

Software-Defined Capacity Enables Providers to Overcome COVID-19 Traffic Spike Issues

The technology allows providers to engineer, provision and transfer capacity around networks via software control.

By Andres Madero / *Infinera*

Humanity has stepped up during the COVID-19 pandemic in an admirable way. Front-line defenders and medical staff have worked tirelessly to contain the spread of the virus, and with the support of communities, people will push through this crisis. The pandemic has shifted the way the world works, and that is not a surprise. Some businesses have suffered from a lack of activity, while others struggle with new and overwhelming demands. What effect has COVID-19 had on the telecommunication industry? How do service providers deal with the growing demand for bandwidth and shifting traffic patterns?

Similar to any other heavy gamer under quarantine, I look forward to walking to my favorite console and once again defying the odds against zombies or an intergalactic dark force. Nevertheless, the network is so saturated that my network quality of experience is thrown out the window. “What’s going on with the network?” Immediately my gamer mask is off, and my network-engineering brain kicks in.

There is a clear surge of traffic in the network as people turn to their favorite digital world applications, from video streaming to online gaming to simple Wi-Fi calling.

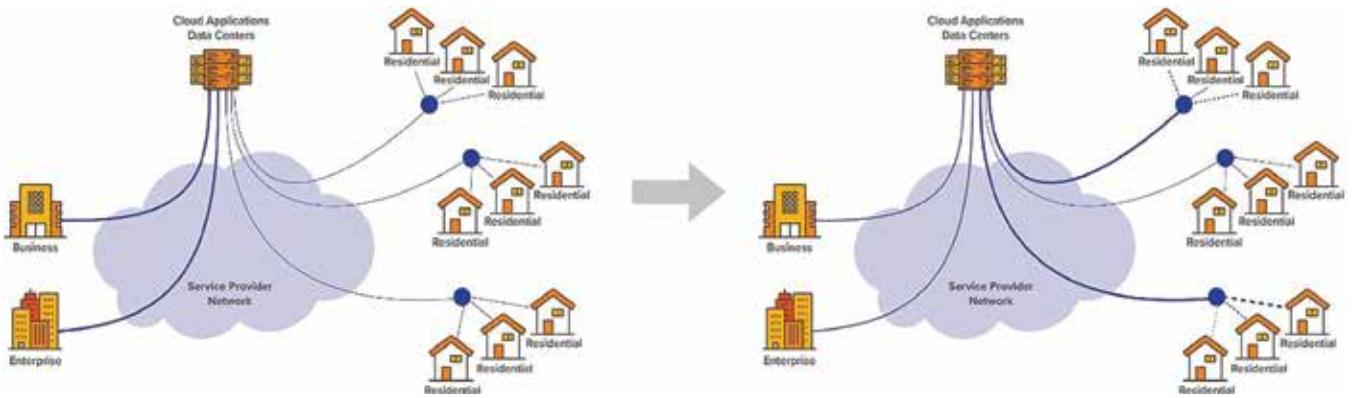
Verizon recently announced in a press release that it has seen a 75 percent increase in

online gaming. Video streaming spiked by more than 12 percent, and web traffic is up close to 20 percent based on Verizon’s latest week-over-week numbers. According to data analytics and broadband solutions company OpenVault, broadband consumption rose by more than 41 percent after the Centers for Disease Control and Prevention (CDC) declared COVID-19 a pandemic.

DEMAND SHIFTS FROM OFFICES TO HOMES

There has been a clear increase in the use of online tools during this crisis. From a telecom infrastructure point of view, there also has been a shift in the source of demand within a network. For instance, employees who regularly videoconference or teleconference with colleagues from the office no longer consume bandwidth from the office location, but have changed their source locations to places that might be in a completely different network segment. The network engineers for this segment might have conceived that for certain traffic peaks, the amount of oversubscription in that area was appropriate, but they could not have anticipated the drastic change in traffic patterns now taking place in all locations.

Nevertheless, those employees are now at home, along with their spouses, who also



Bandwidth moving from office parks to residential areas

Source: Infinera

work from home. They may have children who have moved from streaming educational content directly from school to teleconferencing with teachers to streaming videos and favorite songs. All of this is transpiring in the same household, putting significant pressure on the network.

What is the typical reaction? To call the internet service provider and ask it to increase household bandwidth. But the service provider is likely now receiving the same request

from many of the neighbors and other residents in the area. Therefore, service providers now need to incrementally increase the aggregation tunnel that services the entire area. This will require dispatching a truck roll with new hardware, which could take several days or even weeks if the hardware is not available.

Meanwhile, the portion of bandwidth that the employee used to consume at the office remains available but dormant

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because no one will be in the office for several days, weeks or even months. Now, if just one neighborhood were affected, this would not be such a monumental problem, but this situation is likely happening in most neighborhoods in every major city across the globe.

This simple request creates a chain of actions causing service providers to reconsider the way bandwidth is allocated or distributed throughout their networks.

SOFTWARE-DEFINED CAPACITY CUTS LIMITATIONS

The dynamism of a next-generation bandwidth-allocation mechanism should follow the source and be elastic enough to adapt to service demand. This is easy to understand but difficult to accomplish in a network dependent on tunnels with rigid sizing that lack any flexibility and require a physical infrastructure intervention. A typical bandwidth upgrade requires extra hardware and truck rolls, which in today's pandemic situation may be challenging.

Software-defined capacity (SDC) cuts through this limitation. SDC describes the ability to engineer, provision and transfer capacity around a network via software control. It complements software-defined networking (SDN) and is an essential foundation for fully cognitive networks.

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The ability to incrementally deliver bandwidth on a specific route just by applying licenses is a unique architectural capability that could help service providers achieve a new level of programmability in these situations. More important, this technology enables the service provider to reallocate bandwidth from one portion of the network to another, redefining traffic patterns and alleviating congestion in a matter of minutes.

For my home-gaming experience, this means that a service provider could remove excess bandwidth allocated to the business park where my office is located and use that bandwidth to increase the bandwidth to my neighborhood. By doing so, the service provider could easily increase my bandwidth without any further hardware deployment or truck rolls. This can be done in a matter of minutes – just enough time for me to respawn and get back to my video game.

With the right amount of automation and network analytics, this reallocation of bandwidth can be seamless, reacting to demand and the traffic patterns of the network and allowing bandwidth to follow the end user.

ENABLING INSTANT BANDWIDTH

Instant bandwidth, a form of SDC, enables the activation of optical capacity via software on each module. Solutions such as instant bandwidth enable unprecedented network flexibility that allows for the activation of network bandwidth via software licenses – no truck rolls or site visits needed. Network operators can instantly react to changing network needs by simply activating needed bandwidth with a few mouse clicks. The result is a dramatic savings in operational effort, increased time to revenue, and a reduction in the complexity and uncertainty associated with trying to accurately forecast future network growth.

Concepts such as instant bandwidth license pools allow operators to activate capacity in minutes and be billed for it after the fact. This significantly increases the economic efficiency of the network by reducing the overprovisioning of capacity that is paid for up front and sits idle. Capacity is no longer overprovisioned before customers are ready to use it.

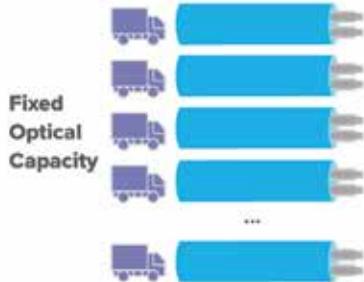
Transferable licenses bring a new degree of freedom to network operators. Capacity is no longer tied to a node but can be transferred in minutes. This alleviates the economic constraints associated with overinvesting in one route in the network when demand suddenly increases or fiber cuts occur.

REPOSITIONING CAPACITY

With an SDC-enabled network, my internet service provider could reposition some of the capacity assigned to the business parks to my neighborhood hubs. This would increase overall bandwidth availability and eliminate any bottlenecks. This implementation could take minutes, without requiring any personnel to be dispatched to the field. With the help of AI and machine learning, the service provider could proactively determine the source of bandwidth demand and reshape the network as traffic patterns change. It could even track peak bandwidth demands through the network to react accordingly. Social events, such as concerts or soccer matches,

Software Defined Networking (SDN) in Conventional Rigid Tunnels

- SDN virtualizes L1-L3 services inside fixed optical capacity with 1 or 2 wavelengths per card.
- Need more capacity? Plan, order, deploy, activate new line cards for additional capacity in months.



Software Defined Capacity (SDC) with Instant Bandwidth

- SDC enables optical capacity to grow as service demands require and move as traffic changes.
- Need more capacity? SDC enables bandwidth license activation via software in minutes.



Software-defined capacity has advantages over conventional rigid tunnels.

Source: Infinera

could be planned for ahead of time. As people around the world shelter in place, SDC enables service providers to adapt to changing flow patterns in the network and provides their valuable customers the QoE they need. ❖

Andres Madero is the CTO of Latin America and Caribbean at Infinera, a global supplier of solutions that provide the resilient foundation for Tier 1 carrier, internet content provider, cable operator, government, and enterprise networks worldwide.



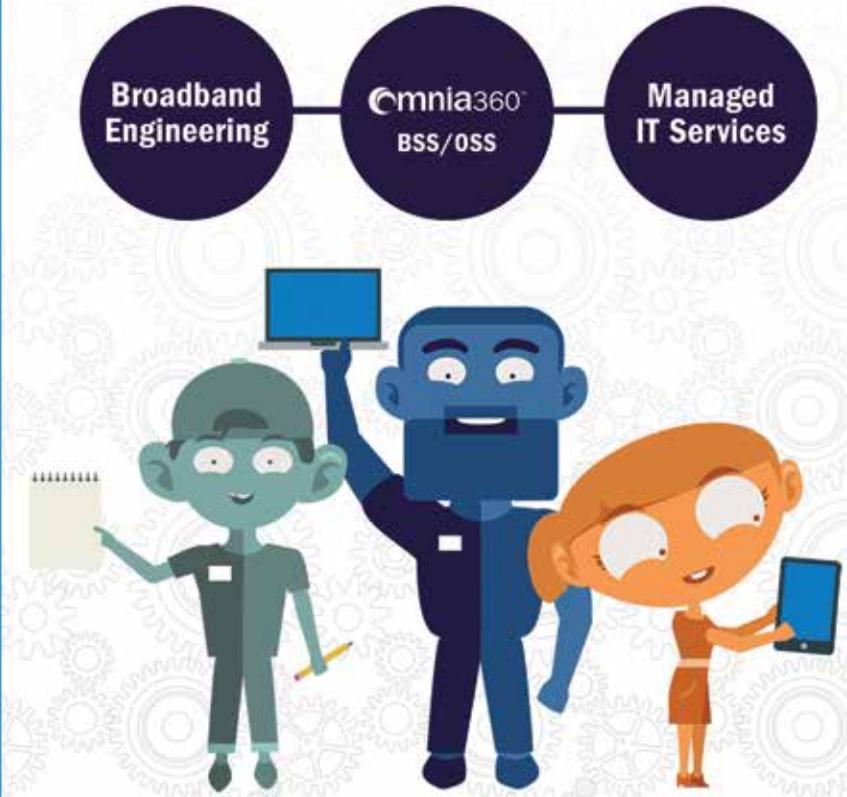
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