INFOBRIEF

How to thrive in the growing broadband market

Flexibility is needed to thrive in today's broadband market. Demand at the network edge is growing, driven by remote work, new applications, streaming video, and everything moving to the cloud. Network operators are deploying fiber to meet today's demand while also looking to create a path to the future. They realize fiber has at least a 30-year life and that the access network is a long term business and strategic asset. The question is how best to unlock the value of that asset, to scale where and when needed, and to accelerate corporate sustainability goals.

It is a defining moment in the industry—where a once-in-a-generation public and private investment in broadband will redefine how internet access is delivered and consumed for both personal and business applications. It is an opportunity to rethink how innovation can be used to address new opportunities.

Ubiquitous, affordable, and reliable broadband will not only ignite a new wave of cloud-based applications for existing consumers but will also directly address digital inclusion for underserved communities to enable broader socioeconomic growth by shrinking the digital divide.

Network operators must be able to meet the demands of a growing subscriber base and the need for speed and performance while ensuring customer satisfaction. Despite increasing competition, commercial success requires a new way of thinking that is not limited by the legacy architectures of incumbent vendors or an outdated operational approach. Legacy architectures typically have a chassis-based or pizza-box form factor with limited choice for size (small, medium, or large). Therefore, scaling is not graceful, and the inherent size of the platform dictates where it can be physically and economically located in the network, not to mention the footprint, power, and cooling requirements negatively impacting sustainability goals.

Using groundbreaking innovations in passive optical network (PON) pluggables (micro-optical line terminal or uOLT), purpose-built routers, optical network units (ONUs), and subscriber management (Ciena's virtual Broadband Network Gateway [vBNG]) and network control software (Navigator Network Control Suite™ [Navigator NCS]), Ciena's broadband solution gives operators unprecedented flexibility to build and evolve their access networks to serve more customers in more locations, scale cost-effectively, and achieve greater sustainability.

Innovative architecture

For example, the uOLT is a fully functional OLT in a small form factor pluggable (with an embedded Ethernet-to-PON OLT MAC bridge) and, when

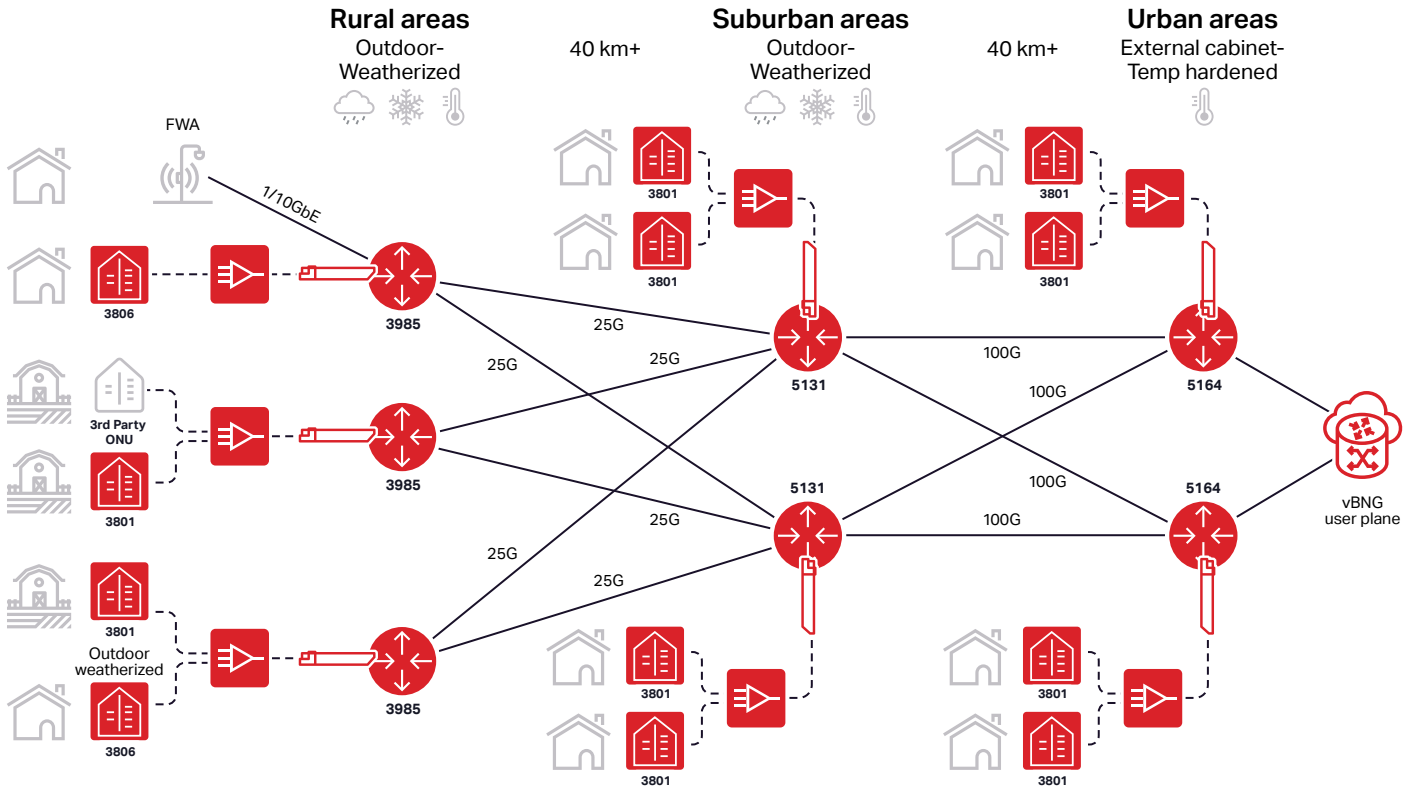

Figure 1. How Ciena's broadband solution can support the requirements of multiple communities

plugged into an Ethernet port in a host switch or router, turns that port into an OLT on a port-by-port basis. Operators can now deploy PON anywhere in the access network (outdoor cabinet, remote pole, or in a controlled environment) with port-level granularity, all without the need for a dedicated OLT chassis. Ciena's robust family of routers and switches includes everything from weatherized outdoor remote routers to a full suite of access and aggregation routers. Operators can deploy remote PON to the far reaches of their network while also converging other services (Ethernet, IP, TDM, PON, and so on) as they pull in traffic from the access portion of the network, enabling numerous revenue opportunities. Operators can use existing infrastructure and cost-effectively deploy 10G PON surgically or at scale in greenfield, brownfield, or mixed networks (see Figure 1).

In addition to deployment flexibility, granular scaling is a highlight of Ciena's broadband solution. Granular scaling begins in increments as small as one port/one uOLT and scales up based on traffic demand by adding more uOLTs into available ports in the same router or into available ports in other routers for true pay-as-you-grow economics. Ciena's broadband solution with the XGS-PON uOLT offers one of the best XGS-PON port densities per rack unit (RU) with the lowest power consumption for typical deployments.[1] Operators can deploy and efficiently scale capacity and deliver service only *where* it is needed, *when* it is needed, and in the increment *in which* it is needed.

The key to the uOLT and higher-speed PON (25GS-PON and CPON) is ASIC development. Ciena owns, develops, and controls the ASIC technology, which is an industry-leading innovation that enables a fully functional OLT to be put on a chip. Combining this with Ciena's leadership in coherent optical technology provides operators with unmatched flexibility and an ensured path to future innovation. When considering the investment going into fiber, which can have a 30-year life, it is extremely important to choose a trusted adviser that controls the technology and can continue to innovate well into the future.

Ciena's broadband solution uses universal aggregation (UA) to support multiple service options, in addition to XGS-PON. Network operators can offer enterprise business services over IP or dedicated Ethernet and mobile wholesale services with xHaul transport capabilities, as well as PON—all from the same aggregation router in a highly optimized

1 OMDIA, "Pluggable PON and Ciena – promoting sustainable access," April 2024

footprint to reduce power and space requirements, thereby accelerating sustainability.

End-users gain access to a family of ONUs that can be deployed indoor or direct outdoor, each with flexible port speeds up to 10G, so they benefit from multi-Gb/s connectivity. Support is also available for third-party ONUs using the open ONU management and control interface (OMCI), with the solution using the innovation of the uOLT (see Figure 2).

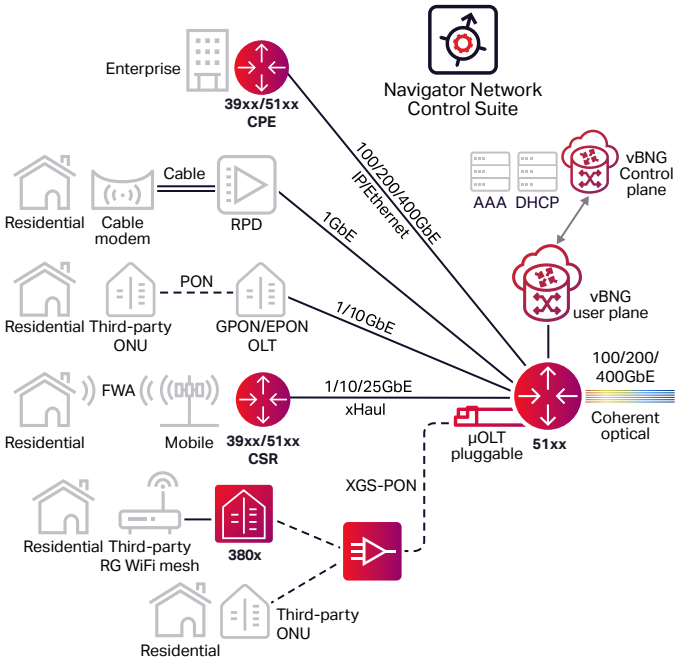

Figure 2. Ciena's access and UA

Subscriber management (vBNG)

Network operators are looking to deliver the best quality of experience (QoE) to their customers with the ability to apply service policies tailored to the specific needs of a given customer.

The fixed broadband network has several critical components, but a cornerstone is the broadband network gateway (BNG). The BNG establishes and manages subscriber sessions by acting as the authentication point through which subscribers connect to a carrier's broadband network. It aggregates subscriber traffic from the access network and handles several important subscriber management functions, including authentication, authorization, and accounting (AAA), IP address assignment, quality of service (QoS), and policy enforcement. All traffic outbound to the internet passes through the BNG, and all traffic inbound from the internet passes through the BNG on its way to the customer.

It is impossible to predict how application and service demands will change over time. Think of the number of technological advancements taken for granted that didn't exist a decade ago. The challenge is to build a flexible network capable of addressing changing market dynamics, particularly at the network edge.

With legacy chassis-based BNGs and their historically closed architectures, it can be difficult to address rapidly changing demands for scalability, flexibility, and innovation at the network edge, especially when addressing new application requirements. BNGs typically come in fixed sizes (small, medium, or large) and are often deployed in a centralized location, demanding user traffic be pulled deeper in the network for handling.

Ciena's vBNG is open architected and built to the Broadband Forum's TR-459 Standard: "Control and User Plane Separation for a disaggregated BNG." User planes (which handle subscriber traffic) can be pushed to the edge, sized and placed where needed, and scaled to meet application performance requirements and changing traffic demands. Ciena's software-defined vBNG provides additional integrated functions, such as a Dynamic Host Configuration Protocol (DHCP) server or carrier-grade network address translation (CGNAT), without the need for additional hardware. Flexibility and scalability are fundamental to the design of the vBNG.

Navigator NCS

Network operators want to operate and scale their broadband networks in a cost-effective and sustainable way. However, they are often encumbered with multiple legacy element management systems (EMSs) or controllers that require manual coordination of IP and optical operational workflows, resulting in long lead times and suboptimal network designs. With Ciena's Navigator NCS, operators gain a single point of control to visualize the performance of their multi-layer, multi-vendor infrastructure to simplify, optimize, and automate network operations—reducing costs and improving customer QoE. In combination, Navigator NCS and Blue Planet® provide operators with the visibility, control, and automation to easily and quickly plan, provision, manage, and orchestrate their multi-layer network from end to end across domains to effectively deliver broadband services.

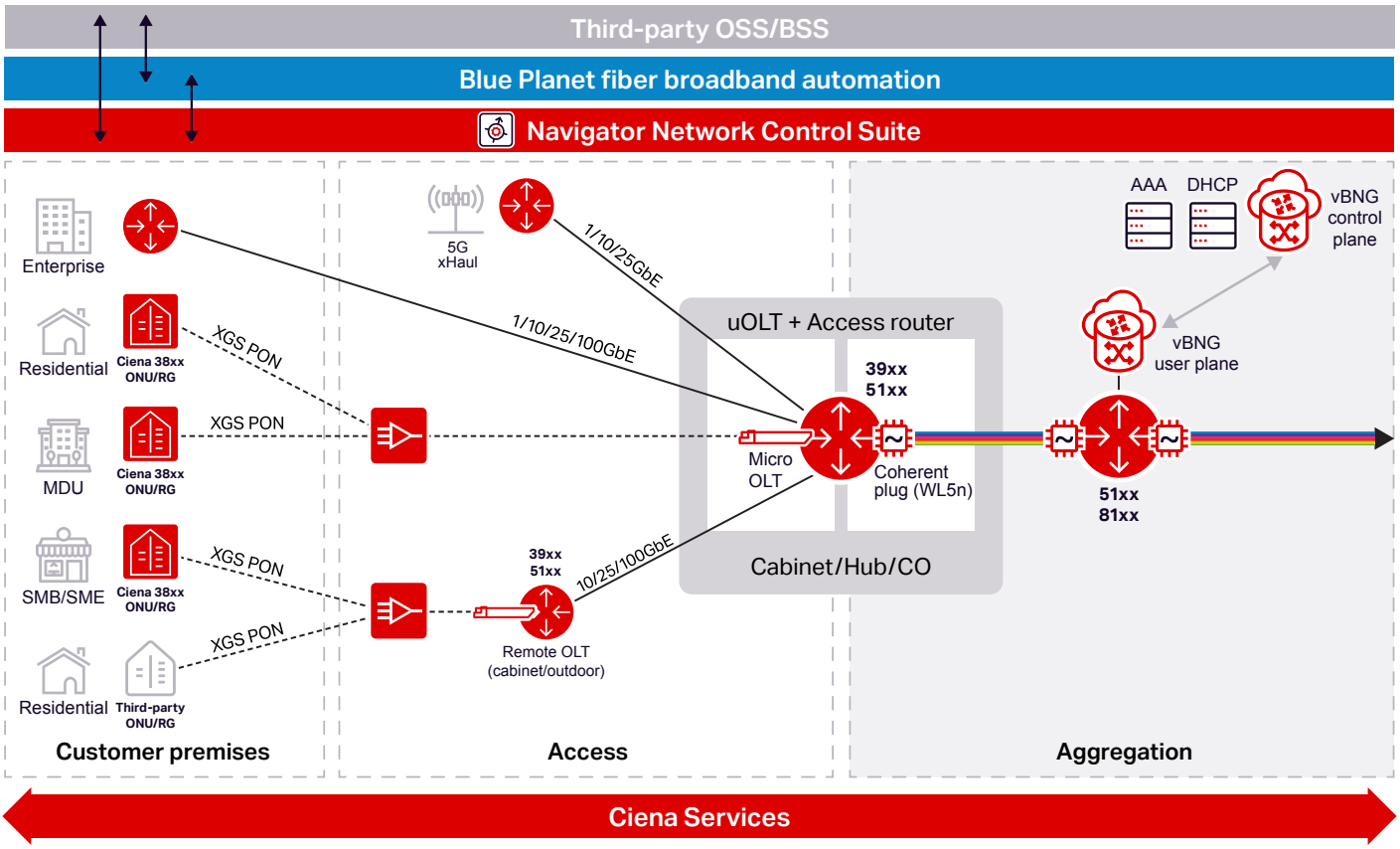

Figure 3. Ciena's broadband access solution

Ciena Services: Support for new and existing network operators

Operators can also benefit from Ciena's expertise in several areas, including network planning, design, deployment, management, maintenance, optimization, evolution, and support. Ciena can also address skill gaps by training operator technical staff.

Access to Ciena's technology is a great start. But considering the diverse range of broadband providers, from long-standing operators to newer and perhaps smaller entrants, capitalizing on that technology requires a team with the right experience, insights, and tools to tie those pieces into a cohesive and profitable solution. This is why Ciena has developed a two-pronged strategy: A flexible, scalable, and sustainable portfolio facilitated by a robust suite of services for broadband.

Ciena goes beyond infrastructure by offering network operators a complete operational approach to accelerating their broadband network deployment or modernization journey, from planning to deployment. This may be particularly useful to operators such as utility co-ops, municipalities, or smaller service providers.

Whatever your team's operational strengths, Ciena's services for broadband are both robust and flexible. To help address operator needs, Ciena has developed a blueprint that anchors an end-to-end suite of professional, support, and learning services to assure commercial success. These services are designed to be flexible rather than an all-or-nothing proposition and are available individually as well as in a packaged solution.

Ciena Services for broadband include:

- Customizable reference blueprint-anchored solution with planning, design, and integration that pre-validates Ciena and third-party components and allows for customer-preference substitutions
- Operations support system/business support system (OSS/BSS) integration
- Enhanced deployment capabilities, such as:
  - Integrated staging, including passive and active cabinets
  - Deployment/turn-up and test
- Rollout assurance for initial service rollout and/or self-deployment

- Go-to-market support, including learning services and the Marketing as a Service (MaaS) program (detailed in the next paragraph)
- 'Day 2' support, including managed services and technical support

MaaS features customized marketing strategies and tactics designed to help participants get the most from their network investments. MaaS is available to participants in the CPNe program and/or select customers. Ciena not only supports the development of go-to-market strategies but also helps with execution so you can win the business.

Accelerating sustainability

As stewards of the planet, customers have declared support for corporate sustainability goals, and technological innovation can help accelerate those efforts.

Traditional access networks are built with single-purpose power-hungry equipment that takes up an inordinate amount of space, regardless of equipment size, not to mention the power and cooling requirements, which negatively affect sustainability goals.

Ciena's uOLT has no such constraints. As a pluggable solution, it only incrementally uses space, power, and cooling when needed. And sustainability goals can be accelerated since multiple services (Ethernet, IP, TDM, PON, and so on) can be delivered out of the same space-saving converged router.

For example, comparing Ciena's converged access with XGS-PON and routing in a single platform to a traditional pure PON chassis-based, multi-boxed solution results in a 67% reduction in footprint and 63% reduction in power consumption using a Ciena solution.[2] This is just one example applied to 100,000 homes passed at a 50% market share (12 sites) using a 64 OLT split, which can avoid 84,400 kWh annually and result in 59.8 metric tons of CO_2 avoided. A higher market share rate or homes passed would yield much larger sustainability results.

Summary

While different operators face their own unique set of challenges, they share a common thread: All are seeking to best serve their customers while also securing their business' financial and operational success now and into the future. This means establishing, maintaining, and growing their customer base, generating new service revenues, and improving CAPEX and OPEX efficiency.

This defining moment—where a once-in-a-generation public and private broadband investment will redefine how internet access is delivered and consumed—is an opportunity to rethink how innovation can be used to address new opportunities.

Ciena's broadband solution delivers the innovation needed to give operators increased flexibility to build and evolve their access networks for a path to better broadband.

Was this content useful? ◯ Yes ◯ No

2 OMDIA, "Pluggable PON and Ciena – promoting sustainable access," April 2024