



Unified Streaming - Cloud Deployment Guide for Amazon Web Services (AWS)

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Table of Contents

[Table of Contents](#)

[Introduction](#)

[Product List](#)

[Unified Origin](#)

[Unified Packager](#)

[Unified Remix](#)

[Unified Capture](#)

[Dependencies and Requirements](#)

[Supported Operating Systems](#)

[Software dependencies](#)

[Architecture](#)

[Use-case\(s\)](#)

[Origin VOD](#)

[Origin Live](#)

[Architecture Considerations](#)

[Platform](#)

[EC2](#)

[ECS/Fargate](#)

[EKS/Fargate](#)

[Lambda](#)

[Storage](#)

[EFS - Elastic File System](#)

[EBS - Elastic Block Storage](#)

[S3 - Object Storage](#)

[Backup](#)

[AWS Backup](#)

[Best Practice](#)

[License](#)

[Installation & Configuration](#)

[Unified Origin](#)

[Unified Packager](#)

[Unified Remix](#)

[Unified Capture](#)

[Upgrade/Update](#)

[Unified Software](#)

[Operating System](#)

[Instance](#)

[Instance type](#)

[Security](#)

[Roles/Policy/Privilege](#)

[Data Encryption at Rest](#)

[Storage Encryption](#)

[Customer sensitive information](#)

[Availability](#)

[AWS Service](#)

[Unified Streaming Applications](#)

[Monitoring](#)

[Amazon CloudWatch](#)

[Application logging](#)

[Application Program Interface \(API\)](#)

[Troubleshooting](#)

[AWS Platform or Service](#)

[Unified Streaming Software or Output](#)

[Support](#)

[Email](#)

[Portal](#)

Introduction

The purpose of this document is to provide information on how to use the range of unified streaming products within a cloud environment or platform.

Product List

Unified streaming offers a range of software products that fit within an end to end OTT streaming platform.

Unified Origin

Use a single source to stream all your content to all devices. Unified Origin is an all-in-one solution for streaming HLS, MPEG-DASH, HDS and HSS. It offers inbuilt support for DRM, timed metadata (SCTE 35), multi-channel audio and accessibility features, such as captions and subtitles.

As a software plugin for industry standard web servers, such as Apache and Nginx, Unified Origin allows a webserver to ingest one format (MP4, fragmented MP4 or HLS for VOD) and package it on-the-fly to all formats, including HbbTV, Progressive and CMAF. It supports all the major DRM systems (Adobe Access, FairPlay, Marlin, PlayReady and Widevine). AVC, HEVC, HDR or Dolby Vision are all compatible.

Unified Packager

Apply one tool to prepare all your content for HLS, MPEG-DASH, HDS, HSS and CMAF. Unified Packager works with content protection schemes, such as encryption, DRM and multiple-key DRM, to create a seamless viewer experience. Once packaged, your content is ready for delivery to an origin server or a CDN.

As a software program, Unified Packager takes MP4 files as input to produce segmented output in HDS, HLS (TS/fMP4), MPEG-DASH and MSS formats. DRM can be applied using the command-line options, whereas CPIX may be used to specify multiple keys.

Unified Packager smoothly handles advanced features for adding multiple audio codecs, such as DTS Express, Dolby Digital Plus/Atmos and HE-AAC v2. Adding subtitles is easy because Unified Packager supports SRT, DFXP, ISMT, STPP or WebVTT.

[Unified Remix](#)

Use a playlist to mix clips from various origins into a single stream and deliver to all devices with no discontinuity. Add a promo, output conditioned manifests and media segments and ready your VOD content for ad insertion. Unified Remix takes an innovative approach by doing content stitching upstream from the origin server. Other use cases include virtual live streams, stream personalization, pre-rolls, mid-rolls, post-rolls and nPVR. Plus, many other interesting cases are in store.

Think of Unified Remix as a just-in-time video-editing suite. Streams can be personalized in any arrangement: a stream for each viewer, streams to groups of viewers (for example, according to geolocation or subscriptions) or even a single stream for all viewers.

[Unified Capture](#)

Create clips from any stream and, in the process, do frame-accurate cutting. Unified Capture works with Live and VOD streams generating clips in HLS, MPEG-DASH, HDS and HSS. It enables monetization of live streaming and new services, such as nPVR, catch-up TV and timeshift TV.

Unified Capture is a command line tool that captures and downloads the adaptive bitrate presentation (ABR) to disk, from a URL with timestamps. It also provides the option to do frame-accurate cuts in stream, whereby Unified Capture decodes and encodes beginning and ending fragments to allow for sample-accurate timing.

Dependencies and Requirements

Supported Operating Systems

List of supported operating systems can be found in the [Unified Streaming documentation](#).

A comprehensive “End of Life” list for each operating system can be found in the [Unified Streaming documentation factsheet](#).

Software dependencies

[Unified Origin](#) being a webserver module requires Apache to be installed.

[Unified Packager](#) can be installed as a standalone tool without any additional dependencies

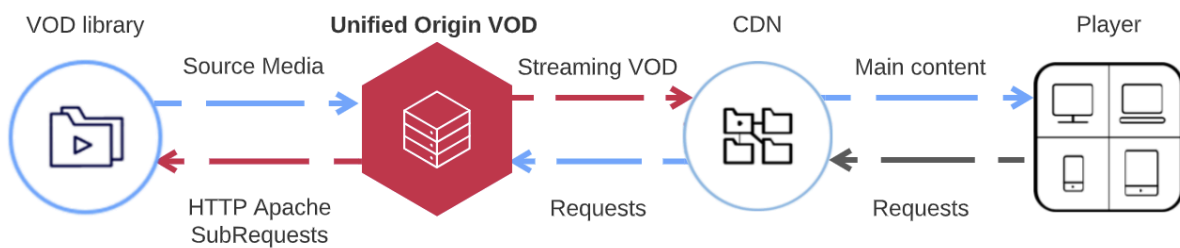
[Unified Remix](#) can be used as either a webserver module (requiring Apache) or as a standalone tool without any additional dependencies.

Architecture

Use-case(s)

Origin VOD

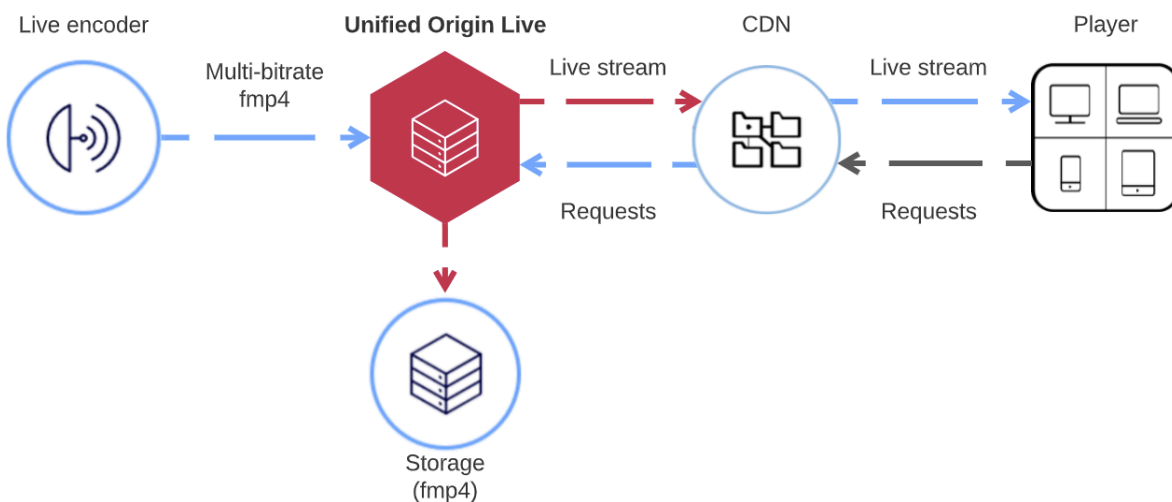
Package, encrypt and apply DRM on-the-fly. Unified Origin, the industry standard for streaming VOD content from a single source to any device. It scales to demand and is highly resilient, meeting the needs of broadcasters, telcos and streaming providers around the world.



For more information please see [the Unified Streaming documentation](#).

Origin Live

Stream events and live channels to all devices using a highly performant lightweight solution. Unified Origin Live underpins services from major broadcasters, streaming platforms and telcos worldwide. It is fully scalable and extremely resilient, providing for the efficient delivery of your live streams to millions of viewers.



For more information please see [the Unified Streaming documentation](#).

Both use-cases show how Unified-Origin fits within typical end-to-end OTT/Media Streaming workflow where media is distributed via a CDN(Content Delivery Network)/Cache for the purposes of cost and scaling.

The CDN/Cache capability could be provided by any number of publicly available CDN solutions such as; [AWS CloudFront](#), Akamai, Level3, Fastly or provided by a custom solution implemented using open-source technology such as; HA-Proxy, Nginx, Varnish, Squid or Apache.

Architecture Considerations

Platform

EC2

[AWS Elastic Cloud computing](#) offers a virtual server platform allowing all software to be installed in the same manner as your own private server.

[A supported operating system](#) should be chosen alongside a server type to support your desired workflow. Static Packaging (VOD) and Dynamic Packager (VOD/Live) each demand CPU, Storage and Network resources to distribute media.

If the platform or service offering depends upon hosting a large archive, serve multiple live channels or distribute large volumes of VOD assets we recommend the use of a high performance/compute optimized instance, such as a C5/c5a (intel/amd) or C6 (arm) depending on your desired CPU architecture.

For more information on this topic, please see our multi-part blog series - [Load testing streaming video at scale](#)

[An Origin VOD solution](#) can benefit from the use of [Storage Proxy](#) to server media hosted on S3 instead of a local EBS/EFS. Any block storage attached to the instance can then be used to cache media requests from S3 further [reducing overheads & improving response times](#).

When selecting a specific instance type it's important to consider the available network throughput of the instance. The advertised throughput is based upon burst capacity, therefore consideration should be taken that an instance type's sustained/constant throughput may be lower.

For instance a c5.xlarge compute optimised instance offers a baseline bandwidth of 1.25Gbps throughput with a mechanism to burst beyond its baseline bandwidth on a **best effort** basis upto 10Gbps. For more information, please see [the AWS documentation](#).

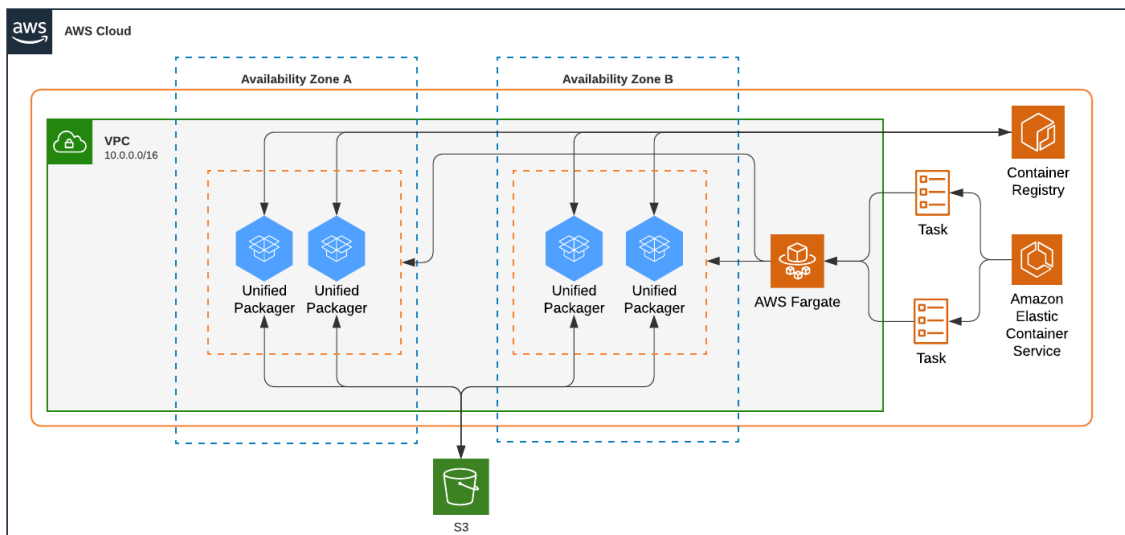
[A Origin Live solution](#) has requirements that block storage is used for hosting the publishing point as high performance read/write access is required to stream media.

For further information regarding the cost of any instance type please see [the AWS documentation](#).

ECS/Fargate

All products within the Unified Streaming portfolio are capable of being built as a container using [a range of different operating systems](#) running on both x86 and arm64 architecture. It is therefore possible to build and deploy your solution within AWS Container Services through the use of a cloud formation template or task.

Example of how a packager workflow could be deployed



For more information on how to use AWS ECS/Fargate please refer to the [AWS documentation](#).

EKS/Fargate

Unified Streaming advocates the use of container based deployments and would recommend the use of EKS to deploy any of the Unified Streaming products. We have documented the benefits of using Kubernetes alongside devops methodology recently [here](#).

AWS offers the capability to run [EKS on Fargate](#) however considerations such as available regions should be factored into deployment decisions (AWS Fargate with Amazon EKS is

available in all Amazon EKS Regions except China (Beijing), China (Ningxia), AWS GovCloud (US-East), and AWS GovCloud (US-West).

For more information on how to use AWS EKS/Fargate please refer to the [AWS documentation](#).

Lambda

When deploying Unified Streaming's software as a Lambda, careful consideration should be taken to the processing time required for the task. [AWS Lambda](#) has an execution time limit of 15 mins which could impact operations.

Storage

EFS - Elastic File System

[EFS](#) provides the capability to share a filesystem, potentially over a network between devices. Both Unified Origin Live and VOD workflows require unconstrained amounts of I/O, it is therefore not recommended to use this type of storage solution. Using such a solution within a live workflow (for instance to share media and a database file) could result in issues due to the baseline metered throughput described in [the AWS documentation](#).

EBS - Elastic Block Storage

[EBS](#) is the default block storage type when provisioning an EC2 instance. It is therefore recommended to review the various [volume types](#) and consider size, availability, throughput and IOPS when provisioning for your desired workflow to ensure performance requirements meet demand.

S3 - Object Storage

[S3](#) object storage service offers industry-leading scalability, data availability, security, and performance. It is recommended to use S3 for the storing of media in a Origin VOD workflow where Unified Origin can access the source via HTTP(s) using Apache SubRequests. This solution has the benefit of keeping the source media on the cost efficient S3 storage instead of more expensive EBS/EFS.

For more information on the benefits of using Unified Origin with AWS S3 please see [the Unified Streaming documentation](#).

Backup

AWS Backup

Centrally manage and automate backups across AWS services using AWS Backup. For further information on how AWS Backup can be used to support your regulatory compliance or business policies for data protection please see [the AWS documentation](#).

Best Practice

AWS offers a set of guidelines and best practices for a range of different services. Please refer to the following docs:

- [AWS EC2](#)
- [AWS ECS](#)
- [AWS Lambda](#)
- [AWS S3](#)

Unified Streaming offers [a set of Guidelines and Best Practices](#) for large scale streaming based on Unified Origin covering both live and on-demand streaming.

Advanced technologies such as object-based cloud storage, live ingest, ad insertion, trick modes, seek preview, content protection, subtitling and others are considered.

The guidelines are based on practical knowledge accumulated in the last two decades. Also, the guidelines are well aligned to other industry best practices.

By following these guidelines, one is able to implement effective content preparation, storage, scalable delivery, frame-accurate capture, effective archiving, low latency delivery, and other performance improvements.

License

All software within Unified Streaming's portfolio requires a license key to function.

To request a license please visit [license access](#) or email sales@unified-streaming.com.

For more information on how to configure the use of your licence key please see [the Unified Streaming documentation](#).

To simplify the use of all Unified Streaming command line tools ('mp4split', 'unified_remix', 'unified_capture') the license key can be configured through the use of an environment variable

that is automatically loaded. For more information please see [the Unified Streaming documentation](#).

Installation & Configuration

Each product within the Unified Streaming portfolio is installed following a specific set of steps, the time taken to install can range from 1 to 15 minutes depending upon installation method.

Unified Origin

The steps required to install Unified Origin depends on your [desired platform and operating system](#).

The steps to configure Unified Origin can be found in [the Unified Streaming documentation](#).

Unified Packager

The steps required to install Unified Packager depends upon your [desired platform and operating system](#).

Unified Packager ('mp4split') requires no specific configuration after installation. For more information on how to use the command line tool please refer to [the Unified Streaming documentation](#).

Unified Remix

The steps required to install Unified Remix depends upon your [desired platform and operating system](#).

The steps to configure Unified Remix depends whether the command line tool or apache module are being used. For more information please refer to [the Unified Streaming documentation](#).

Unified Capture

The steps required to install Unified Capture depends upon your [desired platform and operating system](#). The command line tool is installed when Unified Packager ('mp4split') is installed. Unified Capture requires no specific configuration after installation. For more information on how to use the command line tool please refer to [the Unified Streaming documentation](#).

Upgrade/Update

Unified Software

Unified Streaming provides general release ('GA') software on a quarterly basis with development release ('Beta') software throughout the year.

For more information on how to upgrade your software to a later release, please refer to [the Unified Streaming documentation](#).

Operating System

Unified Streaming aims to support a wide range of operating systems. Should there be a need to upgrade from a version [no longer supported](#), please refer to the operating systems own documentation with guidance on how to upgrade.

Instance

Instance type

For information on how to change or upgrade an instance type, please refer to [the AWS documentation](#).

Security

AWS offers a set of guidelines and best practices ensuring your deployment is secure. For more information please refer to [the AWS documentation](#).

Roles/Policy/Privilege

To help secure your AWS resources, follow the recommendations for the AWS Identity and Access Management (IAM) service described in [the AWS documentation](#).

Data Encryption at Rest

AWS offers a set of guidelines detailing how to protect your data at rest by implementing multiple controls to reduce the risk of unauthorized access or mishandling. For more information please refer to [the AWS documentation](#).

Storage Encryption

Each AWS storage type provides a method of encrypting your storage. For more information how this can be achieved with [EBS](#) or [S3](#), please refer to the relevant AWS documentation.

Customer sensitive information

Should your platform or service host sensitive data related to customers it is recommended to follow the [AWS best practice](#) on how sensitive data should be kept secure.

Availability

AWS Service

The AWS platform has multiple availability zones per region with each type of service used also offering additional scaling and redundancy capabilities.

For more information on how this could be achieved, please refer to [the AWS documentation](#).

Unified Streaming Applications

Unified Origin VOD has the ability to be deployed as part of a high-availability architecture that leverages multiple S3 buckets and/or regions.

For details on how this can be achieved, please see [the Unified Streaming documentation](#).

Unified Origin Live has the ability to receive streams from multiple sources using the DASH-IF Live Media Ingest protocol where multiple encoders are synchronized. This allows for Unified Origin's to be potentially deployed in multiple locations and/or regions with no other requirements or configurations to provide redundancy (other than to comply with the ingest specification).

For further details on how this can be achieved, please refer to [the DASH-IF Live Media Ingest documentation](#).

Monitoring

Amazon CloudWatch

Amazon's CloudWatch service provides you with data and actionable insights to monitor your applications, respond to system-wide performance changes, optimize resource utilization, and get a unified view of operational health.

For more information on how this could be achieved, please refer to [the AWS documentation](#).

Application logging

Unified Origin and Unified Remix both function as modules integrated into Apache as a web server. Therefore application logging can be captured as part of [Apache's mod_log_config](#) providing the capabilities to define a LogLevel alongside a range of information when defined as a CustomLog format.

An example of how application logging can be configured as part of an Apache virtualhost configuration file can be found in [the Unified Streaming documentation](#).

Unified Packager ('mp4split'), Unified Capture and Unified Remix all function as command-line applications. When executed these applications generate logging information which is presented via I/O streams of stdout and stderr. This information can be captured and directed to AWS CloudWatch logs by utilising [aws logs log driver](#).

Application Program Interface (API)

Unified Origin (Live) once deployed with a valid publishing point (isml) offers the capability to gather further information outside of what is described in the logs. This information can be gathered via the Publishing Point API enabling administrators to add, remove, update configurations as well as 'purge' and validate the 'state' of a publishing point.

For more information on how this can be achieved, please refer to [the Unified Streaming documentation](#).

Troubleshooting

AWS Platform or Service

When wishing to troubleshoot a problem within AWS, please consult the service specific documentation for troubleshooting advice. The AWS documentation homepage [can be found here](#).

AWS also provides a useful [AWS service status dashboard](#) enabling you to identify whether an issue affecting your platform or service is regionally related and therefore related to any known outage or maintenance.

For issues regarding the AWS platform or service(s) please [contact AWS Support](#) to raise a case

Unified Streaming Software or Output

Depending upon the type of problem faced, Unified Streaming offers a range of documentation to help troubleshoot a problem.

Issues related to the source media and/or delivery mechanism can often be best checked against our [Best Practices documentation](#).

For workflow or use case specific investigating we also offer documentation related to troubleshooting [Live](#) and [VOD](#) workflows which can also be referred to.

Support

Unified Streaming offers support with every license purchased and does not provide any tiered level of support.

Issues can be raised to our support team (via the method below) that operates during office working hours (09:00-17:30 Amsterdam local time) where a response will be provided within 24 hours.

Email

Please contact support@unified-streaming.com to raise a support ticket regarding any Unified Streaming product issues.

Portal

Unified Streaming offers a support portal where issues can be raised and managed. Please log into <https://unifiedstreaming.freshdesk.com/support/home> or contact support@unified-streaming.com if you do not already have access.