CONTENT DELIVERY NETWORKS: TO BUILD OR BUY

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OTT competition is compelling telcos to reappraise whether to build or buy the content delivery network – or adopt a hybrid public / private or managed model.

Adrian Pennington

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ervice providers are facing a multitude of network challenges that hinder their ability to stay competitive. Foremost among these is a rigid service delivery infrastructure and operating costs that seldom align with revenue. Compounding those problems, network operations are increasingly complex and expensive to maintain, driving up total cost of ownership (TCO).

By contrast the rising ubiquity of smartphones and high speed Internet access have launched a new breed of company - Netflix, Facebook, Amazon, Skype - providing services running OTT without having to invest in underlying infrastructure and instead embracing virtualization and cloud-based architectures.

This approach, argues infrastructure platform vendor VMWare, has allowed OTT players to be much more innovative and agile, while at the same time providing personalized services but a telco’s hardware-based infrastructure and associated long development cycles prevents them from responding on an equal footing.

This is beginning to change. Traditionally, operators haven’t troubled themselves with specific applications such as the specifics of Content Delivery serving. However, as a video has become a larger and larger element of the traffic on their networks - and as such the value that those networks offer rises - they have started to bring the capability in-house to optimise the CDN within their own networks. "Technically, there is very little difference between running an IPTV network within a telecoms infrastructure (where the content may be originated specifically for the operator’s subscribers alone) and taking a feed from an external origin (where the content may be accessed over their network but paid for through an OTT paywall and not exclusively made available to the operators subscribers),” says Dominic Robinson, Co-Founder and Director at IDaaS which offers consultancy on virtualised video workflows.

Akamai, Level 3, Limelight and other ‘pureplay’ CDNs can deliver content between a publisher and other points of origin to a telco’s own internal CDN and on occasion these pureplay providers may also license their proxy technology to the operators for use within their networks.

According to Robinson, as the technology required for serving / proxying such video around networks has become much more commoditised on HTTP operators “are becoming much less averse to ‘rolling their own’ technology stacks which are more tightly aligned to their own development tracks and requirements than to the development path defined by the pureplay CDNs”

"There are many factors that come into play when operators make decisions about how to deliver content they own or license. Every operator has its own set of requirements, cost objectives, operational models, desired mix of services, and other parameters to consider. Ideally the operator should not have to choose one model or the other. What we’ve found is that many operators start by delivering their content from a ‘public’ CDN such as Akamai Intelligent Platform, then as the scale of operations requires it, eventually migrate to their own ‘private’ or ‘operator’ CDN,” informs Jonathan Zarkower, Senior Manager, Product Marketing, Akamai.

It’s one of the reasons why Akamai offers licensed and managed operator CDN solutions, in addition to delivery from its global platform. "We’ve also seen several instances where operators use a combination of public and operator CDN resources. This hybrid approach offers the best combination of quality, reliability, and cost, and lets them easily shift delivery between their own CDN and the public CDN as needed.

In the case of a licensed CDN, the operator purchases both the hardware and software, and then also pays the OpEx, including any additional support or maintenance costs from the vendor. One of the challenges here is developing and maintaining the in-house organization and expertise required to successfully deploy and manage the solution, keeping in mind that the CDN is only one component of a broader video delivery ecosystem.

“Even if the operator has a couple of years of experience and proven success in this regard, we can provide a lot of the support needed during the operator’s ramp-up period until gradually, the operator assumes more of the responsibility,” says Zarkower.

In the case of a managed CDN, while the operator incurs some up-front CapEx most of the responsibility for deploying and managing the solution falls to the vendor. This makes it faster and easier for the operator to get started and operators who don’t have the in-house resources or expertise needed to operate a CDN themselves, tend to favor the managed approach.

So, while the managed approach is more OpEx intensive, it also tends to be simpler, which some operators find more appealing. While all CDNs differ, they all share common traits. The primary differences fall into a couple of different categories, the first of which is shared vs. dedicated resources. In the case of delivery from a public CDN, resources are shared amongst the customers using that CDN provider, whereas in a private CDN resources are dedicated to one customer, the operator.

The second category is location. With a public CDN, delivery is from wherever the CDN provider has footprint. Sometimes those data centres are in optimal locations and sometimes they’re not. With a private, or operator CDN, the operator gets to decide where to locate CDN nodes and how to best map content to those nodes.

What these categories boil down to is control. “With some public CDNs, the operator can find themselves with less control over resource allocation and location,” says Zarkower. “With a private CDN, the operator has total control which tends to have a positive effect on quality of experience and OpEx.”

Controlling bandwidth is crucial with large formats, contents virtualized server vendor Edgeware. It argues that when using a traditional CDN, the cost rises in direct proportion to the bandwidth used. In other words, they don’t offer a great economy of scale. For large scale content delivery, it is much more cost-efficient to build a dedicated CDN, it claims. Edgeware uses the term TV CDN. Using a layered network design allows each function to scale in the most optimal way – from content management that needs to support large volumes of TV assets, to personalized TV streaming that needs to scale to huge numbers of viewers.

Netflix is a great proponent of this DIY approach – it solved problems of scale by building its own CDN for TV delivery. “And the same is true for lots of our customers,” says Richard Brandon, CMO (these include AT&T, KPN (Holland), Proximus (Belgium), Telia (Sweden) and Cincinnati Bell).

Ericsson is making a similar case for its Unified Delivery Network (UDN), a solution connecting content providers with the last mile reach of service providers for content delivery in partnership with service providers including Hutchison Global Communications, Telstra, AIS, and Vodafone.
"Most notable operators have already built or bought their own CDN over the years," says Yves Boudreau, Head of Ecosystem and Partnerships, UDN, Ericsson. "Primarily this was used to deliver their own traffic. However, some have started wholesaling some capacity to select content providers. The major limitation to this approach is simple: even the largest of operators still only operate in one or a few countries: they aren’t truly global. There are some exceptions to this rule, but most service providers are at best national. Content and application providers demand global coverage. Ericsson UDN is a unique partnership model that tries to address this problem - operators can pool their assets and resources together to create a global platform deep in the operators’ network to deliver higher quality and better performance."

Edge computing, which is still a relatively new concept, may actually take this a step further, since it has the potential to give operators even more control over more services. Operators are looking hard at edge computing initiatives such as ON Labs’ Central Infrastructure Project (TIP) and Facebook’s Telecom initiatives such as ON.Labs’ Central Control over more services. Operators anticipate capex and cumulative incremental gains. SDNs are an architectural principle that provides decoupling of control and data plane to increase operational efficiency and to dynamically adapt to changing business needs. In simple terms, states analyst firm Gartner, NFV brings the cloud to the network, while SDN brings the network to the cloud. The analyst reports that communications service providers migrating to virtualized infrastructure anticipate capex reductions of 40% and also expect Opex reductions to be in the region of 60%.

It is possible to virtualise servers that are physically distributed (Edgeware’s solution allows for this) but the benefits decrease, he says. So, the optimum architecture uses virtualised IT resources for control functions and distributed ones to scale the heavy lifting. It is how Netflix scales their application services (or microservices ‘functions’) to areas within the network that they are actually being required, and to scale down services that are underutilised. This in turn allows upgrades and new services to be deployed to market much quicker. The way to scale TV delivery through the CDN is to distribute certain functions but still to take advantage of virtualised infrastructure for central functions like request routing or creating a live-to-VoD library at the origin," he says. "It is possible to run the caching and streaming centrally for low volumes of traffic, which might be a good way to start for smaller companies or trials, but to deliver ‘TV scale’ you need a different architecture - one that leverages virtualisation where it makes sense, and distributes heavy lifting functions nearer to the viewer, to eliminate buffering, delays and glitches.”

Virtualised CDNs (much like any virtualized or containerized application) can make more efficient use of underlying hardware and operating system resources to bring additional economies of scale. The benefit of virtualisation is usually measured in:

- **Savings:** When network resources are released from a particular purpose and made available for other applications

- **Service Velocity benefits:** Operators can roll out new services very quickly and capture market share or avoid churn.

- **Disaster recovery:** Because it becomes much easier to deploy services a failed virtual service can be replaced instantly and this allows an operator to keep its SLA higher and offer much better value with controlled costs.

“Virtualisation for the sake of a single application is often not worthwhile,” advises Robinson. "However, if the requirement for that application server to be used varies with time, then virtualisation can be an excellent way to manage change within a large network.”

For this reason, as technology refreshes are happening in the telco, more and more operators are exploring virtualisation as a means to scale up and scale down services. Robinson says, “Once the migration to virtualisation has been undertaken then it becomes much faster to deploy application services (or microservices / functions) to areas within the network that they are actually being required, and to scale down services that are underutilised. This in turn allows upgrades and new services to be deployed to market much quicker.”

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Orchestrating change

Operators have been managing networks since the dawn of time. It’s what they do to make phone service, internet and television services have more reliability. When it comes to managing web scale architectures, they may have less expertise.

“This is something that the larger operators have addressed by developing and hiring to improve over the years,” reports Boudreau. “That said, not all telecom vendors have adapted their applications to run in web scale environments either.”

While there is some risk associated with taking on the deployment and management of any technology where in-house expertise doesn’t already exist, Akamai’s Zarkower suggests there may be more risk in not investing in technology and solutions that will help reduce costs while enabling much higher quality video services at scale in an increasingly competitive video services market.

“This is why we believe that most operators are best-served by starting with delivery from a public CDN, which will expose them to the basic benefits of CDN technology; then transitioning gradually to a model where they can operate it themselves,” he says. “For that reason, we think operators should strongly consider working with vendors who offer a variety of models, rather than vendors who provide a limited range of choices.”

The biggest challenges may be cultural. “Some executives over 50 years old simply don’t get the idea of a big slow moving telco being able to adapt its capabilities and commercial offerings at a whim,” suggests Robinson. “Some might cite security as a principle challenge, but this is nonsense in the context of a private network: Virtualisation is no more or less secure than a pre-virtualised model in practice.”

The problem has been that they could not ‘change’ what they were orchestrating, he says, without rolling trucks and re-racking hardware. “Telco network operations centre will hardly look any different once they have migrated to virtualisation, but when they want to replace a failed service they can act, rather than calling their field support teams and waiting,” he says. “There is no risk provided they adopt a sensible migration strategy, and virtualisation can be rolled out progressively without any service interruption of the traditional network too, until the traditional network simply becomes too costly or cumbersome to run and is deprecated completely.”

He says the biggest change that telcos need to make is in moving from a ‘waterfall’ type of project management style to a ‘devops’ approach. “This is something that telcos find incredibly difficult because of the wide number of fiefdoms that are fiercely protected within their traditional management structures.”

Perhaps the best strategy is to begin by taking a top-down approach, which starts with understanding and defining the services they want to offer over time, then deciding which operator CDN approach – managed or licensed – best meets the cost objectives, operational models, anticipated traffic volume, and other parameters.

Akamai suggests the next step would be to engage vendors with a track record of offering private CDN solutions, “but who can also demonstrate how their solutions will evolve as service infrastructure evolves.” More specifically, operators should seek vendors and solutions that are future-proof – that is, aligned with emerging trends such as SDN, NFV, edge computing, best-of-breed orchestration solutions.

While investment will vary from operator to operator Boudreau argues that a partnership model with an existing global CDN or joining a partnership program like UDN may be a better fit. Build, versus buy versus partner is a very complicated decision based on who you are, your current situation and how much you’re willing/able to invest.

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