Caching in

Tim Phillips examines how service providers can improve the services they offer to content providers. Doing so will save costs and may create new revenue streams. But will it mean taking on Akamai and Limelight?

As IP networks become stuffed with broadcast video, the role of the content delivery network (CDN) has never been more important. But do the 'over-the-top' CDNs help telcos provide the service their customers need with a sustainable business model? Carriers are increasingly looking at the strain on their networks, and deciding that the answer is 'no'.

The answer is a new generation of on-net telco-managed CDNs. On one hand, they will optimise the telco network and reduce the pain from the CDN traffic that they carry for free; on the other, they could conceivably provide competition to Akamai and Limelight. "We need local CDNs," says Mattias Fridstrom, director of product management at TeliaSonera International Carrier. "They need to be much more regional, because most content stays local."

Time for a new model?

It has been implicit that internet content is always global and that the CDN needs to cache the content as close to where it is needed as possible. This means that a truly global CDN has the only appropriate business model. An Akamai or a Limelight can simplify the business by providing a single point of contact for the content originator, plus global over-the-top distribution: "I don't know what they do with it, we just give it to Akamai," is how the director of one internet content provider summed up the relationship.

This model, or a Google cache, is an appropriate way to handle some of the traffic, some of the time. But as IP networks are given more to broadcast and commercial content, some of which is 'walled garden' protected, there are other models which may be more effective for the content provider and certainly more efficient for the content carrier. The first question is: who pays?

Today, the CDN is paid by the content provider, depending on volume of traffic. The service provider is paid a fixed monthly fee by the end user (and sometimes attempts to extract money from the CDN), for the CDN traffic it carries. But the CDN can't guarantee a level of service to the content provider, and the service provider doesn't make money for providing faster service or more data to the customer. All the while, the volumes of traffic (and expectations of quality) continue to rise.

Stef van der Ziel is the owner of Jet-Stream in the Netherlands, which provides the software that carriers need to set up their own internal CDNs; he also created StreamZilla, a European OTT CDN. Van der Ziel thinks that telcos will quickly have to create a way to capture some of the value of this premium content. But whether that comes from the consumer or producer of the content, they need a CDN infrastructure to guarantee quality. "In the last eight years, we primarily made money with our own StreamZilla CDN," he says. "But in the last two years, the number of contacts we have with telcos starting pilot projects has grown enormously. We built 12 CDNs in our first eight years; then in

2009, we built another 12 CDNs." Now van der Ziel is in partnership with Ericsson and IBM, helping mobile operators and regional carriers to optimise their networks, often by leasing his software to create their internal CDN infrastructure.

"If telcos were smarter they would have looked at this issue many years ago, but they focussed on their walled garden services: triple-play telephone, broadband and TV. Now they are confronted with OTT video services and high-quality video internet traffic, and their networks are under stress," he says. "We just can't keep scaling bandwidth. We have to be smarter."

Smarter solutions

Van der Ziel's smarter solution is that regional service providers cache content locally. It makes sense, he adds, because in the future the most valuable content to retail customers – the content that they might pay a premium for – will be local. "More than 95% of the traffic on the internet is local. English speakers would like to watch the BBC, but someone from Italy doesn't speak English and doesn't want to see that content. The more premium the content gets, the higher the bandwidth, the more local it gets," van der Ziel says. "The strange thing is they are not presenting it to their subscribers: if I were an ISP I would use it as a differentiator – and say, the BBC's content performs better on our network, or provide a video account that costs more."

Until that happens, one telco objection to building a CDN is that it will cost money, which can't be recovered from a customer. It's a speculative investment, and a potentially difficult and open-ended one at that, especially when there are OTT CDNs to do the job of caching content.

They miss the point, says Terry Cudmore, a Yankee Group analyst who covers the emerging telco CDN sector. A telco CDN offers value, even if it is not used to generate new business: "For them it's all about cost savings. The main debate in the CDN world is whether to use caching for cost saving or new revenue streams. Right now, the new revenue streams are not as advanced."

Maybe you still can't charge whoever you're handing the traffic to for what you did. But that doesn't mean there isn't a viable business model if you optimise your own traffic, he explains: "If you have a better way to manage your traffic, that improves the performance on your network. Another way CDNs can help is dynamic site acceleration: retail websites, enterprise business. CDNs don't need to provide an uber-profitable service for telcos, because they always have the cost savings from them. It's something they have going for them that the pure-play CDNs do not. It's a reason for them to look hard at it."

Frost & Sullivan senior analyst Dan Sullivan wrote of this type of CDN in his Businessofvideo.com blog. He points out that Cisco Visual Networking Index predicts internet traffic will grow by a factor of five between 2009 and 2013, and that much of that growth is due to the type of local content that van der Ziel points to. "While CDNs (theoretically at least) stand to gain from this increase in video traffic, network service providers are stuck between the proverbial rock and the hard place," he writes.

Intelligent caching

This type of CDN infrastructure, transparent caching, is the least problematic solution in this context. By moving content closer to where it is required, it helps solve the problem of the volume of content that an OTT CDN drops over the fence, and reduces the overhead of delivering it. It can potentially differentiate the service provided to the end user. But whatever the problems of working with OTT CDNs, there is potential to optimise the carrier's network too, by intelligently caching content that it would have been providing – or content that it actively seeks to carry for a local originator.

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As a defensive response to being overwhelmed with traffic, the telco CDN is beginning to pick up momentum. It's a viable alternative in some cases to upgrading the backbone of the network.

"Every customer we've talked to in the world, bottom line, Akamai and Google are maybe servicing 25% of all their web requests," says Jeff Brainard, director of product marketing in the CacheFlow business unit at Blue Coat Systems, which has built a dedicated carrier-grade appliance that it sells to regional carriers to optimise their caching.

"You still have that long tail of the internet, 60% or 70% that you have to do something with. Even if you have a local CDN, you're still going to have to do something with it to improve the user experience. They all have the tools in place to give them visibility: to see that web traffic is a key part of what they do and that they really have to do something with it. So in some cases it comes down to: is it cheaper to keep buying bandwidth? For some of the Tier 1s today it might be. In other cases, adding caches could be a way to put off upgrades to the core."

Brainard reports that the greatest early interest has been from regional carriers "in regions where bandwidth costs have been highest: south Asia, Thailand, Australia, New Zealand, Malaysia, Indonesia. Also in the Middle East, and there have even been some wins in western Europe and Africa. We even have one win in North America. You'd think bandwidth would be accessible and cheap, but we have providers with rural broadband needing upstream bandwidth."

For those markets, bandwidth costs subside at 10% to 20% every year, but demand is doubling or quadrupling at the same time and the market for premium services is constrained.

Without more intelligent caching, Brainard says, the economics of the carrier's model do not scale to meet the challenge of the next generation of internet content.

Additional services

Moving beyond this, when carriers can optimise their networks, it provides services that they can sell to content originators. This is the justification that AT&T has for investing in its CDN. While it says that the savings from optimisations are "very significant," and that its internal studies show network backbone traffic will expand by more than 50% per year over the next 10 years, it is concentrating – like traditional OTT CDNs – on creating services on top of the CDN.

"One of our retail customers began utilising AT&T content acceleration services at the same time it was looking to launch an online presence in Europe," says Sam Farraj, assistant VP, AT&T Digital Media Solutions. "Our intelligent content distribution service improved their log-in

Intelligent caching is essential to meet the challenge of next-generation internet content

page completion time from 13.58 seconds to 4.51 seconds, but with the dynamic site acceleration service this was reduced to 2.23 seconds. Our content acceleration service allowed them to launch a UK online store without turning up website hosting origin services in the UK."

The impact can be measured, not just as an SLA, but in that there are fewer shopping carts abandoned. This has a definable benefit for a content provider, but it's a sophisticated application of the CDN model, and one that will require a dedicated sales effort.

Instead, basic caching can be relatively inexpensive in carrier terms, and needs not be sold as a premium service. JetStream, for example, built KPN's CDN infrastructure from scratch in two months, and typically charges leasing costs for its software of between €100,000 and €500,000. There are hardware costs on top of that, but for smaller carriers a CDN project is one of the smaller infrastructure investments it could make.

Operating those investments efficiently may be more problematic. Transparent caching involves building some intelligence into the network to decide which content needs to be cached, and where. There will be many different types of service and data on the network, with different types of security and quality requirements. It needs to preserve the business model for the content originator, but be transparent to the subscriber too.

So the investment in expertise, or in a dedicated sales effort, may be more significant than the set-up cost. That's why Cudmore favours partnership for most telcos who want to develop a CDN. "Is it always economically feasible to start your own CDN? Not always, so partnering is an option. If you can put in the resources and spend the money and dedicate the time, it will provide a cost-saving advantage for the telco, but you're selling services against the big boys. Unless you offer the same quality of service with a dramatic price decrease it's going to be difficult."

Van der Ziel considers some investment to be essential for one type of service provider especially: mobile network operators. "Mobile network is like breathing through a straw. The network is so thin, you can hardly push video through it anyway. It doesn't scale at all. The problem is not really the connection between the phone and the tower – the radio is not the problem. The bottleneck is from cell tower to cell tower. We've been participating in trials where CDN and caching technology were bundled. The combination of that technology is a reduction of bandwidth of over 60% in the network."

As developing markets consider a rapid move to 4G and LTE models, then that will also mean a rapid adoption of high-bandwidth services. That may, in turn, mean a difficult moment for the backbone networks that the operators use.

In its white paper on telco CDN strategy, JetStream points out that between 40% and 60% of traffic on mobile networks is video, radio and video download already. It predicts this will be more than 90% in the near future. "Mobile operators should consider deploying a CDN with edge servers right down into the outer edges of the network, not just in the metro ring. Edge servers may even have to be deployed right down to the radio towers, where space is limited and costs should be low because of the huge number of small edge servers needed," it predicts.

The commercial proposition?

While the argument for transparent caching and increasing investment in on-net CDN infrastructure has never been stronger, and the investment case has never been more urgent, then there is still an advantage for content providers in dealing with the major OTT CDNs: a single throat to strangle. Potential paying content providers will have little experience or taste for dealing with a number of smaller CDNs, even if they are working in a geographically limited market. There's also the technical problem that an on-net CDN, having attracted premium content, will still have to hand off some of this traffic, as it will rarely have 100% coverage, and so its ability to offer an improved SLA over that provided by the OTT CDN may be compromised when it does this.

Van der Ziel admits this is a weakness in the telco CDN model if it is to be a commercial proposition to generate revenues. "For content owners it will become more diffuse who you work with. We have a technology called CDN federation which allows us to tie CDNs together – you can do some type of traffic peering, management – but it is on a managed level, so you can control quality. That works not just horizontally, but vertically too. A content owner can deploy their own private mini-CDN on top of all the other CDNs, and distribute their content to the ISPs," he says.

Cudmore is less confident that a single telco can front a relationship with many telco CDNs where the quality of service delivery is the essential factor. "I'm not sure it will work. There are always rumblings that all the telcos will get together and form a giant CDN and that's how CDN services will be done. But there are always a lot of roadblocks to it. It's a great idea on paper, but I don't know when that would come to fruition, if it ever does."