



eduroam Support Organization Status Report - 2022



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Overview

What is eduroam? eduroam is the secure, world-wide wi-fi access service developed and operated by GÉANT on behalf of the global education and research community. Internet2 serves as the U.S. eduroam Roaming Operator and its Trust and Identity division operates the service along with the InCommon-related offerings.

What is the eduroam Support Organization Framework? The true value of eduroam increases with its ubiquity. eduroam in every primary and secondary educational institution, library, and public space boosts the value proposition of the service immensely and regional networks and community anchor institutions present a unique and powerful partner to address this scaling challenge. At the same time, we can help make community services, and the community that provides them, more sticky. K-12s as well as libraries and museums that are part of the K-12 ecosystem have thus far been underserved by eduroam, and the U.S. eduroam Support Organizations (eSOs) leverage their existing relationships with K-12s, libraries, and museums to address this need.

To better enable eSOs to serve these communities, this program provides them with a simplified business model, training and resources to build their staffs' expertise, and ongoing support.

Key responsibilities of eduroam Support Organizations include:

- Provisioning service for new K12, library, and museum constituents, as well as hotspots
- Managing ongoing first level support for constituents
- Publishing a list of constituents to promote awareness within their states and the eduroam community at large of the scope of participating institutions
- Participating in collaborative meetings with other program participants
- Discussing feedback, requests, and program ideas with their community

A recently added feature of the eduroam Support Organization Program is the “On-Ramp.” The On-Ramp allows prospective eSOs to provide eduroam to a set number of constituents at no charge, so they can lay the groundwork in their states, which will better position them for success when they join the next cohort of eSOs.

Internet2 Goals for eSO Framework

As the operator for eduroam in the U.S., Internet2 set the following goals for the eduroam Support Organization Framework:

1. Scale existing program alongside eduroam Support Organizations to ensure consistently good experience for new constituents

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2. Continue to add functionality to eduroam Federation Manager
 3. Adjust eduroam Support Organization program to allow for an On-Ramp for eSO candidates
 4. Continue to evolve eSO training, seeking input from program participants on desired updates
 5. Continue to grow and refine library of technical documentation
 6. Include eduroam Support Organizations in its efforts to collect the eduroam community's needs and ideas on how to improve the eduroam service and work toward making eduroam scale in a way that would meet the growth in the K12, library, and museum sectors.

Objective

The report discusses our progress towards achieving these goals as well as highlighting the goals, successes, and areas of improvement for the individual eduroam Support Organizations. In addition, we review key metrics, present a detailed case study report, and identify our goals for 2023.

eduroam Support Organization Goals

At the close of 2021, Network Nebraska, the Sun Corridor Network, Utah Education and Telehealth Network (UETN), and Internet2 identified the following goals for 2022. As part of their proposals for the On-Ramp, Connecticut Education Network (CEN) and Link Oregon stated their goals for 2022 as well.

Network Nebraska

1. Continue expansion to school districts
2. Refine process for onboarding constituents
3. Expand documentation and guidelines
4. Promote to local businesses and ISPs near participating schools
5. Create promotional materials
6. Review both metro and school bus wi-fi options

The Sun Corridor Network

1. Expand outreach to key stakeholders in K-12 system
2. Explore partnership with state library system
3. Update website
4. Identify additional community stakeholders and locations to serve as points of contact for support
5. Update mapping of eduroam service locations

UETN

1. Expand locations and ensure the quality of the eduroam service
2. Sign up charter schools
3. Provide logging and support for Utah constituents
4. Increase the number of SP-only constituents
5. Engage in meetings, presentations, and outreach
6. Work with Utah Wireless Access Group (UWAG) on emerging wireless technologies that coincide with eduroam
7. Initiate eduroam2go R&D for pre-configured hotspots
8. Update and create marketing assets and novelty promotional materials (digital and physical)

On-Ramp Organizations

Link Oregon

1. Identify and enroll five pilot school districts and assist them with the technology and service requirements as well as the obligations associated with being eduroam IdPs/SPs
2. Gain a better understanding of and comfort in navigating the new Internet2 cloud-forward architecture
3. Learn the necessary protocols and strategies surrounding the RADIUS server environment to effectively support our pilot eduroam subscribers
4. Add staff and establish procedures to support the new subscribers
5. Become familiar with what is needed to offer first line support should a pilot subscriber need assistance in establishing or maintaining their eduroam services
6. Determine how to escalate a support issue to Internet2/InCommon resources should Link Oregon be unable to resolve the subscriber's issues

CEN

1. Finalize connector agreement with Internet2/InCommon with CEN subsidized licensing for ease of adoption by CT libraries and K-12
2. Build a project team comprising individuals from CEN staff, CET (Commission for Educational Technology), and CEN member organizations
3. Develop and implement communications and technical support plans
4. Deploy eduroam at five K-12/libraries in 12 months
5. Develop funding model to continue delivering eduroam as an eduroam Support Organization beyond the On-Ramp
6. Encourage adoption of eduroam at CT higher education institutions

Successes

For 2022 Internet2 and the eduroam Support Organizations sought to build on the successes of 2021 while expanding the program to include an On-Ramp. The On-Ramp provides a prospective eduroam Support Organization a way to “try out” aspects of the program before committing to financial outlay of becoming a full eSO. This helps “On-Rampers” to develop the processes and relationships within their organizations and their states to better position themselves for success. Internet2 also worked on increasing the durability and flexibility of the eduroam infrastructure as well as rolling out enhancements to the eduroam Federation Manager, including a number of features geared specifically towards eSOs.

The program continued to emphasize collaboration between all participants with each learning from the other and problem solving shared issues. Program participants continued to hold bi-weekly coordination calls, which helped to drive progress and accountability while still allowing time for internal meetings on off-weeks. Internet2 updated the training materials for eduroam Support Organization staff, adding new training on troubleshooting and deeper technical topics. It also worked with the eSOs to identify new varieties of wireless gear that should be covered in the training. The updated training was delivered to all eduroam Support Organizations, and recordings and other documentation are being made available on an ongoing basis.

As of the writing of this report, there are more than 280 school districts, private schools and academies, and hotspots deployed across five states by participants of the eduroam Support Organization program. Partnerships the eSOs built with local internet service providers have expanded eduroam’s reach via community hotspots. Currently the eSOs and their constituents represent the fastest growing segment of the eduroam community.

2022 eduroam Support Organization Cohort

The achievements of the 2022 eduroam Support Organization cohort reflect the uniqueness of the organizations which comprise it.

Network Nebraska has worked to expand the reach of eduroam within its K-12 community with adoption up from 13% in 2021 to 63% in 2022 of all school districts having adopted the service. Between an increase in K-12 adoption and work bringing up more eduroam hotspots, Network Nebraska increased its number of eduroam service locations to more than 160. They were also able to incorporate state and federal emergency broadband funding into their work as an eduroam Support Organization, distributing \$1.35M of Governor’s Emergency Education Relief (GEER) Funds to eduroam participants in the state of Nebraska, which helped to further drive adoption. Network Nebraska also moved to include the eduroam Support Organization Program into its regular membership fees, which will allow for ongoing funding of the program.

Additionally, members of their team have promoted the eSO program through conference presentations, both within the state of Nebraska (e.g., the Nebraska Educational Technology Association and the Nebraska Council of School Administrators) and nationally (e.g., the Internet2 Technology Exchange and CoSN/Consortium for School Network).

The Sun Corridor Network (SCN) stood up deployments of eduroam in two pilot districts and are working with multiple other schools to activate eduroam. Working with Arizona State University’s legal and procurement teams, they developed a contract vehicle, which will be used for K-12s, libraries, and museums in their state, with a separate agreement to follow for those who wish to become eduroam hotspot providers. They’ve also been actively promoting eduroam within their state, including presenting to the Arizona Association of School Business Officials (AASBO), and have launched an “Activate eduroam” campaign to encourage subscribers in Arizona to provide the most accurate service location data possible. SCN has also been engaging in individual outreach to its members as part of this project. Looking ahead to long-term sustainability, SCN is working on securing state funding sources to support eduroam for all schools on an ongoing basis, not just for its own subscribers.

UETN has already enabled eduroam for nearly all public schools in Utah and has continued to focus on making eduroam more broadly accessible throughout the state. They developed eduroam hotspot marketing materials, including a promotional video aimed at prospective hotspot location owners, and partnered with a local telecommunication service provider on public deployments of eduroam hotspots. UETN also launched “eduroam2go,” a program that repurposes network gear to provide a turnkey hotspot, which requires little to no configuration by the hotspot operator. To round out K-12 deployments in Utah, UETN partnered with a third-party IT contractor to turn on eduroam in charter schools. UETN has also continued to manage and lead Utah’s eduroam user group, which convenes IT staff across the state’s educational community. Their team has also been busy promoting eduroam at conferences, both inside Utah (e.g., UETN’s Technical Summit) and outside the state (e.g., CoSN 2023 in Austin, Texas, and CENIC Summit in Monterey, California).

On-Ramp Organizations

Link Oregon completed its On-Ramp period in December 2022 and will start 2023 as a full eduroam Support Organization. During its On-Ramp, Link Oregon worked to raise awareness of the value of eduroam and gathered support for a statewide K-12 eduroam program from an influential group of Education Service District (ESD) Chief Information Officers. Through this partnership, Link Oregon’s team recruited nine school districts to deploy eduroam across its service area in addition to its initial pilot school district. Link Oregon also utilized its time in the On-Ramp to engage the Oregon Department of Education in identifying an ongoing funding

strategy and formed a steering group comprised of representatives from institutions that have deployed eduroam in Oregon K-12 and higher education environments to guide the initial rollout to the pilot ESD and its participating school districts. Link Oregon also worked on an action team with UETN, Sun Corridor, and InCommon team members to create Service Provider (SP)/hotspot promotional materials.

Connecticut Education Network (CEN) onboarded four of its pilot schools, with a fifth district pending. CEN continued to raise awareness of the value and support for eduroam by holding a dedicated session at the CEN conference in May 2022 as well as working with the Connecticut Commission for Educational Technology on promotion of eduroam and potential adoption plans. CEN also modeled long-term funding support for K12s and libraries in Connecticut and continues to work with numerous institutions to set up support for more than 130 public wi-fi hotspots that were deployed as part of the state’s Everybody Learns initiative.

Internet2 focused significant effort on adding features to the eduroam Federation Manager (eFM) for the general eduroam community, including testing capabilities for an organization’s IdP and a log viewer. There were also features added specifically for eduroam Support Organizations, such as the ability for eduroam Support Organization administrators (eSOAs) to add new eSOAs directly from the eFM. Internet2 also brought on two eduroam Support Organizations using the new On-Ramp. There were substantial updates to participant training resources as well, including updated training materials and added enhancements to troubleshooting training.

Note: Achieving these successes was due in part to having staffing resources allocated appropriately. During 2022, the eduroam Support Organizations estimated a need for approximately 30 hours per month of operations and other support for its eduroam community. Last year, program management, including marketing and communications, accounted for approximately 40-50 hours per month.

Areas for Improvement

During the course of 2022, participants identified aspects of the program which proved challenging for them. Given that three of the eduroam Support Organizations have been active at least one year, the majority of these challenges centered around technical features of the service.

At the outset of 2022, there was no functionality in the eduroam Federation Manager (eFM) that allowed users to test their eduroam deployment. While testing of eduroam Identity Providers (IdPs) was added in 2022, Service Provider (SP) testing will not be added until 2023. While the monthly, bi-annual, and annual reports continue to provide value to eduroam participants, there have been some irregularities in the process of distributing the reports. Issues have included reports with blank pages or text fields that have been cut off. Because the reports specially generated for eSOs to show activity for all of their constituents have far more information to convey than reports for a single subscriber, these issues can be compounded. Another area of concern for eSOs was the need for customized maps which show the eduroam service locations for their states. eSOs would like the capability to embed these maps on their websites.

For eduroam Support Organizations, the increasing interest of state and national internet service providers in becoming eduroam hotspot operators provides a unique opportunity to expand the availability of eduroam in their states, which increases the value of the service to their communities. However, more work is needed to understand the impact these wider scale deployments will have on the national infrastructure and how they will fit into the eduroam Support Organization Program, especially if national ISPs extend their work into states outside of the program. Additionally, there was limited assistance available from Internet2 in creating marketing and promotional material. This may have impacted efforts to grow deployments in their states.

Another programmatic issue identified was the relatively compressed timetable for organizations wishing to join the eSO program via the “On-Ramp,” which allows interested eSO candidates to participate in the eSO program on a limited basis for no cost with the option to join the next cohort as full eduroam Support Organizations. This gives a prospective eSO time to form the structures to support eduroam for their constituents and secure funding. Because the selection process for On-Ramp participants completed in mid-late Q2 of 2022, the selected organizations had less time to get set up.

Key Metrics of Success

Internet2 and the eduroam Support Organizations have identified the following metrics as important indicators of program success. We believe this information will serve as a foundation for measuring our progress over time.

- Growth in K-12 deployments:
 - 280 K-12 constituents active in 2022
- Total eSO deployed/sponsored hotspots:
 - 63 hotspot constituents active in 2022
- eduroam Support Organization student devices connected:
 - 16,616 unique student devices connected to eduroam hotspots outside their schools in 2022^{*1}
- Guests supported by eduroam Support Organization constituents:
 - 212,433 visiting devices connected through eduroam Support Organizations in 2022

Plans for 2023

Based on the successes of the 2022 eduroam Support Organization Cohort, Internet2 plans to further promote growth in the K-12 sector for eduroam and looks forward to accepting submissions for new eduroam Support Organizations in 2023. Internet2 will also work with current On-Ramp organizations to transition them to full participation in the eduroam Support Organization program.

Internet2 continues to see eduroam Support Organizations as invaluable partners in scaling eduroam nationally and broadening the community of eduroam in the U.S., and looks forward to working with current and future program participants and their communities

¹ **Because of the way some districts configure their devices, many individual students may appear as a single device to the eduroam US infrastructure. The number of individual student devices connecting is likely much higher.*

Detailed eduroam Case Study Report

Program Successes

The goals the program participants identified at the outset of the year represent the baseline for success built on the successes of previous years. The following are demonstrations of the successes of the 2022 cohort:

Network Nebraska

1. Deployed wide scale implementation of eduroam within the Network Nebraska K-12 community to create an expanse of educational hotspots throughout the state, including:
 - a. 150 School Districts (63% of districts in NE)
 - b. 15 Educational Support Units (88%)
 - c. 6 Businesses
2. Allocated ongoing funding for eduroam
3. Included eduroam in state broadband funding

The Sun Corridor Network

1. Created a website for eduroam in the Sun Corridor community
2. Deployed first pilot districts (Pinal and Florence ISDs)
3. Created legal agreement structure for members
4. Engaged with current SCN subscribers to activate eduroam in schools

UETN

1. Deployed eduroam in nearly all districts in Utah
2. Engaged in a promotional campaign to increase awareness of the service drive adoption among K-12 students and teachers
3. Worked with the Utah state government to bring more than 50 new SP-only locations online, including numerous state parks, DMV offices, and other state government facilities

On-Ramp Organizations

- Link Oregon
 - Completed the eduroam Support Organization agreement with Internet2
 - Identified a major ESD and at least nine school districts to participate in the pilot deployment of eduroam under the Link Oregon eSO umbrella
 - Formed a steering group to advise the program
 - Worked with other SOs to develop common outreach messaging (SP/hotspot One Pager)
- CEN
 - Completed bridge agreement with Internet2, progress on new/updated eSO agreement with Internet2
 - Signed up four school districts with another in progress
 - Worked with CT Commission for Educational Technology on promotion of eduroam and potential adoption plans
 - Added an optional eduroam component to the project scoring rubric for community wireless \$10M Grant fund program

Internet2

1. Added capabilities to eFM
 - a. Logging
 - b. IdP testing
 - c. Ability of eA (eduroam Administrators) to add new eAs
 - d. Automatic realm approval
2. Brought on two On-Ramp eduroam Support Organizations
3. Updated training materials, added enhancements to troubleshooting training, and delivered training to eSO staff
4. Worked with eSO representatives on eAC to ensure program participants had a voice in governance of the service

Additional Areas of Success

There were successes outside of the state program goals, some of which were identified and pursued by the project team to add value to the program, and some of which emerged organically. One area of progress has been the partnerships eduroam Support Organizations formed with state and local internet service providers to bring hotspots to public spaces and residential areas. All three of the current eduroam Support Organizations have either entered or identified such partnerships. Internet2 and the eduroam Support Organizations see these

engagements as unique opportunities to increase the reach of eduroam and create partnerships that will benefit all involved, especially the eduroam community at large.

Areas for Improvement

An essential output from this program was to continue scaling the processes and the resources required to implement eduroam within K-12 and community locations for both Identity Providers (IdPs) and Service Providers (SPs) across multiple eduroam Support Organizations, in addition to detailing project challenges and limitations. This has been a valuable process; however, more work is required in the following areas:

1. Issues with reports
 - a. Reports either did not send or were treated as spam by the recipient's mail system.
 - b. Blank reports were sent to eSO staff and constituents.
 - c. Report elements, which included long lists of realms, organizations, or other data, were cut off.
2. Lack of SP testing ability in the eFM
3. Lack of mapping functionality
 - a. Need for customizable maps which show SO's states.
 - b. Desire for more granularity in mapping
 - i. Ability to break out constituent types (e.g. show only K-12s, only libraries, only SPs, etc.).
 - c. Ability to share and/or generate an URL which points to a "pre-zoomed" map of SO's state or part of state.
4. Need for formal processes to engage with commercial ISPs as eduroam hotspot providers
5. On-Ramp timetable compressed
 - a. Announcement and call for participants made in March 2022.
 - b. Decision made in late April.
 - c. This timetable allowed only half of 2022 for active participation in the program.
6. Lack of marketing support, informational resources
 - a. Requests for SP-Only marketing materials, promotional materials for users.
 - b. Need for general information to educate locations and users about the program, benefits, and access.
 - c. Technical documentation continues to prove challenging for smaller constituents, especially wireless controller and RADIUS configuration guides.

Internet2 will continue to work with the eduroam team, the eduroam Support Organizations, and advisory bodies like the eAC to address the issues raised here.

Opportunities for Enhancement

The program participants have identified the following as features or aspects that could better position current and future eduroam Support Organizations for greater success.

1. Creating a structured process for working with commercial ISPs could encourage broader availability of eduroam in public spaces and position SOs to more productively engage with the network providers in their states or regions.
2. Adding features in the eFM, such as SP testing, customizable maps showing service locations, and enhanced features for log viewing will increase the value of eduroam to eduroam Support Organizations, their constituents, and in some cases for the eduroam community at large.
3. Developing informational and marketing materials for users and SP/hotspot providers will better position the eduroam Support Organizations for success in their states or regions.
4. Continuing to grow the repository of technical documentation available to program participants will be beneficial.

Goals for 2023

Network Nebraska

- Continue expansion to all public/private K-12 schools
- Increase adoption within community colleges and other post-secondary institutions
- Continue expansion to businesses

The Sun Corridor Network

- Secure funding to support eduroam from multiple state resources for and related to education
- Continue eduroam expansion within current subscribers and other public/private K12 schools
- Develop and deploy eduroam educational materials and marketing display materials for active eduroam locations
- Understand and track K-12 eduroam users and data to develop best practices and improve outreach materials

UETN

- Establish a new project stage with the following focus:
 - New 2023 marketing campaign
 - New materials to send to new signups and handout at conferences
 - Leverage UETN advocates to distribute materials and information (advocates work with various institutions through UETN)
 - Focus on technical and policy solutions that support the continued rollout, expansion, and availability of eduroam with current IDPs in Utah
 - Conversations around K-12 and concurrent enrollment solutions
 - Increase the number of charter schools with eduroam
 - Increase the number of SPs (hot spots) in Utah
 - Identify new project team members that can help move UETN's eduroam program forward
 - Created a one pager document to share with companies we would like to sign up as eduroam hot spots
 - Sign up and work with local ISPs to setup hot spots

On-Ramp

- **Connecticut Education Network (CEN)**
 - Complete new/updated eSO agreement with Internet2
 - Work with Regional Educational Services Centers in CT to adopt and serve as a central resource for districts to also adopt eduroam
 - Work with Connecticut State Department of Education (CSDE) to communicate the value of eduroam and enable CSDE to promote adoption

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- Submit session proposal and present at CSDE annual conference
 - Promote eduroam within existing programs CEN is administering for eligible members, such as the ARPA-CPF Community Wi-Fi grant funded program to install free community wifi throughout CT
 - **Link Oregon**
 - Complete eduroam deployment in the pilot ESD and its participating school districts
 - Use the initial pilot deployment process to establish and document procedures to support new subscribers and expand enrollment of ESDs and school districts
 - Establish an Oregon eduroam user group to provide peer support among participating institutions
 - Establish ongoing funding model
 - Work across eSO organizations to develop mutually beneficial tools (e.g., SP/hot spot One Pager) and to benefit from best practices

Internet2

- Grow the eduroam Support Organization program, both with new eSOs and new On-Ramp organizations
- Make ongoing improvements to the eFM and reports by engaging with eSO community to gather requirements and feedback on these updates and new features
- Add to the repository of technical documentation available to program participants and the eduroam community
- Create process for collaboration with multi-state or national ISPs
- Increase visibility of the eSOs and their work in the K-12 space
- Update training materials and deliver training to eSOs and their constituents

Conclusion

Based on the successes of the 2022 eduroam Support Organization Cohort, Internet2 plans to continue its work to promote growth in the K-12 sector for eduroam and accept new eduroam Support Organizations for full participation in the program, as well as offering an On-Ramp for organizations that wish to join our work but need time to scale up their own organizational and operational capabilities.

Project Team

Network Nebraska:

- Project Sponsor - Brett Bieber
- Project Director - Neil Brown
- Project Manager - Ben Nelson

The Sun Corridor Network:

- Project Sponsor - Derek Masseth
- Project Director - Gabriel Lopez
- Project Manager - Laura Etter
- Project Manager - Dennis Kinton

UETN:

- Project Sponsor - Jim Stewart
- Project Director - Jeff Egly
- Project Manager - Amanda Molinari
- Project Team Members - UETN NOC
- UETN stakeholders from LEAs, libraries, colleges and many other UETN staff

Connecticut Education Network

- Project Sponsor - Ryan Kocsondy
- Project Manager - Paul Tarsa

Link Oregon

- Project Sponsor - Steve Corbató
- Project Manager - Ann Marcus
- Project Team Member - Molly Thurston

Internet2:

- AVP of Trust and Identity - Ann West
- eduroam Product Manager - Sara Jeanes
- Program Manager - Mike Zawacki
- Project Manager - Romy Bolton
- Subject Matter Experts - Nicole Roy, Margaret Cullen, Johnny Lasker, Mark Donnelly

About Us

Network Nebraska

Network Nebraska (NN) is Nebraska's statewide research and education network. Operating a statewide multipurpose backbone and providing statewide internet, peering, related services, and support for eligible participants. Network Nebraska is made possible through a consortium of K-12 and higher education entities working together to provide a scalable, reliable, and affordable suite of services. Participation in Network Nebraska is voluntary and Network Nebraska is 100% self-funded through member fees.

Sun Corridor Network

The SCN is a collaboration, sponsored by the Arizona Board of Regents, of the three state universities – Arizona State University, Northern Arizona University, and The University of Arizona – created to share high-capacity digital communications resources, network services, and applications among eligible users. Sun Corridor Network advances connectivity, research, and education at gigabit speeds for all Arizonians. We join 41 other higher education-based regional research and education networks and Internet2 in extending our mission to K 12 education, libraries, municipalities, and other community anchors.

Utah Education and Telehealth Network (UETN)

Utah Educational and Telehealth Network (UETN) connects all Utah school districts, schools, higher education institutions, libraries and telehealth organizations to a robust network and quality educational and telehealth resources. UETN is one of the nation's premier education networks providing Internet and Internet2 access to its stakeholders throughout Utah. UETN's role is to work and support the Local Educational Agencies (LEAs), healthcare, libraries and universities in all aspects of the educational network and Internet access. UETN works with each connected organization in the state to help stand up and provide eduroam service that will be reliable, robust and filtered for teachers and students as they travel throughout the state, nation and world.

Link Oregon

The Oregon Fiber Partnership, operating as Link Oregon, is a federally tax-exempt 501(c)(3) Oregon non-profit organization, that provides high-speed, fiber-optic broadband connectivity and shared network services to K-12 and higher education, libraries, Tribes, public health care organizations, remote state offices and other public and non-profit organizations and facilities across Oregon.

Link Oregon is a consortium of the State of Oregon, through its Office of Enterprise Information Services (EIS), and the state's four largest research universities: Oregon Health & Science University (OHSU), Oregon State University (OSU), Portland State University (PSU), and the University of Oregon (UO).



Link Oregon works with an ecosystem of community and commercial collaborators to build and maintain our systems and services. We have engaged with local and national telecommunications companies to operate approximately 2,500 route-miles of dark fiber-optic cable across the state.

Connecticut Education Network (CEN)

Connecticut Education Network (CEN) is part of the State's secure "Nutmeg Network", whose purpose is to deliver reliable, high-speed internet access, data transport, and value-added services to its members throughout Connecticut. Established in 2000 to integrate high speed fiber optics networks into institutions of education statewide, CEN is governed by the Commission for Education Technology. CEN helps deliver on the promise of equality in education by providing access to technology that schools and libraries would not be able to afford on their own. This investment is supported by the State of Connecticut, private schools, nonprofit organizations and institutions of higher education that are committed to the idea of overall improvement in education and broad support for access to technology.

In an effort to remove barriers to technology, CEN supports "Open Access" use of the network, which allows any entity to join the network at a fair price. "Open Access" provides greater access for areas of the state from where it has been prohibitively expensive to obtain high-speed internet access and could include town-to-town sharing of databases and remote access to municipal applications.

Internet2

Internet2® is a non-profit, member-driven advanced technology community founded by the nation's leading higher education institutions in 1996. Internet2 serves 328 U.S. universities, 59 government agencies, 46 regional and state education networks and through them supports more than 80,000 community anchor institutions, over 1,000 InCommon participants, and 57 leading corporations working with our community, and 70 national research and education network operators that represent more than 100 countries.

Internet2 delivers a diverse portfolio of technology solutions that leverages, integrates, and amplifies the strengths of its members and helps support their educational, research, and community service missions. Internet2's core infrastructure components include the nation's largest and fastest research and education network that was built to deliver advanced, customized services that are accessed and secured by the community-developed trust and identity framework. For more information, visit www.internet2.edu or follow @internet2 on Twitter.