

INFOBRIEF

Private Optical Networks for AI-Driven Research and Education

ePlus and Ciena help R&E institutions build networks that remove distance as a barrier to discovery.

AI is accelerating discovery, high-performance computing, genomics, climate science, campus operations, teaching, and student services. Large models now support everything from materials research and medical innovation to adaptive learning, operational analytics, and student success. But as these workloads scale, a new constraint is emerging – and it isn't compute.

Data, models, and compute now span campuses, institutions, cloud platforms, and national research facilities. When the network introduces friction between them, progress slows regardless of how powerful the models are.

For R&E organizations, the network is foundational infrastructure for research, learning, operations, and AI.

The Infrastructure Challenge

R&E workloads are increasingly massive, distributed, latency-sensitive, and dependent on shared resources. AI raises the stakes, but the pressure is already showing up across research collaboration, high-performance computing (HPC) access, cloud connectivity, campus operations, and data security.

A research team training models at a national computing center runs inference back on campus through a regional research and education network (REN).

Multi-institution collaborations move terabytes of research data between labs, facilities, and cloud platforms daily.

Adaptive learning platforms, student success tools, operational analytics, and other AI-enabled services are pushing more data processing to the campus edge.

Sensitive research, student, and institutional data move across campuses, cloud platforms, partners, and shared facilities.

To do this effectively the network must deliver consistent and secure, high-capacity performance across distance, cloud interconnects, and shared computing facilities. When it doesn't, researchers wait, shared resources go underutilized, and project timelines slip.

Why This Matters

Institutions that view the network as a commodity rather than strategic infrastructure risk limiting their ability to advance research, innovation, and digital transformation. Slow data transfers can hinder research collaboration, under-utilize shared computing resources, constrain campus AI initiatives, and place increasing demands on cloud connectivity.

The institutions moving fastest are the ones investing in network foundations that match the scale and distribution of the workloads they're pursuing.



Four Use Cases Driving R&E Network Decisions

1. Scientific Research Collaboration

Share massive datasets across distributed teams without slowing the work.

Large research projects rely on shared datasets and distributed collaboration across institutions and national facilities. Moving this data predictably and securely across regional and national R&E Networks is what determines whether teams can work at the speed of their science or at the speed of their network.

NETWORK REQUIREMENT

Move massive datasets predictably across R&E Networks while enabling secure, high-throughput collaboration between institutions.

2. Hybrid HPC and AI Clusters

Access shared compute wherever it's hosted.

Model training and high-performance computing workloads increasingly happen at national supercomputing centers, while researchers run inference remotely through R&E Networks and cloud services. The infrastructure connecting these environments must deliver consistent throughput, because when access to shared compute is unreliable, researchers adapt their work to network limits rather than to their research ambitions.

Provide a high-throughput, R&E Network-ready interconnect that maintains consistent access to shared compute resources across facilities.

3. Campus Operations and AI

Support digital learning, operations, and AI at the campus edge.

Adaptive learning platforms, operational analytics, and student success systems may not move research-scale datasets, but they still depend on reliable campus infrastructure. These workloads are inference-heavy, campus-scale, and growing across diverse endpoints. They need to work everywhere without requiring institution-by-institution redesign.

Deliver reliable campus-wide connectivity that scales services simply, across diverse endpoints and institutions.

4. Cloud and Ecosystem Connectivity

Connect campuses to the broader cloud, research, and AI ecosystem.

R&E institutions consume AI models, hosted applications, cloud services, and research platforms while relying on R&E Networks for dedicated connectivity across their broader footprint. As campuses become nodes in a larger digital ecosystem — part cloud, part colocation, part national research network — the links between them must be private, resilient, and purpose-built.

Provide dedicated private links to cloud interconnects and resilient connectivity across regional and national R&E Networks.

Operational Impact

Research teams collaborate across institutions without waiting for data transfers.

Shared computing resources are reliably accessible regardless of where they're hosted.

Campus services and AI scale simply across diverse endpoints and institutions.

Campuses connect to cloud and research ecosystems with dedicated, resilient infrastructure.

Why ePlus + Ciena

As a Ciena Service-Accredited and Top Performer Partner, ePlus helps R&E organizations design, deploy, validate, and optimize private optical networks over dark fiber. We pair Ciena's optical networking technology — including WaveLogic 6 coherent optics, the industry's first 1.6T platform — with advisory expertise, implementation experience, and lifecycle support to put it to work in your environment. Together, ePlus and Ciena help institutions move research data faster, connect distributed campuses and facilities, improve access to shared compute, and prepare for AI-driven growth.



Lower total cost of ownership

Better fiber utilization and energy efficiency significantly reduce long-term infrastructure costs compared to legacy approaches or carrier-dependent alternatives.



Faster time to production

Validated network designs, integrated delivery, and hands-on enablement help infrastructure go live sooner, so research and AI initiatives start delivering value faster.



Reduced risk

Lifecycle services and deep operational expertise protect your investment at every stage, from initial architecture through ongoing optimization, so you can scale confidently.



Future-ready architecture

A network foundation built to scale with your organization supports both the workloads you're running today and those on the horizon.



Start With a Data Transport Analysis

We'll assess your current data flows and interconnect architecture, quantify the performance and efficiency opportunity, and help you build a path forward.

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schedule today.