

APPLICATION NOTE

Transform Large-Scale Science Collaboration

Ciena's Programmable Multi-Terabit Solution for Science DMZ

Science data collection and storage is growing at an exponential pace. Data-intensive science can generate multiple petabyte-sized data files in one experiment. Consider a single complete genomic data file is at least 350GB and can be up to 2TB. Climate models typically include Terabytes of information. The data is most useful if it can be easily shared among various members of the global research community. Large-scale storage on its own is only useful if the associated network infrastructure is designed with large data transfer in mind.

Standard campus networks are not optimized to support movement of these very large science data files between instruments, facilities, analysis systems, and scientists. Network limitations can become a gating factor for data-intensive science collaboration. These standard networks are not designed to enable support of educational, administrative, and science applications. Thus, the network must be adapted to support large-scale and data-intensive applications without impact to the standard campus network.

To address this conundrum, the global R&E community has developed an architectural model sometimes referred to as the "Science DMZ"—an idea proposed by ESNET that tailors the traditional concept of a DMZ to the needs of high-performance science data transfer. By streamlining the required security actions, due to the isolated nature and limited risk to science data, ultra-high network performance can be maintained while achieving sufficient security to meet the needs of the science and research community. This paper explains how Ciena can fully participate in the science DMZ using world-class, high-performance, packet-optical equipment.

High-scale data transfer solution

The primary purpose of the Science DMZ model is to create a portion of the campus network that is optimized specifically for large-scale science mobility. By separating the high-scale science network infrastructure from the standard campus network, each can be optimized without impacting the other. The Science DMZ consists of

Benefits:

- Enables the most cost-effective scalability for big science data with a converged packet-optical platform
- Reduces future investments: scale as you grow 10G to 100G+ with the same platform
- Is highly available and resilient with intelligent software to provide automated restoration
- Requires half the space and power of any other comparable solution for a greener, lower cost solution
- Provides security policies and enforcement mechanisms tailored for high-performance science environments
- Ensures data security without latency impact through 10G inline encryption
- Enables performance-on-demand network connectivity for users or applications via open, programmable interfaces
- Simplifies multilayer management for end-to-end performance monitoring