# Digital Signage Solution Using AWS Elemental MediaLive

*A Course Project Report Submitted in partial fulfillment of the course requirements for the award of grades in the subject of*

**CLOUD BASED AIML SPECIALITY**
**(22SDCS07A)**

by

**P. Kusumitha**

**(2210030423)**

*Under the esteemed guidance of*

**Ms. P. Sree Lakshmi**
Assistant Professor,
Department of Computer Science and Engineering


**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**K L Deemed to be UNIVERSITY**

*Aziznagar, Moinabad, Hyderabad,*
*Telangana, Pincode: 500075*

April 2025

# K L Deemed to be UNIVERSITY

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

*Certificate*

This is Certified that the project entitled **" Digital Signage Solution Using AWS Elemental MediaLive"** which is a experimental & Simulation work carried out by P.Kusumitha (2210030423), in partial fulfillment of the course requirements for the award of grades in the subject of **CLOUD BASED AIML SPECIALITY**, during the year **2024-2025**. The project has been approved as it satisfies the academic requirements.

**Ms.P.Sree Lakshmi**

**Course Coordinator**

**Dr. Arpita Gupta**

**Head of the Department**

**Ms. P. Sree Lakshmi**

**Course Instructor**

# CONTENTS

# 1. INTRODUCTION

Digital signage is an electronic display solution used to deliver multimedia content such as videos, images, and real-time data to engage and inform audiences in various environments. It is widely used in retail stores for advertisements, transportation hubs for live updates, educational institutions for announcements, and corporate spaces for internal communications.

Traditional signage systems often rely on local hardware and on-premises infrastructure, which can be expensive, difficult to scale, and less reliable. With the advent of cloud technology, it is now possible to build scalable, flexible, and centrally managed digital signage systems using cloud-native services.

This project focuses on creating a cloud-based digital signage solution using AWS Elemental MediaLive. MediaLive is a real-time video encoding service that processes live or pre-recorded video streams and converts them into adaptive formats suitable for streaming to any device or screen. The solution is further enhanced by integrating it with AWS Elemental MediaPackage for content packaging, Amazon S3 for storing media assets, Amazon CloudFront for global content delivery, AWS IAM for secure access management, and Amazon EventBridge for automating playback schedules.

The result is a robust, cost-effective, and highly scalable digital signage platform that supports live streaming and scheduled content delivery, suitable for businesses, educational institutions, and public services aiming to manage and deliver high-quality visual content across distributed locations.

# 2. AWS SERVICES USED AS PART OF THE PROJECT

The Digital Signage Solution using AWS Elemental MediaLive integrates key AWS services to deliver scalable, reliable, and automated video streaming. It enables centralized management and real-time content delivery across multiple locations. Below are the key AWS services used in the project:

## AWS Elemental MediaLive

AWS Elemental MediaLive is the core service used in this project. It is a live video encoding service that processes high-quality video streams and converts them into adaptive bitrate outputs for seamless internet delivery.

- Video streaming: MediaLive encodes live video feeds in real-time, making it suitable for broadcasting events or news updates.
- Scheduled content playout: The service supports looped pre-recorded content, ensuring digital signage displays operate continuously.
- Adaptive bitrate streaming: MediaLive automatically adjusts video quality based on network conditions and device capabilities, providing smooth playback for all viewers.

By leveraging AWS Elemental MediaLive, the digital signage solution ensures reliable, scalable, and high-quality video streaming across multiple locations.[1]

## AWS Elemental MediaPackage

AWS Elemental MediaPackage works in conjunction with MediaLive to package the encoded video streams into delivery-ready formats. This helps to:

- Deliver content in multiple formats such as HLS, MPEG-DASH, and CMAF for compatibility across devices.
- Ensure secure and scalable streaming by supporting encryption, access control, and redundancy.
- Enable advanced playback features like time-shifted viewing, live-to-VOD, and catch-up TV.

MediaPackage acts as a reliable origin for global content distribution, making it a key component in the digital signage workflow. [4]


## Amazon S3 (Simple Storage Service)

Amazon S3 is used for storing and managing resources essential for the digital signage solution using AWS Elemental MediaLive. This helps to:

- Store video assets such as pre-recorded content for scheduled playout.
- Host media files for on-demand access and seamless content retrieval.
- Archive streaming logs and metadata to monitor performance and analytics.

S3 ensures reliable storage, scalability, and easy integration with other AWS services for efficient content delivery.[3]


## AWS CloudFront

AWS CloudFront is a content delivery network (CDN) used to distribute live or packaged video streams from MediaPackage to digital signage endpoints worldwide. This helps to:

- Reduce latency by caching content at edge locations closer to viewers.
- Improve availability through a globally distributed network that ensures uninterrupted streaming.
- Enhance performance by supporting adaptive bitrate streaming, minimizing buffering, and optimizing content delivery.

CloudFront ensures a seamless and high-quality viewing experience for digital signage audiences across multiple locations [5].

# 3. STEPS INVOLVED IN SOLVING PROJECT PROBLEM STATEMENT

- **Understand the content requirements**
  Identify the type of videos to be shown, such as ads, tutorials, or promotions.
  Determine how often content needs to change and where the signage displays are located.
- **Upload videos to Amazon S3**
  Store all your video files in Amazon S3, which is secure and highly scalable.
  Organize them in folders and use proper naming for easy access and updates.
- **Use AWS Elemental MediaLive for live video processing**
  Encode live video inputs into adaptive bitrate outputs (like HLS or DASH) in real time.
  This enables smooth, high-quality live streaming suitable for digital signage or broadcasting.[2]
- **Set up Amazon CloudFront for fast delivery**
  Connect your S3 bucket to CloudFront to serve videos quickly via a global CDN.
  This reduces buffering and latency when content plays on the signage screens.[7]
- **Create a playlist or video player**
  Use HTML or signage software to create a player that loads videos from CloudFront.
  Set it to loop or change based on a fixed schedule for continuous playback.
- **Configure signage displays**
  Set up devices like Smart TVs or Raspberry Pi to open the video player on startup.
  This makes the system fully automated with no need for manual intervention.
- **Secure your content using AWS features**
  Protect your videos by applying S3 bucket policies and CloudFront signed URLs.
  This ensures only authorized devices or users can access the content.
- **Test the system**
  Verify video playback, scheduling, and performance across all devices.
  Once everything works well, deploy your solution for digital signage use.

# 4. STEPWISE SCREENSHOTS WITH BRIEF DESCRIPTION

**STEP-1 :** Log in to AWS Console

- Go to https://aws.amazon.com/console/
- Log in with your credentials.
- Search for S3 in the search bar and open the service.


*Fig 4.1 : Log in to AWS Console*

**STEP-2:** Create an S3 Bucket

- Click “Create bucket”.
- Enter a unique name, e.g., digital-signage-content.
- Uncheck “Block all public access” to make content viewable (optional depending on need).
- Click “Create bucket”.

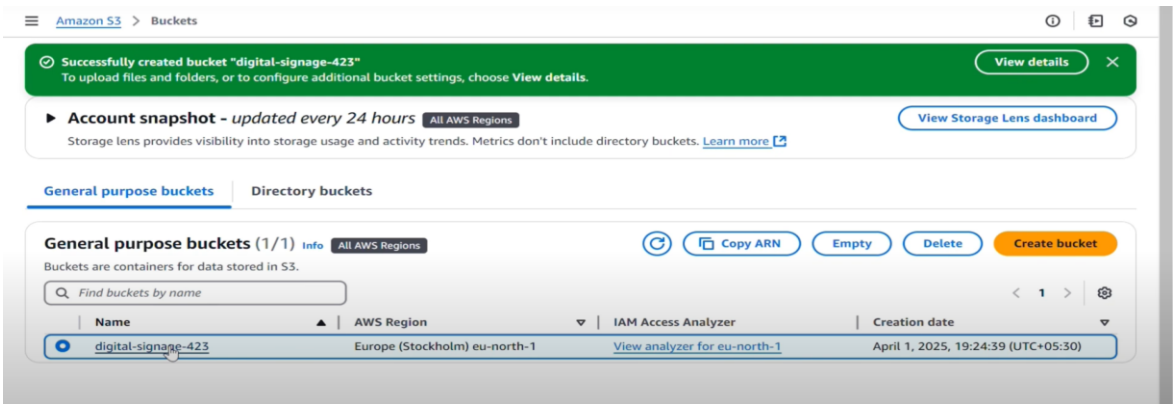


*Fig 4.2 : Create an S3 Bucket*

**STEP-3 :** Upload Files to S3 Bucket

- Open the newly created bucket.
- Click “Upload” → Select your zipped or individual signage files.
- Click “Upload” to add them to the bucket.

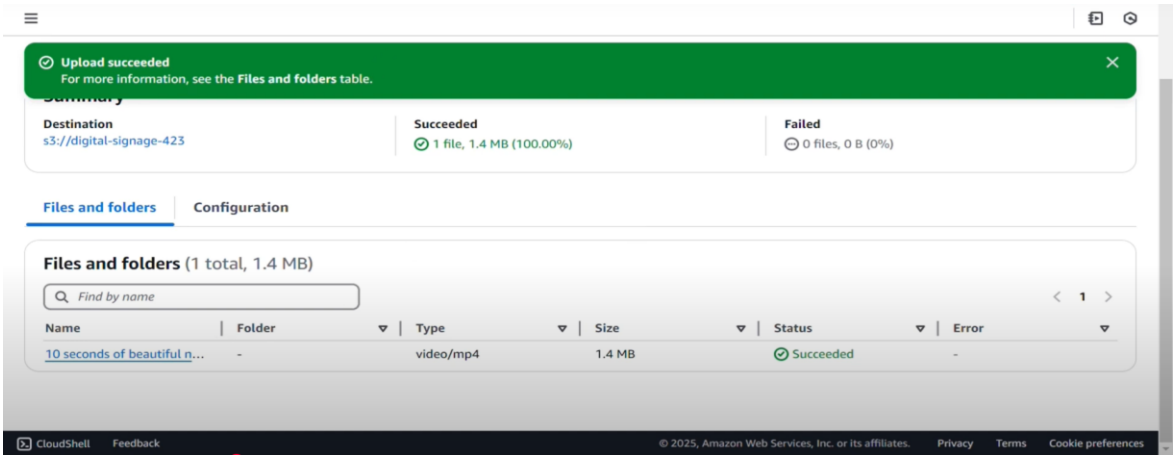


*Fig 4.3 : Upload Files to S3 Bucket*

**STEP-4 :** Create a CloudFront Distribution

- Go to AWS Console → Search and open CloudFront.
- Click “Create Distribution”.
- Under “Origin Domain”, select your S3 bucket.
- Keep settings default or customize cache behaviors as needed.
- Click “Create distribution”.

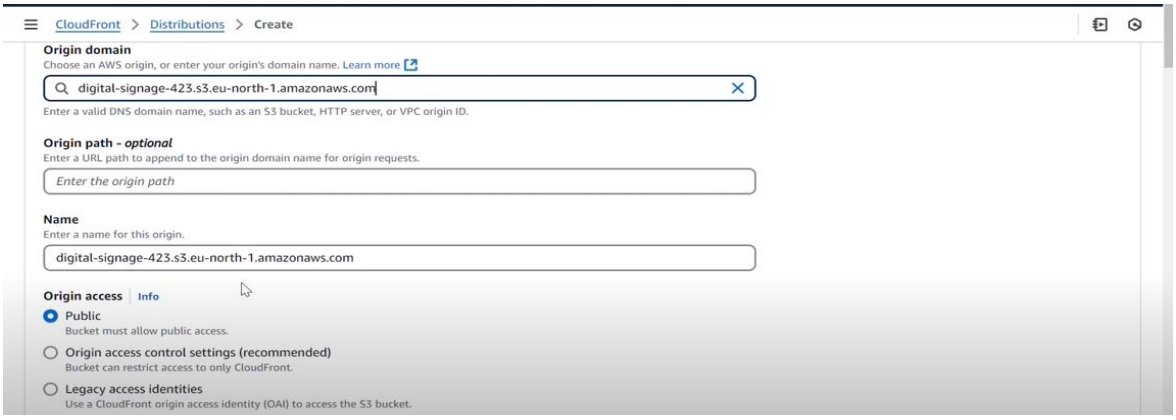


*Fig 4.4 : Create a CloudFront Distribution*

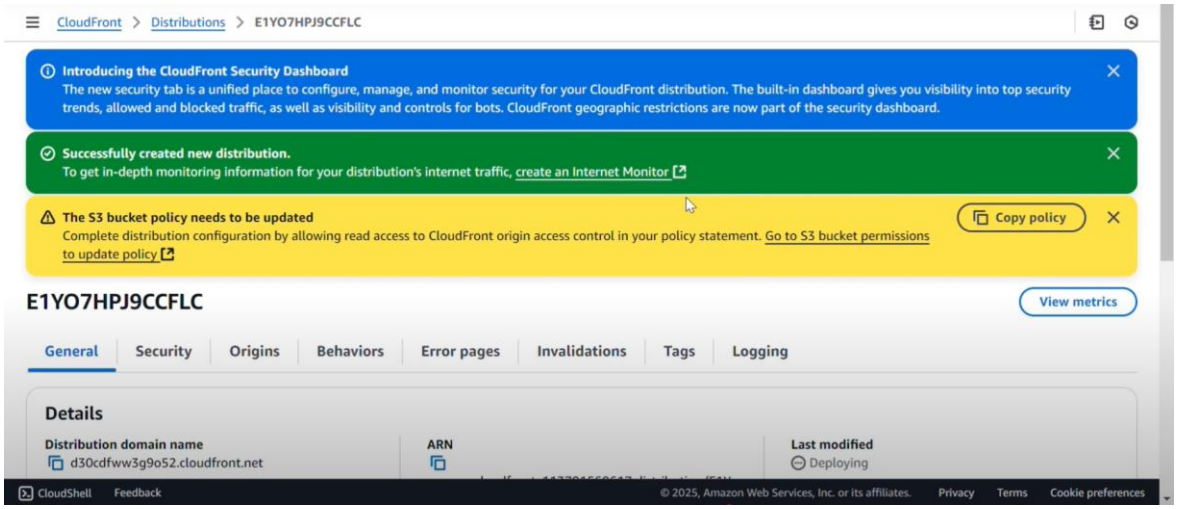


*Fig 4.5 : Copy the S3 bucket policy*

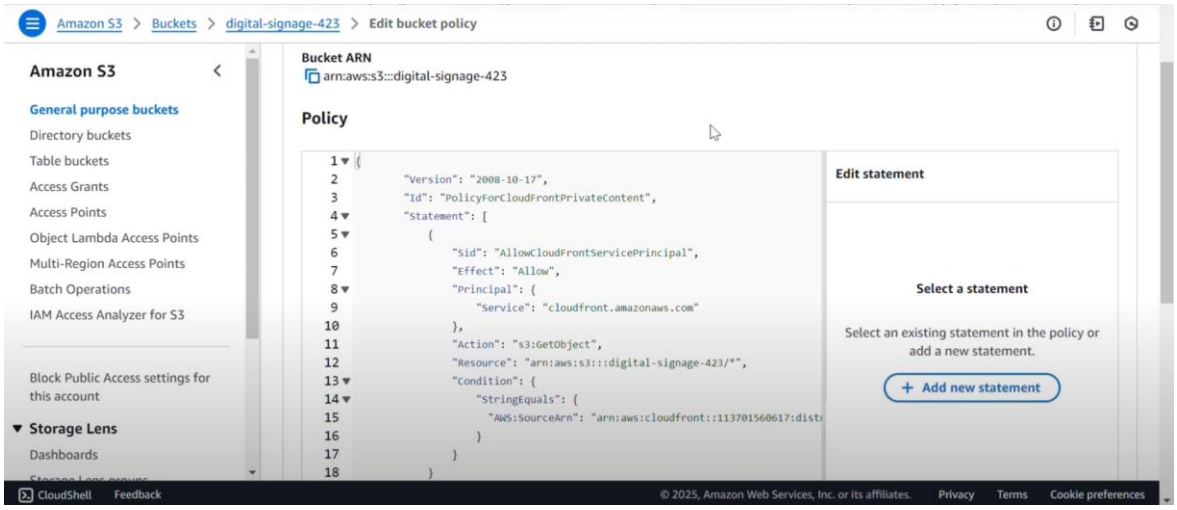


*Fig 4.6 : Update the S3 bucket policy*

**STEP-5 :** Access Your Digital Signage Content

- Once distribution status is “Deployed”, copy the CloudFront Domain Name.
- Paste in browser with file path (e.g., https://d123abc.cloudfront.net/screen1.html)
- Your signage content will be delivered globally through CDN.

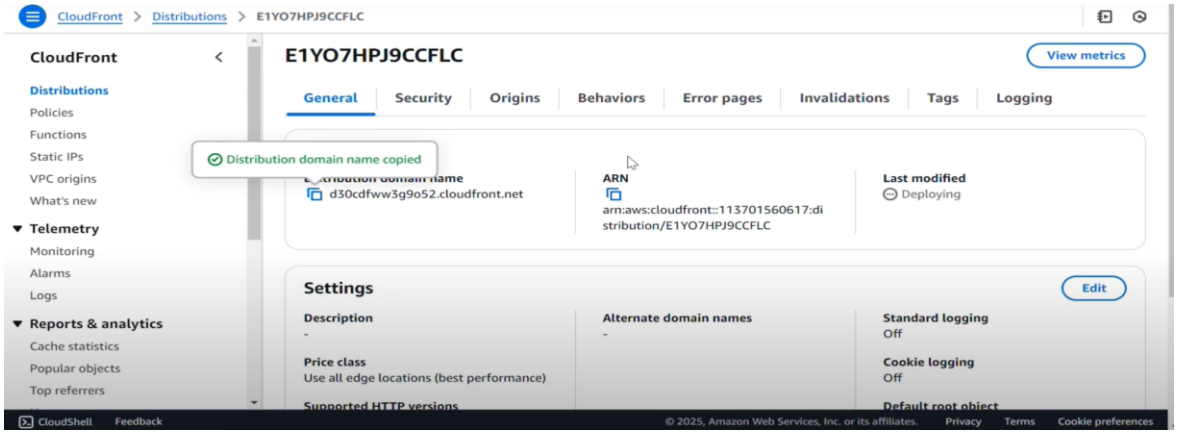


*Fig 4.7 : Copy the Distribution domain name*

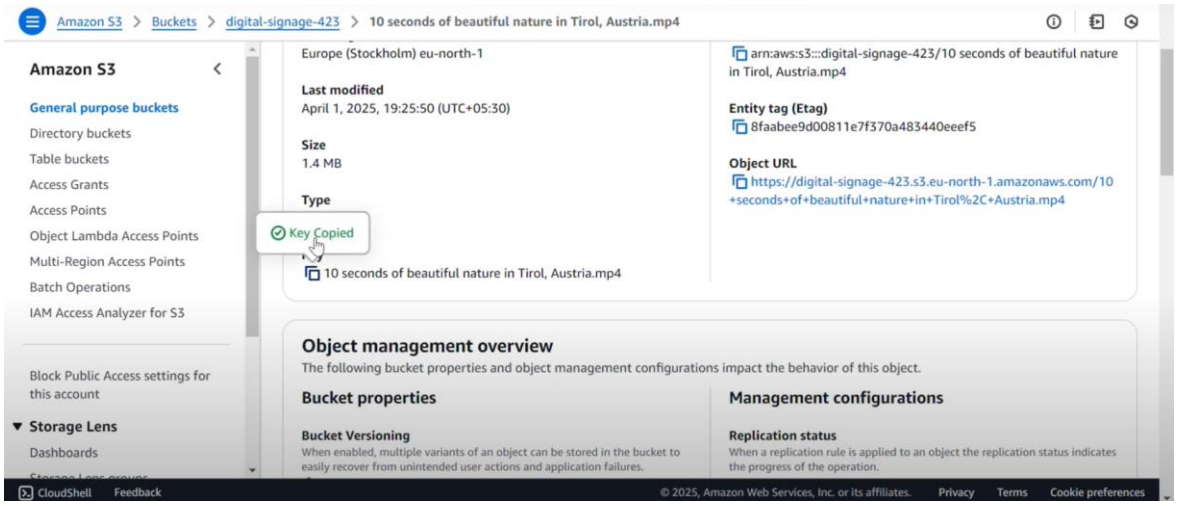


*Fig 4.8 : Copy the key*

**STEP-6 :** Video Stream Delivery

Video streams from a CloudFront CDN, powered by S3-hosted media.

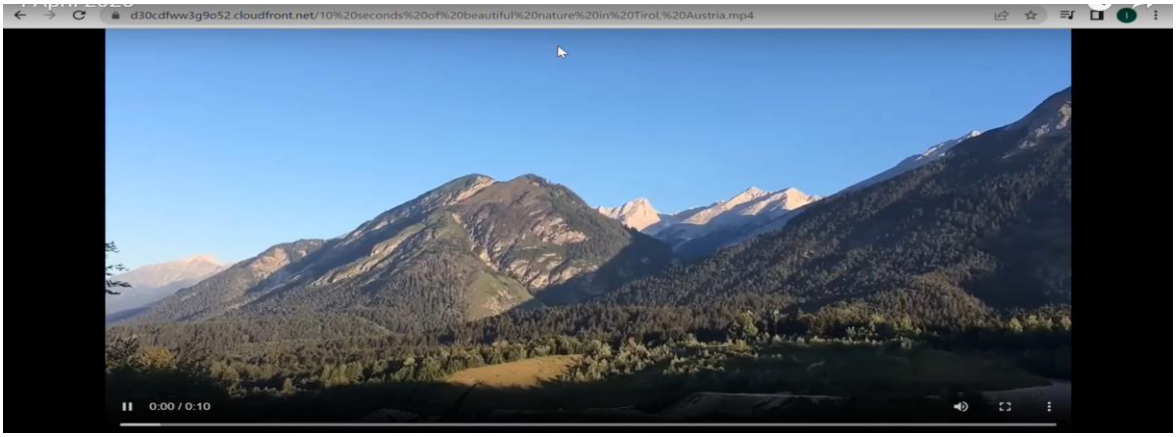


*Fig 4.9 : Video Stream Delivery*

# 5. LEARNING OUTCOMES

**Understanding AWS Elemental MediaLive:**

Learned how MediaLive encodes pre-recorded video content into adaptive bitrate formats, ensuring seamless playback for digital signage.[1]

**Efficient Video Packaging with AWS Elemental MediaPackage:**

Gained insights into how MediaPackage optimizes pre-recorded video streams by converting them into HLS, MPEG-DASH, or CMAF formats for smooth delivery.[4]

**Global Video Distribution with Amazon CloudFront:**

Understood how CloudFront delivers cached video content to digital signage screens worldwide, reducing buffering and improving performance.

**Automating Video Playback Scheduling:**

Gained experience in scheduling MediaLive jobs to automate the encoding and playback of pre-recorded videos for digital signage.

**Adaptive Bitrate Streaming for Seamless Playback:**

Understood the importance of adaptive bitrate streaming in ensuring smooth video playback across varying network conditions.

**Dynamic Content Updates and Cache Management :**

Gained insights into using S3 versioning and CloudFront cache invalidation to update digital signage content dynamically without downtime.

# 6. CONCLUSION

The Digital Signage Solution using AWS Elemental MediaLive for pre-recorded video streaming offers a robust, scalable, and cloud-native approach to content delivery. By leveraging AWS Elemental MediaLive, businesses can encode high-quality video content for adaptive streaming, ensuring compatibility across various devices and networks. AWS Elemental MediaPackage complements this by packaging the content into industry-standard streaming formats such as HLS and MPEG-DASH, enabling smooth playback and added features like encryption and redundancy. Amazon S3 plays a key role in storing pre-recorded video files securely and reliably, while AWS CloudFront accelerates global content delivery, reducing latency and ensuring a seamless viewer experience. This integration of AWS services facilitates centralized content management, flexible scheduling, and efficient delivery across multiple endpoints, making it ideal for digital signage in sectors like retail, education, and transportation. In conclusion, the solution demonstrates how cloud-based video streaming can be effectively achieved with minimal infrastructure overhead. It highlights the potential of AWS media services to transform traditional signage into dynamic, data-driven displays that are easy to manage and scale, thereby improving engagement and operational efficiency.

# 7. REFERENCES


[1] Amazon Web Services (AWS). "Getting Started with AWS Elemental MediaLive." Available at: https://aws.amazon.com/medialive/getting-started/

[2] Amazon Web Services (AWS). "AWS Elemental MediaLive User Guide." Available at: https://docs.aws.amazon.com/medialive/

[3] Amazon Web Services (AWS). "Tutorial: How to Stream Video on Demand with AmazonS3 and CloudFront." Available at: https://aws.amazon.com/blogs/media/streaming-video-on-demand-with-amazon-cloudfront/

[4] Amazon Web Services (AWS). "Live Streaming with AWS Elemental MediaLive and MediaPackage." Available at: https://aws.amazon.com/blogs/media/live-streaming-with-aws-elemental-medialive-and-mediapackage/

[5] Amazon Web Services (AWS)."Getting Started with Amazon CloudFront." Available at: https://docs.aws.amazon.com/AmazonCloudFront/latest/DeveloperGuide/GettingStarted.html

[6] Amazon Web Services (AWS). "Building a Secure Video Streaming Platform on AWS." Available at: https://aws.amazon.com/blogs/media/building-a-secure-video-streaming-platform-on-aws/

[7] Amazon Web Services (AWS). "Optimizing Video Delivery Using CloudFront." Available at: https://aws.amazon.com/cloudfront/media-delivery/

[8] Amazon Web Services (AWS). "Digital Signage Solutions on AWS." Available at: https://aws.amazon.com/retail/digital-signage/