Calix

Network Capacity: Why You Should Be Concerned

This international crisis has millions forced to contend with their family's work, education and personal life routines being significantly disrupted, if not outright halted. With everyone at home, people are streaming on every channel. While parents are working from home family bandwidth wars are being created.

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INCREASED BANDWIDTH: OUR NEW NORMAL TRAFFIC LEVELS AT-A-GLANCE

WORK AT HOME ◄

86,000,000+

Total Work From Home
(Existing + New Individuals Working from Home)

PLAY ◄

31%

Increase in Online Gaming

85%

Increase in Streaming

Over same 3-week period over last year [1]

REMOTE LEARNING ◄

3,600%

Online Educational Tools

Increase in Daily Traffic [2]

54.8M

K-12 Students Learning at Home

End of March [1]

ACCELERATION IN TELEHEALTH SERVICES

Lack of access to broadband services across much of the U.S. is a main obstacle to widespread telehealth adoption.

NEW CHALLENGES FOR EDUCATION

6,500,000

The estimated number of U.S. households with school-age children that lack home internet access.

18%

The amount of U.S. students who don't have access to broadband internet at home, creating a "homework gap" in our nation.

EVERY DAY LOOKS LIKE SUNDAY

As recent as a few months ago, aggregate residential internet traffic has a particular usage pattern where traffic levels showed consistently higher peaks on Sunday. With the shift towards working, playing and streaming from home, the daily usage has changed so that now every day looks like Sunday.

27%
Increase in downloads

36%
Increase in uploads

DOWNSTREAM TRAFFIC

UPSTREAM TRAFFIC
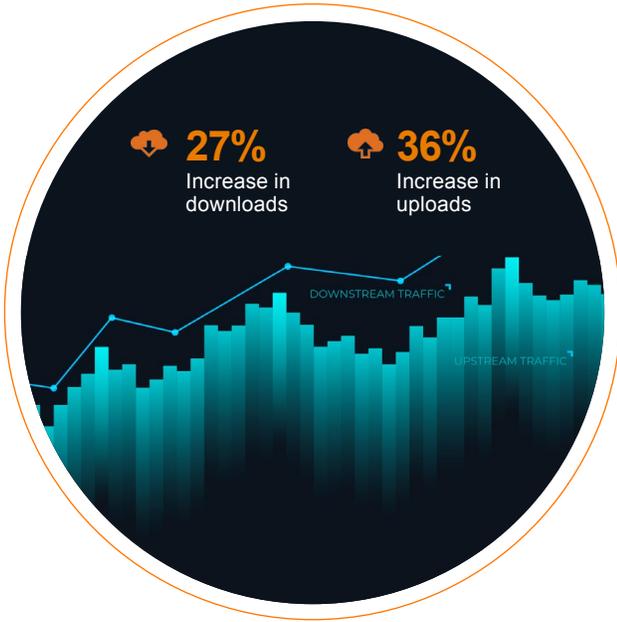
Several organizations and trade associations have weighed in on the increase in traffic due to the new normal of broadband usage:

America Connects Association (ACA) has seen download usage increase by 27% and upload usage increase by 36%. Supports calls did increase but not due to network related issues.

The Internet and Television Association (NCTA) found that since March 1, 2020 downstream peak growth is up 9.1%, but upstream is up over 26%. While upstream peak hours have shifted to the afternoon hours, backbone networks show no sign of congestion.

Verizon: 102% increase in gaming between pre and post pandemic related shut downs. Web usage and downloads are up 24% and 27% respectively.

Broadband Service Providers questions abound, but what are the answers?

What are BSPs asking when it comes to handling increased broadband usage?

- What Passive Optical Network (PON) ports are showing higher than normal utilization?

- Are there PON ports that are nearing exhaustion?

- What higher bandwidth services can I offer without impacting network performance and subscriber experience?

- Do I have sufficient bandwidth in my access network to offer subscribers higher speed services?

- What are my traffic trends over time, and should I take action now to prevent future capacity bottlenecks?

ANSWER: A SYSTEMATIC MONITORING AND ANALYTICS APPROACH

Start by extracting data from the network at key points along the traffic path. The actionable intelligence derived allows BSPs to best understand how different parts of the network are handling broadband traffic. It also helps Network Engineers plan with better precision to address capacity issues.

COMPREHENSIVE APPROACH TO CAPACITY MONITORING AND MANAGEMENT

A systematic, best practices approach to extract and analyze traffic utilization data helps BSPs track capacity issues. Flow-based analysis and traffic statistics from the network elements can be combined to provide a comprehensive view from a ban width utilization perspective.

1) Monitor network traffic at key areas of the core and access network including PON and uplinks—transport, rings, Ling Aggregation Groups (LAGs).

2) Develop actionable views of the data to enable analysis of specific network locations experiencing bottlenecks or nearing exhaust.

3) Track metrics including Average Peak Utilization and Outlier Peak Events. They paint an accurate picture of what's nearing exhaustion and what's experiencing problems.

4) Address near-term bottleneck issues and look at the trends to proactively plan future network expansions or capacity improvement activities where they are needed the most.

SPOTTING CAPACITY BOTTLENECKS IN YOUR NETWORK—IDENTIFYING PON & UPLINK OVERLOAD

Did you know subscriber demographics can affect bandwidth utilization patterns? Along with data about geographical areas, subscriber demographics provide insight into traffic patterns and associated trends. The further out in the access you monitor, the more you see their effects on capacity usage in key parts of the network, affecting PON utilization.

For example, high tech corridors, universities and surrounding retail areas, military bases, and retirement communities will have different traffic usage characteristics. These demographic differences will impact your planning. Monitoring and analyzing the access with a high degree of granularity will allow you to more surgically implement growth projects.

5 TIPS FOR ALLEVIATING BOTTLENECKS IN YOUR NETWORK

First the good news. For most BSPs, PON capacity is faring relatively well. The bigger challenge with bandwidth bottlenecks is in the transport and Internet uplinks. You'll want to identify the location, root cause, and severity of any capacity bottlenecks through a robust approach to monitoring and analysis. Here are five tips for alleviating these issues in your network.

① Leverage Ring Splits

By subdividing the network backbone, you can more effectively distribute traffic. Rings serve an important role in ensuring service reliability and availability, but when they grow too large they can be cumbersome, underutilized and a source of potential risks. It is important to understand when a ring ceases to be a benefit and becomes a burden. Before this occurs, a ring should be split in two or more separate rings thus maintaining protection while eliminating the risks and congestion associated with one overgrown ring.

② Increase Transport Capacity

Sometimes the most obvious answer is the correct one; when links are overutilized, increase the capacity. Using LAG, you can increase capacity up to 560GB. Additionally, by using Ethernet Ring Protection Switching (ERPS) outlined in ITU-T G.832v2, you can increase the capacity of existing ERPS rings by harnessing the capabilities of LAG and still maintain redundancy and sub-50ms convergence time required to protect your customer's mission-critical communications.

③ Increase Internet Drain Capacity

A major potential bottleneck for capacity is at the location where your traffic enters the wider networks comprising the Internet. These peering links are often referred to as Internet drains. Besides ensuring you have enough links and available capacity to your Internet connection point, ask your provider about the availability of geographical link redundancy, and try to avoid routes with a single point of failure.

There is also the opportunity to implement cache servers in your network to bring some of the most accessed content closer to your subscribers. This will not only reduce the cost of peering bandwidth by reducing the usage but will improve the subscriber experience. Calix Services can help you remove the guesswork in developing an efficient, cost-effective connectivity and caching solution.

④ Move IP Out

When you move your IP network further out into the access, you reduce the noise due to overhead traffic. Certain access platforms such as the Calix AXOS E9-2 AXOS E3-2 make it easier to move IP services, that have traditionally been limited to the core of the network, further out into the access edge. This means less equipment, less backhaul, and less physical and logical complexity. You gain improved services levels while reducing operational costs.

⑤ Audit for Undue Complexity

Sometimes simpler is better. Every unnecessary device, path, or protocol adds potential bottlenecks and failure-points. Your network is a holistic system, and every part should serve to improve its functionality, efficiency, and dependability. Whenever possible simplicity should be the rule. A solution partner like Calix understands this and is focused on helping you design, build and maintain a robust network while eliminating extraneous components that can often create or contribute to a poor subscriber experience.

CAPACITY AND TRAFFIC INSIGHTS DRIVE PROACTIVE PLANNING

Identifying PON & Uplink Overload

Network engineers don't design networks to only handle today's traffic requirements. Rather, to analyze bandwidth demand anywhere from a year to eighteen months out and build accordingly. It's best to establish a planning horizon that accommodates spikes in traffic, subscriber growth, and additional usage.

This is one reason why broadband networks have responded well to the latest traffic tsunami. A data-driven approach leveraging traffic monitoring, utilization analysis, and trending is indispensable to properly planning network capacity.

Today's environment poses an unprecedented test of your network's ability to withstand a massive and sustained surge in bandwidth. Choke points in a traditional layer 2 access network are one of the easiest locations in your network to upgrade. Look for OLT aggregation locations first for opportunities to optimize.

IT'S TIME TO ACCELERATE YOUR BUSINESS

Calix Services helps BSPs every step along their network evolution lifecycle so you can grow your business and simplify your operations. Our Customer Success program for Operations enables your technical teams to unlock insights from your Calix Cloud-based tools and then help you integrate them into your network and service performance workflows.

Find out more how Customer Success for Operations and a Calix Customer Success Manager can empower your team.

>>>> Customer Success for Operations