Edge networks make the internet cheaper and faster for all

July 2020

David Abecassis and Michael Kende

As the internet continues to become a critical part of our economic and social lives, it continues to evolve to become more efficient and resilient. Companies that distribute content from the edge of ISPs' networks, rather than from centralised data centres, are a leading example of this evolution. Our increased reliance on the internet throughout the COVID-19 crisis illustrates its benefits, under the most unfortunate of circumstances. Policy and regulation should be used to continue to encourage the spread of infrastructure that supports these benefits.

Three overlapping trends over the past 10 years have changed the way in which we consume content on the internet. First, an ever-increasing amount of content is being made available; much of it is video, which now accounts for the majority of internet traffic. Second, major content aggregators such as Google (YouTube), Facebook and Netflix have become a very large source of this traffic, and third, the demand for this content is now truly global.

These overlapping trends have been made possible by changes in technology and business models. It is not optimal for an online streaming provider to serve the total worldwide demand from a central point. Instead, content is increasingly being served by content delivery networks (CDNs) from the edge of the ISP's network, thereby bringing it closer to the end users. Some CDNs are independent companies such as Cloudflare, while others are developed by content providers such as Google (YouTube) and Facebook. CDNs are putting static content such as videos in caches around the world and are also building points of presence (PoPs) in various countries in order to deliver more dynamic content, such as live events.

These edge networks benefit all stakeholders. The time taken for content to reach the end user falls significantly when content is delivered locally. When content is not local, the round-trip delay and associated latency is frustrating for users; reducing this frustration results in greater engagement and usage of online services. In addition, accessing content locally saves ISPs from having to pay for expensive international connectivity; these costs would otherwise be paid for by end users.

Edge networks currently benefit from a legacy of pro-competitive policy decisions that have helped to fuel the growth of the internet since its earliest days. Interconnection arrangements have been commercially negotiated, rather than regulated, from the start, and this approach remains widespread and is generally considered 'best practice'. Freely negotiated interconnection allows all parties (CDNs, ISPs and content providers) to choose how they interconnect based on business considerations including cost, efficiency and resilience.

Edge networks are becoming increasingly extensive and important as the complexity and scale of the demand for online and cloud services grow. The demand for video streaming will continue to increase, websites will become more dynamic, applications will become more real-time (for example, with the introduction of cloud gaming) and enterprises will continue to migrate to public and hybrid cloud services. As a result, edge infrastructure will continue to rely on more international connectivity, provide more PoPs in more locations and make greater use of caches distributed throughout countries and networks.

On the other hand, there is also an increasing call for national regulators to address the economic and social concerns that arise from the edge networks. Local ISPs often complain about the cost of delivering video content, even though such content is demanded and paid for by their end users. They seek to impose interconnection charges on CDNs, through regulation if necessary. There is also a worry that CDNs will become liable for the third-party content that is made available through the edge network, given the understandable concern about the nature of some content.

Both of these regulatory reactions may be built on a partial understanding of how content is delivered in the modern internet. National regulation will simply result in CDNs not investing in edge network infrastructure in a given country; they will instead make the same content available to the ISPs from outside the country. This will have costs for these ISPs, because they will have to buy more IP transit to access the content, thereby lessening their incentives to provide sufficient capacity for a good user experience. Local end users will also suffer more latency when accessing the content. In addition, the country will lose out on the broader economic benefits of edge networks.

The internet has benefitted from favourable policy and regulatory forbearance for many years. This has led to issues, including harmful content and behaviour, which are being proactively addressed in many advanced nations (for example, through the UK's online harms regulatory agenda). However, it has also been extraordinarily successful in enabling the internet to evolve into what it is today and to reach a previously unthinkable number of people worldwide.

The ability of the internet to absorb the demand shock caused by the COVID-19 crisis provides a dramatic (albeit accidental and unwanted) example of the efficiency and resilience of the internet infrastructure that this regulatory regime has enabled. Without the edge networks to help to meet the demands for increased content and services, the end user experience would probably have suffered considerable degradation, thereby limiting our ability to communicate, work, study, play and even access remote healthcare during these unprecedented times.

Analysys Mason works closely with stakeholders across the internet value chain, including regulators and governments. Recently published studies analyse the benefits of caching, the impact of Facebook's connectivity investments in ASEAN and sub-Saharan Africa and the impact of Google's network infrastructure in Asia–Pacific. We have also written a white paper on internet interconnection in the context of South Korea's drive to regulate these arrangements.