Residential Broadband for Cable/MSOs

Cable companies, also known as Multiple System Operators (MSOs), perform an essential role in providing residential broadband services, mainly in North America. For decades, they have been the leading broadband service provider for many cities and communities—and they helped navigate the challenges created by the COVID-19 pandemic. Now, in a moment where access to broadband connectivity is recognized as a key driver of socioeconomic improvements, Cable/MSOs are in a prime position to leverage their extensive experience to bridge the digital divide. Nevertheless, this opportunity comes with challenges: New applications are requiring more from networks and market dynamics are bringing new players to regions previously dominated by Cable/MSOs, significantly increasing competition.

Additionally, Cable/MSOs have a strong presence as broadband connectivity providers for Small and Medium Businesses (SMBs) in many regions. They also have significant investments in implementing a Converged Interconnect Network (CIN) and moving fiber deeper into the network. These two factors create an excellent opportunity for Cable/MSOs to target large enterprise markets, expanding their addressable market and creating new revenue opportunities.

Rethinking their broadband network infrastructure by adopting a more open, modular, and scalable network solution is the necessary next step to enable Cable/MSOs to protect their competitive edge and provide the flexibility to grow their core business while expanding into new markets.

Rethinking network strategy to succeed in a new market

The last several years saw a drastic shift in how and where people work, play, and learn. 'Everything-from-home' behavior necessitated by the global pandemic shed light on the importance of good, reliable, and affordable broadband connectivity services to help support individuals, families, and communities in achieving financial, social, and educational goals. It also accelerated the development of cloud-based applications with more strict network requirements. Aspects like high bandwidth, low

Highlights

- The strong adoption of home-based activities like working and learning changed broadband service requirements concerning performance and symmetry

- Competition from service providers using different access technologies like Passive Optical Network (PON) and 5G-based Fixed Wireless Access (FWA) is growing fast, mainly in densely populated areas

- For many years, Cable/MSOs invested in Data Over Cable Service Interface Specification (DOCSIS) technology to provide broadband services over cable's Hybrid Fiber Coax (HFC) networks

- DOCSIS cannot provide the same scalability, performance, and symmetry as PON, or the cost and flexibility as 5G FWA

- Cable/MSOs are looking to augment the existing DOCSIS network capacity to support the latest customer demands while leveraging fiber-based access when competition requires

- Ciena supports Cable/MSOs in implementing residential broadband networks without compromise

latency, symmetry, and reliability have been desirable but not mandatory in the past—but are now more important than ever.

Cable/MSOs are invested in deploying and expanding HFC-based networks, leveraging the multiple integrations of DOCSIS technology to provide customers the latest residential applications and services. They are also investing in moving fiber deeper into the network and implementing a Distributed Access Architecture (DAA) to keep up with new competition and application requirements.

Competition is also growing significantly, even in areas where Cable/MSOs used to be alone. Communications Service Providers (CSPs) are investing in fiber-based access technology like PON, and Mobile Network Operators (MNOs) are leveraging 5G FWA to provide residential services in both new and served areas. This competition is causing Cable/MSOs to lose customers and sacrifice their Average Revenue Per User (ARPU), which was already impacted by the 'cord-cutting' trend. And complicating matters further, the constant investment Cable/MSOs are making to update their DOCSIS-based networks is not enough to compete with fiber's scalability, reliability, and performance or with the cost and flexibility of FWA implementations.

Despite all the challenges, Cable/MSOs have an established brand, strong customer relationships, and deep operational expertise in broadband services. The once-in-a-generation public and private investments in broadband networks happening in the next five years provide the perfect opportunity to rethink network strategies and evolve their existing infrastructure to create a highly competitive residential broadband service portfolio without compromise.

Supporting new applications and helping bridge the digital divide will define the winners and losers in the residential broadband market. Ciena is ready to enable Cable/MSOs to evolve their CIN strategy by implementing an open, modular, and scalable infrastructure that can support their existing DOCSIS-based network while providing access to the latest PON technology like XGS-PON.

DAA and CIN
Learn more

$\rightarrow$

Why Ciena for residential broadband

- **Open:** Protects future growth by enabling providers to focus on quality customer experiences while containing cost and offering services at affordable prices

- **Modular:** Allows providers to start small and expand networks where and when residential, business, and institutional customers need it—streamlining operations and ensuring financial sustainability

- **Scalable:** Helps build a high-capacity, affordable, automated residential broadband network that scales dynamically so providers can deliver on customer expectations to ensure quality services

Ciena's Residential Broadband Solution

Ciena's solution to residential broadband is designed to deliver the scalability, openness, and modularity required by Cable/MSOs. This helps operators implement a sustainable network, remain competitive, support the important mission to bridge the digital divide, protect their network investment, and maintain a competitive edge well into the future.

This solution leverages the power of Ciena's portfolio, including Routing and Switching platforms with XGS-PON pluggable technology, market-leading optical networking technology, Ciena's Manage, Control and Plan (MCP) domain controller, Blue Planet® Intelligent Automation Software, and Ciena Services.

This solution allows end-customers to access applications for working from home, telemedicine, remote learning, cloud gaming, and Ultra-High Definition (UHD) video streaming, and enables network operators to upgrade their service portfolio features and capabilities when required by Metaverse and Augmented Reality/Virtual Reality (AR/VR) applications—without the need to rip and replace existing network infrastructure.

Cable/MSOs are moving fiber deeper into the network, closer to end-users, implementing a DAA by virtualizing and distributing the Converged Cable Access Platform (CCAP) and adopting remote Physical Layer Device (PHY) or Remote Media Access Control (MAC) and PHY in the access. This is part of how DOCSIS technology is evolving to support new applications requiring increased capacity and scalability in the network.
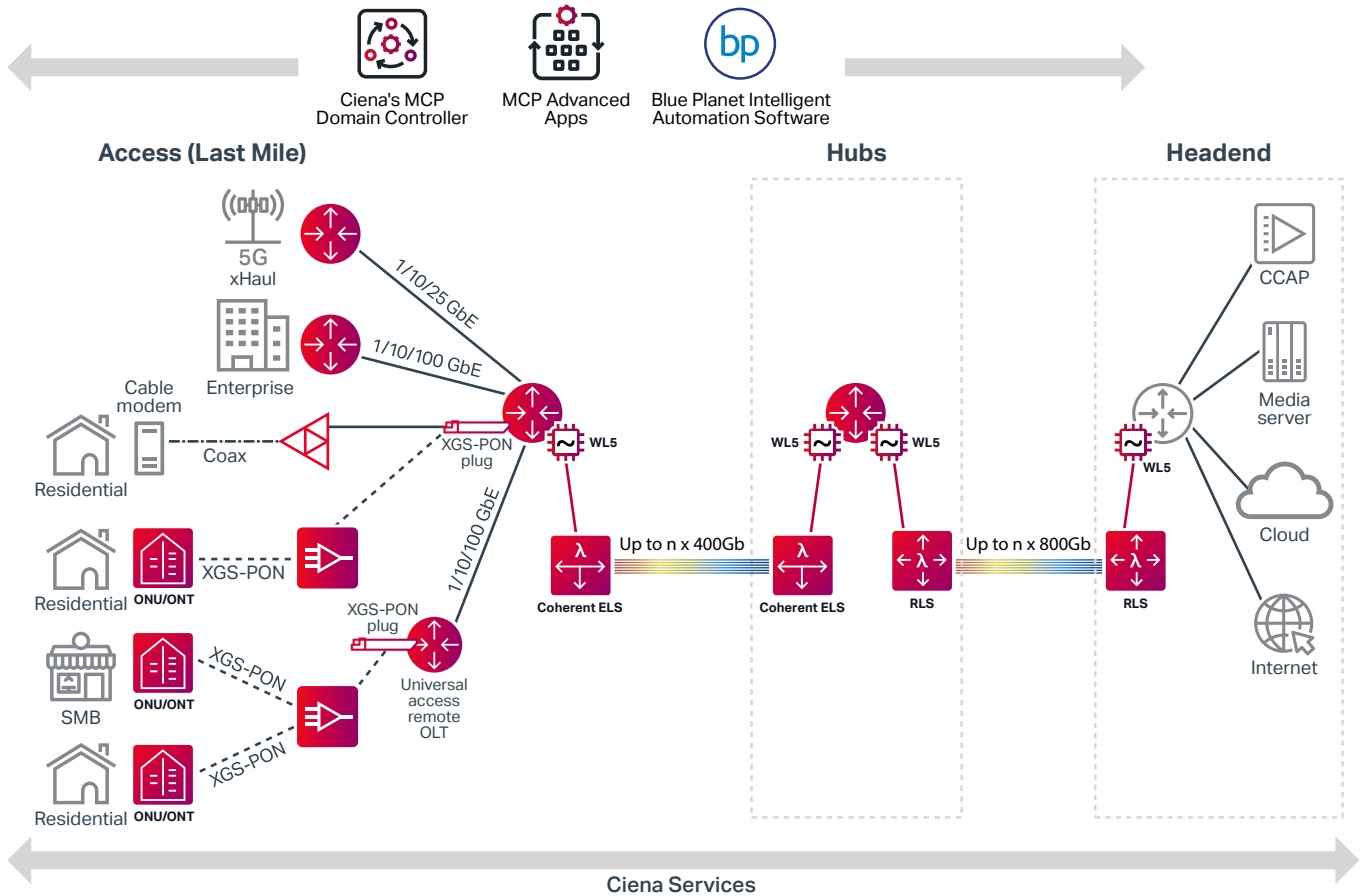
Figure 1. Ciena's Residential Broadband Solution

Cable/MSOs can achieve the capacity, optimization, and efficiency needed to evolve their CIN infrastructure—leveraging the combination of Ciena's routers, intelligent flexible photonics infrastructure, market-leading WaveLogic™ 5 coherent optical technology, and the MCP domain controller. By aggregating and supporting multiple services at the hubs, Ciena's Routing and Switching Platforms deliver unmatched scalability and flexibility to Cable/MSOs by providing traffic using multiple 100, 200, or 400GbE Network-to-Network Interfaces (NNI).

On the access network, Ciena's Routing and Switching Platforms integrate XGS-PON technology, offering symmetrical 10GbE connectivity over shared fiber. This solution allows Cable/MSOs to continue exploring their DOCSIS-based service portfolio, leveraging XGS-PON only when required or implementing a gradual migration to fiber-based access.

Ciena Services also provides customers with the expertise to plan, design, deploy, manage, maintain, and support their residential networks, as well as train their technical staff.

Innovative residential broadband architecture for Cable/MSOs

Ciena's Residential Broadband Solution allows the convergence of hub and Fiber-to-the-Home (FTTH) access functionality by integrating XGS-PON micro Optical Line Terminal (µOLT) pluggables in Ciena's Routing and Switching Platforms, offering shared fiber broadband services for residential as well as Small and Medium Enterprises (SMEs). Ciena offers the best XGS-PON port density per Rack Unit (RU) and the lowest energy consumption per port for typical deployments, while allowing customers to buy only the necessary XGS-PON plugs needed, when required, in a modular business model. As the market evolves, Ciena's Routing and Switching Platforms are ready to support 25G PON pluggables in the future.

Ciena's highly-scalable and modular solution allows network operators to easily go from tens to hundreds of XGS-PON ports without losing sunk platform investments, replacing existing network equipment, or needing significant upfront costs.

This solution leverages Ciena's Universal Aggregation (UA) and access capabilities to support multiple service options in addition to XGS-PON. With solution modularity, network operators can offer enterprise business services over IP or dedicated Ethernet and mobile wholesale services with xHaul transport capabilities. Moreover, they can have a highly-optimized footprint that reduces energy and space requirements to sustainably expand addressable market and revenue opportunities. Hardened and weatherproof platforms provide network operators with maximum flexibility and ability to move their OLTs closer to end-users for improved performance.

From the end-user side, Ciena's solution offers a family of Optical Network Units (ONUs), allowing end-users to benefit from multi-Gb/s connectivity while being open to support other vendors' ONUs to provide increased choice.

Ciena's solution is open by design, allowing Cable/MSOs to create the best possible network infrastructure by choosing preferred vendors that complement Ciena's network elements. This helps operators protect their competitive edge by not limiting their solution to a specific vendor's innovation cycle. This also allows operators to maintain better control over their procurement processes to minimize and outright eliminate lock-in.

Deploying broadband is much more than just deploying network elements

Cable/MSOs are looking to deliver the best Quality of Experience (QoE) to their customers while increasing operational efficiencies. Broadband network planning, infrastructure commissioning, service fulfillment, and service assurance can be complex as networks have grown. Ciena's PON Operations, Administration, and Maintenance (OAM) software simplifies network and service management. PON OAM's carrier-class management and control support Northbound IP API support for gNMI, NETCONF/YANG, and streaming telemetry over Secure Shell (SSH). PON OAM can be cost-effectively hosted on an external x86 server or internally on Ciena's UA platforms.

Ciena's Residential Broadband Solution also leverages Ciena's MCP domain controller which allows operators to scale the network—simplifying operations, reducing cost, and delivering the agility and resiliency their customers expect. It provides Cable/MSOs with the ability to manage and orchestrate their multi-layered network from end to end—including headend, hubs, and Customer Premise Equipment (CPE) when delivering broadband, enterprise, or mobile wholesale services using a common and integrated platform.

Supporting multi-vendor interoperability or third-party ONU integration, Ciena's solution avoids vendor lock-in by supporting both ONU Management Control Interface (OMCI) and Ethernet OAM in-band management. With rich carrier-class OAM and Provisioning (OAMP) software, operators can store configurations, provide Performance Monitoring (PM) data collection, perform fault monitoring, and manage firmware images.

Full support to Cable/MSOs

To ignite a digital future for all requires planning, deployment, management, and support for this emerging technology—and requires specialized skillsets, tools, and deep institutional knowledge. While some network operators may have the requisite capabilities, others may not. Ciena offers a full suite of professional support services, as well as learning and marketing services, to assure success. Ciena Services are designed to be flexible—they are available individually or as a packaged solution—and consist of Consulting, Implementation, Systems Integration, Maintenance, Managed Services, Optimization, and Learning.

Sustainability cannot be an afterthought

Investing in infrastructure to close the digital divide without considering all relevant environmental and economic sustainability aspects can negatively impact any service provider's long-term financial viability.

At Ciena, we continue to invest in the sustainability of all critical network elements by converging the access infrastructure with best-in-class routers, WaveLogic coherent optics, and innovative uOLTs and corresponding ONUs.

Sustainability models show we have already helped our customers avoid more than 550,000 metric tons of CO_2e over an eight-year period (2014–2021) with our Routing and Switching Platforms—helping our customers' production networks achieve 23 percent savings in power consumption, equaling 96,000,000 kWh saved which resulted in $12 million per year OPEX savings.[1]

Through our WaveLogic coherent optic investments, we introduced the industry's first 400 Gb/s transceiver in 2017 and are delivering the pluggable version five years later at one fifth the power, one tenth the space, and with improved industry-leading systems performance.

Combining Ciena's routing, optical, and PON innovations together offers significant improvements in footprint and power savings to enable more efficient and sustainable networks for our customers—and the planet at large. For example, evolving from a traditional pure PON chassis-based, multi-boxed solution to Ciena's converged access with XGS-PON and routing in a single platform results in a 67 percent reduction in footprint and 63 percent reduction in power consumption. This is just one example and, when applied to 100,000 homes passed at 50 percent market share (12 sites) using a 64 OLT split, can avoid 84,400 kWh annually, resulting in 59.8 metric tons of CO_2e avoided. A higher market share rate or homes passed would yield much larger sustainability results.

Summary

Cable/MSOs are at a unique time. They face tremendous competition from CSPs and MNOs, yet at the same time are well positioned to benefit from the massive investments coming to the broadband market. They need to rethink their network approach by implementing a sustainable residential broadband network that leverages the latest in open, modular, and scalable broadband technologies.

(?) Was this content useful?   Yes   No

1 Ciena's Routing and Switching Sustainability Model to Quantify Equivalent CO2 Emissions Avoided: 2014-2021

ciena