

Enterprise Information Services Link Oregon Update

Terrence Woods, State Chief Information Officer

Joint Legislative Committee on
Information Management & Technology

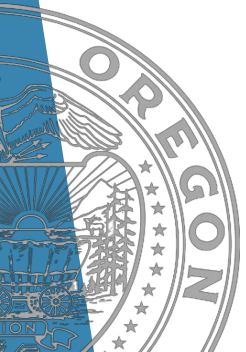
March 29, 2023



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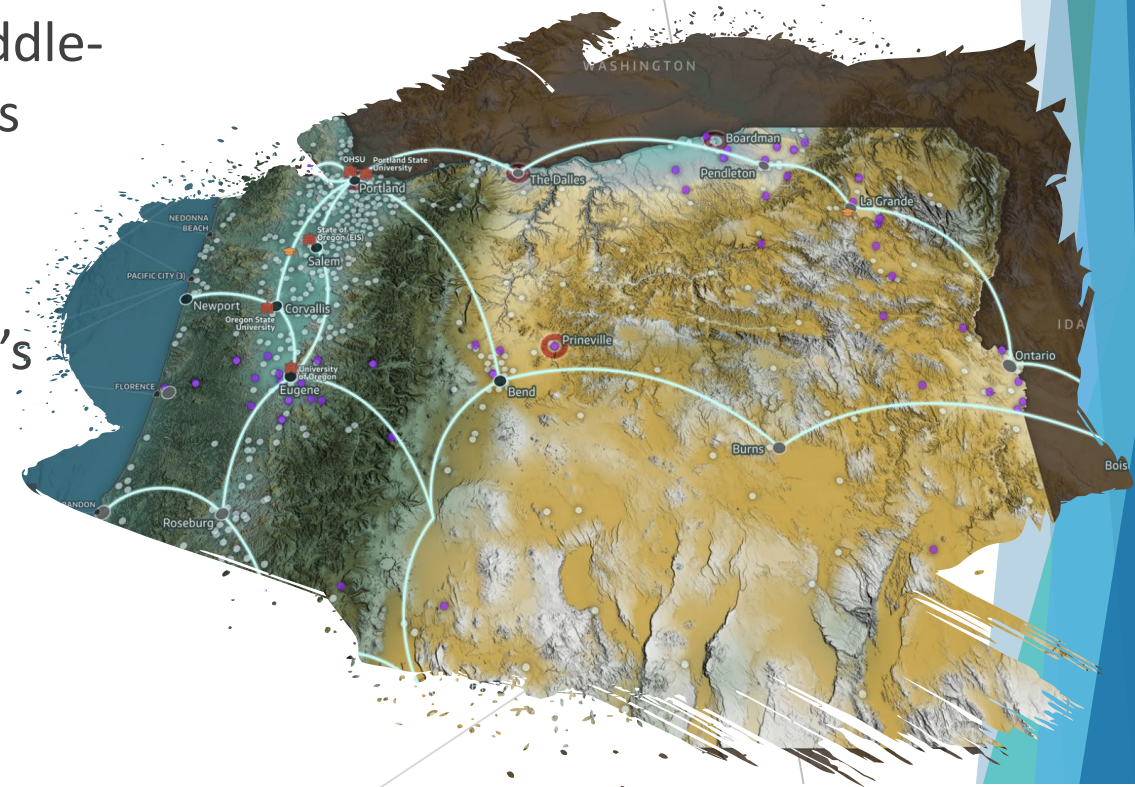
Agenda

- ▶ Link Oregon Partnership
- ▶ Link Oregon Connectivity – Progress to Date
- ▶ Link Oregon Connectivity – Future State



Link Oregon Partnership

- ▶ **Fiber Partnership:** Link Oregon was founded by Enterprise Information Services (EIS) and Oregon's four research universities to acquire existing fiber assets and establish a modern, high-capacity, middle-mile fiber network to serve the needs of Oregon's public and non-profit sectors.
- ▶ **Link Oregon Connectivity:** EIS is leveraging its membership in Link Oregon to enhance the state's network connectivity, network speeds, and resiliency.
- ▶ **Scope:** EIS leverages Link Oregon to provide connectivity to 517 state/branch office locations.



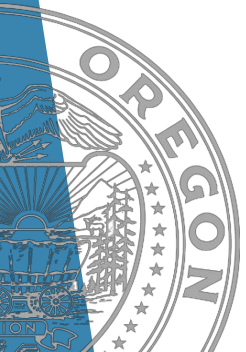
Link Oregon Connectivity – Progress to Date

- ▶ **Statewide Fiber Network:** Access to a modern, resilient, middle-mile fiber network.
- ▶ **Improved Performance:** High-speed connections with low latency, enabling state agencies to embrace the digital workplace and provide digital public services.
- ▶ **100 Gbps Core:** Executive branch agency offices and branches are connected to backbone capable of supporting speeds of up to 100 Gbps.
- ▶ **Network Equipment:** EIS has upgraded network devices to support the new high-speed core.



Link Oregon Connectivity – Future State

- ▶ **Cloud or Internet Exchange Points (IXP):** Enabling direct connections (“peering”) with:
 - Microsoft (Azure)
 - Amazon (AWS)
 - Google
 - Other Cloud Service Providers (CSPs)
- ▶ Leverage 100 Gbps network for resiliency, redundancy and disaster recovery.



Thank you

Shirlene A Gonzalez
Legislative & Communications Director
shirlene.a.gonzalez@das.oregon.gov



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Link Oregon

High-speed Fiber Broadband for
Oregon's Public & Non-profit Sectors

Presented to
Joint Legislative Committee On
Information Management and Technology

Steve Corbató – Executive Director
March 29, 2023



What is Link Oregon?

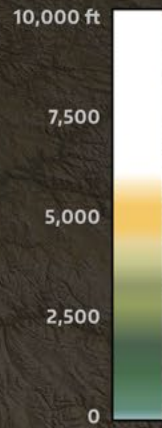
- A non-profit consortium (Oregon Fiber Partnership) of state government and Oregon's four largest public research universities that supports the state's **public and non-profit sectors**



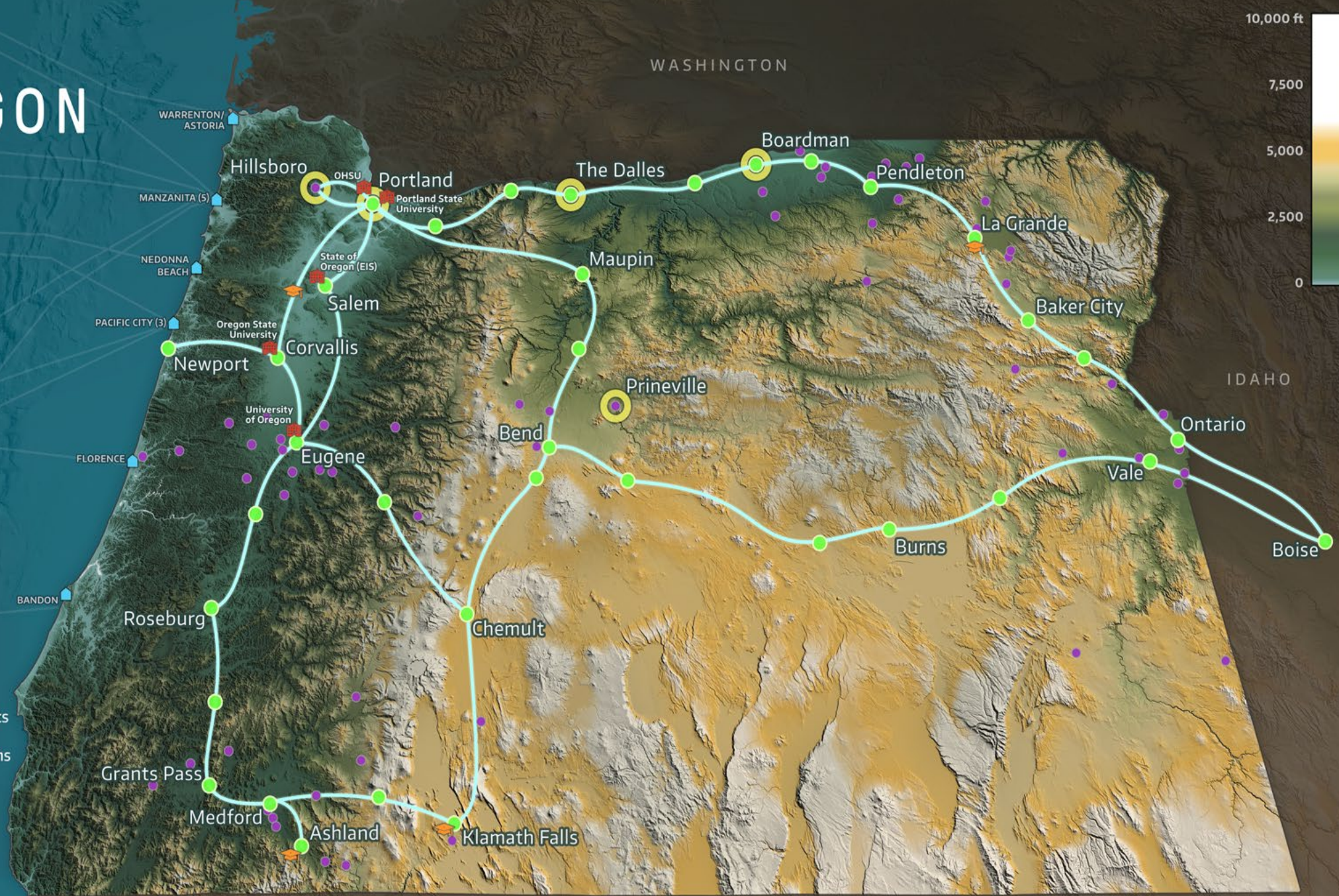
- An advanced, statewide **middle-mile network** using primarily existing dark fiber assets to provide cost-effective, resilient high-speed connectivity for our members
- Ethernet-based transport and comprehensive Internet services



LINK OREGON



- Fiber Broadband Routes
- Current Service Locations
- Link Oregon Founding Entities
- Technical & Regional Universities
- Link Oregon Connected School Districts
- Commercial Data Center Concentrations
- Transoceanic Cables
- Transoceanic Cable Landing Points



PACIFIC OCEAN

WASHINGTON

IDAHO

CALIFORNIA

NEVADA

Our Mission

Link Oregon's mission is to be a trusted thought leader that serves Oregon's public and non-profit sectors by:

- i) operating an advanced statewide broadband network that is resilient, cost-effective, and sustainable and
- ii) fostering innovation and collaboration through forward-looking technology leadership

Our Vision

By providing enhanced networking capabilities, Link Oregon seeks to ensure that all Oregonians have access to essential digital resources for learning, working, and engaging in society, and to build the foundation for Oregon's future prosperity.

A Non-profit Organization

- Oregon non-profit with federal tax-exempt status (501c3)
- Asset vessel and operational entity
- Vehicle for other collaborative information technology projects
- **Public-private partnership (P3)** through collaboration with commercial providers and public entities
- Governance balanced between state government and founding universities
- Annual external audits since founding

Board of Directors

- **Terrence Woods, State CIO, EIS (Chair - FY23)**
- Andrea Ballinger, OSU, VP IT & CIO (Vice Chair - FY23)
- Bridget Barnes, OHSU, VP IT & CIO (Treasurer - FY23)
- Ryan Bass, PSU, VP IT & CIO
- Kurtis Danka, DAS, State of Oregon, CIO
- Scott Emry, EIS, State of Oregon, Asst State CIO
- Stuart Long, NW Regional ESD & CTA CIO (K-12)
- Abhijit Pandit, Univ. of Oregon, CIO
- Vince Porter, Governor Kotek's Office, Economic Dev and Workforce Advisor
- *Ex officio* Link Oregon Executive Director & Chief of Staff (Secretary)
- Two additional seats



What is Middle Mile?

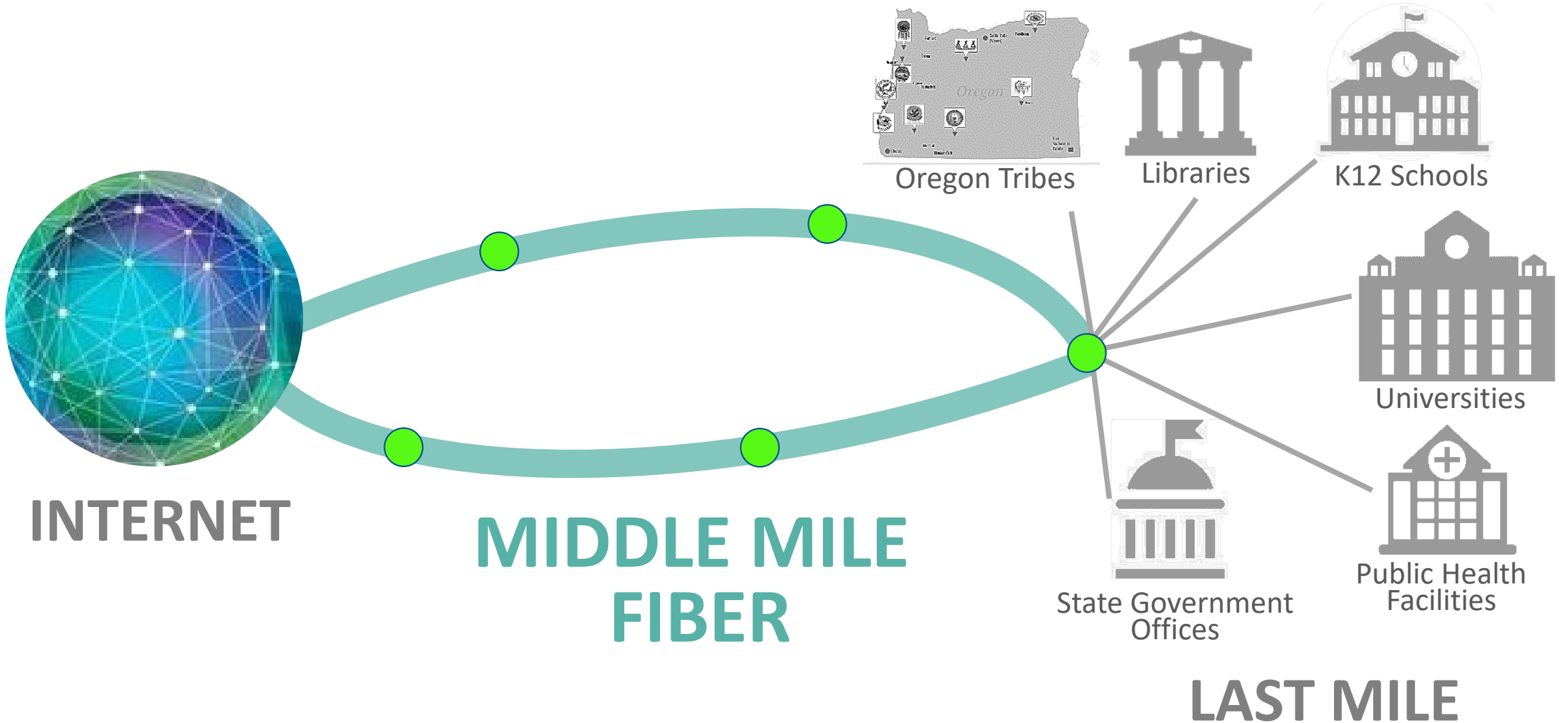
Last mile:

- The final leg of a network that provides service to the home, business or community anchor institution.
- The end user's effective speed usually will be no greater than the bandwidth of this connection.

Middle mile:

- The physical mid-section of the Internet infrastructure required to enable internet connectivity for homes, businesses, and community institutions.
- Made up of high-capacity fiber lines that carry large amounts of data at high speeds over long distances between local networks and global Internet backbones.
- In general, middle mile connections across the state tie together two or more provider nodes.

Link Oregon's Middle Mile





Oregon Broadband Middle Mile Infrastructure Working Group – Summer 2021

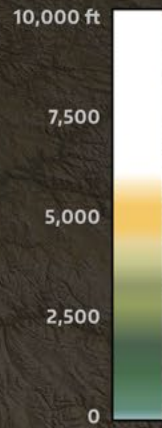
- Convened by Rep. Pam Marsh with Sen. Lee Beyer and Rep. Mark Owens – bipartisan, bicameral
- Group of middle-mile experts including provider and low earth orbit satellite (LEOS) sectors, Kurtis Danka of EIS, Daniel Holbrook of OBO, and David Barber of OSU
- Co-chaired by Stuart Taubman of Zayo and Steve Corbató of Link Oregon

TWELVE KEY RECOMMENDATIONS

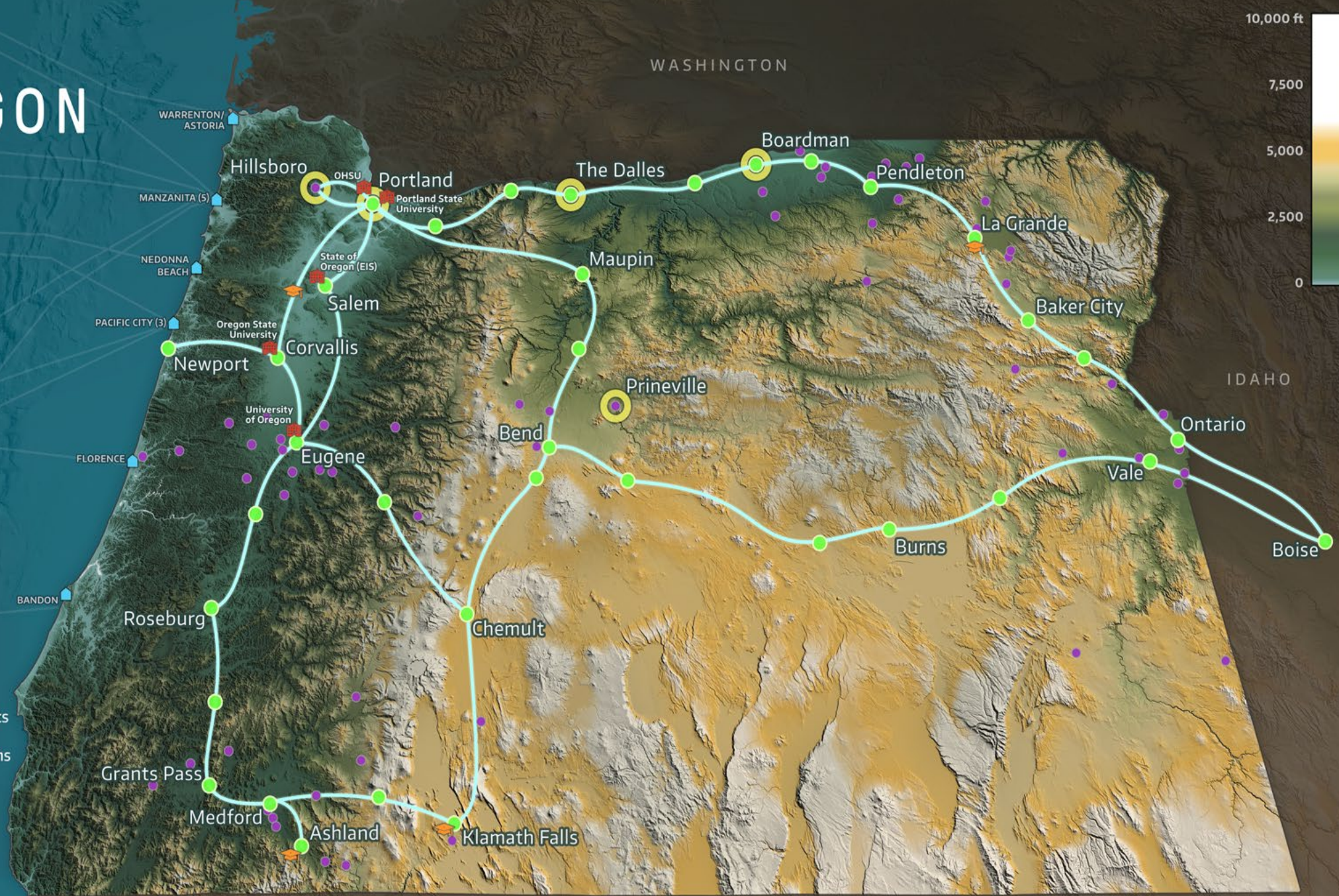
- Ensure a robust, capable broadband office
- Future-proof residential broadband standard
- Accelerate broadband mapping
- Create a central repository of middle-mile maps
- Support a richer array of local Internet exchanges
- Set effective strategies for making public broadband investments
- Fund needed middle-mile extensions
- Future growth and equitable access for publicly funded network assets
- State & local governments are important stakeholders
- Take a ‘whole of government’ approach
- Consider the full spectrum of technologies, including LEOS
- Broadband adoption is not just a technical issue



LINK OREGON



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Link Oregon Statewide Access Locations

#	Site Name	Site Type	Colocation Provider
1	Arlington	Optical Only	Zayo
2	Ashland	Internet / MPLS / Optical	Southern Oregon University
3	Baker City	Internet / MPLS / Optical	Windwave
4	Bend (ODOT)	MPLS / Ethernet Satellite	State of Oregon (ODOT)
5	Bend (Vault)	Internet / MPLS / Optical	TDS One Neck
6	Boardman	Optical Only	Zayo
7	Boise (Idaho)	Internet / MPLS / Optical	Lumen (Internet2/IRON)
8	Burns	Internet / MPLS / Optical	Lumen
9	Central Point	Optical Only	Hunter
10	Chemult	Optical Only	Lumen
11	Clackamas	Optical Only	Clackamas ESD
12	Corvallis (OSU Kerr)	Internet / MPLS / Optical	OSU
13	Corvallis (OSU PASC)	Internet / MPLS / Optical	OSU
14	Drain	Optical Only	Hunter
15	Drewsey	Optical Only	Lumen
16	Durkee	Optical Only	Lumen
17	Eugene (UO Oregon Hall)	Internet / MPLS / Optical	UO
18	Eugene (WIX)	Internet / MPLS / Optical	Lane Council of Governments
19	Fish Lake	Optical Only	Hunter
20	Glendale	Optical Only	Hunter
21	Grants Pass	Internet / MPLS / Optical	Hunter
22	Hermiston	Internet / MPLS / Optical	Intermountain ESD
23	Hillsboro	Internet / MPLS / Optical	Flexential
24	Klamath Falls	Internet / MPLS / Optical	Hunter
25	La Grande (EOU)	MPLS / Ethernet Satellite	Eastern Oregon University
26	La Grande (Lumen)	Optical Only	Lumen
27	Madras	Optical Only	Lumen
28	Maupin	Optical Only	Lumen
29	Medford (Lumen)	MPLS / Ethernet Satellite	Lumen
30	Medford (SOESD)	MPLS / Ethernet Satellite	Southern Oregon ESD
31	Millican	Optical Only	Lumen
32	Modoc Point	Optical Only	Lumen
33	Newport	Internet / MPLS / Optical	OSU (Hatfield Marine Science Center)
34	Oakridge	Optical Only	Lumen
35	Ontario (Lumen CO)	MPLS / Ethernet Satellite	Lumen
36	Ontario (Lumen ILA)	Optical Only	Lumen
37	Parkdale	Optical Only	Zayo
38	Pendleton (IMESD)	Internet / MPLS / Optical	Intermountain ESD
39	Pendleton (Lumen CO)	MPLS / Ethernet Satellite	Lumen
40	Portland (Northrup)	Optical Only	Lumen
41	Portland (Pittock)	Internet / MPLS / Optical	Pittock Block
42	Portland (PSU FAB)	Internet / MPLS / Optical	PSU
43	Riley	Optical Only	Lumen
44	Roseburg	Optical Only	Douglas Fast Net (Hunter)
45	Salem (Revenue Building)	Internet / MPLS / Optical	State of Oregon (Dept. of Revenue)
46	Salem (State Data Center)	Internet / MPLS / Optical	State of Oregon (EIS)
47	Sandy	Optical Only	City of Sandy (Sandy Net)
48	Seattle (Westin Bldg/SIX)		Seattle Internet Exchange (SIX)
49	Sunriver	Optical Only	TDS BendBroadband
50	The Dalles (City Hall)	MPLS / Ethernet Satellite	City of The Dalles (Q-Life)
51	The Dalles (Zayo ILA)	Optical Only	Zayo
52	Vale	Optical Only	Lumen

REGIONAL RESEARCH & EDUCATION NETWORKS IN THE UNITED STATES



THE QUILT



QUILT MEMBERS & AFFILIATES

3ROX ARE-ON Light CAAREN CEN CENIC FLR FRGP GPN I-Light Indiana GigaPOP ILLINOIS CENTURY NETWORK IRON KANREN KINBER KyRON, LEARN LINK OREGON M&RIA INC MAX MCNC MDREN merit MOREnet MREN NETWORKMAINE NEVADA NET NJEdge Northern Lights OARnet OneNet OSHEAN PACIFIC NORTHWEST SoX Sun Corridor Network uen NYM WiscNet WY NET.

Our partner ecosystem includes:

- **State:** EIS, ODE, HECC, State Library, ODOT, PUC, Broadband Office
- **Education:** P/K-12, community colleges, public universities, private colleges
- **Healthcare:** Public/non-profit hospitals & clinics, telehealth
- **Communities:** Urban, rural, and Tribal; Broadband Action Teams
- **Commercial:** Telecommunications providers, data centers
- **Federal:** NTIA, FCC, USDA, NSF, NOAA
- **Local Internet Exchanges (IXs):** NWAX, WIX, COIX, SIX

Network Implementation Partners

Members

- Clackamas ESD
- Eastern Oregon University
- InterMountain ESD
- OHSU
- Oregon State University
Extension & Engagement
Hatfield Marine Science Ctr
- Portland State University
- Southern Oregon ESD
- Southern Oregon University
- State of Oregon
Enterprise Info. Services (EIS)
HECC, ODE, ODOT
Broadband Office
- University of Oregon
Network Startup Resource
Center (NSRC)
Oregon Hazards Lab (OHAZ)

Public Sector Partners

- City of Portland
- City of Sandy (SandyNet)
- Clackamas County (CBX)
- Indiana University (Global NOC)
- Lane Council of Gov'ts. (WIX)
- NOAA (N-Wave)
- Q-Life (Columbia Gorge)
- UETN (Utah)
- WA K-20 (Washington)

Nonprofit Affiliates

- CENIC (California)
- COIX (Bend)
- Internet2
- IRON (Idaho)
- NDIA
- NWAX (Portland)
- PNWGP (Washington)
- SIX (Seattle)
- SHLB
- Tech. Assoc. of Oregon (TAO)
- The Quilt

Professional Services

- Axiom Recovery
- Bau Oregon
- Black Helterline LLP
- CompuNet, Inc.
- Hoffman, Stewart & Schmidt
- Kernutt Stokes
- Fiber Channels, Inc.
- Legacy Fiber Optics
- Structured
- Univ. of Wash. Oceanography

Lateral Fiber & Colocation Providers

- Blue Mountain Networks
- Cascade Divide
- Fatbeam
- Flexential
- Pittock Block
- TDS OneNeck
- Windwave
- Ziplly Fiber

Circuit Providers

- Charter/Spectrum
- Douglas FastNet (DFN)
- LS Networks
- Western Independent Networks (WIN)
- Wtechlink

Equipment Manufacturers

- Arista
- Fujitsu Network Communications

Long Haul Fiber Providers

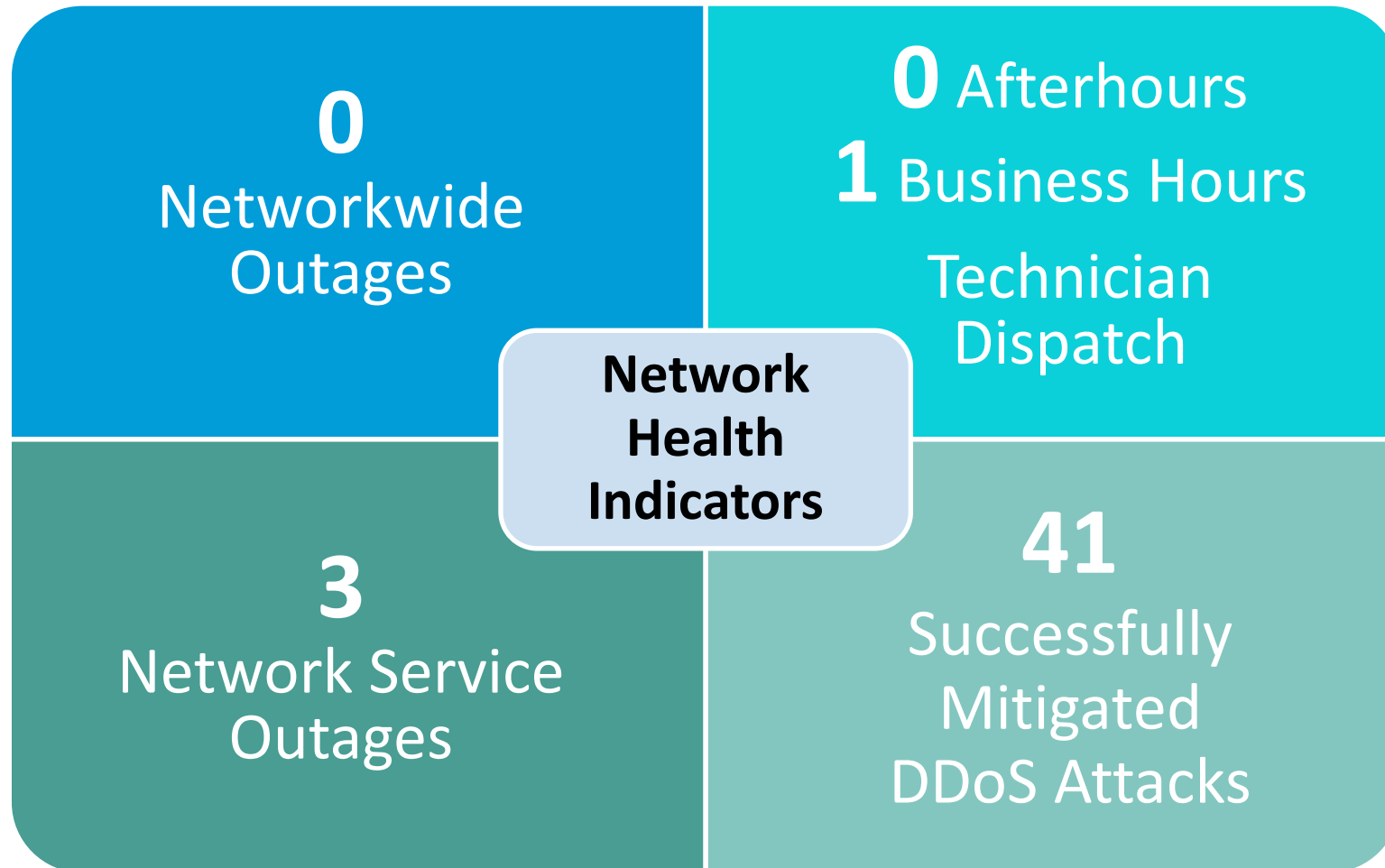
- Hunter Communications
- Lumen
- PEAK
- Pioneer
- TDS BendBroadband
- Zayo

Network expansion financial support via Business Oregon (CARES Act, 2020)

By the Numbers

- 4 years since formation
- 5 founding members
- 11 staff members
- 52 network nodes
 - Primary nodes: Portland, Salem, Corvallis, Eugene, Bend, and Boise ID
- 2,635 route-miles of dark fiber assets held through long-term IRUs
 - 1,714 route-miles have been lit
- \$8.39 million CARES Act funding (2020) to accelerate completion of network in eastern and southern Oregon

1 Year Network Health Snapshot



We **are not** a common carrier (telco) and **do not** provide broadband Internet service to residences and businesses.

We do:

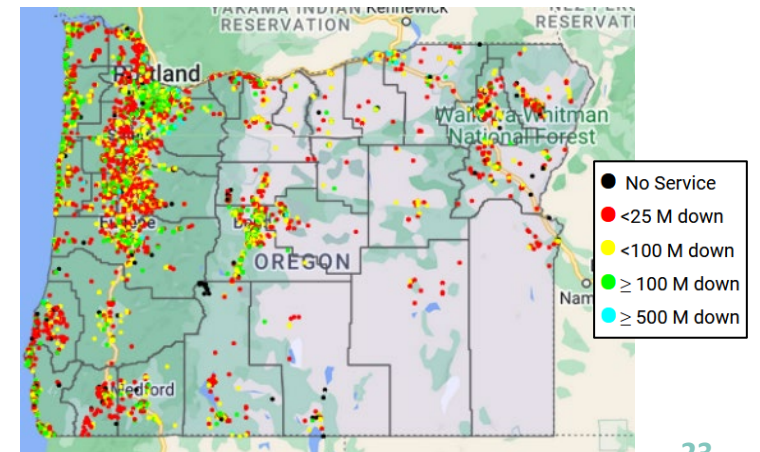
- Serve as an **anchor tenant** through aggregation of community anchor institutions
- Partner with **Internet service providers making broadband investments** in rural and urban communities (example: [EOARC south of Burns](#))
- Support **local exchange** of Internet traffic
- Provide **resilient connectivity** for rural regions
- Collaborate with local **broadband action teams**
 - In coordination with **OSU Extension**
- Assess **new technologies** (wireless, satellite)
- Enable **hazard detection networks** (UO) – ALERTWildfire and ShakeAlert®

Faster Internet Oregon

- **Faster Internet Oregon (FIO)** is a grassroots, crowd-sourced home Internet speed test, availability survey, and broadband mapping initiative.
- FIO gathers data to **accurately reflect services (or lack of service)** actually received and reported by Oregon households (Goal: 10% of Oregon households, or 160,000)



- With **once-in-a-generation Federal broadband funding** coming to states based on current need, Oregonians need accurate, granular broadband data and the ability to develop budgetary designs
- FIO is a **collaborative initiative supported by public & non-profit** entities including Link Oregon, Broadband Action Teams (BATs), Economic Development Districts, Education Service Districts, SpeedUpAmerica, Onward Eugene, Oregon State University Extension, KGW, Oregon PUC, & more.
- Data will allow partners to **estimate costs for building** fiber-to-the-home, fixed wireless, and hybrid competitive **solutions**
- Compiled data may be used to **validate or challenge national broadband speed sources** (e.g., legacy FCC 477 & Broadband Serviceable Location Fabric).
- FIO maps are based on MLab's speed testing model and **successful mapping models deployed in 20 states** using GEO Map™ software.



- Statewide eduroam Deployment
 - Link Oregon is the statewide Support Organization for eduroam, providing secure wireless roaming for K-12 schools and ESDs, libraries, and museums. A pilot program with Lane ESD is in progress.
- K-20 Statewide Networking
 - E-Rate modernization approach
 - NSF Campus Cyberinfrastructure (CC*) proposals
- Education Cross-sector Cybersecurity Strategy
 - Link Oregon is convening K-12, community colleges, universities, and state government to facilitate the development of a unified cybersecurity strategy with an extensible service model that considers the needs and requirements across the distinct sectors.
 - Supporting HB 2049



- Planning Network Expansion for Reach and Resiliency
 - Oregon Coast: Rings connecting the entire coast from Astoria/Warrenton and Brookings – initial focus on Newport-Bandon segments
 - Eastern Oregon: Lakeview, Prineville, John Day, and Enterprise to support Lake, Crook, Grant, and Wallowa Counties
 - California: Potential interconnects on US 101 and 199, 97 and 395, and I-5
- Member Services and Membership Growth
 - Develop value-add services that help our members fulfill their missions
 - Membership open to all public and non-profit entities as well as Tribes
- Support for Tribal Broadband Development and Sustainability
 - Convened three Oregon Tribal Broadband Summits and support the Oregon Tribal Broadband Boot Camp to share expertise and resources and assist Tribes in developing sustainable broadband infrastructure initiatives.

- Hands-on learning, doing, and human networking event designed for Tribal members and held at University of Oregon
- Over 60 attendees from Tribes in Oregon and adjoining States
- Leaders: Chief Jason Younker (Coquille Tribe/UO), Matt Rantanen (SCTCA/CENIC), Christopher Mitchell (ILSR), and Steve Huter (NSRC)
- Sponsors: Burns Paiute Tribe, First Nations Developmental Institute, Tribal Digital Village Network, Oregon Broadband Office, Network Startup Resource Center, Link Oregon, Institute for Local Self Reliance, and others





THANK YOU

Steve Corbató

Executive Director

corbato@linkoregon.org

503-998-3957