



Special Delivery

The exponential growth of video traffic is placing additional demands on carrier and service provider networks. Recent acquisitions and alliances suggest the demand for OTT-delivered content will only continue to rise. How will the different elements in the online video delivery chain develop to meet customer requirements and expectations? What lies ahead for Content Delivery Networks? Colin Mann investigates.

The growing demand for video content is redefining the relationships between players in the online video delivery chain. Can service providers leverage their assets such as access networks to become Content Delivery Networks (CDNs) in their own right, or will the distinction between ISPs, telcos, CDNs and online delivery platforms remain, and what role will partnerships with content owners play?

According to Alex Gibbons, VP, Northern Europe, Akamai, much of this depends on the geography, user base and content type, and he notes that Akamai has been partnering with ISPs for over a decade to deliver its customers' content all around the world. "But in certain countries where one network may be dominant in terms of eyeball traffic, we can and do also create special in-country



"CDN is an old term used by newer dumb-delivery companies to take advantage of the high-profile video delivery business."
ALEX GIBBONS,
AKAMAI

relationships with our ISP partners to create a CDN/Telco hybrid for the benefit of us, them, the Content Providers and of course Users," he advises. "There are many benefits of this technically and commercially, but one of the primary benefits is the Content Providers having continual access to our ever-developing feature roadmap, in addition to reaching all users at the best scale and quality."

Paul Larbey, general manager of Velocix, notes that as digital media becomes the primary driver for service demand and network utilisation, this is inevitably impacting established business models. "Content delivery has become the *de facto* core business for network providers, whether they realise it or not. Nowhere is the cost more significant than for Service Providers whose costs keep rising as more and more video content is dumped onto their networks. This traffic is primarily sourced from off-net CDNs, typically from servers located at a few, centralised peering points," he advises. **ON-NET.** "This is why Service Provider CDNs open the door to a new era of online and 'on-net' video and rich-media services. 'On-net' CDN technology manages and preserves the quality of video content during

its entire delivery – a crucial requirement necessary to monetise the inherent value of the content and build brand equity." He suggests that by cutting out the middlemen (the off-net CDNs), content providers can work with the delivery men (the service provider's on-net CDN) creating a business for the Service Provider in selling bandwidth or retailing content over on-net CDNs; providing a clear differentiated service for content providers and enabling the Service Provider to leverage the network strength and increase their service offering for customers.

Anshu Agarwal, head of product management, content and media business unit at Juniper Networks, suggests that some larger providers certainly have the desire and capability to enter the CDN business, but accepts that it's not for everyone. "There is a lot involved with being a full-fledged CDN. What we see is that many of our service provider customers are taking a pragmatic approach, and not jumping directly into the CDN game. For example, content delivery technologies such as transparent caching can be deployed within their network to reduce the impact over-the-top content has on their networks by intelligently caching popular content. This is an example of deploying



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ERICSSON

content delivery technology without getting into the CDN business. Many of these transparent caching platforms—such as Juniper’s Media Flow products—are also flexible enough to serve as the foundation of a CDN down the road,” she says.

John Williams, director emerging markets, JDSU, argues that CDNs are not just about sourcing content. “The big value, and where telcos are very well placed to succeed, is in providing a network delivery design that enables strategic placement of edge servers and dynamically balances demand loads between interconnects, public peers, private peers and backbones, thereby lowering costs,” he says, adding that various new partnerships and business models between content, service and/or network providers are in development. “They drive further differentiation, competition, innovation and investment

in networks and will keep telecoms an exciting domain for customers and suppliers,” he predicts.

FINAL LINK. Paul Stallard, head of systems management, solution area TV, Ericsson, believes that there is a place for operators to deploy their own CDNs. “We see this as a rapidly growing market and one that allows operators to simultaneously control the growth in traffic on their network and create a new revenue stream for wholesale content delivery,” he says. “Operator CDNs do not replace the global service CDNs, but allow the optimisations that those global CDNs provide at the transit layer of the Internet to be brought to the on-net core and access networks. With their own CDN in place, operators will partner directly with content providers, but we also expect them to partner with global and other operator CDNs (so-called CDN federation). As the owners of the final link to the content consumers, operators are in a unique position to enhance the quality of experience for video consumption and share the resulting revenue with those that are providing the service.”

Verivue’s chief scientist, Larry Peterson, feels that providers can absolutely leverage, and enhance, their existing infrastructure by

integrating CDN technology. “There are many different ways for service providers to utilise a CDN infrastructure and the best way to ensure success is to deploy a CDN solution that is extensible, that is able to support multiple services over a single infrastructure,” he recommends. With such a CDN in place, he suggests that Service Providers have the flexibility to create and deliver a myriad of service offerings such as delivery of their own content over multiple screens: partnering with content providers to deliver partner-owned content; Cache and manage OTT traffic; Cache and offload mobile data traffic, and provide the delivery mechanism for cloud-based services.

Pete Mastin, senior director of CDN engineering at Internap, feels that Service Providers are in the driving seat when it comes to the dynamics of the industry.



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JUNIPER NETWORKS

“They are ahead of where the telcos are,” he observes, suggesting that the telcos are some 18- to-24 months out from being able to offer CDN. “We have a competitive edge over the telcos,” he states.

FOOD CHAIN.

Similarly, Alex Dobrushin, chief marketing officer at Wowza Media Systems, observes that some global providers are making the move to become CDNs by taking advantage of their infrastructure, thereby gaining incremental revenue from it. “They don’t want to become a pipe for other operators, they want to move up the food chain. He sees a combination of arrangements. “Some will be licensees of CDNs, some will have a hybrid model. It boils down to the cost of delivery



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GANNON HALL, KIT DIGITAL

and whether it makes sense to own the network, or outsource.

Dave Stoner, president and CEO of ViewCast, suggests that there will be some third-party partnerships, and consolidation, driven by a move towards ease of use.

“Service providers have to make things easy for the ‘TV Everywhere’ generation,” he argues. “If you are an IPTV provider already, you will have pretty widespread capability; cable MSOs will partner with CDNs to get to market. That’s a likely acquisition path.”

Marty Roberts, VP, sales and marketing at thePlatform, notes a blurring of the distinction, with



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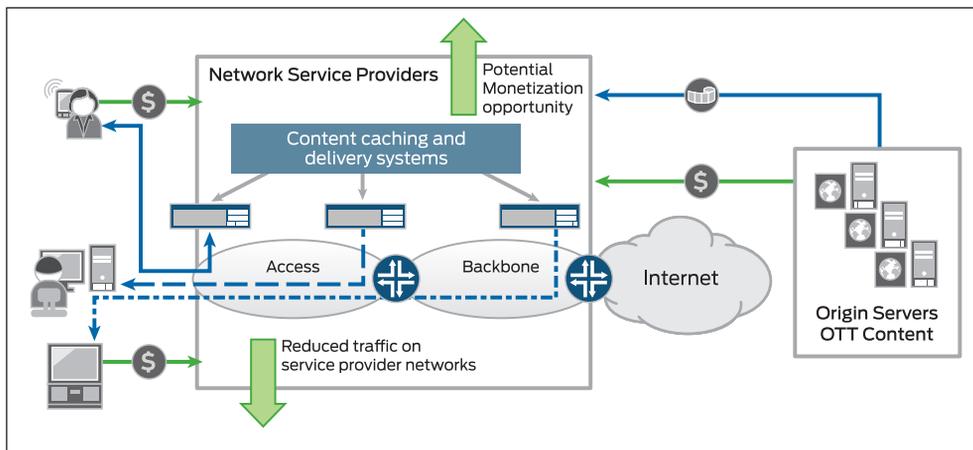
Deutsche Telekom providing CDNs for EdgeCast. He sees Service Providers implementing their own CDN, then scaling it beyond their own requirements. “This reduces transit fees for content coming from other nets; it’s something we’ll see more of over time.” Gannon Hall, EVP, global marketing, KIT digital, notes that all players are in the business of delivering bits over the Internet. “It’s inevitable we’ll encroach on each other’s turf,” he admits, suggesting that co-operation is essential. “We’d not exist if there were no CDNs,” he reasons. “There will remain a distinction, but it will continue to blur.”

VALUE CHAIN. Jean-Christophe Dessange, Cisco’s head of new media and IPTV Europe, reveals that some of the company’s customers are looking at becoming CDNs, either for their own purpose or retail. They want to step into the content value chain. He echoes ViewCast’s Stoner’s emphasis on the importance of delivering a TV-like experience across multiple screens, and accepts that not one size fits all, in terms of CDN solutions. He suggests that Service Providers will focus on their core asset, access, and in some instances, online delivery platforms will merge with CDNs, and that there will be some

partnerships. Mark Taylor, VP, content and media, Level 3 Communications, says that a Content Owner who wants broad distribution is best placed working with a larger player. “It’s a hard business and technology to master if you’re going to provide the quality expected by a company such as Netflix.” In terms of partnerships, he notes that there are examples of ISPs who have built CDNs on their networks where they have the rights to certain content. “We’ve helped out in some instances,” he says. “There’s no clear model. A lot depends on the economic case. We don’t see a significant change from where we are today,” he concludes.

Duncan Potter, chief marketing officer at Edgware, reveals that the company has some 20 to 30 opportunities with Tier 1 and Tier 2 telcos worldwide who are looking to develop their own CDN. “These could both complement and compete with existing operations. The other thing we’re seeing is that video is subject to more stringent QoS/QoE; the current crop [of telcos] are not in a position to guarantee that – even slightly,” he states.

COMMODITY SPACE. With Content Owners jealously guarding their content, yet seeking to monetise it, will they increasingly seek to deal directly with the consumer, or will there always remain a need for a CDN in between? Akamai’s Gibbons’ feeling is that Content Owners want to specialise in what they are good at – Content. “Most of the top global content brands then use Akamai to accelerate and optimise the delivery of their



product, which is what we specialise in,” he says. “I don’t see many Content Providers/Owners seeing the economic (let alone technical) feasibility of building something of Akamai’s scale and technical depth. Our job is

to make it quicker, better, faster and cheaper to deliver a high-quality experience to Users,” he explains.

James Segil, president, EdgeCast Networks, describes the CDN sector as a

commodity space. “You need high-levels of automation to be profitable,” he advises. He suggests that carriers, in the longer-term, want to own a CDN white label service. As such, the company licenses EdgeCast CDNs. “That’s a new division, we sell the software. Operators can set up their own CDN.” He points out that a federated approach enables CDNs to buy capacity from one another.

Velocix’s Larbey suggests that as CDNs move inside operators’ networks, operators will continue to offer different routes to market for content, either through a traditional CDN wholesale position, allowing content owners to buy bandwidth on their networks, or through the operators purchasing the



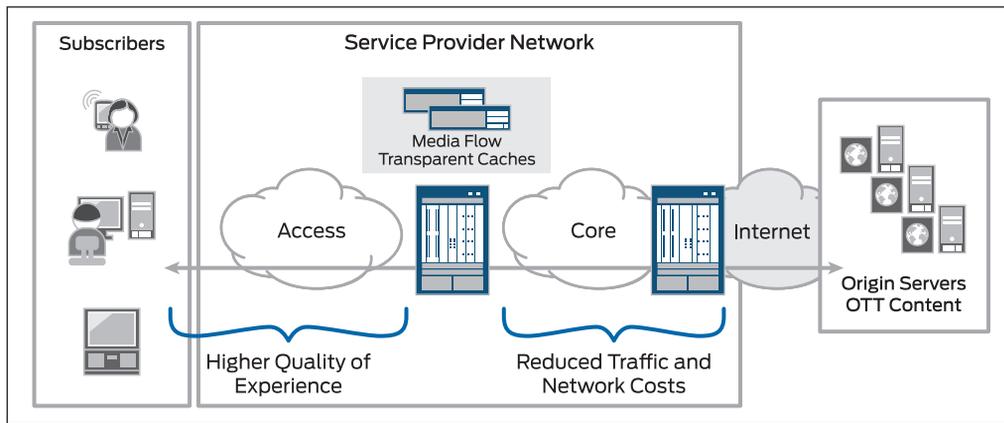
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LEVEL 3 COMMUNICATIONS

content and retailing it directly to their own subscribers under a branded service. “There will always be a need for a CDN to deliver the traffic, the difference being these will be the operators’ CDNs, not the off-net CDNs,” he says.

SCALE MODELS. Juniper Networks’ Agarwal advises that at the most basic level, CDNs address two fundamental challenges: scale and distribution. “CDNs help content owners distribute content globally, so a content owner doesn’t need to support all content requests from their own data centre (essentially adding scale); and distributing content closer to consumers helps improve quality of experience. As long as content owners have the need for scale and geographic distribution, the need for CDNs of some sort will remain. Who those CDNs are operated by is another question



Service Providers. Internap’s Mastin accepts that the Content Owner would prefer to communicate directly, but needs to optimise the delivery to the consumer, and for that reason, CDNs will continue to

- some of the largest content owners already distribute caches around the world, and many others are evaluating similar approaches. And, of course, many service providers are also deploying CDNs and caching technology.”

JDSU’s Williams accepts that Content Owners will want to deal directly with users in many cases, but notes they are also concerned about the quality of the programming they are delivering to end users. “There will therefore remain a need for a CDN,” he asserts, pointing out that a managed CDN will be able to deliver much better quality of experience than a simple over the public Internet flow. In practical terms, he points out that the demand curve for a new movie release has a huge peak in the first few days and then starts to trail off with a long tail. The initial peak can best be supported by a CDN that anticipates the load and caches content at the edges of the network. He also notes that Service Providers have key advantages that include well-engineered networks for delivery of premium quality video, long established relationships (especially for billing and technical support) that make it easier to make business (and generate revenue) with a large number of residential and business customers.

According to Ericsson’s Stallard, with very few exceptions, CDNs will always be part of the delivery chain. “To provide the necessary scalability and quality of experience, content needs to be served from servers distributed throughout the network. For all but the very largest content providers, it is not economically viable to provide that infrastructure themselves - instead they will continue to rely on CDNs (both global CDNs and operator-owned CDNs) to scale their delivery capacity,” he advises.

LARGE PLAYERS. Verivue’s Peterson suggests that Content Owners will continue to utilise CDNs to deliver their traffic to consumers, but predicts that the CDNs they utilise will shift from Global CDN providers to regional CDNs built and operated by

play a role, a view shared by his colleague, Pete Carmody, SVP, product management and business development. “Other than for really large players, the trend is to outsource,” he observes. “Our SLAs are among the best in the industry,” claims Mastin, “that’s why we invest in R&D to ensure we have the best router technology.”

“Very few Content Owners have their own streaming service,” notes thePlatform’s Roberts. “They’ll outsource to a CDN. It’s a specialist service,” he maintains, pointing out the importance of being able to offer adaptive bit rate protocols. “That’s complicated and that’s why you need a specialist CDN.”

“You need to take into account what infrastructure the Content Owner has at his disposal,” advises KIT digital’s Hall. “Are they looking to become network operators? Does it make sense economically? CDN is a commodity business – do you want to get into that market?” Cisco’s Dessange suggests that collaboration between Content Owners and network operators/service providers has been a key success in the past, citing the success of IPTV in France. “In OTT, there’s still a need for collaborations and partnerships,” he advises. Level 3’s Taylor suggests there are examples of ISPs who have built CDNs on their networks where they have the rights to certain content. “We’ve helped out in some instances.” Edgware’s Potter can definitely see Content Owners wanting to become CDNs, especially where they want direct influence on money flow. “The challenge is the operator providing more than best effort,” he warns.

MAJOR EVENTS. With the increased



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EDGEWARE

bandwidth demands, can CDNs scale to meet such needs, as well as ensuring delivery to multiple platforms and devices? According to Gibbons, it depends on the CDN, and claims that Akamai is the only Cloud Provider with the reach, scale, capacity, architecture and ISP/Telco partnerships to outperform any other Network. "Capacity is

not free, and nor is it infinite. Users are distributed. As we've seen with all the recent major events on the Internet, Akamai's HDNetwork and associated features ensures events like the Royal Wedding, Obama's inauguration, Michael Jackson's funeral, and the Osama Bin Laden operation can be delivered without the Internet 'breaking'," he advises.

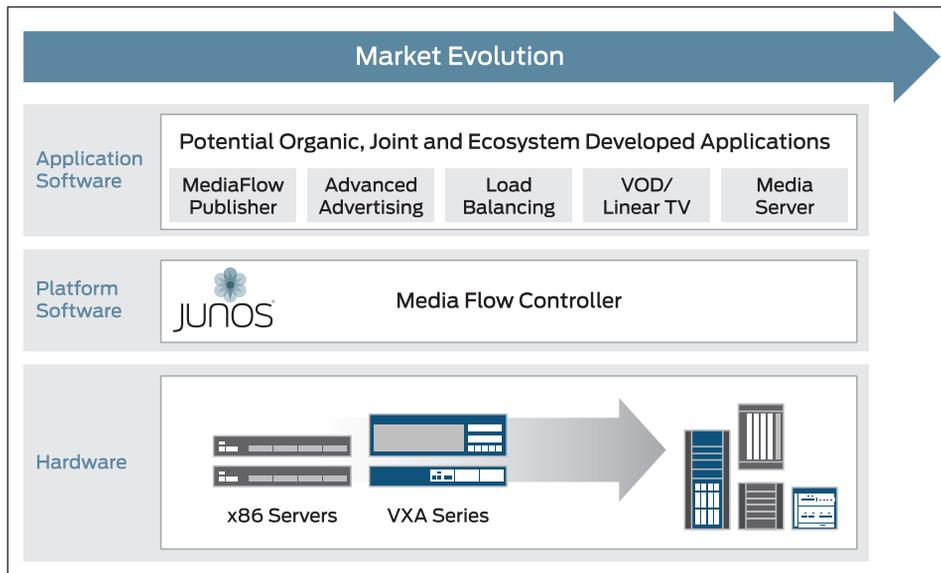


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INTERNAP

"The demands on the Internet grow exponentially when we see how the proliferation of connected devices add to the already growing PC/Laptop/Computer consumption. Akamai's HDNetwork already delivers to all the major run times, connected devices and OSs, and will continue to do so as we see that market develop," he says.

Williams contends that multiple end-devices can be supported and the telco provider is in the best position to offer that three-screen support where the user profile is known to the network and using IMS (IP Multi-media Sub-system) signalling video flows directed to the proper devices. Furthermore, he suggests that a new streaming protocol named DASH (Dynamic Adaptive Streaming over HTTP) just being defined, will become the common standard offering much improved quality of experience with better delivered quality over networks where available bandwidth changes. "This will be especially helpful for wireless access or mobile devices," he explains.

Larbey points out that CDNs are designed



to support and enhance an operator's network, and that without a CDN in place inside an operator's network, they will be challenged to handle economically the volume of content travelling across their networks. "An on-net CDN solution such as Velocix, can provide a single CDN solution capable of delivering all of the modern streaming protocols such as Flash, Apple live streaming, Microsoft smooth streaming, etcetera, to any IP device," he says.

FAST STREAM. "With modern streaming technologies utilising common web protocols such as HTTP, the range of devices that can receive the streams increases daily and due to their adaptive nature, these newer streaming technologies can provide one stream able to adapt to the connectivity of the device. So one stream can deliver to devices from android through to PCs by adapting to the bandwidth each receives; a PC connected to a high bandwidth connection could receive a HD stream, whereas the same stream would provide a lower bit rate stream for an iPhone connected to 3G," he explains.

Stallard argues that CDNs have to be scalable. "Designing a good CDN is all about designing for scalability. Moreover, as multiscreen delivery is becoming a must-have offering for operators, they do not want and cannot afford to deploy separate infrastructures for separate devices or content types. The successful CDN solutions will be those that can address all content types, to all device types, and in a way that can continue to scale with each operator's needs. These are the requirements that underpin Ericsson's Media Delivery Network, a media-centric CDN solution aimed at operators who want to deploy their own CDN," he says.

Peterson suggests that the ability for a CDN to scale varies from vendor to vendor, which he describes as a vitally important

point of differentiation. "For a truly scalable infrastructure, Service Providers must look for a CDN solution that features a caching infrastructure built on commercial-off-the-shelf hardware (COTS) and caching capacity and delivery performance that expands linearly with the addition of

nodes," he recommends. "These nodes are then able to access aggregate bandwidth and storage resources without the expense or complexity of external load balancers. Additionally, each node in a clustered cache is capable of serving every file in the CDN. This avoids the hot-spotting and content replication problems of previous-generation CDN technologies when faced with flash crowds and a highly popular content."

PROGRESS REPORT. Mastin has no fears surrounding scalability and multiple device delivery. "We can offer transparency to whatever device, as well as transcoding live as a service," he advises, with Carmody adding that Internap buys bandwidth and then optimises accordingly. "We've been seeing some really good progress with scalability," claims Roberts. Gibbons, points out the challenges of live events, suggesting that there were in fact outages during coverage of the Obama inauguration, he says that other events were handled "much more gracefully", such as the Royal Wedding, *American Idol* and the Superbowl. "It's a case of taking advantage of capacity where it lies," he advises.

Dessange suggests that pushing from the edge will help address issues of scalability. "You can scale live distribution by using multicast rather than unicast," he says, adding that CDNs should intelligently manage and dynamically push relevant content. According to Taylor, there are only three or four players who can scale. "It's a capital-intensive business; we're deploying thousands of servers throughout the world, for instance. Our customers expect delivery to new formats and functionality," he admits, revealing that Level 3 managed to provision for the iPad launch in just three weeks. "It's the nature of the business; whatever the next device is, we have to react. There's no sign of consolidation as a platform or protocol."

Potter reveals that some operator customers decided against provisioning for scalability but were forced to come back to Edgware. “Their opex was equalling their capex,” he reports. He recommends a high degree of scalability at the edge, and building in the ability to move rapidly between devices. “Certain aspects lend themselves to cloud computing, such as transcoding,” he advises. “I think you’ll see a move by the major encoding manufacturers to cloud computing. That will ease the burden of multiple devices and reduce time for the preparation of assets for multiple devices.”

CLOUD COMPUTING. Gibbons asserts that Akamai has been a Cloud Services provider since Day One. “Our customers have been moving their Enterprise (b2b) apps, Commerce and Media (b2b and b2c) apps and video, and business logic processing out onto our intelligent Internet platform for over a decade. CDN is an old term now used by newer dumb-delivery companies to take advantage of the high-profile



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video delivery business,” he declares.

“Often times when people are talking about ‘the Cloud’ they leave out the most important aspect – the cloud or the Internet itself! The basic concept of taking an application from your own data centre and moving it to a shared data centre running a bunch of VMs is not really taking advantage of Cloud Services,” he says.

“That simplified reality of how others are positioning cloud offerings misses out huge chunks of the important considerations like security, interoperability, scale, distribution, performance and reporting. Utility based services for the Enterprise, Media, Commerce and Security stack are best delivered in an intelligent and distributed fashion,” he recommends.

MUTUALLY SUPPORTIVE. Williams sees things slightly differently, suggesting that CDN technology will become part of cloud computing. “As cloud computing moves past data storage and retrieval, to hosted applications where application response times are a bigger component of quality, and services are expanded outside the enterprise to the worker at home, CDN

technologies will become integrated into the overall network architecture. They will be mutually-supportive,” he predicts.

Larbey describes cloud computing and CDNs as “complementary” and suggests that they will further fuel service innovation and traffic growth on networks. “For example, television is evolving from a passive, lean-back experience structured around channels and timeslots to a richer and more liberating experience tailored to the individual’s tastes, schedule, friends and preferred devices. Delivering this experience requires an on-net CDN to efficiently scale the delivery aspects. It also requires computing resources for the applications whose control logic enables the user interface, recommendation engine, interaction with social networks, advertising and billing to name a few.”

Agarwal says that in a lot of ways, CDNs were the pioneers of Cloud services—the basic principle of CDNs is offloading content distribution to the cloud. “So CDNs and Cloud computing are inextricably linked and the two will continue to grow and evolve with one another,” she concludes.

FINITE RESOURCES. “CDNs are all about getting content deep into the network, at a location that is optimised for delivery to the consumer,” notes Stallard. “They balance the finite resources of the CDN to ensure that the most popular content is pushed to deeper servers and less popular content is pulled back to larger centralised servers. This fundamentally requires infrastructure to be distributed in the network - it is not a solution that can be hosted on a virtual environment outside of the operator’s domain,” he argues. “That said, we see a large role for clouds in the delivery of web content and video content in general. However, it won’t be for the delivery nodes themselves, but for scaling the back office functions (session authentication, catalogue creations, portal hosting, recommendation engines, searching, etcetera). Ericsson’s Multimedia Delivery Management System is a next-generation video management system that is built to exploit the potential of cloud computing” he claims.

Peterson suggests that CDNs could be the killer app that pulls the Cloud out of the data centre and into routing centres, central offices, and head-ends of Telcos and MSOs. “Network operators are poised to deploy CDNs—or more accurately, caching and request redirection technology that can be used to support customer-facing CDN services and optimise the delivery of Over-the-Top content—throughout their network infrastructure. By deploying a CDN, opera-

tors will also be deploying compute and storage capacity deep in their networks. This has the potential to form the hardware foundation for extending the Cloud to the network edge.”

Mastin describes cloud computing is an important aspect of rapid provisioning and flexibility and suggests that CDNs are the original cloud computing application. “We’ve been using virtualisation for years,” he notes. “For me, they’ve always been cloud components,” notes Stoner. “Cloud computing is just a way of virtualising resources,” agrees Dobrushin.

MEZZANINE STORAGE. According to Roberts, cloud applications are not optimised for video delivery. “They are good for mezzanine storage,” he says, “that’s where it helps. They reduce storage costs, and support pretty basic delivery protocols. We typically advise against cloud computing CDNs.” Hall thinks that cloud computing will play a significant role, but contends that in order to deliver services, you need both cloud and on-premises facilities. “We’ll see a move to hybrid cloud models. There’s a need for a flexible deployment model,” he says, suggesting that CDNs are already adopting similar models.

“Cloud computing is already playing a role,” says Dessange, noting that Cisco is enabling further applications. “Online video is at the beginning of a market transformation,” he says. “Even satellite operators are looking at broadband delivery as an alternative. Service providers and media companies need to anticipate the shift,” he warns. “A CDN is by definition a cloud application,” says Taylor. “We’re in the process of taking it a stage further.” He sees distinctions blurring. “There’ll be more of a ‘distributed edge cloud’,” he suggests. “It’s a logical extension of thinking where it’s possible to build and house such elements.”

According to Brightcove’s SVP of marketing Jeff Whatcott, CDNs are trying too hard to avoid becoming the next iteration of ‘dumb pipes’ by adding more cloud intelligence to their offerings. “We think the big future value is in cloud content services. Last mile content delivery of the type that CDNs provide is just one aspect of the cloud content service value proposition, and one that is increasingly commoditised,” he notes. “The big value is in intelligently applying policy to get the great content experiences on the right screens at the right time with optimised monetisation and deep analytical insight that allows continual optimisation. Putting this all together into a complete solution is what is needed. Customers want an expertly prepared meal, not a pantry of ingredients.”