

Content Delivery Networking by IPTV Operators Paves the Way for High Quality Internet Video

By M. Verhoeyen

We are living in the Information Age, and as a result, the distribution of multimedia content is now a cornerstone for our digital society. Indeed, the bandwidth requirements that multi-media traffic – flowing from any to many – is placing on the Internet is growing at an astonishing rate. As demand for this newer and richer category of media rises, service providers are going to have to become more skilled in managing resources that once seemed so vast. This is especially true as we divert more “broadcast” data traffic onto the network. And since no network digitally connects more people than the World Wide Web, we can expect an explosion of growth in multimedia distribution. The early manifestations of this trend are here already. The popularity of Internet video – in the form of Google’s YouTube, Netflix’s online offering and BBC’s iPlayer – are prominent examples. Today’s IPTV operators are uniquely positioned to embrace this by enabling quality of experience (QoE) for video available on the Internet.

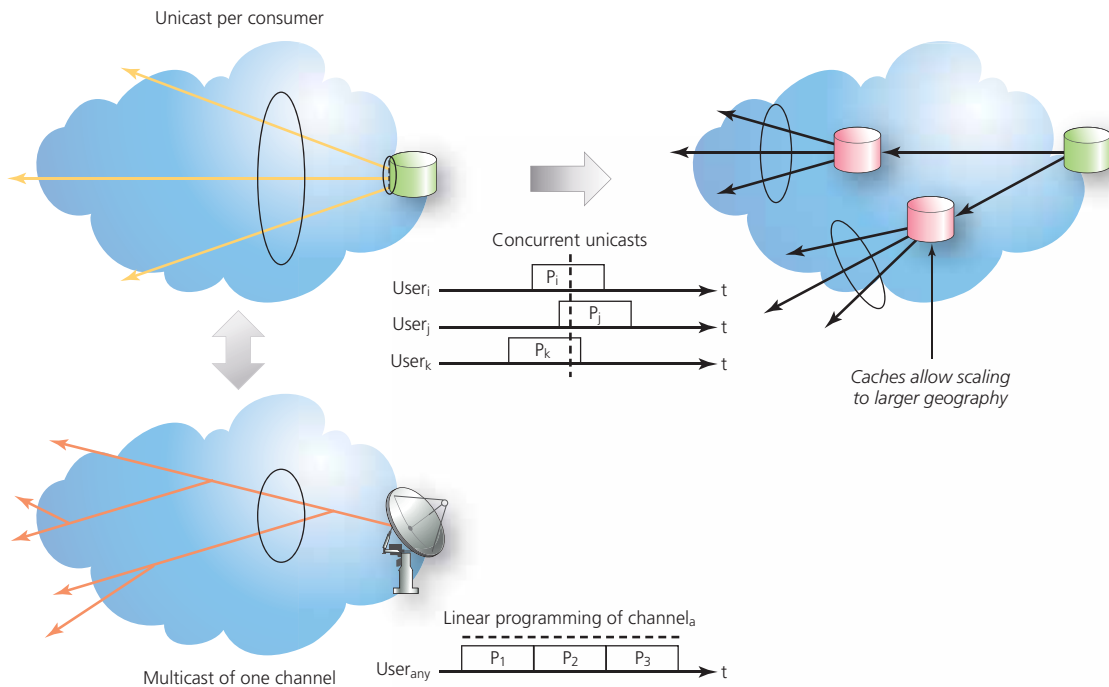
The Need for Content Delivery Networking

As demand for Internet video bandwidth surges, a great amount of content delivery networking (CDN) work is underway to improve the content consumption experience. Internet CDNs aim to cache popular content closer to end users in order to reduce latency and required transport resources for delivering content. Above all, they are essential for offloading pressure on the servers hosting the content. There is a long and growing list of more than 40 Internet CDN providers who are fighting for a piece of the pie in this burgeoning market.

However, the quality of today’s online video is still limited due to CDN scaling issues. Alcatel-Lucent sees an opportunity for network operators to enhance CDNs for video distribution through partnerships and/or investments in their own network. We see great potential, for example, in extending the Internet CDN models into the carrier part of the delivery chain.

There are several emerging demands that will create a need for improved and additional CDN capabilities. For instance, the required Internet bandwidth to serve the anticipated demand for a new high-definition movie a few days after its release is huge and may add up to two orders of magnitude above what is being projected today. The need for scalable content distribution capacity is especially critical for on-demand video content with the long holding times and sustained bandwidths required for long-form, high quality video. On-demand content must be sent to each subscriber individually using unicast delivery, in contrast with linear, broadcast video, where bandwidth-efficient multicast delivery can be used (Figure 1).

Figure 1: Transport efficiency via unicasting with caching



The rising bandwidth costs to the local access operator can be offset with efficient content caching, which is further enabled by a constant decline in storage cost that averages more than 30% annually.¹ With the increased usage of individualized video streams, a CDN presence in the local operator network is essential to optimize the associated cost and performance goals. For example, while bandwidth requirements in the second mile of a DSL or fiber aggregation would grow exponentially, distributed caching would keep bandwidths at reasonable levels at more distant consumer aggregation points.

Video quality, instant access and content control are highly important to the consumer, especially if the content is viewed on a television as opposed to a computer. In fact, these things are fully expected from a television experience. CDNs guarantee this by streaming from caches when the end user presses the “play” button for popular video-on-demand and timeshifted TV. This technique is also increasingly being used for managing content offered over the Internet.

The Role of Operators in Content Delivery

IPTV offers the potential to generate content from various sources, including user-generated content such as home videos. Content providers will likely remain focused on what they do best: producing appealing content and packaging it for mass consumption. They will look for partners to publish their content online and yet will seek to maintain a strong hold on that distribution. They will rely on the capabilities of their distribution partner to scale with growing audiences and available content. Especially with the move to HD, or high-definition content, there is an opportunity for operators to position themselves as essential partners in high quality content delivery. This will enable a sharp contrast and competitive differentiation from those who stay on best-effort delivery channels.

¹ <http://www.storagesearch.com/ssd-ram-v-flash.html>.

Several use cases and business models can also be applied to this CDN opportunity, ranging from revenue sharing models between operators and content providers, to ad-sponsored content delivery that generates additional revenue streams. Ideally, the investments in a caching infrastructure can be leveraged for many applications. Open application programming interfaces (APIs) may facilitate the development of such offerings, including those by third-party application developers, and hence contribute to new revenue streams for the operator.

Content distribution networking is the subject of several research and standardization activities. Alcatel-Lucent is working on different architectural options in this area and is actively engaged in dialogue with a number of leading operators. Our research is focused on enabling high quality video delivery with an emphasis on elements such as optimal caching algorithms, implementation architectures and interface protocols for both P2P and client-server distribution models.

For economy of scale reasons, content providers and operators are interested in a homogenized approach to using the Internet and broadband access/aggregation networks as a quality distribution channel for premium content. Alcatel-Lucent fosters the development of standards in these settings. The idea is that content providers can communicate the location of content resources and the content distribution method via clearly defined interfaces. This is facilitated by the use of content metadata understandable to both content providers and distribution providers such as operators or global CDN providers or a combination of both. Relations between content providers and distribution channel providers can be automated with the help of a dedicated system that keeps track of metadata databases.

To further establish the distribution channel of choice, the supporting network (operator and home network) should enable direct distribution to any end-user device, including adding the PC, the mobile phones, personal digital assistants, portable media players and others to the TV set. A clear demarcation between the operator and the home network may be needed to interface with rendering devices, independent of dealing with a walled garden IPTV operator or any online content provider. Also, existing boxes such as gaming consoles can be reused if alignment with the demarcation interface can be adhered to.

Conclusion

Operators can be instrumental in breaking down the technology barriers that have thus far prevented delivery of high-resolution video streams over the Internet with reliable quality and reasonable cost.

Alcatel-Lucent seeks to help enrich people's lives by enabling media content providers to deliver their products to end users in the best possible way. For example, more than 50 service providers have deployed Alcatel-Lucent's Triple Play Service Delivery Architecture, which provides an ideal CDN foundation to further optimize the distribution of content. Through continued research and innovation, we aim to help providers realize the huge, untapped potential of the Internet as the multimedia distribution channel of choice for billions of consumers worldwide. *

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