Modern network infrastructure propels higher ed into new territory

Next-gen fiber and optical infrastructure form the foundation for learning, research and collaboration

It's no exaggeration to state that every instance of the higher education student experience – and ultimately, student success – relies on the network. And yet, much work remains to ensure equitable access and connections to regional education networks, particularly in the most rural regions of the country, on tribal lands, and at minority-serving institutions.

Obviously a lot of those institutions are very successful, but they haven't been fully integrated into the research community, and to accomplish that they need high-speed connections and high-performance computing," said Matt Kenslea, senior account director of Public Sector Business Development at Lumen. "It's a pretty important time for those institutions to upgrade their infrastructure."

The current era of cloud-based campus computing that powers data-intensive research, global collaboration, and faculty and staff connectivity relies on secure, high-speed, low-latency connections to the fiber backbone. The next era of quantum computing, now undergoing rapid development and experimentation, is already being ushered in on the very latest optical infrastructure.

Power savings that benefit sustainable, climate conscious campuses, as well as a university's bottom line, represent another strong benefit from an upgrade.

Models for collaboration and success

Internet2 completed a series of massive upgrades and unveiled its next-generation network infrastructure in January 2022. Federal funding to build out middle mile connections prompted much of the current work taking place throughout the country to connect regional research and education networks (RENs).

"Internet2 is a great model for those institutions," Kenslea said. "They really set the gold standard at upgrading and many institutions are already following in their footsteps. A lot of the regionals and campus networks are taking their cues from what Internet2 did."



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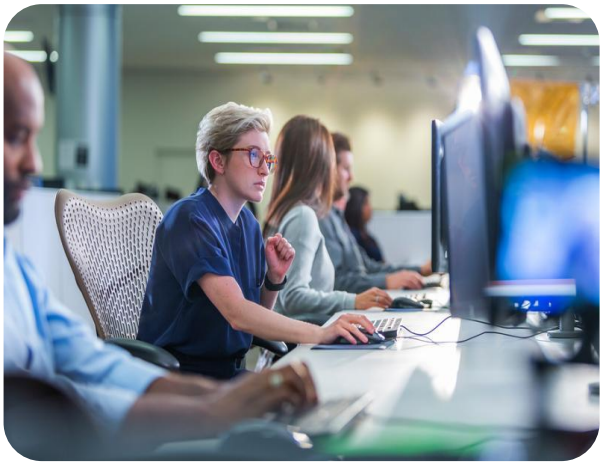
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Internet2's network leverages an optical layer that now supports "up to 32 terabits per segment with a new generation of transponders in increments of 400-800 gigabits per second," according to a release from the organization. NGI's new packet layer provides 8 to 16 petabits per second of port capacity per location and delivers new advanced software-driven capabilities. These advances also reduced Internet2's power consumption, by most estimates up to 70%.

"If you have a network between St. Louis and Kansas City, and every sixty miles there's a hub with equipment in it, it needs space and power. When you add up the power usage on a regional network, it takes up a big piece of their budget," Kenslea said. "Decreasing power usage is a big advantage for them."

Internet2's NGI's software layer simplifies complex research workflows through a more agile, flexible, and secure networking ecosystem, Internet2's release stated. "This fifth generation Internet2 network delivers new services with greatly improved efficiencies that are enabled for both IT administrators and researchers," Rob Vietzke, Internet2 vice president for network services, stated. "As a community, we wanted to ensure that the new network infrastructure delivered accelerated and better experiences for our advanced users. The improvements in speeds, capabilities, security, and resiliency all contribute to realizing faster and more capable results for scientists and educators."

"Just like any other area or industry, higher education and research datasets are expanding greatly," Kenslea said.



"The ability to move datasets around or have a network with enough bandwidth and low latency in place to do computations from 500 miles away, that's critical for big science. Research is really what drives these R1 institutions; it is a key part of what they do. The improved bandwidth and lower latency are a big boon for that."

Faculty enjoy better access to grants when they have better access to high-performance computing, and "there is a risk if institutions aren't providing these types of capabilities and efficiencies. They might not be as competitive and they may see faculty leave or go to other institutions that can offer higher speed connections," Kenslea said.

New learning models that incorporate massive amounts of video and hyflex course design rely heavily on new network infrastructure, as much as administrators using Call Center-as-a-Service and UCC platforms to perform the day-to-day functions that keep their institutions up and running.

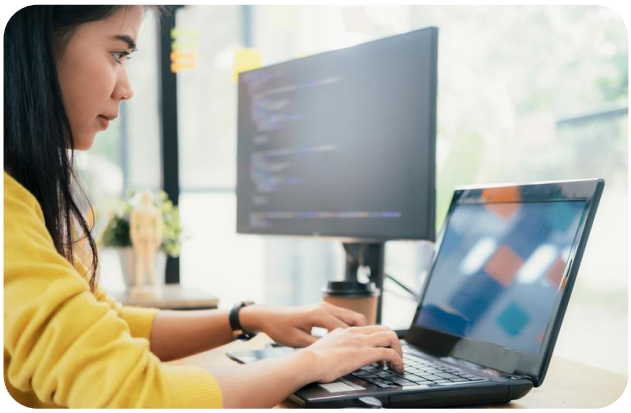
Critical links

Lumen recently worked with Link Oregon to activate a third-party dark fiber connection from an agricultural research center jointly operated by Oregon State University and the USDA Agricultural Research Service in a remote region of the state. Link Oregon, a nonprofit consortium, facilitates and acquires the long-term rights to fiber lines state-wide, and frequently partners with private companies such as Lumen to complete the work. The group's other projects, with Oregon's four largest research universities and the state government, boost science and research. They also ensure students statewide can work or learn from home as effectively as they can while at school or on their college campus.

The latest ag research center connection serves "an area where research is critical," Link Oregon Executive Director Steve Corbató said. "That site had been operating on legacy technology at several megabits per second. They couldn't conduct the science they needed to do."

Link Oregon leveraged Infrastructure Investment and Jobs Act (IIJA) funding, as well as American Rescue Plan Act (ARPA) funds to complete the middle-mile access.

"We really need to look at this the way states looked at the electrification of rural areas 90 years ago – that is, we have essentially a onetime opportunity to modernize our infrastructure," Corbató said.



Kenslea advises institutions to spend what they've been allotted through middle-mile grants, or they may risk losing idle funding. "They need to try to spend it as fast as they can," he said.

Collaborating with in-state broadband offices may be one way to readily fund projects that benefit not only a college or university network, but also the broader community. "They're very small offices and they've received $200 million, and they're not quite sure how to spend it," he said. "Educate them on how to properly spend that money and help get those institutions connected."

See how Lumen helps colleges and universities support student success and keep their campuses connected.

Why Lumen?

With a comprehensive portfolio, Lumen can help your university deliver high-quality connectivity, minimize costs and complexity, and enhance your security posture. Rely on the extensive and deeply peered Lumen global network, Black Lotus Labs' threat intelligence, and our team of experts to help deploy and manage your solution.

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