Synamedia

The Converged Broadcast/ Broadband Headend

Video Processing

The Converged Broadcast/ Broadband Headend

This solution brief will explain how a true converged broadcast/broadband headend enables pay TV operators to retain and grow their subscriber base by implementing cost-effective solutions that enable quick and efficient implementation to stay ahead of market rivals.

Market Landscape

Demand for online video continues to grow dramatically across connected devices. The Cisco Visual Network Index™ forecasts that by 2021 there will be 27 billion connected video devices, with 82 percent of IP traffic being video. Live video will increase 15-fold to 13 percent of video traffic, and ultra-HD (UHD) IP video is forecasted to reach 21 percent of all video traffic. The journey of video streaming services will leverage IP technology and enabling the user video experience to be at least as good as traditional broadcasts. Subscribers should have a consistent and positive experience with their service provider's brand on a variety of different devices they may use to consume content.

Video processing architectures today reflect the natural video stream evolution from basic constant bit rate (CBR) to multi-codec variable bit rate (VBR) to adaptive bit rate (ABR) to enable an increasing number of services such as VOD, time shifted TV, Cloud DVR (cDVR), UHD and future applications. Given the evolution of video streams and application growth over time, the

result is a patchwork of parallel and inefficient workflow silos beginning at content origination all the way through playout and distribution,

Dramatic video growth and market trends present major challenges for video service provider to continue scaling their infrastructure to serve technical evolution and consumer demands. For example

- The introduction of devices using ABR clients requires service providers to operate two parallel video processing and delivery systems: MPEG-2 transport for the traditional set-top boxes (STB) and ABR for mobile devices. This duplication has significant CapEx and OpEx cost implications and operational complexities.

- As Video Service Providers explore the benefits of public cloud infrastructure, they want to understand what use cases benefit from public cloud infrastructure and how agility, scalability can be balanced with Opex and Capex investments.

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- Streaming ABR using unicast requires separate sessions for each viewer. This delivery method cannot scale to the forecasted load of live video, especially for popular live events such as the football or soccer finals as well as sensational news events with burst viewership.

- Because of the nature of unicast streaming, the increase in video traffic volume will require significant infrastructure investment at the edge of the network to absorb the traffic load.

Given that end-to-end workflows are directly related to subscriber value and business outcomes, maintaining building blocks in siloed environments becomes increasingly cumbersome, inefficient, and costly.   A converged broadcast/broadband headend is an accepted and forward-looking strategy that leverages cloud, automation, and data center architectures to create a scalable, flexible, and cost saving platform to facilitate efficient expansion and business growth.

Business Outcomes

The benefits of software-based video processing accelerate innovation and increase service provider agility in launching new codec features and technology advancements much more rapidly without large capital investments.

The benefits of converged encoding and video processing consolidate workflows in a unified platform to serve primary and mobile screens for linear, OTT, VOD, and TV Everywhere applications in an efficient and easy to maintain environment.

Facilitates shared infrastructure, resources, and costs among content providers, service providers, and broadcasters looking to combine operations either through acquisitions, market shift adjustments, OpEx optimization, or needs to increase business outcomes.

Faster time to market to explore new countries, test existing markets, explore new markets, trial new services and applications to increase ARPU or subscriber base while minimizing risk and capital expense. If new markets and applications prove unsuccessful, services can be changed or stopped without the fear of capital loss.

Solution Description

Synamedia's Converged Headend Solution supports a wide range of OTT and broadcast formats and mechanisms with assured delivery in each workflow process and step.

Synamedia's Converged Headend consists of the Video Processing Applications of the Synamedia Media Plane. Synamedia's Media Plane provides a solution for all use cases, including Live Linear, Time-Shift TV, Cloud DVR, and Video on Demand (VOD). The solution encompasses both Streaming (ABR) and Broadcast Delivery (Satellite, Cable, Terrestrial, IPTV) and offers a solution for Encoding, Packaging, Recording, Storage , Encryption and Publishing. (See figure, next page.)
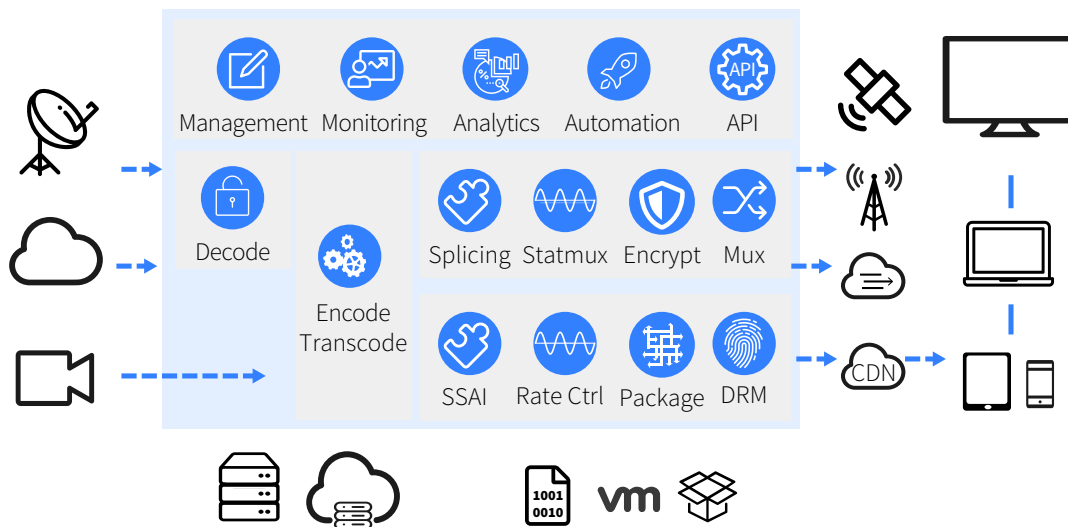
Figure 1: Converged Headend

The Solution is built for unified services whereby Linear, VOD and cDVR use-cases all run as tenants on the same infrastructure and application investment.

The central Workflow Controller manages the lifecycle of these services from stand-up, to configuration, to elastic scale. It offers a mature set of APIs to facilitate integration.

The Software Media Plane Applications are Cloud Native and can be deployed on COTS infrastructure. Cost optimal deployment is achieved by flexible choice between On Premises or Cloud deployments using Synamedia's Workflow Controller. The Solution supports a variety of deployment models: Bare Metal, Containers and Virtualized (VMs) or a combination of these.

Key Capabilities

Converged Architecture

Synamedia's Converged Headend Solution embraces CBR, VBR and ABR technologies, support multi-codec rollouts (MPEG2, H264, HEVC) and runs on all kinds of infrastructures, from appliance to datacenters, in a private or public cloud.

Synamedia's Converged Headend offers a single integrated solution leveraging a variety of deployment scenarios of Hardware, Software and/or combination of both.

Market leading and field-proven solution, optimized for large scale deployment consisting of hardware appliances and software micro-services.

- **Professional Integrated Receiver Decoder D9800**
  Network Transport Receiver to securely distribute over any link (satellite, direct IP connection, and CDN). IP ABR to TS conversion for distribution to traditional end-points.

- **Virtual Digital Content Manager**
  The industry's most mature microservices-based video application for encoding, transcoding, packaging, origin services, encrypting, statmuxing, and other mission-critical operations for both live and VOD workflows.

- **Digital Content Manager**
Broadcast quality encoding and transcoding platform to support various applications from content contribution and production; primary and secondary distribution.

- **Media Streamer**
Open and flexible CDN platform to multi-screen experience to all managed and unmanaged consumer devices. Supports Live/ VOD/TSTV/cDVR unicast ABR streaming services.

- **Media Broadcaster**
Cost-effective and scalable solution for streaming HTTP adaptive bit rate live video to the in-home primary screen using network IP multicast.

Flexible Workflows

Synamedia's Workflow Controller creates and manages workflows of Cloud Native Video Processing micro-services such as ingest, encode, package, encrypt and origination for OTT workflows and ingest, encode, mux, statmux, splice, encrypts for broadcast workflows.

The Workflow Controller consolidates these workflows for rapid creation and modifications, leveraging the templates. It also exposes a REST API for integration with other systems for automation and scheduling.

Automated Deployment and Channels Creation	**Monetize Fast** / **Ease Operations** / Workflow Manager exposing easy to use System workflows
Flexible combination of Redundancy Schemes combined with Smart Deployment	**Scalable and Resilient** / **Cost Optimized Deployment** / Intelligent Use of On-Premises and Cloud Infrastructure

Figure 2: Key Benefits of Converged Headend

Video Workflows can be deployed on standard IT on-premises or cloud infrastructure opening the ability to perform smart and cost optimal deployments. This enables video service providers to have cost optimal deployments to select in a flexible way to deploy channels across available compute resources across data centers. This is typically used for burst and event type channels or load-balanced and disaster recovery use cases

The Workflows are centrally operated and monitored by the Workflow Controller, which brings its own efficiencies by easy provisioning of new channels or services, scaling up capacity and the scheduling of temporary pop-up channels.

The Workflow manager exposes an easy to use User Interface to the Operator, by exposing a simple selection of required functions/applications, making use of templates to create the required workflows. As such, rapid configuration of complex video workflows using a set of video processing resources becomes possible.

The workflows are fully exposed over REST API and provide a seamless integration into existing operations or Umbrella Fault Manager (UFM).

As a result, the platform can spin up new channels in minutes, by dynamically adding and removing workflows, fully automated.

Hybrid Deployment Options

Synamedia's converged headend solution makes intelligent use of the cloud, finding the right balance between OPEX and CAPEX making use of Hybrid On-Premise and Cloud Deployment. Where applicable, workflows are running solely On-Premise while others run in the (public) Cloud. A combination is perfect possible with the Synamedia's Converged Headend Architecture. While all functions in the Converged Headend can be implemented in Software, there are still use cases deploying appliances to create certain workflows. Appliances can come in form of software deployed on a dedicated server or a hardware appliance, such as the Digital Content Manager.

Flexible deployment requires a solution for flexible Operation in order to support flexible deployment.

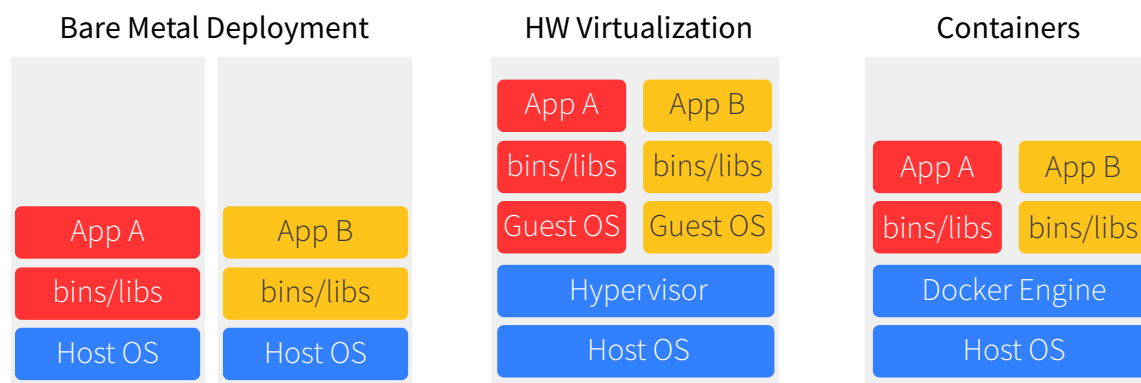The Media Plane Workflow Controller allows for support of any type deployment model from models below.

Figure 3: Application deployment Models

In traditional appliance-based systems, the design of the platform has been relatively static, and therefore platform operations have generally been focused on hardware maintenance.

In the context of software-based processing systems, the platform comprises a hardware compute layer combined with cloud technology and software. Besides a necessary hardware operation, further components such as operating systems, management tools (e.g. ELK stack) and orchestration software have considered as part of the platform operations. In the new world, not only hardware operations are required, but also the operation of all SW components such as Operating systems, Management and Monitoring tools (e.g.ELK stack) and Orchestration SW.

The Container deployment option brings additional value to the converged headend. It allows for infrastructure agnostic implementation of processing workflows, be it on-premises or (public) cloud. Deployment of containers comes with flexible automation. The Media Plane Deployer function of the Workflow Controller integrated Kubernetes (K8s) and Openshift allowing full automation of the Media Workflows.

Monitoring, Management & Analytics

Synamedia's Video Service Manager (VSM) is a video processing management solution enveloping a powerful set of tools for configuring, monitoring and managing Synamedia's vDCM product suite and applications over unified or disparate geographic locations.

The VSM supports a diverse range of applications that allow operators and engineers with a service-oriented workflow management front end to operate and manage video signals for hybrid Broadcast/Broadband delivery in digital video processing headend applications.

VSM's key capabilities include:

- **Centralized Management**
  VSM is highly scalable and extensible. The client/server architecture supports both the centralized management of even the most geographically distributed environments, as well as the remote management of a centralized environment, all using standard IP technology.

- **Easy Lineup Changes**
  VSM Lineup Management and Scheduling allows users to easily modify and deploy new channel line-ups on the fly with minimal disruption.

- **Template- and Wizard-Based System Setup**
  Adding, reconfiguring or removing services or equipment is fast, easy and error-free. Templating, wizards, consolidated data views and powerful cut-and-paste functions are available for both service and system modifications.

- **Support for any deployment type**
  Monitor and control traditional hardware-based, virtualized video infrastructures as well containerized deployments.

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