Unlocking IP/Optical Convergence Success with Coherent Routing

To simplify network architectures, achieve sustainability benchmarks, and keep up with user and application thirst for bandwidth, many operators are looking to converge the IP and optical layers of their networks. According to a study conducted by Heavy Reading, 87 percent of providers view IP/Optical convergence as important for their next-generation networks.[1]

But historical industry thinking around IP/Optical convergence has narrowly focused on collapsing the IP and optical layers of the network—by simply putting a coherent plug in a router. IP/Optical convergence requires more than that. To succeed, operators need to take a holistic approach focused on delivering the greatest performance and return on investment. This includes not just the traditional view of IP/Optical convergence, but is also inclusive of automation from multi-layer operations and scale from an intelligent programmable optical layer.

Understanding the challenges

For decades, providers have built separate networks to support different applications, service types, and SLAs. This has resulted in complex, cost-intensive, and rigid network environments. These networks are based on old assumptions and network designs that must be reevaluated to keep pace with new demands in an era of 5G and multi-cloud IP and must be lean and automated—not bloated. Optical technologies have to be truly scalable. Software control must go further to provide coordinated multi-layer visibility and automation so operators can plan, dynamically adjust traffic flows, and troubleshoot across network layers to achieve optimal network performance. These new networks must all deliver real sustainability and cost-efficiency benefits. IP/Optical convergence provides the opportunity to reshape aging networks and embrace new assumptions.

Ciena's Coherent Routing

Based on a deep understanding of the challenges operators face in trying to converge the IP and optical layers of their networks, Ciena's Coherent Routing brings together the latest in IP and optical technology innovation with advanced multi-layer operations.

It is based on Ciena's proven coherent routers—including the 5164, 5166, 8110, 8112, 8114, and 8180—and driven by a next-gen IP Network Operating System (NOS). Ciena's coherent routers are integrated with industry-leading WaveLogic™ 5 Nano coherent pluggables, and supported by Ciena's fully instrumented, use-case optimized photonic line systems, such as Coherent ELS and 6500 Reconfigurable Line System (RLS).

On the cutting edge of multi-layer operations, this solution takes IP/Optical convergence to the next level. Ciena's Manage, Control and Plan (MCP) Applications provide integrated planning and powerful analytics that span network layers. In a single pane of glass, Ciena's Coherent Routing Solution allows you to easily manage your converged network and optimize performance across a multi-vendor infrastructure. The result is a simplified, highly scalable, and sustainable network driven by coordinated multi-layer operations.

Ciena's Coherent Routing

Automate and simplify
Through coordinated multi-layer operations

Scale and evolve
Via an extensible architecture

Fast-track sustainability
With leading innovation across all networking layers
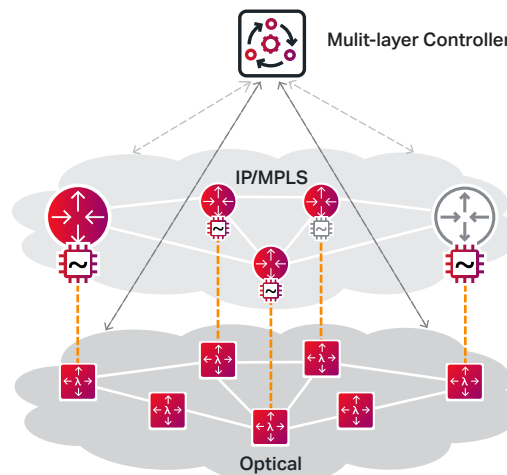
Benefits of Ciena's Coherent Routing

Automate and simplify across network layers

With Ciena's Coherent Routing, you can automate and simplify network operations across layers—which is the key to unlocking the power of network convergence. With coordinated, multi-layer operations, Ciena's MCP Applications allow you to quickly plan your converged network, guaranteeing the best path design and performance with the right equipment and protocols.

Additional cost efficiencies are gained through MCP's open APIs that enable automation of converged IP and optical operational workflows throughout the entire network lifecycle. To adapt capacity to demand and maximize infrastructure ROI, MCP's multi-layer analytics find potential capacity bottlenecks and, through software-defined control, fine-tune network performance by assigning network resources when and where they are needed to deliver the best possible customer experience. In addition to network performance optimization, unique features, such as multi-layer alarm correlation to affected customer services, significantly reduce troubleshooting time. And all of this is possible through a single pane of glass. Working from a unified view of your converged architecture, you can easily and intelligently drive better network performance and deliver any-to-any connectivity to new places in the network.

> Coherent Routing: A rapid evolution to IP/Optical convergence
> **Read blog** →

Scale and evolve your network with ease

Ciena's Coherent Routing enables dynamic scalability and easy network expansion. It starts with Ciena's purpose-built coherent routers, which are based on an Adaptive IP™ approach, and designed to be open, automated, and lean. These are integrated with industry-leading WaveLogic 5 Nano 100G/200G/400G coherent pluggables, which are available in both interoperable and high-performance variants. This allows you to deploy the capacity and performance you need for your network, with pay-as-you-grow modularity.

To ensure your converged network can easily extend to new locations and evolve to support future generations of coherent technology, this solution also leverages Ciena's flexible, self-configurable photonic underlay. With embedded instrumentation and programmability, Ciena's intelligent photonics support application-responsive networking to unleash ultimate scalability and flexibility when managing IP traffic flows. When combined with MCP's software-defined control and analytics, Ciena's Coherent Routing provides a converged, highly scalable network that can adjust capacity based on demand.

Fast-track sustainability efforts

With Ciena's Coherent Routing, you gain the reliability and operational benefits of fewer routers and coherent optics to deploy and manage, fewer error-prone manual provisioning processes, and fewer site visits. Ciena continues to invest in the sustainability of critical network elements—from routers, interoperable, and high-performance coherent pluggables to use-case-optimized photonics and off-board software—helping customers to advance their sustainability goals.

Sustainability models[2] show Ciena has helped customers avoid more than 550,000 metric tons of CO2e over an eight-year period (2014–2021) with Routing and Switching Platforms. This helped customers' production networks achieve 23 percent in power savings, equaling 96,000,000 kWh saved, which resulted in $12 million per year OPEX savings.

Through WaveLogic coherent optic investments, Ciena introduced the industry's first 400G transceiver in 2017, and is delivering the pluggable version five years later at one fifth the power, one tenth the space, and with improved—and industry-leading—systems performance. Ciena offers use-case-optimized, fully-instrumented, and programmable open line systems (Coherent ELS and 6500 RLS) so you can deploy a space- and cost-optimal configuration for the flexibility and scalability you need. Based on numerous network studies, as capacity in the network increases, a flexible photonic underlay using ROADM provides 30-50 percent in power savings compared to a hop-by-hop architecture.

Combining Ciena's IP and optical innovations, Ciena's Coherent Routing Solution offers significant improvements in footprint and power savings to enable more efficient and sustainable networks for customers, and the planet at large. As an example, evolving the network from a 100G-optimized configuration to a 400G-optimized coherent routing architecture results in 75 percent reduction in footprint and 70 percent reduction in power. This is just one example. Upgrading from earlier technology generations can result in even greater OPEX savings.
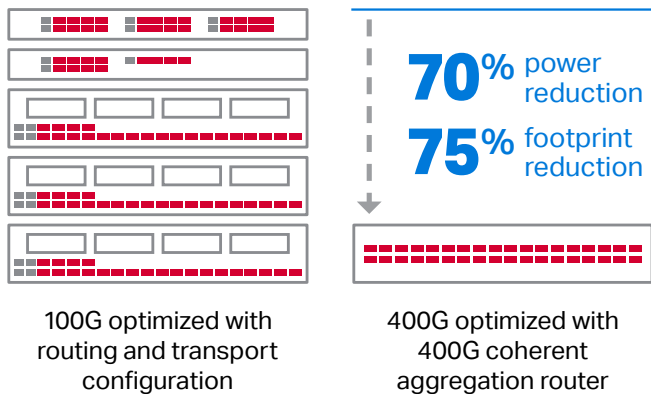
Open and disaggregated by design

While leveraging Ciena's technology all together drives significant business value, Coherent Routing is also open and disaggregated by design. All solution components work within existing legacy environments and with third-party technologies, giving customers maximum flexibility and choice to achieve their ideal converged end state. Furthermore, MCP software supports industry-recognized open APIs and data models to provide visualization and monitoring of third-party optical line systems and transponders (for example, visualization, monitoring of alarms, and metrics). This allows coordinated multi-layer operations even in multi-vendor environments.

To guide you in your convergence journey, Ciena Services' experts can collaborate with you to develop an evolution strategy that meets your business goals. Ciena's network transformation approach is an industry best practice that deploys leading network experts, data analytics, and automation tools to reduce your risk and provide the best path forward to ensure you get the most out of your network investment.

The key to successful network convergence

Ciena's Coherent Routing enables you to realize IP/Optical convergence success. Ciena brings together purpose-built routers, leading coherent optics, and intelligent flexible photonics—all driven by cutting-edge multi-layer operations. Guided by experts, Ciena helps you achieve simplified multi-layer operations, dynamic scalability, and improved network sustainability to take convergence to the next level.

(?) Was this content useful?   Yes   No

70% power reduction

75% footprint reduction

100G optimized with routing and transport configuration

400G optimized with 400G coherent aggregation router