APPLICATION NOTE

Broadband for communication service providers

In recent years, there has been a major shift in how we work, play, and access entertainment by migrating many activities from specific locations to our homes. In this ever-changing environment, having reliable connectivity has become paramount to helping communities thrive and families access the major digital economy. However, many were left stranded by inadequate or unaffordable access to internet connectivity. From remote communities with little to no broadband connectivity to poorer urban areas with affordability challenges, the digital divide remains an overwhelming obstacle for many individuals and communities at large.

Compounding the challenge, developers and content providers are continually investing in bringing new digital applications and technologies to the consumer market, such as artificial intelligence (AI), extended reality (XR)–based immersive experiences, and work-from-home collaboration tools. This new ecosystem of applications will significantly raise the bar for acceptable broadband service performance, even when compared to today's most bandwidth-consuming 4K video streaming services. This will create additional challenges for service providers.

Communications service providers (CSPs) are not new to the broadband market. They have invested, developed, and implemented a mature residential broadband infrastructure and associated services for decades, historically focusing on more lucrative urban and densely populated areas. But, while their profound experience and market penetration put them in an advantageous position, they must rethink their broadband network strategy to stay ahead of new applications and customer demands while continuing to enable digital inclusion.

Highlights

- Strong adoption of home-based activities—like remote working and learning, telemedicine, cloud gaming, and video streaming—has changed broadband service requirements related to bandwidth, latency, availability, and symmetry
- The main challenge for CSPs in coming years is supporting new applications by providing a better quality of experience (QoE) while improving broadband affordability
- Existing gigabit passive optical network (GPON) and digital subscriber line (xDSL) technologies do not have the scalability, performance, and symmetry that new applications require
- Multiple governmental subsidies and stimulus programs will change the CSP marketplace, creating opportunities and increasing competition
- CSPs must rethink their residential broadband networks to make them more flexible, scalable, and sustainable
- Unlike legacy approaches, Ciena helps operators build a sustainable broadband access network

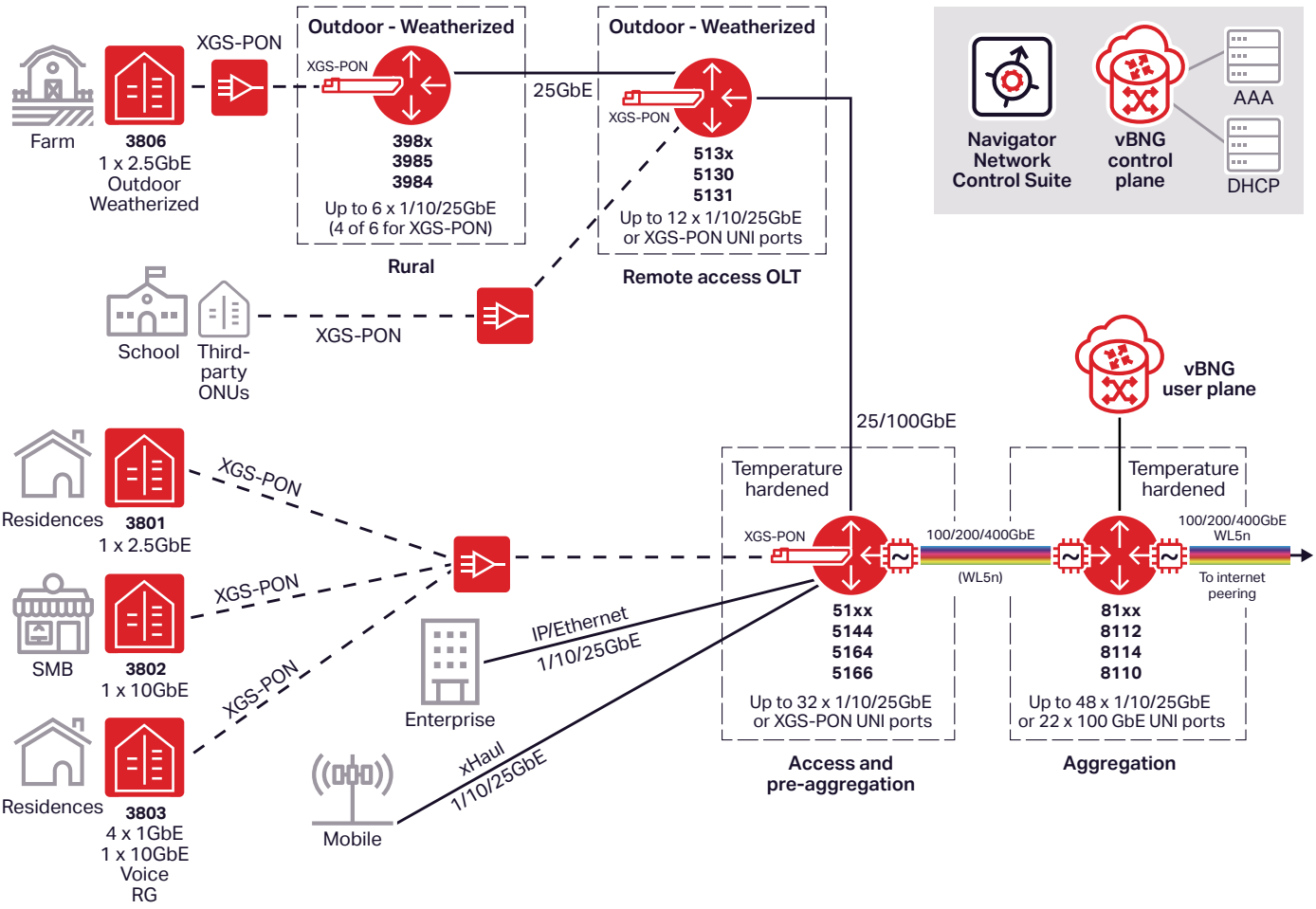

Figure 1. Ciena's broadband solution for access networks

Operators unwilling to change their architecture or approach will limit their ability to compete. As new applications and market dynamics are significantly changing broadband service requirements, many CSPs are still using solutions based on legacy technologies, like xDSL or GPON, which simply cannot provide the performance and cost efficiencies required. In addition to using aging technologies and inefficient architecture, legacy solutions are rigid in design, limiting CSPs' ability to take a best-of-breed approach to modernizing their broadband network infrastructure. As a result, CSPs have fewer opportunities to capitalize on new network innovations to improve service affordability and the end-customer experience.

Unfortunately, legacy fixed-chassis optical line terminals (OLTs) and broadband network gateways (BNGs) force service operators to sacrifice flexibility, scalability, and sustainability. They are typically constrained in size (small, medium, or large) or in fixed port count. This immediately constrains deployment by dictating locations where it is viable to place this equipment both in terms of physical space required and capacity handling. This often leads to deploying more capacity than needed in specific locations, particularly in the early phase of a network buildout.

Creating an inclusive digital future is too important for service providers to sacrifice. Unsurprisingly, CSPs are rethinking their broadband networks, moving away from a closed chassis-based approach and looking for new ways to build and evolve access networks. Service providers need unprecedented flexibility to serve more customers in more locations, scale cost-effectively and only as demand requires, and achieve greater sustainability with the smallest footprint and lowest-power technology.

Ciena offers unparalleled flexibility in broadband network deployment. It begins with Ciena's micro-OLT (uOLT). It is the industry's first fully functional OLT in a small form factor pluggable (with embedded Ethernet-to-PON OLT MAC bridge). The uOLT turns Ethernet ports in a host switch or router into a fully functional

OLT on a port-by-port basis (no dedicated chassis required). The uOLT can be deployed anywhere in the access network, whether in an outdoor cabinet, pole, or controlled environment, with port-level granularity. This flexibility allows operators to use existing infrastructure and deploy 10G PON cost-effectively, whether on a small or large scale, in greenfield, brownfield, or mixed-vendor networks. Since no dedicated OLT chassis is required, converged router/switch ports can be used for all services, including Ethernet, IP, TDM, OLT, and more. This protects the operator's investment and introduces numerous revenue opportunities. It also eliminates the need to qualify multiple OLT boxes for PON deployment. You can qualify the uOLT once and deploy it anywhere.

Ciena's broadband solution allows for granular scaling, starting in increments as small as one port/one uOLT and scaling up based on traffic demand. This enables a pay-as-you-grow economic model. With Ciena, you can position the virtual Broadband Network Gateway (vBNG) (subscriber management function) anywhere in the access network and scale it to handle evolving traffic patterns effectively.

The pluggable uOLT model allows a move to higher speeds (25GS-PON uOLT) without major disruption and also opens new market opportunities. ASIC development is key to uOLT and PON scaling to higher speeds (25GS-PON and CPON). Ciena owns, develops, and controls the ASIC technology. Combining this with our leadership in coherent technology, it provides unmatched flexibility and a guaranteed path to future innovation.

Ciena's broadband solution is designed with sustainability in mind. Since no fixed chassis is required, pluggable uOLTs can be deployed in a qualified router (a port at a time) and only use power, cooling, and space when needed. Converged router/switch ports can be used for all services, helping service providers provide broadband services with XGS-PON. They can also add mobile and enterprise services on the the same fiber (when the market demands) using pluggable 25GS-PON, with only an incremental increase in power and cooling. With Ciena, you can maximize revenue, scale with demand, and reduce environmental impact, all while using your existing infrastructure.

Legacy chassis-based OLTs and chassis-based BNGs often come in fixed sizes (small, medium, or large), which force service providers to sacrifice flexibility, scalability, and access sustainability. Ciena's pluggable uOLT, converged routers, and vBNG can be deployed anywhere in the access network with an unmatched level of granular scalability to help you optimize deployment economics and reduce environmental impacts in the access portion of your network without sacrifice. When managed by Navigator Network Control Suite™ (Navigator NCS), service providers can perform infrastructure, service, and subscriber lifecycle management to simplify operations, reduce your OPEX, and transform your access network.

Igniting a digital future requires planning, deployment, management, and support for implementing the latest broadband technologies—and specialized skillsets, tools, and deep institutional knowledge. While some network operators may have the requisite capabilities, others may not. Ciena Services offers a full suite of services to enable your success. These services are designed to be flexible—they are available individually or can be packaged together—and include consulting, implementation, systems integration, maintenance, managed services, optimization, and learning.

With Ciena, CSPs have unparalleled flexibility to build and evolve their broadband access networks, protecting their network investment and maintaining a competitive edge—while enabling digital inclusion.

With once-in-a-generation broadband investments, CSPs need a path to better broadband for the flexibility, scalability, and sustainability needed to create an inclusive digital future.