time-to-live (TTL) values for objects either statically or dynamically, depending on the object type. The specific TTLs are listed below, and it's strongly recommended that you honor these values and avoid overriding them at the CDN configuration level.

- Multivariant playlist (for both regular HLS and LL-HLS) - half the duration of the media segments
- Media playlists (regular HLS) - half the duration of the media segments
- Media playlists (LL-HLS) - 1 second
- TS media segments and init segments - 1209600 seconds (14 days)
- CMAF media segments and initialization segments - 1209600 seconds (14 days)

Include specific Query Strings in your CDN cache key

Some query strings are used to customize the manifests contents (`aws.manifestfilter`), to define specific startover content window (`start` and `end`), to apply time delay on the manifest contents (`time_delay`), and to support LL-HLS playback requests logic (`_HLS_msn` and `_HLS_part`). It's therefore recommended to include these six query strings in the CDN cache key. MediaPackage will ignore all other query strings, so don't include them in the CDN forward requests.

Response timeout

LL-HLS uses the Blocking Requests mechanism for both playlists and media parts, which is signaled through the `EXT-X-PRELOAD-HINT` tag. This mechanism puts the origin response on hold until the object is fully available. Consequently, the CDN should also wait for the origin response, and therefore, the response timeout value in your CDN distribution should be at least three times your parts duration.

Forwarded HTTP headers

You may consider including the Origin header in your CDN forward requests to MediaPackage as the only potentially necessary HTTP request header. In doing so, MediaPackage will respond with an `access-control-allow-origin` header, using the value passed as the Origin header value.

If the Origin header is not included in the forward requests, MediaPackage will respond with an `access-control-allow-origin: *` header. Choose the approach that best fits your CORS requirements.

Forwarded cookies

MediaPackage doesn't consider any cookies that may be sent together with forward requests. Therefore, it's advisable to exclude cookies from CDN forward requests.

Quotas in AWS Elemental MediaPackage

This section describes the quotas for AWS Elemental MediaPackage. For information about requesting an increase to soft quotas, see AWS service quotas. You can't request an increase to hard quotas.

Topics

- Live soft quotas
- Live hard quotas

Live soft quotas

The following table describes quotas in AWS Elemental MediaPackage for live content that can be increased. For information about changing quotas, see AWS Service Quotas.

For some customers, your account quota might be below these published quotas. If you believe that you encountered a Resource limit exceeded error wrongfully, use the Service Quotas console to request quota increases.

Resource or operation	Default quota
Maximum Live Manifest Length	15 minutes
Maximum Channel Groups	3 per account
Maximum Channels	10 per channel group
Maximum Endpoints per Channel	10 per channel Each origin endpoint represents the output package that you use. If one channel serves TS or TS encrypted, CMAF or CMAF encrypted content, then that channel has 4 endpoints and falls within the 10 endpoints quota. If you have 10 channels set up this same way, then you still haven't exceeded the quota because each channel uses only 4 endpoints.

Resource or operation	Default quota
Manifests per origin endpoint	25 manifests per origin endpoint

Live hard quotas

The following table describes quotas in AWS Elemental MediaPackage for live content that can't be increased.

Resource or operation	Quota
Ingest streams per Channel	20 streams per channel
Maximum Content Age for Time-shifted Viewing	336 hours (14 days)
Maximum Time-shifted Manifest Length	24 hours for all supported output formats
Request Rates per Channel Input	200 requests per second
Request Rates per Endpoint	• Media segments output: 500 requests per second • Manifests output: 500 requests per second **Note** The per Endpoint origination request rate quotas are indicative only and based on typical traffic patterns when using a properly configured CDN. The request rate quotas are applicable for live events, linear channels, and time-shifted viewing. The request rate quotas may be lower under certain conditions like misconfigured CDNs or players generating abnormal levels of origin requests with unique HTTP

Resource or operation	Quota
	headers values, or unique query strings values appended to the playback URLs.
REST API Requests	- Steady state: 5 requests per second - Bursting: 50 requests per second
Tracks per Ingest Stream	10 The maximum number of tracks (audio, video, subtitle, etc.) per stream that you can ingest.

Document history for the MediaPackage User Guide

The following table describes the documentation releases for MediaPackage.

Change	Description	Date
Added `HarvestObject` content	Added information the `HarvestObject` dataplane API operation.	January 28, 2025
Added formatting for query parameters	Added information about how manifest filtering query parameters can be formatted to include multiple queries.	January 16, 2025
Added content about limiting the duration of a manifest	Added information about `manifest_window_seconds` query parameters, which can be used to request shorter manifests on a session-level basis.	January 16, 2025
Added clip-start time delay	Added information about using clip-start query parameters with time delayed live content.	January 16, 2025
Added support for MQCS	MediaPackage now supports Media Quality Confidence Scores (MQCS), which indicates the quality of a stream down to the segment.	November 21, 2024
Added support for CMSD headers	MediaPackage now supports Common Media Server Data (CMSD) headers in responses to downstream systems.	November 21, 2024

Added support for access logging	MediaPackage v2 supports access logging and sending your logs to the log destinati on that you specify.	November 15, 2024
Harvest jobs	Harvest jobs for creating live-to-VOD assets are supported in MediaPackage v2.	October 30, 2024
Added support for Dolby Vision 8.1	MediaPackage now supports the video codec Dolby Vision 8.1, which increases the range of colors that can be shown in a video.	July 23, 2024
Added cross-region failover content	Added information about cross-region failover in AWS Elemental MediaPackage	June 11, 2024
Support for DASH	MediaPackage added support for DASH manifests.	April 19, 2024
Live manifest length quota	Moved Maximum Live Manifest Length to Live soft quotas table. This change allows you to submit requests to increase your quota limit.	February 14, 2024
Manifest header	MediaPackage added manifest header for low-laten cy HLS manifests.	January 31, 2024
Manifest filters and filter configuration	Updated the note for clarifica tion when configuring Manifest filters as part of the Filter Configuration.	January 31, 2024

Manifest filters	MediaPackage added support for manifest filters for endpoint egress requests.	October 30, 2023
Response headers	Added section that explains MediaPackage response headers.	August 4, 2023
AWS managed policy updates	Added new AWS managed policies: `AWSElementalMediaPackageV2FullAccess` , `AWSElementalMediaPackageV2ReadOnly` .	July 25, 2023
`time_delay` query parameters added to time-shifted viewing reference	Added information on using `time_delay` query parameters.	July 23, 2023
Added data plane APIs	Added `PutObject` , `GetObject` , and `GetHeadObject` data plane APIs.	June 14, 2023
Initial release	Initial release of the AWS Elemental MediaPackage User Guide	May 5, 2023