



**EXPLORING THE ROLE OF
AWS ELEMENTAL IN SHAPING
THE DIGITAL CONTENT LANDSCAPE**

THE DIGITAL CONTENT LANDSCAPE

has evolved significantly in recent years, with a surge in streaming services, user-generated content, and social media platforms. This shift is driven by the proliferation of high-speed internet and increased use of mobile devices. Large media corporations are in the throes of navigating this dynamic and rapidly changing landscape which isn't bereft of its own unique challenges.

While the ubiquity of the internet and the proliferation of mobile devices has made content distribution easier, it has also raised serious concerns about intellectual property rights management. This not only includes online piracy & unauthorized access to content but also managing rights that may belong to multiple entities across a complex web of geographies. As a result, **Digital Rights Management (DRM) solutions** rank highly on the priority list of media corporations who want to protect their rights and ensure compliance with highly nuanced contracts that have global ramifications.


Addressing piracy and implementing a DRM strategy requires a multi-faceted approach which combines technological innovation, regulatory clarity, user education, and industry collaboration. Operational integration is key and integrating the DRM strategy with a cloud media pipeline can go a long way in optimizing operational efficiency, enhancing scalability, and improving the overall user experience.

Happiest Minds is in constant pursuit of building industry ready solutions by working closely with our robust partner ecosystem. We work closely with Amazon and can leverage their rich and highly focused AWS Elemental services to develop and execute a highly comprehensive DRM strategy that can help media enterprises meet the evolving needs of a complex ecosystem.


Cloud Solutions with AWS Elemental Media Services

AWS offers purpose-built media services for creating, transforming, and delivering digital content quickly and easily. Key features include –


- 01




Pay-as-you-go media services
- 02




Secure and reliable ways to move content around
- 03




Comprehensive video standards support
- 04



Adaptive bitrate streaming
- 05



Broadcast capabilities for live video streams
- 06



Automated resource provisioning

Happiest Minds, in partnership with AWS, has used the following AWS Elemental services as cloud solutions to build media service pipelines –

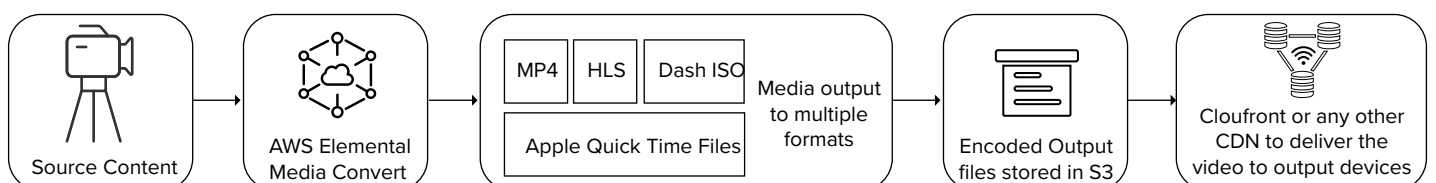
- **AWS MediaConvert**
- **NAGRA Forensic Watermark with AWS Lambda@Edge servers**
- **NAGRA Multi-DRM**
- **Interactive video streaming with Bitmovin and Brightcove players for video playback**

AWS MediaConvert

AWS Elemental MediaConvert helps transcode file-based content libraries of any size into live stream assets reliably and quickly. This essentially means that it doesn't support live encoding of the media – a file is submitted as a job and MediaConvert provisions the resources required for encoding and monitoring. It supports various input formats and Adaptive bitrate (ABR) packaging output formats to deliver high-quality content from a range of sources onto primary & multiscreen devices.



The workflow of AWS MediaConvert is depicted in the diagram below –



MediaConvert Integration



The entry point for the media ingestion pipeline can be a web portal where the multimedia content is uploaded. The uploaded files trigger a transcoding job that does video encoding based on pre-configured settings. These are called media presets, a set of encoding parameters describing how the output shall be created. For example, these presets contain configurations pertaining to bitrate, resolution, etc. The generated media assets were distributed using AWS CloudFront CDN for low-latency streaming.

NAGRA Forensic Watermarking using AWS

Forensic watermarking is the process of adding an imperceptible mark to a video. The objective is to make it traceable such that when the content leaks, it can be traced back to where it came from. A typical example is piracy in the movie & sports industry. It has 3 parts to it –



Content Preprocessing

Content is preprocessed by creating 2 variants, A & B. They are visually identical chunks, but they contain distinct watermarks.



Embedding the Watermark

When distributed over the internet, the content is chunked typically like 2s per piece. For each piece of content distributed, NAGRA sends an A or B segment, and over time, it builds a sequence unique for a user. This setup will be deployed in the customer environment using AWS cloud formation.



Detection Service

Services provided by NAGRA allow you to provide content to NAGRA to extract the AB sequence. The extracted sequence traces back to the user who shared the original content.

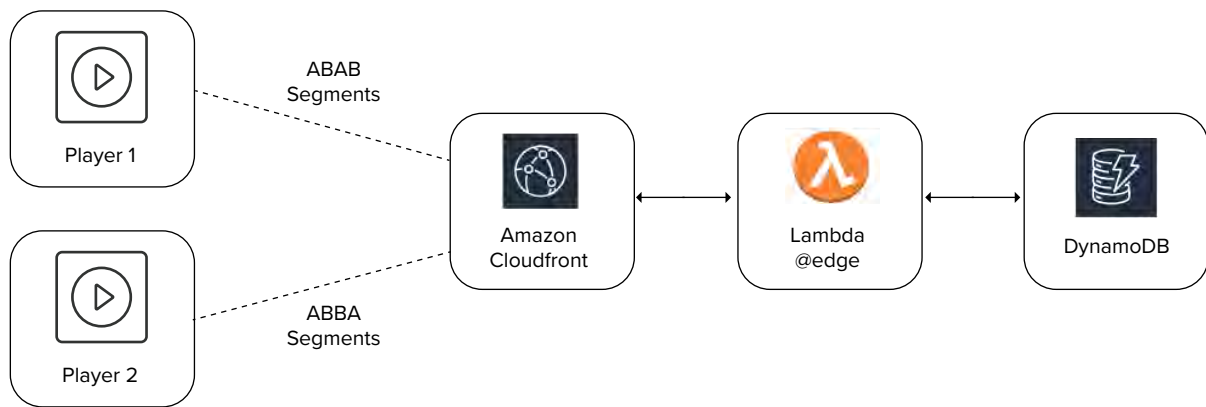
NexGuard

Forensic Watermarking Integration

When content is delivered directly to the consumer, the content can be seamlessly integrated with a combination of Elemental Media conversion and watermarking by using Nagra NexGuard media presets. When a user selects the content via CDN, it sets a unique AB sequence, which will be used for the session.

A unique combination of AB segments is provided for each user accessing the content. This sequence is encoded in the token, and when the request is sent to AWS CloudFront CDN, the Lambda function checks the token to grant access against the user authentication data stored in DynamoDB. Latency is a key factor, making it very efficient for Live content. By using Lambda@Edge, the latency factor can be greatly improved.

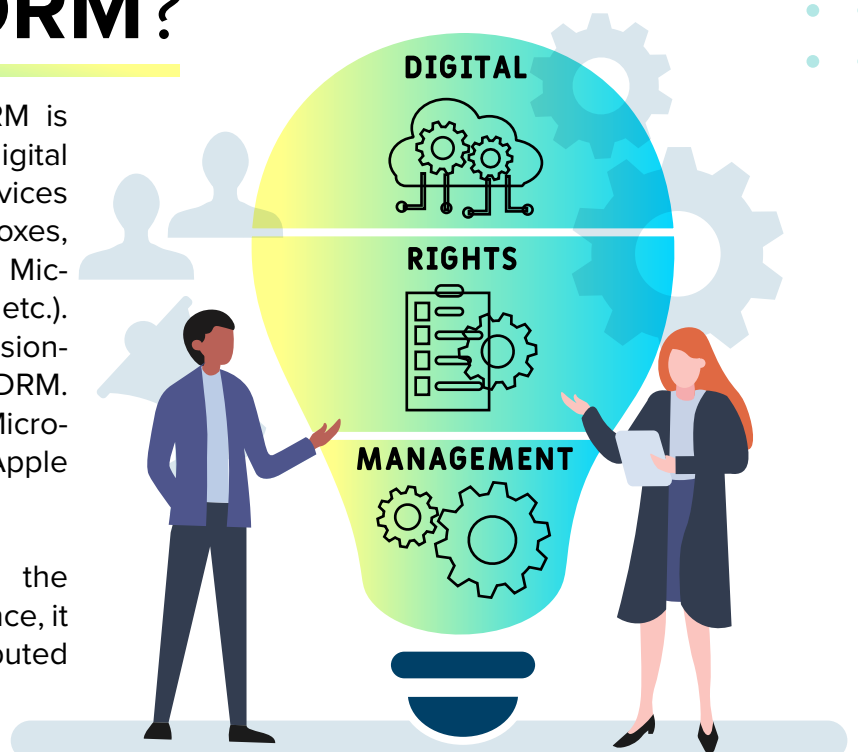
The diagram below depicts the AWS architecture used by NAGRA for runtime workflow –



What is Multi-DRM?

In the media entertainment industry, DRM is crucial to managing the legal access to digital video content on diverse streaming devices (e.g., mobiles, laptops, tablets, set-top boxes, gaming consoles, etc.) and browsers (e.g., Microsoft Edge, Google Chrome, Apple Safari, etc.). DRM techniques that include license provisioning of a variety of DRMs are called Multi-DRM. The most popular DRM technologies are Microsoft PlayReady, Google Widevine and Apple FairPlay Streaming.

Premium content distributors will need the capability to distribute media securely. Hence, it is critical for the OTT content to be distributed using the Multi-DRM solution.



NAGRA Multi-DRM SaaS Model Integration with AWS

Active Streaming Protection framework is a multi-DRM solution, a core module of NAGRA on the AWS marketplace. The multi-DRM solution has been built for SaaS-based modern cloud environments and utilizes services such as Amazon EKS, OpenSearch, S3 and RDS. Its key features include scalable content protection solutions optimized for high-demand content.

NAGRA multi-DRM supports all major DRMs. It also provides individual DRMs for those devices that aren't supported.

AWS Interactive Video Streaming

What is AWS IVS?

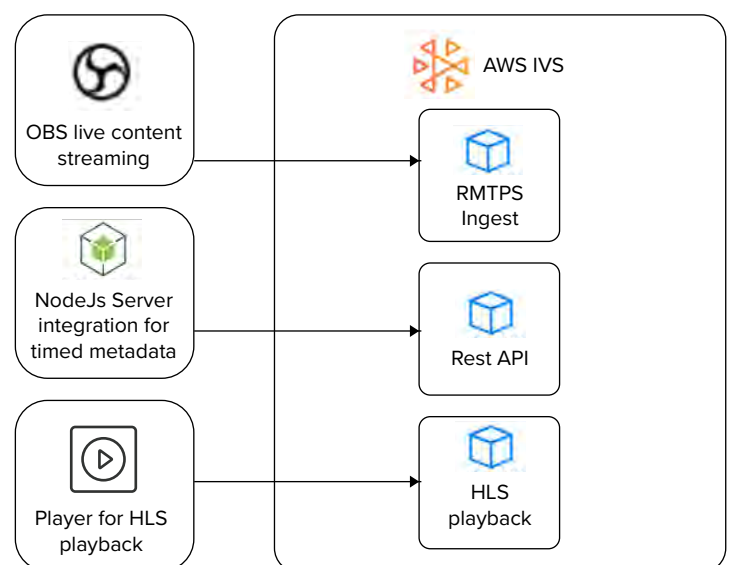
IVS is an AWS-managed live video service that allows one to create a channel and start streaming live quickly. It also has features that help in building live, engaging, and interactive experiences alongside low-latency live streaming. AWS IVS provides APIs to easily integrate with websites and apps for varied devices and platforms.

IVS Integration Workflow

The integration workflow is as follows –

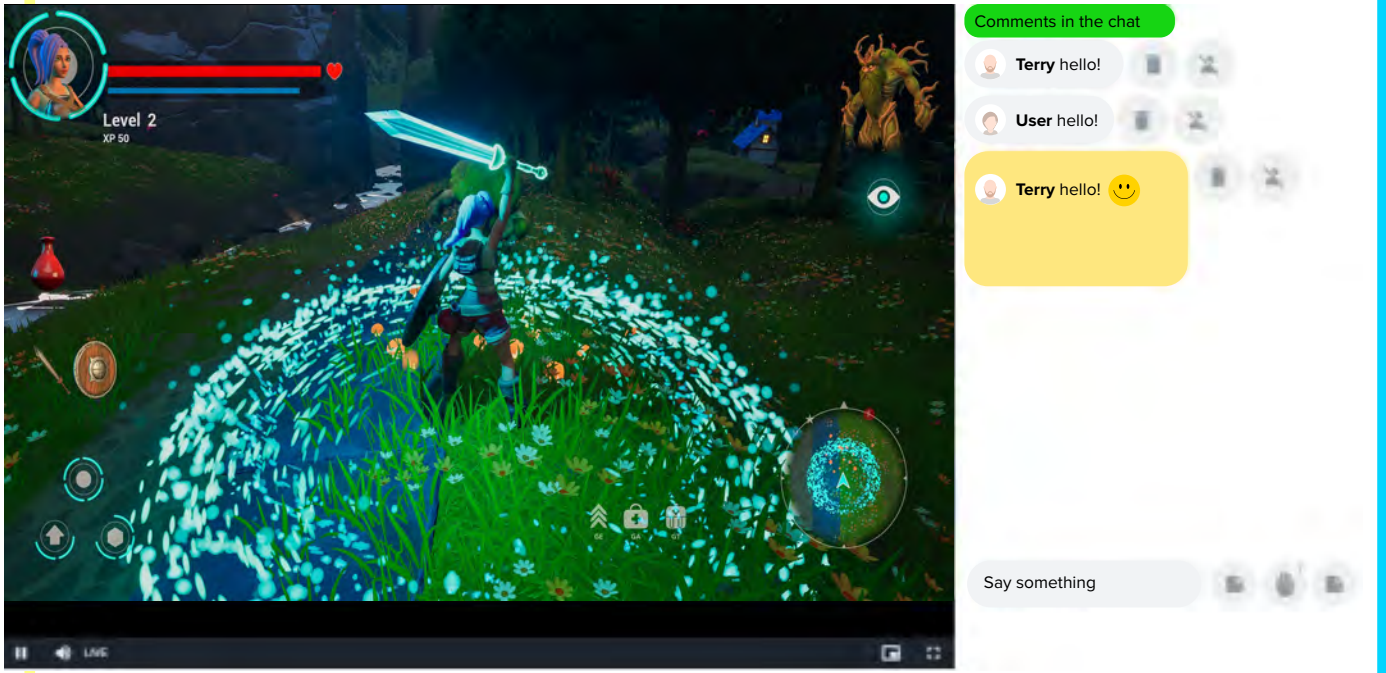
- Create a channel for streaming live videos. The streaming ingest server and a stream key are created for this channel.
- Use an open-source streaming software like Open Broadcasting Software or FFmpeg. These support protocols, RTMP or RTMP, are compatible with IVS.
- A server-side backend using AWS services to get timed metadata from IVS.
- An HTML page to playback the broadcast content and channels.

The different components of integration are depicted in the diagram below –

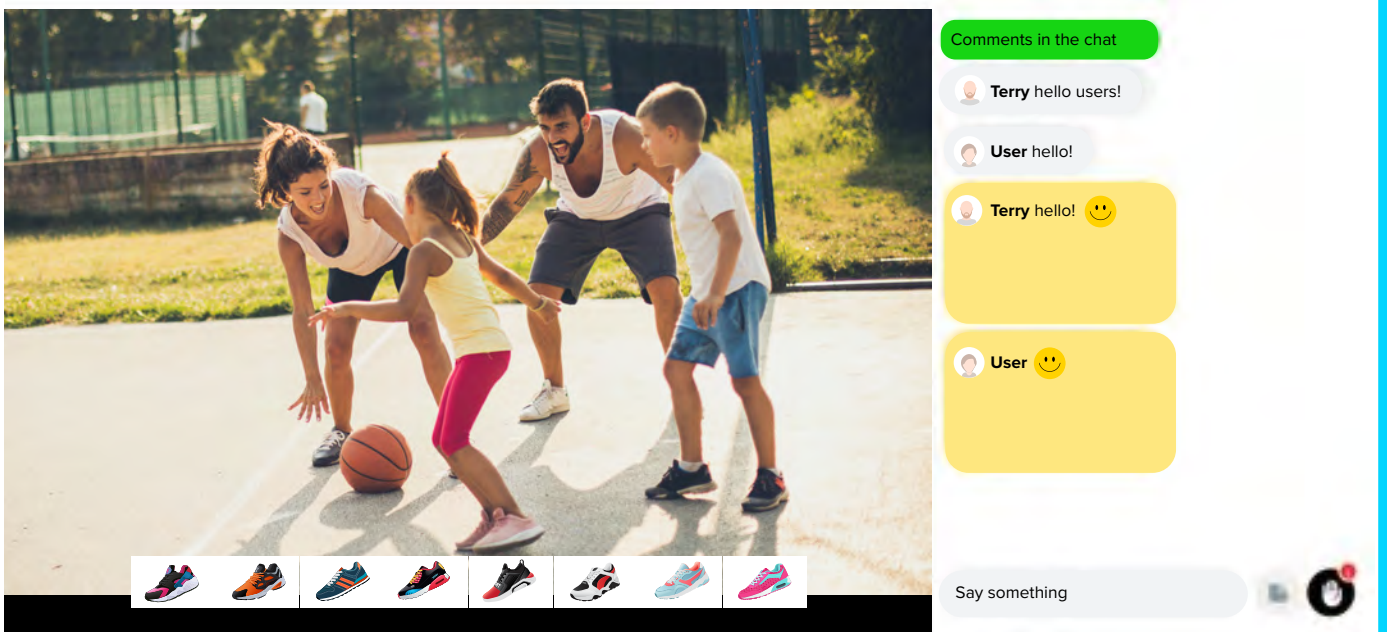


Once a user joins a channel via a URL provided by the admin, one can access a social forum for live discussions. The admin has complete control over the channel to moderate discussions and remove users if required.

(A snapshot of IVS implementation for the live broadcast of a game.)



Here is a sample implementation where ads can be shown alongside the content to engage users with product awareness.



Conclusion

With the ever increasing proliferation of content and the need to create highly personalized offerings at scale, the media industry is moving towards adopting innovative cloud-based solutions for secure and reliable video streaming services that can speed up their supply chain.

Happiest Minds offers best-in-class solutions that are tailored to the unique needs of media enterprises but leveraging AWS media services to build media pipelines quickly and efficiently by eliminating the overheads of capacity planning and scaling. We have deep expertise in AWS' Elemental suite of offerings to help you create a technology roadmap that addresses all your DRM needs, so you can focus on what matters most - engaging viewers and enhancing growth.



Bhavani Krishnan

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She is a seasoned IT professional with over 17 years of experience in open-source web technologies, JavaScript frameworks, and cloud architecture, with a particular expertise in AWS. She specializes in presales and solutioning across industries such as manufacturing, edtech, media, and entertainment.

Currently, at Happiest Minds, Bhavani plays a pivotal role in driving innovation within the Java practice, incubating new technologies. A passionate advocate for Generative AI, she has successfully led teams to develop cutting-edge technology solutions. Before her tenure at Happiest Minds, Bhavani contributed to the digital transformation of prominent clients in the United States, including USAA, LifeScan, and NBL Australia. She holds a bachelor's degree in engineering and an Executive MBA from IIM Bangalore.

**For more information,
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About Happiest Minds

Happiest Minds Technologies Limited (NSE: HAPPSTMNDS), a Mindful IT Company, enables digital transformation for enterprises and technology providers by delivering seamless customer experiences, business efficiency and actionable insights. We do this by leveraging a spectrum of disruptive technologies such as: artificial intelligence, blockchain, cloud, digital process automation, internet of things, robotics/drones, security, virtual/ augmented reality, etc. Positioned as 'Born Digital. Born Agile', our capabilities span Product & Digital Engineering Services (PDES), Generative AI Business Services (GBS) and Infrastructure Management & Security Services (IMSS). We deliver these services across industry groups: Banking, Financial Services & Insurance (BFSI), EdTech, Healthcare & Life Sciences, Hi-Tech and Media & Entertainment, Industrial, Manufacturing, Energy & Utilities, and Retail, CPG & Logistics. The company has been recognized for its excellence in Corporate Governance practices by Golden Peacock and ICSI. A Great Place to Work Certified™ company, Happiest Minds is headquartered in Bengaluru, India with operations in the U.S., UK, Canada, Australia, and the Middle East.