Annual Report

2017–2018

OH·TECH | Ohio Technology Consortium
A Division of the **Ohio Department of Higher Education**

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"OH-TECH combines advanced computing, statewide networking, and information delivery in a way that goes beyond what is found most anywhere else."

— *John Carey, Chancellor, Ohio Department of Higher Education*

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.

oh-tech.org

PHOTO TOP // Chancellor John Carey directs the Ohio Department of Higher Education and oversees the strategic initiatives of the Ohio Technology Consortium and its member organizations in support of the state's technology infrastructure needs.

Welcome to OH-TECH

The member organizations and administrative divisions of the Ohio Technology Consortium (OH-TECH) deliver world-class technologies, information and expertise to provide Ohioans with a strong foundation for education and workforce, scientific research and business innovation.

A division of the Ohio Department of Higher Education, OH-TECH functions as an umbrella organization for Ohio's statewide technology and information infrastructure organizations: the Ohio Library and Information Network (OhioLINK), the Ohio Academic Resources Network (OARnet) and the Ohio Supercomputer Center (OSC). The consortium seeks out and fosters synergies among the member organizations and provides common services to each through its Shared Infrastructure and Consortia Services units.

Each OH-TECH group is staffed by experts, and the accolades garnered over the years are a testament to their skill and dedication. OhioLINK negotiates for content shared among its 118 academic libraries, saving Ohio and its universities millions of dollars each year. Unique among supercomputer centers, OSC is a state-funded organization that provides high performance computing and storage services to students, researchers and engineers at campuses and businesses across the state. OARnet provides more miles of high-speed connectivity—a blistering 100 Gigabits per second—across Ohio to a broader geographic footprint than any other state in the country.

Within OH-TECH, the Shared Infrastructure division provides centralized technology services, tackling significant technological projects, such as coordinating a major rewrite of the department's Higher Education Information system. The Consortia Services division addresses essential services such as supervising an asset management system and coordinating communications through social and tradition media outlets.

In the following pages, you will discover far more about how OH-TECH addresses its mission to "propel Ohio's knowledge economy through the creation and adoption of next-generation technology and information solutions."

Who we are

- Vast collections of books and electronic journals.
- Thousands of miles of high-speed, fiber-optic cable.
- Lightning-fast supercomputers and vast data storage.
- Millions of lines of code and rows of virtual servers.
- Websites, case studies, video clips and publications.

OARnet

OARnet serves Ohio's education, health care, public broadcasting and government communities with a statewide broadband network. 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.

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

This project is a great example of what the skilled and dedicated staff members at OARnet do on a regular basis. By engaging members and users, OARnet uses its diverse assets to create a whole solution to benefit all involved, much more than any individual organization could have accomplished its own. OARnet connects people and communities at the lowest possible cost, maximizing opportunities for clients.

2017–18 Highlights

30th Anniversary

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 for research purposes.

911 Services 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 five counties, four cities and one university with 911 service, with many future sites planned.

Vmware Contract Extension

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.

PHOTO TOP LEFT // A workstation inside one of The Point's maker spaces. PHOTO TOP RIGHT // The grand opening of The Point, where the Westerville community gathered to celebrate the new tech hub.

Otterbein's STEAM innovation hub 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, adjusting knobs and trimming wires. 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.

With all this innovation comes technology, and with technology comes the demand for high-speed internet. Thanks to Otterbein's previous connections to the 100 Gbps network, OARnet provides connectivity to the center, which opened in August of 2016.

"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.

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 is complete, the available space is 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.

As executive director Erin Bender pointed out, students also benefit from The Point's 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," Bender said. "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 complete facility includes a 125-person event space, an outdoor learning laboratory (the facility sits just in front of Otterbein Lake and Alum Creek), 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.

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.
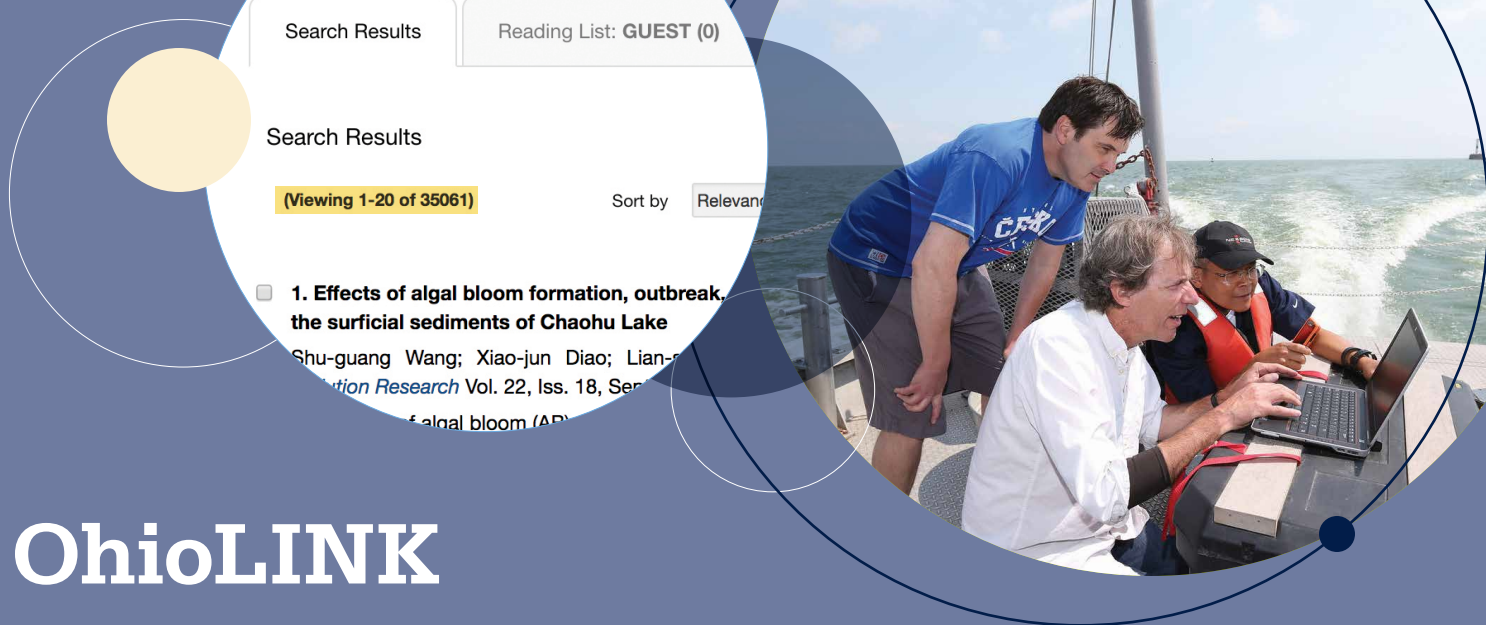
OhioLINK

In its 25th year, OhioLINK has become far more than books and libraries. It is a growing organization with expanding services and stakeholders—with affordable learning and discovery central to its focus, supporting students, increasing access, reducing costs and fueling research are its goals.

One of the top academic library consortia in the nation, OhioLINK serves more than 600,000 students, faculty, researchers and staff at its 90 member institutions, along with providing Ohio citizens access to content at their public libraries. OhioLINK manages Ohio's vast and varied scholarly resources and, through its renowned negotiating ability, delivers these academic, research and discovery resources to its 120 member libraries at the lowest possible cost—saving hundreds of millions of dollars annually. This content is not only available to its member libraries equally, regardless of institution size, but also to any citizen entering any OhioLINK library in the state.

At the heart of OhioLINK, as a consortium, are connectivity and collaboration. No other academic library consortium in the nation collaborates as extensively to share such a comprehensive collection of resources across AN entire state. It is through the actions, contributions, talents and support of its membership and network that its goals are achieved.

2017–18 Highlights

Affordable Learning Ohio

OhioLINK's initiatives are the catalyst for multi-pronged activities across OhioLINK institutions for advocacy, discovery and use of affordable, high-quality course materials. As always, our member librarians have become leading proponents and experts in these areas, on their own campuses and beyond.

Lifetime Learning for All Ohioans

Columbus Metropolitan Libraries joined SearchOhio, giving patrons free access to millions of additional items from public libraries statewide. OhioLINK led negotiations for the Libraries Connect Ohio database package, delivering ebooks, articles, databases and language learning to every individual living, studying and working in Ohio.

Digital Public Library of America: Ohio Hub

In a combined effort among member institutions, the DPLA now includes more than 50,000 digital images, primary source documents and other multimedia from 11 Ohio libraries and cultural institutions—a powerful collaboration among Ohio libraries and cultural heritage organizations.

PHOTO TOP LEFT // OhioLINK's Electronic Journal Center provides researchers with success to vital primary literature. PHOTO TOP RIGHT // BGSU professors are studying water quality of the Great Lakes.

OhioLINK a key asset to Lake Erie cleanup researchers

Robert Michael McKay, Ph.D., and George Bullerjahn, Ph.D., had been studying water quality in the Great Lakes for more than a decade when the situation in Lake Erie turned dire.

On Aug. 2, 2014, nearly half a million Toledoans woke up to contaminated drinking water from toxins released by microscopic cyanobacteria, or blue-green algae, in Lake Erie—Toledo's water supply.

Since then, the biological science professors at Bowling Green State University have been on the front lines of battling the algal bloom in Lake Erie. And among their best weapons is OhioLINK.

"These events are a global phenomenon," said McKay, Ryan Professor of Biology at BGSU. "We're accessing research articles through OhioLINK daily. It's a resource most of us take for granted. You forget about this consortium of schools whose buying power allows you access to essentially anything. I'm really not sure where we would be without OhioLINK."

An "algal bloom" search in the OhioLINK Electronic Journal Center turns up more than 35,000 articles, and searching "algal bloom Lake Erie" returns 2,135 articles.

Bullerjahn said OhioLINK's Electronic Thesis and Dissertation center is also key.

"Our scientific colleagues around the state are mentoring students," said Bullerjahn, Professor of Research Excellence at BGSU. "They're producing work that may not be in primary literature yet, but it may be appendices and theses that afford details that often get omitted in primary literature."

The Lake Erie algal bloom is the result of phosphorus runoff from farm fertilizers. The contaminated water can cause illness in humans and can kill smaller animals. Because of those dangers, algal blooms often wreak millions of dollars of damage to lakeside areas in the form of retail home values, water quality treatment and the tourism trade. Groups are working on voluntary participation, including tax incentives, amongst the farming community to adopt better practices and have considered more regulation through the Ohio Environmental Protection Agency. •

For the full story, see ohiolink.edu/erie.

WHO:

Robert Michael McKay, Ph.D., and George Bullerjahn, Ph.D., researchers at Bowling Green State University

WHAT:

The research team members access OhioLINK resources daily through the Electronic Journal Center and/or the Electronic Thesis and Dissertation Center.

IMPACT:

OhioLINK resources allow the team members to keep abreast of primary literature on algal bloom research, as well as details often not found in primary sources.

RESEARCHER PROFILE // Bowling Green State University. PHOTO RIGHT // Researchers examine an instrument used for their water-quality research.

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Ohio Supercomputer Center

OSC thrives on academic, healthcare and industrial clients who harness advanced computing to make discoveries, unlock innovations and identify trends. Ohio's rich legacy of invention and discovery continued in 2017 through the efforts of over 2,200 students, scientists, engineers and clinicians from 23 universities and 48 commercial companies.

The State of Ohio through the Ohio Department of Higher Education has tasked OSC since its 1987 creation with placing "Ohio's research universities and private industry in the forefront of computational research." Universities also contribute to OSC's sustainability.

OSC's efficient, expert staff offering systems services, software development, support and training is crucial to helping clients get the most out of each computing session, whether through system configuration, coding, training, troubleshooting or other services. This year, OSC staff provided 23 training opportunities across the state to trainees who can now better serve their institutions with the knowledge of what high performance computing can do to accelerate research and innovation.

OSC is fortunate to be more than supercomputers; it is an immeasurable blend of brilliant researchers, dedicated stakeholders, robust connecting technologies and expert support.

2017–18 Highlights

Prioritizing Education and Training

In the last year, OSC staff nearly tripled the amount of education opportunities around the state, training 461 users on HPC systems and OSC-specific programs. For those who lack institutional knowledge of OSC, especially as more new fields realize the usefulness of HPC resources, OSC addresses this learning gap through its workshops, which take staff to a different section of Ohio each month. In-person office hours are also available every other Tuesday in Columbus during the academic year.

Open OnDemand

This fall, OSC launched Open OnDemand 1.0, an open-source version of OSC OnDemand, the Center's online, single-point-of-entry application for HPC services.

Open OnDemand is an NSF-funded project to develop a widely shareable browser-based web portal that provides HPC centers with advanced web and graphical interface capabilities. Version 1.3 came in the spring, featuring quicker installation and Red Hat Package Manager, a common standard for distributing Linux software.

Storage and Facility Upgrades

The center upgraded its backup capacity and performance with the addition of a new tape library in December. A new IBM storage solution implementation was completed mid-2018, and the rest of the year will bring new backup servers and disk storage pools.

PHOTO TOP LEFT // An aerodynamics test run on TotalSim's TS Aero app. PHOTO TOP RIGHT // A 3D rendering of a 'quadcopter,' created using TotalSim software for GoFly.

Competitors take flight with TotalSim CFD testing at OSC

WHO:

TotalSIM US, an engineering consultant firm in Ohio that works in partnership with AweSim, OSC's industrial engagement platform

WHAT:

TotalSIM, with help from OSC, specialized a version of its TS Aero computational fluid dynamics app for competitors in Boeing's GoFly challenge.

IMPACT:

By testing the aerodynamics of personal flying devices, GoFly competitors using TotalSIM's app have allowed the company to refine the software and infrastructure, improving a potential commercial version.

While widely used for aerial photography and video, the next frontier for drones could be human transportation. The GoFly challenge, sponsored by Boeing, is culling the brainpower of the world's most creative innovators and engineers to create personal flying devices. With $2 million of prize money on the line over the course of two years, teams of inventors, engineers and dreamers are reaching outside their comfort zones to make human flight a reality.

To do this, many must reach for unfamiliar technology and tools to model and design a device capable of carrying a person. That's where TotalSIM US and the Ohio Supercomputer Center enter the picture. GoFly approached Ray Leto, president of TotalSIM, about providing contestants with computational fluid dynamics tools. TotalSIM's TS Aero app, built on OSC's AweSim industrial platform, offers an intuitive interface for users to upload their aerospace vehicle designs and test digital prototypes against various forces. In partnership with OSC, TotalSIM created a specific app for GoFly, based on TS Aero, specialized for devices that use vertical takeoff.

"What we offer that other people don't is an app-based workflow specifically made for these types of vehicles that doesn't require expert
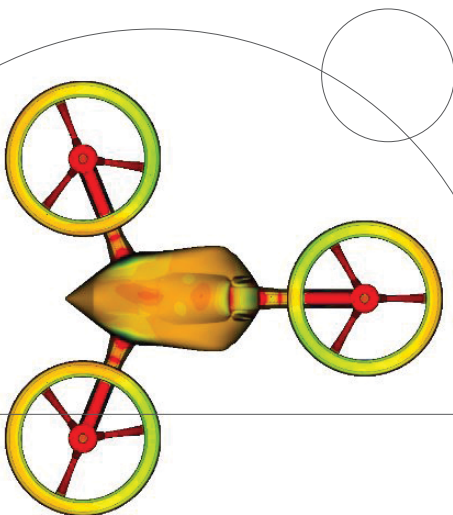
knowledge to run," Leto said. "Many of the people using it have never done CFD before, many of them are not aerodynamicists, they're innovators, inventors, and now we're enabling them to do that."

TotalSIM allows all GoFly contestants to use their app at no cost, so they can log in and run simulations on their drone designs. Each team can run 10 or more simulations, approximately a $5,000 value.

"OSC was really accommodating in having us do the account setups," Leto said. "We've got a streamlined account with OSC where we create the account and share the application. And we've got a website full of documentation, training information and videos. We launched all that, and we've had pretty good success in getting people up and running."

GoFly users have challenged TotalSim since the contest's launch, allowing the company to refine its aerospace application, which it offers to commercial customers as well.

"It's been a good advanced beta testing for us in some ways both from the CFD and aerodynamics side of it, and maybe more importantly from the software and the infrastructure side of it with OSC involved," Leto said.

CLIENT PROFILE // TotalSIM PHOTO LEFT // TotalSim's intuitive Computational Fluid Dynamics TS Aero App simuates how GoFly devices will respond to specific conditions.

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Shared Infrastructure

The Ohio Technology Consortium's Shared Infrastructure team provides information technology and software support to all of the consortium's business units, as well as the Ohio Department of Higher Education. This covers everything from large-scale projects, such as database overhauls and application development, to local desktop support.

SI manages and supports the consortium's use of ServiceNow, a workflow software and ticketing system that ensures client and internal needs are met in an efficient, timely manner. The team provides ongoing updates and development for the system as well as troubleshooting support.

The SI team also provides technical support in conjunction with the State of Ohio Computer Center for the Ohio Supercomputer Center's high performance computing resources as well as OARnet's data storage and servers.

Consortia Services

The Ohio Technology Consortium's Consortia Services team operates as the Business and Communications Office for the consortia, which includes OARnet, OhioLINK and the Ohio Supercomputer Center. The unit provides these organizations with financial, human resource, communications and facilities management services.

The Business Office is responsible for all things fiscal, including accounts receivable, accounts payable, asset management, budgeting and cost modeling, financial reporting, grants management, contract management, and procurement for all consortia members.

The Human Resources Office manages the human resource activities for all of OH-TECH as well as for the Ohio Department of Higher Education, providing support for organizational planning, employee relations and benefit and payroll issues for the consortium.

The Facilities Manager is responsible for building maintenance, vehicle and equipment preventative maintenance, storage and surplus activities and building safety and security.

The Communications Team is devoted to the development of print materials (annual reports, a research report, brochures and newsletters) and electronic media (press releases, web development, social media, blog posts and videos) to advance the efforts of all OH-TECH consortia members.

PHOTO TOP LEFT // The Shared Infrastructure team provides information technology and software support to OH-TECH member organizations and ODHE. PHOTO TOP RIGHT // Students from around the state participate in OSC's Statewide User Group's poster competition in newly refreshed hallways.

2017–2018 Highlights

1224 Kinnear Hallway Renovations

To update our appearance, we embarked on a hallway renovation plan to modernize and better identify public areas of the building. Decades-old photos and artwork were removed and hallway walls received a fresh coat of paint. New ADA-compliant signage has been posted throughout, thanks to efforts from our Facilities and Communications teams.

Capital Budget for Fiscal Year 2019–20

The OH-TECH Business Office assisted consortia members in crafting a combined capital request for the OH-TECH member organizations—OARnet, OSC, OhioLINK and Shared Infrastructure—in excess of $35 million, which the State Legislature approved and enacted to be effective June 29, 2018. These capital dollars will be used, in part, to: expand supercomputer capabilities and services for OSC; subsidize the cost of top-tier research published each year in the electronic journals purchased for OhioLINK member libraries; replace end-of-life equipment and continue to improve/expand the capacity of the OARnet network to increase state competitiveness; and expand and upgrade internal technology that supports both OH-TECH and the Ohio Department of Higher Education.

Higher Education Information (HEI) System Rewrite

HEI is a comprehensive relational database that includes student, course, faculty, facility and financial aid data submitted by Ohio's colleges and universities. The HEI project has five work streams; four of those were deployed during fiscal year 2018, with the remaining financial aid program slated for the second quarter of fiscal year 2019. Those work streams include: the HEI core portal, deployed in January 2018; the War Orphans Scholarship, deployed in February 2018; the Nurse Education Assistance Loan Program and the Subsidy Payment Admin, both deployed in April 2018; and the Ohio College Opportunity Grant, to be deployed in fiscal year 2019.

40G Connection Established

Shared Infrastructure, in partnership with OARnet, implemented 40 Gigabit-per-second connections between the SOCC and data centers in Cleveland and Athens. Primary backups are now located at BlueBridge Networks in Cleveland. This increased throughput allows for quicker backups of current member organizations and allows additional member organizations to utilize the backup infrastructure now in place.

Key
- OhioLINK
- OARnet
- OSC
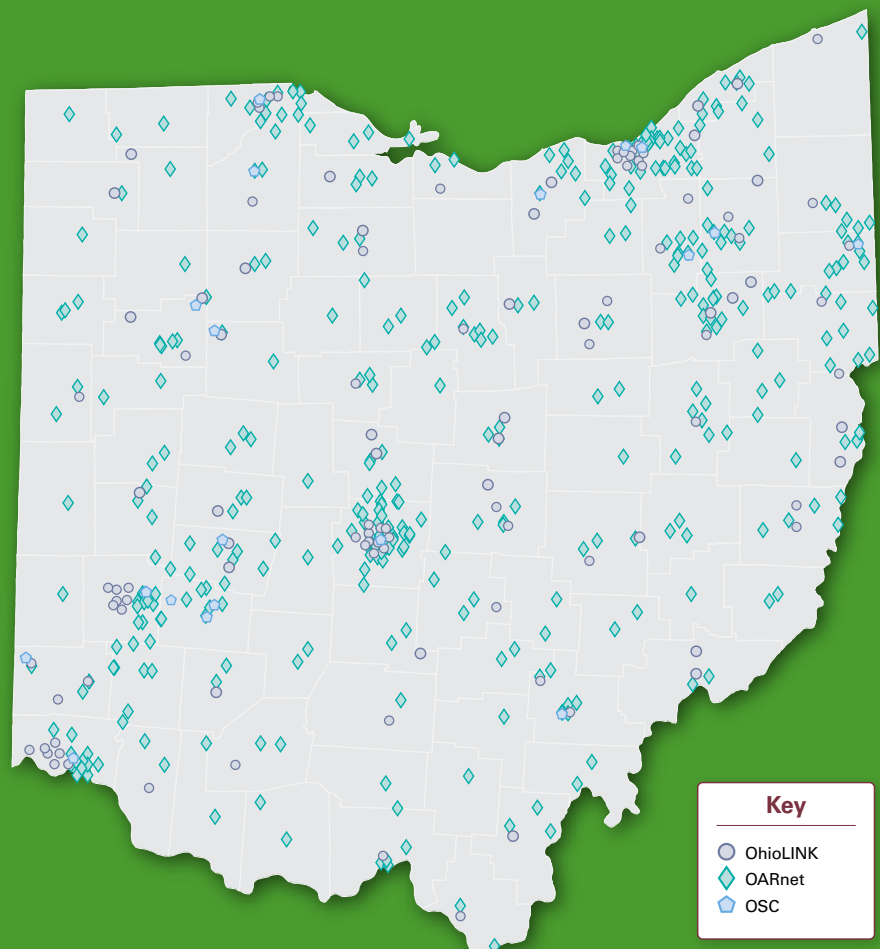
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