

Building More Scalable and Programmable Networks with WaveLogic 5 Extreme

More capacity per wavelength. Longer reach at any capacity. And lower cost per bit. With these benefits, Ciena's WaveLogic™ 5 Extreme helps network providers modernize their networks to maintain the rapid innovation that delivers the services and level of experience customers crave.



What is WaveLogic 5 Extreme?

Part of Ciena's fifth generation of coherent optical solutions, WaveLogic 5 Extreme integrates new DSP innovations to deliver ultimate fiber capacity with less equipment.

WaveLogic 5 Extreme pushes the boundaries of what is possible in optical networking, bringing single-wavelength 800G and new levels of performance and efficiency to the industry for the first time. With programmable capacity from 200G to 800G, WaveLogic 5 Extreme provides a step-function improvement in both scale and economics, delivering 100 percent more capacity per wavelength and up to 30 percent increase in spectral efficiency compared to the previous technology generation. This capacity increase allows network providers to achieve 800G for shorter-reach applications, 600G for metro/regional distances, and a minimum of 400G for long-haul and uncompensated submarine applications. Ready for next-generation router architectures, WaveLogic 5 Extreme allows the ubiquitous deployment and efficient 400GbE client connect at any distance, from across the metro to across the Pacific.

Where does WaveLogic 5 Extreme fit?

WaveLogic 5 Extreme provides benefits in single-span Data Center Interconnect (DCI), metro/long haul infrastructure, and submarine applications.



Figure 1. WaveLogic 5 Extreme for single-span DCI applications

In single-span DCI applications, Internet Content Providers (ICPs) achieve lowest cost per bit with single-wavelength 800G transport. ICPs can also use WaveLogic 5 Extreme as an adaptation layer to provide efficient interconnect between any mix of 100GbE or 400GbE switches/routers.

In metro and long-haul infrastructure applications where network providers are increasingly moving to more software-driven, automated, and highly scalable networks, WaveLogic 5 Extreme provides unmatched programmability from 200G to 800G per wavelength, maximizing efficiencies, cost savings, and service agility. WaveLogic 5 Extreme also facilitates network evolution to next-generation, higher-capacity switching technologies, with efficient 400GbE client connectivity across any distance: from two 400GbE clients on an 800G wave in a short metro, to three 400GbEs mapped across two 600G waves for regional applications, to a single 400G wave for ultra-long-haul distances.

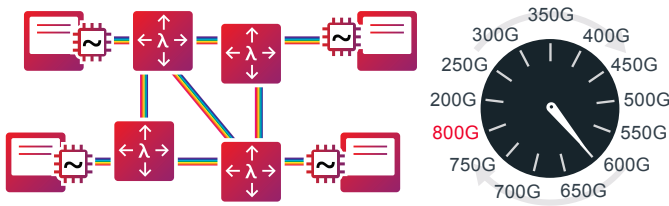


Figure 2. WaveLogic 5 Extreme for metro and long-haul applications

Using WaveLogic 5 Extreme in submarine applications, network providers gain maximum spectral efficiency and return on investment for submerged cable assets. For the first time, operators can support 400GbE client connectivity across subsea links: from three 400GbEs mapped across two 600G waves for uncompensated regional applications, to a single 400G wave for uncompensated trans-oceanic distances, to 400GbE across two 200G waves on compensated trans-oceanic distances.

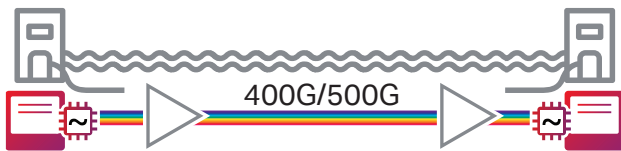


Figure 3. WaveLogic 5 Extreme for submarine applications

Why WaveLogic 5 Extreme?

WaveLogic 5 Extreme offers:

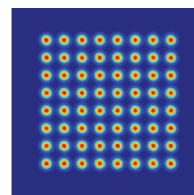
- The ability to transport more data and content using less equipment, increasing competitive differentiation and profitability with reduced cost per bit
- More opportunities, with the ability to offer innovative high-bandwidth services via higher-capacity wavelengths that can extend over longer, unregenerated distances
- More operational efficiencies, with fewer wavelengths to manage
- The ability to elegantly evolve to next-generation switching silicon with efficient 400GbE client connect at any distance—from across the metro to across the Pacific

How does WaveLogic 5 Extreme deliver industry-leading system performance?

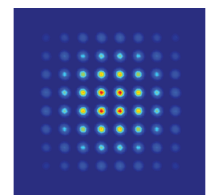
Ciena's vertical integration, including ownership of the DSP as well as electro-optics based on silicon photonics and indium phosphide materials, optimizes the performance, footprint,

and power of WaveLogic 5 Extreme. DSP innovations include the following:

- Throughput-optimized, soft-decision Forward Error Correction (FEC) saves power and obtains the highest noise tolerance to provide maximum reach at each throughput or, equivalently, maximum capacity for a given reach, leading to lower cost per bit for each application.
- Probabilistic Constellation Shaping (PCS) provides quasi-continuous capacity tunability, from 200 Gb/s to 800 Gb/s, resulting in the ability to optimize capacity to available system margin for maximum network efficiency. Ciena's unique PCS algorithm adapts to each application and optimizes usable margin to maximize performance, as shown in Figure 4.
- Non-linear mitigation techniques, such as dispersion pre-compensation and Frequency Division Multiplexing (FDM), further enhance system performance. Reduction in total non-linear noise translates to better reach or higher capacity per channel.
- To support network providers' evolution to more adaptive networks and their need for increased software control and automation, WaveLogic 5 Extreme provides link monitoring derived from machine learning.
- Selectable baud options, up to 95 Gbaud, allow network providers to leverage the benefits of the technology over a range of photonic line systems.
- Advanced integrated AES-256 encryption provides a simple way to safeguard all in-flight data against breaches.



Without shaping
Every symbol sent
equal # of times



With shaping
Low energy symbols favored,
sent more often

Figure 4. Probabilistic constellation shaping

A complete solution

Ciena is committed to helping customers leverage the full potential of coherent technology and realize networks that can readily adapt to change. As the pioneers of coherent technology for commercial optical systems, Ciena's solutions

combine deep expertise in both coherent technology and systems design. By owning all the foundational coherent technology elements—including DSP, converters, high-bandwidth silicon photonics, and indium phosphide electro-optics—Ciena can uniquely provide the innovation, time-to-market, and cost benefits network providers are demanding. Beyond the optics, Ciena offers a fully instrumented photonic layer with sophisticated optical software control, platforms with modern open APIs, and Liquid Spectrum™ analytics apps to enable a fully programmable infrastructure. Finally, Ciena is one of very few solution vendors in the industry with the financial strength and global scale to continue to drive and deliver the fast cadence of innovative solutions network providers need.

Summary

With programmable capacity from 200G to 800G, Ciena's WaveLogic 5 Extreme brings new levels of scale, programmability, and economics to optical networking and the ability, for the first time, to evolve to simple, ubiquitous 400GbE client connect across any path in the network.



Was this content useful?

Yes

No