



Annual Report

2017-2018



OARnet

An OH·TECH Consortium Member

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“Lightning-quick access to the internet and powerful network-related services are at the heart of OARnet’s efforts to serve client communities throughout Ohio.”

— John Carey, Chancellor, Ohio Department of Higher Education

OARnet: Connect. Aggregate. Collaborate. Our powerful trilogy of driving principles provides the necessary technology infrastructure to assure a prosperous economic future for Ohio and beyond. At the Ohio Academic Resources Network (OARnet), we connect our clients—found throughout education, healthcare, public broadcasting and government—by increasing access to affordable broadband service. We reduce the cost of vital technologies for our members through aggregate purchasing. We work with peers locally, within the state, across the country and around the globe to spur communication and collaboration.

Ohio Technology Consortium: Governed by the Chancellor of the Department of Higher Education, OH-TECH serves as the technology and information division of the Ohio Department of Higher Education. The consortium comprises a suite of widely respected member organizations collectively unsurpassed in any other state: OSC, OARnet and OhioLINK. The consortium drives efficiencies through common services provided to member organizations through the Shared Infrastructure and Consortia Services divisions.

oar.net

OARnet: Making the most of our opportunities

OARnet's mission over the last 31 years has been to deliver technology-based solutions that increase bandwidth, reduce costs through aggregation and provide value by maximizing shared services opportunities. Many current initiatives strive to meet these goals.

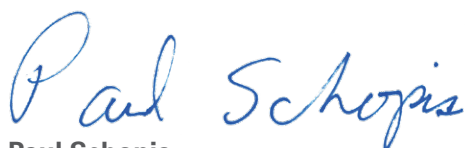
As an example, last December, OARnet was charged with connecting the Ohio/Indiana Unmanned Aerial System (UAS) Center in Springfield to OARnet's statewide, 100 Gigabit-per-second (Gbps) network backbone to support the state's drone testing and data collection efforts. As a high-profile, economic-development priority for the state, Ohio currently is developing a ground-based "sense-and-avoid system" that will, for the first time, empower drone operators to fly beyond their line of sight.

OARnet was able to connect the Springfield site to other UAS constituents as well as Ohio's colleges and universities, K-12 schools, medical centers, public broadcasting stations, and state and local government offices.

At the same time, OARnet delivered backbone connections to the city of Springfield, along with offering nearby OARnet members, such as Wright State and Miami universities, added resiliency, better redundancy and greatly increased bandwidth.

Finally, OARnet will be able to double the bandwidth to native 200 Gbps on portions of the build at the optical backbone layer, further enhancing our portfolio of offerings.

This project is a great example of what the skilled and dedicated staff members at OARnet do on a regular basis. By engaging our members and users we are able to leverage diverse assets to create a whole solution that benefits all involved, much more than an individual organization could have accomplished on its own. We connect people and communities at the lowest possible cost, maximizing the opportunities to share in the investment and effort.



Paul Schopis
Executive Director

Highlights

30th anniversary celebrated in 2017

OARnet celebrated its 30th anniversary in 2017, marking three decades of high-speed data transport. OARnet was initially created in 1987 to provide Ohio's higher education institutions access to the Ohio Supercomputer Center for research purposes.

911 service rolled out

OARnet's role in 911 service is transport and design to ensure the necessary redundancy and geodiversity for these critical emergency communications. OARnet currently provides 911 service to five counties, four cities and one university, with many future sites planned.

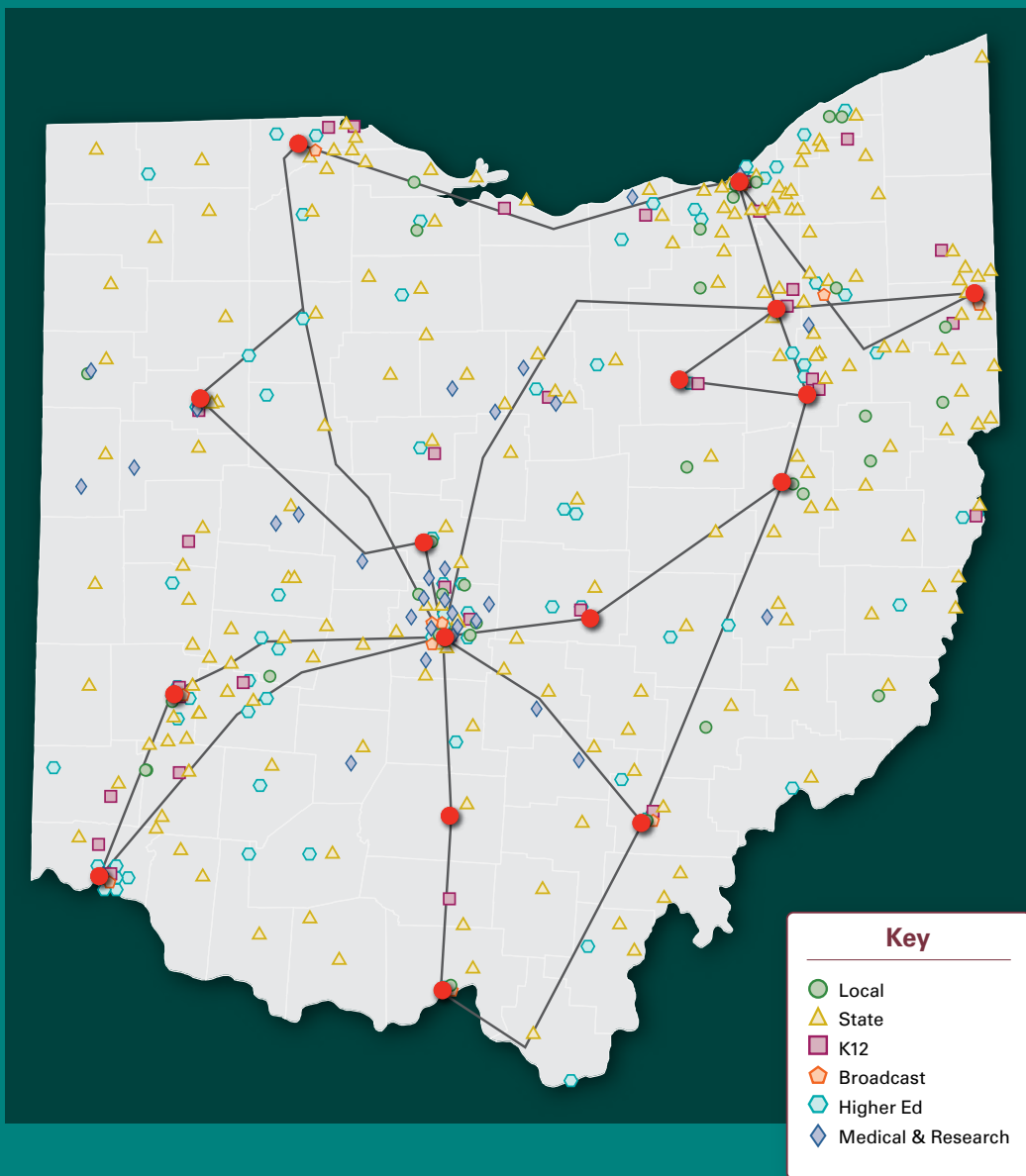
VMware contract extension success

OARnet's VMware project has seen great success, with first quarter 2018 sales exceeding total commitment by more than 100 percent. OARnet clients receive VMware's Production-Level Support & Subscription (SnS), the highest level of support at the lowest price.



OARnet network: Powering community success statewide

OARnet connects Ohio's education, health care, public broadcasting and government communities through more than 2,240 miles of fiber across the state. These organizations participate in OARnet's shared services programs because of the benefits and value-added services they receive.



630+

K-12 Schools

30 Large Urbans + ITCs
600+ School Districts

314

Higher Education

89 Main Campuses
225 Regional Campuses

66

Healthcare Facilities

10 Institutions
56 Sites

8

Research

8 Research Facilities
4 Industry Partners

9

Public Broadcasting

9 Stations

55

Local Entities

55 Local Governments

64

State & Federal Govt.

62 State of Ohio Agencies
2 Federal Government

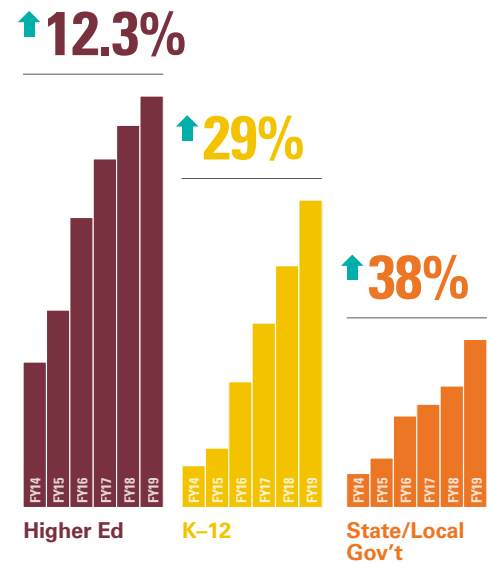
Financial Impact

OARnet provides a forum for universities, colleges, state agencies and medical centers to collaborate and work together to get the best possible services at the best possible prices for the state of Ohio. OARnet is able to customize service offerings to meet client needs so every service is maximized. The network value for our clients is based on three guiding principles:

- Increase access to affordable broadband service
- Reduce technology costs via aggregate purchasing
- Maximize shared-service opportunities

OARnet continues to provide value-added savings for clients through services such as VMware, providing server virtualization and cost savings through time, space and hardware reduction. The VMware project continues its success with first-quarter sales for the new contract exceeding total commitment by more than 100 percent.

SUBSCRIPTIONS



Additional ROIs



\$20+ MILLION savings for all clients



23% total bandwidth increase for all clients



50–84% expected savings when buying more bandwidth thru new IntraOhio Content Subscription service



39% bandwidth increase for state & local government



14% increased bandwidth for higher education



33% bandwidth increase for K–12 schools



\$15 MILLION savings for state of Ohio agencies



\$4 MILLION savings for higher education



\$1+ MILLION savings for K–12 schools

OARnet Services



Through the power of its 100-gigabit-per-second backbone, OARnet enables businesses, government and education to realize high-speed solutions every day. Recent value additions to the OARnet network include combined commodity internet and On-Demand DDoS Mitigation Service, as well as the addition of a 40G port connection to its current 1, 10 and 100 Gbps offerings. The extremely successful IntraOhio content service introduced in 2016 is now a standard service offering, and clients can now purchase security scanning.



Cybersecurity Services

Avoiding DDoS attacks and security breaches requires being ever-vigilant about emerging threats. OARnet's portfolio of cybersecurity services mitigates and prevents attacks and ensures your information and infrastructure remains safe. OARnet offers three different types of DDoS services: response to requests, preconfigured filtering and fully monitored network traffic. Through a layered approach, ranging from local filtering and BGP signaling to packet scrubbing, OARnet can meet your institution's needs. Additionally, OARnet participates in the REN-ISAC program that tracks emerging threats.

DDoS Mitigation

Eduroam

Vulnerability Scan Hosting

InCommon

Shibboleth

Network Peering

OARnet is Ohio's Internet2 connector, with two 100 Gbps connections, one in Cleveland and one in Cincinnati. These services allow researchers to collaborate across institutions and apply to funding sources for research such as the National Science Foundation. OARnet also has 10 Gbps connections to NASA Glenn Research Center and to Wright-Patterson Air Force Base/Defense and Research Engineering Network (DREN). These connections provide Ohio researchers direct access to NASA and DREN sites across the United States.

Research Network Peers

Commercial Network Peers





Integrated Network Services

As OARnet's flagship service, the more than 2,240 miles of fiber that create the network backbone extend into the education, health care, public broadcasting and government communities, lowering their broadband access cost. OARnet aggregates upstream internet providers and connectivity to public internet exchange points to optimize costs while maintaining the highest standard of reliability.

OARnet's communities participate in its shared services programs because of the benefits and value-added services they receive over the 100 Gbps backbone.

MPLS L3VPN & L2 Circuits

IPV4 & IPV6

Domain Name Service (DNS)

Content Delivery

Co-location

Last Mile Access

Commodity Internet Access

Optical Transport

On-Net (IntraOhio)



Application Services

OARnet works with trusted partners to provide clients with reliable services to enhance their communications and operations. From supporting a media repository for educational institutions to VOIP services, from discounted software licensing to server virtualization, our members can connect securely with students and employees.

VMware

ESRI

Voice Over IP (VoIP)

Emergency Web Hosting



Support Services

OARnet clients have access to outstanding engineering solutions through an around-the-clock network operations center with Tier I and Tier II support. Additionally, OARnet engineers provide technical input for areas including fiber and access circuit planning, optical support, routing design, including developing Border Gateway Protocol or failover plans. OARnet's engineering team can remotely configure and manage your environment as well as provide onsite support when necessary.

Support Center (NOC)

Consulting

Quality of Service (QoS)



“OARnet has provided high-speed, reliable access for our community with an impressive 100 percent uptime over the last four years.”

— *Dave Bender, Executive Director of Information and Technology Services at Otterbein*

WHO:

Otterbein University's STEAM Innovation Center

WHAT:

The technology hub uses OARnet for 98 percent of the facility's network traffic for connectivity to useful apps and smart classrooms.

IMPACT:

Through high-speed connectivity and cutting-edge innovations, the center serves a need for the university, community organizations and the city of Westerville's economy.

Otterbein's STEAM innovation center can point to OARnet for reliable connectivity

In a buzzing classroom of wood-top tables, groups of engineering students huddle around the instruments they've created. They adjust knobs, trim wires and even paint a spectrum of colors across 3D-printed fretboards and sound boxes. They need to win the bid for their clients—music students in another class. This collaboration is possible because of Otterbein University's Science, Technology, Engineering, Arts, and Math (STEAM) Innovation Center—housed at a new high-tech facility called The Point.

The Point is a nucleus for innovation, creating an "entrepreneurial ecosystem" at Otterbein and in the city of Westerville, a suburb of Columbus. The unique facility hosts industry clients, community organizations and Otterbein students under one roof, encouraging collaborative projects and start-ups that benefit everyone, from Boy Scout troops to Fortune 500 companies.

With all this innovation comes technology, and with technology comes the demand for high-speed internet. Luckily, most of the internet usage at The Point is provided by OARnet. Thanks to Otterbein's previous connections to the 100 Gbps network, providing connectivity to the center, which opened in August of 2016, was easily achieved.

"Ninety-eight percent of the facility's network traffic is going through OARnet," said Dave Bender, executive director of information and technology services at Otterbein. "The Point's network is fiber connected to Westerville's WeConnect data center a few blocks away, where Otterbein houses its virtual environment. Otterbein's equipment is directly connected to OARnet's protected ring just a few racks away. OARnet has provided high-speed, reliable access for our community with an impressive 100 percent uptime over the last four years."

While only about one-third of the facility was complete at the time of this writing,


the available space was being put to good use. The Point includes state-of-the-art classrooms, a woodworking shop, metal shop, commercial-grade 3D printers, machine shop and electronics shop. While mostly used by Otterbein students and the industrial tenants in the building, community members can access any of these "maker" spaces by paying a \$75-per-month membership fee.

STEAM students not only receive classroom and hands-on instructional time at The Point, but, as executive director Erin Bender (no relation to Dave) pointed out, they also benefit from the industrial tenants. In turn, these clients work with bright minds at a reduced labor cost.

"As a requirement of the lease, (tenants) are obligated to provide some type of student experience," Erin Bender said. "You actually have to engage in the culture. And they can do that in lots of ways—it can be internships, co-op projects, capstone, it can be just a one-on-one engagement. Really, they can be creative in how they fulfill the student experience, but it is a requirement."

The facility was slated to be completed by June 2018, with new additions including a 125-person event space, an outdoor learning laboratory, a catering kitchen and a student lounge area. The flexible facility allows a wide variety of student populations to engage in the high-tech offerings at The Point.

"The great thing about the flexibility of this space is that, as the tenants change, we can change the student population," Erin Bender said. "So I can work with the registrar and say, 'Hey, we're having a healthcare company come in. I need as many nursing and health and sport science students have their classes in here as possible. So let's work with the faculty to have their classes scheduled down here so they get that engagement.'" •



Fostoria Learning Center delivers new training, development options with high-speed classroom technology through OARnet

WHO:

Fostoria Learning Center, a training and education facility in Fostoria, Ohio

WHAT:

Through partnerships with Terra State Community College, OARnet was able to facilitate last-mile connections to the statewide high-speed network backbone.

IMPACT:

The learning center provides job training, virtual adult classes and higher education tools, serving a great need in the Northwest Ohio area.

Ninety percent of the people who live in Fostoria, Ohio, live and work in or near the same small city. Unfortunately, to receive the training necessary for jobs, most people have to travel at least 30 minutes outside the rural northwestern Ohio town to access community colleges or training centers.

That changed with the opening of the Fostoria Learning Center in fall 2017. With connectivity from OARnet, the learning center in the heart of Fostoria hosts training and education classes, including an injection of technology the area sorely needed. With the necessary broadband to support high-tech classrooms and labs, the center provides a remote location for surrounding colleges to hold classes and space for community programs.

The idea for the center was formed in 2010 after the Fostoria Economic Development Corporation led a workforce-development initiative, finding grants and funding sources, collaborating with local and state agencies, and partnering with area colleges and universities, such as Marion Technical College and Terra State Community College. With the opening of the center, citizens of Fostoria can take classes to become medical laboratory technicians, medical assistants and phlebotomists through classes taught by professors from these local higher education institutions.

“We have an amazing facility here,” said Tracey Lawton, director of the Center. “We have a medtronics lab, we have a medical



“We have an amazing facility here. Lectures can be delivered remotely to students, or the lecturer that’s here at the learning center can live stream a lecture back to campus.”

— Tracey Lawton, Director of the Fostoria Learning Center

technology lab, we have a computer suite, we have a collaboration studio, we have three classrooms, and all of these rooms have the latest technology wired into them. Lectures can be delivered remotely to students, or the lecturer that’s here at the learning center can live stream a lecture back to campus.”

Leadership at Terra State Community College was instrumental in ensuring the Fostoria Learning Center had connectivity. OARnet Client Relations Manager Dana Rogers said officials at Terra State initially reached out to OARnet before the center was finished to help facilitate last-mile connections. The community college has reaped the benefits of OARnet’s high-speed backbone for years as a longstanding member.

The learning center recently had its bandwidth tested after a small fire in a local high school displaced more than 400 students for nearly four weeks as the school was cleaned. The center had the space to host grades 9–12 during this time, when Lawton and her staff quickly learned to change the WI-FI password with the sudden influx of teenagers and their smart phones.







“From that, I learned we have a really, really solid internet connection,” Lawton said. “It’s great. It didn’t falter at all under all that pressure.”

Lawton said while the center has big plans for more training opportunities and community events, she wants to keep the programming flexible for the changing needs of the Fostoria area.

“My vision is to just see the center busy every day with all kinds of different programs happening,” Lawton said. “The possibilities are just limitless right now because we have so many different options with this space.” •





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