

How a CDN Federation model can help service providers win the battle for content-hungry consumers

by Scott Puopolo, vice president and global head of Cisco IBSG

It is hard for Service Providers (SPs) to balance profitability with delivery of quality service when a large part of the traffic is generated by OTT video. SPs may resort to building their own Content Delivery Networks (CDNs), but this is costly and makes it difficult for content providers to deal with numerous such networks. To this end, the CDN Federation model has been developed, fostering standard CDN protocols and enabling interconnection tests so that content is delivered by a pool of CDN networks. Joining the CDN Federation, the SP has better reach, a higher quality of delivery and lower costs.



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As demand for high-quality, on-demand content continues to increase worldwide, service providers (SPs) are finding it harder and harder to strike a balance between meeting consumer expectations and maintaining profitability through growing revenues and containing costs.

One factor that is increasing this pressure on service providers is the way that they have traditionally dealt with Over-The-Top (OTT) content providers. To enable online content delivery to customers, OTT content providers such as the BBC, Hulu, Netflix, and YouTube have either outsourced video delivery to pure-play Content Delivery Network (CDN) companies, or have built distributed content hosting infrastructures across the Internet. This approach allows them to cache popular video assets and stream them to end-users, reducing

server, hosting, bandwidth, and operating costs while providing an acceptable end-user experience. As a consequence, the market for these kinds of CDN services is now estimated to be worth about US\$2 billion per year globally.

However, many service providers believe that the current business models developed by OTT content providers and pure-play CDN companies could be drastically improved by enhancing the End-User Quality of Experience. This will increase the revenues that media and content providers generate from their offers. In addition the OTT players do not offer a revenue-distribution mechanism that reflects the true value that SPs provide in the overall content delivery value chain (from content developers to consumers). This is because in most cases

SPs must bear the full costs of transporting the huge amounts of new content on their networks, without receiving corresponding revenues for the services they provide.

In response to content traffic growth, and with a goal to improve Content Quality of Experience, many SPs have deployed their own Content Delivery Networks (CDNs). These have been used to deliver the SPs' own content as well as to deal with increased traffic from OTT content providers. Caching content in a CDN and distributing the CDN nodes deeply into the network can potentially yield significant network cost savings for SPs by offloading transit and peering connections, IP core networks, and potentially parts of their aggregation networks. In addition, it allows delivering a better content experience

to consumers since the caches are closer to the end-users.

AT&T has reported that up to 30 per cent of the traffic on its network could be cached (OTT content). This means that deploying an effective caching solution could translate into substantial network savings. While this may sound higher than expected, it is really not a surprise. For example, in 2010, 20 per cent of all Internet traffic during peak hours in the USA came from Netflix alone.

From an OTT perspective, working with service providers rather than pure-play CDN companies allows OTT content providers to deliver Premium and HD (High Definition) content with an improved QoS, adapted to the receiving user end-device (TV, PC, tablets, etc...), hence increasing their customers' satisfaction. In addition, SPs are able to give content providers additional information from their networks about consumers' behaviour and preferences, allowing them to target and serve their customers more effectively.

Despite these benefits, SPs are discovering that selling CDN capabilities solely based on their own network footprints can be challenging. Imagine a content provider having to negotiate separate contracts with dozens, or even hundreds, of different service providers to reach consumers who may be located around the world and attached to many different fixed and mobile networks. For simplicity and manageability, content providers would much rather deal with fewer companies for their content delivery. This scenario also puts SPs in head-to-head competition with pure-play CDNs - a battle that could prove costly.

It is therefore understandably that, as demand for content continues to increase worldwide, OTTs would rather work with fewer individual companies for the delivery of their content. Given this situation, SPs are now exploring the potential of CDN federations. Defined by the Cisco® Internet Business Solutions Group (IBSG) as multi-footprint, open CDN capabilities built from resources owned and operated by autonomous members, CDN federations give SPs the ability to improve the quality of service delivered to consumers, reduce complexity for content providers and, crucially, allow service providers to reduce their overheads by strategic pooling of resources.

Cisco is involved in a number of CDN-related initiatives to accelerate the move to CDN federations. For example, subject-matter experts have championed and are now co-chairing a CDN Interconnection working group at

the Internet Engineering Task Force (IETF) dedicated to the standardisation of protocols needed for establishing a CDN federation.

Most recently, Cisco has started working with several leading SPs worldwide to plan, deploy and test an open CDN federation pilot. The main goal of this initiative is to move the concept of CDN federations from a great idea in principal to a market reality that can deliver clear benefits to SPs, provide a better experience for consumers, and offer media companies and OTT content providers differentiated online delivery capabilities.

We are collaborating with participating SPs and content providers in three areas:

1. Business assessment - Identifying the roles and responsibilities for each stakeholder, as well as the associated and supporting use cases, business models, business cases and processes.
2. Technical assessment - Assessing the CDN interconnection architecture, capabilities, approaches and operational procedures, as well as identifying a technical roadmap for production deployment. This includes interconnection capabilities for request routing, content distribution and accounting and reporting.
3. Lab trial - Testing and validating the concept of an open CDN federation through the worldwide interconnection of participating CDNs and content sources in a lab environment.

A common theme across all of these components is our goal of creating CDN federations using an open and standards-based approach. We believe that this is the best way to ensure the success of CDN federations and deliver the strongest possible benefits for SPs, content providers, and, most importantly, consumers. To this end, the pilot members are making the results of the pilot available to the industry's standards bodies, including the IETF, which includes a CDN Interconnection (CDNI) working group co-chaired by subject-matter experts from Comcast and Cisco.

Participants in the just-completed first phase of the open CDN federation pilot were BT, KDDI, SFT, Telecom Italia, and Orange Group (through its affiliate Telekomunikacja Polska). From a technical standpoint, the pilot has successfully created a laboratory-based CDN federation validated through distributed testing.

The pilot covered the base functionality required from a CDN federation over the mesh of participating SPs' interconnected CDNs. It

included multiple streaming protocols supported by the federation, with static and progressive HTTP, Apple adaptive streaming and smooth streaming Microsoft Silverlight. It also trialed various CDN topologies, including one upstream CDN to one downstream CDN, one upstream CDN to multiple downstream CDNs, multiple upstream CDNs to one downstream CDN, and one CDN to one CDN to one CDN (also known as cascaded CDNs). The project also tested the possibilities for dynamic content acquisition across CDNs, the purging of content across CDNs, inter-CDN redirection and acquisition latencies and the exchange of logging and reporting information across CDNs.

Employing CDN federations to deliver next-generation content distribution services will result in significant growth of the overall content delivery market. This will increase service revenues for CDN federation participants, including service providers, content providers, and pure-play CDNs. In fact, studies show that moving to a CDN federation model will double the size of the content delivery market from US\$6 billion to US\$12 billion by 2015¹.

This increase is due to the way that the CDN federation approach enables content providers to deliver greater amounts of premium and higher-quality content over fixed and mobile networks to consumers, thereby stimulating the development of and demand for innovative, video-rich applications. Also, content providers that currently support 'do-it-yourself' CDNs will be able to utilise the large-scale, robust infrastructures of CDN federations that will result from the collective strength of the participating SPs.

While much progress has already been made, considerable work must still be done before functional CDN federations become a reality. Soon, phase two of the open CDN federation pilot initiative will begin. This phase will include more service providers as well as key players from other parts of the content delivery value chain, so that the broader content delivery ecosystem is represented.

What is already clear is that CDN federations are gaining momentum as a way for SPs to generate revenues and lower costs from the ever-increasing traffic on their networks. As work on CDN Federations progresses, they will increasingly be seen as a viable way for service providers to ensure that their critical contribution to the content delivery value chain is suitably rewarded. ●

¹ Sources: Frost & Sullivan; Akamai; Limelight Networks; Cisco's Virtual Networking Index; Cisco IBSG (all 2011).