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ON TOPIC
Virtualization in Cable Networks

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Digital acceleration calls for cable infrastructure modernization

BY GARY CUNHA

Most industries had been on a digital transformation journey before 2020, but the pandemic ushered in an era of digital acceleration on a scale and scope never seen before, driven by the need to quickly re-invent and adapt business models to meet the moment. Changes that used to take over a year to implement happened in mere days. At the same time, digital options became viable alternatives to in-person experiences almost overnight, driving people of all digital abilities to adopt technology at an unprecedented scale.

As people retreated to their homes, most services started to be delivered in the home environment. This included traditional services such as entertainment and e-commerce, but also work from home, online education, telehealth, and others. Some of these services are finding their way into the long-term delivery model, and many of the new business models that emerged recently are ushering in profound changes in many verticals, with far-reaching consequences for the digital infrastructure that underpins these services. What is afoot is a significant, far-reaching, once in a career network transformation to keep pace with the demands of the market.

The cable industry has raced to deliver substantial amounts of capacity in record time. However, as transformation takes hold and digital disruption continues to shape many industries, cable operators must accelerate their infrastructure modernization to meet the evolving needs of the market.

Mission critical services delivered digitally

Video streaming and gaming have been on an upward trend for a number of years, leading to an ever-growing level of bandwidth consumption, primarily downstream.

However, recently, while these somewhat traditional services have continued to experience significant growth, mission critical services have started to be delivered in the home, imposing more stringent requirements on the service delivery infrastructure. These services include work from home, home-based healthcare, and online education.

Work from home or anywhere

The growth in work from home over the past few months has been substantial. While companies are still evaluating and defining their work strategies, as they strive to strike the right balance between meeting the safety and needs of their employees and the needs of the business, it is anticipated that some level of flexible work arrangements will be the norm for many companies for the long term.

Healthcare delivered in the home

A substantial shift in healthcare delivery is under way. Driven by need and by an accommodating regulatory environment, patients and healthcare providers pivoted to telehealth as an effective treatment modality during the pandemic when in-person healthcare delivery became problematic. The move to digital care delivery is not new, but it accelerated substantially during the pandemic and led patients and care providers alike to recognize its effectiveness in many areas of medical treatment.

This said, despite its popularity and importance, telehealth is only the tip of the iceberg when it comes to home-based medical care. Increasingly, seniors want to remain in their home as they age instead of going to long-term care facilities, and some highly acute medical care is increasingly delivered in the home (the concept of home hospital is gaining significant

traction). Furthermore, more and more chronically ill patients receive continuous monitoring in their home, using connected devices such as blood pressure monitors, glucose monitors, and others. Use of these solutions, generally referred to as remote patient monitoring (RPM), is growing exponentially.

Online education

While there is a general consensus that online education for K-12 was a poor substitute to the in-person experience, there is tremendous experimentation going on in education more broadly to incorporate online learning into the education ecosystem.

Connected everything

Connectedness of people, things, and facilities has become a de-facto standard of everyday life. Patients are connected to monitoring devices everywhere they go; cars are becoming moving computers, monitored and increasingly "driven" remotely; homes, cities, factories, hospitals, and other facilities are increasingly connected to the internet.

The implications for the network infrastructure

An increasingly digitally enabled world needs to be powered by a network that delivers substantial capacity and that is fast, secure, reliable, adaptable, and available where and when the demand is needed. As the nature of the applications delivered over home networks evolve and become more mission critical, the level of service quality and of the customer experience must rise substantially, imposing new requirements on the operators whose networtks enable these services.

Demand variability

In recent times, broadband consumption was somewhat easy to forecast, and operators were able to plan ahead for network capacity based on demand projections. Today, usage patterns are in flux and will continue to evolve for the foreseeable future. For example, people who have hybrid work arrangements can work from home some days, but these days could vary from week to week. A patient may suddenly need intensive healthcare delivered in the home, requiring data-intensive continuous monitoring. Furthermore, people are increasingly transient, driving further location-independent demand variability.

period, $Tavg$ for upstream (US) utilization increased a significant 57%. Notably, U.S. CAGR is coming closer in line with DS CAGR (24% over the past three years), and the DS:US ratio is trending downward toward 12:1.

Reliability

While reliability has always been an important requirement, the emerging applications such as home healthcare and work from home impose much higher standards of reliability. A patient being treated at home for an acute illness whose medical monitoring equipment requires broadband access cannot tolerate any network downtime.
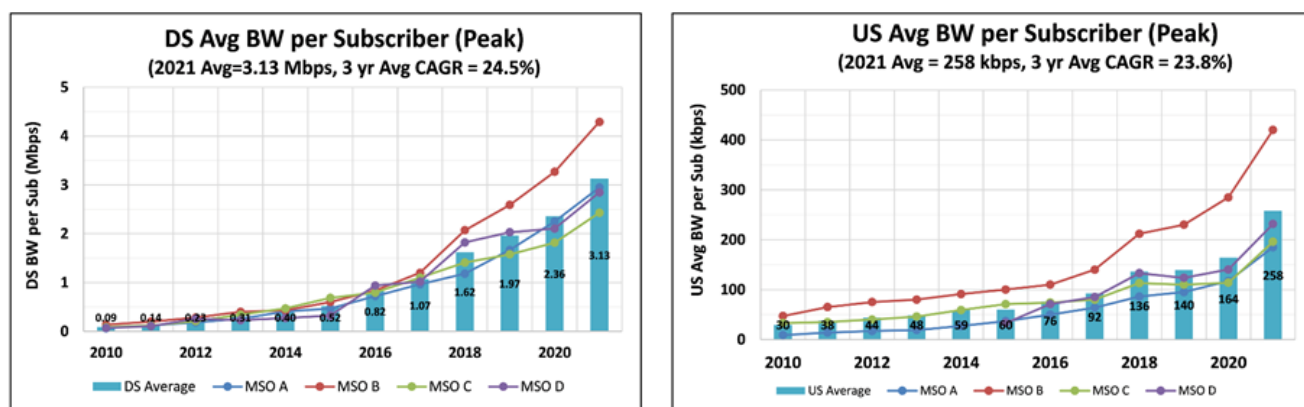

Figure 1. Bandwidth consumption trends. Source: CommScope

Capacity

Broadband consumption continues to grow. However, while while most of the growth thus far had been downstream, upstream bandwidth consumption has started to increase substantially over the recent months, driven by work from home, home-based healthcare, and other applications that require upstream transmission. In fact, an analysis by CommScope indicated average peak-time busy-hour bandwidth consumption (*Tavg*) downstream (DS) increased 32.5% in January 2021 versus January 2020, and for the same

Mobility

Today, consumers expect services to follow them where they go. Work anywhere means that people need to access their work environment even while they are transient, and patients who need constant monitoring need to be monitored anywhere they go.

The enabling network

It is clear that rigid legacy systems, where capacity allocation is largely static, are ill-suited for these increasingly common scenarios. What is needed is an infrastructure that dynamically

allocates capacity where it is needed and when it is needed.

Meeting the above requirements, and more, requires a state-of-the-art network with high capacity, elasticity, adaptability, resilience, and reliability. This infrastructure has to be software-based, automated, and intelligent.

At the same time, operators need to continue to support existing services; therefore, hybrid networks and delivery models will be the norm for the foreseeable future.

Delivering the capacity

The lines between wireless and wired are increasingly fungible, as customers simply expect services to be available when and where they need them.

THE 10G NETWORK

The growing capacity requirements, both upstream and downstream, require the 10G network, which can deliver up to 10 Gbps both upstream and downstream. Delivering this capacity will necessitate a new network architecture. Cable operators have primarily two methodologies to meet the capacity needs: distributed access architectures (DAAs) and passive optical networks (PONs).

DAAs enable operators to augment capacity and improve resiliency by extending the digital part of the plant to the access node. This is accomplished by either moving the PHY layer to the access node (Remote PHY), or moving the PHY and MAC capabilities to the node (Remote MACPHY). While there are tradeoffs to each configuration, they both enable operators to push fiber deeper in the access network and set the stage for virtualization.

The significant increase in upstream capacity utilization calls for more capacity being allocated upstream. In an HFC environment, this is achieved by allocating more spectral capacity to upstream broadband, through either mid-split or high-split configurations. Furthermore, over the longer term, operators will need to introduce DOCSIS 4.0 for additional capacity.

PONs enable operators to extend fiber to the home (FTTx), in areas where it makes sense, enabling IP all the way to the premise, and delivering substantial bandwidth both upstream and downstream.

THE 5G NETWORK

Cable operators increasingly have successful and fast growing wireless businesses. At the same time, consumers and businesses need their services to be available where they go, and require the bandwidth capacity and low latency these services require. Therefore, operators will need to migrate to 5G, which delivers the capacity, efficiency, private network capability, and consistency required to offer the services the market increasingly needs.

Automation

The distributed, complex architectures being deployed to meet capacity requirements cannot be configured and managed with today's largely manual processes and scripts. They require higher levels of automation, starting with automating current processes for deployment, configuration, and scaling, but quickly evolving to adding more and more intelligence and analytics that enable fault mitigation, early intervention, and eventually self-healing and autonomous networks. Machine language and ultimately artificial intelligence will play a key role in the networks of the future.

Virtualization

The elastic nature of demand and its constantly changing parameters mean that rigid allocation of resources is wasteful and inadequate to meet capacity needs. For example, as workers adopt hybrid work models, it is hard to anticipate when workers will need more home bandwidth. Meeting the changing demand needs software-based networks that automatically and elastically allocate capacity where it is needed, when it is needed. DAA is the first step towards virtualization because it removes the hardware components from the headends and hubs; but to unlock the benefits of elasticity and agility, operators need to also migrate over time to a virtualized environment where the management plane, video plane, and data plane are virtualized.

Resilience

The increasingly mission critical applications riding over the network call for a highly reliable, resilient network, which maintains an acceptable level of service despite errors and malfunctions.

The right solutions, the right partners

Meeting the emerging and fast evolving requirements necessitates a continuum of solutions, along with new skillsets, ecosystems, and operating environments. Operators need to evolve their networks to deliver the new services, while maintaining and supporting existing services and customers. This imposes a significant amount of complexity. Operators have various levels of capabilities and skillsets and need to work with vendors and partners who offer the complementary resources they need, the right solutions for their customers, and who have the right combination of proven solutions and know how that straddle the traditional infrastructure and the state of the art architectures. This is because networks do not evolve overnight, but need well-thought-out evolution plans and customized comprehensive solutions, guided by the right levels of expertise and support.

Gary Cunha is director, marketing and strategy at [CommScope](). Gary is a principal member of CommScope's Assurance leadership team and has over 30 years' experience in delivering software solutions. Currently, his focus is on defining new product and solution strategies that fit critical market needs. Previously, Gary was part of the product management team and also led CommScope's software engineering office in Boston, MA. Prior to joining CommScope, Gary was a technology director at Auspice Corp. (a startup acquired by CommScope), worked on the Space Station for NASA at Johnson Space Center, and with the Navy on autonomous vehicles and intelligence programs.

Distributed Access Architecture (DAA) was developed to address surging bandwidth demand and provides two deployment options—**Remote PHY and Remote MACPHY**. *Which one is right for your network?*

CommScope has made the decision easy with the introduction of the RD2322, the industry's most flexible RxD solution, which:

- Can be deployed as a Remote PHY or Remote MACPHY device

- Helps operators achieve new levels of flexibility, operational efficiency, and business agility

- Makes network evolution to DAA faster and easier than ever before

To learn more about the RD2322, download our whitepaper and brochure, then visit our product page.

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Report: Virtualization set to boom

BY BTR STAFF

According to Rethink TV, a boom in virtualization of fixed broadband access infrastructure is developing and will sweep through almost all connections over the next decade, passing the 500 billion mark in 2025. That will be 40% of the total 1.26 billion global broadband subscriber base by then, compared with 0.48% at the end of 2018 and 2.58% at the start of 2020.

Except for Africa, virtualization is expected to proceed at a similar pace in all regions with relatively little difference between the telco and rather smaller cable broadband sectors. This reflects virtualization being universally recognized as essential to contain costs and boost efficiencies. With voice alone no longer generating much revenue and margins for video squeezed to around 15% in North America and Europe, broadband continues to deliver 60% or more, intensifying competition in the broadband space and driving operators toward virtualization to defend those margins.

Most operators deployed broadband over their existing infrastructure, which was originally developed for TV in the case of cable and voice followed by dialup data for telcos. That infrastructure has evolved to higher speeds through technical advances in terminating equipment and increased penetration of fiber,

but is now running out of road for further improvements and is inhibiting new services for the digital home. This is provoking the impending virtualization, which is only just beginning or yet to for most operators. The pace is expected to pick up during 2020 and continue to increase over the next five years, running at more than 9% of total connections per annum by 2025.

While Comcast on the cable side and telco Deutsche Telekom are expected to be among the strongest early adopters, many operators in developing countries across Asia Pacific and Latin America will be not far behind as they deploy virtualized equipment, expanding footprint and as part of the replacement cycle. Some developing countries are expected to be among the leaders, with Indonesia on course to virtualize 63% of its connections by 2025, a considerably higher proportion than the United States at 42.8% because of a greater encumbrance of legacy technology.

Comcast Business acquires SDN, cloud specialist Masergy

BY BTR STAFF

Comcast Business on Aug. 25 announced that it signed an agreement to acquire Masergy, a Plano, Texas-based expert in software-defined networking (SDN) and cloud platforms for global enterprises.

The acquisition stands to accelerate Comcast Business's increasing growth serving large and mid-size companies, particularly U.S.-based organizations with multi-site global operations, the company said in a statement.

"Masergy provides a perfect complement to our portfolio of enterprise services and solutions and will allow us to instantly and dramatically amplify our growth in the global enterprise market," said Bill Stemper, President, Comcast Business. "We're excited to welcome Masergy's employees and leadership to Comcast Business as we bring continued innovation and superior experience to our customers."

Comcast notes that, with over twenty years' experience and innovation in delivering managed network, cloud, and security services, Masergy has become a leading provider to companies worldwide, serving more than 1,400 customers in nearly 100 countries.

The combination of Comcast Business's advanced fiber network and Masergy's innovative services will enable Comcast Business customers to manage their

international operations and networks more efficiently and securely, said the companies.

Masergy enables secure application performance across the network and the cloud with its Managed SD-WAN, Unified Communications as a Service (UCaaS), Call Center as a Service (CCaaS) and Managed Security offerings.

Notably, Masergy has been recognized for the past five years as a "Visionary" in Gartner's Magic Quadrant for Global Network Services.

Comcast Business's acquisition of Masergy is subject to regulatory approval and other customary conditions. Financial terms of the acquisition were not disclosed.

"On behalf of everyone at Masergy, we are thrilled to join the Comcast Business family and are extremely excited for the next chapter of Masergy. We are confident that together we can significantly enhance our service offerings to businesses of all sizes in their journey to the cloud," concluded Chris MacFarland, Chairman and CEO, Masergy.

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As a global technology leader in connectivity, CommScope's network solutions are essential to the world's critical communications infrastructure. By utilizing innovative technology, intelligent engineering and energy-efficient designs, CommScope is building sustainable networks that make our customers more agile while also preserving the natural ecosystems from which we source our raw materials. We're privileged to have the talents of extraordinary thinkers and innovators who are recognized internally and by outside organizations for their efforts. Their committed spirit drives us as a company to be a model of safety, sustainability, and corporate responsibility. CommScope has been recognized by customers and organizations around the world for outstanding solutions and services, management systems, Corporate Responsibility and Sustainability programs, initiatives and performance.

➚ Accelerate DAA Deployment with the RD2322
Remote PHY/MACPHY Device

➚ Virtualization – The Virtual Headend

➚ RD2322-RXD | RD2322 Remote PHY/MACPHY Device (RxD)

➚ Moving existing HFC networks into the future