HYBRID CDN

The new strategy for broadcasters to improve profitability and customer experience of OTT services

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CDN ECONOMICS

A staggering 337,000 Petabytes of video was delivered via CDNs in 2016, representing 67% of total consumer video traffic. By 2021, the forecast is that CDNs will carry 1,470,000 Petabytes (440% growth vs. 2016), representing 77% of total consumer video traffic.

This rapid growth is driven by increasing content consumption on IP-connected devices over broadband or mobile networks. What we today call OTT (Over The Top).

Video on demand (VOD) is currently the dominant form of consumption and represents 90% of the traffic. But Live content is growing as audiences for large events switch to OTT with improved mobile viewing experiences. This summer's FIFA World Cup was another great example of how much people want to use OTT services. It would not be a surprise if the 2021 forecast of 1,470,000 Petabytes is on the low-side.

CDN costs for OTT delivery are increasing rapidly with this traffic growth, which is a growing concern to broadcasters. This cost-line adds to the existing broadcasting costs that need to be maintained. Business profitability is therefore under pressure.

Happily, commercial broadcasters are finding that the average OTT viewer is more valuable to them than the average OTA (Over The Air) viewer. Greater knowledge of the consumer is opening up addressable advertizing opportunities. And the ability in the OTT environment to place more ads and have more flexibility in the viewing experience is increasing the value of the OTT viewer even further.

But there is also an OTT customer experience dilemma facing broadcasters, which is primarily that "Live OTT does not mean live". IP network bottlenecks and delays, client and player latencies, and the "retry model" for IP delivery all create customer experience differences when compared with the traditional OTA experience. In addition, the difficulty of synchronizing signals between devices is a step backwards from the OTA experience. As the viewing of Live OTT content grows, this problem becomes more serious. Various problems made headline news during the FIFA World Cup and during the start of the European football season. Broadcasters are now highly sensitized to these issues.

Perhaps one of the most challenging issues is that OTT delivery uses a network environment that is outside of the control of the broadcaster and content owner. This "black-box" model is proving to be a concern to broadcasters who are struggling to deeply understand the customer experience of their most valuable viewers.

We are still in the early phases of the OTT revolution. But the economics of the industry are moving faster than predicted, and as this paper will show, the time for broadcasters to take greater control of their economic destiny has arrived.

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Broadcasting has a long history of technological advances. Today the industry is in the midst of a seismic shift as it feels the full impact of IP and Mobile technologies. It's worth taking a quick look back at where we've come from as we look to the future.

National broadcasters' OTA networks have been upgraded and tuned over many decades, and provide the best possible quality of delivery to TVs in terms of latency and synchronization between devices. Over the past 20 years, these networks have been upgraded from analogue to digital and then repacked into a smaller part of the UHF spectrum. There is ongoing pressure for the remaining spectrum to be re-allocated for mobile bandwidth in order to support mobile applications, autonomous vehicles and the Internet of Things (IoT).

In the 100 years since the first broadcasts were aired, the ownership of the broadcast network by the broadcast company has not fundamentally changed. However, the last 25 years have seen the arrival of the cable TV service, the satellite TV service and the IPTV service. All of the above have carried the channels supplied by broadcasters, while new media companies emerged to provide new channels.

The transition to OTT-TV has been underway since the introduction of the internet, but the advances in mobile and broadband technology of the last 5-10 years have accelerated the transition.

The early years of OTT-TV have witnessed the fast growth of CDNs. CDN's have enabled content providers, like broadcasters, to deliver content efficiently to internet-enabled mobile devices.

Today the migration to OTT-TV is well-founded. Some analysts are projecting that OTT viewing will surpass OTA in the next 5 years (see page 6).

As that time approaches the conundrum for the broadcaster is how to manage the range of delivery networks that are required to reach their audience.

The OTA network will probably continue to enable content to reach the maximum number of people. But dense populations in cities provide a clear opportunity to use a focused CDN-based delivery model to reach a very large percentage of any population who will be able to leverage fast IP-networks to access content services.

The ownership of the CDN-based delivery model starts to matter to Broadcasters as we approach OTT as the norm. Who controls getting your content to your audience?

Even if the control issue is not paramount for your business, what about the economics? Just like owning your own OTA network, or a cable TV company owning its own QAM network, at what point should you consider owning your own CDN?

CDN COST-DRIVERS

CDN traffic drives CDN cost. Traffic is driven by three components - volume of data, video bit-rate and number of package types. All affect bandwidth usage, which is the currency of public CDN usage. But what drives the most cost?

Volume of Traffic

Traffic is the primary driver of CDN costs and is why broadcasters' costs are increasing dramatically and will continue to do so. Conviva reported that OTT streaming doubled to 12.6bn hours in only one year from 2016-2017. Industry forecasts (next page) show how early we are in the OTT lifecycle and point us towards ongoing cost increases for CDN-based delivery.

Multiple bit-rates

Streaming content to multiple types of devices requires the delivery of multiple bit-rates. A typical "bouquet" of streams contains 4-6 bit-rates for SD and HD channels that support multiple screen sizes. If a "normal" frame-rate is used (24/25/30) then the bouquet of streams is typically 10mbps. If a high frame-rate is used (48/50/60), this increases by 1.5x to about 15mbps. Utilizing different codecs can reduce the bit-rate of a stream to provide some efficiencies.

Multiple packages

To deliver content to Android, Apple and Microsoft platforms the CDN has to deliver three separate bouquets per channel, tripling the traffic. The CDN typically has to transport all of the streams from an Origin to an Edge cache because the Edge must serve the full range of devices.

The current movement towards using the CMAF standard and packaging at the edge will reduce the number of streams that need to traverse the CDN, and minimize network bandwidth usage. However, this does not reduce the egress from the CDN's edge caches which means that CDN services priced on GBs of egress will not automatically cost less when CMAF is implemented.

Managing the Cost Drivers

Reducing the bit-rate and packaging at the edge can improve network efficiency, and reduce cost slightly. But the dramatic reduction in bandwidth utilization, and therefore cost is only achieved by significantly reducing the traffic that traverses the network.

The only way to stream more video to a growing audience and simultaneously reduce network traffic is to introduce a private cache layer within the CDN architecture. This is the primary way to control CDN costs.

Before we look at a cost example of a Hybrid CDN, let's look at why the Hybrid CDN model is going to be so financially important to Broadcasters.

EXPECT THE EXABYTES!

The view from leading analysts is that OTT growth is happening faster than previously expected. Broadcasters need to be prepared for what this means.

Cisco's 2017 Visual Networking Index (VNI) takes the actual quantity of video delivered over the internet in 2016 and predicts the results for 2021. The table shows the exponential scale of the increase in all global regions. Concurrent's view of these trends is that the 2026 forecast will continue the exponential growth projection as more OTA traffic switches to OTT.

Level 3, Streaming Media and **Unisphere** reported in the 3rd annual OTT Trends report that Live OTT viewership is expected to exceed TV (OTA) viewership by 2020. This opinion was given by 70% of the 500 media industry professionals interviewed.

Deutsche Bank produced a related analysis in late 2017, using Cisco's 2017 VNI data. The headline was by 2021 CDN-based delivery would be cheaper than Satellite-based delivery for 85% of 6,700 European TV channels (those with 250,000 or fewer viewers). This analysis was based on expected reductions in CDN pricing and the expected telco network improvements.

These three pieces of analysis point to a major shift from OTA to OTT in the 2021 time-frame. While consumer behaviours push the industry to move to OTT, and telco and mobile network improvements enable the OTT services to grow, there are also reasons why leading broadcasters want to proactively move towards an OTT model for the majority of their content delivery.

GROWTH IS EXPECTED IN ALL PARTS OF THE WORLD
Exabytes of OTT Video
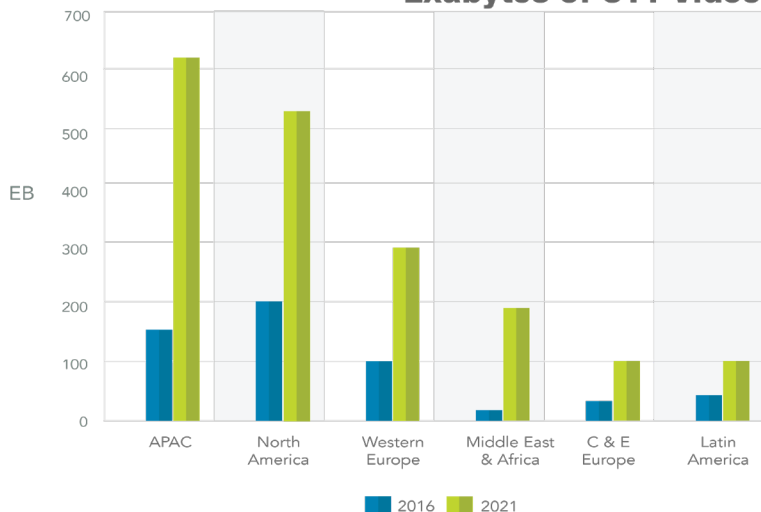
	2016	2021
OTT	350EB	1400EB
STB	150EB	500EB
Totals	500EB	1900EB

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A BROADCASTER PRESPECTIVE

In addition to consumer choice and network improvements driving OTT growth, our conversations with leading Broadcasters highlight three other drivers that we expect will accelerate the growth of OTT.

1. Spectrum reduction

The growing demand for 5G, IoT and autonomous vehicles creates pressure on broadcast spectrum. In Europe, the 700MHz band is being cleared out for mobile use, while the industry is promoting the use of the DVB-T2 broadcast standard to make more efficient use of the remaining bandwidth. In the USA, the ATSC 3.0 standard is doing the same. Broadcast channels must be repacked into the remaining bandwidth. This large investment in the broadcast network, in the face of the consumer shift to OTT consumption, is forcing a review of near-term economic viability.

2. Higher revenues & brand awareness

OTT offers commercial broadcasters more lucrative advertising revenue streams and gives public broadcasters more effective promotional activity because the OTT environment enables addressable advertizing and promotion to an individual. It is also easier to personalize, giving a better viewer experience. These two factors offer a big win-win-win opportunity to broadcasters, advertisers and consumers in the OTT environment when compared to the current OTA environment.

3. Network costs

With more OTT viewing, and less OTA viewing, it makes economic sense to reduce the investment in the Broadcast network and increase investment in the CDN. To continue to support a full broadcast network and add the cost of the OTT network on top is expensive. It is likely that both networks will co-exist for many years to come, but the relative sizes and importance are changing. If the majority of content delivery is to major metropolitan areas (which OTT generally is) and the viewing population is shifting to OTT (which is forecast), the broadcaster's network infrastructure strategy should adjust accordingly.

So what should that network strategy be? Leading broadcasters have realized that they need to look closely at how their content is distributed OTT, to ensure quality of consumer experience and return on advertiser investment. They are also pushing for "OTA-quality parity" to ensure that the OTT experience is compelling to consumers. Today there are some important blockers, such as low latency and cross-device synchronization.

To address the quality and cost requirements, the concept of a Hybrid CDN is evolving quickly for Broadcasters that are reaching greater scale with their OTT services.

WHAT IS A HYBRID CDN?

A Hybrid CDN uses a combination of public and private infrastructure. It is a middle-ground between using a 100% outsourced CDN and having a fully owned-and-operated CDN. It provides a new way for broadcasters to achieve significant cost control and OTA-quality parity for OTT services.

The diagram below shows the basic Hybrid CDN infrastructure, comprised of 6 basic elements - storage, transcoding, packaging & origination, network, caches and ISP connectivity.

The two key benefits of the Private Cache path shown below are 1) cost reduction and 2) service improvement.
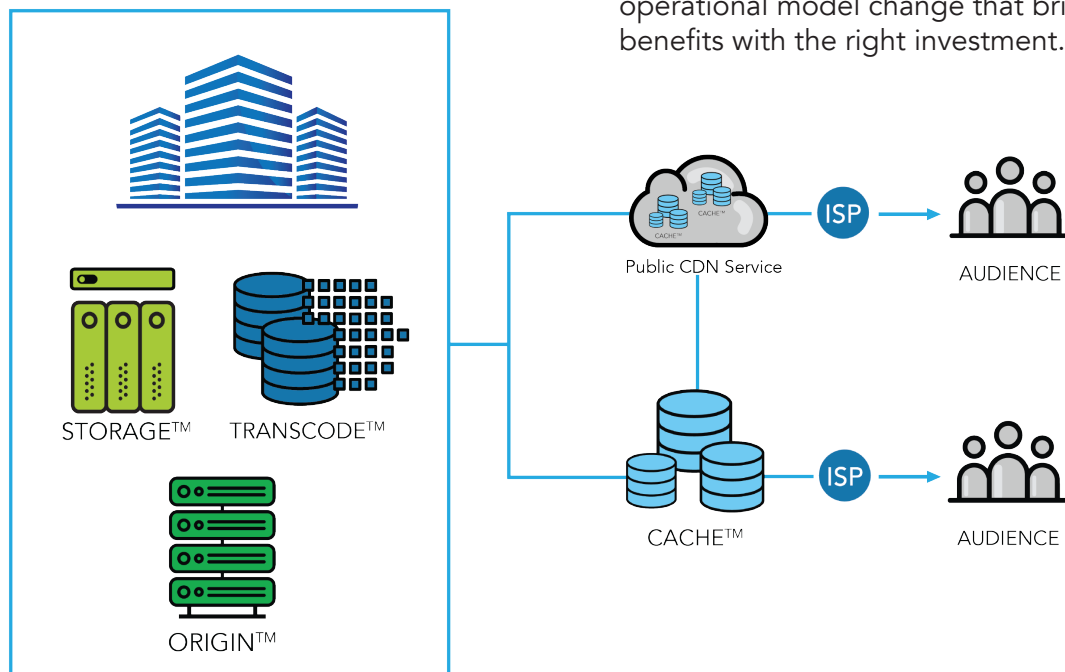
Cost reduction is achieved by a different economic model when investing in Private Cache capacity instead of paying for GBs of Egress from a CDN Service. The former can achieve true economies of scale.

Service improvement is achieved by being able to control the end to end content delivery service from content origination to content caching and session control. By managing the storage, transcoding, origin and cache, with a managed network connection in between, there are benefits from using CMAF, from packaging at the edge, from controlling what is cached where, and from directly managing the interaction between the consumer's player and the cache to achieve low latency and synchronization.

The Public CDN path can provide reach and redundancy. Depending on the scale of the OTT service, this is also possible with flexible Private Cache models.

A Hybrid CDN is not a giant technological leap forwards for broadcasters. It is a relatively simple operational model change that brings significant benefits with the right investment.

STORAGE™   TRANSCODE™

ORIGIN™

Public CDN Service

ISP → AUDIENCE

CACHE™

ISP → AUDIENCE

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THE CASE FOR HYBRID CDN

The business case for a Hybrid CDN model is normally very compelling. Concurrent's models typically show a pure cost reduction of 30-50% over 3-5 years. But the ability to directly control the customer experience of the end-to-end OTT service and achieve key features like lower latency and cross-device synchronization, together provide financial benefits far beyond the easy-to-quantify cost savings.
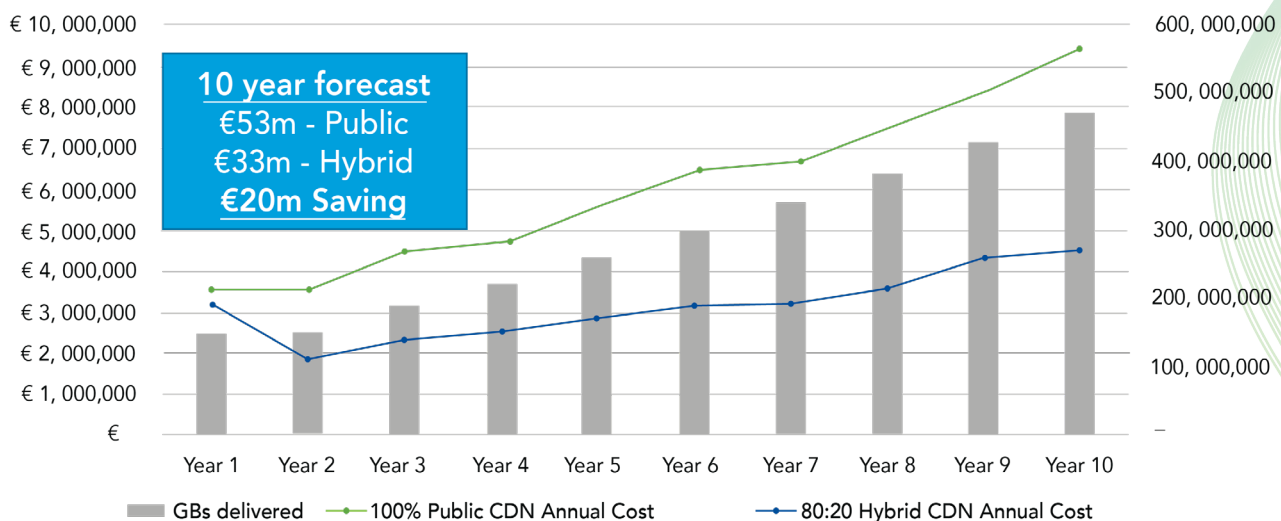
Each business case is different. Each broadcaster has different audiences, viewing patterns, network topologies, and commercial relationships with ISPs. Most broadcasters are primarily concerned about national audiences, and each country has its own set of factors, from regulatory frameworks to population distribution.

While there are differences in each model, there are also many common components. Concurrent analyses the following with customers to build the business case:

• OTT viewing patterns by Month/Week/Day
• Viewing pattern by Audience location
• The proportion of VOD vs. Live content
• The 3-5 year forecasts for total traffic and content library size
• Requirements for time-shifted viewing services (e.g. catch-up, restart, live pause)
• Required bit-rates and package types
• Number and location of ISP nodes
• And more…

With such significant business results at stake, modelling the financial impact of a Hybrid CDN model is critical for defining a broadcaster's short-term and long-term OTT strategy. In most models, the 5-year cost saving for a broadcaster's OTT service is well over €10m, and often significantly more. This large impact, even with a relatively small OTT audience, is achieved through the new economic paradigm of the Private Cache model.

10 year CDN Cost Forecast
Based on actual seasonality for VOD and Live OTT content

10 year forecast
€53m - Public
€33m - Hybrid
€20m Saving

Legend: GBs delivered | 100% Public CDN Annual Cost | 80:20 Hybrid CDN Annual Cost

ROLL CAMERAS!

All signs point to OTT delivery becoming the lead actor in the Broadcaster content delivery model.

As mentioned in this paper, Deutsche Bank's analysis shows that CDN-based delivery is more cost effective than Satellite-based delivery for channels with about 250,000 viewers or less. Concurrent's analysis goes a step further to show that, at this same level, a Hybrid CDN model has 30-50% lower total cost of ownership than a 100% Public CDN model.

Looking longer-term we need to imagine what this means when OTT audience sizes double, triple, and quadruple. According to Cisco's report, this is likely to be 3-4 years away. What about 5-10 years from now when broadcast spectrum is likely reduced, telco and mobile networks have improved, and IP-connected devices are the norm?

The economics are clear: Hybrid CDN is the way forward for Broadcasters in need of cost-optimized OTT delivery. But it is also required to achieve broadcast-quality viewing experiences.

We're only at the beginning of this very fast industry evolution, and already the concept of a Hybrid CDN with private caches is commercially attractive. So, to coin a famous phrase in our industry: "Lights, cameras, action: Hybrid CDN, take one!"

Concurrent's experience building **CDN solutions** for over 2 decades, with a portfolio including **storage, transcoding, origination** and **caching,** is available for Broadcasters now.

Software-defined solutions that are Flexible, Scalable and Affordable
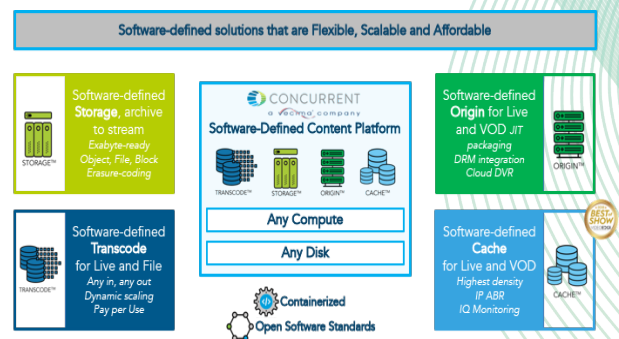
To develop your Hybrid CDN business case contact Concurrent
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