



OARnet

An **OH·TECH** Consortium Member

2016

2017



ANNUAL REPORT

LEADERSHIP

PAUL SCHOPIS

Interim Executive Director
& Chief Technology Officer
(614) 292-1486 | pschopis@oar.net

MARK BEADLES

Chief Information Security Officer
(614) 292-8217 | mbeadles@oar.net

LETHA BUTCHER

Client Services Manager, Government & K-12
(614) 292-9545 | lbutter@oar.net

MARK FULLMER

Network Director
(614) 292-8165 | maf@oar.net

GARY GOETTEL

Network Operations Manager
(614) 247-8032 | ggoettel@oar.net

DENIS WALSH

Chief Relationship Officer
(614) 292-9037 | dwalsh@oar.net

ANN ZIMMERMAN

Client Services Manager, Higher Education
(614) 292-9022 | annz@oar.net

oar.net



OARnet provides the vital statewide connections and resources that allow Ohio students, faculty and staff to collaborate, learn, research and innovate.”

— John Carey, Chancellor, Ohio Department of Higher Education

OARnet: Connect. Aggregate. Collaborate. Our powerful trilogy of goals 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 collaborate 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 unsurpassed in any other state: OSC, OARnet, OhioLINK and eStudent Services.

FROM THE DIRECTOR

2017 represents OARnet's 30th anniversary, a time in which we will celebrate many of the milestone events that mark the organization's history.

We marked another anniversary of sorts this year, as the 20-year leases of dark fiber that now constitute the backbone of OARnet's statewide network will end within the next five years. Those leases allowed OARnet to jump from expensive provisioned circuits to the massively scalable solutions of fiber-optics when the new network was launched in 2004. The move to dark fiber also allowed us to innovate by using virtual routing and optical infrastructures. Data traveling along our 2,240-plus miles of fiber backbone now move at a blistering 100 gigabits per second. We have started a five-year process of negotiating with many of our service providers, seeking arrangements that will best serve our various client-communities for many years into the future.

While the fiber, the routers, the switches, the repeaters and the myriad of other advanced networking hardware have revolutionized network speed and reliability, the largest sources of innovation have always been people—our members, partners and staff. For 30 years, we have listened closely to our clients' needs. Most recently, this has resulted in improved service offerings, such as reactive DDoS services and NG911. We also have sought out and hired the most skilled and helpful staff, and they have spearheaded initiatives such as disaster recovery and portal development. As a result, our partners have approached us with numerous innovative services, such as eduroam's global wireless access and virtualization, and we've launched the ones that best serve our communities.

This focus on people and community has served OARnet well since our founding in 1987, and it will serve us well as we look to the years ahead.



Paul Schopis
Interim Executive Director

2016–17 HIGHLIGHTS

Reduced internet fees

OARnet's new fiscal model reduced internet rates across the state and aligned user tiers with current usage and demand, including the addition of a 10-gigabit tier. Commodity internet rates will drop by 15 percent in the coming year, and rates will include even more services than before.

Reactive DDoS roll out

The new reactive DDoS service is now bundled with commodity internet at no additional cost to clients. This service has unlimited capacity by offloading filtering to upstream carriers at the expense of all impacted services for the victim IP address.

IntraOhio Content Subscription service a success

The new IntraOhio Content Subscription service was a huge success in 2016–17. Over 30 gigabits was subscribed across 33 schools participating in the service. This service helps Ohio schools avoid large download demands on the commodity internet from Ohio-based servers of content providers such as Netflix and Google, saving them substantial internet expenses.



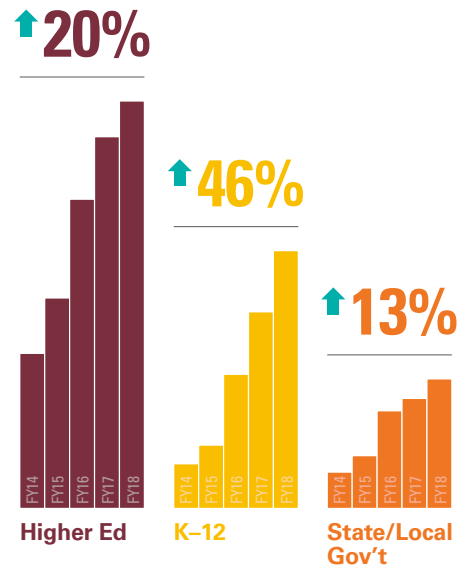
FINANCIAL IMPACT

OARnet promotes community and economic development by expanding access to affordable technology. 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's updated subscription-based pricing and service model keeps commodity internet competitive, aligns the business model with the cost to provide services and allows customers an affordable way to meet the demand for bandwidth.

SUBSCRIPTIONS



ADDITIONAL ROIS



\$1,254,744 savings for all clients (2016-17)



34% total bandwidth increase for all clients (2016-17)



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



28% bandwidth increase for State & local government (2016-17)



18% increased bandwidth for higher education (2016-17)



79% bandwidth increase by K-12 schools (2016-17)



\$76,800 savings for state of Ohio agencies (2016-17)



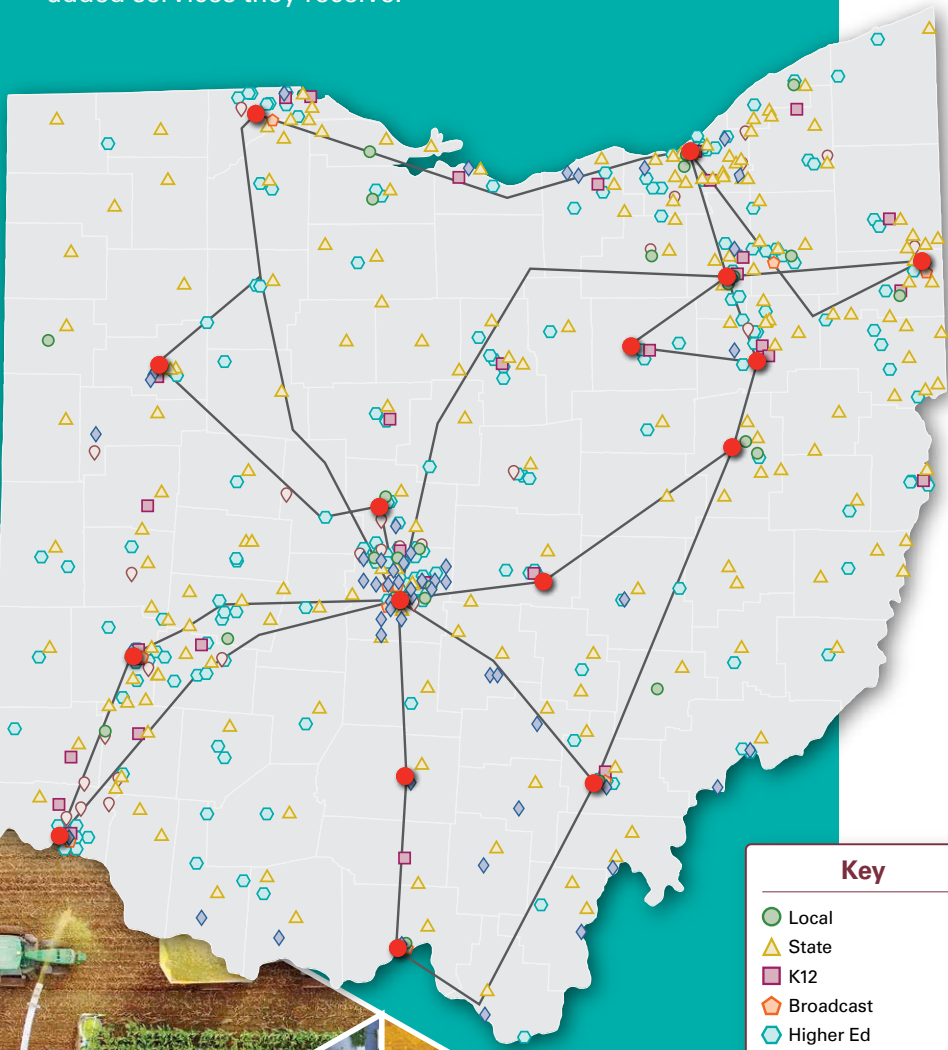
\$904,344 savings for higher education (2016-17)



\$273,600 savings for K-12 schools (2016-17)

COMMUNITIES

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 chose to participate in OARnet's shared services programs because of the benefits and value added services they receive.



Key	
●	Local
▲	State
■	K12
⬠	Broadcast
⬡	Higher Ed
◆	Medical & Research

 **630+**

K-12 Schools

30 Large Urbans + ITCs
600+ School Districts

 **310**

Higher Education

85 Main Campuses
225 Regional Campuses

 **66**

Healthcare Facilities

10 Institutions
56 Sites

 **8**

Research

8 Research Facilities
4 Industry Partners

 **9**

Broadcast Stations

Broadcast Educational Media
Commission (BEMC)

 **55**

Local Entities

55 Local Governments

 **64**

State & Federal Govt.

62 State of Ohio Agencies
2 Federal Government



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 bundled commodity internet and reactive DDoS service and the addition of a 40-G port connection to 1-, 10- and 100-Gbps offerings. The extremely successful IntraOhio Content service introduced last year is now a standard service offering, and clients can now purchase security scanning.



Internet

OARnet's new model for fiscal year 2017 reduced internet rates and aligned user tiers including current usage and demand, with the addition of a 10-gigabit tier. For fiscal year 2018, commodity internet rates will drop by 15 percent, and pricing will include OARnet's new reactive DDoS mitigation service.

IntraOhio Content Subscription

In its first year, this new service was extremely successful, with 33 schools participating. With streaming services at \$1 per megabit, institutions save 50 to 84 percent per Mb from the previous year. This moves large-scale traffic from Ohio-based servers belonging to such content providers as Netflix and Google off of commodity internet and onto the OARnet backbone. This, in turn, provides customers with more bandwidth for every dollar spent and positioning our clients to effectively satisfy the ever-increasing demand for bandwidth. OARnet works closely with each client to determine the right IntraOhio Content Subscription.

IntraOhio Private Cloud Service

By connecting through OARnet's private cloud, our clients can avoid the cost of purchasing additional connections to access public clouds or other services. This shared-service approach is the underlying principle for overall reduction in the cost of broadband services for Ohio and is especially valuable when used in conjunction with high-demand services such as disaster recovery, cloud-based compute and storage or other service offerings.

Internet2

As Ohio's Internet2 connector, OARnet reduces the cost of connector fees through the aggregate purchase of Internet2. Internet2 allows Ohio's higher education institutions to receive research support and to collaborate at a state and national level without having to worry about infrastructure or the boundaries of commodity internet.

Security/DDoS

Now bundled with OARnet commodity internet, reactive DDoS services provide manual intervention to support null route signaling from clients. This capability has unlimited capacity by offloading filtering to upstream carriers at the expense of all impacted services for the victim IP address. OARnet offers proactive DDoS static filters and policers to automatically mitigate these attacks upon request from clients for an added cost.

NG911

Next Generation 911 takes emergency response operations from analog to digital, providing faster, more reliable services when communities need it most. Working with the Department of Administrative Services, OARnet is expanding a two-phase pilot program to bring Ohio counties on to NG911 to improve emergency communications and mapping. Phase One is pre-ESInet and is currently under way.

Data Center Services

OARnet supports an array of co-location options to meet client needs for geographical diversity, based on the recommendations of the Ohio Task Force on Affordability &

Efficiency in Higher Education. OARnet provides cost-effective connections back to your organization via OARnet's high-speed network. Other options of co-location may include space, cabinets and power.

Virtualization

Virtualization allows IT departments to create virtual environments, which can reduce the number of physical servers or computers needed, while still maintaining quality performance levels. OARnet's aggregate purchase of VMware results in license cost-reduction of 25 percent and maintenance fee reduction of 35 percent. An expansion of VMware products now includes Airwatch and vCloud Air for on-demand storage and servers.

Gateway Service

OARnet recently added a client portal protected by two-factor authentication, enabling clients to self-administer their contacts and provide easy access to statistics reflecting their use of OARnet services. OARnet uses the self-administered contacts to keep a client's organization up to date with important maintenance and outage communications.

eduroam & InCommon

Currently, 24 OARnet member institutions participate in eduroam, which provides secure, global wireless access for eduroam members. Through this service, faculty, staff and students can access the wireless network while on site at other member institutions with their home login credentials. OARnet is also working on a legal framework for a consortia purchase of InCommon certificates.



OADNET HELPING CLEVELAND MUSEUM OF ART ACHIEVE GLOBAL REACH



WHO:

The Cleveland Museum of Art (CMA) is expanding its global reach while enjoying safe and secure storage of its digitized materials through an innovative data storage solution.

WHAT:

Customized solutions have improved data security, compression and access speed for CMA's historical and mission-critical assets, allowing access to world-class art for viewers around the world.

IMPACT:

OADnet provides redundancy by transporting CMA's digital repository art collection from BlueBridge Networks in Cleveland to the museum's secondary connection at the Cologix data center in Columbus.



The OARnet topology throughout the state of Ohio helps in a web, data-centric world.”

— Kevin Goodman, managing director and partner at BlueBridge

At any time of day or night, you can step inside the Cleveland Museum of Art (CMA) with nothing more than your smartphone, thanks to an “always-on” assurance provided by OARnet.

Using the CMA’s ArtLens app, you can view sculptures by Auguste Rodin, experience one of the finest Asian collections in the world and even enjoy guided tours in which researchers explain significant details of artists and their works.

The vastness of the Cleveland Museum of Art’s digital repository art collection is breathtaking and is helping the museum expand its global reach. The digital collection—kept on the cloud-based system Piction—is safe and secure through an innovative and reliable data storage solution constructed by BlueBridge Networks in Cleveland and supported by OARnet.

“Anybody in the world can search our collection,” said Tom Hood, director of technology operations at CMA. “The database has been in place almost 10 years now, but within the past three-to-four years, it has really taken on a life of its own.

“The importance of needing a redundancy system has grown

exponentially. In-house we had some ways of doing that, but the scale was growing, and it was really difficult.”

OARnet provides redundancy by transporting CMA’s primary digital repository art collection from the BlueBridge data center to the museum’s secondary backup location at Cologix data center in Columbus. OARnet’s 100-gigabit per second backbone provides instantaneous recovery capabilities in the event of an outage; the collection can be transported and replaced without interruption for viewers. OARnet’s involvement reduces costs for CMA, while increasing efficiency.

“It’s about adding more capacity and storage, and to make sure the storage we had is properly backed up if something happens here in Cleveland. So, we can make sure we have constant access to our image repository data,” Hood said.

Some of the technology CMA patrons enjoy include the ArtWell app, the interactive Collections Wall and Gallery One, which often introduces visitors to the museum’s art and helps them understand many aspects of the collections. Three years ago, CMA opened Gallery One, which helps visitors maneuver the gallery and build their own tours via the Collections Wall.

“It’s used a lot by school groups that come in,” Hood said. “They can rent iPads or use their own devices on a lot of the tours our education department gives.”

The educational aspect is what brought in OARnet—which serves Ohio’s education, health care, public broadcasting and government communities—because CMA is a non-profit educational institution.

“Without OARnet it would have been cost prohibitive based on the topology alone,” said Kevin Goodman, managing director and partner at BlueBridge.

Goodman said that OARnet’s role in helping institutions like CMA helps the state on a larger level.

“Any time you can improve efficiencies and reduce costs, you’re going to create opportunity, you’re going to create education, you’re going to create learning,” Goodman said. “So, the OARnet topology throughout the state of Ohio helps in a web, data-centric world; helps throughout the state of Ohio. Businesses and institutions compete in a global marketplace more effectively.” ◀

STATE VIDEO CENTER ENABLES DISTANCE LEARNING FOR SCHOOLS

WHO:

The Ohio Broadcast Educational Media Commission (BEMC) harnesses the power of OARnet's 100 Gbps statewide backbone to bring virtual educational opportunities to the K-12 classrooms of Ohio's public schools.

WHAT:

The BEMC Video Conference Network Operations Center operates and maintains a statewide video conference network that provides reliable, multi-point services to more than 1,200 customers in Ohio at no cost. Courses such as Mandarin Chinese are affordable to schools that normally could not cover the cost of such programs.

IMPACT:

OARnet provides a high-speed connection to this state of Ohio service, providing service to even the most remote areas of the state.

Professor Chris Stellato waits patiently for his middle-school student to answer the question he's just asked her in fluent Mandarin Chinese. She fidgets with the sleeves on her sweatshirt as she struggles to come up with the right word. Even over webcam, Stellato can tell she's tired today. He nudges her with a verbal clue, and eventually she answers quietly, but correctly, in near-perfect Chinese.

A few months ago, neither this student nor her classmate could speak a word of the language. However, thanks to opportunities provided through the Ohio Broadcast Educational Media Commission (BEMC), school districts across Ohio can offer distance-learning classes with live instruction at a low cost. The seamless real-time video conferencing is made possible through OARnet's high-speed statewide network.

"With a program like this, (a school) may have 10 to 15 kids that want to take Chinese in the whole school. So, to bring on a Chinese teacher who may not be able to teach any other classes would be incredibly expensive," Stellato said. "But with this, you're probably looking at maybe a third of the cost. And I think actually it's just as, if not more, effective."

Since 2006, the BEMC Video Conference Network Operations Center (VNOC) has maintained a statewide video conference network that provides reliable, multi-point video conference services to more than 1,200 customers in Ohio. The service is offered at no cost to Ohio K-12 school districts, Ohio educational service providers and Ohio content providers.

A decade ago, the equipment to operate a class via video conferencing may have been a financial



burden, but BEMC Chief of Operations Jarrod Weiss said that all a school needs today are a computer, webcam and microphone. Through connections to OARnet's 100 Gbps backbone, live video streaming is not only possible, but very accessible to rural districts in even the most remote parts of the state.

"It's an incredible thing to see," said Weiss. "It's a large, fast internet capability and without it, those schools wouldn't be able to connect to us, and we wouldn't be able to help them to provide these educational opportunities."

The Chinese language classes are taught through the Confucius Institute at the East Central Ohio Educational Service Center. Director Michele Carlisle said the

institute uses six instructors, including Stellato, to provide instruction to nearly 825 students.

"The bridging service allows us to add a daily class recording so that students are able to access their class content after class in the manner of a recorded session, while also achieving live instruction daily."

As Stellato can attest, the service is a boon not just to students receiving instruction, but also to the instructors teaching into a webcam.







"It's huge," Stellato said of being able to interact with students in real-time. "Teaching—there's a huge psychological element to it. With just voice, I don't know what's going on. So, especially with foreign language, it's something where I think you need to see the individual." ◀

It's a large, fast internet capability and without it, those schools wouldn't be able to connect to us, and we wouldn't be able to help them to provide these educational opportunities.

— Jared Weiss, BEMC Chief of Operations





-  info@oar.net
-  twitter.com/oarnet
-  facebook.com/oarnet
-  oh-tech.org/blog
-  linkedin.com/company/oarnet
-  oar.net



OARnet

An **OH-TECH** Consortium Member

OH-TECH is the technology and information division of the Ohio Department of Higher Education.

1224 Kinnear Road | Columbus, OH 43212 | ph: (614) 292-9191