

Five Benefits of Practical 100G Implementation

1 Prolonged life of existing systems

Ciena's 100G capabilities validate that it can operate over the same optical amplifier chain as 10G and 40G signals—meaning network providers do not have to light new fibers to take advantage of the higher capacities offered by 100G.

Network providers today have a significant investment in their current infrastructures. The fiber plant, operational model, and deployed equipment all represent large capital investments that need to be leveraged to the maximum extent possible. By making 100G compatible not only with the fiber plant, but also with the deployed equipment, Ciena provides an effective way to extend the life of the existing network and generate more revenue from the in-place infrastructure. For example, a carrier using a traditional 80-channel DWDM system operating at 50 percent capacity with 40G, still has room to add 40 channels of 100G and provide almost triple the total capacity of the original system.

The incremental capacity provided to a 10G system is even more dramatic: Using the fiber and amplifier infrastructure already in place, an existing 10G system that is 90 percent full still could offer double the capacity by adding 100G on the last eight wavelengths. 100G provides a way to grow tremendously without making large changes in the network infrastructure, particularly for fiber-constrained carriers.

2 Massive capacity

100G offers ten times the capacity of most 10G systems. A DWDM system nearing 100 percent capacity today would be at only 10 percent capacity if deployed with 100G—offering lots of room to grow.

Some carriers are experiencing explosive growth even in the current economic environment. As the economy recovers and more people use high-bandwidth applications with video and rich interactive content, capacity growth will increase and spread across the network infrastructure. To absorb this growth and provide useful lifecycles for systems and networks before they reach capacity, a major increase in capability is necessary—more than just a factor of two or four. Compared with 10G, which is still the mainstream data rate in both metro and core networks, 100G provides this major increase. Even with rapidly increasing demands for capacity, 100G increases the total available capacity by an order of magnitude and will allow deployment of networks with sufficient reserve capacity to support years.

3 Incredible speed

100G offers the ability to transfer mass quantities of data at amazing speeds. One Petabyte of data can be transferred in only 12 hours. Even massive, gigabyte-sized files can be transferred in less than 100ms.

Given the incredible speed with which data can be transferred, the actual propagation time through the fiber now merits consideration. Today's DWDM systems use optical technologies to control various fiber impairments. These technologies allow 10G and 40G propagation to work, but also increase the propagation delay by 10 to 15 percent. The most recent optical technologies eliminate this incremental propagation delay and further reduce the time it takes to get data between source and destination. 100G offers a tenfold decrease in the time it takes to transmit a given amount of data. Latency-reducing technologies cut the "time of flight"—the time it takes for information to get from ingress to egress—by an additional 10 percent.

100G will be instrumental for a whole new class of future network-enabled applications that require high-speed, low-latency transport, such as real-time visualizations, high-speed video distributions, and support of next-generation data and router equipment.

4

Flexible ports

Ciena's unique FlexiPort technology for 100G supports SONET, SDH, LAN PHY, and OTU-2 on the same card with complete transparency.

For the foreseeable future, networks must support both legacy and current services and rates. Providers must adapt existing services to take advantage of the speed and capacity provided by leading-edge technologies like 100G. With FlexiPort functionality, Ciena can support 100G services, such as 100GbE and OTU-4, and offer lower-speed support to bridge many existing services, including OC-192, STM-64, 10G LAN PHY, and OTU-2, onto the new high-speed, high-capacity infrastructure. These services must be supported with a completely transparent interface to eliminate any interoperability concerns. With a transceiver that supports multiple protocols using transparent multiplexing and transmission, legacy services can be supported with a single type of device. FlexiPorts provide a clean, adaptable, and efficient way of mapping existing services onto the new 100G transmission infrastructure.

5

Adaptability

Adaptive optics allow Ciena's 100G solution to operate over a variety of fiber types.

As the amount of data driven through an individual wavelength increases, keeping that wavelength together and performing well over the transmission path becomes more difficult. By itself, a 100G serial stream of data would only propagate a short distance. Practical 100G transmission requires 500 to 1000 km propagation distances and the ability to operate over as much of the existing fiber plant as possible. Many different fiber types are used today. A practical 100G solution must be able to operate over all these types of fiber, even on amplifier and transmission systems designed and deployed years ago. A usable 100G system must use high-performance modulation formats with adaptive optics that adjust for the characteristics of the different fiber types and effectively pack multiple bits of information into a single time slot. Only a 100G system with these characteristics can provide a cost-effective upgrade for existing DWDM systems and offer the large capacity and ease of use expected in a next-generation transport system.



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