



An Amagi Whitepaper | March 2022

Best practices in designing

VIDEO

On-Demand delivery workflows

Delve into this whitepaper to understand what it takes to deliver your Video-On-Demand (VOD) content to a platform or operator.

The VOD delivery challenge

Delivering Video-On-Demand (VOD) assets to streaming platforms, OTT, or Video distributors is a complex workflow. As the number of assets, associated meta-data, and the platforms for delivery increase, the complexity involved also increases significantly.

By following certain best practices, content owners can effectively manage assets, build pipelines with transcoding, and ensure efficient packaging and quality control.

Content owners may keep the titles in a cloud location - often optimized for storage. Metadata may be managed through a tool, spreadsheets or mRSS feeds. As the library volume increases and more tools are adopted, the assets and meta-data could be in various formats, locations, and/or tools. For example, some meta-data could be captured in the common mRSS, while some may be still in Excel or in a MAM. Or it could be in multiple mRSS feeds. Similarly, the titles may be in different formats, codecs and resolutions as the library increases.

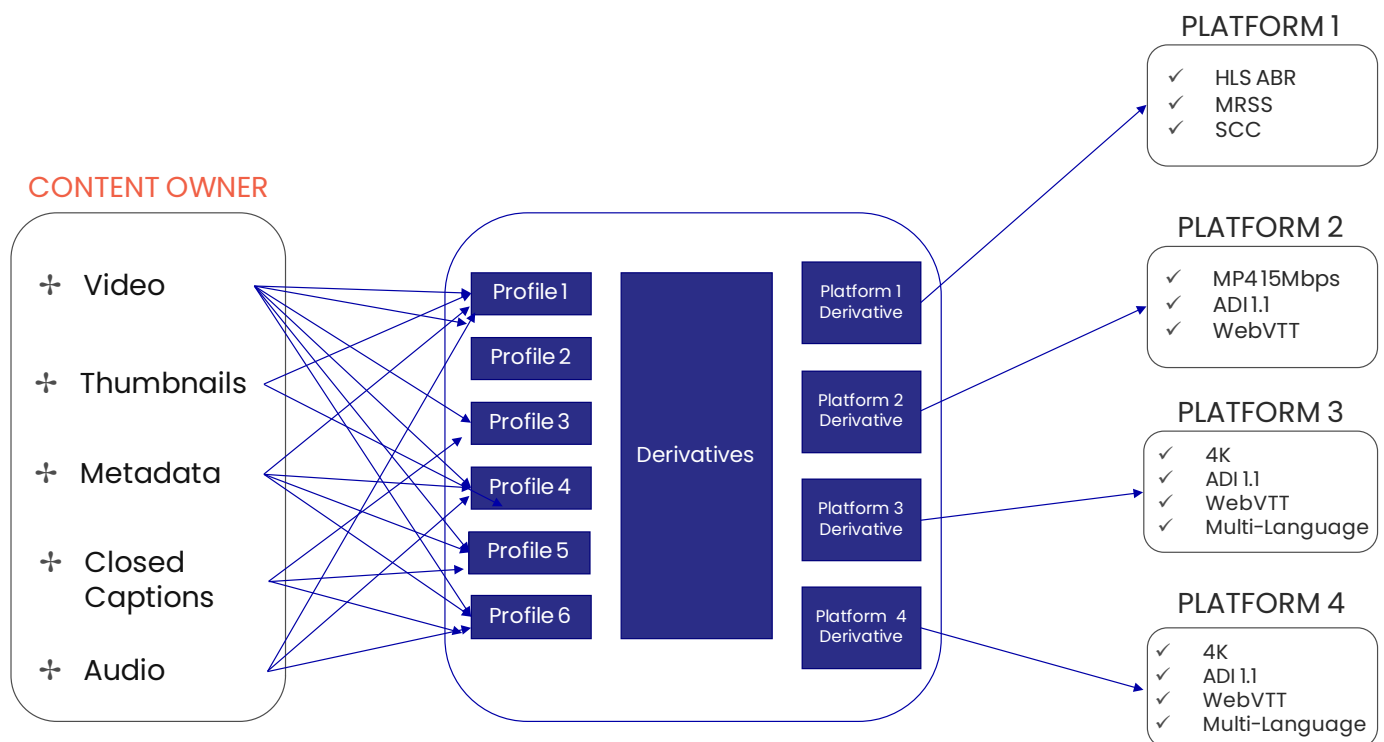
Increasing the audience reach through multiple platforms from vMVPD and MVPD to OTT and FAST platforms as well as across multiple geographies is a key business requirement in today's streaming world. This also results in technical complexity with the team having to manage multiple deliveries simultaneously at different cadence, formats, transfers and specifications. For a digital-first content owner with a nimble technology team, this adds a significant overhead to manage.

Complying with platform requirements

The effort required and the complexities vary depending on the platform to which you are delivering your VOD assets. Some platforms may expect mezzanine files, some may expect in MP4, some may expect it to be in H.265 codec. Similarly, one platform may expect a certain set of meta-data while another may accept a limited set of basic meta-data.

Apart from these basic format level requirements and meta-data, there are other requirements that platforms expect such as black frame and color bar removals/additions, burning watermarks, having additional thumbnails, multi-track audio and closed-captions. Additionally, some expect certain SLAs in timelines in addition to the elaborate asset specifications. For example, a platform may expect all the assets and metadata made available to them five days before the scheduled launch date and pass through a standard set of quality checks.

Additionally, some platforms only allow titles from preferred partners, and in many cases, the certification process itself takes months to complete.



The primary question you need to ask while evaluating the technology investment is – Would you prefer to take the path of the laborious certification process for each platform, implement and keep the required technology or adopt a partner like Amagi who has already built substantial expertise in the process and made available the platform connectors in a plug-and-play marketplace model?

Different platforms, different specifications

Let's try to first understand what a platform may expect from the content owner to accept the titles and metadata in the deemed specifications and quality that the platform may have.

If a platform has adopted CableLabs (Asset Distribution Interface) specification, then it is comparatively straightforward for content and metadata sharing as well as delivery. But most of the streaming TV platforms' mandates are often different and unique. Also, the specifications continue to evolve and mature and differ to a large extent between OTT platforms as well. As the industry is evolving, platforms are also innovating to add value to their viewers adding more nuances to the specifications for delivery.

On top of this, each platform may expect different technology while delivering assets. This may range from being feed-based (like JSON or XML), CableLabs, API-based or through an interface. Similarly, Adaptive Bit Rates (ABR) ladder, formats (HLS/DASH) and codecs differ – throwing in varying permutations of requirements for delivery.

In some cases, there is need for processing on top of transcoding such as adding watermarking, burning bugs, removing certain frames or even creating thumbnails for trick play. Additionally, for certain platforms, we may need to ensure support for multiple transcoders.

These apart, when platforms make a change (which is a high possibility considering the specs are often evolving), it is important that we quickly update on our side as well. For a while, platforms may allow the specs to be backward compatible, but they expect all content owners to move to the latest specifications quickly.

Finally, streaming platform also have a different set of specifications depending on which geographies you are delivering to. If you are a content owner planning for a global reach, you have to build specific pipelines in order to process the requirements for multiple geographies.



The complexity increases when a platform makes different changes to different geographies and when the timelines to consolidate to a single specification are different. This requires support for multiple workflows/hot-deployments. The complexity further increases when the delivery mechanism also differs – some maybe a CDN pull, others such as Aspera transfer.

Case in point

Let's consider you are an aggregator, some of your assets may be owned, and some are licensed. The way you manage meta-data, formats, and/or storage may be completely different between different partners. Having the flexibility to manage the permutations in ingesting diverse sources of formats is a requirement to effectively manage the process and quickly plan your deliveries. Similarly, some assets may be linear, some for VOD and some for both linear playout and VOD. In some cases, we may consolidate all these ingestion processes or sometimes we may have to switch between options. So, it is important that the pipelines we are building can handle these requirements.

At Amagi, we approach this by keeping version-controlled workflows so that multiple workflow versions can be maintained according to the customer and platform needs. The upgradation is also seamlessly managed so that it doesn't impact the delivery SLAs. Similarly, we are often included in early adopter programs of platforms so that we are ahead in terms of the building workflows according to newer specifications.

Increased complexity with a growing video library

As a content owner, you may wish to deliver the titles both as VOD content as well as for linear playout. Often, the library may overlap; but in some cases, it may be mutually exclusive also. Similarly, how the metadata is managed also becomes complex as the library increases. Thus, you may have different methods of managing metadata - like mRSS, spreadsheets, in a tool, and so on.

Metadata that is required for a linear playout can be very different from what is required for VOD. For example, in the case of linear, just the episode name and a short description may be enough. However, in the case of VOD, a complete series, season, and detailed episode description with cast information may be required.

As the library grows, the storage will also need to be streamlined to achieve cost efficiency. Therefore, we need to take each of these nuances as well along with the platform-specific requirements into consideration while building individual delivery pipelines for various platforms.



At Amagi, we follow a unified approach to ingestion of both content and metadata thus helping us reuse these for multiple use-cases, be it for linear playout, VOD delivery, and according to various platform requirements. The ingest-once-multi-deliver paradigm is the basic pillar to our design. Our VOD delivery and cloud playout solutions are deeply federated to achieve this and help our customers achieve faster time to market. This also helps in achieving storage efficiency for our customers as we use the same ingestion storage across solutions.

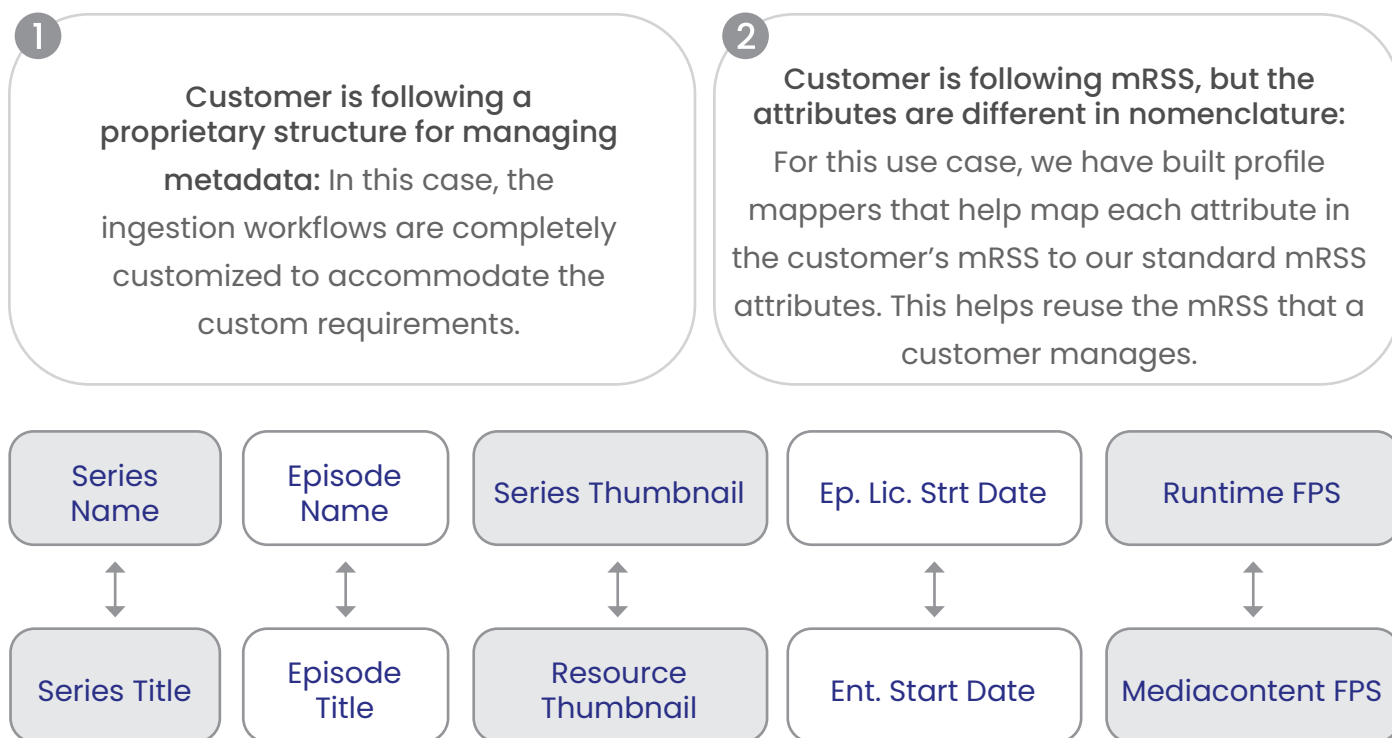
A unified solution to maximize your viewership



Amagi ON-DEMAND – our VOD platform – supports mRSS, CSV, or CableLabs-based ingestion. It usually follows a master metadata ingestion where the entire set of metadata, be it video segments, close caption, spot image, landscape, platform, entitlement dates can be ingested. The workflows can be customized to either pull the content from a customer's cloud location or transferred to us using Aspera, FTP or Faspex.

Building customizable ingestion workflows

Amagi supports customization at two levels



The main advantage of mRSS is that the changes can be periodically done and whoever is consuming the mRSS (including Amagi) can hit the feed at regular intervals to ascertain any changes. The delta alone can be ingested. But the creation of mRSS requires technical resources.

In order to support customers with limited technical resources, Amagi provides spreadsheet-based metadata ingestion. But, as the volume increases and a wide variety of metadata are supported, managing this through spreadsheets becomes tedious with multiple back and forth between concerned teams, while also leading to the creation of multiple versions.

| A | B | C | D | E | F | G | H | |
|--------|------------|---------|----------------------|--------------|-----------|--------------|---------------|------------|
| Type | GUID | Tms ID | Title | Description | Series ID | Series TmsId | Series Name | Series Des |
| Series | AMAGI9999 | TMS 123 | Game of Rings Starts | A boy wizard | SER001 | TMS-ID-1224 | Game of Rings | A boy star |
| Series | AMAGI10000 | TMS 124 | Hobbert meets Hobby | A boy wizard | SER001 | TMS-ID-1224 | Game of Rings | A boy star |

Sample snippet of Amagi standard CSV template

As we discussed, CableLabs is a standard that broadcasters follow for metadata management. By adopting the same, you can simplify sharing between required teams. However, similar to mRSS, CableLabs is also comprehensive and requires technical expertise to maintain the feeds. The main benefit is that the receiver of the feed knows how to understand the feed as it follows a standard.

► **Case In Point:** Delivering Tastemade to a leading vMVPD

While managing VOD deliveries to a leading vMVPD for one of customers – Tastemade, we had to keep in mind that vMVPD required their specific ids added to every asset we deliver. The workflow was completely customized to ingest the assets from Tastemade with their regular mRSS feed, and expose a CSV with the title details to the vMVPD so that they can append a unique id for each title. These were then ingested on our asset management system. Finally, while we deliver titles to the vMVPD, we included the required metadata information including vMVPD specific ids, allowing Tastemade to avoid making any platform-specific changes on their side for this delivery.

► **Case In Point:** Delivering VOD for a 24/7 live TV channel

One of customers that runs a 24/7 live TV channel manages metadata at the series level. This meant that each series had a single specific CSV. If we are to deliver this to their O&O platform, we need to either expose these feeds individually or build a consolidated feed. We customise our workflow to consolidate these and send them as one to all platforms during delivery.



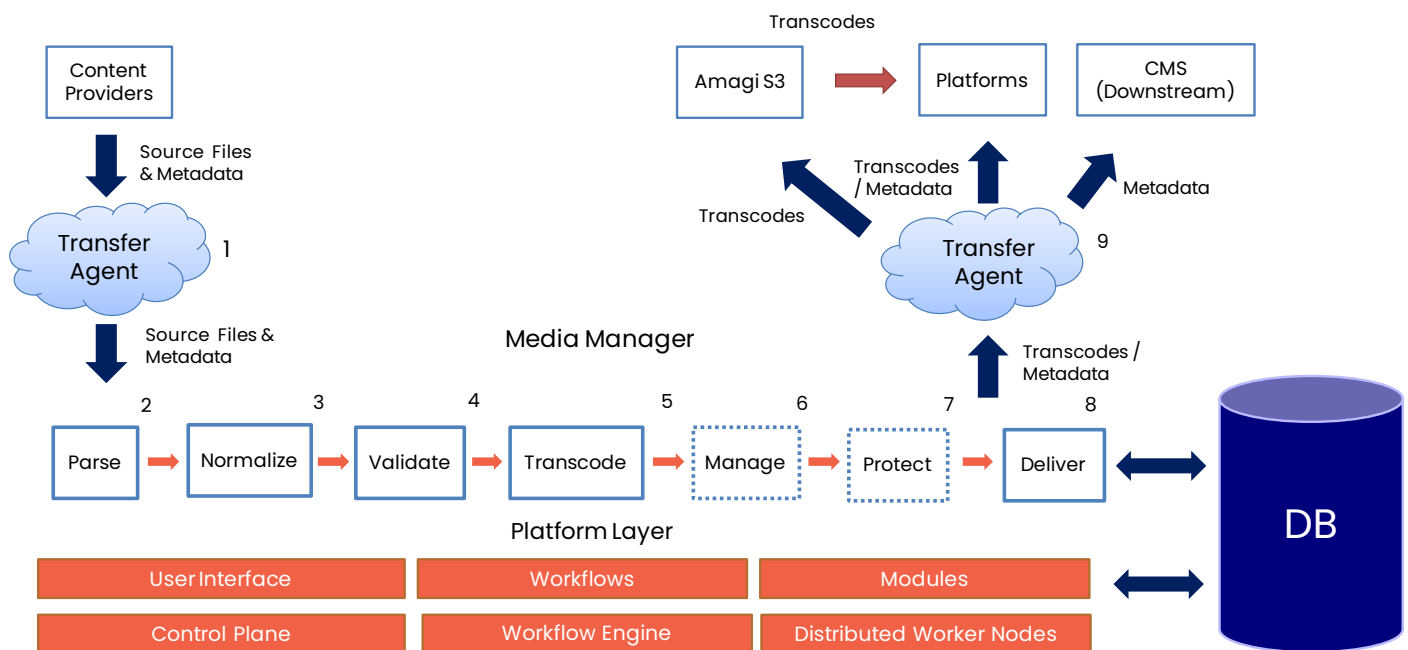
Designing a robust architecture for VOD delivery

Amagi uses a Cadence based orchestration framework for our architecture to cater to the ingestion and delivery requirements. This not only helps us support customizations seamlessly, but also ensure hot deployability. While we support a customer with one platform delivery, we can plug another workflow to deliver to a new platform without impacting the existing workflow. Similarly, we deploy multiple versions of the workflow that allows us to develop workflows based on new platform specifications, while continuing to support old specifications-based deliveries too seamlessly.

Amagi ON-DEMAND platform is built on the 'ingest-once-multi-deliver' paradigm as the central pillar. Once the metadata is ingested, we normalize the entire source metadata and persist to Amagi's metadata management system. This minimizes the ingestion costs and helps seamlessly deliver packages to various platforms.

Pluggable workflows

When we have multi-deliveries, it is important that the architecture takes into account prioritizations. There could be use cases when we need to prioritize certain platform deliveries and the architecture (cadence) helps handle this. At Amagi, we have designed our product such that the priorities can be completely managed both at customer level as well as delivery pipeline levels. In addition to this, by taking advantage of seamless auto-scaling options cloud provides, we ensure SLAs are met at both customer and platform delivery levels.



By virtue of a microservices-based architecture, Amagi can even extend certain aspects of the whole delivery pipeline for customers. For example, we have a few customers who license only the connectors we have built and handle transcoding and QC themselves. In such cases, Amagi only handles the packaging and delivery aspects of the workflow.

► **Case In Point:** Managing VOD deliveries for a top global media company

We manage VOD deliveries as well as live-to-VOD to a few platforms, for a major media company. The customer had continuous live streams running (say as part of an event), for which a set of metadata and EPG were being managed in a specific manner. At the same time, while the live stream continued, we had to convert the coverage into VOD and deliver it to certain platforms (like short-lived catch-up TV). This delivery required a different set of metadata compared to regular VOD deliveries. In this case, we required only minimal level of information pertaining to the short duration live event. We managed this by completely customizing the workflow.

Amagi supports backward compatibility or mix and match of ingestion options to make it easy for a customer to use whichever method is suitable for the context.

Support for multiple transcoders and packaging

As part of the design, we have also plugged multiple commercial and open-source transcoders and invested in a custom transcoder service to minimize the costs. Support for mux/demux, multi-track audio, quality checks at ingestion and delivery are also plugged in to deliver titles to various platforms according to their specifications and quality requirements.

► **Case In Point:** Closed captions for NBCU

We generated closed captions (CC) for NBCU using Google AI/ML libraries based on a running stream. We did not use a webVTT or another external SRT file. We have built this as a service. We also support webVTT to VTT and other format conversions when required.

Improving the speed of delivery

Transcoding of assets and associated QA are the most time-consuming activities in the workflow, and must be done according to platform specifications. In most cases, we select a just-in-time transcoding approach where the assets are passed through a transcoding pipeline before delivery. Another approach is to keep a set of standard transcode profiles ready so that only incremental changes are to be done according to the platform specifications. This can be done as the timeline for delivery approaches.

Building holistic quality check and monitoring modules

It is imperative that the design considers both quality checks and monitoring modules so that the operations team has complete visibility into the pipelines' health as well as ingestion and delivery progress.



| QOE | | |
|---------------------|---------------------------|-------------------|
| API Functionality | Video Quality (Sources) | Service Health |
| Prod Cluster Health | Video Quality (Transcode) | Ingestion Health |
| Orchestrator Health | SLA/Threshold Health | Transcoder Health |
| Delivery Health | | |

Achieving cost-efficiency with optimization

Transcoding cost is the main contributor when it comes to the delivery of VOD assets to a platform. We can always look for optimization through the reuse of transcoded profiles as the same could be acceptable for multiple platforms.

Similarly, we can optimize storage cost especially if you have multiple requirements like playout, EPG and VOD delivery. Before implementing our offering, Amagi solution engineers take a consultative approach and collaborate with our customers to identify and optimize resources for both ingestion and delivery so that the overall cost of VOD delivery is minimized.

Preparing for monetization

If we are preparing the titles for AVOD content, it is key that the required SCTE markers and ad tags are inserted while packaging so that downstream SSAI solutions can stitch ads.

At Amagi, our VOD delivery solution is tightly integrated with Amagi THUNDERSTORM, our SSAI solution. We expose package with SCTE markers in a CDN that our SSAI solution picks up and in turn exposes another CDN endpoint with ads included. The CDN endpoints help us pull required viewership and ad metrics.

By virtue of our customizable workflows explained earlier, we enable seamless switching for HLS and DASH support, thus enabling multi-package and multi-delivery with a single ingest.

Conclusion

Delivering VOD titles to platforms require a well thought through architecture that can handle multiple meta-data formats, customizable workflows for managing both ingestions and delivery. As the number of platforms for delivery increases, the complexities involved may increase; however it also opens many opportunities to streamline and optimize workflows.

Thrive with us!

Reach out to us at cloudandme@amagi.com to build or bolster your VOD delivery strategy

About Amagi

Amagi is a next-gen media tech company that provides cloud broadcast and streaming TV solutions to TV networks, content owners and streaming TV platforms. Amagi enables content owners to launch, distribute and monetize live linear channels on Free-Ad-Supported Streaming TV and SVOD platforms. Amagi also offers 24x7 cloud managed services bringing simplicity, advanced automation, and transparency to the entire broadcast operations for traditional TV networks. Amagi delivers 500+ channels with deployments in over 40 countries. Amagi has presence in New York, Los Angeles, London, Paris, Singapore, New Delhi and Bangalore.

www.amagi.com