Living the Stream

A Multi-Channel Distributor's Journey to Streaming

MediaKind | Application Paper

Many operators have already seen the benefit in embracing streaming based solutions to provide their customers with a great TV experience, delivering better agility and flexibility to their video services, while expanding reach and cost effectiveness.

This shift to streaming brings a second and understated benefit, enabling a one-stop shop for media, combining an operator's own services with those from OTT providers to position themselves as super-aggregators.

However, some major evolutions of both technology and business are still to be addressed to allow operators to fully embrace the change and truly start 'living the stream'.

The Changing Landscape

The adoption of over-the-top streaming services has shifted user expectations towards what an engaging and easy to use media offering should be capable of - from the flexibility of being available on a wide array of devices, the availability of content, and the quality of the experience. However, this fragmented approach to media consumption has many challenges, with the need for consumers to implement billing relationships with each provider, and discovering content limited to each service.

Operators have been shifting their own Pay TV offerings to offer their content line ups on a wider set of devices and a wider set of users by taking advantage of streaming technology to provide new market offers such as streaming only services. The strong relationships that operators have with both content owners and their subscribers puts them in the perfect position to offer a complete range of content, becoming true super-aggregators for all media and removing the need for consumers to hunt between apps to find the content that is relevant to them.

With the heavy investment into their broadband infrastructure to provide increased reach and capacity for traffic, this forms the basis for cutting edge media services, by enabling a set of transformations across the ecosystem towards streaming delivery for both operators own Pay TV services as well as content streamed directly to end consumers.

Streaming AV

A TV service is ultimately about delivering great content with a great experience to the end user. For live content, user expectations have been set by experience gained from content viewed over dedicated broadcast chains that leverage high quality dedicated infrastructure (broadcast, cable, satellite, etc.). Whereas, for non-live content user expectations are set by the flexibility they have from SVOD platforms, combined with the ability to shift seamlessly between live and non-linear driven from DVR type capabilities.

In the case of both live and on demand content the expectation is now for access through many different types of devices, with hugely different capabilities and screen sizes, and differing connectivity, both in and out of the home. This shift has driven the need for streaming to deliver on all of these expectations and provide a great

experience to subscribers. However, in order to deliver this the entire streaming media processing and delivery chain must have several important characteristics for all types of content:

- Reliability
- Latency
- Quality
- Scalability

The streaming AV chain must also provide the operator with several additional characteristics:

- Agility to enable speed of service and feature rollout
- Cost efficiency
- Live, on-demand, pause, timeshift and catchup capabilities
- Content security & rights enforcement

Reliability

Smart TVs and connected TV devices now account for more than half of the streaming viewing hours and has definitively moved from being a delivery mechanism for small devices and on-demand to being more about the main screen and both on demand and live content[1]. The expectation from both the TV Service operator and the consumer is now for the service to 'just work'. This means that the reliability of the full media workflow for streaming becomes a priority, from preparation to processing, through to distribution, and even ensuring in home issues are considered. Automated monitoring of service reliability and client experience shorten the feedback loop to resolving issues, whilst cloud native technologies can help prevent issues through automation and component self-healing characteristics.

Latency

For socially active live content, which is especially true for sports, end-to-end video latency is one of key differentiators between streaming and traditional delivered services – the first generation of OTT live technologies could have up to 60 seconds between action happening in a game, and it being shown on screen. With social media and new push messaging from the likes of sporting apps, this could mean finding out about a goal a minute before you actually saw it. For streaming to be a viable alternative, then end-to-end latency needs to be in the same ballpark as broadcast delivery.

Technologies to reduce live latency are available, either using standards-based approaches (such as CMAF LLC and HLS-LL) or alternatively through proprietary approaches.

Quality

UHD 4k TVs are now pervasive, with a predication that by 2023 66% of connected flat-panel TV sets will be capable of 4k as illustrated in the figure below[2]. Along with the increasing use of TVs for streaming, this is driving the demand for higher resolution content, but in turn is driving up the bandwidth required for each viewer.

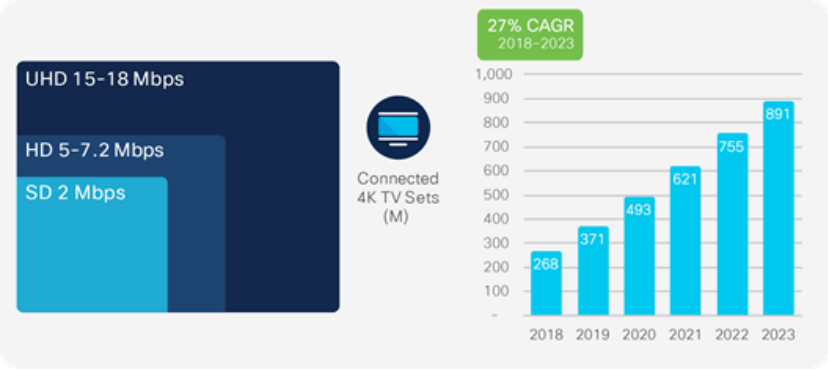


Figure 1: Cisco Annual Internet Report, 2018-2023

When it comes to encoding and compression, live content requires significantly more optimization than file based non-linear services, simply due to its real-time nature. Compression research for current codecs can improve quality for a given bitrate (or conversely reduce bitrate for the same quality) – for example, the figure below shows this research resulting in a 10% year over year decrease in bitrate requirements, and therefore associated cost.

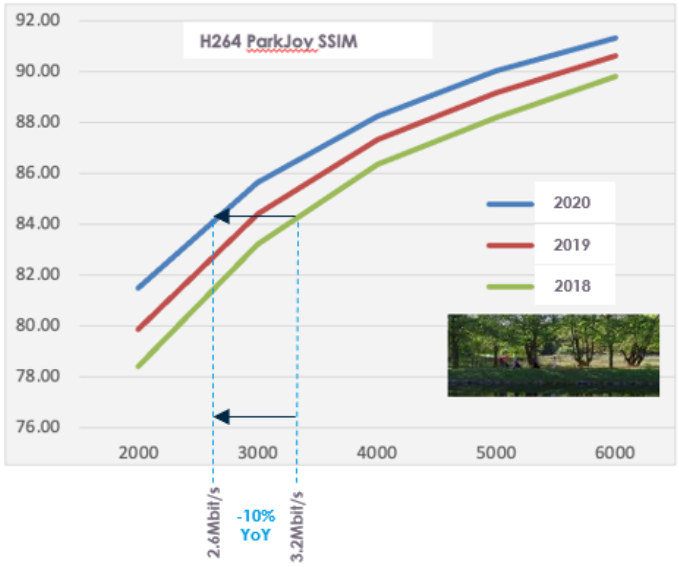


Figure 2: MediaKind Encoding Measurements

The introduction of new codecs has scope to further improve the quality/bitrate achievable. VVC and EVC for example have the potential to reduce the rates achievable today with HEVC, with VVC currently expecting to see around a 40% bit rate saving over current codecs. The implementation of new codecs is made simpler in a streaming environment through the flexibility of clients and the ability to introduce them to subsets of the audience depending on device capabilities.

The balance of compression effectiveness and bitrate can be improved via this evolution to newer codecs and by applying more of the available toolset from a codec, however, typically the amount of computational power required to encode also then increases. Technology innovations such as content adaptive encoding and constant video quality (CVQ) help to reduce the amount of data needed for a given quality without requiring additional CPU cost. More advanced AI techniques such as MediaKind's AI Compression Technology enables the automated use of compute resources for given content types, ensuring the full capabilities of infrastructure are used, and therefore optimizing the bitrate efficiency for any given level of processing power.

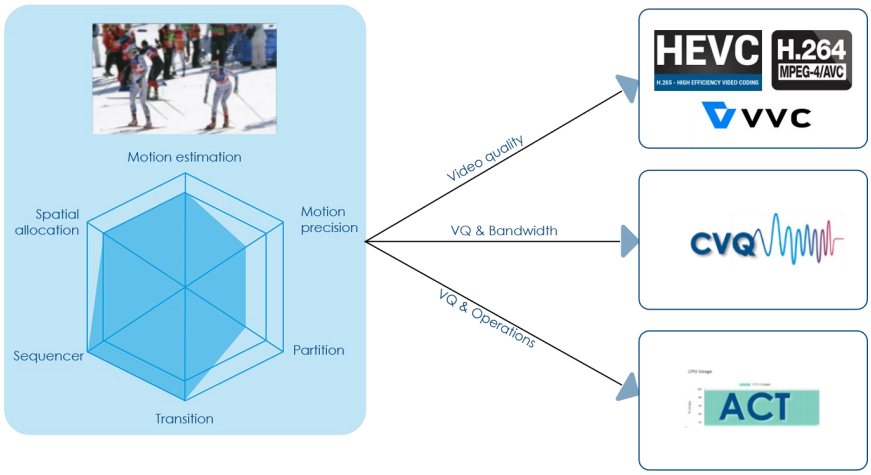


Figure 3: MediaKind Content Aware Compression Technologies

Scalability

One of the biggest challenges experienced when transitioning to a streaming service is being able to deal with the unpredictability of scaling a solution for the potential peaks in traffic caused by live events. This is especially true in operator use cases, where not only the capacity of their networks at every stage needs to be considered, but also the costs for scaling of unicast traffic via operator CDNs.

As more live content moves from broadcast to streaming, inevitably the peaks in demand for traffic also increase, since popular live events invariably have the highest concurrent viewing figures. Today, the level of streaming in large multi-network events is still small compared to the total viewership, however this is changing rapidly. An example of this was the 2021 Super Bowl. During the event there were 96.4 million total viewers, with 5.7 million viewers per minute streaming – this was an increase in 65% from last years 3.4 million[3]. If this rate of growth continues, the Super Bowl peak in streaming traffic will increase by around 10 times in under 5 years – and this growth could easily turn out to be higher.

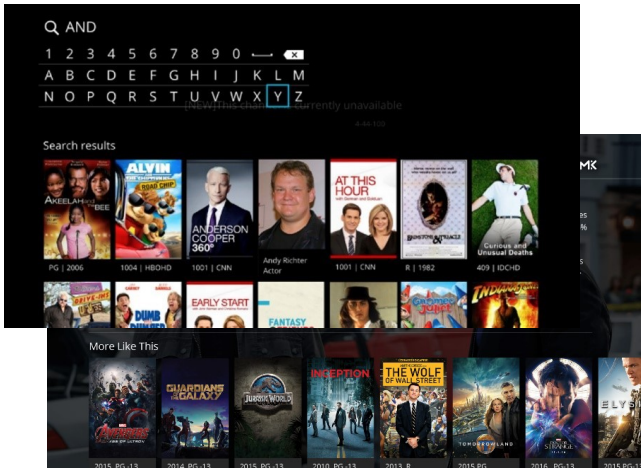
The adoption of high performance in-network caching, in addition to augmentation through external cloud-based delivery capacity, means these peaks can be supported in a more cost-efficient way. Additional technologies such as multicast ABR may have an alternative solution, however, in many cases the implementation of such technologies is an interim step before sufficient network capacity is available.

The Consumer Experience

Delivering a user experience that enables consumers to access relevant and personalized content means that discovery and aggregation is fundamental.

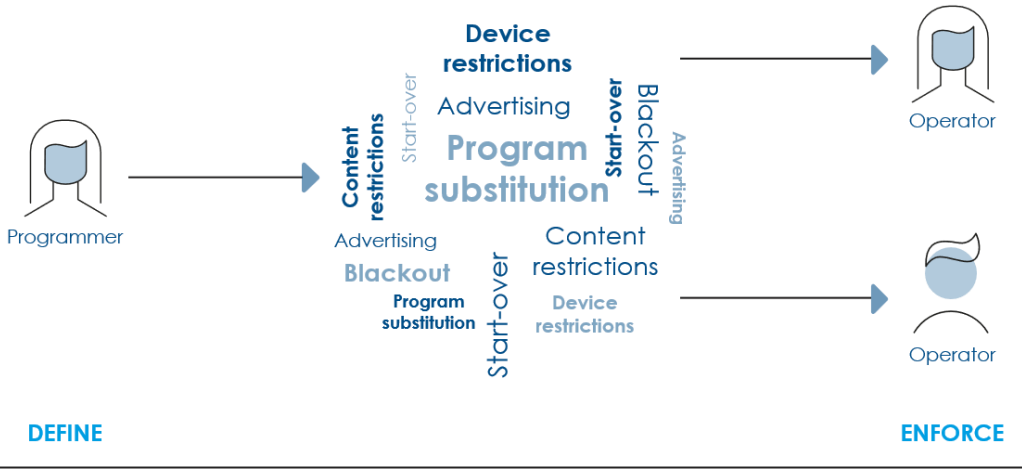
In order to deliver a wide range of relevant content, operator TV platforms have the opportunity to provide a point of aggregation for their own negotiated content, alongside Subscription Video On Demand (SVOD) or other OTT offerings. This super-aggregated platform provides users with a single convenient location for content and billing, leveraging the trust and relationship with both the operator and the consumer.

Content discovery across these different sources through methods such as EPG, asset metadata, genre, can converge to deliver a holistic recommendation and personalization capability – ensuring users remain within the single platform whilst providing additional customer stickiness, and reducing potential for churn.



Monetization

In the era of soaring content acquisition rights and pervasive content digitization, maximizing revenues from every potential viewer is critical. To manage the increasing challenges of content distribution negotiations, Media & Entertainment organizations need to find and distribute the quality content that their viewers will enjoy. At the same time, they must enforce content rights & local regulations to enable the diversification of supporting business models and maximize return on investment, grabbing the monetization opportunity introduced by HTTP-based delivery.



According to sources such as TV/Ad Nation Ipsos Connect/Thinkbox, TV advertising is the most trusted format, so there is a great opportunity for operators to monetize targeted advertising.

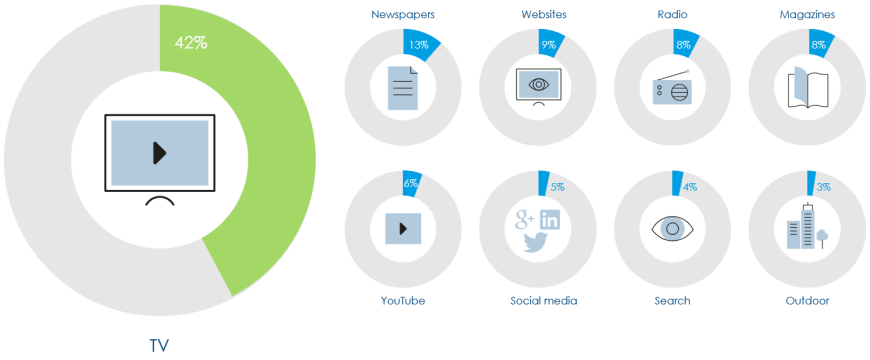
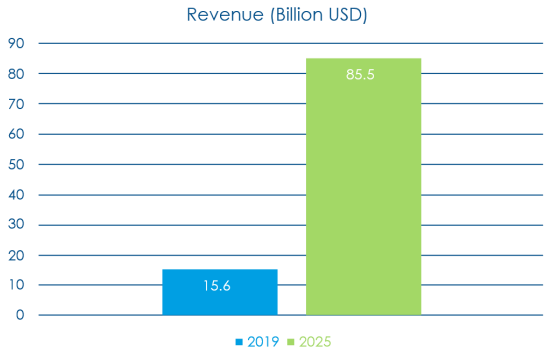


Figure 4: TV Ad Nation Advertising Content Type Trust

This trust is driving targeted advertising growth with the Rethink TV Addressable Advertising Forecast showing revenues increasing from 15.6b to 85.5b by 2025[4] as illustrated in the adjacent graph. The move to streaming unlocks this opportunity for operators, whilst the same technology components can be used to meet rights and content obligations and deliver end users with a high level of personalization.



Shifting to the Cloud

For MPVDs there has been a long-term equation to fulfil the needs of their TV consumers - deliver the best content, with high quality and reliability meeting the demand for millions of connected subscribers. But with the shifts outlined in this document, this is not enough to compete - it must also be possible to launch new services at speed whilst enabling new innovation without the limitations of multi-year processes typical with current offerings.

This need for agility is driving the adoption of streaming, but also the adoption of using cloud native approaches thus removing the existing fixed-function infrastructure and enabling new infrastructure to be created much more rapidly. However, these benefits come with their own challenges, such as the capacity to master such technologies and their associated cost.

The trends in the industry show there is a real tidal wave growing for adoption of cloud native technologies and, more specifically, in public cloud, private cloud or hybrid deployments. When considering cloud native deployments in general, not just in the media industry, Mark Albertson in Silicon Angle[5] stated that 91% of companies have now adopted Kubernetes, and 75% use it within enterprise production environments. As an illustration of the market moving at full speed, ABI Research also predicts Telco Cloud revenues to triple over the next five years, reaching $29.3 billion[6].

So, how do we explain the relatively shy and somewhat slower approach of some media companies to public cloud? One key topic is the cost analysis when considering these different deployment options. A popular opinion is still that public cloud solutions are indeed quicker and more flexible, but they appear more expensive than on-prem or appliance-based solutions. However, to fully understand the costs, it is crucial to undertake a TCO (Total Cost of Ownership) analysis that covers the complete cost structure. Factors such as hardware, infrastructure, cooling, services, redundancy, licenses, upgrade and some services costs must be considered to realistically compare the cost of running dedicated infrastructure versus running software on public cloud. Once a fair TCO calculation has been made it is typical to conclude that a good share of public cloud costs are actually "hidden" when compared with on premise models.

The cost of such solutions is continuing to reduce and an interesting calculation from Quortex[7] explains how public cloud costs show a consistent decrease of 15% year on year, for the last 8 years which will continue to support this move to cloud native software approaches.

MediaKind - Living the Stream

Overall, the shift to streaming is driving a huge transformation in the operator landscape, and this change can bring a closer alignment with web technologies. This has huge potential to enable faster innovation and the introduction of new offers to the end consumer.

This change also goes hand in hand with the use of cloud native technologies, enabling the decoupling from legacy dedicated infrastructure approaches, which supports an increase in the velocity of evolution, whilst providing flexibility for hybrid deployments.

MediaKind's internal predictions are for a year over year increase of 15% for streaming service adoption with a corresponding 8% year over year decrease in legacy delivery technologies in the telco and cable headend market. Anticipating this trend, MediaKind began investing in cloud native technologies as early as 2014, and now boasts a complete, mature and award-winning cloud-native portfolio serving all media segments and benefiting from all the aforementioned capabilities. The full MediaKind portfolio includes:

- Contribution, Distribution and Cloud Ingest solutions which enable the acquisition and processing of content to ingest live content into the cloud or to distribute these feeds for production or onward regionalized distribution – the MediaKind Cygnus solution portfolio incorporates CE1, CE Mini and RX1 products.
- Media Processing and Consumer Delivery solutions – Media workflows for processing live and on demand content and ensuring it is available to any device. MediaKind Aquila solutions enable content to be processed, packaged, and secured for streaming, but also for broadcast and IPTV use cases from a single cloud native solution.
- Consumer Experience and Monetization solutions – the MediaKind portfolio integrates capabilities for content rights management and advertising with PRISMA, and full streaming media platform capabilities from MediaFirst.

MediaKind solutions can be deployed for either on-premises, cloud or hybrid scenarios.

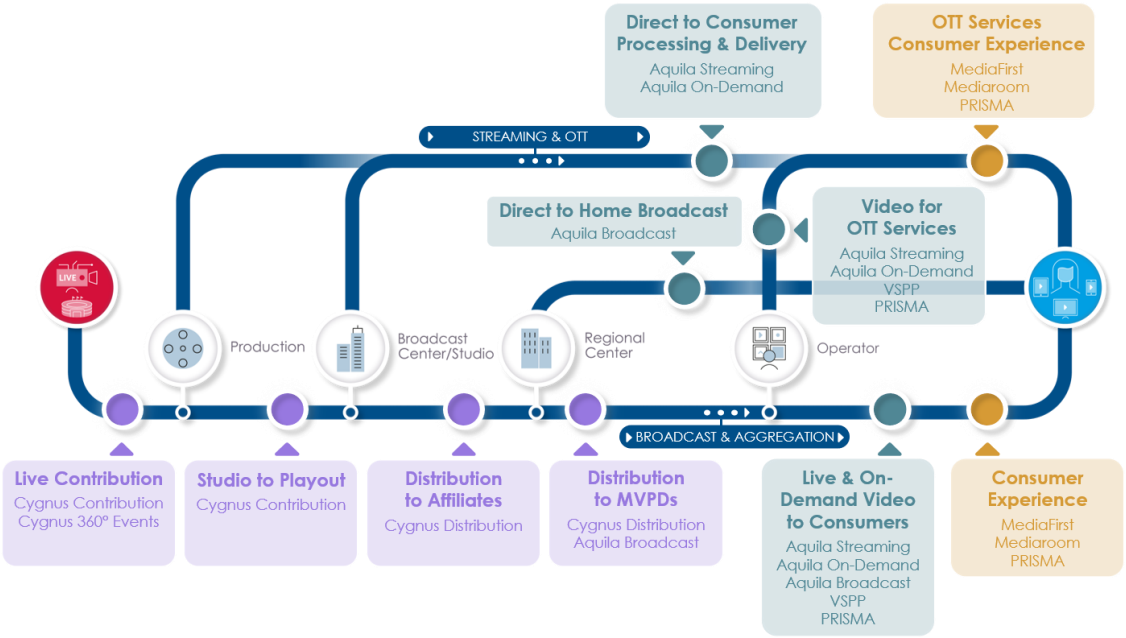


Figure 5: MediaKind End to End Solutions

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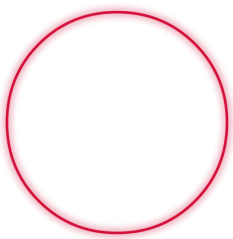

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